

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

VIANCE, LLC,
Petitioner,

v.

KOPPERS PERFORMANCE CHEMICALS, INC.,
Patent Owner.

PGR No. 2026-00023
U.S. Patent No. 12,370,716
Issued: July 29, 2025
Application No. 19/072,608
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TITLE: WOOD PRESERVATIVE COMPOSITION COMPRISING 4,5-
DICHLORO-2-OCTYLISOTHIAZOL-3(2H)-ONE, A METHOD TREATING A
WOOD SUBSTRATE THEREWITH, AND A WOOD PRODUCT PRODUCED
THEREFROM

DECLARATION OF DENNIS MORGAN, BS

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a)	<i>[26.Pre] “A wood preservative composition comprising:”</i>	<i>201</i>
b)	<i>[26.a] “40% by weight to 60% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition; and”</i>	<i>201</i>
c)	<i>[26.b] “40% by weight to 60% by weight of a retaining additive based on the total weight of the composition,”</i>	<i>201</i>
d)	<i>[26.c] “wherein the retaining additive comprises a microcrystalline wax”</i>	<i>201</i>
e)	<i>[26.d] “wherein a weight ratio of the DCOI to the retaining additive is in a range of 1:1.5 to 1.5:1.”</i>	<i>202</i>
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b)	<i>[27.a] “diluting the composition of claim 26 with an organic solvent to form a diluted composition; and”</i>	<i>203</i>
c)	<i>[27.b] “contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.”</i>	<i>204</i>
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a)	<i>[17]. “The method of claim 14, wherein the organic solvent comprises a flash point of at least 40 degrees Celsius.”</i>	<i>204</i>

b)	<i>[18]. “The method of claim 14, wherein the organic solvent comprises a flash point of at least 60 degrees Celsius.”</i>	204
c)	<i>[19]. “The method of claim 14, wherein the organic solvent comprises a flash point of at least 80 degrees Celsius.”</i>	204
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I, DENNIS MORGAN, declare as follows:

I. INTRODUCTION

1. I have been retained as a technical consultant on behalf of Viance LLC (“Viance” or “Petitioner”), whom I understand is the petitioner in the present post-grant review (PGR) proceeding. I have been asked to consider whether the references analyzed herein anticipate or render obvious claims 1–27 (the “challenged claims”) of U.S. Patent No. 12,370,716 (“the ’716 Patent”) (Ex1001), assigned to Koppers Performance Chemicals, Inc. (“Patent Owner” or “PO”). (*See* §VIII (Materials and Other Information Considered.) I have also been asked to consider the state of the art and the prior art available before the time of the alleged invention of the ’716 patent. My opinions are provided in this Declaration.

2. In preparing this Declaration, I have reviewed the ’716 patent and considered documents including those identified herein as a person of ordinary skill in the art at the appropriate date, as discussed below.

3. The claims of the ’716 patent are directed to the formulation and use of wood preservative compositions having 4,5-dichloro-2-octylisothiazol-3(2H)-one (“DCOI”) in combination with a retaining agent, and to the dilution and use of those compositions in organic solvents. As detailed in this Declaration, it is my opinion that every element of these claims is found in the prior art.

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4. As discussed below, it is my opinion that the '716 patent claims lack written description support in its priority U.S. Provisional Application No. 63/229,817 ("the '817 provisional") (Ex1005), rendering the claims invalid over additional intervening prior art, namely, Petitioner's UP-50 product and published PCT application ("Archer") (Ex1007).

5. It is my opinion that the claims of the '716 patent are anticipated or at least rendered obvious by each of Archer, Petitioner's UP-50 product, and the BDES agreement (which predates the date of the '817 Provisional (Ex1005) for the '716 patent). As detailed in this Declaration, each of Archer, Petitioner's UP-50 product, and the UP-50 product offered for sale in the BDES agreement, disclose the claimed wood preservative composition having DCOI in combination with a retaining additive having a wax, and does so in the claimed weight percentages and weight ratios. (§XII.)

6. Furthermore, both Archer and Petitioner's UP-50 product disclose claimed individual waxes and associated melting points (§XII); claimed solvent systems, including claimed individual solvents and associated flash points (§XII); and claimed methods of treating a wood substrate, and resultant wood products (§XII).

7. Irrespective of a lack of priority to the '817 provisional (Ex1005) application, the challenged claims are otherwise rendered obvious by the prior art

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for the reasons discussed herein. As explained in this Declaration, the ‘716 patent does no more than combine well-known prior art elements according to well-known methods to yield predictable results already contemplated in the prior art.

8. For example, the ‘716 patent acknowledges that “oil-borne *preservatives*, such as, for example, pentachlorophenol (Penta) in hydrocarbon solvent carriers *have been used* as heavy-duty industrial wood preservative to treat, for example, utility poles *for many decades.*”¹ (Ex1001 at 1:29-32.) Penta was being phased out, and the ‘716 patent acknowledges that DCOI was a well-known suitable substitute. Specifically, the ‘716 patent acknowledges that “4,5-dichloro-2-octylisothiazol-3 (2H)-one (*DCOI*) *has been used in wood preservative compositions for mold control and antibacterial activity.*” (Ex1001 at 2:54-56.) The ‘716 patent further acknowledges that it was known in the art that the same solvent system used for Penta can be used for DCOI. (Ex1001 at 2:56-58 (“*DCOI dissolved in hydrocarbon solvents has also been proposed* to treat wood for heavy duty applications.”).

9. All that the ‘716 patent purports to contribute is the addition of a “retaining additive” to the already well-known wood preservative DCOI. However,

^{1 1} All emphasis herein has been added unless otherwise noted.

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the '716 patent provides no indication that the "retaining additive" was unknown for wood preservative compositions or provides any unexpected results.

10. The use of retaining additives in combination with wood preservatives, however, was well-known in the prior art. As explained in this Declaration, the challenged claims are rendered obvious, among other things, by U.S. patent 4,143,010 ("Rak") (Ex1015) in combination with Cui, et al. US2006/0057300 ("Cui") (Ex1016) and the AWWA paper (Ex1028).

11. As also explained in this Declaration, Rak discloses "high retention" wood preservative compositions comprising polymeric resin and wax with low toxicity organic wood preservative agents (including pentachlorophenol "Penta" (also known as "PCP")), which the industry later replaced with "DCOI," recited in the challenged claims. Rak teaches the weight percent and weight ratios of the challenged claims. In my opinion, the '716 patent claims do no more than substitute one known element (PCP) for another (DCOI), as taught by (among other things) AWWA paper, to obtain predictable results already contemplated in the art.

12. This Declaration sets forth the opinions I have formed in this matter and provides the bases and reasons for those opinions.

II. CLAIMS OF THE '716 PATENT

13. It is my understanding that the following claims are subject to PGR in this proceeding:

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No.	Claim Elements
[1.Pre]	A wood preservative composition comprising:
[1.a]	40% by weight to 60% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition; and
[1.b]	40% by weight to 60% by weight of a retaining additive comprising a wax based on the total weight of the composition,
[1.c]	wherein a weight ratio of the DCOI to the retaining additive is in a range of 1:5 to 5:1.

No.	Claim Elements
[2]	The wood preservative composition of claim 1, wherein the weight ratio of the DCOI to the retaining additive is in a range of 1:1.5 to 1.5:1.

No.	Claim Elements
[3]	The wood preservative composition of claim 1, wherein the wax comprises an olefin wax, a petroleum wax, a carnauba wax, a polyethylene wax, a silicone wax, a polypropylene wax, a polytetrafluoroethylene (PTFE) synthetic wax, or a combination thereof.

No.	Claim Elements
[4]	The wood preservative composition of claim 1, wherein the wax comprises a melting point in a range of 40 degrees Celsius to 100 degrees Celsius.

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No.	Claim Elements
[5]	The wood preservative composition of claim 1, wherein the wax comprises a melting point in a range of 75 degrees Celsius to 100 degrees Celsius.

No.	Claim Elements
[6]	The wood preservative composition of claim 1, wherein the wax comprises a slack wax.

No.	Claim Elements
[7]	The wood preservative composition of claim 1, wherein the wax comprises a petroleum wax.

No.	Claim Elements
[8]	The wood preservative composition of claim 1, wherein the wax comprises paraffin wax and a microcrystalline wax.

No.	Claim Elements
[9]	The wood preservative composition of claim 1, wherein the composition comprises 45% by weight to 55% by weight of the DCOI based on the total weight of the composition and 45% by weight to 55% by weight of the retaining additive based on the total weight of the composition.

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No.	Claim Elements
[10]	The wood preservative composition of claim 1, wherein the composition consists essentially of the DCOI and the retaining additive.

No.	Claim Elements
[11]	The wood preservative composition of claim 1, wherein the composition further comprises an organic solvent.

No.	Claim Elements
[12]	A wood product comprising the wood preservative composition of claim 1.

No.	Claim Elements
[13.Pre]	A wood preservative composition consisting essentially of:
[13.a]	45% by weight to 55% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition; and
[13.b]	45% by weight to 55% by weight of a retaining additive comprising a first petroleum wax and a second petroleum wax comprising a paraffin wax,
[13.c]	wherein the retaining additive comprises a melting point in a range of 75 degrees Celsius to 100 degrees Celsius.

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No.	Claim Elements
[14]	A method of treating a wood substrate, the method comprising: diluting the composition of claim 1 with an organic solvent to form a diluted composition.

No.	Claim Elements
[15]	The method of claim 14, wherein the organic solvent comprises a hydrocarbon solvent, an amine solvent, a glycol solvent, a ketone solvent, an ester solvent, an alcohol solvent, a halogenated solvent, a biodegradable organic solvent, or combinations thereof.

No.	Claim Elements
[16]	The method of claim 14, wherein the organic solvent comprises diesel, biodiesel, or a combination thereof.

No.	Claim Elements
[17]	The method of claim 14, wherein the organic solvent comprises a flash point of at least 40 degrees Celsius.

No.	Claim Elements
[18]	The method of claim 14, wherein the organic solvent comprises a flash point of at least 60 degrees Celsius.

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No.	Claim Elements
[19]	The method of claim 14, wherein the organic solvent comprises a flash point of at least 80 degrees Celsius.

No.	Claim Elements
[20]	The method of claim 14, wherein the retaining additive has a solubility in the organic solvent of at least 0.5%.

No.	Claim Elements
[21]	The method of claim 14, wherein the retaining additive has a solubility in the organic solvent of at least 1%.

No.	Claim Elements
[22]	The method of claim 14, further comprising contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.

No.	Claim Elements
[23]	A wood product produced by the method of claim 14.

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No.	Claim Elements
[24]	The wood product of claim 23, wherein the wood product retains at least 0.05 pounds of DCOI per cubic foot of the wood product.

No.	Claim Elements
[25]	The wood product of claim 23, wherein the wood product comprises a deck, a rail, a fence, a utility pole, a pile, a railway tie, a railroad bridge, cladding, siding, or a combination thereof.

No.	Claim Elements
[26.Pre]	A wood preservative composition comprising:
[26.a]	40% by weight to 60% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition; and
[26.b]	40% by weight to 60% by weight of a retaining additive based on the total weight of the composition,
[26.c]	wherein the retaining additive comprises a microcrystalline wax,
[26.d]	wherein a weight ratio of the DCOI to the retaining additive is in a range of 1:1.5 to 1.5:1.

No.	Claim Elements
[27.Pre]	A method of treating a wood substrate, the method comprising:
[27.a]	diluting the composition of claim 26 with an organic solvent to form a diluted composition; and

No.	Claim Elements
[27.b]	contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.

III. PROFESSIONAL BACKGROUND AND QUALIFICATIONS

14. A description of my professional background and qualifications is provided below. An additional account of my work experience and qualifications are included in my curriculum vitae (Ex1003). My CV provides a comprehensive description of my academic and employment history along with highlights of my involvement in the American Wood Protection Association (“AWPA”) and issued patents of which I am listed as an inventor.

15. I am qualified by education and experience to testify in the field of wood preservatives and wood preservative compositions, I have developed and consulted with clients on wood treatment practices since 1979 and still work on developing renewable solvent carriers for treating wood to present day. This experience is generally applicable to compositions for treating wood with wood preservative compositions containing DCOI including those described in the '716 patent and the prior art. Additionally, the following overview of my background also pertains to my qualifications for providing expert testimony in this matter.

16. I received a Bachelor of Science degree in Chemical Engineering from Oregon State University in 1976. I have worked as a consultant in the wood

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treatment industry for more than 45 years. Since October 2013, I have served as the Vice President of the Renewable Resource Group and established the Analytical Laboratory Group through which I provide analytical chemistry services to clients in the environmental and wood treatment industries. Since February 2021, I have served as the of President of Renewable Resource Group II, where I successfully developed a new high flash, low VOC renewable carrier solvent for treating wood with DCOI or Copper Naphthenate.

17. My experience includes advising clients on industry standards for specific wood treatment products as well as regulatory changes regarding wood treatment chemicals, including the phase out of pentachlorophenol (“Penta” or “PCP”) published in the Federal Register by the EPA in February 2022. I also have experience with developing manuals for the treatment of wood which incorporate standards from the AWWA and incorporating these manuals into the production and quality control processes of treatment plants.

18. My experience also includes managing analytical laboratories that provide analytical chemistry services to clients in the environmental industry, including the identification and quantification of the chemical and physical properties of wood treatment compositions.

19. Over my professional career, I have received several awards and honors. Since 2008, I have served as the chairperson of the AWWA’s P9/HCS

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Taskforce. One of the objectives of the P9/HCS Taskforce was to develop and maintain standards for solvents used in wood preservatives and ensure suitable test methods to assess properties that are important for use in wood treatment plants and treated wood. I have also developed and proposed standards and guidelines that have been accepted by the AWWPA, including new language for the P9-A, P9-C and P9-F solvent standards.

20. I am being compensated for my time in connection with this matter at my standard consulting rate of \$300.00 per hour, plus reimbursement for actual expenses. My compensation is not dependent in any way upon the outcome of this matter. I have no financial interest in the Petitioner, the Patent Owner, or the '716 patent, and I am not aware of, nor do I have control over, any financial interest that would affect or bias my judgment.

IV. LEVEL OF ORDINARY SKILL IN THE ART

21. It is my opinion that the person of ordinary skill in the art ("POSA"), as of the claimed priority date, would have had at least a bachelor's degree in chemistry (or a related or equivalent field) or wood science, and two or more years of experience researching, developing, designing and/or evaluating wood preservative compositions including directing the selection, use or application of solvents in connection with use of wood preservatives (or supervising the same) or equivalent experience. Such experience could include either formal study or could

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also be obtained during on-the-job experience. A person with less or different education but more relevant practical experience, or vice versa, may also meet this standard. A POSA may have been part of a team or otherwise have experience working with others having the relevant experience set forth above including experience working with wood treatment entities concerning the use of wood preservatives and solvents for the same. I understand there may be a dispute about whether the earliest effective filing date of the '716 patent is August 5, 2022 or August 5, 2021. I am a person of at least ordinary skill in the art and was so on the earliest date to which the '716 patent claims priority (i.e., August 5, 2021), as well as August 5, 2022 (the earliest effective priority date given lack of written description in the priority application). As shown by my qualifications and my curriculum vitae in Ex. 1003, I am aware of the knowledge and skill possessed by a POSA at the time of the alleged invention claimed by the '716 patent. In performing my analysis, I have applied the standard set forth above.

V. UNDERSTANDING OF APPLICABLE LEGAL STANDARDS

22. For the purposes of this declaration, I have been informed about certain aspects of the law that are relevant to forming my opinions. I have applied that understanding of the law, as set forth herein.

23. I have been informed and understand that, in a post grant review proceeding, Petitioner has the burden of proving that each challenged claim is unpatentable by a preponderance of the evidence.

- **Legal Standard for Priority**

24. It is my understanding that for a non-provisional application to be afforded the priority date of a provisional application, 35 U.S.C. §119(e) requires that the specification of the provisional application contain a description of the invention that complies with the written description and enablement requirements of the applicable law (35 U.S.C. §112).

- **Legal Standard for Written Description**

25. I have been informed by counsel and understand that to comply with the written description requirement, the specification must describe the invention sufficiently to convey to a person of skill in the art that the patentee had possession of the claimed invention at the time of the application, i.e., that the patentee invented what is claimed. It is my understanding that the disclosure does not have to provide *in haec verba* support for the claimed subject matter at issue, but nevertheless one skilled in the art, reading the original disclosure, must immediately discern the limitation at issue in the claims.

- **Legal Standard for Enablement**

26. I have been informed by counsel and understand that the enablement requirement means that a patent specification must describe the invention in such terms that one skilled in the art can make and use the claimed invention without undue experimentation. I further understand that the following factors, known as the *Wands* factors, can be weighed to determine whether undue experimentation would have been needed: (1) the breadth of the claims; (2) the nature of the invention; (3) the state of the prior art; (4) the level of one of ordinary skill; (5) the level of predictability in the art; (6) the amount of direction provided by the inventor; (7) the existence of working examples; and (8) the quantity of experimentation needed to make or use the invention based on the content of the disclosure.

27. I have been informed by counsel and understand that that enablement requires that the specification must enable the full scope of the claimed invention and that enablement of only a portion of the claimed subject matter is not sufficient. I have further been informed by counsel and understand that when a range is claimed, there must be enablement of the scope of the range.

- **Legal Standard for Anticipation**

28. I have been informed by counsel and understand that a patent claim may be “anticipated” if each element of that claim is present either explicitly or inherently (necessarily present) in a single prior art reference, and that the elements

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should be arranged in the same way in the reference as in the claim. Petitioner's counsel has further informed me that for a claimed limitation to be "inherently" present, the prior art need not expressly disclose the limitation, so long as the claimed limitation *necessarily* flows from a disclosure in the prior art.

29. I also have been informed by counsel and understand that a prior art patent document (such as an issued patent or a published patent application) may incorporate by reference another document, and that in such circumstances, the referenced document becomes effectively part of the patent document as if the referenced document were explicitly contained therein.

- **Legal Standard for Obviousness**

30. I have been informed by counsel and understand that a patent claim can be considered to have been obvious to a POSA at the time the application was filed. This means that, even if all of the requirements of a claim are not found in a single prior art reference, the claim is not patentable if the differences between the subject matter in the prior art and the subject matter in the claim would have been obvious to a person of ordinary skill in the art at the time the application was filed.

31. I have been informed by counsel and understand that a patent claim is unpatentable if, at the time of the alleged invention, it would have been obvious to one of ordinary skill in the art to combine the teachings of the prior art to yield the patent claim. I also understand that it is not required (although it is acceptable) that

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each element/limitation of a patent claim be found in a single reference in order to find a patent claim obvious. For a patent claim to be found obvious, all the elements/limitations of the patent claim may be found in a combination of references at which a POSA would have been reasonably expected to arrive at the claimed invention. I understand that a proper analysis of whether an invention is unpatentable for obviousness includes a review of the scope and content of the prior art, the differences between the patent claims at issue and the prior art, the level of ordinary skill in the field of the invention at the time of the alleged invention, and other objective considerations identified below.

32. I have been informed by counsel and understand that a showing of obviousness requires some articulated reasoning with a rational underpinning to support the combination of the references. I understand that in consideration of the issue of obviousness it is important to identify whether a reason existed at the time of the alleged invention that would have led a person of ordinary skill in the pertinent art to combine elements of the references in a way that yields the claimed invention.

33. I have been informed by counsel and understand that a claim may be considered unpatentable for obviousness for various reasons. I have been informed that the following exemplary rationales may support a finding of obviousness:

- combining prior art elements according to known methods to yield predictable results;

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- simply substituting one known element for another to obtain predictable results;
- use of a known technique to improve similar devices in the same way;
- applying a known technique to a known device ready for improvement to yield predictable results;
- choosing from a finite number of identified, predictable solutions with a reasonable expectation of success;
- known work in a field that prompts variations in the work in the same or a different field that leads to predictable results; and
- some teaching, suggestion, or motivation in the prior art that would have led a person of ordinary skill in the art to modify a prior art reference or combine multiple prior art references or teachings to arrive at the claimed invention.

34. I have been informed by counsel and understand that various objective or “real world” factors may be indicative of non-obviousness. I understand that such factors include:

- (a) the commercial success of the claimed invention;
- (b) the existence of a long-felt, unresolved need for a solution to the problem solved by the claimed invention;
- (c) failed attempts to solve the problem solved by the claimed invention;

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- (d) copying of the claimed invention;
- (e) unexpected results of the claimed invention;
- (f) praise for the claimed invention by others in the relevant field; and
- (g) willingness of others to accept a license under the patent because of the merits of the claimed invention.

35. I am unaware of any information that would provide secondary considerations of non-obviousness for any of the asserted claims of the '716 patent. However, to the extent that Patent Owner (or its expert) provides opinions and/or analysis with respect to this topic, I reserve the right to supplement my opinions and analyses on this topic.

36. With respect to claimed ranges, I have been informed by counsel that a *prima facie* case of obviousness typically exists when claimed ranges overlap with ranges disclosed in the prior art. Such an overlap creates a presumption of obviousness. I understand that a patent owner can rebut this presumption of obviousness by showing that the claimed range produces a new and unexpected result which is different in kind and not merely in degree from the results of the prior art. A claimed range that demonstrates such unexpected results is referred to as a "critical" range.

37. I have been informed by counsel and understand that the patent owner may show criticality by the following: (1) showing that the prior art taught away

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from the claimed range; (2) showing a change to a parameter was not recognized as “result-effective” (i.e., a variable which achieves a recognized result) in the prior art; or (3) showing that the disclosure in the prior art was so broad that it may not invite routine optimization.

38. I have been informed by counsel and understand that that an alleged invention is obvious if it would have required only routine optimization to arrive at the claim(s) and a POSA would have had a reasonable expectation of success to formulate the claimed range. The presence of a known result-effective variable would be one, but not the only, motivation for a POSA to experiment to reach another workable product or process. In cases in which the optimized variable is a result-effective variable and the general conditions of a patent claim are disclosed in the prior art, I understand that it is not inventive to discover the optimum or workable ranges or values by routine experimentation because routine application of a well-known problem-solving strategy is the work of a skilled artisan, not of an inventor.

39. I have been informed by counsel and understand that a combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.

- **Transition Phrases**

40. I am informed by counsel and understand that the term “comprising” means that additional elements may also be present in an embodiment of the claims.

41. I am informed by counsel and understand that the phrase “consisting essentially of” in a claim means that the claimed invention cannot include any elements that are not recited after the phrase “consisting essentially of,” unless the additional elements do not materially affect the basic and novel properties of the claimed invention.

VI. BACKGROUND

A. Technical Background

1. Wood preservative chemicals

42. As discussed herein, it was long-known to use wood preservatives such as DCOI, to treat wood products to impart resistance to fungal decay. (Ex1016, ¶4 (“The wood preservation process deposits or fixes chemical preservatives in the wood, and the toxic nature of the chemicals effectively prevents the attack of living organisms on the wood, preserving structural integrity and thereby extending the lifetime of the treated wood.”), ¶19.)²

43. It was also long-known to combine wood preservatives with retaining additives, including polymers and waxes. (*See, e.g.*, Ex1015, Abstract (“A wood preservative composition having deep penetration capability, leaving a clean surface

² All statements as to what was known in the art date back to (at least) prior to 2018 unless otherwise stated.

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and imparting high retention of active preservative within the wood, which consists primarily of (a) an organic wood preservative agent, (b) a hydrophobic agent, and (c) small amounts of an amorphous vinylic-type polymer, in a penetrating organic solvent.”), 17:24-38 (“The invention thus includes a wood preservative concentrate, soluble in lipophilic wood penetrating organic solvents, comprising, (a) an organic wood preservative agent . . . (b) a hydrophobic agent selected from the group consisting of fatty acids and their esters, fatty alcohols and paraffin waxes . . . and (c) an amorphous vinylic-type polymer”); claims 1-11 (claim 1 reciting “A penetrating wood preservative solution, causing penetration and substantial immobilization of the preservative agent within the wood, comprising: (a) an organic wood preservative agent . . . (b) a hydrophobic agent selected from the group consisting of fatty acids and their esters, fatty alcohols and paraffin waxes . . . (c) an amorphous vinylic-type polymer . . . and (d) a penetrating organic solvent for (a), (b), and (c).”).

44. Pentachlorophenol (“Penta” or “PCP”) is an organic wood preservative used to treat utility poles and the like for decades. (Ex1001 at 1:29-36; Ex1015 at Abstract, 1:19-23.) It was common to provide PCP as a wood preservative in both solid and liquid concentrate form. (Ex1015, 17:20-25.)

45. In 2015, the Stockholm Convention classified PCP as a persistent organic pollutant and proposed to discontinue its use. Thereafter, in March 2021, the

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EPA made a proposal to cancel all uses of PCP through the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) registration review process. (Ex1023, pp.5-7, 13-15.) The EPA's final registration review decision in February 2022 required cancellation of PCP. It was thus desirable to use an alternative agent for wood preservation. DCOI was a viable alternative for pentachlorophenol ("PCP"), which had been classified as a persistent organic pollutant at the Stockholm Convention in 2015 and cancelled by the EPA in December 2021. (Ex1023, pp. 4, 15.)

46. DCOI is a long-known, environmentally friendly organic wood preservative agent. (Ex1028, p.11 ("The active ingredient has an excellent environmental toxicity profile due in part to the fact that it is not persistent in the soil environment.")) DCOI wood preservative compositions comprising a wax were known at least as early as 2005. (Ex1016 at ¶19 ("Exemplary organic preservatives of the invention include . . . isothiazolones such as 4,5-dichloro-2-n-octyl-4-isothiazolin-3-one . . ."), ¶21 ("The organic phase of the invention may comprise a hydrophobe. . . . Exemplary strong hydrophobes include waxes, such as petroleum waxes, natural waxes, synthetic waxes, or a combination of these.")) DCOI has been standardized as a wood preservative by the American Wood Protection Association ("AWPA") since 1989. (Ex1028, p.11 ("DCOI is well known to the American Wood Protection Association having been originally standardized as a wood preservative in an organic solvent carrier by AWPAC Committee P3 in 1989."))

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47. The AWWPA standardized the use of DCOI as a wood preservation agent for ground contact use in 2017. (Ex1028, p.11 (“In 2017 proposals for an oil-borne formulation of DCOI intended for the pressure treatment of southern pine poles, posts and cross arms as well as Douglas-fir cross arms were considered and adopted by the AWWPA Technical Committees.”).)

48. Given that various treatment entities used PCP in solid or liquid concentrate form, formulators sought to provide DCOI as a concentrate, for use as a drop in, requiring “no process changes” by the treatment entities. (Ex1022, p. 1 (“Brooks is expecting the manufacturer to offer DCOI in both solid and liquid-concentrate forms. Based on this expectation, we are anticipating being able to use the solid block form which would mean there would be no process changes from our previous Fact Sheet, . . . for our switchover from Penta.”).).

2. Wood Treatment Methods

49. As discussed herein, it was also known to treat wood by contacting wood with wood treatment compositions using, for example, AWWPA standardized procedures. (Ex1017, ¶16; Ex1019, ¶15.) Various techniques were known to enhance penetration of the wood preservative into the wood. (Ex1017, ¶¶4, 24; Ex1019, ¶¶4-6.) Common techniques that were known include dipping, soaking, vacuum, and pressure processes. (Ex1015, 3:29-40; Ex1017, ¶¶39-41.)

3. Additives to Reduce Leaching

50. As discussed herein, it was long known that wood preservatives can leach out of treated wood over time, and compositions with additives such as polymers, wax and other hydrophobes were known in the art to provide water repellency and otherwise reduce leaching of the preservative from the treated wood. (Ex1015, 3:60-4:13; Ex1016, ¶¶12, 29.)

4. Formulator Entities and Treatment Entities

51. As discussed herein, it was known in the art for formulators to incorporate wood preservative agents into treatment compositions for shipment to customers (treatment entities), who may be located across the country. Treatment entities prepare wood treatment formulations by diluting, mixing, and/or otherwise preparing the product for application to a particular species of wood. (Ex1020, ¶32; Ex1028, pp.11-17, 24-34.)

5. Use of Concentrated Formulations

52. As discussed herein, treatment entities prepare wood treatment formulations for application to wood by diluting, mixing, and/or otherwise preparing the product as needed for application to wood products. (Ex1020, ¶32; Ex1028, p.17 (“Treating solutions were prepared from concentrates of DCOI in water or DCOI in diesel and diesel amended with 15 or 30% soy-based biodiesel. Treatment solutions of different concentrations of active ingredient were prepared by dilution into

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toluene.”).) It was known that it can be more economical to make and ship concentrated wood formulations as opposed to shipping, for example, large vessels or tanks of diluted wood preservative compositions, e.g., ready-to-use applications, across the country. It was known to make and sell concentrated formulations for on-site dilution with a solvent for use in its wood treatment operations. (Ex1015, 17:20-24; Ex1020, ¶32 (“In many instances biocides are supplied as concentrates which are intended to be diluted before use. Supplying in the form of biocide concentrates can reduce the cost of transport and storage.”).) It was also known, and within the general knowledge of a POSA, that it is more economical for formulators to make and ship a concentrated formulation to customers who can dilute the formulation in connection with the treating process. (*See, e.g.*, Ex1020 at ¶32 (“concentrates can reduce the cost of transport and storage.”)).

B. Real World Developments

53. As of May 2022, Petitioner introduced, sold, and offered for sale a concentrated, solid wood preservative composition, UP-50, in the United States. I understand that at all relevant times, the UP-50 product was comprised of about 50 weight percent DCOI and 50 weight percent wax. (Ex1012, p. 1; Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39.) The UP-50 product was sold in the form of a solid block to wood treatment entity customers for dilution of the product with a hydrocarbon

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solvent and use the diluted composition to treat wood products by way of known techniques. (Ex1012, p.1; Ex1014 (Directions for Use); Ex1011, ¶¶9, 22, 25, 38.)

54. I understand that, on August 5, 2022, following Petitioner's introduction of UP-50, PO filed its PCT '619 application. PO's '619 application introduced new disclosure for solid and other wood preservative compositions with much higher weight percent concentrations of both DCOI and retaining additives, including 40-60% (and 45-55%) by weight based on the total weight of the composition. (Ex1006, ¶¶51, 52, 115-136.)

C. The '716 Patent (Ex1001)

1. Disclosure of the '716 Patent

55. The '716 patent is directed to a wood preservative composition comprising DCOI and a so called "retaining additive" comprising a solvent-borne polymeric resin, a wax, or a combination thereof. (E.g., Ex1001, Abstract.) The '716 patent discloses use of a solvent to "facilitate solubilization of the DCOI and/or the retaining additive and facilitate penetration of the DCOI into the wood product." (*Id.* at 3:29-31.) The '716 patent states that the inventors surprisingly discovered that a wood preservative composition comprising DCOI, an organic solvent, and a retaining additive can enhance resistance to fungal and/or insect attack. (*Id.* at 2:58-63.)

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56. The '716 patent acknowledges that wood preservative compositions were well-known in the art prior to the claimed priority date. (Ex1001 at 1:29-32.)

57. The '716 patent acknowledges that even though Penta was discontinued, DCOI was a well-known substitute prior to the claimed priority date. (Ex1001 at 2:54-56 (“4,5-dichloro-2-octylisothiazol-3 (2H)-one (DCOI) has been used in wood preservative compositions for mold control and antibacterial activity.”)).

58. The '716 patent acknowledges that, prior to the claimed priority date, it was known that hydrocarbon solvents can be used to dissolve DCOI. (Ex1001 at 2:56-58 (“*DCOI dissolved in hydrocarbon solvents has also been proposed to treat wood for heavy duty applications.*”)).

59. The '716 patent does not demonstrate or otherwise recite any criticality with respect to the claimed weight percentage ranges for DCOI. Rather, the '716 patent specification teaches that the concentrated wood preservative compositions can comprise DCOI in any number of varied ranges. (*See, e.g.*, Ex1001 at 10:36-52 (“The concentrated composition can comprise at least 5% by weight DCOI based on the total weight of the composition, such as, for example, at least 10% by weight DCOI, at least 15% by weight DCOI, at least 20% by weight DCOI, at least 30% by weight DCOI, at least 40% by weight DCOI, or at least 50% by weight DCOI, all based on the total weight of the composition. . . . In various examples, the

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concentration composition can comprise DCOI in a range of 5% to 80% by weight based on the total weight of the composition, such as, for example, 20% to 80% by weight, 30% to 70% by weight, 40% to 50% by weight, or 45% to 55% by weight.”)

60. The ‘716 patent also shows that the weight percentage range for DCOI for the purportedly inventive wood treatment compositions is no more than routine optimization based on a desired outcome. (*See, e.g.*, Ex1001 at 2:65-3:2 (“the concentration of the DCOI in the wood preservative composition . . . can be selected based on the desired level of inhibition of the fungal decay and/or insect attack, and/or based on the method used to treat the wood product.”).)

