

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

THE SHERWIN-WILLIAMS COMPANY,
Petitioner,

v.

ARCH CHEMICALS, INC.,
Patent Owner

Patent No. 9,723,842

Issued: August 8, 2017

Filed: May 24, 2007

Inventors: Nicholas Edward Thompson, Malcolm Greenhalgh, Fitzgerald Clark

Title: Isothiazoline Biocides Enhanced By Zinc Ions

Inter Partes Review No. 2019-01498

**CORRECTED
DECLARATION OF RAYMOND FERNANDO, PH.D.**

August 15, 2019

Table of Contents

I.	QUALIFICATIONS	7
II.	COMPENSATION	11
III.	MATERIALS CONSIDERED	11
IV.	LEGAL STANDARD APPLIED	13
V.	BRIEF BACKGROUND ON THE '842 PATENT	16
A.	The Alleged Invention of the '842 Patent	16
B.	State of the Art Prior to the Alleged Invention	17
1.	Known use of BIT and zinc oxide	18
C.	Known Use of Zinc Pyrithione as a Co-biocide	19
D.	The Prosecution of the '842 Patent, Narrowing of Claims, and Reliance on Alleged “Unexpected Results” Showing a Synergistic Effect Between BIT and Zinc Oxide.....	20
E.	Known Synergistic Effects Between BIT and Zinc Oxide	21
VI.	THE LEVEL OF ORDINARY SKILL IN THE ART.	23
VII.	CLAIM CONSTRUCTIONS APPLIED IN MY ANALYSIS.....	25
A.	Context of the '842 Patent claims and specification.....	25
B.	Patent Owner’s Different Context for Infringement	27
59.	I understand that on August 9, 2019 Patent Owner provided initial claim charts in a concurrent district court patent infringement case. I have examined Patent Owner’s initial claim charts, and I am familiar with them.....	27
C.	Preambles of Claims 1, 3, 6, 7 are Limiting.....	28
D.	“Present in an Amount of”	30
E.	“Consisting of” and “Optionally”	31
VIII.	UNPATENTABILITY	32
A.	Overview of the Prior Art.....	33
1.	Liu Application	33
2.	Handbook of Coatings Additives, Second Ed., Chapter 8 titled “Biocides: Wet State and Dry Film” (“the Handbook”).....	36

IX.	'842 PATENT CLAIMS 1, 2, 3, 6, 7, 8, 10, 13, AND 15, ARE OBVIOUS UNDER § 103 IN VIEW OF LIU AND THE KNOWLEDGE OF A POSITA.....	38
A.	Claim 1 is Obvious in View of Liu and the Knowledge of a POSITA.	39
1.	Limitation 1[preamble] is obvious in view of Liu and the knowledge of a POSITA.	39
2.	Limitation 1[a] is obvious over Liu and the knowledge of a POSITA.....	40
3.	Limitation 1[b] is disclosed in or obvious over Liu and the knowledge of a POSITA.	40
4.	Limitation 1[c] is disclosed in or obvious over Liu and the knowledge of a POSITA.....	41
5.	Limitation 1[d] is obvious over Liu and the knowledge of a POSITA.....	43
6.	Limitation 1[e] is obvious in view of Liu and the knowledge of a POSITA.....	47
B.	Claim 3 is Obvious over Liu and the Knowledge of a POSITA.....	48
1.	Limitation 3[preamble] is obvious over Liu and the knowledge of a POSITA.....	48
2.	Limitation 3[a] is obvious over Liu and the knowledge of a POSITA.....	49
3.	Limitations 3[b], 3[c], 3[d], 3[e], and 3[f] are obvious over Liu and the knowledge of a POSITA	50
C.	Claim 6 Is Obvious over Liu and the Knowledge of a POSITA	51
1.	Limitation 6[preamble] is obvious over Liu and the knowledge of a POSITA.....	51
2.	Limitation 6[a] is obvious over Liu and the knowledge of a POSITA.....	51
3.	Limitations [6b], 6[c], 6[d], 6[e], and 6[f], are identical to “antimicrobial composition” elements in claim 1, and are obvious over Liu and the knowledge of a POSITA.....	52
D.	Claim 7 Is Obvious over Liu and the Knowledge of a POSITA	53

E.	Claims 2 and 8 Are Obvious over Liu and the Knowledge of a POSITA	53
1.	Limitations 2[a] and 8[a] are obvious in view of Liu and the knowledge of a POSITA	54
2.	Limitations 2[b] and 8[b] are obvious in view of Liu and the knowledge of a POSITA	54
F.	Claims 10, 13, and 15 are Obvious in view of Liu and the Knowledge of a POSITA	55
X.	GROUND 2: 4, 5, 9, 12, 17, 18, 20, 21, 24, 25, 26, 27, 28, 31, 32, 33, 36, 37, AND 38 ARE INVALID UNDER § 103 AS OBVIOUS IN VIEW OF LIU, HANDBOOK, AND THE KNOWLEDGE OF A POSITA	55
A.	Claims 4 and 9 Are Obvious	56
B.	Claims 12, 20, 27, and 32 are Obvious	58
C.	Claim 17 Is Obvious.....	59
D.	Claims 21 and 28 Are Obvious	59
E.	Claims 5, 24, 31, and 36 Are Obvious Over Liu Application, Handbook, and the Knowledge of a POSITA.....	60
F.	Claims 25, 26, 33, and 37 Are Obvious over Liu Application, Handbook, and the Knowledge of a POSITA.....	61
G.	Claim 38 Is Obvious.....	61
XI.	GROUND THREE: ALTERNATIVELY, IF THE CLAIMS ARE CONSTRUED TO COVER CONCENTRATIONS IN THE FUNCTIONAL FLUID AS OPPOSED TO THE ANTIMICROBIAL COMPOSITION, THEN ALL CHALLENGED CLAIMS ARE OBVIOUS IN LIGHT OF HANDBOOK AND THE KNOWLEDGE OF A POSITA	63
A.	Handbook and the Knowledge of a POSITA Discloses or Renders Obvious Claim 1	65
1.	Handbook discloses or renders obvious limitation 1[preamble]	65
2.	Handbook disclosed or rendered obvious limitation 1[a].....	65
3.	Handbook discloses or with the knowledge of a POSITA, renders obvious limitation 1[b].....	66

4.	Handbook disclosed or rendered obvious limitation 1[c].....	66
5.	Handbook discloses or renders obvious limitation 1[d]	67
6.	Handbook disclosed or rendered obvious limitation 1[e].....	67
7.	It would have been obvious to combine the disclosures of BIT and zinc oxide of Handbook.....	68
B.	Handbook discloses or Renders Obvious Claim 3	69
1.	Handbook discloses or renders obvious limitation 3[preamble]	69
2.	Handbook discloses or renders obvious limitation 3[a]	70
3.	Handbook discloses or renders obvious limitations 3[b], 3[c], 3[d], 3[e], and 3[f]	71
C.	Handbook Discloses or Renders Obvious '842 Patent Claim 6	72
1.	Handbook discloses or renders obvious limitation 6[preamble]	72
2.	Handbook disclosed or rendered obvious limitation 6[a].....	73
3.	Handbook disclosed or rendered obvious elements [6b], 6[c], 6[d], 6[e], and 6[f], which are identical to “antimicrobial composition” elements in claim 1	73
D.	Handbook Discloses or Renders Obvious Claim 7	74
E.	Claims 2 and 8 Are Obvious over Handbook and the Knowledge of a POSITA	74
F.	Claims 10, 13, and 15 Are Obvious Over Handbook and the Knowledge of a POSITA	75
G.	Claims 4 and 9 are Obvious	75
H.	Claims 12, 20, 27, and 32 Are Obvious	76
I.	Claim 17 is Obvious	77
J.	Claims 18, 21, and 28 Are Obvious	78
K.	Claims 5, 24, 31, and 36 Are Obvious	78
L.	Claims 25, 26, 33, and 37 Are Obvious	79
M.	Claim 38 Is Obvious.....	79
XII.	PURPORTED SECONDARY CONSIDERATIONS OF NON- OBVIOUSNESS	80

I, Raymond Fernando, Ph.D., state:

1. I have been retained by counsel for The Sherwin-Williams Company in connection with this proceeding for *Inter Partes* Review. I have been asked to provide opinions concerning U.S. Patent No. 9,723,842 (the “’842 Patent”) Ex. 1101. Specifically, I have been asked to provide my opinion on the level of ordinary skill in the art at the time the application for patent was filed; the scope and meaning of the Challenged ’842 Patent claims; the disclosure of certain prior art; and the validity of the Challenged ’842 Patent claims.

2. As set out in more detail below, I conclude that claims 1-10, 12-13, 15, 17-18, 20-21, 24-28, 31-33, and 36-38 of the ’842 Patent (the “Challenged Claims”) are invalid. The Challenged Claims are anticipated or rendered obvious by the prior art identified herein. In support of my conclusions, I set forth the reasons and basis in several sections, as follows: (1) a summary of my qualifications; (2) a list of the materials I have considered; (3) legal standards on which my opinions are based; (4) a brief overview of the ’842 Patent; (5) the technology and state of the art related to the ’842 Patent; (6) an identification of claim constructions I apply in my analysis; and (7) my specific analysis that the ’842 Patent is invalid.

I. QUALIFICATIONS

3. A copy of my Curriculum Vitae, which is submitted as Exhibit 1114, includes details of my educational credentials, my employment background, and my professional, teaching, and research background as a Professor of Polymers and Coatings.¹

4. I am currently a Professor and the occupant of Arthur C Edwards Endowed Chair in the Department of Chemistry and Biochemistry at California Polytechnic State University (Cal Poly) in San Luis Obispo, California. I also am the Director of the Polymers and Coatings Program and the Kenneth N Edwards Western Coatings Technology Center at Cal Poly. As described below, I have a Ph.D. in Polymers and Coatings from North Dakota State University. I have over 15 years of experience in industry research and development in the field of formulating coatings and additives. The science and technology of coating formulations have been an integral part of my entire professional life, starting from the days of my Ph.D. candidacy.

5. I received my Bachelor of Science degree in Chemistry from the University of Sri Jayewardenepura in Sri Lanka in 1979. Thereafter, I was a

¹ I pause initially to note that paints and primers are each varieties of coatings. A “paint” is a type of coating, and generally refers to a decorative coating. The term “coating” is broader, and also encompasses industrial and protective coatings.

Research Officer in the Rubber Technology Division at the Ceylon Institute for Scientific & Industrial Research in Colombo, Sri Lanka.

6. My Ph.D. in Polymers and Coatings was granted by North Dakota State University in 1986 based on my thesis titled “Influence of Dynamic Uniaxial Extensional Viscosities and Hydrophobically-Modified Water-Soluble Polymers in Aqueous Systems. During my graduate studies from 1981-1986, I taught laboratory classes in the Polymers and Coatings Department to undergraduate students.

7. I then worked in industry for over fifteen years in research and development at several two companies in on their coatings and paint products. From 1986 to 1999, I worked at Armstrong World Industries, where I both established a state-of-the-art rheology (study of viscosity and fluid flow) laboratory, and then developed fundamental coating science and technology base to support the company’s new products and processes relating to resilient floor coatings, ceiling tiles, and rubber cots and aprons for textile machinery. As Principal Scientist, from 1996-1999, I managed the Armstrong’s Building Products Division’s coating research program and coordinated the research and development activities of the coating research group, including providing support to the global manufacturing operations.

8. From 1999 to 2002, I was a Lead Research Chemist for Air Products and Chemicals in Allentown, Pennsylvania. I led a project on nano-particle additives for industrial coating. I also conducted research on formulation impacts of coating and adhesive rheology.

9. Concurrently during my industry R&D work in industry, I taught as an invited lecturer annually at North Dakota State University's Intensive Coatings Science Short Course. The classes I taught included coating formulation, rheology, and formulation additives.

10. In 2002, I joined the faculty at Cal Poly. Currently I occupy an endowed chair in Polymers & Coatings in the Chemistry and Biochemistry Department. As the Director of the Polymers and Coatings Program and the Director of the Kenneth N Edwards Western Coatings Technology Center at Cal Poly, I direct, coordinate and conduct a wide range of activities associated with the program and the center. These activities include student research, fundraising to support the program and the center, contract research and testing services for industry on polymers, coatings and related products, and intensive training workshops for industry professionals.

11. Nearly every year since 2003, I have taught the following classes:

- Polymer Physical Chemistry and Analysis. Undergraduate and graduate lecture and laboratory;

- Coating Formulation Principles. Undergraduate and graduate lecture and laboratory;
- Seminar courses to undergraduate and graduate students preparing for careers in industry;
- A bi-annual Polymer and Coatings Intensive Short Course for industry professionals.

12. Biocide selection for paints and coatings, and their use in paint and coating formulas, are among the topics I teach.

13. I have been the main advisor for 45 graduate students obtaining their Master's Degree in Polymers and Coatings and a graduate committee member for 17 more.

14. As shown in my CV, I have published numerous papers in the fields of polymers and coatings science and rheology. Some of these papers relate to the formulation of waterborne coatings such as paints.

15. I have been appointed a manuscript reviewer of several peer-reviewed journals, including the Journal of Coatings Technology and Research, Progress in Organic Coatings, the Journal of Rheology, and the Journal of Chemical Education. I am an Editorial Review Board member of the Journal of Coatings Technology and Research.

16. In recognition of my service to the field of coatings science and technology, I was awarded Federation of Societies for Coatings Technology President's Award in 2005 and American Coatings Association's Joseph J. Mattiello Award in 2018. Later this month at the American Chemical Society National Meeting, I will be receiving the Polymeric Materials: Science & Technology Division's Roy W. Tess Award.

II. COMPENSATION

17. I am being compensated for my work in this matter at an amount of \$250/hour. My compensation is unrelated to the content of any opinions I provide and is not tied to the outcome of this matter.

