

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

UATP IP, LLC,
Petitioner,
v.
SLICK SLIDE LLC,
Patent Owner.

Case PGR2024-00054
Patent 11,998,854

SECOND DECLARATION OF DR. YOUJIANG WANG

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



Dated: 25 November 2025

By: _____

Dr. Youjiang Wang

TABLE OF CONTENTS

I.	INTRODUCTION AND SCOPE OF WORK	1
II.	EXPERIENCE AND MATERIALS CONSIDERED.....	2
III.	TECHNICAL DISCUSSION.....	16
IV.	CLAIM CONSTRUCTION	17
A.	The “mesh layer” encompasses woven, permeable material (Element [1b-iii])	18
B.	The claimed “coefficient of friction” does not require a specific testing method (Element [1c]).....	27
V.	Grounds 1A-2B: Anticipation and Obviousness based on Phillips	29
VI.	Ground 1B: Obviousness based on Phillips in view of WN0400 (Claims 1-4, 6-7, 14-17, and 22-28.....	31
A.	A POSITA Would Have Been Motivated to combine Philips and WN0400	31
1.	WN0400’s Nylon Mesh Is A Low Friction Material that a POSITA Would Have Been Prompted To Implement on Phillips’ Ride Vehicle	32
2.	Phillips Does Not Teach Away From Mesh	37
3.	Nylon Mesh Was Known To Be Durable	43
4.	Attaching The Mesh Layer To The Ride Vehicle Was Routine For a POSITA	45
B.	The Philips-WN0400 Combination provides Element [1c]	48
VII.	Ground 1A: Phillips Anticipates And Renders Obvious (Claims 1-4 and 6-7)	53
A.	Phillips anticipates the claimed “mesh layer” (Element [1b-iii])	53

B.	A POSITA would have been motivated to implement Phillips with a mesh layer to achieve the claimed coefficient of friction range (Elements [1b-iii] and [1c]).....	56
1.	Phillips’ Express Disclosure Of Low Friction Materials Provides The Claimed Range.....	57
2.	I am Qualified To Opine On Coefficient of Friction	58
VIII.	Ground 2A: Phillips in view of Fallgatter Renders Obvious (Claims 1-7)...	61
A.	The Phillips-Fallgatter Combination provides Element [1b-iii]	62
B.	The Philips-Fallgatter Combination provides Element [1c].....	63
IX.	Ground 2B: Phillips, in view of Fallgatter, and further in view of WN0400 renders obvious (Claims 1-7, 14-17, 22-28)	66
X.	Ground 3A: Enablement (Claims 8-13).....	66
XI.	Ground 3B: Indefiniteness (Claims 5 and 26)	78
XII.	An oil applied to the slide surface would impact the interaction between the ride vehicle bottom and the slide surface	79

I, Dr. Youjiang Wang, declare as follows:

I. INTRODUCTION AND SCOPE OF WORK

1. On October 9, 2024, I submitted a First Declaration in PGR2024-00054. *See* UATP-1003. I submit this Second Declaration for purposes of responding to Patent Owner's Response to Petition (POR) submitted on September 15, 2025, the declaration testimony of Dr. Rust (UATP-2027, UATP-2031), the declaration testimony of Dr. Spiegelberg (UATP-2026, UATP-2030), and the declaration testimony of Mr. Schmit (UATP-2033). In this Second Declaration, I provide additional analysis regarding the claims of U.S. Patent No. 11,998,854 (the '854 Patent) and the relied-upon prior art references.

2. My analysis is based upon my education, training, and experience in the relevant field, including my professional experience and additional experience working with persons of ordinary skill in the art as of the earliest alleged priority date of the '854 Patent. I am familiar with the technology described in the '854 Patent, and I am also familiar with the knowledge of a person of ordinary skill in the art (POSITA) with respect to this technology as of the earliest alleged priority date of the '854 Patent (Nov. 1, 2022). I provide additional description of my background relevant to coefficient of friction testing and fiber science below and note that Patent Owner's characterizations of my experience (e.g., at POR, p. 4, 15-16, 26-30, 37) are incomplete and incorrect.

3. I am being compensated for my work in connection with this IPR proceeding at my standard hourly rate. My compensation is not in any way contingent on the substance of my opinions or the outcome of these proceedings.

II. EXPERIENCE AND MATERIALS CONSIDERED

4. My analysis set forth in this Second Declaration is based on my education, training, and experience as summarized in my First Declaration and detailed in my CV (*see* UATP-1003), as well as my review of the '854 Patent, its prosecution history, and the prior art references relied-upon in this PGR proceeding. I have also reviewed the Patent Owner's Preliminary Response to the Petition (POPR), the Patent Owner's Response to Petition (POR), each of the accompanying exhibits submitted with the POPR and POR, the Board's Decision Instituting IPR ("Institution Decision"), and the deposition transcripts of Dr. Rust (UATP-1045), Dr. Spiegelberg (UATP-1046), and Mr. Schmit (UATP-1047).

5. I have authored numerous academic articles that deal with coefficient of friction, textiles, fibers, or a combination of these. These publications include the following.

- Wang, Y., Li, V.C., and Backer, S., "Modeling of Fiber Pull-out from a Cement Matrix", *International Journal of Cement Composites and Lightweight Concrete*, Vol. 10, No. 3, 1988, 143-149.

- Wang, Y., Backer, S., and Li, V.C., “A Special Technique for Determination of the Critical Length of Fiber Pull-Out from a Cement Matrix”, *Journal of Materials Science Letters*, Vol. 7, 1988, 842-844.
- Wang, Y., Backer, S., and Li, V.C., “A Statistical Tensile Model of Fiber Reinforced Cementitious Composites”, *Composites*, Vol. 20, No. 3, 1989, 265-274.
- Li, V.C., Wang, Y., and Backer, S., “Effect of Inclining Angle, Bundling, and Surface Treatment on Synthetic Fiber Pull-Out from a Cement Matrix”, *Composites*, Vol. 21, No. 2, 1990, 132-140.
- Li, V.C., Wang, Y., and Backer, S., “A Statistical-Micromechanical Model of Tension-Softening Behavior of Short Fiber Reinforced Brittle Matrix Composites”, *Journal of Mechanics and Physics of Solids*, Vol. 39, No. 5, 1991, 607-625.
- Ramasamy, A., Wang, Y., and Muzzy, J., “Braided Thermoplastic Composites from Powder Coated Towpregs: Characterization of Towpregs”, *Polymer Composites*, Vol. 17, No. 3, 1996, 497-504.
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- Qiu, Y., Wang, Y., Laton, M., and Mi, J. Z., “Analysis of Energy Dissipation in Twisted Fiber Bundles under Cyclic Tensile Loading”, *Textile Research Journal*, Vol. 72, No. 7, 2002, 585-593.
- X. Shao, Y. Qiu, Y. Wang, “Theoretical Modeling of the Tensile Behaviour of Low-twist Staple Yarns: Part I- Theoretical Model”, *Journal of the Textile Institute*, Vol. 96, No. 2, 2005, 61-68.
- X. Shao, Y. Qiu, Y. Wang, “Theoretical Modeling of the Tensile Behaviour of Low-twist Staple Yarns: Part II- Theoretical and Experimental Results”, *Journal of the Textile Institute*, Vol. 96, No. 2, 2005, 69-76.

6. In addition to the Editorial Board memberships that I listed in my first declaration (UATP-1003, Appendix A), I also served as a member of *Textile Science and Research Journal*.

7. In addition to the Professional Societies & Activities that I listed in my first declaration (UATP-1003, Appendix A), I have served as a member of the American Society for Testing and Materials (ASTM) for eight years, between 1994 and 2002. While a member of ASTM, I served on the following committees:

- ASTM Technical Committee C09 on Concrete and Concrete Aggregates, 1994-2002;
- ASTM Technical Committee D30 on High Modulus Fibers & Their Composites, 1994-2002; and
- ASTM Technical Committee D13 on Textiles, 1995-2002.

8. In addition to the Selected Publications & Presentations that I provided in my first declaration, I am an author of the following Publications & Presentations.

- Wang, Y., Backer, S. and Li, V.C., “An Experimental Study of Synthetic Fiber Reinforced Cementitious Composites”, *Journal of Materials Science*, Vol. 22, 1987, 4281-4291.
- Wang, Y., Li, V.C., and Backer, S., "Modeling of Fiber Pull-out from a Cement Matrix", *International Journal of Cement Composites and Lightweight Concrete*, Vol. 10, No. 3, 1988, 143-149.
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- Wang, Y., Gawayed, Y., Kong, X., Li, J. and Zhao, D., "Properties and Analysis of Composites Reinforced with E-Glass Weft Knitted Fabrics", *Journal of Composites Technology & Research*, Vol.17, No. 4, 1995, 283-288.
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- Honglin Liu, Zifeng Wang, Xuzheng Tian, Karl I. Jacob, Youjiang Wang, “Molecular Investigation of Thermal Conduction and Local Phonon Transport in Graphene Aerogels”, *International Journal of Heat and Mass Transfer*, <https://doi.org/10.1016/j.ijheatmasstransfer.2025.127713> (2025)

III. TECHNICAL DISCUSSION

9. The analysis provided in my first declaration fully addresses why each and every feature of the Challenged Claims of the '854 Patent is provided in the prior

art. I understand that Patent Owner, Dr. Rust, and Dr. Spiegelberg have offered their own proposals.

10. I have noted that the Patent Owner's Response does not address, much less rebut, much of the analysis I provided in my First Declaration. Indeed, rather than squarely confronting the substantial evidence of unpatentability offered in my First Declaration, Patent Owner, Dr. Rust, and Dr. Spiegelberg sometimes mischaracterize my testimony, the disclosure of the '461 Patent, and the cited prior art, as I discuss in more detail below. As I previously explained with reference to the applied prior art, each of Grounds 1A-3B renders obvious the Challenged Claims. I do not repeat all of that analysis here. Rather, this declaration is intended to respond to particular arguments presented in the Patent Owner's Response.

IV. CLAIM CONSTRUCTION

11. Based on my analysis of the '854 patent and the references set forth in my original analysis and the Petition, no constructions that substitute language for the original claim terms are necessary to resolve invalidity given the overlap between the preferred embodiment of the '854 patent and the prior art set forth in the Petition. I nevertheless address Patent Owner's proposed constructions here, including reasons why Patent Owner's proposals contradict the '854 patent itself. Additionally, Patent Owner's analysis of the "mesh layer" limitations creates ambiguity into otherwise ordinary claim terminology. POR, 10-16.