61. The ‘716 patent also does not demonstrate or otherwise recite any criticality with respect to the claimed weight percentage ranges for the retaining additive. The ’716 patent specification teaches that the concentrated wood preservative compositions can comprise retaining additive in any number of varied ranges, some outside the claimed ranges. (*See, e.g.*, Ex1001 at 10:53-11:5 (“The concentrated composition can comprise at least 5% by weight of the retaining additive based on the total weight of the composition, such as, for example, at least 10% by weight retaining additive, at least 20% by weight retaining additive, at least 30% by weight retaining additive, at least 40% by weight retaining additive, or at least 50% by weight retaining additive, all based on the total weight of the composition. . . . In various examples, the concentration composition can comprise

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retaining additive in a range of 5% to 80% by weight based on the total weight of the composition, such as, for example, 20% to 80% by weight, 30% to 70% by weight, 40% to 50% by weight, or 45% to 55% by weight, all based on the total weight of the composition.”); *see also id.* at 6:14-43 (“The wood preservation composition according to the present disclosure can comprise a concentration of the retaining additive of at least 0.05% by weight based on the total weight of the composition, such as, for example, at least 0.2% by weight, at least 0.5% by weight, at least 1.0% by weight, at least 1.2% by weight, at least 1.5% by weight, at least 2% by weight, at least 3% by weight, or at least 4% by weight, all based on the total weight of the composition. . . . For example, the wood preservative composition can comprises a concentration of the retaining additive in a range of 0.05% by weight to 20% by weight based on the total weight of the composition, such as, for example, 0.2% by weight to 20% by weight, 0.5% by weight to 20% by weight, 1% by weight to 15% by weight, 1% by weight to 10% by weight, 1% by weight to 5% by weight, 1.5% by weight to 10% by weight, 2% by weight to 5% by weight, 1.5% by weight to 3% by weight, or 1.5% by weight to 2.5% by weight, all based on the total weight of the composition. For example, the wood preservative composition according to the present disclosure can comprise 2.5% by weight of the retaining additive based on the total weight of the composition.”).)

62. The '716 patent also does not demonstrate or otherwise recite any criticality with respect to the claimed weight ratio of the DCOI to the retaining additive. Rather, the '716 patent specification teaches that the wood preservative compositions can comprise weight ratios of the DCOI to the retaining additive in any number of varied ranges, with no showing of criticality relative to ranges outside the claims or narrower ranges within select, narrower claimed ranges (e.g., claim 2).

63. The '716 patent also does not demonstrate or otherwise show any criticality with respect to the claimed flash point ranges of the organic solvent. Rather, the '716 patent specification teaches that the flash point of the organic solvent can be within any number of varied ranges, some outside the claimed ranges. (*See, e.g.*, Ex1001 at 3:52-63 (“The organic solvent can comprise a flash point of at least 20 degrees Celsius, such as, for example, at least 50 degrees Celsius or at least 60 degrees Celsius, at least 70 degrees Celsius, at least 80 degrees Celsius, at least 90 degrees Celsius, at least 100 degrees Celsius, at least 110 degrees Celsius, at least 120 degrees Celsius, at least 150 degrees Celsius, or at least 200 degrees Celsius.”)).

64. The '716 patent also reflects that selection of a specific organic solvent is no more than a simple and obvious design choice, subject to routine optimization based on a desired outcome, e.g., “based on the application and/or desired properties of the organic solvent.” (*See, e.g.*, Ex1001 at 3:33-36 (“The organic solvent can comprise one solvent, or a mixture of two or more solvents based on the application

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and/or desired properties of the organic solvent.”) The ’716 patent specification teaches that the organic solvent can be any number of varied solvent classes. (*See, e.g.* Ex1001 at 3:33-41 (“The organic solvent can comprise one solvent, or a mixture of two or more solvents based on the application and/or desired properties of the organic solvent. The organic solvent can comprise a hydrocarbon solvent (e.g., diesel #2, diesel #4, diesel #6, an aliphatic solvent), an amine solvent, a glycol solvent, a ketone solvent, an ester solvent, an alcohol solvent, a halogenated solvent, a terpene solvent, an aromatic solvent, a biodegradable organic solvent, or a combination thereof.”).)

65. Likewise, the ’716 patent demonstrates that the flash point of the organic solvent is no more than a selection based on routine optimization to achieve a desired outcome (e.g., reduced risk of fire by ignition of solvent). (*See, e.g.*, Ex1001 at 9:56-58 (“The wood preservative composition can comprise a flash point suitable for handling and/or a desirable treatment application.”); *id.* at 3:48-52 (“The chain length and hydrocarbon classes of the hydrocarbon solvents suitable for use with the present disclosure can be selected to achieve a desired flash point of the composition and/or solubility of the DCOI and/or retaining additive.”).)

66. The ’716 patent also acknowledges that the melting point of the wax component in the retaining additive is no more a selection based on routine optimization to achieve a desired outcome, e.g., “handling and/or for a desirable

treatment application.” (*See, e.g.*, Ex1001 at 6:62-63 (“The wax can comprise a melting point suitable for handling and/or for a desirable treatment application.”)).

2. Prosecution History

67. It is my understanding that the ’716 patent issued from application No. 19/072,608, filed on March 6, 2025 (Ex1009), as a continuation of non-provisional application No. 18/294,852 (‘852 application) (Ex1008), which is a Section 371 application of the ’619 PCT Application (Ex1006). The ‘619 PCT claims priority to the ‘817 provisional. (Ex1005.) It is also my understanding that the Examiner rejected claims 43-50 and 53-72 for obviousness, citing U.S. Application Nos. 2006/0057300 (“Cui”) (Ex1016), 2006/0240263 (“Ashmore”) (Ex1017), and 2021/0112812 (“Arumugam”) (Ex1021). (Ex1004, pt.1, 86-103.) But, the Examiner indicated that claim 51, reciting a range of 40-60% by weight DCOI and 40-60% by weight retaining additive, and claim 52, reciting a range of 45-55% by weight DCOI and 45-55% by weight retaining additive, would be allowable if rewritten in independent form. (Ex1004, pt.1, 103-105.) After amendments, the Examiner issued a Notice of Allowance, stating that none of the prior art of record taught or suggested DCOI concentrations of 40-60% or 45-55% and retaining additive concentrations of 40-60% or 45-55% as claimed. (Ex1004, pt. 2, 164.)

3. The '817 provisional (Ex1005)

68. The '817 Provisional (Ex1005) is directed to a wood preservative composition comprising at least 0.5% by weight DCOI, at least 0.05% of a retaining additive comprising a solvent borne polymer, a wax, or a combination thereof, and a solvent. All examples and claims in the '817 provisional include a solvent. (Ex1005, ¶¶59-95, claims 1-41.) The '817 provisional discloses the concentration of DCOI comprises “no greater than 10% by weight” and identifies a range of 0.5% to 10% by weight and narrower sub-ranges for DCOI in the composition. (Ex1005, ¶13.) The '817 provisional also discloses the concentration of the retaining additive comprises “no greater than 20% by weight” and identifies a range of 0.05% to 20% by weight and narrower sub-ranges for the retaining additive in the composition. (*Id.* at ¶32.) A numerical range of 40-60% (or 45%-55%) is not stated for either the retaining additive or DCOI component. Not until PO's PCT '619 application did PO describe numerical ranges of higher concentrations (e.g., 40-50%) of DCOI and retaining additive. The '817 provisional identifies waxes for the retaining additive but does not mention microcrystalline wax or wax temperatures. (*Id.* at ¶34.)

4. The PCT '619 Application (Ex1006)

69. PCT '619 application was filed on August 5, 2022 (Ex1006) and claims priority to the '817 provisional, but it differs from the '817 provisional in numerous respects. First, the Abstract, Summary of the Invention, and independent claims were

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all modified to remove the solvent as a recited component of the wood preservative composition.

70. Second, the PCT '619 application added new disclosure stating that the concentrated composition could comprise, e.g., at least 40% by weight DCOI and 40% by weight retaining additive or at least 50% by weight DCOI and 50% by weight retaining additive. (Ex1006, ¶¶51-52.)

71. Third, the PCT '619 application added 15 new examples directed to DCOI-wax concentrates and treating solutions formed from the concentrates. DCOI concentrate Example 19 discloses a microcrystalline wax as the retaining additive (mixing 98.48 g of a microcrystalline wax with 101.52 g DCOI, heating to form an intermediate mixture, and allowing the mixture to cool to form a solid block). (Ex1006, ¶¶135-136.)

72. Fourth, PCT '619 application added new disclosure reciting melting points for the waxes. For example, the new disclosure included melting points of at least 55C, at least 60 C, or at least 75 C, and no greater than 100 C, no greater than 90 C, or no greater than 80 C for the waxes, and ranges of 30 C-100 C and 35 C- 70 C.

VII. CLAIM CONSTRUCTION

73. For purposes of this PGR, it is my understanding that all terms should be given their plain and ordinary meaning, unless otherwise specified. It is my

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understanding that the plain and ordinary meaning of a claim term is its meaning to a person of ordinary skill in the art after reading the entire patent and the prosecution history. It is also my understanding that when applying this standard, the Board need only construe terms that are in controversy, and only to the extent necessary to resolve the controversy.

74. It is my understanding that Petitioner has identified the following construction of the term “retaining additive” for use in this PGR. The specification states that “[t]he retaining additive comprises a solvent-borne polymeric resin, a wax, or a combination thereof. Without being bound to any particular theory, the retaining additive can bind the DCOI to the wood product, entrap the DCOI within the wood, physically fix the DCOI to the wood product, and/or otherwise inhibit movement of the DCOI in the wood product (e.g., from inside of the wood product to a surface of the wood product.” (Ex1001 at 5:63-6:3.)

75. In my opinion, a POSA would understand the term retaining additive to mean “solvent-borne polymeric resin, a wax, or a combination thereof.” A POSA would *not* understand the term retaining additive to require additional functional language such as a material that “can bind the DCOI to the wood product, entrap the DCOI within the wood, physically fix the DCOI to the wood product, and/or otherwise inhibit movement of the DCOI in the wood product (e.g., from inside of the wood product to a surface of the wood product), as this text is not stated as

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definitional, but rather as a mere potential theory, to which the inventors disclaim any obligation to be “bound.”

76. Nonetheless, even if PO (incorrectly) contends that this text supports an improper, more narrow construction of the term retaining additive that, for example, “entraps” or otherwise “inhibits movement of the DCOI in the wood,” the prior art cited herein satisfies such a construction. As explained in the respective grounds below and the Background prior art discussion below, the waxes and wax compositions described in the cited prior art function to at least entrap the DCOI within the wood product, physically fix the DCOI to the wood product, and/or inhibit movement of the DCOI in the wood product, as evidenced by, for example, reduced preservative leaching.

VIII. MATERIALS AND OTHER INFORMATION CONSIDERED

77. In connection with my study of this matter and in forming my opinions as stated herein, I have reviewed the following exhibits identified in this Declaration:

No.	Reference	Referred to As
1001	U.S. Patent No. 12,370,716	'716 Patent
1002	Declaration of Dennis Morgan	Morgan Declaration
1003	Curriculum Vitae of Dennis Morgan	Morgan CV

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No.	Reference	Referred to As
1004	Certified File History of U.S. Patent No. 12,370,716	'716 Pat. Hist.
1005	U.S. Provisional Application No. 63/229,817, filed on August 5, 2021	'817 provisional application
1006	PCT/US2022/074619, filed on August 5, 2022	PCT '619 application
1007	PCT application no. WO2023/096905, filed on November 22, 2022, published on June 1, 2023	PCT '905 application or "Archer"
1008	PCT U.S. national stage Application No. US18/294,852 (U.S. national stage application of the PCT '619 PCT application, filed on August 5, 2022.), published on October 17, 2024	'852 application
1009	U.S. Application No. US19/072,608, filed on March 6, 2025, which is a continuation of a PCT U.S. national stage application No. 18/294,852	'608 application
1010	U.S. Provisional Application No. 63/282,794, filed on November 24, 2021	'794 provisional application
1011	Declaration of Kevin Archer	Archer Declaration
1012	UP-50 Internal Manufacturing Specification	UP-50 manufacturing document
1013	UP-50 Environmental Protection Agency ("EPA") Approval Letter	EPA Approval Letter

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No.	Reference	Referred to As
1014	UP-50 Wood Preservative Concentrate Product Label	UP-50 Label
1015	U.S. Patent No. 4,143,010, filed March 27, 1978, granted March 6, 1979	'010 patent or "Rak"
1016	U.S. Application No. 11/222,552, filed on September 9, 2005 and published as U.S. 2006/0057300, on March 16, 2006	'300 publication or "Cui"
1017	U.S. Application No. 11/408,425, filed on April 21, 2006 and published as US2006/0240263 on October 26, 2006	'263 publication or "Ashmore '263"
1018	Declaration of Barbara Aldinger	Aldinger Declaration
1019	U.S. Application No. 11/656,100, filed on January 22, 2007 and published as US2007/0175360 on August 2, 2007	'360 publication or "Ashmore '360"
1020	U.S. Application No. 12/087,106, filed on January 29, 2007 and published as US 2009/0004497 on January 1, 2009	'497 publication or "Blow"
1021	U.S. Application No. 16/497,089, filed on March 29, 2018 and published as U.S. 2021/0112812 on April 22, 2021	'812 publication or "Arumugam"
1022	Letter filed to the Washington Department of Ecology dated January 16, 2020	Customer Letter

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No.	Reference	Referred to As
1023	EPA Pentachlorophenol Final Registration Review Decision, Case Number 2505, dated December 2021	EPA Final Decision
1024	UP-50 Solubility Report, Received December 1, 2025	UP-50 Solubility Report
1025	Proposed Modified Protective Order	Proposed Modified Protective Order
1026	Proposed Modified Protective Order showing redlines made to the Default Protective Order	Redline Proposed Modified Protective Order
1027	Business Development and Exclusive Supply Agreement dated February 5, 2021	BDES Agreement
1028	AWPA 114 th Annual meeting paper, copyright 2018	AWPA paper
1029	2019 AWPB Book of Standards, P39-18 Standard (p.139)	P39-18
1030	2019 AWPB Book of Standards, HSA-18 Standard (p.161)	HSA-18
1031	Purchase order from Viance to toll manufacturer dated 04/19/2022 for first sale of UP-50	04/19/2022 Invoice from Viance to Toll Manufacturer
1032	Purchase order from customer to Viance dated 05/18/2022 for first sale of UP-50	05/18/2022 Customer Purchase Order
1033	Bill of Lading dated 05/27/2022 for first sale of UP-50	05/27/2022 Bill of Lading
1034	Invoice from Viance to customer dated 06/29/2022 for third sale of UP-50	06/29/2022 Invoice to Customer

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No.	Reference	Referred to As
1035	Sales Order Acknowledgement from toll manufacturer to Viance dated 06/29/2022 for third sale of UP-50	06/29/2022 Sales Order Acknowledgement
1036	Shipping invoice from shipping company to Viance dated 06/29/2022 for third sale of UP-50	06/29/2022 Shipping Invoice
1037	Bill of Lading dated 06/29/2022 for third sale of UP-50	06/29/2022 Bill of Lading
1038	Invoice from Viance to customer dated 07/07/2022 for third sale of UP-50	07/07/2022 Invoice to Customer
1039	Corrected Invoice from Viance to customer dated 07/07/2022 for third sale of UP-50	07/07/2022 Corrected Invoice to Customer
1040	Fuels and Lubricants Handbook: Technology, Properties, Performance, and Testing; Ch. 19 "Petroleum Waxes", Mansoori, et al.	Petroleum Waxes
1041	Fischer-Tropsch Wax Safety Data Sheet	F-T SDS
1042	Microcrystalline Wax Safety Data Sheet	Microcrystalline SDS
1043	Diesel Fuel SDS	Diesel SDS
1044	Biodiesel SDS	Biodiesel SDS
1045	Invoice from toll manufacturer to Viance dated 05/20/2022 for first sale of UP-50	05/20/2022 Toll Manufacturer Invoice
1046	Purchase order from Customer to Viance dated 05/20/2022 for second sale of UP-50	05/20/2022 Customer Purchase Order
1047	Invoice from toll manufacturer to Viance dated 06/24/2022 for second sale of UP-50	06/24/2022 Toll Manufacturer Invoice
1048	Invoice from shipping company to Viance dated 07/06/2022 for second sale of UP-50	07/06/2022 Shipping Invoice

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No.	Reference	Referred to As
1049	Bill of lading dated 06/24/2022 for second sale of UP-50	06/24/2022 Bill of Lading
1050	Sales order dated 06/20/2022 for third sale of UP-50	06/20/2022 Customer Order
1051	Invoice from toll manufacturer to Viance dated 06/29/2022 for third sale of UP-50	06/29/2022 Toll Manufacturer Invoice
1052	Email with customer order dated 07/26/2022 for fourth sale of UP-50	07/26/2022 Order Email from Customer
1053	Sales order dated 07/26/2022 for fourth sale of UP-50	07/26/2022 Customer Order
1054	Invoice from toll manufacturer to Viance dated 08/05/2022 for fourth sale of UP-50	08/05/2022 Toll Manufacturer Invoice
1055	Bill of Lading dated 08/05/2022 for fourth sale of UP-50	08/05/2022 Bill of Lading
1056	Invoice from shipping company to Viance dated 08/24/2022 for fourth sale of UP-50	08/24/2022 Shipping Invoice
1057	Purchase order from Viance to toll manufacturer dated 05/12/2022 for second sale of UP-50	05/12/2022 Invoice from Viance to Toll Manufacturer
1058	Email with customer order dated 06/17/2022 for third sale of UP-50	06/17/2022 Order Email from Customer
1059	Invoice from Viance to customer dated 05/27/2022 for first sale of UP-50	05/27/2022 Invoice to Customer
1060	Invoice from Viance to customer dated 06/24/2022 for second sale of UP-50	06/24/2022 Invoice to Customer
1061	Invoice from Viance to customer dated 08/05/2022 for fourth sale of UP-50	08/05/2022 Invoice to Customer
1062	Invoice from shipping company to Viance dated 06/08/2022 for first sale of UP-50	06/08/2022 Shipping Invoice

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No.	Reference	Referred to As
1063	Correlation Between the Composition and Flash Point of Diesel-Biodiesel Blends	de Mattos
1064	HCS 25 Treating Oil SDS, Prepared January 3, 2014; Revised on January 15, 2015	HCS 25 Treating Oil SDS
1065	Invoice for HCS 25 Treating Oil Dated January 10, 2014	01/10/2014 Invoice for HCS 25 Treating Oil
1066	Invoice for HCS 25 Treating Oil Dated April 28, 2014	04/28/2014 Invoice for HCS 25 Treating Oil
1067	Gardner's Commercially Important Chemicals Synonyms, Trade Names and Properties	Gardner's Commercially Important Chemicals
1068	Paraffin solubility curves of diesel fuels from thermodynamic model adjusted through experimental DSC thermograms, Fuel, Carmo, Rafael et al. (2018)	Paraffin Solubility Curves of Diesel Fuel
1069	Wood Treatment Plant Had a Clean Operating Record, Nevada Appeal, January 31, 2002	Wood Treatment Plant Fire Article
1070	Evaluation report titled "DCOI Treatment Analysis – UP50 Treatment 1, 2, 3 and 4" and dated December 3, 2020	12/03/2020 UP-50 Report
1071	Evaluation report titled "DCOI - UP50" and dated January 7, 2021	01/07/2021 UP-50 Report
1072	Evaluation report titled "DCOI Summary Report" dated April 15, 2021	04/15/2021 UP-50 Report
1073	Presentation titled "DCOI Treatments Summary" dated May 2, 2021	05/02/2021 Presentation
1074	Presentation titled "Quick DCOI Summary" dated December 23, 2020	12/23/2020 Presentation

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No.	Reference	Referred to As
1075	Cover letter submitted to the Environmental Protection Agency for registration of UP-50 and proposed label, dated February 28, 2021	EPA Proposed Label
1076	Presentation summarizing evaluations of UP-50 dated September 28, 2020	09/28/2020 Presentation
1077	Document summarizing evaluations of UP-50 dated September 28, 2020	09/28/2020 UP-50 Report
1078	Environmentally friendly properties of vegetable oil methyl esters	Gateau
1079	Business Development and Exclusive Supply Agreement dated October 16, 2018 with amendments	10/16/2018 Agreement with Amendments
1080	UP-23 Wood Preservative Concentrate Product Label	UP-23 Label
1081	July 15, 2022 and July 26, 2022 emails reporting transition to UP-50	Emails regarding transition to UP-50
1082	June 10, 2022 timeline for transitioning to UP-50	06/10/2022 UP-50 transition timeline report
1083	Records of UP-50 treatments conducted from June 29, 2022 to July 2, 2022	06/29/2022-07/02/2022 Treatment Records
1084	July 29, 2022 Invoice from Viance's Customer to Third-Party	06/29/2022 First Invoice from Viance's Customer to Third-Party
1085	July 29, 2022 Invoice from Viance's Customer to Third-Party	06/29/2022 Second Invoice from Viance's Customer to Third-Party
1086	Records of UP-50 treatments conducted from June 19, 2022 to August 4, 2022	06/19/2022-08/04/2022 Treatment Records

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No.	Reference	Referred to As
1087	Declaration by Viance's Customer	Customer Declaration

78. In forming my opinions, I also relied upon my education, knowledge, and experience and considered the level of ordinary skill in the art as of the filing date of the '817 provisional application (Aug. 5, 2021) and also the filing date of PCT '619 application (Aug. 5, 2022) as discussed below; in my opinion there is no material difference between those dates with respect to the level of ordinary level of skill in the art for purpose of this PGR.

IX. SUMMARY OF PRIOR ART

79. There are a number of patents and publications that constitute prior art to the '716 patent, as well as sales, offers for sale, and use of a prior art product, namely, "UP-50." I have reviewed and considered the prior art product (and use, sales, and offers for sale thereof), as well as patents and printed publications identified below, which I understand were all publicly available and/or filed with the United States Patent and Trademark Office prior to the earliest effective filing date of the '716 patent, as discussed below. A description of these references, and my general understanding of prior art under the patent law from counsel, follows below.

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80. In addition to considering the knowledge of a person of ordinary skill in the art, I relied upon prior art references to the extent identified herein.

A. Archer (Ex1007)

81. On November 22, 2022, Petitioner filed Archer (Ex1007) claiming the benefit of priority to US provisional application no. 63/282,794 (the “’794 provisional”) (Ex1010), on November 24, 2021. (Ex1007, Cover/Title Page.) The specification and claims of Archer are identical in all material respects to the ’794 provisional, and the applicants are the same, which I understand from counsel entitle Archer to the benefit of the November 24, 2021 provisional filing date. (Ex1007, ¶¶1-90, claims 1-30; Ex1010, ¶¶1-90, claims 1-30.)

82. Archer was published on June 1, 2023. I understand from counsel that Archer qualifies as prior art to the ’716 Patent because it is a published application naming another inventor than the ’716 patent inventors and was effectively filed on November 24, 2021, before August 5, 2022, the earliest possible effective filing date to which claims 1-27 of the ’716 patent could be entitled. Archer was not of record during prosecution of the ’716 patent. (Ex1007, Cover.)

83. Archer discloses wood preservative compositions and states that “[i]n some aspects of the composition, the preservative comprises [DCOI]...” (Ex1007 and Ex1010, ¶6.) In exemplary compositions, “the preservative is 35%-80% by total weight of the composition, alternatively 40%-75% by total weight of the

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composition, alternatively 45%-70% by total weight of the composition.” (Ex1007 and Ex1010, ¶53.) Archer makes clear that, unless otherwise specified, all percentages are expressed in weight percent (%), based on the total weight of the composition or formulation. (Ex1007 and Ex1010, ¶37.)

84. Archer discloses that its wood preservative composition contains wax. (Ex1007 and Ex1010, ¶¶48-49.) Archer states that “in some aspects, the wax is 20%-60% by total weight of the composition, alternatively 30%-50% by total weight of the composition, alternatively 30%-40% by total weight of the composition.” (Ex1007 and Ex1010, ¶50.) Archer further states that “Waxes of the present disclosure include petroleum waxes, scale waxes, synthetic waxes, natural waxes (e.g., carnauba or montan), or a combination thereof. Archer states that, in some aspects, the wax is a petroleum wax, such as but not limited to microcrystalline wax. Archer states that, in some aspects, the wax is a synthetic wax, such as but not limited to, Fischer Tropsch wax, polyethylene wax, or oxidized polyethylene wax.” (Ex1007 and Ex1010, ¶48-49.) Archer also states that “[e]xemplary waxes ... provide a good water repellency to wood and wood products, have a melting point between, and inclusive of, 75°C - 110°C, alternatively 75°C -100°C, alternatively 80°C - 100°C....” (Ex1007 and Ex1010, ¶51.) Archer also teaches that the waxes “prevent or minimize leaching/depletion of active preservatives due to in-use environmental conditions...”. (Ex1007 and Ex1010, ¶51.)

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85. Archer also discloses a “50% DCOI and 50% wax” concentrate composition. (Ex1007 and Ex1010, ¶80.) Archer teaches that its wood treatment compositions “result in lower preservative depletion in the treated wood (i.e., reduced preservative leaching), reduced preservative migration out of the wood into the environment . . . and an improved surface gradient (*i.e.*, penetration of the preservative into the wood), such that adequate preservative loading to prevent or reduce decay or termite attack is achieved.” (Ex1007 and Ex1010, ¶55; *see also* ¶51.)

86. I am informed and understand that only analogous art can be used to set forth an obviousness ground of invalidity. It is further my understanding that the appropriate test for determining whether or not art is analogous requires a determination as to (1) whether the art is from “the same field of endeavor,” and (2) if not, whether the reference still is “reasonably pertinent to the particular problem with which the inventor is involved.” It is my opinion that Archer is analogous art, as Archer discloses wood preservative compositions and thus is from the same field of endeavor.

B. Petitioner’s UP-50 Wood Preservative Concentrate Product

87. UP-50 is a wood preservative product composition intended for use on utility poles, cross arms, or road and rail bridge timbers. (Ex1014; Ex1011, ¶9.) I understand that Petitioner commercially sold and offered UP-50 for sale prior to August 5, 2022 and at least as early as May 2022. (Ex1031-39; Ex1045-1062;

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Ex1018, ¶¶5-35; Ex1011, ¶¶23-25.) I understand from counsel that UP-50 and UP-50 label qualify as prior art. I also understand from counsel that UP-50 and UP-50 label were not of record during prosecution of the ‘716 patent.

88. UP-50 contains 50% by weight DCOI (preservative) and 50% by weight inert ingredients comprised of a wax blend comprising microcrystalline wax and Fischer-Tropsch synthetic wax. (Ex1012, p.1; Ex1014; Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39.) UP-50 is a solid concentrate for dilution prior to use, with a hydrocarbon solvent, such as fuel oil, mineral spirits, diesel, or petroleum distillates. (Ex1014 at “Directions for Use.”)

89. Per the UP-50 label instructions, treating a wood product with UP-50 involves diluting with a hydrocarbon solvent, and pressure treating the wood in a commercial vessel capable of physically impregnating the wood with the UP-50 treatment solution for up to 12 to 48 hours or until effective retention and penetration is achieved. (Ex1014 at “Directions for Use.”) The UP-50 product label states that retention of 0.1-0.24 pounds/cubic foot (pcf) of UP-50 active (i.e., DCOI) is required for effective protection from fungi and subterranean termites. (*Id.*)

90. It is my opinion UP-50 is analogous art, as UP-50 discloses a wood preservative composition and thus is from the same field of endeavor.

91. **Sales of UP-50.** On March 4, 2021, Petitioner submitted an application to the EPA to register UP-50 as a new end use product under FIFRA and to approve

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the UP-50 label. (Ex1011, ¶¶23-25; Ex1075; Ex1013.) The label for the UP-50 product was approved and the product was registered by the EPA on March 18, 2022. (Ex1011, ¶¶23, 30-31; Ex1013.)

92. Petitioner commercially sold and offered UP-50 for sale prior to August 5, 2022 following approval of an application for EPA registration under FIFRA on March 18, 2022 and at least as early as May 2022. (Ex1018, ¶¶5-35; Ex1027; Ex1031-39; Ex1045-1062; Ex1011, ¶¶23-25.) The existence of the sales of UP-50 was not confidential (Ex1079, p.13); further treated wood products (impregnated with UP-50) were sold and delivered without restriction to downstream customers prior to August 5, 2022. (Exs1032, 1046, 1052, 1059-1061, 1081-1086; Ex1087, ¶¶16-35)

C. The Business Development and Exclusive Supply Agreement for the Sale of UP-50 Wood Preservative Concentrate Product

93. I understand that Ex1027 is a Business Development and Exclusive Supply Agreement (“BDES Agreement”) dated February 5, 2021 between Petitioner and a third party offering the UP-50 product for sale. (Ex1027.) (Ex1018, ¶¶5-6.) The BDES agreement was not of record during prosecution of the ‘716 patent.

94. I am informed by counsel and understand that to the extent the BDES Agreement imposed any obligation to keep the composition of UP-50 confidential, this is legally irrelevant to whether the BDES qualifies as prior art.

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95. I am informed by counsel and understand that there was no express obligation of confidentiality restricting disclosure of the existence of the BDES agreement (or other matters not of a proprietary nature).

96. In my opinion, the BDES Agreement is analogous art, as it involves an offer for sale of UP-50 which is a wood preservative composition and thus is from the same field of endeavor.

UP-50 was Reduced to Practice as of (at Least) December 3, 2020

97. I am informed by counsel and understand that an offer for sale can qualify as prior art if (1) the claimed invention was the subject of a commercial offer for sale; and (2) the invention was ready for patenting. I am informed by counsel and understand that there are at least two ways that an invention can meet the “ready for patenting” prong. Specifically, an invention is ready for patenting if (1) the invention is reduced to practice, or (2) the invention was depicted in drawings or other descriptions that were “sufficiently specific to enable a person skilled in the art to practice the invention,” which is also referred to as “constructive reduction to practice.” In my opinion, UP-50 was constructively reduced to practice as of at least February 5, 2021. A description of UP-50 the invention was “sufficiently specific to enable a person skilled in the art to practice the invention” of at least claim 1. (See Ex1011, ¶¶26-39 and Ex1012, p.21 (discussing manufacture and testing of a UP-50 DCOI block composed of 50% DCOI, 25% Fischer Tropsch wax and 25%

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microcrystalline wax, testing of UP-50, and application for registration under FIFRA with proposed label); Exs1070-1074.)

98. In addition, I am informed by counsel and understand that an invention is actually reduced to practice when the inventor (1) has constructed an embodiment or performed a process that met all of the limitations of a claim, and (2) determined that the invention would work for its intended purpose.

99. In my opinion, UP-50 was actually reduced to practice at least as early as December 3, 2020. Petitioner made UP-50, which as explained herein, meets all of the limitations of (at least) challenged claim 1. Petitioner's internal testing showed that UP-50 worked as a wood preservative and was thus reduced to practice as of (at Least) December 3, 2020). (Ex1070, p.2; Ex1011, ¶¶13-22.)

100. Ex1074 is a report titled "Quick DCOI Summary" created on or about December 23, 2020. Slide 2 of Ex1074 reports that "DCOI UP 50 – Solid with microcrystalline wax *No issues with gelling, crystals or penetration.*" (Ex1074, p.2; Ex1011, ¶16.)

101. In my opinion, additional evaluations by a potential customer showed that UP-50 worked as a wood preservative and was thus reduced to practice. I understand that Ex1070 is a report of an evaluation of UP-50, titled "DCOI Treatment Analysis – UP50 Treatment 1, 2, 3, and 4" prepared on or about December 3, 2020. (Ex1070.) Ex1070 shows that four treatments of UP-50 were evaluated and

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that core samples from each of the four treatments of UP-50 were then prepared and analyzed. Ex1070 further shows that UP-50 met the target uptake and retention metrics. Ex1070 reports that “[a]ll the cores met the required retentions of 0.2 pcf and 0.1 pcf for the outer zones and inner zones respectively.” (Ex1070, p.2; Ex1011, ¶15.) The results of Ex1070 confirmed that the UP-50 product worked for its intended purpose as a wood preservative.

102. I further understand that the potential customer conducted further evaluation of the UP-50 product at least as early January 2021 for the purpose of determining “the optimal treatment parameters for UP-50 to ultimately be used in a full wood treatment facility.” (Ex1071, p.3; Ex1011, ¶17.) The customer provided a report Ex1071 of the results and observations from this testing on January 7, 2021.

103. Ex1071 reported that solid blocks of UP-50 were tested and that these blocks were “composed of 50% DCOI, 25% paraffin waxes and hydrocarbon waxes, and 25% microcrystalline wax.” (Ex1071, p.3.) Ex1071 demonstrates that the UP-50 product worked for its intended purpose by meeting target values for retention and solution uptake of the active ingredient, DCOI. Ex1071 states that “DCOI-UP50 would be capable of treating the poles to meet required retentions.” (Ex1071, p.4.) Ex1071 also states that “DCOI-UP50 was capable of treating four Douglas Fir poles without creating a gel, as well as meet the required assay retentions. Based on these

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observations it appears that DCOI-UP50 would be a suitable wood preservative and should undergo an upsacle experiment . . .” (Ex1071, p.39; Ex1011, ¶18.)

104. A later report (Ex1072) by the potential customer dated April 15, 2021 similarly showed that UP-50 was reduced to practice. As noted in Ex1072, “Pentachlorophenol ... is in the process of being phased out of service as wood preservative. *** The solid block was DCOI UP-50 which was composed of 50% DCOI, and 50% wax variants.” (Ex1072, p.8.)

105. Ex1072 states that the UP-50 product was a solid block with a chemical composition of 50% DCOI, 25% paraffin waxes and hydrocarbon waxes, and 25% microcrystalline wax. (Ex1072, p.8.) Ex1072 reports that “In addition DCOI UP-50 is an acceptable solid block solution as it successfully met all required retentions and gel did not form due to solution matrix.” (Ex1072, p.12; Ex1011, ¶20.) In my opinion, the results demonstrated that UP-50 product worked for its intended purpose.

106. Other reports likewise showed that UP-50 was reduced to practice. I understand that Ex1073 is a presentation a PowerPoint Slide Deck titled “DCOI Treatments Summary” created by or about May 2, 2021. Ex1073 reports on various evaluations, stating that “DCOI UP 50 – SOLID WITH MICROCRYSTALLINE WAX NO ISSUES WITH GELLING, CRYSTALS OR PENETRATION. *** VERY PLEASING APPEARANCE, DOES NEED HEAT TO WORK BUT

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RAPIDLY GOES TO LIQUID UNDER MODERATE TEMPERATURES.”