III. MATERIALS CONSIDERED

18. In support of my opinions herein, I have reviewed a number of materials. A list of the materials I have reviewed in support of my opinions is provided below. In addition to those materials, I also have relied on any materials cited or referenced in this declaration:

- a. U.S. Patent No. 9,717,250 B2 (to Thompson);
- b. File History of U.S. Patent No. 9,717,250 B2
- c. U.S. Patent No. 9,723,842 B2;
- d. File History of U.S. Patent No. 9,723,842 B2
- e. U.S. Patent App. Pub. No. US2007/0224135A1 ("Liu");

- f. UK Patent Application, GB 2 230 190 A (“Morpeth”);
- g. Handbook of Coatings Additives, 2nd Edition, by Joohn J. Florio & Daniel J. Miller (“Handbook”), including a chapter authored by scientist Paul S. Kappock titled “Biocides: Wet-state and Dry Film”;
- h. U.S. Patent No. 9,731, 321 B2 (“Hawsett”);
- i. *Formulating Stable Latex Paints with Zinc Oxide*, Mattei, Presented at the 68th Annual Meeting of the Federation of Societies for Coatings Technology, Washington D.C., October 29, 1990;
- j. U.S. Patent No. 5,208,272 (“LeSota”);
- k. U.S. Patent No. 5,227,156 (“Wiese”);
- l. U.S. Patent App. Pub. No. US2003/0232906 A1 (“Ghosh”);
- m. Zinc Oxide, Properties and Applications, by Harvey E. Brown;
- n. Declaration of Sylvia D. Hall-Ellis, Ph.D.
- o. U.S. Patent No. 5,073,582 to LeSota
- p. U.S. Published Patent Application No. US 2003/0232906 A1 to Ghosh
- q. U.S. Patent No. No. 4,150,026 to Miller et al
- r. Excerpts of Zeno W. Wicks, Jr. et al., Organic Coatings; Science and Technology

IV. LEGAL STANDARD APPLIED

19. In this section, I set out my understanding of the legal standards applicable to my opinions. I am not a lawyer and do not provide opinions on the law. Nonetheless, here I set out the standards applicable to my opinions.

20. I understand that the Petitioner must demonstrate by a preponderance of the evidence that the asserted claims are invalid. I further understand that to satisfy the preponderance of the evidence standard, the conclusion must be more likely than not. I also understand that this burden is applied individually to each patent claim.

21. I understand that determining the invalidity of a patent claim involves two steps: first, the claim or individual terms therein are construed to ascertain their meaning, and second, the construed claim is compared to the prior art. In this forum, invalidity may be asserted on the basis that the claim is anticipated or that the claim would have been obvious to a person having ordinary skill in the art.

22. I understand that the invalidity of a patent claim is assessed from the perspective of a person having ordinary skill in the art. The knowledge and understanding of a person having ordinary skill in the art is that as of the priority date applicable to the patent claims. For my analysis, I have applied the date of the provisional application (No. 60/808,697), to which the '842 Patent claims priority, which is May 26, 2006 (the "effective filing date"). Should additional information

come to light disclosing an earlier invention date, I reserve the right to reassess my opinions.

23. I understand that a patent claim is anticipated by a prior art reference when each and every element of the claim is disclosed expressly or inherently in a single prior art reference. I understand that to inherently disclose a claim element, the element must necessarily flow from the disclosure of the prior art reference. An element is not inherently disclosed if it is merely possible or probably that the element is present in the prior art reference. Instead, the inherent characteristics must be a necessary part of the prior art reference.

24. It also is my understanding that if a prior art reference discloses multiple embodiments, for the reference to anticipate, all elements of the claim must be disclosed in a single embodiment.

25. In addition, to anticipate, the single prior art reference must also enable one of ordinary skill in the art to make and use the invention claimed.

26. I also understand that when a claim covers several compositions, either generically or as alternatives, the claim is deemed anticipated if any of the compositions within the scope of the claim is known in the prior art.

27. I also understand that when a composition is known in the art, the discovery of a previously unappreciated property of the composition does not make the composition patentable.

28. I understand that a claim is invalid for obviousness if the differences between a claim and one or more prior art references are such that the claim as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the art. I understand several factors are considered in assessing the obviousness of a claim: (1) the scope and content of the prior art; (2) the differences between the art and the claims at issue; (3) the level of ordinary skill in the art; and (4) any objective evidence of non-obviousness.

29. I understand this analysis is not to be based on hindsight or ex-post reconstruction of the patent. Hindsight analysis occurs when the patent itself is used as a road map to recreate the invention. Instead, only information known to a person having ordinary skill in the art (POSITA) prior to the invention can be considered.

30. I understand that one important guard against hindsight reconstruction is whether there existed a motivation, teaching, or suggestion to a POSITA to duplicate the challenged claim at the time of the invention based on the one or more prior art references.

31. I understand that a patent may be obvious if the variation of the prior art constitutes a combination of known elements according to their known functions. Driving the combination may be a need or market pressure for which there are a finite number of identifiable solutions. I understand that a claim is

obvious in view of prior art if, to a person having ordinary skill in the art, the combination of prior art references would have been obvious to try.

32. I understand that when a claim recites an element as a range, a prior art reference disclosing a range overlapping the claimed range typically renders the claim obvious. In such a situation, the claim is non-obviousness only if the claimed range is critical, exhibiting some result that to a person of ordinary skill in the art would have been unexpected or surprising. On the other hand, if the characteristic of the claimed range would have been unsurprising or expected to a person having ordinary skill in the art based on his or her knowledge, experience, and information known in the art, then the claim is obvious.

33. I also understand that where the general conditions of a claim are known in the prior art, optimization of those conditions by routine experimentation is not inventive so as to render the claim non-obvious. I understand that disclosure in the prior art of a range that overlaps with the claimed range constitutes the general conditions of the claim.

V. BRIEF BACKGROUND ON THE '842 PATENT

A. The Alleged Invention of the '842 Patent

34. I understand the '842 Patent issued on August 8, 2017, from application No. 11/805,779, filed on May 24, 2007. I also understand the '842 Patent claims priority under § 119 to provisional application No. 60/808,697, filed May 26, 2006.

I understand that solely for purposes of this Petition, I am assuming the alleged priority date for the '842 patent is May 26, 2006.

35. The '842 Patent claims *antimicrobial compositions* comprising identified species of isothiazoline-3-one and identified species of zinc compound. Ex. 1101 cl. 1, 3, 6, 7. The isothiazoline-3-one species are 1,2-benzisothiazolin-3-one ("BIT") and N-(n-butyl)-1,2-benzisothiazoline-3-one ("BBIT"). The zinc compound species are zinc oxide and zinc chloride. The '842 Patent does not claim merely the presence of BIT or BBIT and zinc chloride or zinc oxide: each must be present in the composition within a specific concentration range, and also present in concentrations relative to each other within a particular concentration ratio range. The '842 Patent also claims the addition of a pyrithione compound as a co-biocide.

B. State of the Art Prior to the Alleged Invention

36. The '842 Patent's purported improvement was that antimicrobial compositions containing an isothiazoline-3-one compound and a zinc compound had enhanced efficacy in inhibiting microbial growth. Ex. 1101 at 2:66-3:7. These compounds were well-known antimicrobials used in antimicrobial compositions and finished products both individually and together within the concentration and concentration ranges claimed in the Challenged Claims.

1. Known use of BIT and zinc oxide

37. The '842 Patent admitted that "Isothiazolines, such as 1,2-benzisothiazoline-3-one (also referred to as 'BIT') are known to be effective antimicrobials." Ex. 1101 at 1:16-20. The '842 Patent identifies a European Patent, the European Patent EP 07 03726 B1 filed in May 1994 (the "Payne Patent"), which identified BIT to have been "used as a bactericide in a variety of applications." Ex. 1101 at 1:17-18; Ex. 1106. In Handbook, Patent Owner's employee taught the use of BIT as a wet-state preservative and recommended a target concentration. Ex. 1104 at 274, 275, 287.

38. Likewise, the '842 Patent admits that the use of a zinc compound with an isothiazoline-3-one compound as an antimicrobial in compositions was well-known. Ex. 1101 at 1:21-29. The '842 Patent identified a British published Patent Application GB 2,230,190 ("Morpeth"), filed in 1989, that taught the use of BIT and a zinc compound, namely zinc chloride, in a composition that met the claimed concentration ranges. Ex. 1118 at 14:9-11, 14:25. Morpeth is Grounds 1 and 2 in Petitioner's concurrently-filed Petition for *Inter Partes Review* in IPR2019-01497. Prior to the earliest claimed priority date, Liu taught an antimicrobial concentration containing BIT and zinc oxide. Upon dilution upon instructed by Liu, the result is the '842 Patent claims. Liu is Ground 1 and, in

combination with Handbook as disclosing zinc pyrithione, Ground 2 of this Petition for *Inter Partes Review*.

C. Known Use of Zinc Pyrithione as a Co-biocide

39. The use of a co-biocide of pyrithione was also well known in the art well before the '842 Patent's earliest claimed priority date. The admitted prior art in the '842 Patent, Payne, taught the use of an additional microbiological agent, i.e. co-biocide, with BIT, namely 2-mercaptopyrithione-1-oxide. Ex. 1106 (European Patent 0703726 ("Payne")) at 3:55-56. Payne further taught the use of the Zinc complex of 2-mercaptopyrithione-1-oxide, which is zinc pyrithione. *Id.* Thus, Payne, issued over 12 years before the earliest claimed priority date, taught the use with BIT of a zinc pyrithione co-biocide.

40. In Handbook, authored two years prior to the '842 Patent's earliest alleged priority date, Patent Owner's employee taught that zinc pyrithione may be added to antimicrobial compositions within the claimed ranges of the Challenged Claims. Ex. 1104 at 279-280. When zinc pyrithione is used in a paint composition, Patent Owner's employee recommended that zinc oxide should be included with the zinc pyrithione due to the tendency of zinc pyrithione to chelate (complex) with iron and discolor the composition. *Id.* at 280. Patent Owner's employee provided a recommended concentration of zinc oxide that should be added that was within the claimed ranges of the Challenged Claims. *Id.* at 280.

41. Further, Patent Owner's employee also taught that isothiazoline-3-one compounds, including BIT, may be used in antimicrobial compositions, *id.* at 275, and that BIT should be used in a concentration that overlaps with the concentration range of the Challenged Claims. Handbook at 287. Following Patent Owner's own recommendations, including BIT at the recommended concentration, zinc pyrithione at the recommended concentration, and the recommended amount of zinc oxide, the result is the Challenged Claims.

D. The Prosecution of the '842 Patent, Narrowing of Claims, and Reliance on Alleged "Unexpected Results" Showing a Synergistic Effect Between BIT and Zinc Oxide

42. Patent Owner's claims during prosecution were the subject of 15 office actions, three advisory actions, and seven Requests for Continued Examination. Substantial claim narrowing occurred during the patent prosecution, which spanned nearly 10 years from first rejection to allowance. Ex. 1102.

43. During prosecution, the examiner rejected Patent Owner's claims as obvious in light of prior art showing that compositions containing BIT within the concentration range of the Challenged Claims and zinc oxide within the concentration range of the Challenged Claims. Ex. 1102 at 640-642. To overcome this rejection, Patent Owner submitted declarations of experimental results that Patent Owner contended showed "unexpected results": increased BIT effectiveness when used in combination with zinc oxide or zinc chloride, as compared to the use

of BIT alone. Patent Owner stated that these “unexpected results can be indicative of synergism between 1,2-benzisothiazoline-3-one [BIT] and zinc oxide.” Ex. 1102 at 668. This claim of purportedly novel synergistic results between zinc oxide and BIT remains the purported point of novelty.

E. Known Synergistic Effects Between BIT and Zinc Oxide

44. I understand that during the prosecution of the '842 Patent, Patent Owner Arch Chemicals submitted two affidavits showing experimental results that it contended demonstrated “unexpected results” of increased BIT antimicrobial effectiveness when used with zinc oxide or zinc chloride, as compared to the use of BIT alone. I address these declarations and experimental results further below.

45. The synergistic effect claimed as inventive by Patent Owner was known. U.S. Patent No. 5,208,272 (“LeSota”), which issued in 1993, taught that “[i]n aqueous paint formulations, zinc oxide is a well known stabilizer for isothiazolones [the common name for isothiazoline-3-one compounds].” Ex. 1109 at 1:17-19. Moreover, LeSota taught that “zinc oxide also acts as a synergist with the isothiazolones for mildew resistance in aqueous paint formulations.” *Id.* at 1:19-21. Other publications disclosed the synergy between zinc compounds and isothiazoline-3-ones. For instance, Ghosh stated, “The use of various copper and zinc salts as stabilizers for isothiazolones in paint compositions is disclosed in U.S. Pat. Nos. 5,073,582 and 5,208,272. Typically, copper salts are not required as

stabilizers for isothiazolones when the paint compositions contain zinc oxide.” Ex. 1107 at ¶3. Mattei stated in 1991, “[i]n its own right, zinc oxide . . . functions synergistically with isothiazoline microbiocides.” Ex. 1111 at 39; see also 1110 at 1:26-30. And Brown stated, thirty years before the earliest claimed priority date of the ’842 Patent, “In a study of shelf-preservation of latex paints, Carter, et al., reported that mold formation was inhibited by mixtures of ZnO with 1,2-benzisothiazolin-3-one”). Ex. 1112 at 79. Even more specific to Patent Owner’s dependent claims, it was also known a zinc compound has a synergistic effect with BIT in the presence of a zinc pyrithione. More than ten years before the provisional application to the ’842 Patent was filed, the Wiese Patent taught “it has been found that the activity of a thiazolinone preservative in a zinc pyrithione shampoo can be maintained by adding a stabilizer comprising a zinc compound.” (Wiese Patent at 1:26-30.).

46. Thus, it is my opinion that, contrary to Patent Owner’s experimental results declarations, at least 30 years prior to the earliest claimed priority date of the ’842 Patent, “results [that] can be indicative of synergism between 1,2-benzisothiazoline-3-one [BIT] and zinc oxide” were fully expected. Patent Owner was incorrect to state that the experimental results showed “unexpected results . . . indicative of synergism between 1,2-benzisothiazoline-3-one [BIT] and zinc oxide.” Ex. 1102 at 667-668.