A. The “mesh layer” encompasses woven, permeable material (Element [1b-iii])

12. Slick Slide and its expert witnesses do not dispute that the prior art discloses a “mesh layer,” even according to their proposed construction of the term (which is inaccurate). The validity of the ’854 patent can be resolved without making any formal interpretation of the term. For instance, Slick Slide never disputed that the low friction slide system of the Phillips-WN0400 combination provides a “mesh layer.” POR, 52-66. This is understandable, because WN0400 expressly describes a “Micron Nylon Mesh,” and the characteristics of the material (e.g., woven, permeable material), plainly provide a mesh layer. UATP-1006, 1. The Petition thus demonstrates a “mesh layer,” even according to Slick Slide’s substitute language.

13. In the Patent Owner’s Response, Slick Slide asserts that “‘mesh layer’ means a layer of mesh material which is characterized by open spaces between threads” (POR, 12). I note that this language itself is not very helpful to a POSITA’s understanding of the term. Notably, however, Slick Slide’s application of its interpretation demonstrates that Slick Slide’s interpretation is much narrower than this language and improperly adds limitations into claim 1. The improperly added limitations are not supported by the specification of the ’854 patent and defy normal usage of the term “mesh layer.” As I describe in more detail below, Patent Owner’s interpretation also creates unworkable ambiguity as to whether a material is a mesh layer within the meaning of the ’854 patent’s claims. POR, 12. I also address Slick

Slide's assertion that there is a fundamental conflict between a "sheeting" and a "mesh," because a sheeting "neither allows for nor is characterized by open spaces that is required of the mesh layer." POR, 32. Patent Owner's proposed distinction between "sheeting" and "mesh" is contrary to ordinary usage and Phillips and the other references cited in this proceeding.

14. Slick Slide's definition of the term "mesh layer" is not workable for several reasons. For example, Slick Slide's expert witness Dr. Rust acknowledged that whether or not a material has "open spaces" and the characteristics of those open spaces is not what determines whether the material is a "mesh layer," according to Patent Owner's interpretation. UATP-1046, 55: 55:10-56:24. Under Patent Owner's interpretation, the determination of whether a material is a "mesh layer" requires the existence of a "technical specification" or data sheet that **characterizes** the material's open spaces:

So to be a mesh layer means that the material is "characterized by open spaces, and **that means that there is a technical specification** that - - that indicates the size of the opening or the percent of open area.

UATP-1045 (Dr. Rust Transcript), 55:10-56:24. Patent Owner's approach here is problematic for several reasons. Under Patent Owner's approach, the characteristics of the material itself are not determinative, but rather whether there is some additional technical specification or written material describing it in a certain manner. This is contrary to how a POSITA would consider a material. For

example, a material can be a mesh based on its characteristics, even if no technical specification was written to describe that material, or if the technical specification was written but was later lost or destroyed. A POSITA would be able to evaluate any material through observation to determine whether the material has characteristics of a mesh (e.g., woven, permeable), without requiring a technical specification. Patent Owner's reliance on third party documents would result in absurd results where such third party documents are unreliable, conflicting or inconsistent with respect to how they characterize materials, including in ways that are inconsistent with the '854 patent's usage. Indeed, under Patent Owner's interpretation, two materials having identical physical characteristics could be a mesh layer or not a mesh layer depending on the presence or absence of a "technical specification." For example, the first would be a "mesh layer" and the second not a "mesh layer," respectively, if the first has a technical data sheet characterizing the size of openings and the second is unaccompanied by such a technical data sheet. This is not workable or reasonable. Limiting the term "mesh layer" to include only materials that have certain technical specifications is not reflected by the '854 specification or by ordinary usage. Slick Slide's interpretation should not be adopted. A consistent definition of "mesh layer" is necessary to evaluate a material that does not require reliance on third-party sources such as a technical specification.

15. I note that the unworkability of Slick Slide's definition is highlighted by its exclusion of materials that are characterized by open spaces on the basis that the material is not accompanied by a technical specification reciting the size of the openings. For example, Dr. Rust discussed a material (burlap) as an example of a material that has "open spaces between threads" such that the material is "see-through" due to "holes in the structure." UATP-1045, 40:18-41:23. But even though that material is clearly a woven material that has see-through holes in the structure, Dr. Rust indicated that the material is excluded from Slick Slide's definition of the term "mesh layer":

The burlap example that you brought up earlier is a prime example. That example lists clearly how it's characterized. ***It's characterized by fabric weight*** as 10 ounces. Okay? It's not characterized by the openings or the size of the openings; and, ***therefore, it's not a mesh.***

16. UATP-1045, 55:7-56:8 (discussing EX2012). Slick Slide's interpretation here confines the term "mesh layer" arbitrarily based on technical specifications or data sheets, rather than on the characteristics of the material, and this leads to puzzling results like excluding materials from characterization as a "mesh" even though they are "see though" due to "holes in the structure," and plainly include open spaces.

17. Slick Slide's application of its "mesh layer" interpretation also attempts to exclude particular materials based on the size of the openings or positioning of adjacent parallel threads. POR, 32 ("If the sheeting material/membrane were mesh,

riders' bodies would contact the slide surface through the openings"), UATP-1046, 57:19-24 ("if they're nearly touching, that means they are not touching...then it can be a mesh"). There is no mandate in the claims or the specification of the '854 patent that "mesh layer" be interpreted to require open spaces defined by adjacent parallel threads having no physical contact, and a POSITA would not understand such a requirement to exist based on the claims or specification. Interpret of "mesh layer" in such a narrow manner would be improper.

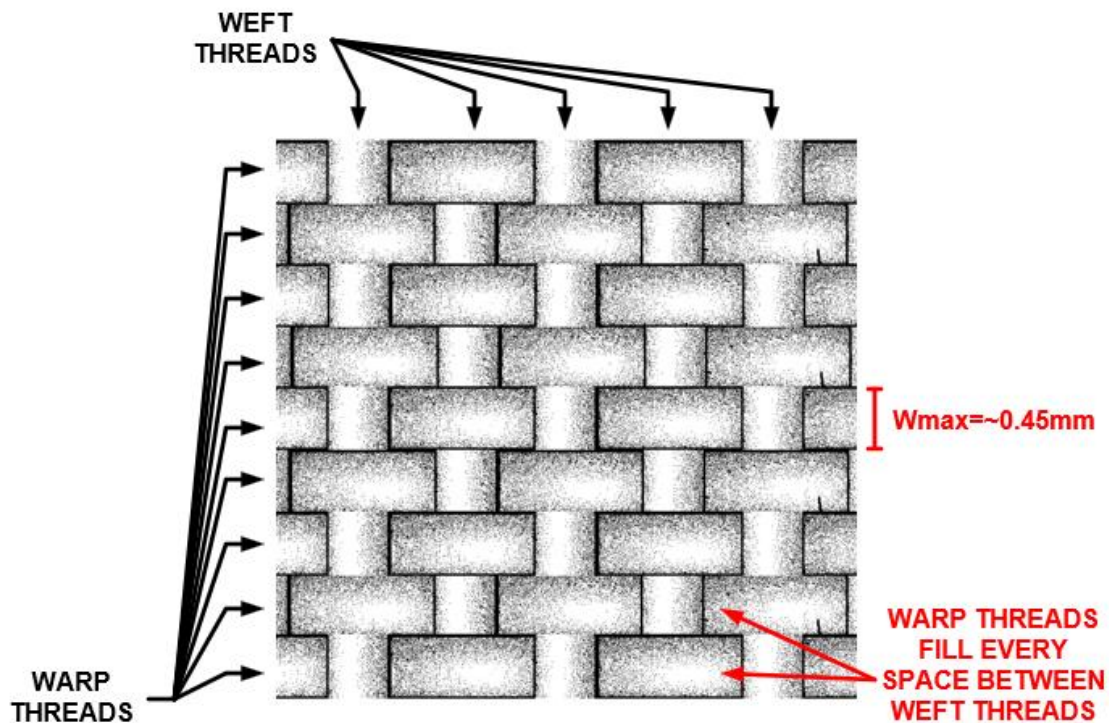
18. In the institution decision, the Board encouraged the parties to "focus on any lower limit below which the material would not be considered a mesh material." ID, 12. I note that Slick Slide and its declarants Dr. Rust and Dr. Spiegelberg have not done so here and have only relied on unworkable standards that do not define a lower limit of what is a mesh layer. Slick Slide indicates that a POSITA "understands the difference between a woven fabric that is not characterized by open spaces versus a mesh that is characterized by open spaces," and "the lower bound of the range of open spaces that still is considered a mesh." POR, 13. But in doing so, Slick Slide never provided an indication of how that determination would be made. Slick Slide's assertion that a POSITA "understands" the difference does not provide a workable determination of what is a mesh layer and what is not. Instead, it highlights the ambiguity in its definition where even woven materials that are permeable due to passages between threads would be

excluded from Slick Slide's interpretation. Slick Slide remains silent as to criteria for making this distinction, in an attempt to narrow the claims and exclude woven, permeable materials that have relatively small openings but that would have been understood as a mesh layer according to the '854 patent and industry usage reflected in ASTM definitions (EX2018, 2), for example.

19. I note that Dr. Rust did not define a lower limit opening size for what material constitutes a mesh layer. UATP-1045, 53:22-54:2 (material having openings outside the range would "perhaps" not be a mesh layer), 54:4-17; UATP-1001, 10:17-50. When asked if open areas of less than 10%, less than 1%, or less than 0.1%, would preclude a material from being a mesh, Dr. Rust did not say. *Id.*, 54:19-56:12; 56:17-24. Patent Owner's interpretation is inconsistent with the '854 Patent and ordinary usage to the extent that Patent Owner excludes woven materials that have open passages (e.g., such that the material is permeable). Patent Owner's interpretation does not allow for consistent determination of whether a material is a mesh layer or not.