(Ex1073, p.2.) Slide 19 of Ex1073 further states, “HIGHLIGHTED RESULTS: UP-50; 20X MAGNIFICATION – NO ISSUES AT ALL.” (Ex1073, p.19.)

107. Ex1073 reported that use of UP-50 had “[n]o issues with gelling, crystals or penetration.” (Ex1011, ¶21.) In connection with such use and testing, UP-50 was diluted in organic solvent to form a diluted composition which was used to treat wood products, e.g. utility poles, by contacting the wood for a period of time suitable to inhibit fungal decay in the wood substrate. (Ex1011, ¶ 22.) (Ex1070, p.2 (“[a]ll the cores met the required retentions of 0.2 pcf and 0.1 pcf for the outer zones and inner zones respectively;” Ex1011, ¶15).

108. I understand that, in connection with the use and testing described in Exs1070-1074, UP-50 was diluted in organic solvent to form a diluted composition which was used to treat wood products, e.g. utility poles, by contacting the wood for a period of time suitable to inhibit fungal decay in the wood substrate. For example, Ex1070 reports that “[a]ll the cores met the required retentions of 0.2 pcf and 0.1 pcf for the outer zones and inner zones respectively. (Ex1070, p.2.)

D. Rak (Ex1015)

109. U.S. patent 4,143,010 (“Rak”) is a U.S. patent that issued on March 16, 1979 which I understand from counsel qualifies as prior art. Rak was not of record during prosecution of the ‘716 patent. Rak is directed to a “high retention wood

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preservative composition” and discloses PCP, “an oxathiin compound or other preservative preferably of low mammalian toxicity.” (Ex1015, Abstract.) Rak states that treated wood suffered from disadvantages such as “loss of PCP from the wood and low water repellency and weather resistance,” resulting in “lowering of service life” and other concerns. (Ex1015 at Title, Abstract, 1:19-38, 11:16-17:19 (showing comparative examples).)

110. Rak teaches a wood preservative composition comprising a vinyl-type polymer, a wax and an organic wood preservative agent for “increasing leaching-resistance” and “extend[ing] the toxicity of treated wood to decay fungi, thus prolonging the service life.” (Ex1015, 1:62-2:8, 11:17-68 (Example 9) (“additives of the invention were significantly more leach resistant than their counterpart samples treated [without additives]”, 13:1-53 (Example 11) (“additives play an important role in increasing leaching resistance”), 15:31-4 (“additives bestow an unexpected extension of resistance to wood decay ...”).) Rak teaches use of wax and other hydrophobic agents as additives. (Ex1015, 2:30-50 (stating in part, “Paraffin waxes have been tested and provided the same degree of water repellency as the fatty acids....”), 6:25-7:47, 11:18-17:20 (showing examples).)

111. Rak describes a “concentrate” either without a solvent or with “small amounts of the organic solvent adapted for dilution to form a final solution at the job site.” (Ex1015, 17:20-24.) Rak discloses concentrations of organic wood

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preservative agent, hydrophobic agent which can be a wax, and vinylic-type polymer in amounts and weight ratios that encompass the ranges of the challenged claims with respect to DCOI and retaining additive. (Ex1015, 11:24-38; *see also infra* at XII.I (regarding claimed weight percentages and weight ratios.)

E. Cui (Ex1016)

112. Cui is a U.S. patent application that was filed on September 5, 2005 and published on March 16, 2006 which I understand from counsel qualifies as prior art. (Ex1016, Title page). Cui was of record during prosecution of the ‘716 patent, but not in the context of the combinations discussed herein, which reference (e.g., Rak and AWWA paper) are more material than prior art of record, as shown below. Cui discloses wood preservative compositions comprising DCOI solubilized in an organic phase comprising a wax. (Ex1016, ¶¶19, 21, 37, claims 3, 9-13.)

113. Cui states that “fixation and depletion” and “poor distribution gradient” are among the concerns with organic preservatives. (Ex1016, ¶12.) Cui teaches that “[t]he combined use of wax, solubility enhancing agents, and organic acids provide the benefits of excellent water repellency [and] low preservative leaching” (*Id.* at ¶29.)

114. Cui further states, “Exemplary strong hydrophobes include waxes, such as petroleum waxes, natural waxes, synthetic waxes, or a combination of these. Exemplary petroleum waxes include slack wax or microcrystalline wax ***

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Exemplary synthetic waxes include polyethylene wax” (*Id.* at ¶¶21, 41, 47, 50, Examples 1 and 3 (slack wax).)

115. It is my opinion that Cui is analogous art, as Cui discloses wood preservative compositions and thus is from the same field of endeavor.

F. AWPAs Standards P39-18 (Ex1029) & HSA-18 (Ex1030)

116. The AWPAs introduced standards for using wood preservatives for wood treatment. AWPAs standard P39-18 (Ex1029) is the 2018 standard for DCOI in a solvent for preserving wood. P39-18 specifies the solvents to be used with DCOI are Hydrocarbon Solvent Type A and Hydrocarbon Solvent Type C. (Ex1029, p.5.) P39-18 also lists the minimum retention of DCOI in the wood required for efficacy and specifies a minimum retention of DCOI of 0.08 pcf for ground contact applications. (Ex1029, p.5, “minimum retentions”.)

117. AWPAs standard HSA-18 is the 2018 standard for Hydrocarbon Solvent Type A, published as of 2018 and thereafter. (Ex1030, p.5) HSA-18 specifies that the solvent should have a flash point of at least 66 C. (Ex1030, p.5, “flash point.”) AWPAs standard P39-18 (Ex1029) and HSA-18 (Ex1030) were published as of 2018, and I understand from counsel that each reference qualifies as prior art. These references were not of record during prosecution of the ’716 patent, although HSA-18 was mentioned in the ’716 patent specification.

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118. It is my opinion that P39-18 and HSA-18 are analogous art, as they pertain to standards for wood preservative compositions and thus are from the same field of endeavor.

G. AWPAPaper (Ex1028)

119. The AWPAPaper was presented at the 2018 annual meeting of the American Wood Protection Association (“AWPA”). (Ex1028, pp.1-11; Ex1011, ¶6.) The paper was collated with other papers presented at the meeting and published as a book distributed to participants after the annual meeting as of 2018. It is my understanding from counsel that the AWPAPaper qualifies as prior art under AIA 35 U.S.C. §102(a)(1). The AWPAPaper was not of record during prosecution of the ‘716 patent.

120. The AWPAPaper discloses the use of oil-borne DCOI compositions for the treatment of wood products such as poles, posts, and sawn cross arms. (Ex1028, pp.11-42.) The paper reports the results of several wood treatment studies comparing solvent-based DCOI to solvent-based PCP. The results demonstrated that DCOI in solvents, such as diesel, blends of diesel and biodiesel, toluene, and hydrocarbon oils, can meet AWPAPenetration requirements, provide efficacy against fungi and termites, and provide excellent performance compared to PCP at equivalent retention levels. (Ex1028, pp.11-42.)

H. HCS 25 Safety Data Sheet (Ex1064) and de Mattos (Ex1063)

121. The HCS 25 Safety Data Sheet (“SDS”) is dated January 15, 2015, and describes a hydrocarbon solvent for use as a wood and wood pole processing oil. (Ex1064, p.1.) The HCS 25 hydrocarbon solvent was sold and offered for sale for wood treatment at least as early as 2015 (Ex 1065-1066.) Customers received the HCS 25 SDS with the HCS 25 product. I understand from counsel that the HCS 25 SDS and HCS 25 hydrocarbon solvent are prior art; these references were not of record during prosecution of the ‘716 patent.

122. The HCS 25 hydrocarbon solvent comprises hydrotreated petroleum distillates and has a flash point of 150 °C. (Ex1064, p.3.) The HCS 25 product and SDS are analogous art, as the HCS 25 product is a hydrocarbon solvent for use in wood treatment and thus is from the same field of endeavor.

123. Also, Ex1063 (de Mattos) is a report entitled “Correlation Between the Composition and Flash Point of Diesel-Biodiesel Blends,” published in 2015 from the Journal of the Brazilian Chemical Society. I understand from counsel de Mattos qualifies as prior art; de Mattos was not of record during prosecution of the ‘716 patent.

124. de Mattos shows that diesel/biodiesel blends exist having 75% or more biodiesel and that have flash points of at least 80°C. (Ex1063, p.2 (Table 1); XII.A.14.)

125. In my opinion, de Mattos is analogous art because it is at least reasonably pertinent to the particular problem the patent at issue is concerned with, including organic solvents having a flash point of at least 80 degrees Celsius.

X. THE CHALLENGED CLAIMS ARE NOT ENTITLED TO CLAIM PRIORITY TO THE '817 PROVISIONAL APPLICATION

A. Legal Standard for Priority

126. As discussed above with regard to the legal standard establishing priority, it is my understanding based on my discussions with counsel, that for a non-provisional application to be afforded the priority date of a provisional application, 35 U.S.C. §119(e) requires that the specification of the provisional application contain a description of the invention that complies with the written description and enablement requirements of 35 U.S.C. §112.

127. As explained below, it is my opinion that the '817 provisional fails to provide written description support for the DCOI and retaining additive concentrations recited in every independent claim, the wax melting temperatures recited in independent claim 13, and the microcrystalline wax limitation recited in independent claim 26. It is therefore my opinion that no claim in the '716 patent is entitled to the filing date of the '817 provisional.

B. The '817 Provisional Does not Contain Written Description Support for the Weight Percent Ranges and Weight Ratios of the Challenged Claims

128. It is my opinion that neither the weight ranges of 40-60% for the DCOI and retaining additive recited in claims 1 and 26, nor the weight ranges of 45-55% for the DCOI and retaining additive recited in claim 13, or sufficient description leading a POSA to the same, appear anywhere in the '817 provisional (Ex1005).

129. The '817 provisional discloses an open range of “at least 0.5% by weight based on the total weight of the composition,” for DCOI, but further discloses that “the DCOI concentration can comprise *no greater than 10% by weight based on the total weight* of the composition.” (Ex1005, ¶13.) The '817 provisional application identifies specific ranges of “0.5% to 10% by weight” (and narrower ranges) for the DCOI concentration. (*Id.*)

130. Similarly, the '817 provisional discloses that the retaining additive concentration is “at least 0.05% by weight based on the total weight of the composition,” and further teaches a concentration of the retaining additive of *no greater than 20% by weight based on the total weight of the composition*. (*Id.* at ¶32.) The only identified ranges for the retaining additive concentration in the '817 provisional are 0.05% to 20% by weight (and narrower ranges). (*Id.*)

131. The '817 provisional mentions that the wood preservative composition can be formulated as a “concentrated” composition in either a solid or liquid form,

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containing e.g., greater than 5% by weight DCOI—or as a diluted or ready to treat formulation containing 0.5% to 5% by weight DCOI, based on the total weight of the composition. Ex1005, ¶50. The only example of a “concentrated” composition in the ’817 provisional contains 23.5% DCOI and 25% by weight retaining additive in a solvent. (*Id.* at ¶¶69-70.)

132. It is my opinion that the disclosed ranges for the concentrations of DCOI and retaining additive in the ’817 provisional do not describe, support, or lead a POSA to the 40-60% and 45-55% by weight ranges claimed in the ’716 patent. Nothing in the ’817 provisional suggests that the bottom end of the DCOI and retaining additive ranges should be 40% or 45% by weight. Nor is there a disclosure that the top end of the ranges should be 60% or 55% by weight. Further, the teaching of a DCOI concentration of no greater than 10% by weight and a retaining additive concentration of no greater than 20% by weight, coupled with the disclosure of specific and much lower weight percent ranges, directs one skilled in the art *away from* concentrations of DCOI and retaining additive as high as 40% by weight.

133. It is my opinion that the disclosure of broad ranges in the ’817 provisional, such as the disclosed “greater than 5% by weight DCOI” range, do not provide written description support for the weight percentages recited in the ’716 patent claims. Here, no “blaze marks” or other description direct a POSA to a preservative composition comprising 40-60% or 45-55% by weight DCOI and

retaining additive comprising a wax, respectively. It is my opinion that the '817 provisional specification does not provide any guidance or direction leading one skilled in the art to a wood preservative composition comprising 40-60% or 45-55% by weight DCOI and retaining additive comprising a wax, respectively.

C. PO's '817 Provisional Does Not Provide Written Description Support for the Melting Temperature of the Wax

134. In my opinion, there is nothing in the specification of the '817 provisional that demonstrates that the inventors believed that the melting point of the wax recited in independent claim 13 (and dependent claims 4 and 5) was part of their invention. The *only disclosure* in the '817 provisional regarding the wax component is the single sentence stating the wax “can comprise a paraffin wax, an olefin wax, a petroleum wax, a carnauba wax, a polyethylene wax, a slack wax, a silicone wax, a polypropylene wax, a polytetrafluoroethylene (PTFE) synthetic wax, or a combination thereof.” (Ex1005, ¶34.) Completely absent is any mention of melting temperatures of the wax, let alone the melting point temperature range of 75 to 100 degrees Celsius recited in claim 13 (as well as the ranges recited in claims 4 and 5). Nor is there any indication that the inventors attributed any importance to the melting point of the wax.

D. PO's '817 Provisional Does Not Provide Written Description Support for a Microcrystalline Wax

135. Microcrystalline wax is nowhere identified in the '817 provisional as a wax that could be used as a retaining additive. The word "microcrystalline" does not appear anywhere in the '817 provisional. Even assuming a microcrystalline wax is a type of petroleum wax, in my opinion, the disclosure of a petroleum wax genus is not a written description of a particular sub-genus or species of wax. I am informed by counsel and understand that to satisfy the written description requirement the specification must describe an invention understandable to one skilled in the art and "show that the inventor actually invented the invention claimed." Here, it is my opinion that there is no indication in the '817 provisional that the inventors even contemplated using a microcrystalline wax as a retaining additive. In my opinion, the '716 patent lacks written description support for the microcrystalline wax recited in independent claim 26 (and claim 8).

XI. SUMMARY OF ASSERTED GROUNDS

136. As detailed in this Declaration, it is my opinion that the challenged claims are unpatentable based on the following grounds:

GROUND	BASIS	CLAIMS	PRIOR ART
1	§§102, 103	1-5, 7-27	Archer

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GROUND	BASIS	CLAIMS	PRIOR ART
2	§§102, 103	1-5, 7-12, 14-16 and 20-27	UP-50/UP-50 Label ³
3	§103	17-19	UP-50/UP-50 Label, AWWA paper, AWWA Standard HSA-18, HCS25 SDS
4	§§102, 103	1-5, 7-10, 12, and 26	BDES Agreement
5	§103	11, 14-16 and 20-25 and 27	BDES Agreement, AWWA Paper
6	§103	17-19	BDES Agreement, AWWA Paper, AWWA Standard HSA-18, HCS25 SDS
7	§103	1-16 and 20-27	Rak, AWWA Paper, Cui
8	§103	17-19	Rak, AWWA Paper, Cui, AWWA Standard HSA-18, HCS25 SDS
9	§112 lack of enablement and written description; indefiniteness	1, 3-12, and 14-25	

³ “UP-50/Label” includes the UP-50 product, and the public use, commercial sale, and offer for sale of the same, together with the UP-50 Label (Ex1014).

XII. FACTS AND OPINIONS RELEVANT TO THE APPLICATION OF PRIOR ART TO THE CHALLENGED CLAIMS⁴

137. I am informed from counsel and understand that when a claim covers several compositions (e.g., by recitation of ranges or a number of species with a genus), that claim is “anticipated” if one of them is in the prior art. For example, it is my understanding that a prior art range anticipates a claimed range if the prior art describes the claimed range with sufficient specificity such that a reasonable fact finder could conclude that there is no reasonable difference in how the invention operates over the ranges.

138. It is also my understanding that a prior art reference that discloses a broader overlapping range anticipates a claimed range unless the claimed range is “critical” to the claimed invention. It is my understanding that if there is no considerable difference between how the alleged invention would operate within the claimed range and within the range disclosed in the prior art, the claimed range is anticipated. It is my understanding that if a claimed range overlaps or lies inside ranges disclosed by the prior art, the range is prima facie obvious.

⁴ My analysis with respect to dependent claims should be understood to incorporate pertinent prior analyses of the claims upon which they depend.

A. Ground 1: Claims 1-5, 7-27 are Anticipated By or at a Minimum Rendered Obvious By Archer

139. It is my opinion, as explained below, that Archer anticipates or renders obvious claims 1-5, 7-27. In my opinion, to the extent there is any question whether Archer anticipates any element of 1-5, 7-27, the element or claim would have been obvious based on Archer for substantially similar reasons. That is, to the extent any limitation is not disclosed by Archer, it is my opinion that it would have been strongly suggested to a POSA for the same reasons discussed in Ground 1 below for that limitation. Further, given the nature and identical teachings in Archer of each disclosed or suggested element, as articulated in Ground 1 below, it is my opinion that a POSA would have been motivated to arrive at the claim inventions as a whole based on Archer and the knowledge of a POSA.

1. Independent Claim 1

a) [1.Pre]. “A wood preservative composition comprising”

140. It is my opinion that to the extent limiting, Archer discloses the preamble [1.Pre] of claim 1. (Ex1007 and Ex1010 at Abstract (“The presently claimed and described technology provides wood preservative compositions”), ¶¶4-7, 38-39, 41, claims 1-9.)⁵

⁵ All citations to Archer (Ex1007) have identical support in corresponding numbered

b) *[1.a]. “40% by weight to 60% by weight 4,5-dichloro-2-octyl-isothiazol-3-one (DCOI) based on a total weight of the composition; and”*

141. It is my opinion that Archer discloses element [1.a]. Archer states that “[i]n exemplary aspects of the composition, the preservative is DCOI.” (Ex1007 and Ex1010, ¶¶47, 5-6, 24, 67-82, 85-89, claims 1, 3 (which recite or otherwise include DCOI); *see also* Abstract (“The presently claimed and described technology provides wood preservative compositions comprising a preservative”); ¶6 (“In some aspects of the composition, the preservative comprises 4,5-dichloro-2-n-octyl-3-isothiazolone.”); ¶47 (“In exemplary aspects of the composition, the preservative is DCOI.”).

142. Archer discloses a “50% DCOI and 50% wax” composition in Example 6. (Ex1007 and Ex1010, ¶80.) Archer states that all percentages are expressed in weight percent (%), based on the total weight of the composition or formulation, unless otherwise specified. (Ex1007 and Ex1010, ¶37.) It is my opinion that the 50% by weight DCOI in the Example 6 composition falls squarely within the 40-60% weight range of DCOI recited in claim 1 and therefore anticipates this element.

paragraphs of the ’794 provisional application. As such, all citations to Archer (Ex.1007) shall be understood to also cite to corresponding paragraphs of the ’794 provisional application (Ex1010).

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143. Archer also states that “the preservative is 35%-80% by total weight of the composition, alternatively 40%-75% by total weight of the composition, alternatively 45%-70% by total weight of the composition.” (Ex1007 and Ex1010, ¶53 (“In some aspects, the preservative is 35% – 80% by total weight of the composition, alternatively 40% - 75% by total weight of the composition, alternatively 45% - 70% by total weight of the composition. In exemplary aspects, the preservative is 35%-79.5% by total weight of the composition.”); ¶ 80 (“wood treatment composition of 50% DCOI and 50% wax”)). Archer therefore discloses wood preservative compositions having 40% by weight to 60% by weight DCOI based on the total weight of the composition.

144. It is my opinion that the ranges disclosed in Archer encompass and overlap the claimed range of 40-60% by weight and render element [1.a] prima facie anticipated and obvious. It is my opinion that there is no considerable difference between how the alleged invention would operate within the claimed ranges (e.g., 40-60% by weight) and within the range disclosed in the prior art. For example, the '716 specification discloses concentrated compositions that can comprise DCOI in a range of 5% to 80% by weight, 20% to 80% by weight, 30% to 70% by weight, 40% to 50% by weight, or 45% to 55% by weight and does not disclose any difference in properties between the disclosed ranges. (Ex1001, 10:47-52; *see also* VI.C.1.) The '716 specification also provides concentrate examples in which DCOI

is about 23% by weight, demonstrating a suitable DCOI concentration outside the claimed range and providing further evidence that the claimed ranges are not critical. (Ex1001, 14:41-50, 18:50-19:59.)

c) [1.b]. “40% by weight to 60% by weight of a retaining additive comprising a wax based on the total weight of the composition,”

145. It is my opinion that Archer discloses element [1.b]. Archer discloses wood treatment compositions that include a wax. (Ex1007 and Ex1010 at Abstract (“The presently claimed and described technology provides wood preservative compositions comprising a preservative, a wax, and an organic solvent”); ¶ 56 (“In some aspects, the composition or the ready-to-use formulation is a solid made up of a wax and an active ingredient (i.e., preservative).”), ¶¶4, 7-8, 13, 25-28, 48-52, 56, 80, and claims 1, 3-7.) Archer therefore discloses the recited retaining additive. Archer also teaches that its waxes “prevent or minimize leaching/depletion of active preservatives” and the wax-containing compositions “result in lower preservative depletion in the treated wood (i.e., reduced preservative leaching).” (Ex1007 and Ex1010, ¶¶55, 70-82, 85-87.) Archer therefore discloses the recited

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retaining additive even under a narrow (improper) construction of the term “retaining additive”⁶

146. As discussed above for element [1.a], Archer discloses a “50% DCOI and 50% wax” composition in Example 6. (XII.A.1.b; Ex1007 and Ex1010, ¶ 80 (“wood treatment composition of 50% DCOI and 50% wax”).) It is my opinion that the 50% by weight retaining additive in the composition of Example 6 falls squarely within the 40-60% weight range of retaining additive recited in claim 1 and therefore anticipates element [1.b].

147. Archer also discloses that, “[i]n some aspects, the wax is 20-60% by total weight of the composition, alternatively 30-50% by total weight of the composition, alternatively 30-40% by total weight of the composition.” (Ex1007 and Ex1010, ¶50.) The disclosed range in Archer of 20-60% by weight wax encompasses the claimed 40-60% by weight retaining additive comprising a wax and renders element [1.b] prima facie anticipated and obvious.

148. The ’716 patent demonstrates that, like the claimed 40-60% by weight for the DCOI component, the 40-60% by weight range of retaining additive is not

⁶ This explanation that Archer discloses a retaining additive under Petitioner’s claim construction and also the any asserted (improper), narrower construction should be understood to apply to all grounds relying upon Archer, including dependent claims.

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critical to the practice of the claimed invention. The specification states that the “concentrated” composition can comprise retaining additive in a range of 5% to 80% by weight, 20% to 80% by weight, 30% to 70% by weight, 40% to 50% by weight, or 45% to 55% by weight and does not disclose any difference in properties between the disclosed ranges. (Ex1001, 10:66-11:5; *see also id.* 6:14-43; 12:10-12; VI.C.1.). Thus, it is my opinion that there is no considerable difference between how the alleged invention would operate within the claimed range and within the ranges disclosed in Archer.

149. By way of further example, the ‘716 patent states that “[i]ncertain examples, the wood preservation composition can be adjusted to have enhanced DCOI leach resistance without the use of the retaining additive.” (Ex1001, 12:10-12.) In my opinion, this is further evidence that the claimed range of 40% by weight to 60% by weight of a retaining additive is not critical.

d) [1.c]. “wherein a weight ratio of the DCOI to the retaining additive is in a range of 1:5 to 5:1”

150. It is my opinion that Archer discloses element [1.c]. Example 6 of Archer discloses “a wood treatment composition of 50% DCOI and 50% wax.” (Ex1007 and Ex1010, ¶80 (disclosing a wood preservative composition having a 1:1 weight ratio of DCOI to retaining additive (*i.e.*, disclosing a “wood treatment composition of 50% DCOI and 50% wax”).) The 50% DCOI and 50% wax

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composition discloses a 1:1 weight ratio (50%:50%) of DCOI and wax, which falls within the 5:1 to 1:5 weight ratio recited in claim 1 and anticipates element [1.c].
(*See also* XII.A.1.b; XII.A.1.c.)

151. Archer also discloses that the wax can be 20%-60% by weight of the composition and the preservative (which can be DCOI) can be 35%-80% by weight of the composition (Ex1007 and Ex1010, ¶¶50 (“In some aspects, the wax is 20% - 60% by total weight of the composition, alternatively 30% - 50% by total weight of the composition, alternatively 30% - 40% by total weight of the composition.”), 53 (“In some aspects, the preservative is 35% – 80% by total weight of the composition, alternatively 40% - 75% by total weight of the composition, alternatively 45% - 70% by total weight of the composition. In exemplary aspects, the preservative is 35%-79.5% by total weight of the composition.”)). The weight percent ranges for DCOI and the retaining additive disclosed in Archer translate to DCOI/retaining additive weight ratios that fall within the claimed weight ratio of 1:5 to 5:1 of DCOI and retaining additive, rendering element [1.c] *prima facie* anticipated and obvious. It is also my opinion that there is also no showing that the recited weight ratio range is critical, and the '716 patent's disclosure of widely varying weight percentages of these two components shows otherwise. (VI.C.1.)

2. Dependent Claim 2

- a) *[2]. “The wood preservative composition of claim 1, wherein the weight ratio of the DCOI to the retaining additive is in a range of 1:1.5 to 1.5:1.”*

152. It is my opinion that Archer anticipates and renders obvious claim 2 for the same reasons explained above regarding claim 1. Claim 2 depends from claim 1 and recites a narrower weight ratio. (See XII.A.1 (regarding claim 1) and XII.A.1.d (regarding element [1.d].))

153. As discussed above for element [1.c], Archer discloses weight percent ranges for DCOI and the retaining additive disclosed that translate to DCOI/retaining additive weight ratios that encompass and fall within the claimed weight ratios for DCOI to retaining additive. It is my opinion that Archer discloses weight ratios of the DCOI to the retaining additive that encompass and fall within the narrower range of claim 2 (1:1.5 to 1.5:1) (*see, e.g.*, Ex1007 and Ex1010 at ¶ 56 (“In some aspects, the composition or the ready-to-use formulation is a solid made up of a wax and an active ingredient (i.e., preservative).”); ¶ 53 (“In some aspects, the preservative is 35% – 80% by total weight of the composition, alternatively 40% - 75% by total weight of the composition, alternatively 45% - 70% by total weight of the composition. In exemplary aspects, the preservative is 35%-79.5% by total weight of the composition.”); ¶ 50 (“In some aspects, the wax is 20% - 60% by total weight of the composition, alternatively 30% - 50% by total weight of the composition,

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alternatively 30% - 40% by total weight of the composition.”); ¶ 80 (disclosing a wood preservative composition having a 1:1 weight ratio of DCOI to retaining additive (*i.e.*, a “wood treatment composition of 50% DCOI and 50% wax”)).

154. Archer also discloses a 1:1 weight ratio of DCOI to wax disclosed in Example 6 (which falls within the 1:1.5 to 1.5:1 weight ratio recited in claim 2). (Ex1007 and Ex1010, ¶ 80 (disclosing a wood preservative composition having a 1:1 weight ratio of DCOI to retaining additive (*i.e.*, a “wood treatment composition of 50% DCOI and 50% wax” has a DCOI/retaining additive weight ratio of 1:1).) The 50% DCOI and 50% wax disclosed in Archer Example 6 is a 1:1 weight ratio of DCOI to wax that falls within the 1:1.5 to 1.5:1 weight ratio recited in claim 2. Further, compositions containing a wax within the weight range of 20-60% and DCOI within the weight range of 35-80% as disclosed in Archer would have weight ratios encompassing and within the 1:1.5 to 1.5:1 range recited in claim 2. (*See* XII.A.1.)

155. It is also my opinion that the ‘716 patent does not demonstrate or otherwise recite any criticality with respect to the claimed narrower weight ratio of DCOI to retaining additive. (*See, e.g.*, Ex1001 at 6:3-13 (indicating that that the wood preservative compositions can comprise weight ratios of DCOI to retaining additive in any number of varied ranges); *see also* VI.C.1).

3. Dependent Claim 3

- a) *[3]. “The wood preservative composition of claim 1, wherein the wax comprises an olefin wax, a petroleum wax, a carnauba wax, a polyethylene wax, a silicone wax, a polypropylene wax, a polytetrafluoroethylene (PTFE) synthetic wax, or a combination thereof.”*

156. It is my opinion that Archer anticipates or at least renders claim 3 obvious as explained below. Claim 3 depends from claim 1 and recites specific waxes. (See XII.A.1 (regarding claim 1).)

157. Archer discloses that its wood preservative compositions include wax and that its wax can include “*petroleum waxes*, scale waxes, synthetic waxes, natural waxes (e.g., *carnauba*, montan), or a combination thereof.” (Ex1007 and Ex1010, ¶48 (“Waxes of the present disclosure include petroleum waxes . . . natural waxes (e.g., carnauba or montan), or a combination thereof. . . .”). Archer also discloses that the wax of its wood preservative composition can be “a synthetic wax, such as but not limited to, Fischer Tropsch wax, *polyethylene wax*, or an oxidized *polyethylene wax*.” (Ex1007 and Ex1010, ¶48 (In some aspects, the wax is a synthetic wax, such as but not limited to . . . polyethylene wax”), claims 4, 5, 24, 25 (claiming petroleum wax).) It is my opinion that Archer’s disclosure of petroleum waxes, carnauba waxes, and polyethylene wax anticipates claim 3. (Ex1007 and Ex1010, claims 4 and 5.) Moreover, it is my opinion that using the

recited waxes was well-known and within the skill set of a POSA, and routine for wood treatment prior to 2022.

4. Dependent Claims 4 and 5

- a) *[4]. “The wood preservative composition of claim 1, wherein the wax comprises a melting point in a range of 40 degrees Celsius to 100 degrees Celsius.”*
- b) *[5]. “The wood preservative composition of claim 1, wherein the wax comprises a melting point in a range of 75 degrees Celsius to 100 degrees Celsius.”*

158. It is my opinion that Archer anticipates or at least renders claims 4 and 5 obvious as explained below. Claims 4 and 5 depend from claim 1 and recite melting points of the claimed wax. (See XII.A.1 (regarding claim 1) and XII.A.3 (regarding claim 3).)

159. With respect to its wood preservative compositions, Archer states “[e]xemplary waxes ... have a melting point between, and inclusive of, 75°C-110°C, alternatively 75°C -100°C ...” (Ex1007 and Ex1010 at ¶51 (“Exemplary waxes of the disclosure provide a good water repellency to wood and wood products, have a melting point between, and inclusive of, 75°C - 110°C, alternatively 75°C - 100°C, alternatively 80°C - 100°C, and an oil content between, and inclusive of, 0.1% - 10%, alternatively 1% - 10%. In some aspects, waxes of the disclosure have a melting point between, and inclusive of, 85°C - 95°C.”); see also ¶¶4 (“ii. a wax having a melting point between and inclusive of about 75°C to 100°C”), 13 (same),

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22 (same); claims 1, 11, 21 (claiming 75°C-100°C).) Archer's disclosed 75-100 °C wax melting point range falls squarely within the claimed 40-100 °C and 75-100 °C ranges. Moreover, there is no showing of criticality of the claimed ranges, and the widely varying melting point ranges of the '716 patent shows otherwise. (Ex1001 at 6:62-7:9 (indicating that that the wax can have a melting point within any number of varied ranges); *id.* at 6:62-63 ("The wax can comprise a melting point suitable for handling and/or for a desirable treatment application.")).

160. It is therefore my opinion that Archer anticipates and renders obvious claims 4 and 5. It is also my opinion that the melting point of the wax component in the retaining additive is no more a selection based on routine optimization to achieve a desired outcome, e.g., "suitable for handling and/or for a desirable treatment application." (*See, e.g.*, Ex1001 at 6:62-63 ("The wax can comprise a melting point suitable for handling and/or for a desirable treatment application.")).

5. Dependent Claim 7

a) [7]. *"The wood preservative composition of claim 1, wherein the wax comprises a petroleum wax."*

161. It is my opinion that Archer anticipates or at least renders claim 7 obvious. Claim 7 depends from claim 1 and recites that the wax comprises a petroleum wax. (*See* XII.A.1 (regarding claim 1); *see also* XII.A.3 (regarding claim 3).)

162. Archer discloses that its wood preservative compositions include wax and that its wax can include “*petroleum waxes, scale waxes, synthetic waxes, natural waxes (e.g., carnauba, montan), or a combination thereof.*” (Ex1007 and Ex1010, ¶48 (“Waxes of the present disclosure include petroleum waxes”); *see also* discussion above at XII.A.3 (regarding claim 3).)

6. Dependent Claim 8

- a) ***[8]. “The wood preservative composition of claim 1, wherein the wax comprises paraffin wax and a microcrystalline wax.”***

163. It is my opinion that Archer anticipates or at least renders claim 8 obvious. Claim 8 depends from claim 1 and recites that the wax comprises paraffin wax and a microcrystalline wax. (*See* XII.A.1 regarding claim 1.)

164. Archer discloses “in exemplary aspects, the wax composition is a blend of Fischer Tropsch wax and microcrystalline wax.” (Ex1007 and Ex1010, ¶49 (“For example, in exemplary aspects, the wax composition is a blend of Fischer Tropsch wax and microcrystalline wax.”); *see also* ¶8 (“in some aspects of the composition, the wax comprises a blend of a petroleum wax and a synthetic wax, wherein the petroleum wax comprises a microcrystalline wax and the synthetic wax comprises a Fischer Tropsch wax.”), ¶26 (same); claims 5 (same), 25 (same).) In my opinion, a POSA would understand that Fischer-Tropsch wax is a synthetic paraffin wax synthesized by the Fischer-Tropsch process, and therefore Archer’s disclosure of a

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Fischer Tropsch wax is a disclosure of a paraffin wax. (Ex1041 at p. 1 (“Synonyms: Paraffin wax; FTHard Wax”); Ex1067, p.22 (indicating that Fischer-Tropsch wax is a synonym for paraffin wax).) It is my opinion that Archer therefore expressly discloses a wax comprising paraffin wax and a microcrystalline wax and thus anticipates and renders claim 8 obvious.