VI. THE LEVEL OF ORDINARY SKILL IN THE ART.

47. I have been informed that unpatentability must be analyzed from the perspective of “one of ordinary skill in the art” in the same field as the patent-in-suit at the time of the invention. I have also been informed that several factors are considered in assessing the level of ordinary skill in the art, including the (1) types of problems encountered in the prior art; (2) prior-art solutions to those problems; (3) rapidity with which innovations are made; (4) sophistication of the technology; and (5) educational level of active workers in the field.

48. I am familiar with the technology at issue where and the state of the art at the time the application leading to the '842 patent was filed on May 26, 2006. A person having ordinary skill in the art would have at least an associates degree in Chemistry, Biochemistry, or a related field, with 5-7 years of hands-on, dedicated experience in coatings or biocide formulation.

49. Alternatively, a POSITA could have a Bachelor's degree, Master's degree, or Ph.D. in Chemistry, Chemical Engineering, Biochemistry, Materials Science, or Materials Engineering or a related field, including some coursework in polymer science and chemistry, and 3-5 years of experience in coatings or biocide formulation.

50. Finally, a POSITA could have a Master's degree or Ph.D. in the field of Coatings & Polymers.

51. A POSITA also would be able to perform routine experimentation for formulations. In the industries of coatings and other useful industrial fluids, a POSITA would have available for use and experimentation a pilot-scale laboratory and chemistry bench sufficient to mix experimental formulations. A POSITA would know that experimental formulations are inexpensive to develop and test, and are commonly made. A POSITA would know that usually many experimental formulations must be tried before a successful formula is found. A POSITA would know that because the cost of producing an experimental formula is small, failure is permitted.

52. A POSITA also would be able to perform routine experimentation for formulations, including mixing concentrates and diluting them, calculating concentrations and required amounts to yield a target concentration in a final product.

53. I consider myself to have such “level of ordinary skill in the art” with respect to the subject matter of the ’842 Patent at the time of the application, as I have a Ph.D in Polymers and Coatings and experience in formulations. Thus, I am able to opine on how the person of ordinary skill would have understood the disclosure and claims of the ’842 Patent, the disclosures of the prior art, the knowledge of one of skill in the art at the time, the motivation to combine the prior

art, and what combinations would or would not have been obvious to one of skill in the art.

VII. CLAIM CONSTRUCTIONS APPLIED IN MY ANALYSIS.

54. I have been informed that the claims of the '842 Patent are to be construed according to the same principles that apply in a civil action under 35 U.S.C. § 282(b). I have been informed that the rule from *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc), and its progeny, applies to this proceeding. I further understand that under *Phillips*, claim terms are given their ordinary and customary meanings, as would have been understood by a POSITA, at the time of the invention, having taken into consideration the language of the claims, the specification, and the prosecution history of record.

A. Context of the '842 Patent claims and specification

55. The '842 Patent claims two categories of substances: an “antimicrobial composition” (cl. 1, 7) and a “functional fluid comprising . . . a wet state preservative comprising an antimicrobial composition,” (cl. 3, 6). Claims 1 and 7 claim an “antimicrobial composition” that “comprises an isothiazoline-3-one selected from the group of [BIT] and [BBIT] and combinations thereof” that is “present in an amount from 1 to 500 ppm”; and a “zinc compound comprising zinc chloride, zinc oxide, or combinations thereof” that is “present in an amount of 5 to

200,000 ppm.” The “weight ratio of the isothiazoline-3-one to the zinc compound is from 1:100 to 100:1.”

56. The “functional fluid” of claim 3 comprises a “wet state preservative comprising [the antimicrobial composition of claim 1].” Claim 6 covers a species of “functional fluid,” a “coating composition.” Ex. 1101 at 3:52-55 (“The antimicrobial compositions of the present invention are suitably used in functional fluids such as polymer emulsions, or other coating compositions . . .”). In claim 6, the “coating composition . . . compris[es] . . . a wet state preservative comprising [the antimicrobial composition of claim 1].” In each of claims 1, 3, 6, and 7, the concentration elements cover the antimicrobial composition, not the functional fluid.

57. The ’842 Patent specification states that the “antimicrobial composition of the present invention is suitably incorporated into a functional fluid.” Ex. 1101 at 3:8-9. The specification, like the claims, teaches only one single set of concentration limitations that cover the antimicrobial composition. The Summary of the Invention states: “In one aspect, the present invention relates to an antimicrobial composition “[i]n the composition, the isothiazoline-3-one is present in an amount of 1 to 500 ppm (preferably 5 to 500 ppm).” Ex. 1101 at 1:43-56; *also* 3:30-35. (emphasis added). The zinc compound is present “[i]n the composition . . . in an amount of 5 to 200,000 ppm (preferably 5 to 500 ppm). *Id.*

1:43-56 (emphasis added). This range is claimed in the “antimicrobial composition” of claims 1 and 7, and in the “antimicrobial composition” element of claims 3 and 6.

58. In all of these claims, the concentration elements cover the “antimicrobial composition.” The specification also states that “[a]ll percentages given herein are weight percents *based on the total weight of the composition* unless otherwise stated.” Ex. 1101 at 8:66-9:1 (emphasis added). In referring to the “total weight of the composition,” Patent Owner referred to the “antimicrobial composition of the present invention.” Ex. 1101 at 1:43-60 (Summary of the Invention).

B. Patent Owner’s Different Context for Infringement

59. I understand that on August 9, 2019 Patent Owner provided initial claim charts in a concurrent district court patent infringement case. I have examined Patent Owner’s initial claim charts, and I am familiar with them.

60. I understand that patent claims are interpreted according to the meaning to a POSITA, in the context of the patent claims, specification, and extrinsic evidence relevant to the state of the art. I also understand that the accused product can provide important context to understand a claim construction dispute, though the claims are not to be interpreted with respect to any particular accused product.

61. Patent Owner’s claim chart illuminates the key import of the claim construction dispute here: Patent Owner reads all Challenged Claims on a functional fluid or coating composition—in this case, Petitioner’s paints. Ex. 1120 at 1-3, 9-11. Patent Owner does not read the claim on an antimicrobial composition that “is suitably incorporated into a functional fluid” as required by the ‘842 Patent. *Id. contra* Ex. 1101 at 3:8-9. Rather, Patent Owner reads the “antimicrobial composition” of claims 1 and 7 and the “functional fluid” and “coating composition” of claims 3 and 6 that comprise an “antimicrobial composition” on the *same substance*. Ex. 1120 at 1-3, 9-11. Likewise, Patent Owner reads the concentration limitations as covering the functional fluid (*e.g.*, a paint); not the antimicrobial composition that “is suitably incorporated into a functional fluid” as required by the ‘842 Patent. *Id. contra* Ex. 1101 at 3:8-9. Patent Owner’s interpretation is contrary the express limitations in the claims and the specification, and its attempt to ignore the patent’s clear distinction between an “antimicrobial composition” and a “functional fluid” is clearly improper. Ex. 1101 at 1:43-60 (Summary of the Invention), 3:8-9, 3:52-53.

C. Preambles of Claims 1, 3, 6, 7 are Limiting

62. I understand that a preamble of a claim is the initial part of the claim that typically precedes the words “comprising.” I understand that a preamble is not

always considered to limit the scope of the claim, but if the preamble is gives life, meaning, or vitality to the claim, the preamble is limiting.

63. It is my opinion that preambles of claims 1, 3, 6, and 7 are limiting.

64. In claims 1 and 7, the preamble is an “antimicrobial composition.” In claims 3 and 7, the “antimicrobial composition” is present in a finished product—in the claims, a “functional fluid” or “antimicrobial composition.”

65. The structure of the Challenged Claims demonstrates that the “antimicrobial composition” is distinct from the “functional fluid. Claims 1 and 7 are directed solely at the “antimicrobial composition,” which the patent clearly describes “is suitably incorporated into a functional fluid” as required by the ‘842 Patent. Ex. 1101 at 3:8-9.

66. The preambles of claims 3 and 6 require a “functional fluid” or “coating composition” which are distinct from the “antimicrobial composition” required in subsequent claim elements. The preambles breathe life into the claims in distinguishing between the antimicrobial composition and the functional fluid into which an antimicrobial composition is incorporated. As such, the preambles are limiting in that “functional fluid” and “coating composition” are distinct from the “antimicrobial composition.”

67. The specification provides further support that these are distinct categories of substances. The specification states “[t]he antimicrobial composition

of the present invention is suitably incorporated into a functional fluid.” Ex. 1101 3:8-9; *see also id.* 3:52-54. These are unequivocal statements that an antimicrobial composition and a functional fluid are different. Indeed, the specification does not contain any statement to the contrary. Rather, the Summary of the Invention states: “In one aspect, the present invention relates to an antimicrobial composition,” and then provides that “[i]n the composition,” the concentrations are as claimed in the antimicrobial compositions of claims 1, 3, 6, and 7. As such, the Board should find that the preambles are limiting to clarify that the “antimicrobial composition” is distinct from the “functional fluid” and the “coating composition.”

D. “Present in an Amount of”

68. It is my opinion that the term “present in an amount of” means “present in the antimicrobial composition in an amount of.”

69. Independent claims 1, 3, 6, and 7 each include concentration ranges for isothiazoline-3-one and zinc compound components.

70. In my opinion, claim construction will clarify the reference against which the claimed concentrations are measured.

71. In claims 1 and 7, it is clear that the parts per million (ppm) concentration range is concentration *in the antimicrobial composition*, as this is the only composition referenced in the claims. Claims 3 and 7 contain the same antimicrobial composition. The concentration elements of claims 3 and 7 are the

same as in claims 3 and 7. In claims 3 and 7, this same antimicrobial composition is included in, but distinct from, a “functional fluid” or a “coating composition.” Nevertheless, the only proper interpretation is that these ranges in claims 3 and 6 are in the antimicrobial composition, consistent with the interpretation of claims 1 and 7 that include identical limitations.

72. The specification requires this construction. The Summary of the Invention first states that “present invention relates to an antimicrobial composition,” and then states that “[i]n the composition,” the components are present in the same concentration ranges claimed in all of the independent Challenged Claims. Ex. 1101 at 1:43-60. This leaves no room for concentrations to be measured in a functional fluid. Indeed, the specification lacks any disclosure of concentration ranges in a functional fluid (e.g., a paint). All of the disclosures demonstrate that the concentrate ranges refer to the antimicrobial composition.

73. Consequently, it is my opinion that the term “present in an amount of” means “present in the antimicrobial composition in an amount of.”

E. “Consisting of” and “Optionally”

74. I understand that the term “consisting of” refers to a closed claim, where the inclusion of other materials except for impurities results in non-coverage of the claim. I have seen the term “consisting of” in claim 17. I also understand

that Patent Owner has provided initial claims charts that include each of these elements.

75. I understand that as a matter of law, optional limitations are not restrictive on the claim. Accordingly, to a POSITA, the term “optionally” in claim 17 does not require that the “at least one polymer base medium” and “a co-biocide.” I understand that the patent owner has provided claim charts that read claim 17 as including these elements.

76. I have found the optional elements in the prior art, and base my opinions on their presence in the prior art. My opinions in this case thus assume the constructions Patent Owner has assumed in its initial claim charts, specifically, that the claim is not closed and that the “optional” limitations are limiting

VIII. UNPATENTABILITY

77. The analysis below presents the technical subject matter described in the '842 Patent, as well as background known in the art as of the earliest priority date of the '842 Patent. It also presents my opinions regarding unpatentability of certain '842 Patent claims based on certain references that I considered.

78. In my opinion, a person of skill in the art would have understood '842 Patent claims 1, 2, 3, 6, 7, 8, 10, 13, and 15 are invalid under § 103 as obvious over U.S. Patent Application No. 11/388,553, filed on March 24, 2006 and published as

U.S. Pub. No. US2007/0224135 on Sept. 27, 2007, (“the Liu Application”) in view of the knowledge of a POSITA.

79. In my opinion, a person of skill in the art would have understood ’842 Patent claims 9, 17, 18, 20, 21, 24, 25, 26, 27, 28, 31, 32, 33, and 36 are invalid under § 103 as obvious over the Liu Application, the Handbook of Coating Additives, 2d edition, in view of the knowledge of a POSITA

80. I also provide an alternative opinion. If the claims are construed contrary to my opinion, such that the concentrations recited in the claims are measure in the functional fluid or coating composition, then it is my opinion that ’842 Patent claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 17, 18, 20, 21, 24, 25, 26, 27, 28, 31, 32, 33, 36, and 37 are invalid under § 103 as obvious over the Handbook of Coating Additives, 2d edition, in view of the knowledge of a POSITA.

A. Overview of the Prior Art

1. Liu Application

81. The Liu Application was filed on March 24, 2006 and published on Sept. 27, 2007. It is my understanding that the Liu Application is at least prior art under 35 U.S.C. § 102(e)(1).

82. The Liu Application is not cited on the face of the ’250 Patent.

83. The Liu Application taught an aqueous suspension concentrate that includes a UV-labile biocide activity for delivery of such concentrate into formulations. Ex. 1103 at ¶0007. The Liu Application taught that the biocide may be an isothiazolone, such as benzisothiazolone (BIT). *Id.* at ¶0011. In addition, the Liu Application taught that the concentrate may include a UV-blocker, such as zinc oxide. *Id.* at ¶0012. The Liu Application disclosed that a concentrate with the biocide, such as BIT, and UV-blocker, such as zinc oxide, was preferred in order for such concentrate to “experience substantially no degradation or coloration upon storage and/or exposure to sunlight or UV-radiation *while retaining its bioactivity.*” *Id.* at ¶0008 (emphasis added).