20. Slick Slide's interpretation of "mesh layer" improperly excludes embodiments that are expressly described by the '854 patent. Notably, the '854 patent describes an embodiment where the mesh layer has little or no open spaces. The specification explains that "the mesh material 46 is a woven mesh that comprises a weave of threads" and "includes a number of warp threads 70 which extend

generally perpendicular to a number of weft threads 72.” EX1001, 10:17-50. The “density of the warp threads 70 is approximately 22 threads per centimeter” and the “diameter of each warp thread 70 may be within a range of between about 0.1 mm to about 0.6 mm.” EX1001, 10:61-11:14. At a density of 22 threads per centimeter, a maximum diameter of each thread is approximately 0.45mm. This dimension is squarely within the range of warp thread diameters expressly disclosed by the ’854 Patent. In such an embodiment, warp threads are arranged side-by-side. Such a construction includes interstices (e.g., open spaces) between threads, and is a mesh layer consistent with the ’854 specification, but yet is improperly excluded by Patent Owner’s application that implicitly demands open separation between parallel threads.



UATP-1001, FIG. 5 (modified to adjust spacing and annotated).

21. I note that the '854 specification does not expressly limit the “mesh layer” recited in claim 1 to the size/type of openings described by Patent Owner. Instead, the '854 patent describes with respect to example implementations. For example, the '854 Patent explains that “[a]ccording to *one aspect*...the mesh layer of the ride vehicle may include a weave of threads.” EX1001, 2:37-53, *see also id.*, 3:16-32 (“According to one aspect...the woven mesh layer includes a weave of threads”). Later in the same paragraph, the '854 Patent explains that “In *one aspect*, the mesh layer *may* include a plurality of interstitial openings that define an open area of the mesh layer. *Id.*, *see also* 3:16-32 (“In another aspect, the mesh layer includes a plurality of interstitial openings”). The specification is clear through its use of permissive language that openings are present in *only some implementations* of the disclosed mesh layer (e.g., because the specification says that the mesh layer “may” include a plurality of interstitial openings, not that it “must” include these openings). I also note that a POSITA would have understood that at least some implementations of the mesh layer include a weave of threads *without any requirement of openings*, as I discussed above.

22. Slick Slide’s interpretation of “mesh layer” proposed in the Patent Owner Response is inconsistent with its own usage in dependent claims and elsewhere in counterpart applications. Dependent claim 17 requires “a plurality of

interstitial openings” “that “define an open area of the mesh layer.” UATP-1001, 13:4-8. Slick Slide’s narrowing interpretation recited similar language that the mesh layer is “characterized by open spaces.” Interpreting claim 1 according to Patent Owner’s narrow construction would thus render this language of claim 17 duplicative and unnecessary. Slick Slide’s usage in its Great Britain family member likewise demonstrates usage of the “mesh layer” term in a broader manner than Slick Slide proposes in this proceeding. Claim 1 of GB2623710 recites a “woven” mesh layer, the “woven mesh layer having a plurality of interstitial openings that define an open area of the woven mesh layer.” If “mesh layer” were interpreted according to Slick Slide’s proposed language, it would render the claim language superfluous. UATP-1056, cl. 1.

23. The extrinsic dictionary definitions cited by Slick Slide also conflict with its proposed interpretation of claim 1. The ASTM standard cited by Patent Owner for other aspects defines the term “fabric, mesh” as including “a woven fabric *with a permeable network made from interlacing threads* or mono filament fibers.” EX2018, 2. This definition comports with common usage of the term. Patent Owner’s interpretation, however, is much narrower and excludes materials that are plainly encompassed by this well-understood and conventional understanding reflected by the ASTM definition. Indeed, the ASTM definition does not expressly

recite “open spaces” between threads, and plainly encompasses woven, permeable materials.

24. Ultimately, based on my review of the ’854 patent and evidence of record, and my knowledge and experience, the claimed “mesh layer” encompasses woven material that is permeable through interstices (e.g., regardless of whether adjacent threads, such as parallel warp threads, are in physical contact).

25. Phillips also describes “sailcloth,” which is a woven material that is permeable and therefore includes open spaces. *Infra*, §VI.A.2. Because sailcloth is a permeable material that allows any one or both of air molecules and water molecules to pass, sailcloth is consistent with Slick Slide’s ASTM definition of “mesh.” EX2018, 2; UATP-1048 (“because it is a breathable, woven fabric, Voyager sails are ideal for performance cruisers”); UATP-1054 (“[w]oven from high tenacity nylon” that has “low air porosity”) UATP-1057 (showing nonzero air permeability for sailcloth sample).

B. The claimed “coefficient of friction” does not require a specific testing method (Element [1c])

26. In the Patent Owner’s Response, Slick Slide asserted that the “coefficient of friction” of Element [1c] means “the frictional force between two surfaces to the normal force pressing the surfaces together, as determined using the ASTM D1894 test method.” POR, 15, *see also id.*, 39, 51 (“this limitation is to be ‘determined using the...ASTM D1894 standard test method’”). Element [1c] recites

that a coefficient of friction between the mesh layer and the slide surface be within a range between about 0.03 to about 0.2. Nothing in this claim limitation mentions a specific testing standard for determining coefficient of friction values. Simply put, there is *no requirement to use a particular testing standard* to determine the coefficient of friction, and the language of claim 1 and the specification do not support such a requirement.

27. I agree with the Board’s analysis in the Institution Decision. ID, 13 (“[w]e agree with Petitioner that the ’854 patent specification does not include clear and explicit lexicography or a disclaimer that would support requiring ‘coefficient of friction’ to be determined by a specific ASTM test method”). The ’854 patent expressly discloses that the “coefficient of friction...*may* be determined using the...ASTM D1894 standard test method,” expressly describing ASTM D1894 as an example test method. EX1001, 11:31-44.

28. I note that Dr. Spiegelberg acknowledged that the ASTM D1894 mentions only “film” and “sheeting” as samples for testing under the ASTM D1894 standard, despite the fact that Patent Owner maintains that a mesh layer is not a sheeting or a film. EX1046, 111:6-113:15. Notably, the ASTM test conditions differ from the conditions of the claimed dry slide in many ways, further highlighting confirming that the ’854 patent describes the standard as something that *can optionally* be used to measure coefficient of friction.

29. I note that the '854 patent explains that “the coefficient of friction between the ride vehicle and the slide surface is the ratio of the frictional force between two surfaces to the normal force pressing the surfaces together. That is, Coefficient of Friction (p)=Force of Friction (F)/Normal Force (N).” EX1001, 4:38-43. This is consistent with the conventional and commonly understood definition of coefficient of friction. I have applied this understanding in my analysis. More, each of the coefficient of friction values that I cite to were determined consistent with this definition, including UATP-1021, UATP-1026, UATP-1027, for example.

V. Grounds 1A-2B: Anticipation and Obviousness based on Phillips

30. In this declaration, I address Slick Slide’s assertions regarding Phillips-WN0400 (Ground 1B) first, and then I address Slick Slide’s assertions regarding Grounds 1A (Phillips) and 2A-2B (Phillips-Fallgatter/Phillips-Fallgatter-WN0400).

31. In the Patent Owner’s Response, Slick Slide made several false assertions regarding my experience and my ability to opine on the subject matter of the Challenged Claims. POR, 23-30, 37-38. For example, Patent Owner asserted that I have “almost no experience” in fiber science. This is incorrect. I have authored dozens of academic articles that are in the field of fiber science. *Supra*, §II (“An Experimental Study of Synthetic Fiber Reinforced Cementitious Composites,” “Tensile Properties of Synthetic Fiber Reinforced Mortar,” “Properties of Fiber Reinforced Concrete Using Recycled Fibers from Carpet Industrial Waste”). I have

taught numerous collegiate level courses that directly deal with fiber science, including a course titled “Fiber Science” and another course titled “Advanced Fiber Science.” UATP-1003, Appendix A. I was a member of the Fiber Society for over thirty years, and I served as a member of the *Journal of Fiber Bioengineering and Informatics*. I am very well qualified in the field of fiber science, and Patent Owner’s assertions to the contrary are unfounded.

32. Slick Slide also alleges that I would “likely misunderstand, and likely misuse, CoF data.” POR, 29. I am very well versed in coefficient of friction, as my academic work is directly implicated by coefficient of friction. For example, I have published papers such as “Modeling of Fiber Pull-out from a Cement Matrix” that deal with the physical interactions between materials as they move relative to each other. Coefficient of friction is an important factor here. Moreover, I have advanced degrees in Mechanical Engineering from the Massachusetts Institute of Technology. Friction is a fundamental concept in Mechanical Engineering, and I have encountered coefficient of friction throughout my career as a student and an academic. I am more than capable of interpreting coefficient of friction data, and I have done so repeatedly. Because of my educational background in Mechanical Engineering and my decades of experience publishing academic papers and teaching collegiate courses where coefficient of friction is a fundamental concept, my experience with coefficient of friction amounts to multiple decades—significantly

more than the five years Slick Slide claims is necessary. More generally, I note that, the result of my analysis does not change under either party's definition of POSITA. I am qualified to speak to a POSITA's perspective even if PO's heightened level of skill is applied. I note that Patent Owner's proposed level of skill (POR, 23-26) is inconsistent with the '854 patent. Such a heightened level of skill is not required to understand the concepts recited by the '854 patent, and nothing in the '854 patent dictates such a heightened level of skill.

VI. Ground 1B: Obviousness based on Phillips in view of WN0400 (Claims 1-4, 6-7, 14-17, and 22-28)

33. I note that the Patent Owner's Response does not dispute that Ground 1B (Phillips-WN0400) discloses all limitations of the challenged claims, except for arguments related to the coefficient of friction range recited in Element [1c]. The Patent Owner's Response focuses largely on motivations to combine and reasonable expectation of success. POR, 52-66. Based on my review of the record in this matter, the Patent Owner's Response does not fully address motivations set forth in the Petition and my original analysis.

A. A POSITA Would Have Been Motivated to combine Philips and WN0400

34. As I explained in my first declaration, multiple reasons would have motivated a POSITA to combine Phillips with a nylon mesh suggested by WN0400. Pet., 39-42; UATP-1003, §134-140. Woven nylon was a known low friction

material. EX1045, 62:6-9, 76:18-21; POR, 16, 38. Phillips expressly identifies both nylon and woven materials (e.g., “sailcloth”) as “low friction high durable material” suitable for a ride vehicle bottom. UATP-1004, 4:38-49. A POSITA would have selected a woven nylon mesh, such as described by WN0400, as a readily available material to achieve express benefits of low friction and high durability articulated by Phillips.

35. I note that the Patent Owner’s Response never specifically disputes that “a POSITA would have been motivated to implement Phillips’ “nylon” bottom surface in accordance with WN0400 to **facilitate sourcing** by utilizing a material commercially available from nylon mesh suppliers,” as described in the Petition and my original analysis. Pet., 40. This rationale provides an independent reason why a POSITA would have been motivated to combine Phillips and WN0400 and is never disputed in the Patent Owner’s Response.