165. Moreover, the '716 patent does not describe any particular effect of the claimed combination of waxes or provide any example of a combination of waxes. The claimed combination merely combines two known waxes for their intended purpose to yield the predictable and desirable result of enhancing retention of preservative in treated wood. (Ex1007/Ex1010, ¶48.) A POSA would have had a reasonable expectation of success in using the recited combination of waxes; use of such waxes was well-known prior to 2022 for wood treatment compositions and implementing the recited waxes in the composition of Archer would have been a routine matter well within the ability of a POSA.

7. Dependent Claim 9

- a) *[9]. “The wood preservative composition of claim 1, wherein the composition comprises 45% by weight to 55% by weight of the DCOI based on the total weight of the composition and 45% by weight to 55% by weight of the retaining additive based on the total weight of the composition.”*

166. It is my opinion that Archer anticipates or at least renders claim 9 obvious as explained below. Claim 9 depends from claim 1 and recites that the

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composition comprises narrower ranges of “45% by weight to 55% by weight of the DCOI based on the total weight of the composition and 45% by weight to 55% by weight of the retaining additive based on the total weight of the composition.” (See XII.A.1 (regarding claim 1), XII.A.1.b (regarding element [1.a], and XII.A.1.c (regarding element [1.b]; *see also* XII.A.2 (regarding claim 2).)

167. In my opinion, Archer discloses the narrowed ranges of DCOI and the retaining additive recited in claim 9 for the same reasons discussed above for claim 1. (See XII.A.1 (regarding claim 1); *see also* XII.A.2 (regarding claim 2).) Archer states that “the preservative is 35%-80% by total weight of the composition, alternatively 40%-75% by total weight of the composition, alternatively 45%-70% by total weight of the composition.” (Ex1007 Ex1010, ¶53.) Archer also states that “the wax is 20%-60% by total weight of the composition.” (Ex1007 and Ex1010, ¶50.) These ranges discloses in Archer overlap and encompass the claimed narrower range. Furthermore, Example 6 of Archer discloses a composition having 50% DCOI and 50% wax, which falls directly with the claimed narrower ranges for DCOI and the retaining additive. (Ex1007 and Ex1010, ¶80 (“wood treatment composition of 50% DCOI and 50% wax”).)

168. Further, it is my opinion that the ‘716 patent does not demonstrate or otherwise recite any criticality with respect to the claimed weight percentage ranges for DCOI or the retaining additive. (Ex1001 at 10:36-52 (indicating that wood

preservative compositions can comprise DCOI in any number of varied ranges, including ranges outside the claimed range); *id.* at 6:14-43 (indicating that wood preservative compositions can comprise the claimed retaining additive in any number of varied ranges, some outside the claimed ranges); *see also* XII.A.1, XII.A.2, and VI.C.1). In my opinion, Archer therefore anticipates and renders claim 9 obvious.

8. Dependent Claim 10

- a) *[10]. “The wood preservative composition of claim 1, wherein the composition consists essentially of the DCOI and the retaining additive.”*

169. It is my opinion that Archer anticipates or at least renders claim 10 obvious as explained below. Claim 10 depends from claim 1 and recites that the composition consists essentially of the DCOI and the retaining additive. (*See* XII.A.1 (regarding claim 1).)

170. It is my opinion that Archer discloses that the composition of claim 1 can consist essentially of DCOI and retaining additive. Archer discloses that “[i]n some aspects, the composition or the ready-to-use formulation is a solid made up of a wax and an active ingredient (i.e., preservative)” and further discloses that DCOI is an exemplary preservative. (Ex1007 and Ex1010, ¶¶56 (“In some aspects, the composition or the ready-to-use formulation is a solid made up of a wax and an active ingredient (i.e., preservative).”), 6 (“In some aspects of the composition, the

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preservative comprises 4,5-dichloro-2-n-octyl-3- isothiazolone.”.) Archer also discloses that the composition “can be provided as one or more separate ingredients, such as the preservative and wax as a concentrate suitable for dilution in the solvent.” (Ex1007 and Ex1010, ¶56 (“Alternatively, the composition of the present disclosure can be provided as one or more separate ingredients, such as the preservative and wax as a concentrate suitable for dilution in the solvent”).) Additionally, Example 6 of Archer illustrates an embodiment of a wood treatment composition that consist essentially of 50% by weight DCOI and 50% wax. (Ex1007 and Ex1010, ¶80 (“wood treatment composition of 50% DCOI and 50% wax”).) The only components in this embodiment (before dilution) are DCOI and wax (retaining additive). It is my opinion that Archer therefore discloses a composition consisting essentially of DCOI and retaining additive.

171. It is also my opinion that it was well-known that it is more economical for formulators to make and ship a concentrated formulation to customers who then dilute the formulation at the point of use. (*See* VI.A.5; *see also* Ex1020 at ¶32 (“concentrates can reduce the cost of transport and storage.”); Ex1015, 17:20-24 (“The preservative can be prepared in the form of a masterbatch or concentrate (without the organic solvent) . . . adapted for dilution to form the final solution at the jobsite.”); Ex1020, ¶32 (“In many instances biocides are supplied as concentrates which are intended to be diluted before use. Supplying in the form of biocide

concentrates can reduce the cost of transport and storage.”.) In my opinion, a POSA would therefore have been motivated to provide the wood preservative composition of claim 1, wherein the composition consists essentially of the DCOI and the retaining additive. A POSA would have a reasonable expectation of success in doing so because providing such a composition was well within the knowledge and skill of a POSA.

9. Dependent Claim 11

- a) *[11]. “The wood preservative composition of claim 1, wherein the composition further comprises an organic solvent.”*

172. It is my opinion that Archer anticipates or at least renders claim 11 obvious as explained below. Claim 11 depends from claim 1 and recites that the composition further comprises an organic solvent. (*See* XII.A.1 regarding claim 1.)

173. Archer discloses and claims that the wood treatment compositions of its invention are dissolved or dispersed in an organic solvent. (Ex1007 and Ex1010, Abstract (“The presently claimed and described technology provides wood preservative compositions comprising a preservative, a wax, and an organic solvent, ¶¶4 (“iii. an organic solvent”); 41, 52, 56, 80, 89, and claims 1-9 (reciting “iii. an organic solvent”).) Notably, Archer’s claim 1 specifically recites an organic solvent as a component of the wood treatment composition in combination with a wood preservative (including DCOI) and wax. (Ex1007 and Ex1010, claim 1 (““iii.

an organic solvent”).) Archer therefore teaches the wood preservative composition of claim 11, wherein the composition of claim 1 further comprises an organic solvent.

174. Further, as the 716 patent acknowledges, prior to the claimed priority date, a POSA would understand that organic solvents have been used in wood treatment compositions for many decades (Ex1001 at 1:29-32 (“Oil-borne preservatives, such as, for example, pentachlorophenol (Penta) in hydrocarbon solvent carriers have been used as heavy-duty industrial wood preservative to treat, for example, utility poles for many decades.”)).

175. Further, as the 716 patent acknowledges, a POSA would understand that prior to the claimed priority date, DCOI dissolved in organic solvents had been proposed to treat wood. (Ex1001 at 2:56-58 (“DCOI dissolved in hydrocarbon solvents has also been proposed to treat wood for heavy duty applications.”)). Archer therefore anticipates or at least renders claim 11 obvious.

10. Dependent Claim 12

a) [12]. “A wood product comprising the wood preservative composition of claim 1.”

176. It is my opinion that Archer anticipates or at least renders claim 12 obvious as explained below. Claim 12 depends from claim 1 and recites a wood product comprising the wood preservative composition of claim 1. (See XII.A.1 regarding claim 1.)

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177. Archer states that one aspect of the disclosure is a treated wood impregnated with a preservative, a wax, and an optional organic solvent. (Ex1007 and Ex1010, ¶¶22 (“In a further aspect, the disclosure provides a treated wood, wherein the wood is impregnated with: i. a preservative . . . ii. a wax . . . and iii. an optional organic solvent”), 23 (“In some aspects of the treated wood, the preservative comprises . . . 4,5-dichloro-2-n-octyl-3-isothiazolone.”), 30-31 (reciting a number of different wood products), claims 21-30 (claiming the treated wood impregnated with the preservative (DCOI), wax, and an optional organic solvent).) Archer specifies the preservative can be DCOI and that the treated wood can be a “railroad tie, bridge timber, utility pole, post, piling or utility pole cross arm.” (Ex1007 and Ex1010, ¶¶30-31 (“In some aspects of the treated wood, the wood is a railroad tie, bridge timber, utility pole, post, piling or utility pole cross arm.”), 38-40, claims 21-30, Example 6 (treated wood).) Further, Example 6 of Archer discloses an embodiment in which a wood treatment composition of 50% DCOI and 50% wax is used to treat hardwood lumber. (Ex1007 and Ex1010, ¶80; *see also* claim 21 (reciting treated wood product comprising a wax and 3-isothiazolone compound including DCOI, claim 29 covering a treated wood (e.g., “Southern pine”)), claim 30 (“wherein the wood is []a utility pole).) It is therefore my opinion that Archer anticipates and renders obvious a wood product comprising the wood preservative composition of claim 1.

11. Independent Claim 13

178. It is my opinion that Archer anticipates or renders obvious claim 13, as explained below. Claim 13 is substantively similar to claim 9 but recites “consisting essentially of” instead of “comprising,” and recites further details regarding the composition of the wax retaining additive, and specifies a wax melting point temperature range. (*See* XII.A.1 (claim 1) and XII.A.8 (claim 10).)

179. It is my understating that the transitional phrase “consisting essentially of” limits the scope of a claim to the specified elements and to those that do not materially affect the basic and novel characteristic(s) of the claimed invention.

180. It is also my opinion that it was well-known, and within the general knowledge of a POSA, that it is more economical for formulators to make and ship a concentrated formulation to customers who then dilute the formulation at the point of use. (*See* VI.A.5; *see also* Ex1020 at ¶32 (“concentrates can reduce the cost of transport and storage.”); Ex1015, 17:20-24; *see also* XII.A.8.) It is my opinion that a POSA would therefore have been motivated to provide the wood preservative composition of claim 13, wherein the composition consists essentially of the DCOI and the retaining additive. A POSA would have a reasonable expectation of success in doing so because providing such a composition was well within the knowledge and skill of a POSA. It is therefore my opinion that Archer anticipates and renders claim 13 obvious. (*See* XII.A.1, 3-7 & 8.)

a) *[13.pre] “A wood preservative composition consisting essentially of:”*

181. If limiting, it is my opinion that Archer discloses element [13.pre]. (See XII.A.1 & XII.A.8 (regarding claims 1 and 10).) Archer also discloses a composition consisting essentially of 50 weight percent DCOI and 50 weight percent wax. (Ex1007 and Ex1010, ¶80 (“a wood treatment composition of 50% DCOI and 50% wax”).) Archer further discloses that the composition of claim 1 can have only DCOI and a retaining additive (*see, e.g.*, Ex1007 and Ex1010 at ¶ 56 (“In some aspects, the composition or the ready-to-use formulation is a solid made up of a wax and an active ingredient (i.e., preservative). . . . the composition []can be provided as one or more separate ingredients, such as the preservative and wax as a concentrate suitable for dilution in the solvent”))

182. As indicated above, it was well-known, and within the general knowledge of a POSA, that it is more economical for formulators to make and ship a concentrated formulation to customers who then dilute the formulation at the point of use. (See VI.A.5; *see also* Ex1020 at ¶32 (“concentrates can reduce the cost of transport and storage.”); Ex1015, 17:20-24; Ex1020, ¶32; *see also* XII.A.8.) It is my opinion that a POSA would therefore have been motivated to provide the wood preservative composition of claim 13, wherein the composition consists essentially of DCOI and the retaining additive. It is also my opinion that a POSA would have a

reasonable expectation of success in doing so because providing such a composition was well within the knowledge and skill of a POSA.

b) [13.a] “45% by weight to 55% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition;”

183. Element [13.a] is substantively similar to claim 9, which depends from claim 1, and recites the narrower range of “45% by weight to 55% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition.” For the reasons explained above for claim 9, it is my opinion that Archer discloses element [13.a]. (See §XII.A.1, XII.A.7 & XII.A.8 (regarding claims 1, 9 and 10); Ex1007 and Ex1010, ¶¶56, 80.)

c) [13.b] “45% by weight to 55% by weight of a retaining additive comprising a first petroleum wax and a second petroleum wax comprising a paraffin wax,”

184. Element [13.b] is substantively similar to claim 9, which depends from claim 1, and recites the narrower range of “45% by weight to 55% by weight of a retaining additive.” For the reasons explained above for claim 9, it is my opinion that Archer discloses the narrower range of the retaining additive recited in element [13.b]. (See XII.A.1, XII.A.7 and XII.A.8 (regarding claims 1, 9, and 10).)

185. As discussed above, Archer discloses the recited weight percent ranges of wax (retaining additive), including a 50-50 weight percent DCOI and wax embodiment disclosed in Example 6. (XII.A.1, 7 and 8 (regarding claims 1, 9, and

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10); Ex1007 and Ex1010, ¶¶56, 80.) Archer also discloses weight percent ranges for the wax (retaining additive) that encompass and are within the claimed narrower range. (Ex1007 and Ex1010, ¶50 (“In some aspects, the wax is 20% - 60% by total weight of the composition, alternatively 30% - 50% by total weight of the composition, alternatively 30% - 40% by total weight of the composition.”).)

186. Archer further discloses a retaining additive comprising a first petroleum wax and a second petroleum wax comprising a paraffin wax. (Ex1007 and Ex1010, ¶48; *see also* XII.A.3, XII.A.5, and XII.A.6 (regarding claims 3, 7 and 8).). Archer’s wood preservative composition can include *petroleum* waxes, *scale* waxes, synthetic waxes, or *a combination thereof*. (Ex1007 and Ex1010, ¶48; *see also* XII.A.3, XII.A.5, and XII.A.6 (regarding claims 3, 7, and 8).) A POSA would understand that scale waxes are derived from petroleum and comprise paraffin wax. (See Ex1040, p.14; Ex1019, ¶9 (“Paraffin, such as slack and scale wax . . .”).) It is my opinion that Archer therefore teaches combining a petroleum wax (first petroleum wax) and a scale wax (second petroleum wax comprising a paraffin wax). Archer therefore anticipates this element [13.b].

187. Additionally, it is my opinion that Archer renders this element obvious. A POSA would understand that a scale wax would be functionally and chemically suitable in all relevant respects to combine with another petroleum wax because Archer discloses that these waxes, either alone or in combination, are equally

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suitable in the disclosed wood preservative compositions. Moreover, the '716 patent does not describe any particular effect of the claimed combination of waxes or provide any example of a combination of waxes. It is my opinion that the claimed combination merely combines two known waxes for their intended purpose to yield the predictable and desirable result of enhancing retention of preservative in treated wood. A POSA would have had a reasonable expectation of success in using the recited combination of waxes; use of such waxes was well-known prior to 2022 for wood treatment compositions and implementing the recited waxes in the composition of Archer would have been a routine matter well within the ability of a POSA.

d) [13.c] “wherein the retaining additive comprises a melting point in a range of 75 degrees Celsius to 100 degrees Celsius.”

188. Element [13.c] is substantially similar to claim 5 (which depends from claim 1) and recites “wherein the retaining additive comprises a melting point in a range of 75 degrees Celsius to 100 degrees Celsius.” (*see* XII.A.4 (regarding claims 4-5)).

189. It is my opinion that this element, which is substantively similar to claim 5, is taught by Archer for the reasons discussed above for claim 4 and 5. (*See* XII.A.4 (regarding claims 4-5)). For the reasons explained above for claims 4 and 5, it is my opinion that Archer discloses element [13.c].

12. Dependent Claim 14

- a) *[14]. “A method of treating a wood substrate, the method comprising: diluting the composition of claim 1 with an organic solvent to form a diluted composition.”*

190. It is my opinion that Archer anticipates and renders claim 14 obvious as explained below. Claim 14 depends from claim 1. Archer discloses the elements of claim 1 (*see* XII.A.1 (regarding claim 1) and XII.A.9 (regarding claim 11)).

191. As explained above in connection with claim 11, Archer discloses adding an organic solvent to the composition of claim 1. (*See* XII.A.9). Archer further discloses that its wood preservative composition are suitable for dilution in an organic solvent (*see, e.g.,* Ex1007 and Ex1010, ¶56 (“In some aspects, the composition or the ready-to-use formulation comprises a preservative and wax melted, dissolved or dispersed in an organic solvent such that the composition can be applied as a singular treatment. Alternatively, the composition of the present disclosure can be provided as one or more separate ingredients, such as the preservative and wax as a concentrate *suitable for dilution in the solvent . . .*”). (Ex1007 and Ex1010, ¶56.)

192. Archer further teaches such use of an organic solvent. (Ex1007 and Ex1010, Abstract, ¶¶4, 29, 41, 52, 56, and claims 11, 15-16.) Example 6 of Archer discloses dilution of a 50%-50% DCOI-wax composition in a solvent. (Ex1007 and Ex1010, ¶¶80-82.) Example 6 describes dilution of a solid 50:50 DCOI and wax

composition used for a dislodgeable residue test (DLR test), the results of which are reflected in table 6 (Ex1007 and Ex1010 at ¶82.)

193. A POSA would therefore understand that Archer teaches diluting the formulation of claim 1 in an organic solvent. Moreover, this element would have been obvious to a POSA, as it was well known to dilute wood preservative concentrates for treatment (to save on shipping costs), with a reasonable expectation of success. (Ex1020, ¶32; *see also* VI.A.) Doing so was well within the knowledge and skill set of a POSA.

13. Dependent Claims 15 and 16

- a) *[15]. “The method of claim 14, wherein the organic solvent comprises a hydrocarbon solvent, an amine solvent, a glycol solvent, a ketone solvent, an ester solvent, an alcohol solvent, a halogenated solvent, a biodegradable organic solvent, or combinations thereof.”*
- b) *[16]. “The method of claim 14, wherein the organic solvent comprises diesel, biodiesel, or a combination thereof.”*

194. It is my opinion that Archer anticipates and renders obvious claims 15 and 16, as explained below. Claims 15 and 16 depend from claim 14 and recite further details concerning the organic solvent. (*See* XII.A.1 (regarding claim 1) and XII.A.12 (regarding claim 14).)

195. Archer discloses using the claimed organic solvents to dilute the composition of claim 1. (*see* Ex1007 and Ex1010, ¶¶52, 17-18, 86, and claims 8-9,

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15-16.) Archer discloses suitable organic solvents for its preservative composition include *hydrocarbon* solvents, esters (e.g., C₁₄-C₂₄ methyl esters), *glycol* ether solvents, *diesel* fuel, *biodiesel* fuel, and *mixtures thereof*. (Ex1007 and Ex1010, ¶¶52 (“To produce the compositions of the present disclosure, the preservative and wax are dissolved or dispersed in an organic solvent. Suitable solvents include, but are not limited to, aliphatic hydrocarbons, esters (e.g., alkyl C₁₄-C₂₄ methyl esters), ethers (e.g., glycol ethers), petroleum distillate, diesel fuel, biodiesel fuel, Diesel: Biodiesel blends and mixtures thereof.”), 86, and claims 8-9, 15-16.) Archer also teaches and claims a blend of diesel and biodiesel as the solvent. (Ex1007 and Ex1010, ¶52, claims 9, 16.) Notably, the 716 patent indicates that selection of a specific organic solvent is no more than routine optimization based on a desired outcome (*see, e.g.*, Ex1001 at 3:33-36 (“The organic solvent can comprise one solvent, or a mixture of two or more solvents based on the application and/or desired properties of the organic solvent.”)).

196. It is therefore my opinion that Archer anticipates and renders obvious claims 15 and 16.

14. Dependent Claims 17-19

- a) *[17]. “The method of claim 14, wherein the organic solvent comprises a flash point of at least 40 degrees Celsius.”*
- b) *[18]. “The method of claim 14, wherein the organic solvent comprises a flash point of at least 60 degrees Celsius.”*
- c) *[19]. “The method of claim 14, wherein the organic solvent comprises a flash point of at least 80 degrees Celsius.”*

197. Claims 17-19 depend from claim 14 (which depends from claim 1) and further recite details concerning the flash point of the organic solvent. As explained above, Archer discloses the elements of claims 1 and 14 (*see* XII.A.1 and 12.) Archer anticipates and renders claims 17-19 obvious as explained below. (*See* IX.A.1, IX.A.12, and IX.A.13 (claims 1 and 14-16).)

198. Archer discloses esters (e.g., C₁₄-C₂₄ methyl esters), petroleum distillates, and biodiesel as suitable organic solvents. (IX.A.13; Ex1007 and Ex1010, ¶¶52, 17, and claims 8, 11, 15, 28.) Biodiesel has a flashpoint of greater than 93°C (Ex1063, p.2 (Table 1); Ex1044, p.5.) C₁₄-C₂₄ methyl esters have flashpoints of 100°C or greater. (Ex1078, Table 5.) Petroleum distillates can have a flash point above 80°C. (Ex1064, p. 3 (“Safety Data Sheet - HCS 25 Treating Oil”).) Archer therefore discloses an organic solvent comprising a flash point of at least 40°C, at

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least 60°C, and at least 80°C, and anticipates and renders obvious claims 17, 18 and 19.

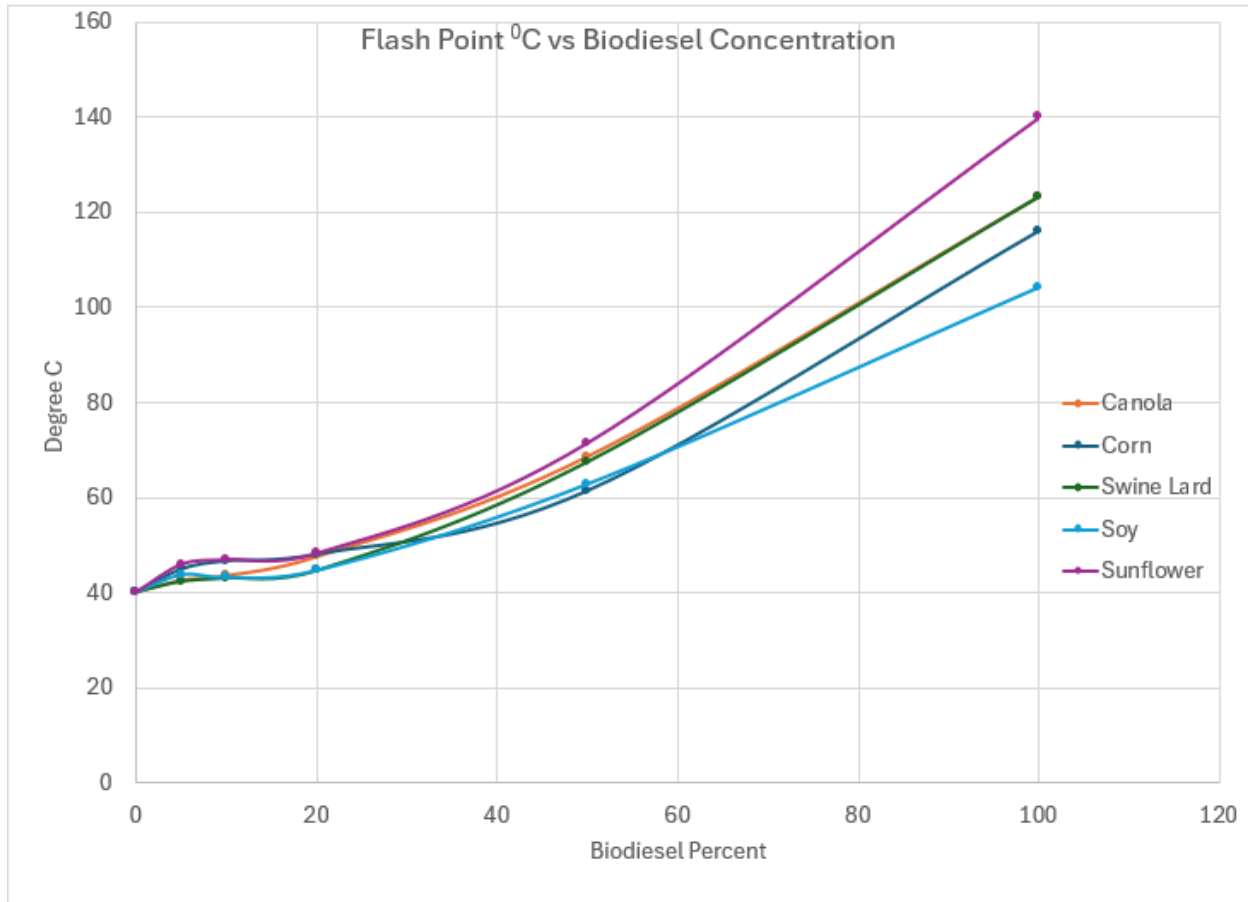
199. A POSA would have been motivated to use an organic solvent having the recited flash points to provide a flash point of over 80°C, when concerned with the known risk of sparking and resulting fire in the treatment facility. (Ex1069.) As further discussed below, doing so can reduce the risk of igniting the solvent from, for example, sparks caused by friction from steel rails/tram components arising from accidents while loading/unloading the treatment cylinder.

200. Archer further discloses biodiesel as a suitable organic solvent. (XII.A.13 (regarding claims 15 and 16); Ex1007 and Ex1010, ¶¶52, 11, 17, 29, and claims 8, 15, 28).) Biodiesel has a flashpoint of greater than 93°C (*i.e.*, of at least 80 degrees Celsius). (Ex1044, p.5 (reciting a biodiesel flashpoint of >93 °C).).

201. It was also known to blend solvents with biodiesel to obtain flash points of at least 60 or 80°C as evidenced by de Mattos (Ex1063) (Ex1063, p.2 (Table 1).) More particularly, it was known in the art that one could blend diesel with biodiesel to increase the flashpoint of the blend, in excess of the claimed minimum flash points. (Ex1063.) Exhibit 1063 is a copy of a report entitled “Correlation Between the Composition and Flash Point of Diesel-Biodiesel Blends,” published in 2015 from the Journal of the Brazilian Chemical Society. As shown below, my analysis

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of the data set forth in Table 1 of this report indicates that diesel/biodiesel blends exist having 75% or more biodiesel have flash points of at least 80°C:



202. A POSA would have been motivated to use the organic solvent such as HCS25 (Ex1064), or a custom blend as were known in the art to provide a flash point of over 80 C, when concerned with the known risk of sparking and resulting fire in the wood treatment facility. (*See, e.g.,* Ex1069.) Doing so can reduce the risk of igniting the solvent from, for example, sparks caused by friction from steel rails/tram components arising from accidents while loading/unloading the treatment cylinder.

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203. As the '716 patent acknowledges, selection and use of the organic solvents with high flash points was known in the art and within the level of skill in the art. A POSA would have a reasonable expectation of success in using solvents with the recited flash points for their intended purpose, as selection of appropriate solvents (e.g., with high flash points) was routine and within the skill of a POSA.

204. Additionally, the '716 patent does not demonstrate or otherwise show any criticality with respect to the claimed flash point ranges of the organic solvent. (See Ex1001 at 3:52-63 (indicating that the flash point of the organic solvent can be within any number of varied ranges); *see also* VI.C.1.).)

205. Archer therefore anticipates and renders obvious the recited flash points of claims 17-19. It is therefore my opinion that Archer discloses an organic solvent comprising a flash point of at least 40 degrees Celsius, at least 60 degrees Celsius, and at least 80 degrees Celsius, and anticipates and renders obvious claims 17, 18 and 19.

15. Dependent Claims 20 and 21

- a) *[20]. “The method of claim 14, wherein the retaining additive has a solubility in the organic solvent of at least 0.5%”*
- b) *[21]. “The method of claim 14, wherein the retaining additive has a solubility in the organic solvent of at least 1%.”*

206. It is my opinion that Archer anticipates and renders claims 20-21 obvious as explained below. Claims 20-21 depend from claim 14 (which depends from claim 1) and further recite details concerning the solubility of the retaining additive in the organic solvent. As explained above, Archer discloses the elements of claims 1 and 14. (*See* XII.A.1 (regarding claim 1) and XII.A.12 (regarding claim 14).)

207. Archer teaches that the claimed retaining additive is dissolved in the organic solvent (*see* Ex1007 and Ex1010 at ¶41 (“the preservative and wax are dissolved or dispersed in the organic solvent”), ¶56 (“In some aspects, the composition or the ready-to-use formulation comprises a preservative and wax . . . dissolved . . . in an organic solvent such that the composition can be applied as a singular treatment.”)). It is my opinion that a wax dissolved in an organic solvent would necessarily have a solubility in that organic solvent of at least 0.5% and at least 1.0%. This was confirmed through solubility testing which demonstrated that the Fischer-Tropsch and microcrystalline wax blend disclosed in Archer has a

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solubility in an organic solvent recited in claims 20 and 21. (*See* Ex1024 (“Viance UP50 WAX Solubility Test”); *see also* Ex1012 at p.1 (“The [Viance UP50] wax blend contains different waxes mixed in equal parts each 25% w/w in the finished product. Wax 1 is a micro-crystalline wax Wax 2 is a Fischer-Tropsch synthetic wax”). The organic solvent used was Archer’s 70/30 diesel/biodiesel blend. (Ex1007 and Ex1010 at ¶¶52 (“Exemplary solvents of the disclosure include Diesel : Biodiesel blends having a ratio of 70:30, 60:40, or 50:50.”), and 86 (disclosing 70/30 ratio of diesel to biodiesel (“70:30 diesel/biodiesel diluent oil”))).)

208. Further, in my opinion it would have been obvious for a POSA to select a wax having the recited solubility of claims 20 and 21, as a POSA would have recognized the need to dissolve the preservative and wax/retaining additive to incorporate the same into the wood during the wood treatment process (e.g., Ex1015, 3:29-40; Ex1017, ¶¶39-41). Further, a POSA would have had a reasonable expectation of success doing so, as such treatment methods were well-known prior to 2022 and doing so would have been a routine matter well within the ability of a POSA. (Ex1028, p.11-42).

16. Dependent Claim 22

- a) *[22]. “The method of claim 14, further comprising contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.”*

209. It is my opinion that Archer anticipates and renders obvious claim 22, as explained below. Claim 22 depends from claim 14 which depends from claim 1 and further recites contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate. As explained above, Archer anticipates or renders obvious claims 1 and 14. (See XII.A.1 (regarding claim 1) & XII.A.12 (regarding claim 14).)

210. Archer further discloses contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate. (see Ex10007 and Ex1010, ¶13 (“In another aspect, the disclosure provides a method for treating wood, the method comprising contacting the wood with a wood preservative composition . . .”), 55-64, 68-82; and claims 11-20.) Archer discloses and claims a method for treating wood comprising contacting the wood with the disclosed, diluted wood preservative compositions. (Ex1007 and Ex1010, ¶¶13, 55-64, 68-82, claims 11-20 (contacting wood with diluted composition).)

211. Archer also discloses particular methods for treating the wood for a suitable period of time to inhibit fungal delay of the wood substrate and teaches that “the temperature, treatment duration, and vacuum-pressure parameters [and]

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treatment composition, ... can readily be determined for a given treatment by those skilled in the art....” (Ex10007 and Ex1010, ¶59.) Archer further discloses that “microbial-induced decay resistance in treated wood” is one of the advantages of the disclosed compositions. (Ex10007 and Ex1010 at ¶57.)

212. Further, it is my opinion that a POSA would have understood that wood would need to be treated for a period of time sufficient to obtain the disclosed benefit of fungal decay resistance, as this was common practice in the art. Further, it is my opinion that a POSA, as evidenced by the AWWA paper (Ex1028), would have understood that wood would need to be treated for a period of time sufficient to obtain the disclosed benefit of fungal decay resistance and doing so based on Archer would have a reasonable likelihood of success, as this was within the skill of a POSA. (Ex1028.)

17. Dependent Claim 23

a) *[23]. “A wood product produced by the method of claim 14.”*

213. It is my opinion that Archer anticipates or renders obvious claim 23, as explained below. Claim 23 depends from claim 14 which depends from claim 1 and further recites “a wood product produced by the method of claim 14.” As explained above, Archer discloses anticipates and renders obvious claims 1 and 14. (See XII.A.1 (regarding claim 1) and XII.A.12 (regarding claim 14 directed to method of

treating a wood product by diluting the composition of claim 1 with an organic solvent)); *see also* XII.A.10 (regarding claim 12 directed to a wood product comprising the wood preservative composition of claim 1).)

214. Archer discloses that “[e]xemplary wood products that benefit from treatment with the compositions and methods disclosed herein include railroad ties, bridge timbers, utility poles, posts, piling, and cross arms.” (Ex1007 and Ex1010, ¶39; claims 21-30 (claiming a treated wood impregnated with the wood treatment composition); *see also* XII.A.10.)

215. Finally, claim [23] would have been obvious to a POSA, as producing a wood product by the method of claim 14 is the intended purpose of the composition of Archer. Further, in my opinion a POSA would have had a reasonable expectation of success in producing a wood product from the wood treatment composition of Archer, as doing so is within the knowledge and skill set of a POSA.