84. The Liu Application then disclosed that the concentrate should include a concentration of the biocide, such as BIT, in a range by weight of the prepared concentrate of 5-50%, and preferred range of 10-40%. Likewise, the Liu Application disclosed that the concentration of the UV-blocker, such as zinc oxide, should be included in the concentrate in a range by weight of the prepared concentrate of 0.2%-20%, and preferred range of 2-10%. *Id.* at ¶0048. Then, the Liu Application disclosed various examples of concentrates with the biocide, including BIT, and the UV-blocker, including zinc oxide, within the preferred ranges that the Liu Application disclosed. *Id.* at ¶¶0051-61. More particularly, the Liu Application discloses one example where the BIT concentration would be

about 20% of the weight of the prepared concentrate, and an example where the zinc oxide concentration would be about 2% of the weight of the prepared concentrate. *Id.*

85. Liu taught that “[t]he concentrate is easily dilutable with water.” *Id.* at ¶25. Liu also taught how to dilute the antimicrobial concentrate: the “composition may be diluted with a desired amount of water by mixing in a high speed mixer for a period of from about 30 minutes to 1 hour. *Id.* at ¶0031. The antimicrobial composition concentrates of Liu should be diluted so that “[o]n dilution, the active component can have a concentration of 10 ppm to 50% in the diluted mixture while retaining suspension stability for 4 hours or more.” *Id.*

86. Liu thus taught a POSITA to dilute the antimicrobial composition concentrate by a factor that would result in the claimed concentration ranges of the ’842 Patent. From a mathematical perspective, one dilution factor that would result in the claims is dilution by 400x, but other dilution factors would also result in the claimed concentration ranges.

87. Liu also taught that the diluted concentrate could be incorporated into a finished product like a paint or coating composition, Ex. 1103 ¶0015, each of which are examples of functional fluids in the ’842 Patent. Ex. 1101 at 3:60-64. Such modifications would not change the principle of operation of the examples, namely inhibiting microbial growth. Ex. 1103 ¶0008.

2. Handbook of Coatings Additives, Second Ed., Chapter 8 titled “Biocides: Wet State and Dry Film” (“the Handbook”)

88. The Handbook was published in 2004, and I understand was publicly available since at least Dec. 12, 2004. Ex. 1115. Thus, it is my understanding that the Handbook is prior art under at least 35 U.S.C. §102(b), even if the '250 Patent is entitled to a priority date of May 26, 2006.

89. Handbook was not cited to the USPTO during prosecution of the '842 Patent. Handbook includes a chapter authored by Patent Owner's employee Paul Kappock, titled “Biocides: Wet State and Dry Film.”

90. The Handbook was authored by an employee of Patent Owner, Mr. Paul Kappock. The Handbook provides a disclosure of the known biocides that could be used in formulations, such as paints. Ex. 1104 at pg. 263-64. The Handbook also discloses that it was a well-known practice for various biocides to be blended together, i.e. combining various biocides. *Id.* at pg. 265.

91. Handbook disclosed 1,2-benzisothiazoline-3-one, BIT, as a wet-state preservative. *Id.* at 275. Handbook stated that 1,2-benzisothiazoline-3-one, BIT, as a wet-state preservative. *Id.* Handbook also provided a recommended concentration of BIT in a finished product. The recommended concentration was “0.1-0.3% of 20% solution.” *Id.* at 287.

92. “0.1-0.3% of a 20% solution” of BIT is 200-600 ppm BIT, as shown in the calculation below.

$$0.1 \% \times 20\% \text{ solution} \times \frac{1}{100} (\text{conversion from percent to fraction})\% =$$

$$0.0002 \times 1,000,000 (\text{conversion to ppm}) = 200 \text{ ppm}$$

$$0.3 \% \times 20\% \text{ solution} \times \frac{1}{100} (\text{conversion from percent to fraction})\% =$$

$$0.0006 \times 1,000,000 (\text{conversion to ppm}) = 600 \text{ ppm}$$

93. The Handbook also recommended that zinc pyrithione be used as a dry film preservative. *Id.* at 279-280. The Handbook provided a recommended concentration of zinc pyrithione for “architectural” applications. *Id.* at 290. The recommended concentration was 0.1-0.5%. *Id.*

94. The Handbook instructed that if zinc pyrithione is used, a small amount of zinc oxide should be added to prevent complexing with iron, which results in unfavorable discoloration. *Id.* at 280. Specifically, Handbook stated: “[p]yrithiones complex strongly with transition metals when iron or cobalt is present in a coating formulation, some transchelation may occur.” *Id.* Iron may be present in pigments at a level of several parts per million. “Dissolution of that iron could occur and react with zinc pyrithione to cause discoloration. *Id.* “*Prevention of ferric pyrithione formation in the coating is easily accomplished by the addition of about 0.05% zinc oxide.*” *Id.* (emphasis added). This disclosure provided an

explicit reason for a POSITA to add zinc oxide at a level of 0.05% when zinc pyrithione is used. In parts per million, 0.05% is 500 ppm, as shown in the equation below:

$$0.05 \% \text{ zinc oxide} \times 1/(100 (\text{conversion to fraction from } \%)) \times 1,000,000 (\text{conversion to ppm}) = 500 \text{ ppm zinc oxide}$$

95. This recommended level of 500 ppm zinc oxide is the concentration in a finished product, like a paint or a coating. Two exemplary types “functional fluid” of claim 3 or “coating composition” of claim 6 are paints. Ex. 1101 at 3:60-64.

96. The weight ratio of the isothiazoline-3-one to zinc oxide is easily calculated by a POSITA from the recommended concentrations. For the lower bound of 200 ppm BIT, the weight ratio for the recommended concentrations would be 200 isothiazoline-3-one : 500 zinc oxide, or 1:2.5. For the higher bound of BIT, 600 ppm, the weight ratio would be 600 isothiazoline-3-one : 500 zinc oxide, or 1:1.2.

IX. '842 PATENT CLAIMS 1, 2, 3, 6, 7, 8, 10, 13, AND 15, ARE OBVIOUS UNDER § 103 IN VIEW OF LIU AND THE KNOWLEDGE OF A POSITA

97. The Liu Application, in view of the knowledge of a POSITA, renders claims 1, 2, 3, 6, 7, 8, 10, 13, and 15, obvious.

98. It was obvious to combine the knowledge of a POSITA to select the aqueous antimicrobial composition concentrate of Liu including an isothiazolin-3-one compound such as BIT and a zinc compound such as zinc oxide, and to dilute the concentrate according to Liu's teaching to obtain the claimed formulations of the '842 Patent. A POSITA would have a reasonable expectation of success for such combination as the technique of dilution was well known and the combination of known biocides used in predictable manner in antimicrobial compositions, functional fluids, or coating compositions to achieve the predictable result of preventing microbial growth.

A. Claim 1 is Obvious in View of Liu and the Knowledge of a POSITA.

1. Limitation 1[preamble] is obvious in view of Liu and the knowledge of a POSITA.

1[preamble]	An antimicrobial composition comprising:
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99. As I discussed above, it is my opinion that the term "antimicrobial" means inhibiting growth of or destroying a living microorganism.

100. The Liu Application discloses a concentrate is a "UV-labile biocide active for delivery of such active in stabilized form into formulations." Ex. 1103 at ¶0007. The Liu Application also discloses that the "concentrate includes a biocide which is a fungicide or preservative." *Id.* at ¶0010. A biocide and/or fungicide are compositions that inhibit the growth of living organisms, such as bacteria and fungi. Thus, the concentrate disclosed in the Liu Application has antimicrobial

properties. Diluting the disclosed aqueous concentrate in Liu would have been well within the skill of a POSITA. And diluting the aqueous antimicrobial concentrate would not change that the resulting composition is antimicrobial.

101. In my opinion, the Liu Application discloses or renders obvious the preamble “an antimicrobial composition.”

2. Limitation 1[a] is obvious over Liu and the knowledge of a POSITA

1[a]	(a) at least one isothiazolin-3-one selected from the group consisting of 1,2-benzisothiazolin-3-one, N-(n-butyl)-1,2-benzisothiazolin-3-one, and combinations thereof;
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102. Liu disclosed that one biocide that may be used in the concentrate is “Benzisothiazolone (BIT).” Ex. 1103 at ¶¶0022; *see also* ¶¶0011; 0043; 0060-61. It was well known that BIT’s chemical formulation is 1,2-benzisothiazolin-3-one. Ex. 1106 at 1:6-8. The ’842 Patent admits that the chemical name of BIT is 1,2-benzisothiazolin-3-one. Ex. 1101 at 1:14-15. As such, the antimicrobial composition concentrate disclosed in Liu discloses BIT. Upon dilution, Liu discloses or renders obvious an antimicrobial composition that comprises BIT.

103. In my opinion, the Liu Application discloses or renders obvious an antimicrobial composition that comprises BIT.

3. Limitation 1[b] is disclosed in or obvious over Liu and the knowledge of a POSITA.

1[b]	(b) at least one zinc compound comprising zinc chloride, zinc oxide, or a combination thereof;
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104. Liu disclosed that the concentrate may include “zinc oxide” as one of the UV-blockers. Ex. 1103 at ¶0012. Liu also discloses example formulations of the concentrate that include zinc oxide. *Id.* at ¶0052. Upon dilution with water by a POSITA, the resulting antimicrobial composition would include zinc oxide, rendering obvious limitation 1[b].

105. In my opinion, the Liu Application discloses or renders obvious an antimicrobial composition that comprises zinc oxide.

4. Limitation 1[c] is disclosed in or obvious over Liu and the knowledge of a POSITA

1[c]	wherein the isothiazolin-3-one is present in an amount of from 1 to 500 ppm,
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106. The Liu Application disclosed an example of concentrate that includes BIT, which is a one isothiazolin-3-one, within the range of about 1% to about 95% w/w based on the total weight of the concentrate. Ex. 1103 at ¶0060. Example 19 in the Liu Application stated that the 1Kg concentrate is made with BIT and following the procedure in Example 15C. *Id.* Example 15C is prepared following the procedures in Example 15B, except that titanium oxide replaces the zinc oxide in Example 15B. *Id.* at ¶0053. Example 15B is prepared according to the procedure in Example 15A, except that 50g of zinc oxide replaces part of the 53g of remaining water in Example 15A. *Id.* at ¶0052. Thus, the formulation disclosed in Example 19 of the Liu Application is:

Formulation of Example 19 in the Liu Application	
Compound	Amount (grams)
BIT	220
Easy-Sperse	25
DI Water	600
Surfynol 104 E	1
Sag 30	1
1% Keizan	122
Titanium Dioxide	50
Make-up water	3

Ex. 1103 ¶¶0051-53; 0060.

107. In the above formulation, BIT would have a concentration of about 20% w/w of the total weight of the concentrate. This equals 200,000 ppm BIT. Upon dilution by a factor of 400x water, the concentration of BIT in the resulting antimicrobial composition would be 500 ppm BIT.

108. The Liu Application also discloses that the suitable range for the biocide, such as BIT, in the concentrate would be 5-50% w/w of the total weight of the concentrate, and the preferred range was 10-40% w/w of the total weight of the concentrate. Ex. 1103 at ¶0048. In parts per million, these concentrations are 50,000 ppm – 500,000 ppm, and 100,000 ppm to 400,000 ppm. Upon dilution by 400x, the concentration in the resulting antimicrobial composition would include 125 ppm – 1,250 ppm BIT; or 250 ppm to 1,000 ppm BIT. These resulting concentrations are within the claimed range in Claim 1.

109. As discussed above in Sec. IX.A.1, Liu taught that its concentrates should be diluted for use. Ex. 1103 ¶0031. Dilution of an aqueous concentrate by 400x is a normal factor for diluting a concentrated solution, particularly in view of Liu’s instruction on how to dilute. *Id.* Liu also taught that the resulting antimicrobial active concentration should be “10 ppm to 50% in the diluted mixture.” Ex. 1103 ¶31. Liu thus taught how to dilute its antimicrobial concentrate to concentrations within the ’842 Patent. Liu thus taught how to dilute its antimicrobial concentrate to concentrations within the ’842 Patent claims.

110. It is my opinion that Liu discloses or renders obvious limitation 1[c].

5. Limitation 1[d] is obvious over Liu and the knowledge of a POSITA

1[d]	wherein the zinc compound is present in an amount of from 5 to 200,000 ppm, and
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111. Liu Application disclosed in Example 19 a concentrate that include BIT. However, Example 19 includes 50g of titanium dioxide. It would have been obvious to one of skill in the art to create Example 19 substituting zinc oxide for titanium dioxide. First, the Liu Application disclosed two examples where zinc oxide and titanium dioxide are interchangeable with each other, namely Example 15B and 15C. Ex. 1103 ¶¶0052-53. Notably, the Liu Application discloses that zinc oxide and titanium dioxide may be substituted for each other at the same amount, namely 50g. Further, the Liu Application discloses that zinc oxide and

titanium dioxide are both examples of UV-blockers to be used in the concentrate. *Id.* at ¶0012. Thus, the Liu Application provides explicit motivation for the substitution. One of skill would understand from the disclosures in the Liu Application that the titanium dioxide in Example 19 could be replaced with zinc oxide at the same amount in the concentrate, such as 50g in Example 19 in the Liu Application.

112. In addition, one of skill would be motivated to use zinc oxide in Example 19 in the Liu Application because it was known that zinc oxide is a stabilizer for isothiazolones, like BIT. Ex. 1109 1:15-18. Moreover, it was known that zinc oxide “acts as a synergist with the isothiazolones [like BIT] for mildew resistance in aqueous paint formulations.” *Id.* at 1:19-21; *see also* Ex. 1111 at 39; Ex. 1112 at pg. 79. The concentrate in Example 19 of the Liu Application is a concentrate with biocide activity from BIT and is to be used in aqueous paint solutions. Ex. 1103 ¶¶0007, 0015. As such, one of skill would have been motivated to modify the composition of Example 19 to include zinc oxide because of the stabilization provided by zinc oxide and the synergistic effect in antimicrobial efficiency that zinc oxide provides to isothiazolones, like BIT.