1. WN0400’s Nylon Mesh Is A Low Friction Material that a POSITA Would Have Been Prompted To Implement on Phillips’ Ride Vehicle

36. In my first declaration I described numerous reasons why a POSITA would have constructed the bottom of a ride vehicle using a woven material having open spaces, including to promote a low coefficient of friction. Pet., 37-42; UATP-1003, ¶¶134-140.

37. Phillips already provides woven materials. Based on my knowledge and experience and my review of Phillips, selecting a “looser” woven fabric having a more open weave would have been obvious to a POSITA because open weaves were known to slide with lower friction over a surface. UATP-1003, ¶137; Pet., 40-41. A POSITA knew both that mesh coarseness impacted coefficient of friction and that coarse mesh constructions often promoted lower coefficient of friction as compared with fine mesh. UATP-1009, 4, Table 2. Kothari (UATP-1009), which I cited in my first declaration, corroborates the POSITA’s knowledge on this point. Kothari expressly indicates that “[V]ariation of mesh size in monofilament fabrics affects the frictional resistance of these fabrics,” and demonstrates the coefficient of friction of nylon meshes generally decreases as the threads become coarser (i.e., thicker) and the thread density decreases. UATP-1009, 3-4; UATP-1003, ¶137 (“the finest meshes having a higher coefficient of friction than the coarsest meshes”). Indeed, Kothari reports data indicating that the coarsest nylon mesh has the lowest coefficient of friction, and the finest nylon mesh has the highest coefficient of friction, according to more than one measure (i.e., Fabric-to-Fabric, Fabric-to-Leather, Fabric-to-Metal). UATP-1009, 4, Table 2 (Fabric No. 15 exhibits lower coefficient of friction than Fabric Nos. 13 and 14 according to all three measurements). A POSITA would have thus looked to a mesh such as WN0400,

having a relatively coarse weave, to advance Phillips’ express objectives of a “low friction” ride vehicle bottom made of “nylon.”

38. I understand that Dr. Spiegelberg asserted that the “lowest density mesh has the highest coefficient of friction, which is the opposite of Dr. Wang’s interpretation of this Exhibit.” EX2026, ¶198. This is a mischaracterization of my opinion and of Kothari. Such an assertion is premised on a mistaken use of “fabric weight” as a measure of “mesh density,” instead of “sett.” The ’854 patent defines “density” as a measure of threads per centimeter, a parameter likewise identified in UATP-1009 and referred to as “sett.” UATP-1046, 81:23-82:6, 88:19-24. This sett parameter, consistent with the ’854 patent’s usage of “density,” corroborates the trend a POSITA would have recognized and expected of mesh constructions—lower density, higher coarseness meshes tend to have lower coefficients of friction on a variety of surface types.

39. Patent Owner’s assertion that “a mesh coefficient of friction is detrimental to Phillips” fails for a second reason. Multiple design considerations would be considered by a POSITA and would lead a POSITA to select a material for the ride vehicle bottom, even if the material does not produce the lowest possible coefficient of friction in some scenarios. I note that Dr. Rust agreed with this. UATP-1045, 65:14-67:4 (noting that materials listed by Phillips do not have the same coefficient of friction and a POSITA “could be justified to pick the higher coefficient

of friction material”). For example, a higher coefficient of friction material would be selected “*considering other parameters such as durability,*” in some scenarios. *Id.* A POSITA would have considered many parameters in selecting a material for a ride vehicle bottom, and a POSITA would have selected a nylon mesh suggested by WN0400, even if this mesh had a higher coefficient of friction than some other materials (which I note the Patent Owner’s Response does not present any documentary evidence of). I note that the Patent Owner’s Response again mischaracterizes my previous analysis and testimony by incorrectly stating that “Petitioner’s own expert admits that a POSITA would not consider WN0400 with Phillips, as doing so would yield a significantly higher coefficient of friction and therefore markedly worse sliding performance” (POR, 2). As I discussed in my previous analysis, first deposition, and herein, this statement in the Patent Owner Response is incorrect because the coefficient of friction performance would not be “markedly worse” and would have been expected by a POSITA to be much better, and because even if the coefficient of friction was not the lowest possible, there were still many benefits that would have motivated a POSITA to utilize a nylon mesh like WN0400 (e.g., as set forth in the Petition and my original analysis).

40. Patent owner based its arguments on improperly incorporating features into the Phillips low friction slide system. For example, the Patent Owner’s Response stated that “Petitioner’s expert admits that a POSITA...would not change

to a bottom surface with a material that has a higher CoF” (POR, 54). I disagree with this statement because I never suggested that the combination would require increasing coefficient of friction or that a POSITA would have looked exclusively to coefficient of friction. Instead, I explained that there are many criteria that a POSITA might consider when designing a slide system, including durability, geometry, and safety. UATP-1029, 122:20-123:23. Slick Slide asserts that “the lowest CoF for any mesh relied upon by Petitioner’s expert is 0.26” (POR, 54), but in doing so cites only UATP-1009 and ignores the actual combination based on Phillips-WN0400 that includes “Teflon” and “nylon”—materials known to have very low coefficients of friction—and other coefficient of friction evidence cited in the Petition. UATP-1004, 4:38-49; UATP-1021, 1; UATP-1026, 5, 7; UATP-1027, 4; UATP-1009, 4-5.

41. I disagree with Slick Slide’s assertion that the “the lowest CoF for any mesh relied upon by Petitioner’s expert is 0.26.” POR, 54. In making this statement, the Patent Owner’s Response cites only a single exhibit (UATP-1009) without referring to other coefficient of friction evidence provided in my original analysis. For example, Phillips explains that the surface of a slide can be any one of a list of materials including “Teflon” and “nylon,” and that the ride vehicle bottom can include one or more of these same materials. UATP-1004, 4:38-49. The Petition explains that nylon-Teflon interactions (as well as Teflon-Teflon, nylon-nylon, etc.)

have very low coefficients of friction, as low as 0.04. UATP-1021, 1; UATP-1026, 5, 7; UATP-1027, 4. Instead of considering Petitioner's extensive record concerning the friction characteristics of nylon and Teflon materials, the Patent Owner's Response focuses on UATP-1009 which measures the coefficient of friction of a nylon mesh against *leather, aluminum, and another nylon mesh*. UATP-1009, 4-5. The Patent Owner's Response does not address the fact that Phillips expressly discloses *Teflon* as a material for the slide surface. Because Teflon exhibits one of the lowest coefficients of friction measured for any synthetic material, a POSITA would have understood that coefficient of friction data regarding nylon-Teflon interactions would have been beneficial for assessing the coefficient of friction between a nylon mesh and a Teflon slide surface, and demonstrates that the resulting combination, in view of Phillips express motivations, would have included a similar coefficient of friction value well within the broad range recited by the '854 patent.

2. Phillips Does Not Teach Away From Mesh

42. The analysis in the Patent Owner's Response attempts to draw a distinction between "sheeting" and "mesh." I disagree with this purported distinction, which incorrectly asserts that "Phillips uniformly and repeatedly teaches a 'sheeting material,' which is the opposite of a mesh layer." POR, 42, 53-55.

43. First, Patent Owner's proposed distinction is contrary to a POSITA's ordinary understanding of both "sheeting" and "mesh." This is demonstrated by

Patent Owner's own extrinsic dictionary definitions. Patent Owner presented definitions of "sheeting" that refer to "material in the form of sheets," "plain-woven cloth," and "bedsheets," and Dr. Rust further confirmed that bedsheets, for example, have a woven, permeable construction. EX2005; EX2007; UTAP-1045, 43:19-45:16. Not only does such material construction not exclude "mesh," but it in fact aligns squarely with the ASTM standard defining "fabric, mesh" as "a *woven* fabric with a *permeable network* made from interlacing threads or mono filament fibers." EX2018, 2. Based on my knowledge and experience, a POSITA simply would not understand Phillips' use of the term "sheeting" as prohibiting a "mesh" layer, especially in view of the ASTM definition of mesh that recites "woven" and "permeable" material that aligns with "sheeting," including "bedsheets."

44. Second, Slick Slide's purported distinction is contrary to Phillips. Nothing in Phillips excludes a mesh implementation from its express teaching of a "nylon" bottom for the ride vehicle, which a POSITA would have been motivated to implement based on the teachings of Phillips and WN0400. *Id.* Phillips provides a list of example materials for the bottom surface having very different characteristics (e.g., sailcloth, artificial turf, synthetic carpet, etc.), and its recitation of "nylon" is not limited to a particular format/material construction. Simply put, Phillips' example list of materials are not limited in a way that excludes woven, permeable material. Patent Owner fails to provide any reason that Phillips' nylon must be a

sheeting (to the exclusion of a mesh) while other materials in Phillips list are plainly not sheeting according to Patent Owner's definition of sheeting. Nylon, artificial turf, and synthetic carpet are each part of the same list of materials that Phillips describes as "sheeting" and "low friction high durable material." UATP-1004, 4:38-49.