18. Dependent Claim 24

- a) *[24]. “The wood product of claim 23, wherein the wood product retains at least 0.05 pounds of DCOI per cubic foot of the wood product.”*

216. It is my opinion that Archer anticipates and renders obvious claim 24, as explained below. Claim 24 depends from claim 23 (which depends from claims 1 and 14) and further recites “wherein the wood product retains at least 0.05 pounds of DCOI per cubic foot of the wood product.” As explained above, Archer

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anticipates and renders obvious claims 1, 14, and 23. (See XII.A.1 (regarding claim 1), XII.A.12 (regarding claim 14), and XII.A.17 (regarding claim 23.)

217. Archer further discloses that the amount of preservative (which can be DCOI) in the treated wood product is 0.05 pcf-0.5 pcf. (Ex1007 and Ex1010, ¶47 (“In treated wood, the preservative is 0.05 pcf - 0.5 pcf (0.8 kg/m³ - 8 kg/m³). In some aspects, in treated wood, the preservative is 0.1 pcf - 0.4 pcf (0.16 kg/m³ - 6.4 kg/m³).”); ¶86 (Example 7 indicating that “the average assay in the DCOI + wax composition treated wood was 0.73 pcf.”).)

218. Archer is directed to the use of DCOI solvent-borne wood preservative compositions to treat wood products such as utility poles and railroad ties. Moreover, use of wood preservative compositions to achieve the claimed retention rate would have been a routine matter well within the knowledge and general skill set of a POSA.

19. Dependent Claim 25.

- a) *[25]. “The wood product of claim 23, wherein the wood product comprises a deck, a rail, a fence, a utility pole, a pile, a railway tie, a railroad bridge, cladding, siding, or a combination thereof.”*

219. It is my opinion that Archer anticipates and renders obvious claim 25, as explained below. Claim 25 depends from claim 23 which depends from claims 1 and 14, and further recites examples of treated wood products. As explained above, Archer discloses anticipates and renders obvious claims 1, 12, 14, and 23. (See

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XII.A.1, 10, 12, and 17 (regarding claims 1, 12, 14, and 23).) Archer discloses claim 25. (See IX.A.1, 10, 12 and 17 (regarding independent claim 1 and claims 12, 14, and 23); Ex1007 and Ex1010, ¶¶39, 31, claim 30; (“Exemplary wood products... include railroad ties, bridge timbers, utility poles...”).)

220. Archer further discloses examples of treated wood products within claim 25. (See Ex1007 and Ex1010, ¶39 (“Exemplary wood products that benefit from treatment with the compositions and methods disclosed herein include railroad ties, bridge timbers, utility poles, posts, piling, and cross arms.”), ¶31 (“In some aspects of the treated wood, the wood is a railroad tie, bridge timber, utility pole, post, piling or utility pole cross arm.”), and claim 30 (“The treated wood of any one of claims 21-29, wherein the wood is a railroad tie, bridge timber, utility pole, post, piling or utility pole cross arm.”).)

221. It is also my opinion that claim 25 would have been obvious to a POSA, as producing any of the recited wood products by the method of claim 25 is the intended purpose of the composition of Archer. Further, in my opinion a POSA would have had a reasonable expectation of success in producing a wood product from the wood treatment composition of Archer, as doing so is within the knowledge and skill set of a POSA.

20. Independent Claim 26

- a) *[26.pre]. “A wood preservative composition comprising:”*
- b) *[26.a]. “40% by weight to 60% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition; and”*
- c) *[26.b]. “40% by weight to 60% by weight of a retaining additive based on the total weight of the composition,”*
- d) *[26.c]. “wherein the retaining additive comprises a microcrystalline wax,”*
- e) *[26.d]. “wherein a weight ratio of the DCOI to the retaining additive is in a range of 1:1.5 to 1.5:1.”*

222. It is my opinion that Archer anticipates and renders obvious claim 26, as explained below. Claim 26 is substantively similar to the elements of claims 1, 2, and 8 as follows: (1) element [26.pre] is the same as element [1.pre] of claim 1, which Archer discloses (*see* XII.A.1.a); (2) element [26.a] is the same as element [1.a] of claim 1, which Archer discloses (*see* XII.A.1.b); (3) element [26.b] is the same as element [1.b] of claim 1, which Archer discloses (*see* XII.A.1.c); (4) element [26.d] is the same as claim 2, which Archer discloses (*see* XII.A.2; *see also* XII.A.1.d); and (5) Archer teaches element [26.c], wherein the retaining additive comprises a microcrystalline wax ((Ex1007 and Ex1010 at ¶ 48 (“In some aspects, the wax is a petroleum wax, such as but not limited to microcrystalline wax.”)), ¶ 49 (“in exemplary aspects, the wax composition is a blend of Fischer Tropsch wax and microcrystalline wax”); *see also* XII.A.6.)

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223. It is my opinion that independent claim 26 is substantively similar to claim 1, except that it recites the narrower weight ratio of DCOI to retaining additive of 1:1.5 to 1.5:1 recited in claim 2, and the retaining additive comprises a microcrystalline wax. As explained above, Archer anticipates and renders claims 1 and 2 obvious (*i.e.*, elements [26.pre], [26.a], [26.b], and [26.d]). (*See* XII.A.1 & XII.A.2.) Archer also teaches microcrystalline wax as an exemplary wax for its wood preservative composition, thus anticipating and rendering claim 26 obvious (*i.e.*, element [26.c]). (XII.A.6 (regarding claim 8); Ex1007 and Ex1010, ¶¶48-49, 67-79, claims 5, 25.)

224. Further, it is my opinion that it would have been obvious to select any of such waxes known for use with wood treatment compositions, with predictable results. Notably, the '716 patent does not describe any particular effect of the claimed microcrystalline wax, let alone any criticality or unexpected results related to the use of microcrystalline wax as compared to other known waxes.

225. A POSA would have had a reasonable expectation of success in using a microcrystalline wax for a wood treatment composition, as the use of microcrystalline and other waxes were well-known prior to 2022 for wood treatment and such use would have been a routine matter well within the ability of a POSA, yielding predictable results.

21. Dependent Claim 27

- a) *[27.Pre]. “A method of treating a wood substrate, the method comprising:”*
- b) *[27.a]. “diluting the composition of claim 26 with an organic solvent to form a diluted composition; and”*
- c) *[27.b]. “contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.”*

226. It is my opinion that Archer anticipates and renders obvious claim 27, as explained below. Claim 27 depends from claim 26, and has elements substantively similar to elements of claims 1, 14, and 22. [27.Pre] and [27.a] are substantively similar to claim 14, and [27.b] is substantively similar to claim 22. As explained above, Archer anticipates and renders obvious claims 1, 2, 14, 22, and 26. (See XII.A.1, XII.A.2, XII.A.12, XII.A.16, and XII.A.20 (regarding claims 1, 2, 14, 22 and 26, respectively).)

227. It is my opinion that Archer discloses and renders claim 27 anticipated and obvious for the same reasons discussed above for claims 14, 22, 26. (See XII.A.1, XII.A.2, XII.A.12, XII.A.16, and XII.A.20 (regarding claims 1, 2, 14, 22, and 26).)

B. Ground 2: Claims 1-5, 7-12, 14-16 and 20-27 are Anticipated, or at a Minimum Rendered Obvious by the Public Use, Commercial Sale, and Offer for Sale of the UP-50 Product/UP-50 Label

228. As discussed in Section X, *supra*, it is my opinion that the '716 patent is not entitled to an effective filing date any earlier than August 5, 2022. I understand

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that the UP-50 wood preservative product was commercially used, sold, and offered for sale as early as May 2022, before the effective filing date of the '716 patent and is therefore prior art to the '716 patent.

229. It is my opinion that the public use, commercial sale, and offer for sale of the UP-50 Product and its use (individually and collectively “UP-50/UP-50 label”) anticipates and at least renders obvious claims 1-5, 7-12, 14-27 as explained below and UP-50 Label anticipates 1-5, 7-12, 14-27 as explained below. It is also my opinion that to the extent any element is not disclosed by UP-50 alone and/or together with its label, it would have been strongly suggested to a POSA and would render those claims obvious for the same reasons discussed in Ground 2 below for that element. Given the nature of the substantially identical teachings of UP-50 of each disclosed or suggested element, as articulated in Ground 2 below, a POSA would have been motivated to arrive at the claims as a whole based on UP-50 and the knowledge of a POSA. For example, assuming that UP-50 and UP-50 label are separate prior art references, it would have been obvious for a POSA to use UP-50 in accordance with the instructions on the UP-50 label.

1. Independent Claim 1

230. It is my opinion that UP-50/UP-50 label anticipates and renders claim 1 obvious as explained below.

a) [1.Pre] A wood preservative composition comprising:

231. It is my opinion that to the extent limiting, UP-50/UP-50 label discloses the preamble [1.Pre] of claim 1. (Ex1012, p1 (“Product Definition”); Ex1014, at Directions for Use (“For use as a wood preservative to protect treated wood articles from fungi For use in industrial vacuum pressure treatment plants to treat wood intended for use as distribution poles, utility poles, cross arms or transportation (road or rail) bridge timbers.”); Ex1011, ¶¶9, 36-38.)

b) [1.a] 40% by weight to 60% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition; and

232. It is my opinion that UP-50 discloses element [1.a]. UP-50 contains 50% by weight DCOI based on the total weight of the composition. (Ex1012, p.1 (“UP-50 is a solid wood preservative concentrate that contains three components. The active ingredient is . . . DCOI (Kathon 287T). The concentration of DCOI is 50% w/w of the product. The balance of the composition (the inert components) consist of a high melt point (~80°C) wax blend.”); Ex1014 (“Active Ingredients: 4,5-Dichloro-2-n-octyl-3(2H)- isothiazolone (50.0%); Inert Ingredients (50.0%)”); Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39.) DCOI in an amount of 50% by weight is within the claimed 40-60% range for DCOI. Further, it is my opinion that there is no considerable difference between how the alleged invention would operate within the claimed ranges (e.g., 40-60% by weight) and within the range disclosed in the prior

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art. For example, the '716 specification discloses concentrated compositions that can comprise DCOI in a range of 5% to 80% by weight, 20% to 80% by weight, 30% to 70% by weight, 40% to 50% by weight, or 45% to 55% by weight and does not disclose any difference in properties between the disclosed ranges. (Ex1001, 10:47-52; *see also* VI.C.1.) The '716 specification also provides concentrate examples in which DCOI is about 23% by weight, demonstrating a suitable DCOI concentration outside the claimed range and providing further evidence that the claimed ranges are not critical. (Ex1001, 14:41-50, 18:50-19:59; *see also* XII.A.1.a.)

c) *[1.b] 40% by weight to 60% by weight of a retaining additive comprising a wax based on the total weight of the composition,*

233. It is my opinion that UP-50 discloses element [1.b]. UP-50 contains 50% by weight of a wax blend based on the total weight of the composition. (Ex1012, p.1 (“UP-50 is a solid wood preservative concentrate that contains three components The concentration of DCOI is 50% w/w of the product. (Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39.) The balance of the composition (the inert components) consist of a high melt point (~80°C) wax blend.”); Ex1011, ¶36.) The wax blend in UP-50 is a blend of microcrystalline wax and Fischer-Tropsch synthetic wax as disclosed in Archer (Ex1007 and Ex1010, ¶49) and is a retaining additive comprising a wax (even under an improper, narrow construction identified herein). (*See*

IX.A.1.c.)⁷ The wax blend in UP-50 is a retaining additive comprising a wax. (Ex1012, p.1; Ex1011, ¶¶33, 36-39.)

234. The wax blend in an amount of 50% by weight of UP-50 is within the claimed range of 40-60% range for the retaining additive comprising a wax. (*See* also XII.A.1.c.) Further, the '716 patent demonstrates that, like the claimed 40-60% by weight for the DCOI component, the 40-60% by weight range of retaining additive is not critical to the practice of the claimed invention. The specification states that the “concentrated” composition can comprise retaining additive in a range of 5% to 80% by weight, 20% to 80% by weight, 30% to 70% by weight, 40% to 50% by weight, or 45% to 55% by weight and does not disclose any difference in properties between the disclosed ranges. (Ex1001, 10:66-11:5; *see also* 6:14-43; 12:10-12 (“In certain examples, the wood preservation composition can be adjusted to have enhanced DCOI leach resistance without the use of the retaining additive.”); *see also* VI.C.1.).

⁷ This explanation that UP-50 discloses a retaining additive under Petitioner’s claim construction and also any asserted (improper) narrower construction should be understood to apply to all grounds relying upon UP-50, including dependent claims.

d) *[1.c] wherein a weight ratio of the DCOI to the retaining additive is in a range of 1:5 to 5:1.*

235. It is my opinion that UP-50 discloses element [1.c]. The weight ratio of DCOI and the wax blend in UP-50 is 1:1 (i.e., 50 % DCOI and 50% retaining additive (wax blend). (Ex1012, p.1 (“UP-50 is a solid wood preservative concentrate that contains three components. . . . The concentration of DCOI is 50% w/w of the product. The balance of the composition (the inert components) consist of a high melt point (~80°C) wax blend.”); Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39; *see also* XII.B.1.b and XII.B.1.c.) The 1:1 weight ratio is within the claimed 1:5 to 5:1 weight ratio.

2. Dependent Claim 2

a) *[2] The wood preservative composition of claim 1, wherein the weight ratio of the DCOI to the retaining additive is in a range of 1:1.5 to 1.5:1.*

236. It is my opinion that UP-50 anticipates and renders obvious claim 2, as explained below. Claim 2 depends from claim 1 and recites a narrower weight ratio. (*See* XII.B.1 regarding claim 1; *see also* XII.B.1.d.)

237. The weight ratio of DCOI and the wax blend in UP-50 is 1:1 (i.e., 50 % DCOI and 50% retaining additive/wax blend). (Ex1012, p.1 (“UP-50 is a solid wood preservative concentrate that contains three components. . . . The concentration of DCOI is 50% w/w of the product. (Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39.) The balance of the composition (the inert components) consist of a high melt point

(~80°C) wax blend.”); Ex1011, ¶¶33, 36-39.) The 1:1 weight ratio of DCOI to wax blend in UP-50 is within the narrower range of 1:1.5 to 1.5:1 recited in claim 2.

3. Dependent Claim 3

- a) *[3] The wood preservative composition of claim 1, wherein the wax comprises an olefin wax, a petroleum wax, a carnauba wax, a polyethylene wax, a silicone wax, a polypropylene wax, a polytetrafluoroethylene (PTFE) synthetic wax, or a combination thereof*

238. It is my opinion that UP-50 anticipates and renders obvious claim 3, as explained below. Claim 3 depends from claim 1 and further recites specific waxes. (See XII.B.1 regarding claim 1.)

239. The wax blend in UP-50 is a blend of microcrystalline wax and Fischer-Tropsch synthetic wax. (Ex1012 at p.1 (“The wax blend contains different waxes mixed in equal parts each 25% w/w in the finished product. Wax 1 is a microcrystalline wax Wax 2 is a Fischer-Tropsch synthetic wax”); Ex1011, ¶¶18-20, 36-39.) Microcrystalline wax is a type of petroleum wax. (Ex1040, p.14 (“There are two general types of petroleum waxes that are produced during the dewaxing process. Wax that is obtained from the distillate lubricating oil fractions is known as macrocrystalline wax (paraffin wax), and wax derived from the residual distillate lubricating oil fraction is referred to as microcrystalline wax (microwax).”).) It is therefore my opinion that the wax in UP-50 comprises a petroleum wax, and UP-50 anticipates and renders obvious claim 3.

4. Dependent Claims 4 & 5

- a) *[4] “The wood preservative composition of claim 1, wherein the wax comprises a melting point in a range of 40 degrees Celsius to 100 degrees Celsius.”*
- b) *[5] “The wood preservative composition of claim 1, wherein the wax comprises a melting point in a range of 75 degrees Celsius to 100 degrees Celsius.”*

240. It is my opinion that UP-50 anticipates and renders obvious claims 4 and 5, as explained below. Claims 4 and 5 depend from claim 1 and recite melting points of the claimed wax. (See XII.B.1 & 3 (regarding claims 1 & 3).)

241. The microcrystalline wax used in UP-50 has a melting point of 79°C. (Ex1012, p.1 (Wax 1 is a micro-crystalline wax . . . with a melting point of 79°C.”); Ex1011, ¶¶36.) The Fischer-Tropsch wax used in UP-50 has a melting point of 78°C. (Ex1011, ¶36; Ex1012, p.1 (“Wax 2 is a Fischer-Tropsch synthetic wax . . . with a melt point of 78°C.”).) The UP-50 wax blend has a melting point within the claimed range of 40-100 degrees Celsius (claim 4) and 75-100 degrees Celsius (claim 5). (Ex1012, p.1 (“The balance of the composition (the inert components) consist of a high melt point (~80°C) wax blend.”). Moreover, wax melting point is a matter of an obvious design choice depending upon the wood treatment application and wood species being treated. Further, there is no showing of criticality relative to the claimed melting point ranges. (See Ex1001 at 6:62-7:9 (indicating that that the wax can have a melting point within any number of varied ranges); *id.* at 6:62-63 (“The

wax can comprise a melting point suitable for handling and/or for a desirable treatment application.”); *see also* XII.A.4.)

5. Dependent Claim 7

- a) ***[7] “The wood preservative composition of claim 1, wherein the wax comprises a petroleum wax.”***

242. It is my opinion that UP-50 anticipates and renders obvious claim 7, as explained below. Claim 7 depends from claim 1 and recites that the wax comprises a petroleum wax. (*See* XII.B.1 & 3 (regarding claim 1 and 3).)

243. As discussed above, UP-50 comprises microcrystalline wax. (Ex1012 at p.1 (“The wax blend contains different waxes mixed in equal parts each 25% w/w in the finished product. Wax 1 is a micro-crystalline wax”).) The microcrystalline wax in UP-50 is a type of petroleum wax as recited in claim 7. (Ex1040, p.14 (“There are two general types of petroleum waxes that are produced during the dewaxing process. Wax that is obtained from the distillate lubricating oil fractions is known as macrocrystalline wax (paraffin wax), and wax derived from the residual distillate lubricating oil fraction is referred to as microcrystalline wax (microwax).”).)

6. Dependent Claim 8

- a) *[8] “The wood preservative composition of claim 1, wherein the wax comprises paraffin wax and a microcrystalline wax.”*

244. It is my opinion that UP-50 anticipates and renders obvious claim 8, as explained below. Claim 8 depends from claim 1 and recites that the wax comprises paraffin wax and a microcrystalline wax. (See XII.B.1 regarding claim 1.)

245. The wax blend in UP-50 is a blend of Fischer-Tropsch synthetic wax and microcrystalline wax. ((Ex1012 at p.1 (The wax blend contains different waxes mixed in equal parts each 25% w/w in the finished product. Wax 1 a microcrystalline wax Wax 2 is a Fischer-Tropsch synthetic wax”); Ex1011, ¶¶18-20, 36-39.) A POSA would understand that Fischer-Tropsch wax is a synthetic paraffin wax synthesized by the Fischer-Tropsch process, and therefore UP-50’s disclosure of a Fischer Tropsch wax is a disclosure of a paraffin wax. (Ex1041, p.1 (indicating that paraffin wax and Fischer-Tropsch wax are synonyms); Ex1067, p.22 (indicating that Fischer-Tropsch wax is a synonym for paraffin wax); *see also* XII.A.6;) The wax blend in UP-50 therefore comprises paraffin wax and a microcrystalline wax as recited in claim 8, and thus anticipates and renders obvious claim 8.⁸ Further, a POSA would understand that such waxes known in the art for

⁸ Further, a microcrystalline wax is a paraffin wax. As such, the claimed elements

wood preservative compositions would be suitable for use in the composition of claim 1 with a reasonable expectation of success, and the use of such waxes was within the knowledge and skill set of a POSA.

7. Dependent Claim 9

- a) *[9] “The wood preservative composition of claim 1, wherein the composition comprises 45% by weight to 55% by weight of the DCOI based on the total weight of the composition and 45% by weight to 55% by weight of the retaining additive based on the total weight of the composition.”*

246. It is my opinion that UP-50 anticipates and renders obvious claim 9, as explained below. Claim 9 depends from claim 1 and recites that the composition comprises narrower ranges of “45% by weight to 55% by weight of the DCOI based on the total weight of the composition and 45% by weight to 55% by weight of the retaining additive based on the total weight of the composition.” (See XII.B.1 regarding claim 1.)

247. It is my opinion that UP-50 anticipates and renders obvious claim 9, for the same reasons set forth above for claim 1. The 50% by weight DCOI and 50% by weight wax blend in UP-50 falls within the narrower weight percent ranges for DCOI

paraffin wax and a microcrystalline wax are overlapping and redundant, and thus the microcrystalline wax in UP-50 discloses both a microcrystalline wax and a paraffin wax. (See, e.g., XII.B.5.)

and retaining additive recited in claim 9. (Ex1012, p.1; XII.B.1, XII.B.1.b and XII.B.1.c.) Further, it is my opinion that the ‘716 patent does not demonstrate or otherwise recite any criticality with respect to the claimed weight percentage ranges for DCOI or the retaining additive. (Ex1001 at 10:36-52 (indicating that wood preservative compositions can comprise DCOI in any number of varied ranges, including ranges outside the claimed range); *id.* at 6:14-43 (indicating that wood preservative compositions can comprise the claimed retaining additive in any number of varied ranges, some outside the claimed ranges); *see also* XII.A.1 and VI.C.1).

8. Dependent Claim 10

- a) *[10] “The wood preservative composition of claim 1, wherein the composition consists essentially of the DCOI and the retaining additive.”*

248. It is my opinion that UP-50 anticipates and renders obvious claim 10, as explained below. Claim 10 depends from claim 1 and recites that the composition consists essentially of the DCOI and the retaining additive. (*See* XII.B.1 regarding claim 1.)

249. UP-50 contains 50% by weight DCOI and 50% by weight wax blend. (Ex1012, p.1 (“UP-50 is a solid wood preservative concentrate that contains three components. The active ingredient is . . . DCOI (Kathon 287T). The concentration of DCOI is 50% w/w of the product. (Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39.) The

balance of the composition (the inert components) consists of a high melt point (~80°C) wax blend.”); Ex1011, ¶¶36-39.) It is my opinion that since these are the only components in UP-50, UP-50 consists essentially of DCOI and retaining additive comprising wax.

9. Dependent Claim 11

- a) *[11] “The wood preservative composition of claim 1, wherein the composition further comprises an organic solvent.”*

250. It is my opinion that UP-50/UP-50 label (Ex1014) and its use anticipates and renders obvious claim 11, as explained below. Claim 11 depends from claim 1 and recites that the composition further comprises an organic solvent. (See XII.B.1 regarding claim 1.)

251. As set forth in the UP-50 label, UP-50 is a solid concentrate that must be diluted prior to use with a hydrocarbon solvent. (Ex1014, at “Directions for Use” (“This product is a solid concentrate and must be diluted with a hydrocarbon solvent such as fuel oil, mineral spirits, diesel or petroleum distillates.”); Ex1011, ¶¶9, 38.) A POSA would understand that a hydrocarbon solvent is an organic solvent. (See, e.g., Ex1017, ¶23 (“suitable organic solvents include, . . . hydrocarbons and oils”).) It is my opinion that claim 11 is anticipated or at least rendered obvious because a POSA would be motivated to dilute UP-50 with an organic solvent as instructed by the UP-50 product label to prepare the final treatment solution. (Ex1014, at

“Directions for Use.”). Further, a POSA would be motivated to dilute UP-50 with an organic solvent because it is necessary to do so to use UP-50 to treat wood products. A POSA would have a reasonable expectation of success in doing so in accordance with the instructions; further doing so is within the knowledge and skill set of a POSA.

10. Dependent Claim 12

a) [12] “A wood product comprising the wood preservative composition of claim 1.”

252. It is my opinion that UP-50/UP-50 label (Ex1014) and its use anticipates and renders obvious claim 12, as explained below. Claim 12 depends from claim 1 and recites a wood product comprising the wood preservative composition of claim 1. (See XII.B.1 regarding claim 1.)

253. UP-50/UP-50 label (Ex1014), and its use disclose claim 12. (See XII.B.1 (claim 1); Ex1014.) As set forth in the label, UP-50 is used to treat wood products such as utility poles and physically impregnates the wood product during treatment. (Ex1014 at “Directions for Use” (“For use in industrial vacuum pressure treatment plants to treat wood intended for use as distribution poles, utility poles, cross arms or transportation (road or rail) bridge timbers.”); Ex1011, ¶9.) UP-50 is physically retained within the wood product after treatment, and the treated wood product therefore comprises UP-50. (Ex1014 at “Directions for Use” (“A retention rate of 0.1 – 0.24 pounds/cubic foot (pcf) of UP-50 active ingredient is required for

all the above treatments.”); Ex1011, ¶¶10-13, 15, 18 and 20.) Further, a POSA would understand that a wood product treated with UP-50 would comprise the composition of claim 1, as that is the intended purpose of UP-50. A POSA would have a reasonable expectation of success in treating a wood product with UP-50 in accordance with the UP-50 label instructions; further treating a wood product with UP-50 is within the knowledge and skill set of a POSA.

11. Dependent Claim 14

- a) *[14] “A method of treating a wood substrate, the method comprising: diluting the composition of claim 1 with an organic solvent to form a diluted composition.”*

254. It is my opinion that UP-50/UP-50 label (Ex1014) and its use anticipates or renders obvious claim 14, as explained below. Claim 14 depends from claim 1. UP-50/UP-50 label (Ex1014) and its use discloses the elements of claim 1 (*see* XII.B.1; *see also* XII.B.9 (regarding claim 11 reciting the composition of claim 1 further comprising an organic solvent)).

255. The UP-50 label states that “the product is a solid concentrate and must be diluted with a hydrocarbon solvent.” (Ex1014, at Directions for Use (“This product is a solid concentrate and must be diluted with a hydrocarbon solvent such as fuel oil, mineral spirits, diesel or petroleum distillates”).) The final treatment solution is a diluted composition containing 1-3% by weight DCOI based on the total weight of the solution (which is how the UP-50 composition was used before August

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5, 2022). (Ex1014, at Directions for Use (“Use 147-420 lbs of UP-50 per 7000 pounds of final treatment solution (1-3% by weight of UP-50 active ingredient in the final treatment solution).”); Ex1011, ¶¶9, 12, 22, 25, 38; Ex1087, ¶¶15, 28.)

256. Additionally, it is my opinion that even assuming they are two distinct references, UP-50 in combination with the UP-50 label (Ex1014) renders claim 14 obvious. A POSA would have been motivated to dilute UP-50 in a hydrocarbon (i.e., organic) solvent as instructed by the UP-50 label to form a diluted composition for treating a wood substrate. (Ex1014, at “Directions for Use” (“This product is a solid concentrate and must be diluted with a hydrocarbon solvent such as fuel oil, mineral spirits, diesel or petroleum distillates.”).) Doing so was a routine matter within the skill of a POSA.

257. Further, a POSA would be motivated to dilute UP-50 with an organic solvent because it is necessary to do so to use UP-50 to treat (impregnate) wood products. A POSA would have a reasonable expectation of success in doing so in accordance with the instructions; further doing so is within the knowledge and skill set of a POSA.

12. Dependent Claim 15

- a) *[15] “The method of claim 14, wherein the organic solvent comprises a hydrocarbon solvent, an amine solvent, a glycol solvent, a ketone solvent, an ester solvent, an alcohol solvent, a halogenated solvent, a biodegradable organic solvent, or combinations thereof.”*

258. It is my opinion that UP-50/UP-50 label (Ex1014) and its use anticipates and renders obvious claim 15, as explained below. Claim 15 depends from claim 14 (which depends from claim 1) and recites further details concerning the organic solvent. (See XII.B.1 & 11 (claims 1 and 14).)

259. UP-50/UP-50 label (Ex1014) and its use disclose claim 15. (See XII.B.1 & 11 (claims 1 and 14); *see also* XII.B.9 (regarding claim 11 reciting the composition of claim 1 further comprising an organic solvent).) The UP-50 label shipped with UP-50 states the product must be diluted with a hydrocarbon solvent for use, and UP-50 was in fact used in that manner before August 5, 2022. (Ex1014 at “Directions for Use” (“This product is a solid concentrate and must be diluted with a hydrocarbon solvent such as fuel oil, mineral spirits, diesel or petroleum distillates.”); Ex1011, ¶¶9, 12, 22, 25, 38; Ex1087, ¶¶15, 28.) Additionally, UP-50, its product label (Ex1014), and its use renders claim 15 obvious for the same reasons set forth for claim 14, above. (See XII.B.11.)

13. Dependent Claim 16

- a) *[16] “The method of claim 14, wherein the organic solvent comprises diesel, biodiesel, or a combination thereof.”*

260. It is my opinion that UP-50/UP-50 label anticipates or renders obvious claim 16, as explained below. Claim 16 depends from claim 14 (which depends from claim 1) and recites further details concerning the organic solvent.

261. UP-50/UP-50 label (Ex1014) and its use disclose claim 16. (See XII.B.1, 11 & 12) (regarding claims 1, 14, and 15).) The UP-50 label identifies “fuel oil, mineral spirits, *diesel* or petroleum distillates” as exemplary hydrocarbons for diluting UP-50. (Ex1014, at Directions for Use (“This product is a solid concentrate and must be diluted with a hydrocarbon solvent such as fuel oil, mineral spirits, diesel or petroleum distillates.”).) Furthermore, it would also have been obvious to use diesel as the solvent for diluting UP-50, with a reasonable degree of success, because diesel was a well-known solvent for DCOI and other wood preservative agents prior to August 5, 2022. (Ex1028, pp. 12-17, 33-41; *id.* p.12 (“DCOI is sparingly soluble in water but relatively soluble in a wide range of organic solvents including #2 diesel fuel (AWPA HSA) as summarized in Table 1”), p. 13 (“It is apparent that DCOI in #2 diesel can be successfully used to treat southern pine poles, southern pine posts, southern pine cross arms and Douglas fir cross arms to meet AWPA penetration requirements.”), p. 17 (“DCOI in #2 diesel was highly

effective against the Brown rot”); Ex1011, ¶¶9, 12, 22, 25, 38; Ex1087, ¶¶15, 28.) Doing so was a routine matter within the skill of a POSA.

14. Dependent Claims 20-21

- a) *[20] “The method of claim 14, wherein the retaining additive has a solubility in the organic solvent of at least 0.5%”*
- b) *[21] “The method of claim 14, wherein the retaining additive has a solubility in the organic solvent of at least 1%.”*

262. It is my opinion that UP-50 anticipates and renders obvious claims 20 and 21, as explained below. Claims 20-21 depend from claim 14 (which depends from claim 1) and further recites details concerning the solubility of the retaining additive in the organic solvent. (See XII.B.1 & 11 (claims 1 and 14).)

263. UP-50/UP-50 label (Ex1014) and its use disclose claims 20 and 21. The UP-50 product label states that UP-50 “is a solid concentrate and must be diluted with *a hydrocarbon solvent* such as fuel oil, mineral spirits, diesel or petroleum distillates.” (Ex1014, Directions for Use.) It is my opinion that diluting UP-50 in a hydrocarbon solvent (*i.e.* an organic solvent) would necessarily result in a solubility for UP-50 in that organic solvent of at least 0.5% and at least 1.0%. This was confirmed through solubility testing which demonstrated that the Fischer-Tropsch and microcrystalline wax blend in UP-50 has a solubility of at least 1% in an organic solvent suitable for diluting UP-50. (See Ex1024 (“Viance UP50 Wax Solubility

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Test”); *see also* XII.A.15 (claims 20-21). Further, it is my opinion that a POSA would be motivated to dilute/dissolve UP-50 with an organic solvent because it is necessary to do so to use UP-50 to treat (impregnate) wood products. A POSA would have a reasonable expectation of success in doing so in accordance with the instructions, and further doing so is within the knowledge and skill set of a POSA.

264. Additionally, the elements of claim 20 and 21 would have been obvious because a POSA would have been motivated to solubilize the UP-50 in an organic solvent so that UP-50 can be used to penetrate into the wood to produce a treated wood product, in accordance with known methods. A POSA would have had a reasonable expectation of success in solubilizing UP-50 in organic solvent because this was routine and within the general skill of a POSA.

15. Dependent Claim 22

- a) *[22] “The method of claim 14, further comprising contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.”*

265. It is my opinion that UP-50/UP-50 label anticipates and renders obvious claim 22, as explained below. Claim 22 depends from claim 14 (which depends from claim 1) and further recites “contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.” As explained above, UP-50 anticipates or renders obvious claims 1 and 14. (*See* XII.B.1 & 11 (claims 1 and 14).)

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266. The UP-50 label (Ex1014), and the use of UP-50 in accordance with that label, disclose the elements of claim 22 (including “contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate”). (*See* XII.B.1 & 11 (claims 1 and 14); Ex1014, “Directions for Use”.) The UP-50 label directs the user to treat a wood substrate, such as a utility pole, “to protect treated wood articles from fungi,” by contacting the wood substrate with the diluted UP-50 treatment solution in a commercial vessel capable of physically impregnating the wood substrate with the UP-50 treatment solution. (Ex1014, at “Directions for Use” (“For use as a wood preservative to protect treated wood articles from fungi and subterranean termites. . . . For use in industrial vacuum pressure treatment plants to treat wood intended for use as distribution poles, utility poles, cross arms or transportation (road or rail) bridge timbers. This product is a solid concentrate and must be diluted with a hydrocarbon solvent such as fuel oil, mineral spirits, diesel or petroleum distillates. Use 147 - 420 lbs of UP-50 per 7000 pounds of final treatment solution (1-3% by weight of UP-50 active ingredient in the final treatment solution). . . . To protect dry and/or seasoned lumber, timbers, posts, poles and other wooden members . . . the wood should be pressure treated in a commercial vessel capable of physically impregnating the wood and providing adequate penetration and retention.”).)