113. One of skill would have a reasonable expectation of success in substituting zinc oxide for titanium dioxide in Example 19 because it is a substitution of known components in predictable manner to achieve predictable

results. As disclosed in the Liu Application, zinc oxide and titanium dioxide were known UV-blockers. Ex. 1103 ¶¶0012. The use of either in the concentrate would achieve the same, predictable result of assisting in the degradation effects of sunlight and UV-radiation in the concentrate. As disclosed in the Liu Application, concentrates with zinc oxide and titanium dioxide, notably in the same weight percentages in each concentrate, demonstrated inhibition of degradation because of UV-light exposure. Ex. 1103 ¶¶0055-57. As such, one of skill would have had a reasonable expectation of success in the substitution of zinc oxide for titanium oxide in Example 19 in the Liu Application because it was the substitution of known components in predictable manner to achieve predictable results.

114. The substitution of zinc oxide for titanium oxide in Example 19 of the Liu Application results in the following formulation:

Formulation of Substituted Example 19 in the Liu Application	
Compound	Amount (grams)
BIT	220
Easy-Sperse	25
DI Water	600
Surfynol 104 E	1
Sag 30	1
1% Keizan	122
Zinc Oxide	50
Make-up water	3

Ex. 1103 ¶¶0051-53; 0060.

115. In the above formulation, zinc oxide would have a concentration of about 5% w/w of the total weight of the concentrate. In parts per million, this equates to 50,000 ppm. Moreover, the Liu Application disclosed that the suitable range for the UV-blocker, like zinc oxide, in the concentrate would be 0.2-20% w/w of the total weight of the concentrate, and the preferred range was 2-10% w/w of the total weight of the concentrate. Ex. 1103 ¶0048. These concentrations equal 2,000 ppm – 200,000 ppm (0.2-20% w/w) and 20,000 ppm – 100,000 ppm (2-10% w/w).

116. Upon dilution of the disclosed concentrates with water, the above formulation would result in an antimicrobial composition that contains 12.5 ppm. The disclosed and preferred ranges would be 5 ppm – 500 ppm, and for the preferred range, 50 ppm to 250 ppm. These ranges of zinc oxide in the resulting antimicrobial concentrate are within the claimed range in Claim 1.

117. As discussed above, Liu instructed how to dilute its antimicrobial composition concentrates. Ex. 1103 at ¶31. The target range for the resulting antimicrobial active concentration should be “10 ppm to 50% in the diluted mixture. *Id.* Such dilution would result in an antimicrobial composition that included zinc oxide in the claimed range.

118. It is my opinion that limitation 1[d] is obvious over Liu and the knowledge of a POSITA.

6. Limitation 1[e] is obvious in view of Liu and the knowledge of a POSITA

1[e]	wherein the weight ratio of the isothiazolin-3-one to the zinc compound is from 1:100 to 100:1.
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119. As discussed above, Liu renders obvious an antimicrobial concentrate with isothiazolin-3-one and zinc compound. In addition, one of skill would motivated and have a reasonable expectation of success of creating a concentrate as shown in Substituted Example 19 in the Liu Application, for the reasons described above. The formulation for the Substituted Example 19 in the Liu Application is provided again below:

Formulation of Substituted Example 19 in the Liu Application	
Compound	Amount (grams)
BIT	220
Easy-Sperse	25
DI Water	600
Surfynol 104 E	1
Sag 30	1
1% Keizan	122
Zinc Oxide	50
Make-up water	3

Ex. 1103at ¶¶ 51-53; 60.

120. In this Substituted Example 19, the isothiazolin-3-one, BIT, and the zinc compound, i.e. zinc oxide, have a weight ratio of 220g/50g, or about a 4:1 weight ratio. Diluting the antimicrobial concentrate of Liu would not change this

weight ratio. This about 4:1 weight ratio is within the claimed ratio of 100:1 to 1:100. *Id.*

121. It is my opinion that the Liu Application discloses or renders obvious limitation 1[e].

B. Claim 3 is Obvious over Liu and the Knowledge of a POSITA

122. The '842 Patent teaches that “[t]he antimicrobial compositions of the present invention are suitably used in functional fluids such as polymer emulsions, or other coating compositions, to impart both wet state and dry state preservation.” '842 Patent 3:51-54. Claim 3 covers the inclusion of the antimicrobial composition of claim 1 with a polymer emulsion to make a functional fluid.

123. It is my opinion that claim 3 is obvious over the Liu Application and the knowledge of a POSITA.

1. Limitation 3[preamble] is obvious over Liu and the knowledge of a POSITA

3[preamble]	A functional fluid composition comprising:
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124. Liu stated that its “invention herein further comprises a composition which includes the stable aqueous suspension concentrate, e.g., a paint composition; or a coating composition” Ex.1103 ¶0015; *compare to* Ex. 1101 at 3:60-61 (stating that “[t]ypical functional fluids include coating compositions

such as paints . . . and other aqueous based systems”). Liu thus discloses limitation 3[preamble].

2. Limitation 3[a] is obvious over Liu and the knowledge of a POSITA

3[a]	a polymer emulsion; and
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125. In its “Initial Claim Chart” showing infringement contentions in concurrent district court litigation, I understand that Patent Owner reads the “polymer emulsion” on an “acrylic latex” component of paint. Ex. __ at 9, 16, 23, 30, 44.

126. The ’842 Patent admits that acrylic latex paint components were known. For instance, Example 1 of the patent included a “commercial water based acrylic latex, REVACRYL 1A,” that was “supplied” by a third party. Ex. 1101 at 4:6-8. Further, the use of acrylic latex polymer emulsions was ubiquitous. In *Organic Coatings; Science and Technology*, the authors provided a “formulation recommended by a latex manufacturer for a ‘high quality’ exterior white house paint.” Ex. __ at 315. The formulation included “Rhoplex AC-64,” *id.* at 316, an “all-acrylic latex,” *id.* at 319. The Rhoplex AC-64 is “a copolymer of methyl methacrylate (MMA) with ethyl or butyl acrylate. . . .” *Id.* at 319; *compare to* 842:54-60 (“The base medium can be, for example, a polymer useful in polymer emulsions wherein the polymer is selected from the group consisting of acrylic and

substituted (meth)acrylates . . . and copolymers of the aforementioned.”). Through admission in the ’842 Patent or knowledge in the state of the art, a polymer emulsion of limitation 3[a] was known.

127. It is my opinion that limitation 3[a], a functional fluid comprising a polymer emulsion, was known.

3. Limitations 3[b], 3[c], 3[d], 3[e], and 3[f] are obvious over Liu and the knowledge of a POSITA

128. Claim 3 covers the inclusion of the same “antimicrobial composition” of claim 1 with a polymer emulsion into a “functional fluid.” As for the “wet state preservative,” Liu disclosed this limitation by including BIT, a known wet state preservative. The “antimicrobial composition” elements of claim 6 are identical to claim 1.

3[b], covers identical “antimicrobial composition” of element 1[a]	a wet state preservative comprising an antimicrobial composition comprising at least one isothiazolin-3-one selected from the group consisting of 1,2-benzisothiazolin-3-one, N-(n-butyl)-1,2-benzisothiazolin-3-one, and combinations thereof, and
3[c], identical to 1[b]	at least one zinc compound comprising zinc chloride, zinc oxide, or a combination thereof,
3[d], identical to 1[c]	wherein the isothiazolin-3-one is present in an amount of from 1 to 500 ppm,
3[e], identical to 1[d]	wherein the zinc compound is present in an amount of from 5 to 200,000 ppm, and
3[f], identical to 1[e]	wherein the weight ratio of the isothiazolin-3-one to the zinc compound is from 1:100 to 100:1.

129. For the same reasons as discussed above in association with claim elements 1[a], 1[b], 1[c], 1[d], and 1[e], it is my opinion that the Liu Application in view of the knowledge of a POSITA renders elements 3[b], 3[c], 3[d], 3[e], and 3[f] obvious.

C. Claim 6 Is Obvious over Liu and the Knowledge of a POSITA

130. In claim 6, the antimicrobial composition of claim 1 is mixed with a “base medium,” resulting in a “coating composition.” Claim 6 is obvious over Liu and the knowledge of a POSITA.

1. Limitation 6[preamble] is obvious over Liu and the knowledge of a POSITA

6[preamble]	A coating composition comprising:
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131. Liu taught that the “stable aqueous suspension concentrate” may be added to a “paint composition; or a coating composition.” Ex. 1103 at ¶0015. Thus, Liu discloses limitation 6[preamble].

2. Limitation 6[a] is obvious over Liu and the knowledge of a POSITA

6[a]	a base medium selected from the group consisting of paints, adhesives, sealants, caulks, mineral and pigment slurries, printing inks, agricultural pesticide formulations, household coating products, personal care products, metal working fluids, and combinations thereof; and
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132. Liu explained that his invention comprised including his “stable aqueous suspension concentrate” in a paint composition or a coating composition.”

Ex. 1103 at ¶15. A “paint” composition is one of the alternatives in the Markush group for this limitation.

133. It is my opinion that limitation 6[a] is obvious over the Liu Application and the knowledge of a POSITA.

3. Limitations [6b], 6[c], 6[d], 6[e], and 6[f], are identical to “antimicrobial composition” elements in claim 1, and are obvious over Liu and the knowledge of a POSITA

134. The remaining elements of claim 6 are essentially identical to claim 1. Like claim 3, claim 6 introduces a “wet state preservative comprising an antimicrobial composition” having the same elements as claim 1. As discussed above in claim 3, the antimicrobial composition concentrates of Liu are a wet state preservative because they include BIT. The antimicrobial composition limitations of claim 6 are identical to claim 1.

6[b], covers identical antimicrobial composition of 1[a]	a wet state preservative comprising an antimicrobial composition comprising at least one isothiazolin-3-one selected from the group consisting of 1,2-benzisothiazolin-3-one, N-(n-butyl)-1,2-benzisothiazolin-3-one, and combinations thereof, and
6[c], identical to 1[b]	at least one zinc compound comprising zinc chloride, zinc oxide, or a combination thereof,
6[d], identical to 1[c]	wherein the isothiazolin-3-one is present in an amount of from 1 to 500 ppm,
6[e], identical to 1[d]	wherein the zinc compound is present in an amount of from 5 to 200,000 ppm, and
6[f], identical to 1[e]	wherein the weight ratio of the isothiazolin-3-one to the zinc compound is from 1:100 to 100:1.

135. For the same reasons as discussed above in association with claim elements 1[a], 1[b], 1[c], 1[d], and 1[e], it is my opinion that Liu Application and the knowledge of a POSITA render obvious the corresponding elements in claim 6.

D. Claim 7 Is Obvious over Liu and the Knowledge of a POSITA

136. Claim 7 is identical to claim 1, except that the “isothiazoline-3-one” of claim 1 is limited to BIT, and the “zinc compound” of claim 1 is limited to zinc oxide. As discussed in Sec. IX.A.3, IX.A.5, Liu disclosed concentrate wherein the isothiazoline-3-one includes BIT; and Liu disclosed concentrates that include zinc oxide. As explained in claim 1, when the disclosed antimicrobial composition concentrates of Liu are diluted by 400x, the result is the antimicrobial composition of claim 1. Consequently, claim 7 is also obvious based on the same reasons provided for claim 1. *See* Sec. IX.A. In other words, the same disclosures referenced above and incorporated herein disclosing claim 1’s limitations similarly disclose the limitations in claim 7. Accordingly, claim 7 is obvious over Liu and the knowledge of a POSITA.

137. It is my opinion that claim 7 is obvious over the Liu Application and the knowledge of a POSITA.

E. Claims 2 and 8 Are Obvious over Liu and the Knowledge of a POSITA

138. Claim 2 and claim 8 add limitations to their parent independent claims, claim 1 and 7, respectively, that further restrict the concentrations of the

isothiazoline-3-one and zinc compound. Upon dilution of the antimicrobial composition concentrate of Liu, the resulting antimicrobial composition meets the more restrictive concentration range of claims 2 and 8. As a predicate matter, as shown above, Liu and the knowledge of a POSITA render obvious independent parent claims 1 and 7.

1. Limitations 2[a] and 8[a] are obvious in view of Liu and the knowledge of a POSITA

2[a], 8[a]	wherein component (a) is present in an amount of from 5 to 500 ppm, and
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139. As discussed above in the context of limitation 1[d], upon dilution of the substituted Example 19 of Liu by addition of 400x water, the concentration of BIT in the resulting antimicrobial composition would be 500 ppm BIT.

140. It is my opinion that Liu Application in view of the knowledge of a POSITA renders obvious limitation 2[a] and 8[a].

2. Limitations 2[b] and 8[b] are obvious in view of Liu and the knowledge of a POSITA

2[b], 8[b]	wherein component (b) is present in an amount of from 5 to 500 ppm.
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141. As discussed above in limitation 1[e], dilution of multiple disclosed concentrates of Liu meets the more restrictive concentration elements for zinc oxide in claims 2 and 8. As to the formula that is substituted Example 19 of Liu, diluted by addition of 400x water, the concentration of zinc oxide in the antimicrobial composition would have been 125.

142. And, as to the disclosed and preferred range of zinc oxide in the concentrate, (0.2-20% w/w [2,000 ppm-200,000 ppm]) and (2-10% w/w [20,000 ppm – 100,000 ppm]), by addition of 400x water, the disclosed and preferred ranges would be 5 ppm – 500 ppm, and for the preferred range, 50 ppm to 250 ppm. These ranges of zinc oxide in the resulting antimicrobial concentrate are within the more restrictive concentration ranges for zinc oxide in Claims 2 and 8.

143. It is my opinion that Liu Application in view of the knowledge of a POSITA renders obvious limitations 2[b] and 8[b].

F. Claims 10, 13, and 15 are Obvious in view of Liu and the Knowledge of a POSITA

144. Claims 10, 13, and 15, dependent of independent claims 1, 3, and 6, respectively, limit the zinc compound to zinc oxide. As discussed in Section X.A.3, X.A.5, Liu disclosed zinc oxide. Thus, claims 10, 13, and 15 are also obvious.