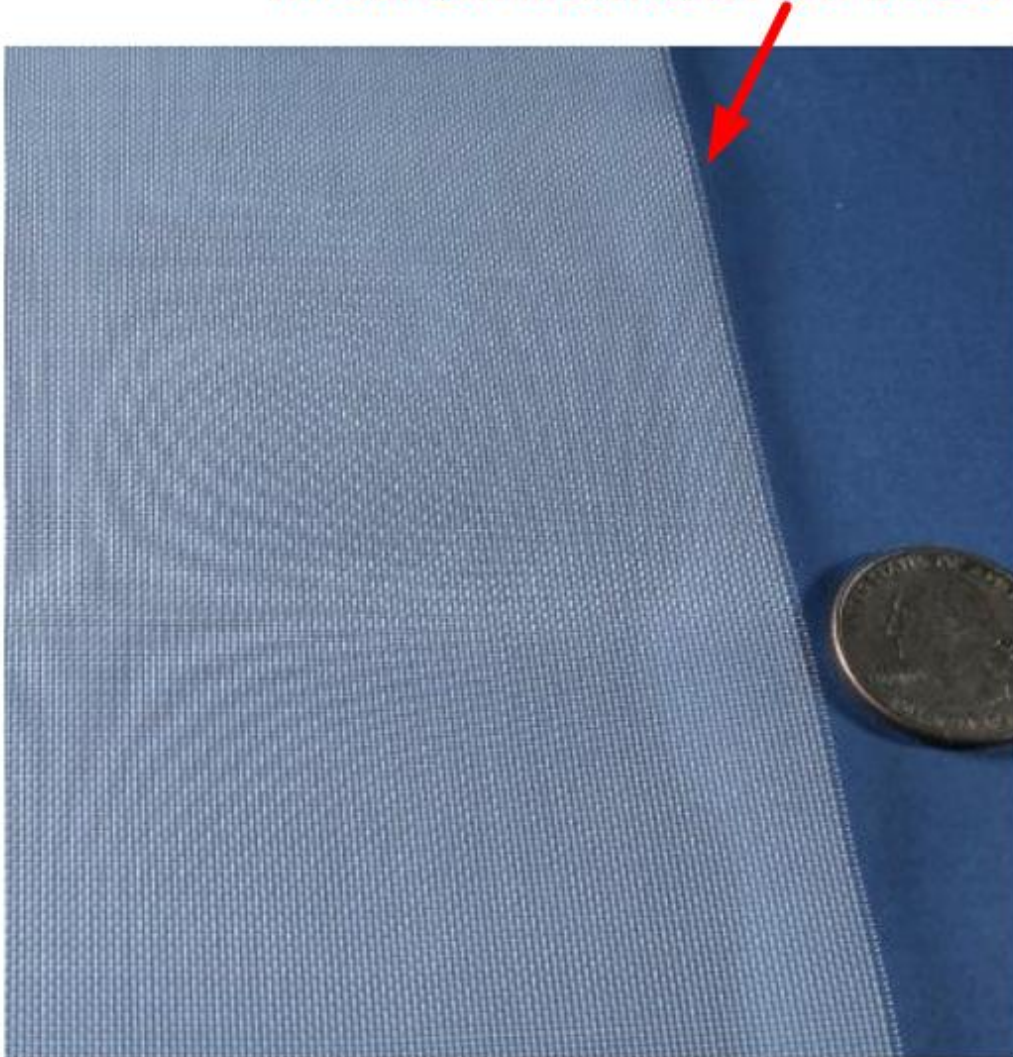
45. Patent Owner's assertions that a POSITA would not have considered "mesh" based on Phillips description of "sheeting" ignores that woven material with open spaces between threads was used in prior art ride vehicles. *See, e.g.*, Pet., 1-3. Use of a woven material with open spaces was not new at the time of the '854 patent and would not have been considered a departure from Phillips' straightforward teachings. In addition to polymer mesh, plain weave burlap was a known choice for ride vehicles in prior systems (UATP-1029, 1; UATP-1020, 3; UATP-1030, 1-2), and burlap was commonly formed as a plain weave having open spaces between threads such that the material was "see through." UATP-1045, 40:4-41:23. Nylon mesh has a similar weave construction with open spaces between threads and was widely available at the time leading up to the '854 patent. Based on my knowledge and experience and my review of Phillips and WN0400, a POSITA would have readily utilized this known construction using a nylon in accordance with Phillips, effectuating Phillips' "low friction high durable" ride vehicle bottom.

46. As another example, Phillips’ “sailcloth” likewise squarely fits within the ASTM definition of “mesh” cited by PO—sailcloth is made from woven interlacing threads and is permeable. UATP-1048 (“because it is a breathable, woven fabric, Voyager sails are ideal for performance cruisers”); UATP-1054, 3 (“[w]oven from high tenacity nylon” that has “low air porosity”). Phillips’ sailcloth demonstrates an example of what Patent Owner incorrectly argues Phillips excludes—a low friction, high durability material described by Phillips as a “sheeting” that is also woven and permeable. This further highlights that Patent Owner’s purported distinction between “sheeting” and “mesh” is inconsistent with Phillips and conventional understanding of a POSITA.

47. What’s more, sailcloth is commonly woven using nylon threads, and a POSITA would have understood this. As described above, one high end sailcloth manufacturer describes a product as being “[w]oven from high tenacity nylon.” UATP-1054, 3. Because Phillips describes sailcloth as a low friction, high durability sheeting material and sailcloth is woven (sometimes from nylon threads), a POSITA would have also understood that the nylon material in the same list can be a woven material in the likeness of sailcloth. Because nylon can be woven, and sailcloth can be woven, it is clear that Phillips discloses nylon as a woven material in some embodiments.

48. To be clear, a POSITA would have recognized that sheeting includes meshes. This is evidenced by the fact that meshes are commonly sold in flat “sheets.” UATP-1051 (describing “several types of metal mesh sheets”); UATP-1052 (explaining that “metal mesh sheets” are “in many different sizes and shapes”); UATP-1053 (explaining that a “Nylon Mesh Filter” is sold as a “Sheet”). A POSITA would have understood that “sheeting” includes meshes of various configurations that come in sheets that are generally flat and thin (e.g., like sheets of paper). Indeed, the nylon mesh of WN0400 appears as a generally flat sheet of material.

THE NYLON MESH IS A FLAT SHEET



UATP-1006, 1 (annotated). A POSITA would not have been discouraged from implementing the Phillips ride vehicle using a nylon mesh like WN0400.

49. I note that Patent Owner’s assertion that sheeting and mesh are mutually exclusive is not remedied by its statement that Phillips “expressly distinguishes” sheeting material from “nylon netting.” POR, 53. Phillips does not distinguish the “nylon” of the bottom surface of the ride vehicle from “nylon netting” or any other kind of mesh. Phillips explains that the membrane of the ride vehicle in Phillips can

be composed of “nylon” in some embodiments but does not expressly preclude any structural morphologies such as mesh. UATP-1004, 4:38-49.

50. In another context, Phillips explains that two slide elements can be connected by “nylon netting.” UATP-1004, 9:37-55. But Phillips never suggests that the membrane cannot include netting or another kind of mesh when the membrane is composed of nylon. UATP-1004, 4:38-49; *Infra*, §V.A. Because Phillips does not exclude its ride vehicle from having a mesh layer on the bottom surface and indeed discloses contemplates using a mesh layer, a POSITA would have been motivated to implement Phillips’ ride vehicle with the nylon mesh of WN0400.

3. Nylon Mesh Was Known To Be Durable

51. I understand that the Patent Owner’s Response alleges that “the durability of any mesh layer is significantly worse than sheeting, primary because sheeting incorporates more fibers.” POR, 55; EX2031, ¶16. This statement is inconsistent with Phillips and inconsistent with a POSITA’s understanding of sheeting and mesh. I note that Patent Owner’s assertion that “sheeting incorporates more fibers” is unsupported by any explanation or evidence and is inconsistent with a POSITA’s knowledge. Phillips does not specify a number of fibers, and its Nylon material is not limited to a particular construction. Slick Slide’s assertion is not followed by any evidence that mesh would have been considered insufficiently durable for use in Phillips’ system. Woven constructions were known to impart

durability when creating a material (e.g., as compared to the threads themselves), and a POSITA recognized woven nylon as relatively durable as a slide bottom.

52. Nylon is well known to be a material for woven sailcloth, and nylon woven sailcloth is known for durability. For example, one high end sailcloth is described as being “[w]oven from high tenacity nylon” and is described as being “[i]mpregnated and coated for...durability.” UATP-1054, 3. Woven sailcloth is a mesh, as I described above. *Supra*, §VI.A.2. A POSITA would have been motivated to implement Phillips’ ride vehicle bottom with a nylon mesh layer, because doing so would provide a low friction high durability material.

53. To be clear, even if a POSITA could have theoretically implemented a more durable Nylon (which Slick Slide never identifies), doing so does not undermine the motivations for use of a Nylon mesh set forth in the Petition—namely to promote a low coefficient of friction and promote sourcing using a readily available known material. Here again, Slick Slide’s position is premised on an artificial distinction between sheeting and mesh (*supra*, §VI.A.2) and an unsupported and incorrect assumption that “any mesh layer” has significantly worse durability than sheeting. As described above, meshes are often sold in “sheets” and are correctly characterized as sheeting (e.g., consistent with Phillips’ characterization of woven sailcloth as a sheeting). Slick Slide ignores that durability of a material is influenced by numerous factors, such as the coarseness of threads in

a woven material or the thickness of a solid material. For example, a mesh with coarse threads will often have a higher durability than a solid nonwoven material that is very thin. One example of a sheet material that is not durable is aluminum foil, which tears easily and degrades quickly under strain. A POSITA would have understood this dynamic and known that it is beneficial in some cases to select a mesh over a sheet of solid material.

4. Attaching The Mesh Layer To The Ride Vehicle Was Routine For a POSITA

54. I understand the POR states that “Petitioner failed to demonstrate how to implement the bottom of Phillips’ ride vehicle with a mesh,” that such combination would require “extensive and additional manufacturing steps,” and adhesive would “destroy any benefits possibly stemming from the combination” POR, 55-56, 58. I disagree with these statements because they are based on mischaracterization of Phillips and the combination. First, the POR fails to address that Phillips is not limited to adhesive attachment on the bottom. Phillips describes generally that the low friction membrane be “appended” to a ride vehicle, and providing adhesive attachment as an example. UATP-1004, 3:19-22, 10:18-20. A POSITA would have understood from Phillips that there are many ways to append a mesh layer such as the nylon mesh of WN0400 to a ride vehicle so that the mesh layer represents the bottom layer of the ride vehicle. For example, one way was to wrap a ride vehicle with the nylon mesh and make a seam on the top of the ride

vehicle to connect ends of the mesh, resulting in a seamless bottom surface of the mesh material. Another method of adhering the nylon mesh was attaching ends of the nylon mesh to sides of the ride vehicle where there is no contact with the slide surface. These are just examples, and a POSITA would have considered these and other methods in addition to applying an adhesive to the bottom of the ride vehicle. Slick Slide's assertions fail for this independent reason as a POSITA would have appended the mesh to the ride vehicle using any of a number of known techniques, consistent with Phillips teachings. *Id.*

55. Even as to adhesive attachment on a bottom surface, a POSITA would have readily adhered the mesh to the ride vehicle without encountering the artificial problems proposed in the Patent Owner's Response. POR, 55. A POSITA would be able to readily adhere a nylon mesh (e.g., described by WN0400) to the ride vehicle of Phillips without "requir[ing] extensive and additional manufacturing steps," as alleged by Slick Slide. POR, 55. I note that the POR lacks evidence that suggests the nylon mesh of WN0400 could not be as easily appended to a ride vehicle as other materials, and there is none, as I describe in more detail below.