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267. Per the UP-50 label, treatment is up to 12 to 24 hours or until effective retention and penetration is achieved. (*Id.* (“If temperature or time is used as the treating parameter, treat for up to 12 to 48 hours or until effective retention and penetration is achieved.”).)

268. The UP-50 label further states that retention of 0.1 to 0.24 pounds per cubic foot of DCOI is required for effective treatment. (*Id.* (“A retention rate of 0.1 – 0.24 pounds/cubic foot (pcf) of UP-50 active ingredient is required for all the above treatments.”))

269. It is also my opinion that claim 22 would have been obvious because a POSA would have been motivated carry out wood treatment with a UP-50 treatment solution for a sufficient time to achieve the required retention of DCOI for effective protection against fungi, as directed by the UP-50 label, with a reasonable expectation of success, as that is the intended purpose of the product and within the skill of a POSA. (Ex1014, at “Directions for Use.”)

16. Dependent Claim 23

a) *[23] “A wood product produced by the method of claim 14.”*

270. It is my opinion that UP-50 anticipates and renders obvious claim 23, as explained below. Claim 23 depends from claim 14 which depends from claim 1 and further recites “a wood product produced by the method of claim 14.” As

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explained above, UP-50/UP-50 label anticipates and renders obvious claims 1 and 14. (*See* X.B.1 & 11 (claims 1 and 14).)

271. UP-50/UP-50 label and its use disclose claim 23. (*See* X.B.1 & 11 (claims 1 and 14). The UP-50 label states that the product is “for use as a wood preservative to protect treated wood articles from fungi....”. (Ex1014, p.1 (“For use as a wood preservative to protect treated wood articles from fungi For use in industrial vacuum pressure treatment plants to treat wood intended for use as distribution poles, utility poles, cross arms or transportation (road or rail) bridge timbers.”)

272. It is my opinion that a wood product treated as directed by the UP-50 product label would necessarily result in a wood product produced by the method of claim 14. Additionally, a POSA would have found it obvious to produce a wood product of claim 23 in view of the stated intended purpose of UP-50 and the directions for its use. (Ex1014, p.1 (“For use as a wood preservative to protect treated wood articles from fungi and subterranean termites. . . . For use in industrial vacuum pressure treatment plants to treat wood intended for use as distribution poles, utility poles, cross arms or transportation (road or rail) bridge timbers.”))

17. Dependent Claim 24

- a) *[24] “The wood product of claim 23, wherein the wood product retains at least 0.05 pounds of DCOI per cubic foot of the wood product.”*

273. It is my opinion that UP anticipates and renders obvious claim 24, as explained below. Claim 24 depends from claim 23 which depends from claims 1 and 14; claim 24 further recites “wherein the wood product retains at least 0.05 pounds of DCOI per cubic foot of the wood product.” As explained above, UP-50 anticipates and renders obvious claims 1, 14, and 23. (See XII.B.1, 11 & 16 (claims 1, 14 and 23).)

274. UP-50/UP-50 label (Ex1014) and its use disclose claim 24. (See XII.B.1, 11 & 16 (claims 1, 14 and 23).) The UP-50 label states that a retention rate of 0.1 to 0.24 pcf of DCOI is required in the wood product for effective protection from fungi. (Ex1014 (“A retention rate of 0.1 – 0.24 pounds/cubic foot (pcf) of UP-50 active ingredient is required for all the above treatments.”) Per the UP-50 label, the DCOI retention rate meets the element “at least 0.05 pcf.,” rendering claim 24 anticipated and obvious. Furthermore, it is my opinion that a POSA would have been motivated to use UP-50 as instructed by the UP-50 label, with a reasonable expectation of success. (Ex1014.) Doing so was a routine matter within the skill of a POSA. (Ex1014, p.1).

18. Dependent Claim 25

- a) *[25] “The wood product of claim 23, wherein the wood product comprises a deck, a rail, a fence, a utility pole, a pile, a railway tie, a railroad bridge, cladding, siding, or a combination thereof.”*

275. It is my opinion that UP-50 anticipates and renders obvious claim 25, as explained below. Claim 25 depends from claim 23 which depends from claims 1 and 14, and further recites examples of treated wood products. As explained above, UP-50 anticipates and renders obvious claims 1, 14, and 23. (See XII.B.1, XII.B.10, XII.B.11 and XII.B.16 (claims 1, 12, 14, and 23).)

276. It is my opinion that UP-50/UP-50 label and its use disclose claim 25. (See XII.B.1, XII.B.10, XII.B.11 and XII.B.16 (claims 1, 12, 14, and 23).) According to the UP-50 product label, UP-50 is intended for use on utility poles, cross arms, or road and rail bridge timbers and anticipates claim 25. (Ex1014, p.1 (“For use in industrial vacuum pressure treatment plants to treat wood intended for use as distribution poles, utility poles, cross arms or transportation (road or rail) bridge timbers.”).)

277. It is my opinion that claim 25 would have been obvious over UP-50 in view of the UP-50 label (Ex1014.) A POSA would be motivated to use UP-50 in accordance with its label instructions and would have a reasonable expectation of success in preparing a treated wood product since that is the purpose of UP-50. Doing so was a routine matter within the skill of a POSA.

19. Independent Claim 26

278. It is my opinion that UP-50/UP-50 label anticipates and renders obvious claim 26, as explained below. Claim 26 is substantively similar to the elements of claims 1, 2, and 8 as follows: (1) element [26.pre] is the same as element [1.pre] of claim 1, which UP-50 discloses (*see* XII.B.1.a); (2) element [26.a] is the same as element [1.a] of claim 1, which UP-50 discloses (*see* XII.B.1.b); (3) element [26.b] is the same as element [1.b] of claim 1, which UP-50 discloses (*see* XII.B.1.c); (4) element [26.d] is the same as claim 2, which UP-50 discloses (*see* XII.B.2); and (5) UP-50 teaches element [26.c], wherein the retaining additive comprises a microcrystalline wax ((Ex1012 at p.1 (“The wax blend contains different waxes mixed in equal parts each 25% w/w in the finished product. Wax 1 a microcrystalline wax”); *see also* XII.B.6 (claim 8).)

a) [26.Pre] “A wood preservative composition comprising:”

279. It is my opinion that to the extent limiting, UP-50/UP-50 label discloses the preamble [1.Pre] of claim 1. (Ex1014 (“For use as a wood preservative to protect treated wood articles from fungi For use in industrial vacuum pressure treatment plants to treat wood intended for use as distribution poles, utility poles, cross arms or transportation (road or rail) bridge timbers. This product is a solid concentrate”); Ex1012, p.1; Ex1011, ¶¶9,38; *see also* XII.B.1.a).)

b) [26.a] “40% by weight to 60% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition; and”

280. It is my opinion that UP-50 discloses element [26.a]. UP-50 contains 50% by weight DCOI based on the total weight of the composition. (Ex1012, p.1 (“UP-50 is a solid wood preservative concentrate that contains three components. The active ingredient is . . . DCOI (Kathon 287T). The concentration of DCOI is 50% w/w of the product. (Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39.) The balance of the composition (the inert components) consist of a high melt point (~80°C) wax blend.”); Ex1014 (“Active Ingredients: 4,5-Dichloro-2-n-octyl-3(2H)-isothiazolone (50.0%); Inert Ingredients (50.0%)”); Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39.) DCOI in an amount of 50% by weight is within the 40-60% by weight range for DCOI and anticipates this element. (*See also* XII.B.1 and XII.B.1.b.)

c) [26.b] “40% by weight to 60% by weight of a retaining additive based on the total weight of the composition,”

281. It is my opinion that UP-50 discloses element [26.b]. UP-50 contains 50% by weight of a wax blend based on the total weight of the composition. (Ex1012, p.1 (“UP-50 is a solid wood preservative concentrate that contains three components. . . . The concentration of DCOI is 50% w/w of the product. The balance of the composition (the inert components) consists of a high melt point (~80°C) wax blend.”); Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39; *see also* XIIB.1.c.) The wax blend in UP-50 is a retaining additive comprising a wax. (Ex1012, p.1; Ex1011, ¶¶33-34,

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36-37, 39.) The wax blend of UP-50 in an amount of 50% by weight is within the claimed range of 40-60% range for the retaining additive comprising a wax. (*See also* XII.B.1 and XII.B.1.c.)

d) [26.c] “wherein the retaining additive comprises a microcrystalline wax,”

282. It is my opinion that UP-50 discloses element [26.c]. The wax blend in UP-50 is a retaining additive comprising a microcrystalline wax. ((Ex1012 at p.1 (The wax blend contains different waxes mixed in equal parts each 25% w/w in the finished product. Wax 1 a micro-crystalline wax”); Ex1011, ¶¶18-20, 36-39; *see also* XII.B.6.)

e) [26.d] “wherein a weight ratio of the DCOI to the retaining additive is in a range of 1:1.5 to 1.5:1.”

283. It is my opinion that UP-50 discloses element [26.d]. The weight ratio of DCOI and the retaining additive in UP-50 is 1:1 (i.e., 50 weight % DCOI and 50 weight % retaining additive/wax blend) and within the claimed 1:1.5 to 1.5:1 weight ratio. (Ex1012, p.1 (“UP-50 is a solid wood preservative concentrate that contains three components. . . . The concentration of DCOI is 50% w/w of the product. (Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39.) The balance of the composition (the inert components) consists of a high melt point (~80°C) wax blend.”); Ex1011, ¶¶36-39; *see also* XII.B.1 & 2.)

20. Dependent Claim 27

- a) *[27.Pre] “A method of treating a wood substrate, the method comprising:”*
- b) *[27.a] “diluting the composition of claim 26 with an organic solvent to form a diluted composition; and”*
- c) *[27.b] “contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.”*

284. It is my opinion that UP-50/UP-50 label anticipates and its use renders obvious claim 27, as explained below. Claim 27 depends from claim 26, and is substantively similar to elements of claims 1, 14, and 22. [27.Pre] and [27.a] are substantively similar to claim 14, and [27.b] is substantively similar to claim 22. As explained above, UP-50 anticipates and renders obvious claims 1, 14, 22, and 26. (See XII.B.1, XII.B.2, XII.B.11, XII.B.15, and XII.B.19 (regarding claims 1, 2, 14, 22 and 26, respectively.)

285. It is my opinion that UP-50/UP-50 label and its use disclose claim 27. Dependent claim 27 is substantively the same as the limitations in 22 (depending from claim 14) except reciting the composition of claim 26. UP-50/UP-50 label and its use disclose the limitations in claim 27 for the same reasons discussed above regarding claims 1, 2, 14, 22, and 26. (See XII.B.1, 2, 11, 15, and 19 (regarding claims 1, 2, 14, 22 and 26).)

C. Ground 3: Claims 17-19 are rendered Obvious over UP-50/UP-50 Label, AWWA Paper, HSA-18 and HCS25 SDS

- a) *[17]. “The method of claim 14, wherein the organic solvent comprises a flash point of at least 40 degrees Celsius.”*
- b) *[18]. “The method of claim 14, wherein the organic solvent comprises a flash point of at least 60 degrees Celsius.”*
- c) *[19] “The method of claim 14, wherein the organic solvent comprises a flash point of at least 80 degrees Celsius.”*

286. Claims 17, 18 and 19 depend from claim 14 (which depends from claim 1), and further recite ranges for the flash point of the organic solvent. (See XII.B.1 and 11 regarding claims 1 and 14).

287. It is my opinion that UP-50/UP-50 label (Ex1014) in combination with the AWWA paper (Ex1028), AWWA Standard HSA-18 (Ex1030), and HCS25 SDS (Ex1064) render claims 17-19 obvious, as explained below. (See XII.B.1, 11 (claims 1 and 14).

288. The UP-50 label states that UP-50 “is a solid concentrate and must be diluted with a hydrocarbon solvent.” (Ex1014, p.1) The AWWA paper states that “[DCOI] exhibits excellent solubility in AWWA HSA solvents....” (Ex1028, p. 42.) This is confirmed by the AWWA Standard P39-18 for DCOI, which specifies Hydrocarbon Solvent Type A (HSA solvent) as an acceptable carrier/diluent for

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DCOI. (Ex1029, p.5.) The AWWA standard for Hydrocarbon Solvent A (HSA-18) recites a minimum flashpoint of 66°C. (Ex1030, p.5.)

289. The UP-50 label also indicates that suitable hydrocarbon solvents include “petroleum distillates.” (Ex1014.) HCS25 is a “petroleum distillate” and Hydrocarbon Solvent Type A for use as a “wood and wood pole process oil.” (Ex1064, pp.1, 3.) The HCS25 SDS recites a flash point of “150° C.” (Ex1064, p.1, p.2 (“Hydrotreated Distillate”); HCS 25 (Ex1064, p.3 (Flash Point 150°C).)

290. The AWWA paper also discloses the use of diesel/biodiesel blends for DCOI. (Ex1028, p.197.) A POSA would understand that diesel/biodiesel blends have higher flash points than diesel alone, including above 80°C, as evidenced by de Mattos. (Ex1063, Table 1.)

291. A POSA would have been aware of the known risk of sparking and resulting fire in treatment facilities, including the risk of igniting the solvent from sparks caused by friction from steel rails/tram components arising from accidents while loading/unloading the treatment cylinder. (Ex1069.) A POSA would have been motivated to follow AWWA Paper and select a HSA solvent for UP-50, having a minimum flashpoint of 66°C for “plant and worker safety.” (Ex1030, p.5 (“minimum flash point of 66C”).) A POSA would also have been motivated to use the organic solvent of HCS25 (or a custom blend as was known in the art, as evidenced by de Mattos (Ex1063) for diesel/biodiesel blends) having a flash point of over 80°C, for

the same reasons. Selection and use of appropriate solvents was a routine matter within the skill of a POS.

D. Ground 4: Claims 1-5, 7-10, 12, and 26 are Anticipated, or at a Minimum Rendered Obvious by the BDES Agreement

292. It is my opinion that UP-50, which I understand was offered for sale in the BDES Agreement, is the same UP-50 described above in XII.B.1-20. (Ex1011, ¶¶9, 39; Ex1012, p.1; Ex2027, pp.1, 5, and 6.)

293. In my opinion, the BDES Agreement anticipates or renders obvious claims 1-5, 7-10, 12, and 26 for the same reasons explained above XII.B (regarding claims 1-5, 7-10, 12, and 26; *see also* IX.C), and below.

1. Independent Claim 1

294. In my opinion, the BDES Agreement (Ex1027) anticipates and renders obvious claim 1 for the same reasons explained above in XII.B.1, and as explained below.

a) [1.Pre] A wood preservative composition comprising:

295. It is my opinion that, if limiting, UP-50, which was offered for sale in the BDES Agreement, is an wood preservative composition. (Ex1075, p. 5 (“For use as a wood preservative to protect treated wood articles from fungi and subterranean termites.”); Ex1012, p.1 (“UP-50 is a solid wood preservative concentrate”); Ex1011, ¶¶9, 15-16, 18-19; Ex1027.); *see also* XII.B.1a.)

b) [1.a] 40% by weight to 60% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition; and

296. It is my opinion that UP-50, which was offered for sale in the BDES Agreement, contains 50% by weight DCOI based on the total weight of the composition. (Ex1012, p.1 (“UP-50 is a solid wood preservative concentrate that contains three components. The active ingredient is . . . DCOI (Kathon 287T). The concentration of DCOI is 50% w/w of the product. The balance of the composition (the inert components) consist of a high melt point (~80°C) wax blend.”); Ex1027, p.6, ¶9; Ex1011, ¶¶36-39; *see also* XII B.1.b.) DCOI in an amount of 50% by weight is within the claimed 40-60% range for DCOI. (*See also* XII B.1.b.)

c) [1.b] 40% by weight to 60% by weight of a retaining additive comprising a wax based on the total weight of the composition,

297. UP-50, which was offered for sale in the BDES Agreement, contains 50% by weight of a wax blend based on the total weight of the composition. (Ex1012, p.1; Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39; *see also* XII.B.1.c.)

298. The wax blend in UP-50 is a retaining additive comprising a wax. The wax blend in an amount of 50% by weight of UP-50 is within the claimed range of 40-60% range for the retaining additive comprising a wax. The wax blend in UP-50 is a blend of microcrystalline wax and Fischer-Tropsch synthetic wax as disclosed in Archer (Ex1007 and Ex1010, ¶49.) Archer teaches that its waxes “prevent or

minimize leaching/depletion of active preservatives” and the wax-containing compositions “result in lower preservative depletion in the treated wood (i.e., reduced preservative leaching).” (Ex1007 and Ex1010, ¶¶51, 55, 70-82, 85-87.) UP-50 as offered for sale under the BDES agreement therefore discloses a retaining additive both under Petitioner’s proposed construction, as well as the (improper) narrower construction discussed under VII, above.⁹ (*See also* XII.B.1.c.)

d) [1.c] wherein a weight ratio of the DCOI to the retaining additive is in a range of 1:5 to 5:1.

299. The weight ratio of DCOI and the wax blend in UP-50, which was offered for sale in the BDES Agreement, is 1:1 (i.e., 50 % DCOI and 50% retaining additive/wax blend). (Ex1012, p.1; Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39; *see also* XII.B.1.d.) The 1:1 weight ratio is within the claimed 1:5 to 5:1 weight ratio.

⁹ This explanation that UP-50 and thus the BDES agreement discloses a retaining additive under Petitioner’s claim construction and under any asserted (improper), narrower construction should be understood to apply to all grounds relying upon the BDES agreement, including dependent claims.

2. Dependent Claim 2

- a) *[2] The wood preservative composition of claim 1, wherein the weight ratio of the DCOI to the retaining additive is in a range of 1:1.5 to 1.5:1.*

300. In my opinion, the BDES Agreement anticipates and renders obvious claim 2 as explained below.

301. The BDES Agreement discloses claim 2. (See XII.D.1 (regarding independent claim 1); *see also* XII.B.2.) The 1:1 weight ratio of DCOI to wax blend in UP-50, which was offered for sale in the BDES Agreement, is within the narrower range of 1:1.5 to 1.5:1 recited in claim 2.

3. Dependent Claim 3

- a) *[3] The wood preservative composition of claim 1, wherein the wax comprises an olefin wax, a petroleum wax, a carnauba wax, a polyethylene wax, a silicone wax, a polypropylene wax, a polytetrafluoroethylene (PTFE) synthetic wax, or a combination thereof.*

302. In my opinion, the BDES Agreement anticipates or renders obvious claim 3 as explained below. (See XII.D.1 (regarding independent claim 1); *see also* XII.B.3.) Claim 3 depends from claim 1 and further recites the wax can comprise a “petroleum wax.”

303. The BDES Agreement discloses claim 3. (See XII.D.1 (regarding claim 1); *see also* XII.B.3.) The wax blend in UP-50, which was offered for sale in the BDES Agreement, is a blend of microcrystalline wax and Fischer-Tropsch synthetic

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wax. (Ex1011, ¶¶33-34, 36-39; Ex1012, p.1.) Microcrystalline wax is a type of petroleum wax. (Ex1040, p.14.) The wax in UP-50 therefore comprises a petroleum wax.

4. Dependent Claims 4 & 5

- a) **[4] The wood preservative composition of claim 1, wherein the wax comprises a melting point in a range of 40 degrees Celsius to 100 degrees Celsius.**
- b) **[5] The wood preservative composition of claim 1, wherein the wax comprises a melting point in a range of 75 degrees Celsius to 100 degrees Celsius.**

304. In my opinion, the BDES Agreement anticipates or renders obvious claims 4 and 5 as explained below. Claims 4 and 5 depend from claim 1 and further recite melting points of the wax.

305. The BDES Agreement discloses claims 4 and 5. (*See* XII.D.1 (regarding claim 1) and XII.D.3 (regarding disclosure of petroleum wax); *see also* XII.B.4.) The BDES Agreement is an offer to sell UP-50, and the microcrystalline wax used in UP-50, which was offered for sale in the BDES Agreement, has a melting point of 79°C. (Ex1012, p.1; Ex1011, ¶¶36-39.) The Fischer-Tropsch wax used in UP-50 has a melting point of 78°C. (Ex1011, ¶¶36-39; Ex1012, p.1.) The UP-50 wax blend has a melting point within the claimed ranges of 40-100°C (claim 4) and 75-100°C (claim 5). (Ex1012, p.1.)

5. Dependent Claim 7

- a) [7] The wood preservative composition of claim 1, wherein the wax comprises a petroleum wax.**

306. In my opinion, the BDES Agreement anticipates or renders obvious claim 7 as explained below. Claim 7 depends from claim 1 and further recites “wherein the wax comprises a petroleum wax.”

307. The BDES Agreement discloses claim 7. (*See* XII.D.1 (regarding independent claim 1) & XII.D.3 (regarding disclosure of waxes of claim 3); *see also* XII.B.5.) The microcrystalline wax in UP-50, which was offered for sale in the BDES Agreement, is a type of petroleum wax as recited in claim 7. (Ex1040, p.14 (“There are two general types of petroleum waxes ... wax derived from the residual distillate lubricating oil fractions is referred to as microcrystalline wax”)).)

6. Dependent Claim 8

- a) [8] The wood preservative composition of claim 1, wherein the wax comprises paraffin wax and a microcrystalline wax.**

308. In my opinion, the BDES Agreement anticipates or renders obvious claim 8 as explained below. Claim 8 depends from claim 1 and further recites the “wax comprises paraffin wax and a microcrystalline wax.”

309. The BDES Agreement discloses claim 8. *See* XII.D.1 (regarding independent claim 1); *see also* XII.B.6.) The wax blend in UP-50, which was offered for sale in the BDES Agreement, is a blend of Fischer-Tropsch synthetic wax and

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microcrystalline wax. (Ex1012, p.1; Ex1011, ¶¶36-39.) A POSA would understand that Fischer-Tropsch wax is a synthetic paraffin wax synthesized by the Fischer-Tropsch process, and therefore UP-50's Fischer Tropsch wax is a disclosure of a paraffin wax. (Ex1041, p.1; Ex1067, p.22; *see also* XII.A.6.) The wax blend in UP-50 comprises paraffin wax and a microcrystalline wax as recited in claim 8, and thus anticipates and renders obvious claim 8.

7. Dependent Claim 9

- a) *[9] The wood preservative composition of claim 1, wherein the composition comprises 45% by weight to 55% by weight of the DCOI based on the total weight of the composition and 45% by weight to 55% by weight of the retaining additive based on the total weight of the composition.*

310. In my opinion, the BDES Agreement anticipates or renders obvious claim 9 as explained below. Claim 9 depends from claim 1 and further recites narrower weight percentages of DCOI and retaining additive.

311. The BDES Agreement discloses claim 9. *See* XII.D.1 (regarding independent claim 1); *see also* XII.B.7.) The 50% by weight DCOI and 50% by weight wax blend in UP-50, which was offered for sale in the BDES Agreement, falls within the narrower weight ranges recited in claim 9.

8. Dependent Claim 10

- a) *[10] The wood preservative composition of claim 1, wherein the composition consists essentially of the DCOI and the retaining additive.*

312. In my opinion, the BDES Agreement anticipates or renders obvious claim 10 as explained below. Claim 10 depends from claim 1 and further recites “wherein the composition consists essentially of the DCOI and the retaining additive.”

313. The BDES Agreement discloses claim 10. (*See* XII.D.1 (regarding independent claim 1); *see also* XII.B.8.) UP-50, which was offered for sale in the BDES Agreement, contains 50% by weight DCOI and 50% by weight wax blend. (Ex1012, p.1; Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39.) Since these are the only components in UP-50, UP-50 consists essentially of DCOI and retaining additive comprising a wax, as recited in claim 10.

9. Dependent Claim 12

- a) *[12] A wood product comprising the wood preservative composition of claim 1.*

314. In my opinion, the BDES Agreement anticipates or renders obvious claim 12 as explained below. Claim 12 depends from claim 1 and recites “A wood product comprising the wood preservative composition of claim 1.”

315. The BDES Agreement discloses claim 12. (*See* XII.D.1 (regarding independent claim 1); *see also* XII.B.10.) UP-50, which was offered for sale in the

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BDES Agreement, is a wood preservative to be used for treating wood products such as utility poles. (Ex1011, ¶9.) A POSA would understand that UP-50 physically impregnates the wood product during treatment and UP-50 is physically impregnated within the wood product after treatment. Ex1075, p.5 (“Directions for Use *** A retention rate of 0.1-0.4 pounds/cubic foot (pcf) of UP-50”); Ex1027, p.5; Ex1070, p. 2; Ex1071, pp. 4, 39; Ex1072, pp.12, 30; Ex1073, pp.2, 19; Ex1074, p. 2; Ex1011, ¶¶9, 11-22, 38.) The treated wood product with UP-50 therefore comprises UP-50.

10. Independent Claim 26

316. In my opinion, the BDES Agreement anticipates or renders obvious claim 26 as explained below.

a) [26.Pre] A wood preservative composition comprising:

317. If limiting, UP-50, which was offered for sale in the BDES Agreement, is a wood preservative composition. (Ex1012, p. 1; Ex1027, p. 1; *see also* XII B.19.a.)

b) [26.a] 40% by weight to 60% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition; and

318. Element [26a] recites the same 40-60 weight percent range of DCOI as recited in claim 1. UP-50 contains 50% by weight DCOI based on the total weight of the composition. (*See* XII.D.1 (regarding independent claim 1; Ex1012, p.1;

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Ex1075, p. 5; Ex1011, ¶¶9, 18-20, 33-34, 36-37, 39.) DCOI in an amount of 50% by weight is within the 40-60% by weight range for DCOI and anticipates this element.

(*See also* XII.D.1; *see also* XII.B.19.b.)

- c) [26.b] 40% by weight to 60% by weight of a retaining additive based on the total weight of the composition, & [26.c] wherein the retaining additive comprises a microcrystalline wax,**

319. Elements [26.b] recites the same weight percent range of retaining additive as recited in claim 1. Element [26.c] recites “wherein the retaining additive comprises a microcrystalline wax.” UP-50 contains 50% by weight of a wax blend based on the total weight of the composition. (*See* XII.D.1 (regarding independent claim 1; Ex1012,p.1; Ex1011, ¶¶9, 18-20, 36-37, 39; *see also* XII.B.19.c and XII.B.19.d.) The wax blend in UP-50 is a retaining additive comprising a microcrystalline wax. (Ex1012, p.1; Ex1011, ¶¶36-39.) The UP-50 retaining additive comprising a microcrystalline wax is in an amount of 50% by weight, within the claimed 40-60% range for the retaining additive. (Ex1012, p.1; Ex1011, ¶¶9, 18-20, 36-37, 39; *see also* XII.B.19.c and XII.B.19.d.)

- d) [26.d] wherein a weight ratio of the DCOI to the retaining additive is in a range of 1:1.5 to 1.5:1.**

320. Element [26.d] recites the same weight ratio of DCOI to retaining additive of 1:1.5 to 1.5:1 recited in claim 2. (*See* XII.D.2 (regarding claim 2.) The weight ratio of DCOI to retaining additive in UP-50 is 1:1 (i.e., 50 weight % DCOI

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and 50 weight % retaining additive/wax blend) and within the claimed 1:1.5 to 1.5:1 weight ratio. (Ex1012, p.1; Ex1011, ¶¶9, 18-20, 36-37, 39; *see also* XII.D.1 and XII.D.2, XII.B.19.e. and XII.B.2.)

E. Ground 5: Claims 11, 14-16 and 20-25 and 27 are Rendered Obvious over the Combination of the BDES Agreement and the AWPAPaper

1. A POSA Would Have Been Motivated to Combine the BDES Agreement and the AWPAPaper and Would Have Reasonably Expected Success – including to Dilute UP-50 in Diesel/Organic Solvent and Use to Contact Wood to Produce a Wood Product

321. UP-50 is a DCOI-containing wood preservative concentrate intended to be diluted in an organic solvent to form a diluted composition which is then used to treat wood products, such as utility poles. (Ex1011, ¶¶9, 38.) As explained above in XII.D, UP-50 offered for sale in the BDES Agreement is the same UP-50 described in XII.B.

322. AWPAPaper discloses several studies in which DCOI compositions were diluted in various organic solvents, such as diesel, diesel/biodiesel blends, toluene, and hydrocarbon oils, and successfully used for treating wood products, such as utility poles, posts, and cross arms. (Ex1028, pp. 13 (“DCOI in #2 diesel can be successfully used ... to meet AWPAPenetration requirements”), 17, 20 (“DCOI concentrate was diluted in toluene to achieve the desired retentions...”), 42 (“The active ingredient [DCOI] exhibits excellent solubility in AWPAPHSA solvents

without the need for co-solvents.”.) A WPA paper also discloses diluting/using DCOI in an organic solvent and contacting a wood substrate for a period of time suitable to inhibit fungal decay (e.g., efficacy against fungi and termites), to produce a wood product having suitable performance compared to PCP at equivalent retention levels. (Ex1028, pp.11-42.) These studies demonstrated that DCOI compositions containing such organic solvents provide excellent wood treatment properties. (Ex1028, pp. 13, 17-42).

323. In my opinion, a POSA would also have been motivated to combine the teachings of A WPA paper with UP-50 when selecting an organic solvent, e.g., diesel, for diluting UP-50 and using the same for its intended purpose to produce a treated wood product. A POSA would have had a reasonable expectation of success in view of the successful wood treatment results reported in A WPA paper. *See also supra*, IX.C. (regarding reduction to practice).

2. Dependent Claim 11

- a) [11] *The wood preservative composition of claim 1, wherein the composition further comprises an organic solvent.***

324. Claim 11 depends from claim 1 and recites “wherein the composition further comprises an organic solvent.” In my opinion, the BDES Agreement in combination with A WPA paper (Ex1028) renders claim 11 obvious as explained below. (*See XII.E.1 and XII.D.1 (regarding independent claim 1); see also XII.B.1.)*

325. The AWWA paper teaches compositions of DCOI and various organic solvents, including diesel, blends of diesel and biodiesel, toluene, and hydrocarbon oils. (E.g., Ex1028, pp.17 (“DCOI in #2 diesel was highly effective”). AWWA paper also discloses diluting DCOI in an organic solvent for treating wood products and that the resultant solvent borne DCOI provides excellent treatment properties. (Ex1028, p.13 (“DCOI in #2 diesel can be successfully used ... to meet AWWA penetration requirements”).). A POSA would be motivated to use UP-50 with an organic solvent because it was well-known to use organic solvents with organic wood preservatives, e.g., DCOI, to treat wood products. (Ex1028, pp.17, 24; Ex1020, ¶¶38, 42; Ex1017, ¶¶6-7, 23.) Moreover, doing so is a routine matter within the skill of a POSA.

3. Dependent Claim 14

- a) ***[14] A method of treating a wood substrate, the method comprising: diluting the composition of claim 1 with an organic solvent to form a diluted composition.***

326. Claim 14 depends in part from claim 1 and recites a method of treating a wood substrate comprising “diluting the composition of claim 1 with an organic solvent to form a diluted composition.” In my opinion, the BDES Agreement in combination with AWWA paper (Ex1028) renders claim 14 obvious, as explained below. (See XII.E.1, XII.D.1 (regarding independent claim 1); *see also* XII.B.1.)

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327. The AWWA paper teaches diluting DCOI in hydrocarbon solvents, such as diesel, blends of diesel and biodiesel, toluene, and hydrocarbon oils—which are organic solvents—to form a diluted composition. (e.g., Ex1028, pp.17 (“DCOI in #2 diesel was highly effective”); *see also id.* at pp.18-23 (diluting step)). AWWA paper also discloses diluting DCOI in an organic solvent for treating wood products and that the resultant solvent borne DCOI provides excellent treatment properties. (Ex1028, p.13 (“DCOI in #2 diesel can be successfully used ... to meet AWWA penetration requirements”).).

328. A POSA would have been motivated to dilute UP-50 (a solid block (Ex1011, ¶¶9, 22, 25, 38) and (Ex1012, p.1)) to form a diluted composition to use it for its intended purpose in treating a wood substrate. A POSA would also have been motivated to use an organic solvent (e.g., diesel), as evidenced by the AWWA paper. For example, the AWWA paper teaches dilution of organic DCOI in an organic solvent, and that doing so can meet AWWA penetration requirements, provide efficacy against fungi and termites, and provide suitable performance compared to PCP at equivalent retention levels. (Ex1028, pp.11-42.)

329. A POSA would have a reasonable expectation of success in diluting UP-50 (an organic wood preservative containing DCOI) in any of the organic solvents disclosed in the AWWA paper to form a diluted composition for treating a wood substrate. Further, a POSA would understand that a variety of waxes (e.g.,

paraffin, Fischer-Tropsch, and microcrystalline) are dilutable/soluble in organic solvents, including diesel. (Ex1068, p.4 (Table 3).) Moreover, diluting a wood preservative such as UP-50 in an organic solvent to form a diluted composition was routine and within the general skill of a POSA.

4. Dependent Claim 15

- a) *[15] The method of claim 14, wherein the organic solvent comprises a hydrocarbon solvent, an amine solvent, a glycol solvent, a ketone solvent, an ester solvent, an alcohol solvent, a halogenated solvent, a biodegradable organic solvent, or combinations thereof.*

330. Claim 15 depends from claim 14, which depends from claim 1, and recites a “wherein the organic solvent comprises a hydrocarbon solvent” As discussed for claim 14, the solvents disclosed in the AWPAs are hydrocarbon solvents. What is more, the AWPAs disclose hydrocarbon solvents for use with DCOI. (See, e.g., Ex1028, p. 47.) In my opinion, the BDES Agreement in combination with AWPAs renders claim 15 obvious for the same reasons discussed above for claim 14. (See XII.E.1, XII.E.3 (regarding claim 14), XII.D.1 (regarding independent claim 1); see also XII.B.1 (regarding claim 1).)