X. GROUND 2: 4, 5, 9, 12, 17, 18, 20, 21, 24, 25, 26, 27, 28, 31, 32, 33, 36, 37, AND 38 ARE INVALID UNDER § 103 AS OBVIOUS IN VIEW OF LIU, HANDBOOK, AND THE KNOWLEDGE OF A POSITA

145. In this section, I provide my opinion that dependent claims of the '842 Patent are obvious. All of the claims challenged in Ground 2 are dependent claims. Each includes a further limitation that is obvious by combining zinc pyrithione disclosed in Handbook with the diluted antimicrobial composition concentrate of Liu.

146. Each includes a further restriction over the independent claims that is established by combining zinc pyrithione disclosed in Handbook with diluted antimicrobial composition concentrate of Liu.

A. Claims 4 and 9 Are Obvious

147. Dependent claims 4 and 9, each add identical limitations to their parent independent claims, claims 3 and 7 respectively. Specifically claims 4 and 9 add:

a co-biocide selected from the group consisting of pyrithione salts, pyrithione acids, and combinations thereof; and wherein said co-biocide is present in said composition in an amount of from about 0.001 to about 1.0% w/w based on the total weight of the composition.

148. It is my opinion that claims 4 and 9 are obvious in view of Liu Application, Handbook, and the knowledge of a POSITA.

149. Zinc pyrithione was a known co-biocide with BIT. Ex. 1104 at 276, 279. Zinc pyrithione is a pyrithione salt, specifically, the zinc salt of pyrithione (2-pyridinethiol-1-oxide). *Id.* at 290 (listing “zinc 2-pyridinethiol-1-oxide” as “zinc pyrithione”). The ’842 Patent admits that zinc pyrithione is a pyrithione salt. Ex. 1101 at 2:20-22 (“Useful pyrithione salts include . . . zinc pyrithione . . .”).

150. Handbook discloses a recommended concentration for zinc pyrithione in “architectural” applications. Ex. 1104 at 290. To a POSITA, “architectural” refers to an architectural coating, e.g., a paint, which is a type of “functional fluid” or a “coating composition” of claims 3 and 6. Ex. 1101 at 3:60-64. The

recommended concentration in the finished architectural product is “0.1-0.5% active for architectural,” measured in “% by wt.”). Ex. 1104 at 290.

151. Under the proper construction of “present in an amount of,” the concentrations of the ’842 Patent claims are measured in the antimicrobial composition, not in the finished product, e.g., an architectural paint. Although Handbook discloses a concentration of zinc pyrithione in a finished product, a POSITA would know how to calculate the amount of zinc pyrithione needed in an antimicrobial composition that is then added to make the “coating composition” or “functional fluid” of claims 3 and 6 to yield the target concentration in a functional fluid or coating composition. Indeed, Liu disclosed that the “concentrate is easily dilutable with water”. Ex. 1103 ¶0025. Thus, it was well within the skill of a POSITA to determine the amount of zinc pyrithione that should be added to antimicrobial composition that could yield a finished product with the recommended concentration in Handbook.

152. A POSITA would have had ample reason to combine zinc pyrithione of Handbook, a known dry-film preservative, Ex. 1104 at 279-280, with the diluted antimicrobial composition concentrate of Liu in order to provide additional dry-state preservative characteristics in addition to the wet-state preservation provided by BIT. Given that it was known that BIT and zinc pyrithione were used as co-biocides, and zinc pyrithione was used by a POSITA at a concentration that would

yield the recommended concentration of Handbook in a finished product, a POSITA would have had a reasonable expectation of success. A POSITA also would have had a reasonable expectation of success because blending biocides was common practice. *See also* Ex. 1104 at 265.

153. Thus, it was well within the skill of a POSITA to determine the amount of zinc pyrithione that should be added the antimicrobial composition to yield a finished product with the recommended concentration. A POSITA would be motivated to include zinc pyrithione within the claimed range, such as 1%, because such formulation will be diluted in the final “functional fluid” or “coating composition” in order to be within the dosage range of 0.1-0.5% described in Handbook. The technique of diluting such formulation was well-known and would achieve a predictable result. *Id.* Thus, claims 4 and 9 are unpatentable.

154. It is my opinion that Liu Application, Handbook, and the knowledge of a POSITA, renders obvious dependent claims 4 and 9.

B. Claims 12, 20, 27, and 32 are Obvious

155. Dependent claims 12, 20, 27, and 32 limit their parent claims 1, 10, 13, and 15, respectively, by adding the following limitation:

wherein the composition further comprises a co-biocide selected from the group consisting of pyrithione salts, pyrithione acids, and combinations thereof.

Ex. 1101 at 14:9-13; 14:32-34; 14:52-55; 15:1-4. Claims 12, 20, 27, and 32 are obvious for the same reasons as claims 4 and 9, which include the same limitation Zinc pyrithione is a pyrithione salt, specifically, the zinc salt of pyrithione (2-pyridinethiol-1-oxide). It is my opinion that Liu Application, Handbook, and the knowledge of a POSITA, renders obvious dependent claims 12, 20, 27, and 32.

C. Claim 17 Is Obvious

156. It is my opinion that claim 17 is obvious over Liu with Handbook and the knowledge of a POSITA.

157. Dependent claim 17 limits claim 1 by adding the following restriction.

the composition consisting of the at least one isothiazolin-3-one, the at least one zinc compound, optionally at least one polymer base medium, and optionally a co-biocide.

158. Assuming all of the recited components must be present, claim 17 has the same scope as claim 32, which requires a co-biocide over the composition of independent claim 6, which itself requires a base medium. Therefore, for the same reasons as provided for dependent claim 32, it is my opinion that claim 17 is obvious.

D. Claims 21 and 28 Are Obvious

159. Dependent claims 21 and 28 limit their respective parent claims, 20 and 27, by identifying that “the pyrithione salt is zinc pyrithione.” Ex. 1101 at 14:36-37; 14:56-57. Claim 18 adds to claim 7 that the composition “further comprises zinc pyrithione.” Ex. 1101 at 14:22-25.

160. As shown above for claims 20 and 27, the pyrrithione salt disclosed in Handbook is zinc pyrrithione. *See* Sec. X.B; Ex. 1104 at 279-80. Thus, in my opinion claims 21 and 28 are obvious for the same reasons as claims 20 and 27.

161. As to claim 8, the discussion above in Sec. X.A for claims 4 and 9 describes the disclosure of zinc pyrrithione in Handbook and the reasons why a POSTIA would have included zinc pyrrithione as a co-biocide with BIT of claim 7 and had a reasonable expectation of success. For the same reasons, it is my opinion that claim 8 is obvious.

E. Claims 5, 24, 31, and 36 Are Obvious Over Liu Application, Handbook, and the Knowledge of a POSITA

162. Dependent claims 5, 24, 31, and 36, each limit their parent independent claim (1, 3, and 6, respectively) by adding a limitation:

the composition further comprises a pyrrithione salt selected from the group consisting of copper pyrrithione, zinc pyrrithione, sodium pyrrithione, and combinations thereof

Claim 5 restricts that the “pyrrithione salts” of claim 4 consist of the same group.

163. As I discussed above, zinc pyrrithione, the zinc salt of pyrrithione (2-pyridinethiol-1-oxide), is a pyrrithione salt as admitted in the '842 Patent. Ex. 1101 at 2:20-22; Ex. 1104 at 290 (listing “zinc 2-pyridinethiol-1-oxide” as “zinc pyrrithione.”).

164. As described above, a POSITA would have had ample reason to combine zinc pyrrithione of Handbook with the antimicrobial composition

described for the parent claims 1, 3, and 6, and would have had a reasonable expectation of success in doing so because zinc pyrithione was a known co-biocide with BIT for architectural applications like paint, and Handbook provided a recommended concentration. *See* Sec.X.A-X.C; Ex. 1104 at 276, 279, 290.

165. It is my opinion that Liu Application with Handbook and the knowledge of a POSITA, renders obvious dependent claims 5, 24, 30, and 36.

F. Claims 25, 26, 33, and 37 Are Obvious over Liu Application, Handbook, and the Knowledge of a POSITA

166. Dependent claims 25, 26, 33, and 37 restrict their parent claims, which are 24, 4, 32, and 36, respectively, by identifying that “the pyrithione salt comprises zinc pyrithione.”

167. As shown above for the parent claims 24, 4, 32, and 36, the pyrithione salt disclosed in Handbook is zinc pyrithione. *See* Sec. X.A, X.E, X.B, X.E; Ex. 1104 at 279-80.

168. It is my opinion that claims 18, 25, 26, 33, and 37 are obvious over Liu Application, Handbook, and the knowledge of a POSITA.

G. Claim 38 Is Obvious

169. It is my opinion that claim 38 is obvious over Hawzett in view of Handbook and the knowledge of a POSITA.

170. Dependent claim 38 limits claim 7 in that the “composition further comprises a pyrithione salt selected from the group consisting of copper pyrithione, sodium pyrithione, and combinations thereof.” Ex. 1101 at 15:18-21.

171. Handbook discloses sodium pyrithione as a dry-film preservative. Ex. 1104 at 280. Handbook provides a recommended concentration for sodium pyrithione. *Id.* at 290.

172. A POSITA would have been motivated to combine sodium pyrithione of Handbook with the antimicrobial composition of claim 7 discussed in Sec. IX.D. Handbook taught “[i]f zinc oxide is also present in the coating formulation, then the sodium pyrithione will react with the zinc oxide to become an insoluble zinc complex that will provide dry-film protection against the growth of both fungi and algae.” Ex. 1104 at 280. A POSITA would have combined sodium pyrithione with the combination that Petitioner identified for claim 7, which included zinc oxide, to enhance the composition’s dry-film preservative characteristics. *See* Sec. IX.D, Xi.A. A POSITA would have had a reasonable expectation of success because blending such biocides was common practice. Ex. 1104 at 265.

XI. GROUND THREE: ALTERNATIVELY, IF THE CLAIMS ARE CONSTRUED TO COVER CONCENTRATIONS IN THE FUNCTIONAL FLUID AS OPPOSED TO THE ANTIMICROBIAL COMPOSITION, THEN ALL CHALLENGED CLAIMS ARE OBVIOUS IN LIGHT OF HANDBOOK AND THE KNOWLEDGE OF A POSITA

173. Here I provide an alternative opinion. In this alternative opinion, I assume that the claims are construed such that the concentrations recited therein are measured against the “functional fluid” or “coating composition,” and not the antimicrobial composition that is incorporated into a functional fluid or coating composition. It is my opinion that under this construction, claims 1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12, 13, 15, 17, 18, 20, 21, 24, 25, 26, 27, 28, 31, 32, 33, 36, 37, and 38 are invalid under § 103 as obvious over Handbook and the knowledge of a POSITA.

174. Handbook identified BIT as a wet-state preservative, and provided a recommended concentration of BIT—0.1-0.3% by weight of a 20% solution of BIT. Ex. 1104 at 290. This equates to 200 ppm-600 ppm of BIT, as shown in the calculations above, within the broader BIT concentration range of claims 1, 3, 6, and 7, and nearly matching the narrower range in claims 2 and 8. Handbook also disclosed zinc pyrithione as a dry-film preservative, and provided a finished product concentration (0.1-0.5% for architectural applications). *Id.* at 279-280. This is within the concentration of zinc pyrithione in claims 4 and 9. Handbook stated that when zinc pyrithione is used “prevention of ferric pyrithione formation in the coating is easily accomplished by the addition of 0.05% zinc oxide.” *Id.* at

280. This equates to 500 ppm, within claimed ranges. When BIT is incorporated in the recommended amount, with zinc pyrithione in the recommended amount with the recommended amount of zinc oxide, the result is the '842 Patent claims.

175. If the Challenged Claims are not anticipated by Handbook, then a POSITA had a motivation to combine BIT in the recommended concentration of Handbook (200-600 ppm BIT) with zinc pyrithione in the recommended concentration of Handbook (0.1%-0.5%), together with zinc oxide at the recommended level (500 ppm) to prevent undesired discoloration of the composition. Whereas, according to the Handbook, BIT is primarily a preservative in the wet-state, Ex. 1104 at 274-275 (section on isothiazoline-3-ones including BIT in subsection on "Wet-State Preservatives") the section on zinc pyrithione is in the dry-film preservative subsection. *Id.* at 279-280. A POSITA would have known that coatings and functional fluids must have both wet-state preservative and dry-state preservative characteristics. *Id.* at 264. Handbook stated that "bacteria are the principle degraders of paint in the wet state." *Id.* at 264. And, "[p]reservation of the dry paint film against microbial growth is also necessary for most exterior and some interior applications." *Id.* at 264.

176. Moreover, Handbook instructed that "[i]n Europe, blends of biocides are commonly used in coatings." Handbook at 265. Nonetheless, development of biocide blends was "the focus of product development by suppliers looking for

new opportunities.” *Id.* at 265-266. The blend of BIT and zinc pyrithione would have been routine task for a POSITA to achieve a predictable result of a formulation with blending biocides.

A. Handbook and the Knowledge of a POSITA Discloses or Renders Obvious Claim 1

177. Handbook expressly disclosed or rendered obvious all elements of claim 1. It would have been obvious to a POSITA to combine BIT at the concentration recommended in Handbook with zinc pyrithione at the concentration recommended in Handbook, adding the recommended amount of zinc oxide to prevent undesirable coloration.

1. Handbook discloses or renders obvious limitation 1[preamble]

1[preamble]	An antimicrobial composition comprising:
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178. Handbook disclosed an antimicrobial composition. Handbook stated that “fungi can thrive and multiply quickly to spoil the paint.” Ex. 1104 at 267. As a result “a wet state preservative must be used if the paint will not be used within a few days.” *Id.* Handbook recommended the use of BIT as a wet-state preservative. *Id.* at 275. Handbook discloses an antimicrobial composition.