56. For example, a POSITA would readily adhere the mesh layer without the problems the POR proposes that adhesive "would permeate through WN0400 and destroy any benefits possibly stemming from the combination." POR, 56-57; UATP-2027, ¶150. Slick Slide's evidence for this assertion largely relies on Dr.

Rust's uncorroborated assertion that adhesive necessarily wicks through open pores in the mesh and "becomes the friction bearing surface, rather than the mesh." *Id.* A POSITA would have recognized, however, the extent to which adhesive would wick through open pores depends on several factors, including the thickness of the adhesive, the viscosity of the adhesive, the size of the pores, etc. A POSITA would have understood how to attach a mesh layer to a ride bottom in a way that did not result in the adhesive wicking through the pores to become the friction bearing surface. For example, a POSITA would have selected adhesive characteristics, volume, and application technique so that the adhesive penetrates less than halfway through the pores, meaning that the mesh layer remains the friction bearing surface.

57. Slick Slide alleges that adhesive "would permeate through WN0400" (POR, 56-57; EX2027, ¶150). Contrary to Slick Slide's assertions, a POSITA knew about "wicking" and would have considered the properties and materials being bonded, the amount of adhesive, and the viscosity of adhesive. UATP-1045, 73:2-19; 71:12-1. A POSITA would have understood how to attach a mesh layer to a ride bottom in a way that did not result in the adhesive wicking through the pores to become the friction bearing surface and would have done so as a matter of routinely implementation based on Phillips and WN0400.

58. To be clear, a POSITA would have readily considered any number of conventional techniques for adhering a mesh without adhesive wicking through the

open spaces, such as by utilizing a pressure-sensitive adhesive (which a POSITA would have recognized was not vulnerable to the issue of “wicking” that the POR alleges), partially curing the adhesive to limit viscosity, and/or utilizing a thin layer of adhesive (e.g., less than a thickness of the mesh layer). UATP-1045-69:20-70:14; 71:24-6. All were known techniques to a POSITA and none are excluded by Phillips. *Id.* For example, a POSITA would have designed the ride vehicle so that the adhesive penetrates less than halfway through the pores, meaning that the mesh layer remains the friction bearing surface.

59. Notably, the wicking phenomenon PO alleges would prevent the combination is never mentioned as a problem in Phillips despite the use of woven, permeable material (e.g., sailcloth). This further highlights that the problems the POR raises would not have prevented routine attachment of a mesh layer. A POSITA would have understood how to append Phillips’ ride vehicle with a mesh (whether nylon mesh, sailcloth, or another material) using adhesive such that the adhesive does not destroy the benefits of appending the chosen material.

B. The Philips-WN0400 Combination provides Element [1c]

60. As an initial matter, I note that the Patent Owner’s Response does not address the analysis in the Petition and my first declaration that “a POSITA would have been prompted to select Teflon and nylon materials that achieve low friction between slide surface and vehicle (e.g., below the 0.15 coefficient of friction value

that was “typical” of dry slides),” to promote a fast and exhilarating sliding experience. Pet., 30-31. This obviousness rationale provides an independent basis why the combination includes Element [1c].

61. The ’854 patent itself acknowledges that the “coefficient of friction between a rider (or ride vehicle) and the slide surface of a typical dry slide is often within a range of between 0.15 to 0.3.” UATP-1001, 1:43-56; UATP-1047, 25:5-9. That is, the claimed range includes “typical” dry slides that didn’t include a lubricant in the slide surface. A POSITA would have readily implemented the slide surface using Teflon and nylon and been motivated to do so based on Phillips teachings, to achieve a coefficient of friction that was “low friction.” UATP-1004, 4:38:49; UATP-1045, 76:14-21. This is especially the case in view of the coefficient of friction values of “typical” slides that lacked Teflon or other lubricant.

62. Slick Slide’s other arguments do not address the actual combination and attempt to dismiss coefficient of friction values as not tested according to ASTM D1894 (a protocol the ’854 patent describes as an example, as I noted above).

63. According to ’854 patent, the “coefficient of friction between a rider (or ride vehicle) and the slide surface of a typical dry slide is often within a range of between 0.15 to 0.3,” which means that the claimed range includes “typical” dry slides conceded to be known as of the filing date of the ’854 patent. UATP-1001, 1:43-56. Teflon and nylon were known to be low friction materials at the time of

the '854 patent. Phillips explains that the “top surface” of the slide can be a low friction material such as Teflon, and the membrane that forms the bottom of the ride vehicle can be Nylon. UATP-1004, 4:38:49. Because Teflon and nylon were known to be low friction materials and the '854 patent acknowledged that typical dry slides already exhibited at least some of the claimed range, a POSITA would have understood that Phillips' ride vehicle would be implemented with a nylon mesh bottom and Teflon slide surface to result in a coefficient of friction within the claimed range from 0.03 to 0.2.

64. The Patent Owner's Response at page 3 incorrectly states that, according to “Petitioner's expert, the lowest CoF that could be achieved by the combination is 0.26.” POR, 3. This statement is both incorrect and mischaracterizes my testimony. This sentence is not followed by any citation. Importantly, the combination would plainly result in a coefficient of friction of less than 0.2 in view of Phillips' straightforward teachings about the use of Teflon and nylon materials, well-known to result in low friction below 0.2. This is especially the case where the POSITA would have implemented the system to have a relatively low friction based on Phillips express teachings. Elsewhere, the Patent Owner's Response asserts that “the lowest CoF” for any nylon mesh is “0.26,” but this ignores the actual combination which involves interaction between nylon mesh and a Teflon surface. Numerous references cited by the Petition and in my first declaration confirm that

nylon-Teflon interactions (and Teflon-Teflon, nylon-nylon) are typically lower than 0.2, and often significantly lower (e.g., 0.04), corroborating a POSITA's motivation to achieve the claimed range, with a reasonable expectation of success. *Supra*, §IV.A.

65. Slick Slide asserts that the coefficient of friction tables that I cited do not comply with ASTM D1894” and that “[s]uch results would not be relied upon by a POSITA.” POR, 65; EX2026, ¶¶61-69. This is incorrect and inconsistent how a POSITA would understand the '854 patent and these coefficient of friction values. For example, UATP-2027 includes tables of coefficient of friction data compiled by Oak Ridge National Laboratory, a federally funded research institution which a POSITA would have understood is a reliable source of such data. Notably, EX2026 describes the same equation for the coefficient of friction that is described in the '854 patent, consistent with the conventional understanding of coefficient of friction that all of the values I cite are based on. A POSITA would have understood that the coefficient of friction values included therein are reliable measures. And again, to be clear, the '854 patent does not require that the coefficient of friction be measured using the ASTM D1894 standard. Rather, the '854 patent explains that the coefficient of friction *may* be determined using the ASTM standard. UATP-1001, 11:31-44.

66. I note additionally that the numeric coefficient of friction values I've cited corroborate the coefficient of friction values rendered obvious and achieved by Phillips-WN0400. *Id.*; *infra*, §VII.C.1. The prior art materials align with the examples of the '854 Patent itself and would have readily achieved the coefficient of friction range of Element [1c] as a matter of routine implementation in accordance with Phillips' teachings. *Id.*

67. I disagree with the assertions in the Patent Owner's Response that coefficient of friction values would necessarily be higher such that the combination does not provide Element [1c] because Phillips' slide is inflatable and purportedly "deformable." POR, 52. As an initial matter, Phillips describes that the slide "can be inflatable," indicating that an inflatable configuration is optional. UATP-1004, 2:52-54; cl. 12. Indeed, Phillips likewise explains that the slide can be "fixed to a rigid frame," and can be "made to reside in a fixed location." UATP-1004, 2:44-60; 1:27-30 ("structural frames"). Accordingly, the premise in the Patent Owner's Response that the Phillips slide is necessarily "deformable" in a meaningful way that impacts coefficient of friction is unsupported and contrary to Phillips. Even as to an inflatable configuration, Phillips describes various embodiments that utilize a ride vehicle in the form of a "sports board," which a POSITA would have recognized as indicating a high level of rigidity to support the rider down the slide surface. UATP-1004, 3:9-

12. And nothing in Phillips requires, or even indicates as beneficial, any meaningful underinflation or deformation of its slide surface.

VII. Ground 1A: Phillips Anticipates And Renders Obvious (Claims 1-4 and 6-7)

A. Phillips anticipates the claimed “mesh layer” (Element [1b-iii])

68. Slick Slide’s arguments regarding Element [1b-iii] are based on a distinction of “sheeting” and “mesh layer” that is inconsistent with Phillips and the ordinary understanding of a POSITA. As I described above (refer to §§VI.A.2-3), “sheeting” is used by Phillips as encompassing a wide variety of materials, and there is nothing in Phillips that excludes meshes. *Id.* Slick Slide’s argument that Phillips does not disclose the claimed mesh layer is premised on an assumption that nylon, by virtue of inclusion in a list of low friction “sheeting material,” thus cannot be a mesh. But as I noted above, Phillips list includes materials that are not even a sheeting based on Patent Owner’s interpretation of “sheeting.” UATP-1045, 74:15-75:13 (acknowledging that artificial turf and synthetic carpet are not sheeting). Patent Owner’s assertion that nylon described by Phillips must be considered a sheeting to the exclusion of mesh directly conflicts with Patent Owner’s understanding that Phillips’ artificial turf and synthetic carpet are not sheeting.

69. Slick Slide’s proposed distinction between “sheeting” and “mesh” additionally fails upon consideration of Slick Slide’s cited definitions. Slick Slide alleges that a mesh layer is “characterized by open spaces” in a way that sheeting is

not, but this argument is inconsistent with Slick Slide's cited definitions of "mesh." POR, 32. As I described above, Slick Slide cited the ASTM standard definition of "fabric, mesh" as "a woven fabric with a permeable network made from interlacing threads or mono filament fibers." EX2018, 2. Sailcloth squarely fits this definition, because sailcloth is made from woven interlacing threads and is permeable. UATP-1048 ("because it is a breathable, woven fabric, Voyager sails are ideal for performance cruisers"); UATP-1054 ("[w]oven from high tenacity nylon" that has "low air porosity").

70. "Mesh layer," consistent with the '854 spec and common usage reflected in ASTM standards, encompasses woven, permeable fabric, such as sailcloth and woven nylon. Indeed, a POSITA would have readily envisaged from Phillips that the "nylon" be implemented as a woven, permeable material, just as the sailcloth recited in the same list is a woven, permeable material.