5. Dependent Claim 16

- a) *[16] The method of claim 14, wherein the organic solvent comprises diesel, biodiesel, or a combination thereof.*

331. Claim 16 depends from claim 14, which depends from claim 1, and further recites a “wherein the organic solvent comprises diesel, biodiesel, or a combination thereof.” In my opinion, the BDES Agreement in combination with AWWA paper renders claim 16 obvious as explained below and for the same reasons discussed above for claim 14. (See XII.D.1 (regarding claim 1), XII.B.1 (regarding claim 1), (XII.E.3 (regarding claim 14); *see also* XII.E.1.) As explained above for claim 14, the AWWA paper teaches dilution of DCOI wood preservative in diesel, blends of diesel and biodiesel for treatment of wood products. (Ex1028, p.17.) Further, a POSA would have been motivated to use diesel as the solvent for diluting UP-50 to form a diluted composition as taught by the AWWA paper, with a reasonable degree of success, because diesel was a well-known solvent for DCOI and other wood preservative agents long prior August 5, 2021. (Ex1028, pp.12-17.)

6. Dependent Claims 20-21

- a) *[20] The method of claim 14, wherein the retaining additive has a solubility in the organic solvent of at least 0.5%.*
- b) *[21] The method of claim 14, wherein the retaining additive has a solubility in the organic solvent of at least 1%.*

332. Claims 20 and 21 depend from claim 14, which depends from claim 1, and further recite “wherein the retaining additive has a solubility in the organic solvent” of at least 0.5% and 1%, respectively. In my opinion, the BDES Agreement in combination with AWP paper (Ex1028) renders claims 20 and 21 obvious as explained below. (See XII.D.1 (regarding claim 1), XII.B.1 (regarding claim 1), and XII.E.3 (regarding claim 14); *see also* XII.E.1.)

333. As explained above for claim 14 in this same Ground, the AWP paper teaches dilution of DCOI wood preservative in diesel, blends of diesel and biodiesel. (Ex1028, pp.12-17.) The wax blend in UP-50 has a solubility of at least 1% in a diesel/biodiesel blend. This was confirmed through solubility testing showing that the Fischer-Tropsch and microcrystalline wax blend in UP-50 has a solubility of at least 1% in an organic solvent suitable for diluting UP-50. (See XII.A.15 and XII.B.14 (regarding claims 20-21); Ex1024 (UP-50 Solubility Report).) Additionally, the elements of claim 20 and 21 would have been obvious because a POSA would have been motivated to solubilize the UP-50 in an organic solvent so

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that UP-50 can be used to penetrate into the wood to produce a treated wood product, in accordance with known methods. A POSA would have had a reasonable expectation of success in solubilizing UP-50 in organic solvent because this was routine and within the general skill of a POSA.

7. Dependent Claim 22

- a) *[22] The method of claim 14, further comprising contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.*

334. Claim 22 depends from claim 14, which depends from claim 1, and further recites “further comprising contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.” In my opinion, the BDES Agreement in combination with AWWA paper (Ex1028) renders claim 22 obvious, as explained below. (See XII.D.1 (regarding claim 1), XII.B.1 (regarding claim 1) and XII.E.3 (regarding claim 14); *see also* XII.E.1.

335. A POSA would have been motivated to contact a wood substrate with a diluted wood preservative composition for a period of time suitable to inhibit fungal decay of the wood substrate, as this was long-known in the art. For example, the AWWA paper shows numerous examples of successfully treated wood by contact with DCOI (a solid) in this manner to obtain suitable retention rates of the wood preservative and efficacy against fungal decay. (Ex1028, pp.13-20 (Tables 4-7 and

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associated text), p.11 (citing AWWA standard P39); *see also* Ex1029, p.5 (AWWA Standard P39-18 recommending minimum retention of 0.08 pcf for ground contact applications).)

336. Further, a POSA would have been otherwise motivated carry out wood treatment with the UP-50 treatment solution (of UP-50 diluted in an organic solvent) for a sufficient time to achieve adequate retention of DCOI in the wood for effective protection against fungi, as a POSA would have understood that it is necessary to do so to use UP-50 for its intended purpose in treating a wood product. (*See, e.g.,* Ex1075, p.5 (“treat for up to 12 to 48 hours or until effective retention and penetration is achieved.”).) A POSA would have had a reasonable expectation of success, as doing so was routine and well within the skill of a POSA.

8. Dependent Claim 23

a) [23] *A wood product produced by the method of claim 14.*

337. Claim 23 depends from claim 14, which depends from claim 1, and recites “a wood product produced by the method of claim 14.” In my opinion, the BDES Agreement in combination with AWWA paper (Ex1028) renders claim 23 obvious, as explained below. (*See* XII.D.1 (regarding independent claim 1), XII. B.1 (regarding claim 1), and XII.E.3 (regarding claim 14); *see also* XII.E.1.)

338. A POSA would have been motivated to produce a wood product by treating a wood substrate by diluting the UP-50 with an organic solvent and using

the diluted composition to treat the wood substrate. The AWP paper discloses the predictable and desirable benefits of using a diluted composition of DCOI wood preservative for treating wood and thus producing a treated wood product. (Ex1028, p.11 (DCOI for “Pressure Treatment of Poles, Posts and Sawn Cross Arms”), pp.13-16 (utility poles), and pp.24-33 (wood poles).). Additionally, a POSA would have otherwise found it obvious to produce a wood product of claim 23 by the method of claim 14, using the diluted composition of UP-50, in view of the intended purpose of UP-50. A POSA would have had a reasonable expectation of success because doing so was routine and within the general skill of a POSA.

9. Dependent Claim 24

- a) *[24] The wood product of claim 23, wherein the wood product retains at least 0.05 pounds of DCOI per cubic foot of the wood product.*

339. Claim 24 depends from claim 23, which depends from claim 14, which depends from claim 1, and recites “The wood product of claim 23, wherein the wood product retains at least 0.05 pounds of DCOI per cubic foot of the wood product.” In my opinion, the BDES Agreement in combination with AWP paper (Ex1028) renders claim 24 obvious, as explained below. (See XII.D.1 (regarding claim 1), XII.B.1 (regarding claim 1) and XII.E.3 (regarding claim 14) and XII.E.8 (regarding claim 23); *see also* XII.E.1.)

340. As explained above for claim 23, the AWP paper shows numerous examples of successfully treated wood in this manner to obtain suitable retention rates of the wood preservative, e.g., 0.05, 0.1, 0.2, and 0.4 pcf. (Ex1028, pp.24-32, p.11 (citing AWP standard P39); *see also* Ex1029, p.5 (AWP Standard P39-18 reciting “Minimum Retentions” for “Ground Contact applications - 0.08 pcf”).) As disclosed, the treated wood products retain “at least 0.05 pounds of DCOI per cubic foot of the wood product,” as recited in claim 24. A POSA would have been motivated to produce a wood product with the recited retention level of DCOI because that is consistent with known levels of effectiveness and also known industry standards; Ex1028, p. 13 (“DCOI in no. 2 diesel can be successfully used . . . to meet AWP penetration requirements.”). Producing a wood product with recited level of retention of DCOI was known and well within the general skill set of a POSA.

10. Dependent Claim 25

- a) ***[25] The wood product of claim 23, wherein the wood product comprises a deck, a rail, a fence, a utility pole, a pile, a railway tie, a railroad bridge, cladding, siding, or a combination thereof.***

341. Claim 25 depends from claim 23, which depends from claim 14, which depends from claim 1. Claim 25 recites “The wood product of claim 23, wherein the wood product comprises a deck, a rail, a fence, a utility pole, a pile, a railway tie, a railroad bridge, cladding, siding, or a combination.” In my opinion, the BDES

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Agreement in combination with AWWA paper (Ex1028) renders claim 25 obvious, as explained below. (See XII.D.1 (regarding independent claim 1), XII.B.1 (regarding claim 1), XII.E.3 (regarding claim 14) and XII.E.8 (regarding claim 23); *see also* XII.E.1.)

342. The AWWA paper discloses examples of treatment of utility poles, posts and cross arms. (Ex1028, pp.13-16; 24-33.) BDES Agreement discloses use of UP-50 to treat wood poles. (Ex1027, p. 1.) A POSA would be motivated to use UP-50 in accordance with its known purpose to produce such wood products by treating a wood substrate by diluting UP-50 with an organic solvent to produce a diluted composition. Doing so is both taught by AWWA paper and rendered obvious by the BDES agreement as well as the knowledge of a POSA. A POSA would have a reasonable expectation of success in preparing such treated wood products since that is the purpose of UP-50 and doing so was routine and within the general skill of a POSA. (Ex1075, p. 5 (“For the Industrial Pressure Treatment of Wood Intended for Use on Utility Poles, Cross Arms or Transportation (road or rail) Bridge Timbers”).)

11. Dependent Claim 27

- a) *[27.Pre] A method of treating a wood substrate, the method comprising:*
- b) *[27.a] diluting the composition of claim 26 with an organic solvent to form a diluted composition; and*
- c) *[27.b] contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.*

343. Dependent claim 27 is a method claim substantively the same as the limitations in 22, which depends from claim 14, which depends from claim 1, except reciting the composition of claim 26 for the steps of diluting and contacting. In my opinion, the BDES Agreement in combination with AWWA paper (Ex1028) renders claim 27 obvious for the same reasons discussed above regarding claims 1, 14, 22, and 26. (See XII.D.1 (regarding claim 1) and XII.E.3 (regarding claim 14) and XII.E.7 (regarding claim 22) and XII.D.10 (regarding claim 26); see also XII.B.19 (regarding claim 26), and XII.E.1.)

F. Ground 6: Claims 17-19 are rendered Obvious over the Combination of BDES Agreement, AWPAPaper, HSA-18, and HCS25 SDS

- a) *[17] The method of claim 14, wherein the organic solvent comprises a flash point of at least 40 degrees Celsius.*
- b) *[18] The method of claim 14, wherein the organic solvent comprises a flash point of at least 60 degrees Celsius.*
- c) *[19] The method of claim 14, wherein the organic solvent comprises a flash point of at least 80 degrees Celsius.*

344. Claims 17, 18 and 19 depend from claim 14 and recite wherein the organic solvent comprises a flash point of at least 40°C, at least 60°C, at least 80°C, respectfully. In my opinion, the BDES Agreement in combination with the AWPAPaper, HSA-18, and HCS25 SDS render claims 17, 18 and 19 obvious. (See XII.D.1 and XII.E.3 (regarding claims 1 and 14); see also XII.E.1 (teaching and motivation regarding use of hydrocarbon solvents), XII.C (claims 17-19) (teaching and motivation regarding flash points, taught by combination of UP-50, AWPAPaper, HSA-18, and HCS25 SDS); see also XII.B.1, XII.D.1 and XII.E.3.) The AWPAPaper discloses solvents for use with DCOI and states that “[DCOI] exhibits excellent solubility in AWPAPaper HSA solvents....” (Ex1028, p. 42.) This is confirmed by the AWPAPaper Standard P39-18 for DCOI, which specifies Hydrocarbon Solvent Type A (HSA solvent) as an acceptable carrier/diluent for DCOI. (Ex1029, p.5.) The

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AWPA standard for Hydrocarbon Solvent A (HSA-18) recites a minimum flashpoint of 66°C. (Ex1030, p.5.) HCS25 is a “petroleum distillate” and Hydrocarbon Solvent Type A for use as a “wood and wood pole process oil.” (Ex1064, pp.1, 2 (“Hydrotreated Distillate”).) The HCS25 SDS recites a flash point of “150° C.” (Ex1064, p.3 (Flash Point 150°C).) The AWP paper also discloses the use of diesel/biodiesel blends for DCOI. (Ex1028, p.17.) A POSA would understand that diesel/biodiesel blends have higher flash points than diesel alone, including above 80°C, as evidenced by de Mattos. (Ex1063, Table 1; *see also* XII.A.14 (De Mattos).)

345. A POSA would have been aware of the known risk of sparking and resulting fire in treatment facilities, including the risk of igniting the solvent from sparks caused by friction from steel rails/tram components arising from accidents while loading/unloading the treatment cylinder. (Ex1069.) A POSA would have been motivated to follow AWP Paper and select a HSA solvent for UP-50, having a minimum flashpoint of 66°C for “plant and worker safety.” (Ex1030, p.5 (“minimum flash point of 66C”).) A POSA would also have been motivated to use the organic solvent of HCS25 (or a custom blend as was known in the art, as evidenced by de Mattos (Ex1063) for diesel/biodiesel blends) having a flash point of over 80°C, for the same reasons. Selection and use of appropriate solvents was a routine matter within the skill of a POSA.

G. Ground 7: Claims 1-16 and 20-27 are rendered obvious by Rak in Combination with AWWA Paper and Cui

1. A POSA Would Have Been Motivated to Combine Rak, AWWA Paper and Cui and Would Have Reasonably Expected Success

346. It is my opinion that a POSA would have been motivated to combine Rak, AWWA Paper and Cui for the reasons explained below. Rak, AWWA Paper, and Cui each relate to organic wood preservative compositions, e.g., PCP and/or DCOI, and share the common objective of improving retention of an organic wood preservative in the treated wood product.

347. Rak discloses organic wood preservative compositions comprising a hydrophobic agent such as waxes, an amorphous polymer, and an organic wood preservative agent in a hydrocarbon solvent. Rak discloses the wood preservative can be “pentachlorophenol [PCP], an oxathiin compound *or other preservative preferably of low mammalian toxicity.*” (Ex1015, Abstract.) Rak further discloses that the preservative be highly toxic to microorganisms which attack wood. (*Id.* at 2:23-26.)

348. The AWWA paper (Ex1028) discloses treatment studies conducted in 2017 and earlier establishing that DCOI in solvent has excellent efficacy against decay fungi and termites compared to PCP at equivalent retention levels and performs similarly to PCP with respect to “treatment cycle, solution uptakes, penetration gradients and uptake of active ingredient into wood.” (*Id.* at 13, 24-32.)

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The AWWA paper also discloses DCOI was a well-known wood preservative of low mammalian toxicity. (*Id.* at 42 (“low human and ecotoxicity characteristics”).)

349. Cui discloses wood preservative compositions comprising DCOI solubilized in an organic phase comprising a wax. (Ex1016, ¶¶19, 21, claims 3 and 10.) Cui discloses that the wax helps provide excellent water repellency and low preservative leaching. (Ex1016 at ¶29, *see also* ¶¶4, 12 (discussing concerns concerning fixation, depletion, and distribution gradient).) It is my opinion that a POSA would understand from Cui that the claimed retaining additive (i.e., comprising a wax) can be successfully used in combination with DCOI to prepare effective wood preservative compositions (in an organic phase, compatible with an organic solvent).

350. Prior to the filing date of the '817 provisional, it was known that PCP was being phased out due to environmental concerns. (Ex1023, pp.4-6, 12-15.) There was thus market pressure to replace PCP with a suitable organic preservative, such as DCOI, which the industry recognized as a preservative of low mammalian toxicity. (Ex1028, p. 42).

351. It is my opinion that a POSA would have been motivated to use DCOI as the wood preservative agent in the Rak composition, given DCOI's excellent environmental toxicity profile and efficacy against microorganisms that attack wood products. (Ex1028, pp.11-13, 17-32; Ex1023, pp.13-14.)

352. A POSA would have had a reasonable expectation of success in using DCOI as the wood preservative agent in the composition of Rak, and in the amounts taught in Rak, including with an organic solvent in view of AWWA paper's teaching that DCOI performs similarly to PCP with respect to "treatment cycle, solution uptakes, penetration gradients and uptake of active ingredient into wood." (Ex 1028, pp13-17.)

353. A POSA would also have had a reasonable expectation that DCOI could be used successfully in combination with the wax retaining additive of Rak in view of Cui's teaching that DCOI can be successfully used with a wax to help achieve water repellency and low preservative leaching. (Ex1016, ¶¶19, 21, 29, claims 3, 10.)

2. Independent Claim 1

a) *[1.Pre] A wood preservative composition comprising:*

354. It is my opinion that to the extent limiting, Rak discloses the preamble [1.Pre] of claim 1. (Ex1015, Abstract ("A wood preservative composition"), 1:13-16, claims 1, 9.)

b) *[1.a] 40% by weight to 60% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition; and*

355. It is my opinion that Rak in combination with Cui (Ex1016) and AWWA paper (Ex1028) renders element [1.a] obvious.

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356. As explained above (XII.G.1), prior to the filing date of the '817 provisional, it is my opinion that a POSA would have been motivated to use DCOI as the organic wood preservative agent in the Rak composition as taught by AWWA paper and Cui.

357. Rak teaches and claims a wood preservative concentrate composition (without solvent) comprising from about 1 to about 10 parts by weight organic wood preservative, from about 0.5 to about 5 parts by weight of a hydrophobic agent, which can be paraffin waxes, and from about 0.2 to about 1 part by weight amorphous vinylic-type polymer. (Ex1015 at 17:20-38 "The preservative can be prepared in the form of a masterbatch or concentrate (without the organic solvent) . . . adapted for dilution to form the final solution at the jobsite. The invention thus includes a wood preservative concentrate, soluble in lipophilic wood penetrating organic solvents, comprising (a) an organic wood preservative agent in from 1 to about 10 parts by weight; (b) a hydrophobic agent selected from the group consisting of . . . paraffin waxes in from about 0.5 to about 5 parts by weight, . . . ; and (c) an amorphous vinylic-type polymer, soluble in said penetrating organic solvent, in from about 0.2 to about 1 part by weight."), and claim 9.)

358. As shown in the table below, when converted to weight percent based on the total weight of the concentrate, the amount of the preservative in the concentrate ranges from **14.3% to 93.5%**. The low end of the range (i.e., **14.3 wt%**)

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represents a weight percent calculation using a concentrate composition having the lowest amount of preservative (1 parts by weight) in combination with the highest amount of retaining additive (5 parts by weight wax plus 1 parts by weight polymer). The high end of the range (i.e., **93.5 wt%**) represents a weight percent calculation using a concentrate composition having the highest amount of preservative (10 parts by weight) in combination with the lowest amount of retaining additive (0.5 parts by weight wax plus 0.2 parts by weight polymer).

Wood Preservative (parts by wt.)	Retaining Additive		Total wt. of comp.	Wt. % Wood Preservative¹⁰
	Wax (parts by wt.)	Polymer (parts by wt.)		
1	5	1	7	14.3
10	0.5	0.2	10.7	93.5

359. Rak's range of 14.3% to 93.5% for the weight percent of wood preservative encompasses the range of DCOI recited in claim 1. Rak also discloses a wood preservative composition in Example 6 comprising 4.5% weight/volume penta (PCP), 1% w/v polystyrene polymer, and 4.5% w/v paraffin wax. (Ex1015,

¹⁰ wt% of wood preservative = (wt of wood preservative / total wt of composition) x 100

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6:47-59 (Table).) The weight % of PCP in the composition based on total parts by weight of the solids components is 45% ($4.5/10 \times 100 = 45\%$), within the range of DCOI recited in claim 1. (Ex1015, 6:47-59.) It is also my opinion that there is no showing of criticality (in the '716 patent) for element [1.a] for the reasons discussed above. (*See*, e.g., XII.A.1; *see also* VI.C.1 .)

360. There is no considerable difference between how the invention would operate within the claimed ranges (e.g., 40-60% by weight) and within the range disclosed in the prior art. For example, the '716 specification discloses concentrated compositions that can comprise DCOI in a range of 5% to 80% by weight, 20% to 80% by weight, 30% to 70% by weight, 40% to 50% by weight, or 45% to 55% by weight and does not disclose any difference in properties between the disclosed ranges. (Ex1001, 10:47-52.) It also provides concentrate examples in which DCOI is about 23% by weight, demonstrating a purportedly suitable DCOI concentration outside the claimed range. (Ex1001, 14:41-50, 18:50-19:59.)

361. Rak therefore discloses 40% by weight to 60% by weight of a wood preservative, and in combination with the AWWA Paper and Cui render element [1.a] obvious.

- c) *[1.b] 40% by weight to 60% by weight of a retaining additive comprising a wax based on the total weight of the composition,*

362. It is my opinion that Rak discloses element [1.b]. Rak discloses high retention wood preservative compositions that cause the immobilization of active ingredient within the wood microstructure. (Ex1015, Title (“High retention wood preservative composition”), 1:13-16 (“This invention is directed to wood preservation primarily from biological attack using compositions causing the immobilization of active ingredient within the wood microstructure.”).) Rak teaches that additives in the wood preservative composition, comprising a hydrophobic agent and an amorphous vinylic-type polymer, function to increase the leach resistance of the preservative component in treated wood. (*Id.* at 2:30-3:8, 3:60-65, 13:47-50.) Rak specifically identifies paraffin waxes as suitable hydrophobic agents. (*Id.* at 2:46-48 (“Paraffin waxes have been tested”).) Rak teaches that these components protect against “(1) blooming or sublimation loss of preservative, (2) wetting and leaching of the preservative, and (3) biological attack and degradation.” (*Id.* at 4:1-5.) Rak therefore discloses a retaining additive both under Petitioner’s

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proposed construction, as well as any such (improper) narrower construction discussed under VII, above.¹¹

363. Rak teaches and claims a wood preservative concentrate composition (without solvent) comprising from about 1 to about 10 parts by weight organic wood preservative, from about 0.5 to about 5 parts by weight of a hydrophobic agent, which can be paraffin waxes, and from about 0.2 to about 1 part by weight amorphous vinylic-type polymer. (*Id.* at 17:20-38 “The preservative can be prepared in the form of a masterbatch or concentrate (without the organic solvent) . . . adapted for dilution to form the final solution at the jobsite. The invention thus includes a wood preservative concentrate, soluble in lipophilic wood penetrating organic solvents, comprising (a) an organic wood preservative agent in from 1 to about 10 parts by weight; (b) a hydrophobic agent selected from the group consisting of . . . paraffin waxes in from about 0.5 to about 5 parts by weight, . . . ; and (c) an amorphous vinylic-type polymer, soluble in said penetrating organic solvent, in from about 0.2 to about 1 part by weight.”), and claim 9.)

¹¹ This explanation that Rak discloses a retaining additive under Petitioner’s claim construction and also under any asserted (improper), narrower construction should be understood to apply to all grounds relying upon Rak, including dependent claims.

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364. As shown in the table below, the amount of the retaining additive comprising a wax (wax hydrophobic agent together with the amorphous vinylic-type polymer) in the concentrate ranges from **6.5% to 85.7%** weight percent based on the total weight of the concentrate. The low end of the range (*i.e.*, **6.5 wt%**) represents a weight percent calculation using a concentrate composition having the highest amount of preservative (10 parts by weight) in combination with the lowest amount of retaining additive (0.5 parts by weight wax plus 0.2 parts by weight polymer). The high end of the range (*i.e.*, **85.7 wt%**) represents a weight percent calculation using a concentrate composition having the lowest amount of preservative (1 part by weight) in combination with the highest amount of retaining additive (5 parts by weight wax plus 1 parts by weight polymer).

Wood Preservative (parts by wt.)	Retaining Additive		Total wt. of comp.	Wt. % Retaining Additive¹²
	Wax (parts by wt.)	Polymer (parts by wt.)		
1	5	1	7	85.7
10	0.5	0.2	10.7	6.5

¹² wt% of retaining additive = (wt of retaining additive / total wt of composition) x 100

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365. Rak's range of 6.5% to 85.7% for the weight percent of retaining additive encompasses the range of retaining additive recited in claim 1. Rak also discloses a wood preservative composition in Example 6 comprising 4.5% weight/volume penta, 1% w/v polystyrene polymer, and 4.5% w/v paraffin wax. The weight% of retaining additive (paraffin wax plus polystyrene polymer) in the composition based on total parts by weight of the solids components is 55% ($5.5/10 \times 100 = 55\%$). (*Id.* at 6:47-59.) Rak therefore discloses the recited retaining additive in an amount within the claimed range. As explained above (XII.G.1), Cui confirms that wax is compatible with DCOI.

366. The '716 patent demonstrates that, like the claimed 40-60% by weight for the DCOI component, the 40-60% by weight range of retaining additive is not critical. The specification states that the "concentrated" composition can comprise retaining additive in a range of 5% to 80% by weight, 20% to 80% by weight, 30% to 70% by weight, 40% to 50% by weight, or 45% to 55% by weight and does not disclose any difference in properties between the disclosed ranges. There is no considerable difference between how the invention would operate within the claimed range and within the range disclosed in the prior art. (Ex1001, 10:66-11:5.) There is no thus showing of criticality.

367. It is also my opinion that there is no showing of criticality of the claimed range for the reasons discussed above. (XII.A.1; *see also* VI.C.1).)

368. Rak therefore discloses element [1.b], reciting 40% by weight to 60% by weight of a retaining additive comprising a wax.

d) [1.c] wherein a weight ratio of the DCOI to the retaining additive is in a range of 1:5 to 5:1.

369. It is my opinion that Rak in combination with Cui (Ex1016) and AWWA paper (Ex1028) render element [1.c] obvious. (See XII.G.2.b, XII.G.2.c; see also XII.G.1 (motivation to combine).)

370. As set forth in the table below, the Rak concentrate provides a weight ratio of the wood preservative to the retaining additive in a range of **1:6 to 10:0.7**. The low end of the range (*i.e.*, **1:6**) represents the weight ratio of a concentrate composition having the lowest amount of preservative (1 parts by weight) in combination with the highest amount of retaining additive (5 parts by weight wax plus 1 parts by weight polymer). The high end of the range (*i.e.*, **10:0.7**) represents the weight ratio of a concentrate composition having the highest amount of preservative (10 parts by weight) in combination with the lowest amount of retaining additive (0.5 parts by weight wax plus 0.2 parts by weight polymer). Rak's range of **1:6 to 10:0.7** for the weight ratio of preservative to retaining additive overlaps the weight ratio range of claim 1. (Ex1015, 17:20-38; see also XII.G.2b and XII.G.2c.)

Wood Preservative (parts by wt.)	Retaining Additive		Preservative / Retaining Additive wt. ratio ¹³
	Wax (parts by wt.)	Polymer (parts by wt.)	
1	5	1	1:6
10	0.5	0.2	10:0.7

371. Further, in Example 6 of Rak, the weight percentages of the wood preservative and the retaining additive are 45% and 55%, respectively. These weight percentages provide a wood preservative to retaining additive weight ratio of 1:1.2, which falls within the claimed range. (Ex1015, 6:52-59.) There is no showing that the recited weight ratio range is critical, and the '716 patent's disclosure of widely varying weight percentages of these two components shows otherwise. It is also my opinion that there no showing of criticality in the '716 patent with respect to the claimed weight ratio range for the reasons discussed above. (XII.A.1, *see also* VI.C.1.)

372. Rak therefore discloses a weight ratio of wood preservative to retaining additive in a range of 1:5 to 5:1, and in combination with the AWWA Paper and Cui render element [1.c] obvious.

¹³ weight ratio of preservative to the retaining additive = wt preservative / wt retaining additive

3. Dependent Claim 2

- a) *[2] The wood preservative composition of claim 1, wherein the weight ratio of the DCOI to the retaining additive is in a range of 1:1.5 to 1.5:1.*

373. It is my opinion that Rak in combination with Cui (Ex1016) and AWP paper (Ex1028) renders claim 2 obvious, as explained below. Claim 2 depends from claim 1 and recites a narrower DCOI to retaining additive weight ratio. (See XII.G.2 (regarding claim 1).)

374. As set forth in the table above for element [1.c] (see XII.G.2.d), the Rak concentrate provides a weight ratio of the wood preservative to the retaining additive in a range of 1:6 to 10:0.7, which encompasses the claimed weight ratio. (Ex1015, 17:20-38.)

375. As also discussed above for element [1.c], the weight ratio of wood preservative to retaining additive in Example 6 of Rak is 1:1.2, which is within the weight ratio recited in claim 2. (*Id.* at 6:52-59.)

376. Further, there is no showing of criticality for the reasons discussed above. (See IX.G.2)

4. Dependent Claim 3

- a) *[3] The wood preservative composition of claim 1, wherein the wax comprises an olefin wax, a petroleum wax, a carnauba wax, a polyethylene wax, a silicone wax, a polypropylene wax, a polytetrafluoroethylene (PTFE) synthetic wax, or a combination thereof*

377. It is my opinion that Rak in combination with the AWWPA paper and Cui (Ex1016) renders claim 3 obvious, as explained below. Claim 3 depends from claim 1 and recites specific waxes. (*See XII.G.2 (regarding claim 1).*)

378. Rak discloses paraffin waxes in combination with a wood preservative. (Ex1015, Abstract, 2:30-50.) It is my opinion that a POSA would understand that paraffin waxes include waxes derived from petroleum. (Ex1040, p.10 (“The majority of crude oils produced around the world contain substantial amounts of paraffin wax. . . . The wax present in petroleum crudes primarily consists of paraffin hydrocarbons (C18- C36), known as paraffin wax”).)

379. Cui discloses wood preservative compositions comprising DCOI solubilized in an organic phase comprising a wax. (Ex1016, ¶¶19, 21, claims 3 and 10.) Cui discloses that the wax helps provide excellent water repellency and low preservative leaching. (*Id.* at ¶29, *see also* ¶¶4, 12 (discussing concerns concerning fixation, depletion, and distribution gradient).) Cui also discloses “waxes, such as *petroleum waxes*, natural waxes, synthetic waxes, or a combination of those.” (Ex1016, ¶21, claim 11.)

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380. Both Rak and Cui teach that the use of wax in an organic wood preservative composition contributes to enhanced water repellency and low preservative leaching. (Ex1015, 3:60-4:13; Ex1016, ¶29.)

381. A POSA would have been motivated to use the waxes, e.g. petroleum waxes taught by Cui for their known purpose of improving water repellency and low preservative leaching when DCOI is the wood preservative in the composition of Rak. A POSA would have a reasonable expectation of success since both Cui and Rak teach petroleum waxes that are suitable for use in wood preservative compositions. (Ex1016, ¶¶21, 29; claim 1 (“A wood preservative composition comprising an organic preservative agent . . . solubilized in an organic phase . . .”); claim 3 (“The wood preservative composition according to claim 1, in which said organic preservative agent comprises 4,5-dichloro-2-n-octyl-4-isothiazolin-3-one.”); claim 11 (“The wood preservative composition according to claim 1, in which said organic phase comprises a petroleum wax”); Ex1015, 2:30-50 (“The hydrophobic agent is a water-insoluble solid or semisolid from ...various waxes.” “Examples include ... paraffin waxes.”).)

5. Dependent Claims 4 and 5

- a) *[4] “The wood preservative composition of claim 1, wherein the wax comprises a melting point in a range of 40 degrees Celsius to 100 degrees Celsius.”*
- b) *[5] “The wood preservative composition of claim 1, wherein the wax comprises a melting point in a range of 75 degrees Celsius to 100 degrees Celsius.”*

382. It is my opinion that Rak in combination with the AWP paper and Cui renders claims 4 and 5 obvious, as explained below. Claims 4 and 5 depend from claim 1 and recite melting points of the claimed wax. (See XII.G.2 (regarding claim 1).)

383. Cui discloses “[p]referred waxes have a melting point of 30-100 C.” (Ex1016, ¶21.) A POSA would have been motivated to use waxes having melting points taught by Cui for wood treatment compositions of Rak with a reasonable expectation of success because Cui teaches that waxes with such melting points are preferred for use with DCOI wood preservative compositions. Moreover, wax melting point is a matter of an obvious design choice depending upon the wood treatment application and wood species being treated. Further, there is no showing of criticality relative to the claimed melting point ranges. (See Ex1001 at 6:62-7:9 (indicating that that the wax can have a melting point within any number of varied ranges); *id.* at 6:62-63 (“The wax can comprise a melting point suitable for handling and/or for a desirable treatment application.”); *see also* XII.A.4.)

6. Dependent Claim 6

- a) *[6] “The wood preservative composition of claim 1, wherein the wax comprises a slack wax.”*

384. It is my opinion that Rak in combination with the AWWPA paper and Cui render obvious claim 6, as explained below. Claim 6 depends from claim 1 and further recites wherein the wax comprises a slack wax. (See XII.G.2 (regarding claim 1).)

385. Cui discloses that “[e]xemplary petroleum waxes include slack wax or microcrystalline wax.” (Ex1016, ¶21.) It is my opinion that a POSA would have been motivated to use the waxes taught by Cui, including a slack wax, for their known purpose of improving water repellency and low preservative leaching when DCOI is the organic preservative in the composition of Rak. It is also my opinion that a POSA would have a reasonable expectation of success in doing so because Cui teaches slack wax is suitable for use in DCOI wood preservative compositions. (Ex1016 ¶21.) Further, doing so reflects a simple substitution of one known suitable wax for another to obtain the predictable and desirable result of reduced leaching.

7. Dependent Claim 7

- a) *[7] “The wood preservative composition of claim 1, wherein the wax comprises a petroleum wax.”*

386. It is my opinion that Rak in combination with the AWWPA paper and Cui render claim 7 obvious, as explained below. Claim 7 depends from claim 1 and

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further recites that the wax comprises a petroleum wax. (*See* XII.G.2 and XII.G.4 (regarding claims 1 and 3 (which recites petroleum and other waxes).)

387. Rak discloses paraffin waxes. (Ex1015, Abstract, 2:30-50.) The POSA would understand that paraffin waxes include waxes derived from petroleum. (Ex1040, p.10.) Further, Cui teaches exemplary waxes include petroleum waxes for use in DCOI-wax wood treatment compositions. (Ex1016, ¶21 (“Exemplary petroleum waxes include slack wax or microcrystalline wax.”).) Cui confirms that a petroleum wax can be used in the retaining additive when DCOI is used as the wood preservative in the Rak composition because Cui teaches exemplary waxes include petroleum waxes for use in DCOI-wax wood treatment compositions. (Ex1016, ¶21.)