179. It is my opinion that Handbook disclosed limitation 1[preamble].

2. Handbook disclosed or rendered obvious limitation 1[a]

1[a]	(a) at least one isothiazolin-3-one selected from the group consisting of 1,2-benzisothiazolin-3-one, N-(n-butyl)-1,2-benzisothiazolin-3-one, and combinations thereof;
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180. The Handbook discloses an isothiazoline-3-one, specifically 1,2-benzisothiazoline-3-one as a wet state preservative in an antimicrobial composition. *Id.* at 275. Thus, Handbook disclosed or rendered obvious limitation 1[b].

181. It is my opinion that limitation 1[a] is disclosed or rendered obvious by Handbook.

3. Handbook discloses or with the knowledge of a POSITA, renders obvious limitation 1[b]

1[b]	(b) at least one zinc compound comprising zinc chloride, zinc oxide, or a combination thereof;
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182. As described in detail above, Handbook disclosed that when zinc pyrithione is used as an antimicrobial, 0.05% zinc oxide should be added to the composition to prevent discoloration. Ex. 1104 at 280. Thus, Handbook disclosed or rendered obvious limitation 1[b].

183. It is my opinion that Handbook disclosed or rendered obvious limitation 1[b].

4. Handbook disclosed or rendered obvious limitation 1[c]

1[c]	wherein the isothiazolin-3-one is present in an amount of from 1 to 500 ppm,
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184. The Handbook disclosed a recommended concentration for 1,2-benzisothiazoline-3-one (BIT), when used in “architectural” applications. Ex. 1104

at 290. The recommended concentration is 0.1-0.3% by weight of a 20% solution of BIT. *Id.* at 287. As shown in the calculations above, this equals 200-600 ppm BIT. Thus, Handbook disclosed or rendered obvious limitation 1[c].

185. It is my opinion that Handbook disclosed or rendered obvious limitation 1[c].

5. Handbook discloses or renders obvious limitation 1[d]

1[d]	wherein the zinc compound is present in an amount of from 5 to 200,000 ppm, and
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186. Handbook instructed that if zinc pyrithione is used in a composition, Handbook recommended adding 0.05% zinc oxide to prevent discoloration. *Id.* As shown in the calculations above, this equals 500 ppm zinc oxide in composition.

187. It is my opinion that Handbook disclosed or rendered obvious limitation 1[d].

6. Handbook disclosed or rendered obvious limitation 1[e]

1[e]	wherein the weight ratio of the isothiazolin-3-one to the zinc compound is from 1:100 to 100:1.
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188. A POSITA could determine that the weight ratio of isothiazoline-3-one to the zinc compound can be calculated from the relative amounts of the isothiazoline-3-one and zinc compound present that included BIT at the recommended concentration and zinc oxide at the recommended concentration. As

shown in the calculations above, the weight ratio of the isothiazoline-3-one to zinc compound (in the Handbook, BIT to zinc oxide), ranges from 1:2.5 to 1:1.2. It is my opinion that Handbook discloses or with knowledge of a POSITA, renders obvious limitation 1[e].

7. It would have been obvious to combine the disclosures of BIT and zinc oxide of Handbook

189. It is my opinion that a POSITA would have been motivated to combine BIT in the recommended concentration of Handbook (200-600 ppm BIT) with zinc pyrithione in the recommended concentration of Handbook (0.1%-0.5%), together with zinc oxide at the recommended level (500 ppm) to prevent undesired discoloration of the composition. As described above, a POSITA would have been motivated to utilize zinc pyrithione to obtain increased dry-film preservation, with BIT present in composition as a wet-state preservative. Whereas, according to the Handbook, BIT is primarily a preservative in the wet-state, Ex. 1104 at 274-275, zinc pyrithione is described as a dry-film preservative. *Id.* at 279-280.

Discoloration when zinc pyrithione is added is “easily accomplished by the addition of zinc oxide.” *Id.* at 280.

190. A POSITA would have known that coatings and functional fluids must have both wet-state preservative and dry-state preservative characteristics. Ex. 1104 at 264. Handbook stated that “bacteria are the principle degraders of paint in the wet state.” *Id.* And, “[p]reservation of the dry paint film against microbial

growth is also necessary for most exterior and some interior applications.” *Id.* This provides ample reason to combine BIT with zinc pyrithione. And, if zinc pyrithione is added, a POSITA would have been motivated to prevent undesired discoloration of the composition by adding the recommended amount of zinc oxide. *Id.* at 280.

191. A POSITA would have a reasonable expectation of success in this combination as blending biocides, like BIT and zinc pyrithione (including zinc oxide), was common. Ex. 1104 at 265. This combination is nothing more than using known components in a predictable manner to achieve a predictable result.

B. Handbook discloses or Renders Obvious Claim 3

192. Claim 3 covers the inclusion of the “antimicrobial composition” of claim 1 with a polymer emulsion into a “functional fluid.” It is my opinion that claim 3 is obvious over Handbook and the knowledge of a POSITA.

**1. Handbook discloses or renders obvious limitation
3[preamble]**

3[preamble]	A functional fluid composition comprising:
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193. Handbook disclosed a variety of functional fluids. According to the ’842 Patent, “typical functional fluids include coating compositions, such as paints” Ex. 1101 at 3:60-64. Handbook reported that “[b]acteria are principle degraders of paint in the wet state” and that “[p]reservation of dry paint film

against microbial growth is also necessary for most exterior and some interior applications.” Ex. 1104 at 264. Thus, Handbook disclosed a functional fluid, specifically, a “paint.”

194. It is my opinion that Handbook disclosed a functional fluid of limitation 3[preamble].

2. Handbook discloses or renders obvious limitation 3[a]

3[a]	a polymer emulsion; and
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195. In its “Initial Claim Chart” showing infringement contentions in concurrent district court litigation, Patent Owner reads the “polymer emulsion” on an “acrylic latex” component of paint. *E.g.*, Ex. 1120 at 9, 16, 23, 30, 44. The ’842 Patent admits that acrylic latex paint components were known. For instance, Example 1 of the patent included a “commercial water based acrylic latex, REVACRYL 1A,” that was “supplied” by a third party. *Id.* at 4:6-8. Further, the use of acrylic latex polymer emulsions was ubiquitous. In Organic Coatings; Science and Technology, the authors provided a “formulation recommended by a latex manufacturer for a ‘high quality’ exterior white house paint.” Ex. 1117 at 315. The formulation included “Rhoplex AC-64,” *id.* at 316, an “all-acrylic latex . . .,” *id.* at 319. The Rhoplex AC-64 is “a copolymer of methyl methacrylate (MMA) with ethyl or butyl acrylate. . . .” *Id.* at 319; *compare to* Ex. 1101 at 3:54-60 (“The base medium can be, for example, a polymer useful in polymer emulsions

wherein the polymer is selected from the group consisting of acrylic and substituted (meth)acrylates . . . and copolymers of the aforementioned.”). Through admission in the ’842 Patent or knowledge in the state of the art, it is my opinion that a polymer emulsion of limitation 3[a] was known.

3. Handbook discloses or renders obvious limitations 3[b], 3[c], 3[d], 3[e], and 3[f]

196. Element [3b] introduces that inclusion of a “wet state preservative comprising an antimicrobial composition” having the same elements as the antimicrobial composition of claim 1. The remaining elements of claim 3 are identical to claim 1.

3[b], covers identical “antimicrobial composition” of element 1[a]	a wet state preservative comprising an antimicrobial composition comprising at least one isothiazolin-3-one selected from the group consisting of 1,2-benzisothiazolin-3-one, N-(n-butyl)-1,2-benzisothiazolin-3-one, and combinations thereof, and
3[c], identical to 1[b]	at least one zinc compound comprising zinc chloride, zinc oxide, or a combination thereof,
3[d], identical to 1[c]	wherein the isothiazolin-3-one is present in an amount of from 1 to 500 ppm,
3[e], identical to 1[d]	wherein the zinc compound is present in an amount of from 5 to 200,000 ppm, and
3[f], identical to 1[e]	wherein the weight ratio of the isothiazolin-3-one to the zinc compound is from 1:100 to 100:1.

197. Handbook described benzisothiazoline (1,2 benzisothiazoline-3-one), also known as BIT, as a wet-state preservative. Ex. 1104 at 275. By including an isothiazoline-3-one in an antimicrobial composition, the composition is a wet state

preservative. Thus, the antimicrobial composition of claim 3 is a wet state preservative

198. For the same reasons as discussed above in association with claim limitations 1[a], 1[b], 1[c], 1[d], and 1[e], Handbook discloses or renders obvious the corresponding limitations in claim.

C. Handbook Discloses or Renders Obvious '842 Patent Claim 6

199. Claim 6 incorporates the “antimicrobial composition” of claim 1 with a “base medium” to yield a “coating composition.” The “antimicrobial composition” in claim 6 is identical to the “antimicrobial composition” of claim 3. Thus, the same disclosures and proof that taught the “wet state preservative comprising an antimicrobial composition” of claim 3 also taught the “antimicrobial composition” elements 6[b], 6[c], 6[d], 6[e], and 6[f] of claim 6. It is my opinion that claim 6 is obvious over Handbook and the knowledge of a POSITA.

**1. Handbook discloses or renders obvious limitation
6[preamble]**

6[preamble]	A coating composition comprising:
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200. According to the '842 Patent, “typical functional fluids include *coating compositions, such as paints . . .*” (Ex. 1101 at 3:60-64 (emphasis added).) Handbook reported that “[b]acteria are principle degraders of paint in the

wet state” and that “[p]reservation of dry paint film against microbial growth is also necessary for most exterior and some interior applications.” Ex. 1104 at 264.

201. It is my opinion that Handbook discloses limitation 6[preamble].

2. Handbook disclosed or rendered obvious limitation 6[a]

6[a]	a base medium selected from the group consisting of paints, adhesives, sealants, caulks, mineral and pigment slurries, printing inks, agricultural pesticide formulations, household coating products, personal care products, metal working fluids, and combinations thereof; and
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202. Handbook disclosed paint, an alternative in the Markush group. Specifically, “[b]acteria are principle degraders of paint in the wet state” and that “[p]reservation of dry paint film against microbial growth is also necessary for most exterior and some interior applications.” Ex. 1104 at 264. Thus, Handbook disclosed a base medium, specifically, a “paint.” It is my opinion that Handbook disclosed limitation 6[a].

3. Handbook disclosed or rendered obvious elements [6b], 6[c], 6[d], 6[e], and 6[f], which are identical to “antimicrobial composition” elements in claim 1

203. The remaining elements of claim 6 are identical to claim 3. Element [6b] introduces that inclusion of a “wet state preservative comprising an antimicrobial composition” having the same elements as the antimicrobial composition of claim 3.

6[b], covers identical	a wet state preservative comprising an antimicrobial composition comprising at least one isothiazolin-3-one
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antimicrobial composition of 3[b]	selected from the group consisting of 1,2-benzisothiazolin-3-one, N-(n-butyl)-1,2-benzisothiazolin-3-one, and combinations thereof, and
6[c], identical to 3[c]	at least one zinc compound comprising zinc chloride, zinc oxide, or a combination thereof,
6[d], identical to 3[c]	wherein the isothiazolin-3-one is present in an amount of from 1 to 500 ppm,
6[e], identical to 3[e]	wherein the zinc compound is present in an amount of from 5 to 200,000 ppm, and
6[f], identical to 3[f]	wherein the weight ratio of the isothiazolin-3-one to the zinc compound is from 1:100 to 100:1.

204. For the same reasons as discussed above in association with claim limitations 3[b], 3[c], 3[d], 3[e], and 3[f], it is my opinion that Handbook discloses the identical limitations in claim 6.

D. Handbook Discloses or Renders Obvious Claim 7

205. Claim 7 is identical to claim 1, except that the “isothiazoline-3-one” of claim 1 is limited to BIT, and the “zinc compound” of claim 1 is limited to zinc oxide. Ex. 1101 at 12:57-13:2 *compared with* 13:53-61. Handbook disclosed BIT as the isothiazoline-3-one and zinc oxide as the zinc compound of claim 1. As a result, claim 7 is obvious for the same reasons as claim 1. It is my opinion that claim 7 is obvious over Handbook with the knowledge of a POSITA.

E. Claims 2 and 8 Are Obvious over Handbook and the Knowledge of a POSITA

206. Claims 2 and 8 add limitations to their parent independent claims, claim 1 and 7, respectively, that further restrict the concentrations of the

isothiazoline-3-one (in claim 7, BIT) and zinc compound (in claim 7, zinc oxide).

Above I provided an opinion that Handbook with the knowledge of a POSITA discloses or renders obvious independent parent claims 1 and 7.

207. As shown above in Sec. XI.A, the concentration of BIT in the antimicrobial composition disclosed by Handbook is 200-600 ppm BIT and the concentration of zinc oxide in the antimicrobial composition disclosed by Handbook is 500 ppm. Ex. 1104 at 287, 290.

208. It is my opinion that claims 2 and 8 are obvious over Handbook and the knowledge of a POSITA.

F. Claims 10, 13, and 15 Are Obvious Over Handbook and the Knowledge of a POSITA

209. Claims 10, 13, and 15, dependent of independent claims 1, 3, and 6, respectively, limits the zinc compound to zinc oxide. In Petitioner's showing of the obviousness of claims 1, 3, and 6 in Sec. XI.A-XI.C, the zinc compound was zinc oxide. Thus, for the same reasons as my opinions of invalidity of claims 1, 3, and 6, claims 10, 13, and 15 are also obvious.

G. Claims 4 and 9 are Obvious

210. Dependent claims 4 and 9, each add identical restrictions to their parent independent claims, which are claims 3 and 7, respectively.

211. Claims 4 and 9 add:

a co-biocide selected from the group consisting of pyrithione salts, pyrithione acids, and combinations thereof; and wherein said co-biocide is present in said composition in an amount of from about 0.001 to about 1.0% w/w based on the total weight of the composition.

Ex. 1101 at 13:22-27; 13:66-14:4.