71. There is no dispute that nylon was known to exist as a mesh by the Critical Date of the '854 patent. UATP-1006, 1; UATP-1007, 1. A POSITA would have understood that Phillips' nylon material be a mesh, especially as Phillips enumerates it together with sailcloth, which is squarely encompassed by the ASTM definition of the term "mesh" cited by Patent Owner. UATP-1006, 1; UATP-1007, 1. Dacron—another material listed by Phillips with nylon and sailcloth—is a

common material that is used to make a woven sailcloth, and a POSITA would have likewise understood this.

72. Focusing on one embodiment of Phillips where the membrane “can be a single sheet of...material...upon which a user would sit or lie,” the POR alleges that if the ride vehicle were a mesh characterized by open spaces, riders would have discomfort associated with contacting the slide surface through these open spaces. POR, 33; UATP-1004, 7:4-30. This assertion of the POR overlooks the actual size of openings in the mesh layer. Nothing in Phillips requires open spaces of a particular size, and certainly not of an enlarged sized contemplated in Patent Owner’s argument. Also, to be clear, the assertions in the Patent Owner’s Response on this point do not apply at all to implementations in which the mesh is appended to a “sliding element,” described by Phillips in the same sentence. UATP-1004, 7:4-30.

73. The list of materials that Phillips describes as “sheeting material” does not exclude nylon meshes, and Phillips’ description of “nylon netting” in another context does not change this fact, as I discussed above (refer to §IV.A.2). Phillips clearly indicates that woven, permeable materials (e.g., such as sailcloth) are among the “sheeting materials” listed for the ride bottom, and a POSITA would have understood that nylon likewise be implemented similarly.

B. A POSITA would have been motivated to implement Phillips with a mesh layer to achieve the claimed coefficient of friction range (Elements [1b-iii] and [1c])

74. Even if not anticipated, a POSITA would have found it obvious to implement Phillips' "nylon" as a permeable, woven fabric, like Phillips' "sailcloth," with a reasonable expectation of success, for reasons I discussed in my original analysis and above (§VI.A.2).

75. Phillips describes "sailcloth"—a woven, permeable material—as a material for the ride vehicle bottom. Teflon and nylon were known to POSITA as having very low friction, which is further confirmed by Phillips' express description as such. A POSITA would have been motivated to implement the Teflon and nylon surfaces in a manner to effectuate Phillips "low friction" objectives, and would have reasonably expected that implementing these materials would result in a low coefficient of friction. This is especially the case given that the low friction properties of Teflon and nylon were well known by the Critical Date of the '854 Patent and these materials were expressly listed by Phillips. Furthermore, a POSITA would have understood how to implement the ride vehicle bottom with a nylon mesh made of monofilament fibers, as I discussed above. There are numerous ways that a monofilament mesh would have been attached to a ride vehicle as a matter of routine skill for a POSITA, without required difficult or unconventional processing steps (POR, 49).

76. Phillips anticipates Element [1c] because (1) Phillips' expressly discloses "low friction" sheeting materials that results in the coefficient of friction falling within the broad range claimed in the '854 patent, and (2) the known properties of these sheeting materials establish that the coefficient of friction between the slide surface and the ride vehicle would be at the low end of the claimed range. Even if not anticipated (which Petitioner does not concede), the Patent Owner's Response never specifically addresses the Petition's analysis that a POSITA would have been motivated to implement Phillips' Teflon slide surface and nylon ride vehicle to have a coefficient of friction within the claimed range, as I discussed above.

1. Phillips' Express Disclosure Of Low Friction Materials Provides The Claimed Range

77. In my first declaration, I set forth reasons why Phillips' "Teflon" slide surface and "nylon" ride vehicle would have been recognized as having a coefficient of friction within the claimed range. UATP-1001, 1:43-56; Pet., 26-31; UATP-1003, §§105-116. Phillips expressly discloses an embodiment where the slide surface comprises "Teflon," and the ride vehicle comprises "nylon." UATP-1004, 4:43-46. Both of these materials are described as "low friction" materials. EX1004, 2:44-60. Teflon-nylon interactions have very low friction (e.g., 0.05). UATP-1021, 1. Teflon-Teflon and nylon-nylon interactions are similarly low. UATP-1026, 5, 7; UATP-1027, 4. A POSITA would have understood that Phillips' embodiment of a Teflon

slide surface and a nylon ride vehicle bottom provides a coefficient of friction between these materials that fall within the claimed range, especially in view of Phillips' express teaching that the surfaces provide "low friction." The '854 patent concedes that the coefficient of friction between a ride vehicle and the slide surface of a "typical dry slide" is as low as 0.15, and a POSITA would have understood that the Teflon and nylon "low friction materials" achieve a low friction based on the disclosure of Phillips. UATP-1001, 1:43-56. I note that Slick Slide alleges purported differences in morphology or other factors as potentially impacting coefficient of friction, but none of these factors would take the Teflon and nylon of Phillips' system outside of the claimed range where Phillips expressly teaches "low friction" implementations and the known coefficient of friction values for such materials are at the lower end of the claimed range. *Supra*, §IV.B (addressing ASTM D1984). UATP-1001, 1:43-56; Pet., 26-31.

2. I am Qualified To Opine On Coefficient of Friction

78. Slick Slide contended that "Petitioner's expert identifies zero personal experience or graduate education related to measurement and analysis in the field of coefficient of friction... Petitioner's expert merely directed a student's study more than twenty years ago." POR, 37. This is simply incorrect. I have extensive coefficient of friction experience, including experience that directly relates to fibers and fiber science. First, my academic work has focused directly on fiber science and

coefficient of friction, and I have authored numerous papers on these subjects. Second, I was a member of ASTM for eight years, and I served on three committees that dealt directly with friction testing. Slick Slide's incorrect assertions concerning my expertise does not undermine the extensive documentary evidence that corroborates my testimony.

79. My academic work has focused heavily on studying the properties of materials (especially fibers) and what happens when materials move relative to each other. For example, I have studied at length how fibers interact with cement, and I authored several academic papers on this subject (e.g., "Modeling of Fiber Pull-out from a Cement Matrix," "A Special Technique for Determination of the Critical Length of Fiber Pull-Out from a Cement Matrix," "Effect of Inclining Angle, Bundling, and Surface Treatment on Synthetic Fiber Pull-Out from a Cement Matrix"). *Supra*, §II. Coefficient of friction is important to this analysis, because the force it takes to pull a fiber out of cement depends on the coefficient of friction between the fiber and the cement. Thus, I have not only studied coefficient of friction at length but I have studied coefficient of friction at length in the context of fiber science.

80. I also teach a course called "Engineering Mechanics – Statics" which introduces students to friction and its practical applications. Other courses that I teach deal directly with the coefficient of friction, fiber science, textile science, or

any combination of these. These courses include Textile Engineering, Fiber Science, Structure & Properties of Polymers, Yarn & Fabric Formation Processes, Mechanics of Textile Structures, Carpet Technology, Textile Testing, Advanced Fiber Science, Fiber Mechanics, Composite Materials & Processing, Principles and Applications of Engineering Materials, and Polymer/Fiber Enterprises.

81. I served on three ASTM committees that dealt directly with friction testing, taught courses involving coefficient of friction. *Supra*, §II. These committees included the “ASTM Technical Committee C09 on Concrete and Concrete Aggregates,” the “ASTM Technical Committee D30 on High Modulus Fibers & Their Composites,” and the “ASTM Technical Committee D13 on Textiles.” These three committees each dealt with testing standards for coefficient of friction as it relates to certain materials—explicitly including fibers and textiles. So not only am I well versed in coefficient of friction, fiber science, and textile science—I have served on the scientific committees that are tasked with developing the standards used to test materials in these contexts.

82. Slick Slide asserts that the Board should not weigh my declaration highly because Patent Owner alleges that I do not understand the term “ploughing” in the context of fibers. POR, 28. This term is mentioned briefly in one of the references that I cited in my first declaration. In my deposition, a lawyer for Slick Slide asked me about the term “ploughing.” UATP-2029, 77:15-78:16. When the

lawyer first asked me about this term, he did not do so in the context of fibers, he merely mentioned the term and asked me to describe what it is. He then moved on without asking further, and did not ask further questions about ploughing in the context of the references or my analysis. I note that Exhibit 1009 mentions the term “ploughing” in the context of “deformation” at page 2, and particularly with respect to deformation that can occur in the context of friction between unlubricated surfaces. Exhibit 1009 mentions this concept again at page 5, noting “no deformation” in that example. Based on my review of Exhibit 1009, there is no indication that such interactions would result in the combined system involving a lubricated surface, or that such interactions would result to negatively impact the coefficient of friction in the combined system in any meaningful way. The nylon would slide over the Teflon slide surface and would not result in deformation that impacts coefficient of friction values, especially due to the structure of these materials in the combined system.

VIII. Ground 2A: Phillips in view of Fallgatter Renders Obvious (Claims 1-7)

83. I note that the Patent Owner’s Response does not specifically address the motivations to implement Phillips’ slide using materials to achieve a low numerical coefficient of friction between the slide and ride vehicle, and a woven fabric vehicle bottom, as suggested by Fallgatter, which were set forth in the Petition and my original analysis. Pet., 59-64; POR, 66-69. Based on my review, the POR

does not address the actual combination presented in the Petition and my original analysis.

A. The Phillips-Fallgatter Combination provides Element [1b-iii]

84. Fallgatter expressly discloses a ride vehicle that uses a “woven textile” such as “nylon, polyester and polyethylene.” UATP-1005, [0006], [0009]. Slick Slide asserts that “Fallgatter does not disclose a mesh layer,” here again relying on an improperly narrowed interpretation. POR, 67; *supra*, §IV.A. The combined system includes a woven, permeable material, providing a “mesh” even under Slick Slide’s ASTM definition. *Id.*

85. The woven material is permeable, a characteristic even in woven fabrics such as sailcloth. *Supra*, §II.A. As Fallgatter’s nylon is a woven textile, a POSITA would have recognized this material is permeable. Gaps exist between threads of the woven material, even if the gaps are relatively small. Air and other particles (e.g., water) can fit between the threads meaning the material is permeable. Because Fallgatter expressly discloses a mesh layer on the bottom of a ride vehicle, it is even more clear that the ride vehicle of the Phillips-Fallgatter combination comprises the claimed ride vehicle.