388. A POSA would have been motivated to use the waxes taught by Cui (and Rak), including a petroleum wax, for their known purpose of improving water repellency and low preservative leaching when DCOI is the organic preservative in the composition of Rak. A POSA would have a reasonable expectation of success in doing so because Cui teaches petroleum wax is suitable for use in DCOI wood preservative compositions.

8. Dependent Claim 8

- a) *[8] “The wood preservative composition of claim 1, wherein the wax comprises paraffin wax and a microcrystalline wax.”*

389. It is my opinion that Rak in combination with the AWP paper and Cui render obvious claim 8, as explained below. Claim 8 depends from claim 1 and further recites that the wax comprises paraffin wax and a microcrystalline wax. (See XII.G.2 (regarding claim 1); *see also* XII.G.4 and XII.G.7 (regarding claims 3 and 7).)

390. Cui discloses that exemplary waxes include slack wax or microcrystalline wax and claims “slack wax, microcrystalline wax, or a combination of these.” (Ex1016, ¶21, claim 12.) Rak discloses paraffin waxes for use as a hydrophobe in wood preservative compositions to provide benefits including increasing leaching-resistance of the preservative. (Ex1015, 2:37-50; 13:47-49.)

391. A POSA would have understood that one could use a microcrystalline wax as taught by Cui with the paraffin wax taught by Rak (in the Rak/Cui DCOI preservative composition), and that doing so amounts to no more than combining prior art elements according to known methods to yield predictable results. A POSA would have a reasonable expectation of success, as doing so would have been a routine matter well within the ability of a POSA. Further, the ‘716 does not describe

any particular effect of the claimed combination of waxes or even provide any example of the claimed combination of waxes.

9. Dependent Claim 9

- a) *[9] “The wood preservative composition of claim 1, wherein the composition comprises 45% by weight to 55% by weight of the DCOI based on the total weight of the composition and 45% by weight to 55% by weight of the retaining additive based on the total weight of the composition.”*

392. It is my opinion that Rak in combination with the AWWPA paper and Cui render obvious claim 9. Claim 9 depends from claim 1 and recites that the composition comprises narrower ranges of 45% by weight to 55% by weight of the DCOI based on the total weight of the composition and 45% by weight to 55% by weight of the retaining additive based on the total weight of the composition.

393. It is my opinion that Rak in view of Cui and AWWPA paper renders claim 9 obvious for the same reasons discussed for claim 1. (XII.G.2.)

394. It is also my opinion that the narrower weight percent ranges recited in claim 9 are encompassed by the ranges disclosed in Rak, and that the ‘716 patent does not demonstrate that the claimed narrower ranges are critical (*e.g.*, produce any new and unexpected result). (*See XII.G.2, see also XII.A.1, VI.C.1.*)

10. Dependent Claim 10

- a) *[10] “The wood preservative composition of claim 1, wherein the composition consists essentially of the DCOI and the retaining additive.”*

395. It is my opinion that Rak in combination with the AWWA paper and Cui render obvious claim 10, as explained below. Claim 10 depends from claim 1 and recites that the composition consists essentially of the DCOI and the retaining additive. (See XII.G.1 and XII.G.2 (regarding claim 1).)

396. Rak discloses a wood preservative composition (in the form of a concentrate) that contains only the organic preservative and the retaining additive. (Ex1015, 17:20-38 (“The preservative can be prepared in the form of a masterbatch or concentrate (without the organic solvent) . . . adapted for dilution to form the final solution at the jobsite.”), claim 9 (“A wood preservative concentrate, soluble in lipophilic wood-penetrating organic solvents, comprising: (a) an organic wood preservative agent . . . (b) a hydrophobic agent selected from the group consisting of fatty acids and their esters, fatty alcohols and paraffin waxes, and (c) an amorphous vinylic-type polymer . . .”).)

397. Additionally, a POSA would have been motivated to use DCOI as the organic preservative in Rak’s preservative concentrate for the reasons discussed above for claim 1. XII.G.1 and XII.G.2 (regarding claim 1). When DCOI is used as the organic preservative in Rak, the Rak preservative concentrate consists essentially

of DCOI and the retaining additive. Moreover, a POSA would have been motivated to provide such a concentrate to reduce storage and transport costs and to accommodate users seeking concentrate for use as a drop in for PCP, requiring “no process changes” by the treatment entities. (VI.A.5; Ex1020, ¶32; Ex1022, p.1.)

11. Dependent Claim 11

- a) *[11] “The wood preservative composition of claim 1, wherein the composition further comprises an organic solvent.”*

398. It is my opinion that Rak in combination with the AWWA paper and Cui render claim 11 obvious, as explained below. Claim 11 depends from claim 1 and recites that the composition further comprises an organic solvent. (See XII.G.1 & XII.G.2 (regarding claim 1).)

399. Rak discloses that its wood preservative composition comprises an organic solvent. (Ex1015, Abstract, 3:9-51 (“The common solvent for dissolving all three main components into one solution, is an organic solvent”); Ex1001 at 2:56-58 (acknowledging that “DCOI dissolved in hydrocarbon solvents has also been proposed to treat wood for heavy duty applications.”).

400. Furthermore, AWWA paper discloses the use of DCOI as a preservative agent, and discloses DCOI dissolved in organic solvents (e.g., diesel). (Ex1028, pp.11-42.) It is my opinion that a POSA would understand that paraffin and other waxes such as microcrystalline wax, and Fischer Tropsch wax are also soluble in

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organic solvents, including diesel. (Ex1068, p.4, (Table 3) (“Amount of solid paraffin for samples 1 and 2 for each temperature measured (mass %). . .”).) Ex1068 shows that paraffin wax is soluble in diesel. (Ex1068.) AWWA paper therefore discloses a suitable solvent for both DCOI and the claimed retaining additive.

401. A POSA would therefore have been motivated to use an organic solvent with the composition of claim 1, as taught by Rak and AWWA paper, with a reasonable expectation of success. Doing so is a routine matter within the general skill of a POSA.

12. Dependent Claim 12

a) [12] “A wood product comprising the wood preservative composition of claim 1.”

402. It is my opinion that Rak in combination with the AWWA paper and Cui render claim 12 obvious, as explained below. Claim 12 depends from claim 1 and recites a wood product comprising the wood preservative composition of claim 1. (See XII.G.1 and XII.G.2 (regarding claim 1).)

403. Rak discloses that the preservative solution penetrates “into the wood during application,” to produce a wood product comprising the preservative and retaining additive comprising a wax. (Ex1015, 3:60-65.) Examples 14 and 15 of Rak disclose treating siding boards and roof shingles, respectively, with the wood preservative composition comprising organic preservative and retaining additive comprising a wax. (Ex1015, 15:52-17:19.) The AWWA paper also discloses treated

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wood products such as “poles, posts, and sawn cross arms.” (Ex1028, p.11 (“DCOI - An Oil-borne Preservative System for Pressure Treatment of Poles, Posts and Sawn Cross Arms.”).) Producing a wood product comprising the composition of Rak (using DCOI as the wood preservative) would have been obvious, as that is the intended purpose as taught by each of Rak, AWP paper, and Cui.

13. Independent Claim 13

404. It is my opinion that the combination of Rak, Cui and AWP renders claim 13 obvious, as explained below. The elements of claim 13 are substantively similar or the same as certain of the elements of claims previously discussed (e.g., claims 3-10), and disclosed as follows: element [13.Pre] is substantively similar to element [1.pre] of claim 1 (regarding the wood preservative composition), and to claim 10 (regarding consisting essentially of [DCOI and retaining additive]), and is disclosed for at least the reasons discussed above (*see, e.g.*, XII.G.2.a and XII.G.10.); elements [13.a] and [13.b] are substantively similar to claim 9 (with respect to the weight percent ranges for DCOI and the retaining additive), and are disclosed for at least the reasons discussed above (*see, e.g.*, XII.G.9; *see also* XII.G.2b and XII.G.2c); element [13.b] is also similar to claims 3, 6, 7, and 8 (with respect to the retaining additive comprising a first petroleum wax and a second petroleum wax comprising a paraffin wax), and is disclosed for at least the reasons discussed above (*see* XII.G.4, XII.G.6, XII.G.7, and XII.G.8); and element [13.c] is substantively

similar to claims 4 and 5, and is disclosed for at least the reasons discussed above (*see* XII.G.5).

a) [13.pre] “A wood preservative composition consisting essentially of:”

405. It is my opinion that to the extent limiting, Rak discloses the preamble [13.Pre] of claim 13. (Ex1015, Title, Abstract (“A wood preservative composition . . .”), 1:13-16, claims 1, 9.) Rak further discloses wood preservative concentrate compositions consisting of only an organic wood preservative and a retaining additive. (XII.G.10 (regarding claim 10, reciting a composition consisting essentially of DCOI and retaining additive); Ex1015, Title, 17:20-38.)

b) [13.a] “45% by weight to 55% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition;”

406. It is my opinion that Rak in combination with Cui and AWWA paper discloses this element which is substantively similar to claim 9. (*See* XII.G.9 regarding claim 9; *see also* XII.G.2.)

c) [13.b] “45% by weight to 55% by weight of a retaining additive comprising a first petroleum wax and a second petroleum wax comprising a paraffin wax,”

407. It is my opinion that Rak in combination with Cui and AWWA paper discloses “45% by weight to 55% by weight of a retaining additive” for the reasons discussed above regarding claims 1 and 9. (*See* XII.G.2 and XII.G.9 regarding claims 1 and 9.) Cui teaches a combination of a microcrystalline wax (the claimed

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first petroleum wax) and a slack wax (the claimed second petroleum comprising a paraffin wax). (Ex1016, ¶21 (“Exemplary petroleum waxes include slack wax or microcrystalline wax.”), and claim 12; *see also* XII.G.6, XII.G.7, and XII.G.8.) A POSA would understand that a slack wax comprises paraffin wax. (Ex1040, p.14.)

408. Furthermore, it is my opinion that Rak specifically discloses “various waxes,” including “paraffin waxes,” which include waxes derived from petroleum. (Ex1015, 2:30-50; *see also* XII.G.4.) A POSA would therefore have understood that one could use the combination of petroleum waxes taught by Cui (with or) for the retaining additive in the wood treatment composition of Rak, with a reasonable expectation of success. Doing so amounts to no more than combining prior art elements according to known methods to yield predictable results (enhancing retention of preservative in treated wood).

d) [13.c] “wherein the retaining additive comprises a melting point in a range of 75 degrees Celsius to 100 degrees Celsius.”

409. It is my opinion that Rak in combination with Cui discloses this element. Cui discloses that, for its DCOI-wax wood treatment compositions, “preferred waxes have a melting point of 30-100° C.” (Ex1016, ¶21; *see also* XII.G.5.)

410. Moreover, it is my opinion that the selection of wax melting point is an obvious design choice, considering the wood treatment application. (*See, e.g.,*

Ex1001, 6:63-7:9 (“The wax can comprise a melting point suitable for handling and/or for a desirable treatment application.”).) Further, there is no showing of criticality relative to the claimed melting point ranges. (Ex1001, 6:62-7:9 (disclosing any number of varied ranges, some outside the claimed ranges).)

14. Dependent Claim 14

- a) *[14] “A method of treating a wood substrate, the method comprising: diluting the composition of claim 1 with an organic solvent to form a diluted composition.”*

411. It is my opinion that Rak in combination with the AWWPA paper and Cui render claim 14 obvious, as explained below. Claim 14 depends from claim 1 and further recites diluting the composition of claim 1 with an organic solvent to form a diluted composition. (See XII.G.2 (regarding claim 1); *see also* XII.G.11 (regarding the composition of claim 1 further comprising an organic solvent).)

412. Rak discloses that the preservative composition “can be prepared in the form of a masterbatch or concentrate (without the organic solvent) or as a paste with small amounts of the organic solvent-*adapted for dilution to form the final solution at the jobsite...*” (Ex1015, 17:20-27, *see also* claim 9 (“A wood preservative concentrate, soluble in lipophilic wood-penetrating organic solvents”); *see also* XII.G.11.) Rak further discloses that its preservative composition “can be applied by various methods used in the industry; for example by impregnation of square or round timbers (under pressure) or by dip, spray, or brush treatment of lumber or

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fabricated structures,” which teaches diluting the wood preservative compositions in an organic solvent. (Ex1015, 3:52-56.)

413. A WPA paper discloses diluting DCOI in an organic solvent for treating wood products and that the resultant solvent borne DCOI provides excellent treatment properties. (Ex1028, p.13 (“DCOI in #2 diesel can be successfully used . . . to meet A WPA penetration requirements.”); p.17 (“Treating solutions were prepared from concentrates of . . . DCOI in diesel and diesel amended . . . soy-based biodiesel. Treatment solutions of different concentration of active ingredient [DCOI] were prepared by dilution into toluene.”).) Both A WPA paper and Rak disclose diluting an organic preservative in an organic solvent to treat wood products. A POSA would have been motivated to use the organic solvent disclosed in the A WPA paper to dilute the Rak wood preservative concentrate (containing DCOI) to form a diluted composition because the A WPA paper discloses such solvents are suitable for use with DCOI and provide desirable results. (XII.G.1.) A POSA would have a reasonable expectation of success, as both A WPA paper and Rak disclose diluting an organic preservative in an organic solvent to form a diluted composition to treat wood products and doing so was within the skill of a POSA.

15. Dependent Claim 15

- a) *[15]. “The method of claim 14, wherein the organic solvent comprises a hydrocarbon solvent, an amine solvent, a glycol solvent, a ketone solvent, an ester solvent, an alcohol solvent, a halogenated solvent, a biodegradable organic solvent, or combinations thereof.”*

414. It is my opinion that Rak in combination with the AWP A paper and Cui render claim 15 obvious, as explained below. Claim 15 depends from claim 14 (which depends from claim 1) and further recites details concerning the organic solvent. (See XII.G.1. XII.G.2 and XII.G.14 (regarding claims 1 and 14).)

415. Rak discloses hydrocarbon solvents for dissolving the organic preservative and retaining additive. (Ex1015, 3:9-51 (“Preferred are the highly halogenated lower aliphatic hydrocarbons ...”); 3:42-43 (“toluene or xylene”).) The AWP A paper discloses suitable organic solvents for diluting DCOI include xylene and toluene (disclosed in Rak), and also AWP A HSA solvents, diesel, and biodiesel, which a POSA understands are hydrocarbon solvents). (Ex1028, pp.12-18, 20-42.)

416. As explained above for claim 14, a POSA would have been motivated to use the hydrocarbon organic solvent (e.g., diesel, biodiesel, xylene, and toluene) disclosed in the AWP A paper to dilute the Rak wood preservative concentrate (containing DCOI), to obtain predictable and desirable results of a useful, diluted wood preservative composition, with a reasonable expectation of success. A POSA would also have a reasonable expectation of success that such solvents would have

been suitable for diluting and/or dissolving, e.g., paraffin wax. (Ex1015, 3:42-45; Ex1068, p.4 (Table 3).) Ex1068 shows that paraffin wax is soluble in diesel. (Ex1068.)

16. Dependent claim 16

- a) *[16]. “The method of claim 14, wherein the organic solvent comprises diesel, biodiesel, or a combination thereof.”*

417. It is my opinion that Rak in combination with the AWWA paper and Cui render claim 16 obvious, as explained below. Claim 16 depends from claim 14 (which depends from claim 1) and further recites details concerning the organic solvent. (See XII.G.1, XII.G.2 (claim 1), and XII.G.14 (claim 14).)

418. Rak discloses hydrocarbon solvents for dissolving the wood preservative and retaining additive (e.g., waxes). (Ex1015, 3:9-51.) The AWWA paper discloses diesel as a suitable solvent for wood preservatives, including DCOI. (Ex1028, pp.12-17.)

419. In my opinion a POSA would have been motivated to use diesel as the solvent in the wood preservative composition of Rak containing DCOI as the organic preservative because the AWWA paper identifies diesel as a suitable solvent for DCOI to obtain predictable and desirable results of a diluted preservative composition useful for treating wood. (Ex1028, pp.12-17.) A POSA would have had a reasonable expectation of success because the AWWA paper teaches that DCOI in

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diesel provides good DCOI uptake, retention and efficacy in wood products. (Ex1028, pp.13-19 (“DCOI in #2 diesel can be successfully used ... to meet AWWA penetration requirements.”).) In my opinion a POSA would likewise have a reasonable expectation of success that diesel would have been a suitable solvent for diluting and/or dissolving, e.g., paraffin wax. A POSA would understand that waxes such as paraffin are generally soluble/dilutable in diesel. (Ex1068, p.4 (Table 3) (paraffin soluble, samples 1 and 2.) For example, paraffin wax is soluble in diesel. (Ex1068, p.4 (Table 3) (“Amount of solid paraffin for samples 1 and 2 for each temperature measured (mass %). . . .”).) Ex1068 shows that paraffin wax is soluble in diesel. (Ex1068.)

17. Dependent Claims 20-21

- a) *[20]. “The method of claim 14, wherein the retaining additive has a solubility in the organic solvent of at least 0.5%”*
- b) *[21]. “The method of claim 14, wherein the retaining additive has a solubility in the organic solvent of at least 1%.”*

420. It is my opinion that Rak in combination with the AWWA paper and Cui render claims 20-21 obvious, as explained below. Claims 20-21 depend from claim 14 (which depends from claim 1) and further recite details concerning the solubility of the retaining additive in the organic solvent. (See XII.G.1, XII.G.2 (claim 1) and XII.G.14 (claim 14).)

421. Rak discloses hydrocarbon solvents, including toluene and xylene for dissolving the claimed retaining additive. (Ex1015, 3:42-45 (“These aromatic solvents dissolve ... paraffin waxes and polystyrene as well.”).)

422. A POSA would be motivated to select a solvent in which the preservative composition components would have a solubility of at least 1% so that the components achieve the predictable and desirable result of deep penetration into the wood as taught by Rak. (Ex1015, abstract; 1:64-67; 13:54-14:8 (example 12 (solubilities of waxes))). A POSA would have a reasonable expectation of success since Rak discloses solvents, such as xylene, for dissolving the retaining additive. (*Id.*)

18. Dependent Claim 22

- a) *[22]. “The method of claim 14, further comprising contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.”*

423. It is my opinion that Rak in combination with the AWWA paper and Cui renders claim 22 obvious, as explained below. Claim 22 depends from claim 14 (which depends from claim 1) and further recites contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate. (*See* XII.G.1, XII.G.2 (claim 1) and XII.G.14 (claim 14).)

424. Rak discloses wood preservative compositions directed to preserving wood from biological attack, such as from fungi. (Ex1015, 1:13-16, 12:3-68

(demonstrating effectiveness against decay fungi); 15:1-34 (same).) Cui and AWWA paper likewise disclose that an objective of the disclosed DCOI-containing wood preservative compositions is efficacy against wood decay fungi, teaching the “contacting” step, to e.g., obtain the resulting treated/impregnated wood product. (Ex1016, ¶¶4, 7; Ex1028, pp.11-20.) A POSA would have been motivated to treat wood with the Rak wood preservative composition containing DCOI as the organic preservative for a sufficient time to inhibit fungal decay of the wood substrate, with a reasonable expectation of success, as that is the purpose (and the predictable and desirable result of) the compositions disclosed in Rak, Cui and AWWA paper.

19. Dependent Claim 23

a) [23]. “A wood product produced by the method of claim 14.”

425. It is my opinion that Rak in combination with the AWWA paper and Cui renders claim 23 obvious, as explained below. Claim 23 depends from claim 14 (which depends from claim 1) and further recites a wood product produced by the method of claim 14. (See XII.G.1, XII.G.2 (claim 1) and XII.G.14 (claim 14).)

426. Rak discloses that the preservative solution penetrates “into the wood during application” (Ex1015, 3:60-65.) Examples 14 and 15 of Rak show treating siding boards and roof shingles, respectively. (Ex1015, 15:52-17:19.) AWWA paper discloses that compositions comprising DCOI in an organic solvent are effective for

the pressure treatment of poles, posts, and cross arms. (Ex1028, p.11.) A POSA would have a reasonable expectation of success that a wood product would be produced from treating wood with the diluted Rak wood preservative composition containing DCOI as the organic preservative (as taught by Cui and AWWA paper), as that is the purpose (and the predictable and desirable result of) the compositions disclosed in Rak, AWWA paper, and Cui. Further, using a diluted wood preservative composition to produce a wood product is routine and within the skill in the art.

20. Dependent Claim 24

- a) *[24]. “The wood product of claim 23, wherein the wood product retains at least 0.05 pounds of DCOI per cubic foot of the wood product.”*

427. It is my opinion that Rak in combination with the AWWA paper and Cui renders claim 24 obvious, as explained below. Claim 24 depends from claim 23 (which depends on claim 14) and further recites wherein the wood product retains at least 0.05 pounds of DCOI per cubic foot of the wood product. (See XII.G.1, XII.G.2 (claim 1), XII.G.14 (claim 14) & XII.G.19 (claim 23).)

428. Rak teaches a suitable amount of organic preservative retained in the wood is from 0.05 to 2.5 pcf for effective preservation. (Ex1015, 4:31-35; 12:1-68.) AWWA paper similarly discloses that poles, posts, and cross arms treated with DCOI in #2 diesel all had DCOI retention rates of greater than 0.05 pcf in the wood. (Ex1028, pp.13-16 (Tables 2B and 3).) A POSA would have been motivated to treat

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a wood product with the diluted Rak wood preservative composition containing DCOI as the organic preservative to achieve the predictable and desirable retention rate taught by Rak and AWWA paper, each of which teaches retention rates of at least 0.05 pcf as claimed. Doing so is routine and within the skill in the art.

21. Dependent Claim 25

- a) *[25]. “The wood product of claim 23, wherein the wood product comprises a deck, a rail, a fence, a utility pole, a pile, a railway tie, a railroad bridge, cladding, siding, or a combination thereof.”*

429. It is my opinion that Rak in combination with the AWWA paper and Cui renders claim 25 obvious, as explained below. Claim 25 depends from claim 23 (which depends on claim 14) and further recites examples of treated wood products. (See XII.G.1, XII.G.2 (claim 1), XII.G.14 (claim 14), and XII.G.19 (claim 23).)

430. Rak discloses treating wood products such as poles and square timbers (col. 3, lines 29-30), and siding. (Ex1015, Example 14.) AWWA paper discloses that compositions comprising DCOI in an organic solvent are effective for the pressure treatment of poles, posts, and cross arms. (Ex1028, pp.11, 13-16 (Tables 2B and 3).) This element would have been obvious to a POSA, as treating wood products is the intended purpose of the composition as taught by each of Rak, AWWA, and Cui. (Ex1015, Abstract; Ex1028, pp.11-20; Ex1016, ¶¶4, 16.) Producing a treated wood product with a wood preservative is routine and within the skill in the art.

22. Independent claim 26

431. It is my opinion that Rak in combination with the AWWPA paper and Cui render claim 26 obvious, as explained below.

a) [26.Pre] “A wood preservative composition comprising:”

432. If limiting, it is my opinion that Rak discloses a wood preservative composition. (Ex1015 (e.g., Title (“High Retention Wood Preservative Composition”), Abstract, and claims).)

b) [26.a] “40% by weight to 60% by weight 4,5-dichloro-2-octylisothiazol-3-one (DCOI) based on a total weight of the composition; and”

433. For the same reasons discussed above regarding element [1.a], it is my opinion that Rak in combination with Cui and AWWPA paper renders element [26.a] obvious. (See XII.G.1 and XII.G.2.b.)

c) [26.b] “40% by weight to 60% by weight of a retaining additive based on the total weight of the composition,”

d) [26.c] “wherein the retaining additive comprises a microcrystalline wax”

434. It is my opinion that, for the same reasons discussed regarding element [1.b], Rak discloses the weight percent limitation in element [26.b]. (See XII.G.2, XII.G.2.c.) With respect to element [26.c], Rak teaches a wood preservative composition comprising a retaining additive, which includes a wax for “increasing

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leaching-resistance.” (Ex1015,1:62-2:8, 11:17-68 (Example 9); 13:1-53 (Example 11); 15:31-4; *see also* XII.G.1 and XII.G.2.)

435. Cui also teaches a wood preservative composition comprising a retaining additive that comprises a microcrystalline wax, suitable for use with DCOI wood preservative, to help provide water repellency and low preservative leaching. (Ex1016, ¶¶19, 21, 29; *see also* XII.G.8.)

436. A POSA would have understood that one could use the microcrystalline wax of Cui as a retaining additive of Rak when DCOI is used as the organic preservative in the Rak composition, with a reasonable expectation of success. Cui teaches microcrystalline wax as an exemplary wax for use in wood treatment compositions comprising DCOI. (Ex1016, ¶21.) Further, such a selection of waxes from known waxes having suitable characteristics for use as a hydrophobe with an organic preservative such as DCOI merely substitutes one known wax for another according to known methods (e.g., the retaining methods of Rak) to yield the predictable and desirable result of enhancing retention of preservative in treated wood, as taught by Rak, as discussed immediately above. (Ex1015.)

e) ***[26.d] “wherein a weight ratio of the DCOI to the retaining additive is in a range of 1:1.5 to 1.5:1.”***

437. For the same reasons discussed regarding claims 1 and 2, it is my opinion that Rak in combination with Cui and AWPAP paper renders the weight ratio

limitation in element [26.d] obvious. (See XII.G.1, XII.G.2 (claim 1), XII.G.3 (claim 2).)

23. Dependent Claim 27

438. It is my opinion that Rak in combination with the AWWA paper and Cui renders claim 27 obvious, as explained below. Claim 27 depends from claim 26, and is substantively similar to elements of claims 1, 14, and 22. [27.Pre] and [27.a] are substantively similar to claim 14, and [27.b] is substantively similar to claim 22. As explained above, Rak in view of Cui and AWWA paper renders obvious claims 1, 14, 22, and 26. (See XII.G.2, 14, 18, and 22 regarding claims 1, 14, 22 and 26.)

a) [27.pre] “A method of treating a wood substrate, the method comprising:”

439. It is my opinion that Rak alone and/or in combination with AWWA paper and Cui discloses a method of treating a wood substrate. (See XII.G.14 (regarding claim 14).)

b) [27.a] “diluting the composition of claim 26 with an organic solvent to form a diluted composition; and”

440. It is my opinion that Rak in combination with Cui and AWWA disclose the composition of claim 26. (See XII.G.1, XII.G.2, XII.G.14, XII.G.18 and XII.G.22 (claims 1, 14 (diluting step), 22, and 26, respectively).) Rak and AWWA Paper each disclose diluting wood treatment compositions with an organic solvent and together with Cui render this element obvious for the reasons discussed above

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in (XII.G.14 (diluting step), XII.G.18 (contacting step), and XII.G.22 (regarding claim 26); Ex1015, 3:52-59, 17:20-24; Ex1028, p.13 (“DCOI in #2 diesel can be successfully used ... to meet AWPAs penetration requirements.”); pp.13-19; p.17 (“Treating solutions were prepared from concentrates of . . . DCOI in diesel and diesel amended . . . soy-based biodiesel. Treatment solutions of different concentration of active ingredient [DCOI] were prepared by dilution into toluene.”).)

- c) *[27.b] “contacting the wood substrate with the diluted composition for a period of time suitable to inhibit fungal decay of the wood substrate.”*

441. It is my opinion that Rak in view of Cui and AWPAs render this element obvious for the reasons discussed above regarding claim 22. (See XII.G.18 (contacting step).)

H. Ground 8: Claim 17-19 are rendered obvious by Rak in Combination with AWPAs Paper, Cui, HSA-18, and HCS25 SDS

- a) *[17]. “The method of claim 14, wherein the organic solvent comprises a flash point of at least 40 degrees Celsius.”*
- b) *[18]. “The method of claim 14, wherein the organic solvent comprises a flash point of at least 60 degrees Celsius.”*
- c) *[19]. “The method of claim 14, wherein the organic solvent comprises a flash point of at least 80 degrees Celsius.”*

442. It is my opinion that Rak in combination with the AWPAs paper, Cui, AWPAs Standard HSA-18, and HCS25 SDS renders claims 17-19 obvious, as

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explained below. Claims 17-19 depend from claim 14 (which depends from claim 1) and further recite details concerning the flash point of the organic solvent. (*See* XII.G.2 and XII.G.14 (regarding claims 1 and 14).)

443. *See, supra*, XII.G.1 (teaching and motivation regarding use of hydrocarbon solvents for the combination of Rak, AWWA paper, and Cui; XII.C (claims 17-19) (teaching and motivation regarding flash points, for the reasons taught by AWWA paper, HSA-18 (66°C for “plant and worker safety”), and HCS25 SDS (“150° C.”)).

444. Rak in combination with Cui and AWWA paper render the method of claim 14 obvious (using DCOI with the composition of Rak). (*See* XII.G.2 and 14 (regarding claims 1 and 14).) The AWWA paper discloses solvents for use with DCOI and states that “the active ingredient [DCOI] exhibits excellent solubility in AWWA HSA solvents without the need for co-solvents.” (Ex1028, p. 42.) This is confirmed by AWWA standard P39-18, which specifies Hydrocarbon Solvent Type A (HSA solvent)as an acceptable carrier/diluent for DCOI. (Ex1029, p.5.) The AWWA standard for Hydrocarbon Solvent A (HSA-18) recites that Hydrocarbon Solvent A should have a minimum flashpoint of 66 degrees C. (Ex1030, p.5.) HCS25 is a “petroleum distillate” and Hydrocarbon Solvent Type A for use as a “wood and wood pole process oil.” (Ex1064, pp.1, 2 (“Hydrotreated Distillate”).) The HCS25 SDS recites a flash point of “150° C.” (Ex1064, p.3 (Flash Point 150°C).) The

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AWPA paper also discloses the use of diesel/biodiesel blends for DCOI. (Ex1028, p.17.) A POSA would understand that diesel/biodiesel blends have higher flash points than diesel alone, including above 80°C, as evidenced by de Mattos. (Ex1063, Table 1; *see also* XII.A.14 (De Mattos).)

445. A POSA would have been aware of the known risk of sparking and resulting fire in treatment facilities, including the risk of igniting the solvent from sparks caused by friction from steel rails/tram components arising from accidents while loading/unloading the treatment cylinder. (Ex1069.) A POSA would have been motivated to follow AWP Paper and select a HSA solvent for the composition of Rak containing DCOI as the preservative, having a minimum flashpoint of 66°C for “plant and worker safety.” (Ex1030, p.5 (“minimum flash point of 66C”).) A POSA would also have been motivated to use the organic solvent of HCS25 (or a custom blend as was known in the art, as evidenced by de Mattos (Ex1063) for diesel/biodiesel blends) having a flash point of over 80°C, for the same reasons. Selection and use of appropriate solvents was a routine matter within the skill of a POSA.

I. Ground 9: Lack of Enablement, Written Description and Indefiniteness of Claims 1, 3-12, and 14-25

446. I have been informed by counsel and understand that the specification must enable the full scope of the claimed invention, and that a claim to impossible

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subject matter can be invalid as indefinite. I have been informed by counsel and understand that patent claim must “particularly point out and distinctly claiming the subject matter which the inventor or a joint inventor regards as the invention.” I have been informed by counsel and understand that a claim is indefinite if, when read in light of the specification delineating the patent, and the prosecution history, it fails to inform, with reasonable certainty, those skilled in the art about the scope of the invention.

447. In my opinion, the '716 patent fails to enable the full scope claims 1, 3-12, and 14-25 because it is mathematically impossible to satisfy the full scope of recited weight ratios and weight percent concentrations of DCOI and retaining additive.

448. Here, claim 1 recites a 1:5 to 5:1 weight ratio of DCOI to retaining additive. It is mathematically impossible to meet the 40-60 weight percent concentrations of DCOI and retaining additive and simultaneously meet the entire range of weight ratios encompassed by the claimed range (e.g., 1:2, 1:3, 1:4, 1:5 and 5:1, 4:1, 3:1, and 2:1).

449. Further, claim 11 is invalid because it is mathematically impossible for, e.g., a 50/50 weight percent DCOI/retaining additive composition to “further comprise[] an organic solvent. The total weight percent is mathematically limited to a maximum of 100%. Claim 11 is also indefinite because it lacks “reasonable

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certainty,” as the recited weight percentages of the “composition” would change with the addition of a solvent.

450. Finally, it is my opinion that claims 14, 15-21, and 23-25, which claim a single step of “diluting the composition of claim 1 with an organic solvent,” are invalid for lack of written description, enablement, and definiteness. The specification does not describe “treating a wood substrate” that comprises “diluting the composition of claim 1” as the sole step (i.e., without “contacting the wood substrate with the diluted composition”).

XIII. SECONDARY CONSIDERATIONS

451. I am not aware of any relevant secondary considerations, but if Patent Owner puts forth any such allegations, I respectfully reserve the right to respond to the same.

XIV. AVAILABILITY FOR CROSS-EXAMINATION

452. In signing this declaration, I recognize that the declaration will be filed as evidence in a contested case before the Patent Trial and Appeal Board of the United States Patent and Trademark Office. I also recognize that I may be subject to cross examination in the case and that cross examination will take place within the United States. If cross examination is required of me, I will appear for cross

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examination within the United States during a time as mutually agreed between the parties.

XV. RIGHT TO SUPPLEMENT

453. I reserve the right to supplement my opinions in the future to respond to any arguments that the Patent Owner raises. This declaration represents only those opinions that I have formed to date. I reserve the right to revise, supplement, and/or amend my opinions stated herein based on new information that becomes available to me and on my continuing analysis of the materials already provided.

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XVI. CONCLUSION

454. I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

3/12/26

Date

Dennis Morgan
Dennis Morgan, BS