212. Zinc pyrithione was a known co-biocide with BIT. Ex. 1104 at 276, 279. Zinc pyrithione is a pyrithione salt, specifically, the zinc salt of pyrithione (2-pyridinethiol-1-oxide). *Id.* at 290 (listing “zinc 2-pyridinethiol-1-oxide” as “zinc pyrithione”). The ’842 Patent admits that zinc pyrithione is a pyrithione salt. Ex. 1101 at 2:20-22 (“Useful pyrithione salts include . . . zinc pyrithione . . .”).

213. Handbook discloses a recommended concentration for zinc pyrithione in “architectural” applications. Ex. 1104 at 290. To a POSITA, “architectural” refers to an architectural coating, e.g., a paint, which is a type of “functional fluid” or a “coating composition” of claims 3 and 6. Ex. 1101 at 3:60-64. The recommended concentration in the finished architectural product is “0.1-0.5% active for architectural,” measured in “% by wt,” which is within the claimed range. Ex. 1104 at 290. Thus, it is my opinion that Handbook and the knowledge of a POSITA renders obvious dependent claims 4 and 9.

H. Claims 12, 20, 27, and 32 Are Obvious

214. Dependent claims 12, 20, 27, and 32 limit their parent claims 1, 10, 13, and 15, respectively, by adding the following limitation:

wherein the composition further comprises a co-biocide selected from the group consisting of pyrithione salts, pyrithione acids, and combinations thereof.

Ex. 1101 at 14:9-13; 14:32-34; 14:52-55; 15:1-4.

215. Claims 12, 20, 27, and 32 are obvious for the same reasons as claims 4 and 9, which include the same Markush group limitation. It is my opinion that Handbook and the knowledge of a POSITA renders obvious dependent claims 12, 20, 27, and 32.

I. Claim 17 is Obvious

216. It is my opinion that claim 17 is obvious over Handbook and the knowledge of a POSITA.

217. Dependent claim 17 limits claim 1 by adding the following limitation:

the composition consisting of the at least one isothiazolin-3-one, the at least one zinc compound, optionally at least one polymer base medium, and optionally a co-biocide.

Ex. 1101 at 14:22-25.

218. Assuming all of the recited components must be present, claim 17 has the same scope as claim 32, which requires a co-biocide over the composition of independent claim 6, which itself requires a base medium. Therefore, for the same reasons as provided for dependent claim 32, claim 17 is obvious. Therefore, for the same reasons as I provided for my opinion that dependent claim 32 is obvious, it is my opinion that claim 17 is obvious.

J. Claims 18, 21, and 28 Are Obvious

219. Dependent claims 18, 21, and 28 limit their respective parent claims, 20 and 27, by identifying that “the pyrithione salt is zinc pyrithione.” Ex. 1101 at 14:36-37; 14:56-57. Claim 18 adds to claim 7 that the composition “further comprises zinc pyrithione.” Ex. 1101 at 14:22-25.

220. As shown above for claims 20 and 27 in Sec. XI.H, the pyrithione salt on disclosed in Handbook is zinc pyrithione. Ex. 1104 at 279-80. Thus, in my opinion claims 21 and 28 are obvious for the same reasons as claims 20 and 27.

221. As to claim 18, the discussion above in Sec. XI.G for claims 4 and 9 describes the disclosure of zinc pyrithione in Handbook and the reasons why a POSTIA would have included zinc pyrithione as a co-biocide with BIT of claim 7 and had a reasonable expectation of success. For the same reasons, it is my opinion that claim 8 is obvious.

K. Claims 5, 24, 31, and 36 Are Obvious

222. Dependent claims 5, 24, 31, and 36, each limit their parent independent claim (1, 3, and 6, respectively) by adding a limitation:

the composition further comprises a pyrithione salt selected from the group consisting of copper pyrithione, zinc pyrithione, sodium pyrithione, and combinations thereof.

Ex. 1101 at 14:44-47; 14:64-68; 15:12-15. Claim 5 restricts that the “pyrithione salts” of claim 4 consist of the same group.

223. As discussed above in claim 4, zinc pyrithione is a pyrithione salt as admitted in the '842 Patent. Ex. 1101 2:20-22; *see also* Ex. 1104 at 290 (listing “zinc 2-pyridinethiol-1-oxide” as “zinc pyrithione”). The Handbook disclosed zinc pyrithione. Ex. 1104 at 279-80. As such, in my opinion claims 5, 24, 30, and 36 are unpatentable.

L. Claims 25, 26, 33, and 37 Are Obvious

224. Dependent claims 25, 26, 33, and 37 restrict their parent claims, which are 24, 4, 32, and 36, respectively, by identifying that “the pyrithione salt comprises zinc pyrithione.”

225. As shown above in Sec. XI.K for the parent claims 24, 4, 32, and 36, the pyrithione salt disclosed in Handbook is zinc pyrithione. Thus, it is my opinion that claims 25, 26, 33, and 37 are obvious for the same reasons.

M. Claim 38 Is Obvious

226. Dependent claim 38 limits claim 7 in that the “composition further comprises a pyrithione salt selected from the group consisting of copper pyrithione, sodium pyrithione, and combinations thereof.” Ex. 1101 at 15:18-21

227. Handbook discloses sodium pyrithione as a dry-film preservative. Ex. 1104 at 280.

228. A POSITA would have been motivated to combine sodium pyrithione of Handbook with the antimicrobial composition of claim 7 discussed in Sec. XI.D.

Handbook taught “[i]f zinc oxide is also present in the coating formulation, then the sodium pyrithione will react with the zinc oxide to become an insoluble zinc complex that will provide dry-film protection against the growth of both fungi and algae.” Ex. 1104 at 280. A POSITA would have combined sodium pyrithione with the combination Petitioner identified for claim 7, which included zinc oxide, to enhance the composition’s dry-film preservative characteristics. *See* Sec.XI.D. A POSITA would have had a reasonable expectation of success because blending such biocide was common practice. Ex. 1104 at 265.

229. Thus, it is my opinion that claim 38 is obvious.

XII. PURPORTED SECONDARY CONSIDERATIONS OF NON-OBVIOUSNESS

230. I understand that secondary considerations of unexpected results can impact the obviousness of patent claims. I also understand that any evidence of secondary considerations of non-obviousness must be commensurate with the scope of the claims.

231. In order to obtain the narrow claims that issued in the ’842 Patent, I understand that the applicant submitted a declaration from Mr. Scott Brown and Ms. Helen Hyde, neither is a claimed an inventor of ’842 Patent. Ex. 1102 at 670-676. Mr. Brown described testing paint formulations that included BIT and zinc oxide. *Id.* Ms. Hyde described testing formulations that included BIT and zinc chloride. *Id.*

232. Mr. Brown claimed to test a variety of paint formulations as shown below:

The results of the challenge testing are shown in the table below:

Ratio of BIT/ZnO	Conc. Of BIT/ZnO (ppm)	1 st Challenge	2 nd Challenge	3 rd Challenge	4 th Challenge	5 th Challenge
		72 hour	72 hour	72 hour	72 hour	72 hour
Blank	0	5	5	5	5	5
BIT only	60	0	1	0	0	5
1 : 0.17	60 : 1	0	0	0	0	2
1 : 0.5	60 : 30	0	0	0	0	0
1 : 1.0	60 : 60	0	0	0	0	1(1)*
1 : 1.5	60 : 90	0	0	0	0	0
1 : 2.0	60 : 120	0	0	0	0	0
1 : 2.6	60 : 160	0	0	0	0	0
1 : 5.0	60 : 300	0	0	0	0	0
1 : 10.0	60 : 600	0	0	0	0	0
1 : 50.0	60 : 3000	0	0	0	0	0
1 : 100.0	60 : 6000	0	0	0	0	0
ZnO only	1	5	5	5	5	5
ZnO only	30	5	5	5	5	5
ZnO only	60	5	5	5	5	5
ZnO only	90	5	5	5	5	5
ZnO only	120	5	5	5	5	5
ZnO only	160	5	5	5	5	5
ZnO only	300	5	5	5	5	5
ZnO only	600	5	5	5	5	5
ZnO only	3000	5	5	5	5	5
ZnO only	6000	5	5	5	5	5

*Only a single colony was observed on the plate, likely an artifact from airborne contamination.

Ex. 1102 at 672.

233. As shown the in the table for the formulations that included both BIT and zinc oxide, Mr. Brown only varied the amounts of zinc oxide. From the experiments described in the table, the applicant asserted that the formulation with BIT and zinc oxide exhibited “unexpected results” that may be “indicative of synergism between BIT and ZnO.” Ex. 1102 at 668. However, these results do not

commensurate with the claim scope of the Challenged Claims and do not reflect any unknown synergism between BIT and zinc oxide.

234. Ms. Hyde claimed to test a variety of formulations provided below:

Compound	Weight Ratio of BIT:ZnCl ₂	Compared with BIT	MIC (ppm) of BIT/ZnCl ₂ After 48 Hours Contact	Average FIC Values		
				BIT	ZnCl ₂	Total
BIT	-	-	50	1	0	1
ZnCl ₂	-	-	468.8	0	1	1
BIT:ZnCl ₂ mixtures	100:1	Reduced concentration of ZnCl ₂	46.25/0.46	0.925	0.001	0.93
	75:1		47.22/0.64	0.944	0.001	0.95
	50:1		47.22/0.94	0.944	0.02	0.96
	25:1		48.61/1.94	0.972	0.004	0.98
	10:1		43.05/4.3	0.861	0.009	0.87
	1:1	Increased concentration of ZnCl ₂	25/25	0.5	0.053	0.55
	1:10		13.54/135.4	0.270	0.288	0.56
	1:25		9.72/243.1	0.194	0.518	0.71
	1:50		5.04/252.1	0.101	0.537	0.64
	1:75		4.0/300	0.080	0.64	0.72
	1:100		3.34/334.3	0.067	0.71	0.78

Ex. 1102 at 675.

235. Ms. Hyde did not state whether the formulations included a polymer emulsion or base medium. The formulations only tested BIT and zinc chloride in combination. The concentration of BIT in the formulations only range from 3.34-48.61 ppm, and zinc chloride was in the range of 0.46-334ppm. From the experiments described in the table, the applicant asserted that the formulation with BIT and zinc chloride exhibited “unexpected results” that may be “indicative of synergism between BIT and ZnCl.” Ex. 1102 at 676. However, these results do not commensurate with the claim scope of the Challenged Claims and do not reflect any unknown synergism between BIT and zinc chloride.

236. First, claim 3 requires a functional fluid composition that includes a “polymer emulsion,” and claim 6 requires a coating composition that includes a “base medium.” Ex. 1101 at 13:6-21; 13:32-53. The Hyde Declaration does not describe that anything other than the formulations with BIT and zinc chloride were tested. Ex. 1102 at 675. Thus, the tested formulations in the Hyde Declaration do not commensurate with the scope of the claims 3 and 6. Likewise, claims 1 and 7 are directed at an “antimicrobial composition.” Ex. 1101 at 12:57-13:2; 13:54-61. The Brown Declaration states that the compositions being tested with “standard interior acrylic paint formulations,” i.e. something more than just an antimicrobial composition. Ex. 1102 at 671. Thus, the formulations being tested in the Brown Declaration do not commensurate with the scope of claims 1 and 7.

237. Second, the Challenged Claims require BIT be present “in an amount from 1 to 500ppm.” Ex. 1101 at 12:64-65; 13:16-17; 13:47-48; 13:56-57. However, the tested samples in the Brown declaration only had “60 ppm BIT concentration.” Ex. 1102 at 672. Likewise, the tested samples in the Hyde Declaration included BIT in a range of 3.34-48.61 ppm. Ex. 1102 at 675. None of the tested samples in either declaration included BIT within the entire claimed range of 1-500pm, with the greatest amount only being 60 ppm. As such, the results in the declarations do not commensurate with the claimed range.

238. Third, the Challenged Claims require the zinc compound to be present in an amount of “5 to 200,000 ppm.” Ex. 1101 at 12:66-67; 13:18-19; 13:49-50; 13:59-60. The tested samples in the Brown Declaration only included zinc oxide from 1-6,000 ppm. Ex. 1102 at 672. Likewise, the tested samples in the Hyde Declaration only included zinc chloride from 0.46-334.3 ppm. *Id.* at 675. As such, the zinc compound amounts in the tested samples do not cover the entire claimed range.

239. Fourth, claims 4-5, 9, 12, 18, 20-38 includes a pyrrithione co-biocide. Ex. 1101 at 14: 3-5; 14:32-34. The samples tested in the Brown Declaration and Hyde Declaration did not include any pyrrithione co-biocide. Ex. 1102 at 670-676. Thus, the results do not commensurate with the scope of these claims.

240. For any one reason provided above or any combination of them, the results shown in the Brown and Hyde Declarations in my opinion are not objective secondary considerations of non-obviousness for the Challenged Claims because they do not commensurate with the scope of the Challenged Claims.

241. Lastly, the Brown Declaration’s assertion that the alleged “unexpected results” may be “indicative of synergism between BIT and ZnO” was not an unknown attribute or synergism between these compounds in these materials. It was known for over a decade before the filing of the ’842 Patent that BIT and zinc oxide were synergists “for mildew resistance in aqueous paint formulations.” Ex.

1109 at 1:19-21. Indeed, in a 1978 textbook disclosed that using BIT and zinc oxide in paints had a synergistic effect by providing an “effective” inhibition on microbial growth. Ex. 1112 at pg. 79. The results in the Brown Declaration are nothing more than the expected results that had been known for decades prior to the filing of the ’842 Patent.

242. Likewise, the Hyde Declaration asserts that there may be a “synergism between BIT and ZnCl.” However, such synergy was well known as U.S. Patent No. 4,150,026, issued in 1979, discloses that compounds with BIT and zinc chloride can be used as bactericide in “water-based paints.” Ex. 1116 at 15:62-67; 1:5-45; 2:36-68. As such, the results in the Hyde Declaration are nothing more than the expected results that had been known for decades prior to the filing of the ’842 Patent.

243. As such, it is my opinion that the declarations do not provide any “unexpected results” that rise to objective secondary considerations of non-obviousness.

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

Dated: August 15, 2019



Raymond H. Fernando, Ph.D.