86. I disagree with Slick Slide’s assertion that “when an inventor is trying to specify a mesh or fabric, they call it as such,” implying that Fallgatter’s nylon woven textile is not a mesh because the term “mesh” is not used in the specification.

POR, 67. Patent Owner's distinction between "sheeting" and "mesh" is not consistent with ordinary usage and is not relevant to Fallgatter's description. A POSITA would have understood Fallgatter as describing a woven, permeable material, and thus a mesh consistent with the '854 patent. Here, a POSITA would have plainly understood, based on Fallgatter, that the nylon woven textile of the combination is a mesh, because a woven textile includes gaps between threads that make it permeable.

B. The Philips-Fallgatter Combination provides Element [1c]

87. The petition and my first declaration explained multiple reasons that a POSITA would have been motivated to implement Phillips to achieve a coefficient of friction within the range that Fallgatter expressly provides. Pet., 58-64; UATP-1003, ¶¶199-211. Fallgatter expressly discloses a "dry slide 20" includes "slide body 22" that "can be formed of multiple layers." UATP-1005, [0038], [0042]. Fallgatter also explains that a "rider 32" can ride a "ride vehicle 34" down the slide. UATP-1005, [0039]. The slide body 22 includes a "substrate layer 52" and a "low-friction coating 54" applied to the substrate layer. UATP-1005, [0042]. According to Fallgatter, a static coefficient of friction of the low-friction coating "preferably less than about 0.25 and "even more preferably about 0.21 or less." UATP-1005, [0042].

88. The Patent Owner's Response never addresses this combination set forth in the Petition, instead focused on a composition of Fallgatter's slide surface.

POR, 67-69. For example, Slick Slide asserts that Phillips' low friction slide system "cannot reach Fallgatter's numerical values because it lacks the silicone coating" of Fallgatter. POR, 68. In doing so, Slick Slide makes assertions about the performance of Phillips' slide based solely on Slick Slide's perception of how Fallgatter's slide would perform without the low-friction coating. A POSITA would have been motivated to select Teflon and nylon materials to effectuate Phillips "low friction" system so as to achieve Fallgatter's desired range of "about 0.21 or less." Teflon was known to be a very low friction material. Likewise, a POSITA would have selected nylon for the bottom of the ride vehicle, because nylon is likewise a low friction material and durable.

89. Phillips expressly teaches the desirability of "low friction" between slide and vehicle (without any reservations against being too low), which a POSITA would have recognized as enhancing the ride experience. A POSITA would have been motivated and had a reasonable expectation of success in achieving a coefficient of friction within the claimed range (which encompasses even "typical" slides), including due to the motivations in my original analysis and set forth in the petition, and the known coefficient of friction values of nylon-Teflon interaction. There is no dispute that Phillips describes "low friction" as desirable.

90. I disagree with the statement in the Patent Owner's Response that any system without the low-friction coating of Fallgatter would yield a coefficient of

friction that “must therefore exceed 0.25.” POR, 68. There are many ways to achieve a coefficient of friction less than 0.25. Phillips provides a known, suitable technique to achieve a coefficient of friction significantly lower than 0.25—by using Teflon for the slide surface and using nylon for the ride vehicle bottom, which a POSITA would have been motivated to implement to achieve a coefficient of friction less than “typical” slides, for example. The record reveals that these two materials would produce a coefficient of friction far less than 0.25, and often as low as 0.05. UATP-1021, 1; UATP-1026, 5, 7; UATP-1027, 4.

91. I understand that Slick Slide argues that the Phillips-Fallgatter combination is insufficient as to the coefficient of friction limitation because Fallgatter’s low-friction coating would not be present in Phillips, and the combination seeks to “import” Fallgatter’s coefficient of friction values into Phillips. POR, 68. This does not accurately reflect the combination set forth in my original analysis. Phillips already discloses materials to reach the claimed coefficient of friction range, and Fallgatter provides a suggestion of a numeric value for the coefficient of friction—including that it is “even more preferable” to achieve a coefficient of friction that is “0.21 or less” because this would result in the benefit of a faster ride. UATP-1005, [0012], [0042].

IX. Ground 2B: Phillips, in view of Fallgatter, and further in view of WN0400 renders obvious (Claims 1-7, 14-17, 22-28)

92. The Phillips-Fallgatter-WN0400 combination provides the claimed mesh layer. Slick Slide challenges Ground 2B by repeating arguments that Slick Slide raised in the context of Ground 1B (Phillips-WN0400) and offering additional assertions that the combination is a “hindsight reconstruction” of the alleged invention. As described in my original analysis and the petition, a POSITA would have been motivated to combine Phillips, Fallgatter, and WN0400, and Phillips-Fallgatter-WN0400 provide all the features of claim 1.

93. Petitioner’s reliance on WN0400 in Ground 2B is not merely “tacking on” WN0400 as a generic mesh as Slick Slide claims in hindsight. Nylon meshes were well known and available by the Critical Date of the ’854 patent, as demonstrated by Fallgatter and WN0400. POR, 71. Fallgatter expressly discloses a nylon “woven textile” that represents a mesh and WN0400 expressly discloses a “nylon mesh.” UATP-1005, [0043]; UATP-1006, 1.

X. Ground 3A: Enablement (Claims 8-13)

94. Counsel provided me with the criteria to identify enablement, which they defined as the Wands factors. I considered each of the *Wands* factors based on my prior testimony as well as the affidavit and deposition testimony of Dr. Rust, Dr. Spiegelberg, and Mr. Schmit. Based on these materials, I maintain that the ‘854 patent has not enabled claims 8–13.

95. **Breadth of the claims:** I first considered the scope of the claims and whether they are broad or narrow. Earlier, I noted that the claims are broad enough to read on the theoretical limits of two solids in contact with one another. In responding to this record, Patent Owner turns to Dr. Spiegelberg's affidavit Exhibit 2026, presumably to establish that coefficient of friction in this range was routine. Yet, a more detailed review of Dr. Spiegelberg's testimony in paragraphs 251-254 reveals that (1) this range in EX2024 was for diamond-like carbon materials that nevertheless fall above the claimed range at .05 and (2) that the source relied on by the Patent Owner in EX2026 is in fact relying on "A review of the state of the art and perspectives on future research".¹ Nowhere does the Patent Owner acknowledge that diamond-like carbon materials should be used in slides. Patent Owner also fails to acknowledge that these materials are state of the art. Separately, Dr. Rust fails to acknowledge the record evidence that demonstrates the claimed performance is at the theoretical performance of any materials. Dr. Rust notes in paragraphs 202, "these values are reported for interactions involving ice and snow. UATP-1027, 7; UATP-1026, 3 (interactions between ice and brass); 5 (interactions between ice samples), 7 (interactions between snow and PTFE)." Nowhere does the Patent

¹ Baykara, M.Z.; Vazirisereshk, M.R.; Martini, A. Emerging superlubricity: A review of the state of the art and perspectives on future research. Appl. Phys. Rev. 2018, 5, 18.

Owner make clear how the recited slide would align with a coefficient of friction at .03 that is made up of ice or snow. Separately, the Patent relies on UATP-2026, which reveals a coefficient of friction for Teflon with Teflon of .04, which nevertheless lies above the recited range. It would be expected to be even higher when combined with known higher coefficient of friction materials required by claim 8, for example, including resin, thermal conductor, and hardener.

96. **Nature of the invention:** By claiming a coefficient of friction with a range of .03, the Patent Owner claims performance at the cutting edge of material science. In an attempt to corroborate performance in the recited range, Patent Owner relies on articles that describe the claimed superlubricity including an article seeking to explore “[a] review of the state of the art and perspectives on future research.” Any representation that this amounts to an enabling disclosure is undercut by their reliance on evidence showing that this performance is either “state of the art” or should be the subject of “future research.”

97. Further, the Patent Owner fails to acknowledge the complexity of the art to address this range. UATP-1043, §6 (noting that addition of molybdenum disulfide (MoS_2) powder may initially lower then wear rate below 4%, which then increases above 4%); UATP-1043, §7 (temperature and presence of curing agent impact coefficient of friction); UATP-1043, §8 (maximum coefficient of friction with lubricant is .09). As I outlined in my supplemental declaration and later

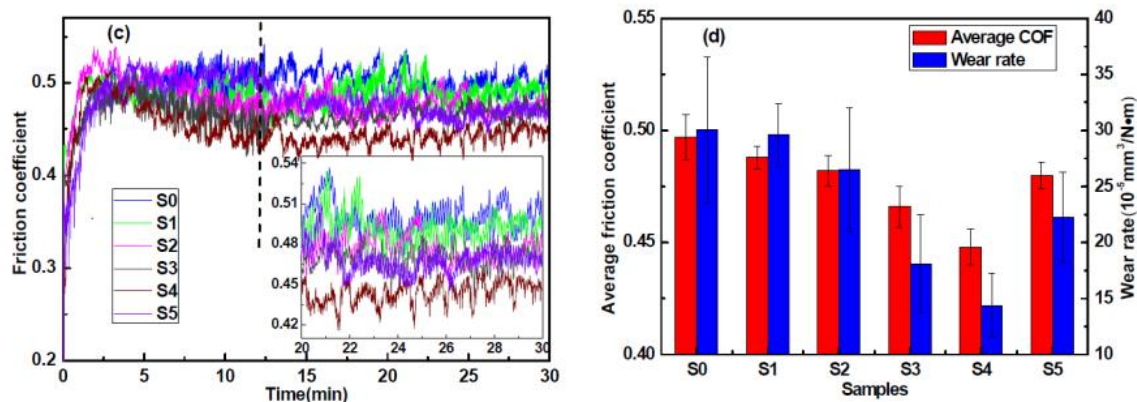
deposition testimony, formulations of a lubricant surface is wildly unpredictable at the low end of the range because changing the formulation of the materials may result in presence of “excess, weakly-bonded, lubricant particles” in the boundary layer of these materials. UATP-1043, §21, (referencing UATP-1039, 12). This, in turn, results in an increase in the coefficient of friction. As will be discussed in the *Wands* factor on the extent of experimentation, hundreds of tests were performed where a test would require hours or even weeks. UATP-1047, 36-37. Nowhere does the ‘854 patent acknowledge the difficulties in formulating these materials to avoid these challenges. Nor did the inventor reveal any such insight during his testimony. UATP-1043, §19 (noting that the coefficient of friction depends on macro and micro surface characteristics as well as interlayer characteristics). In paragraphs 11-13 of my supplemental declaration, I noted that nowhere did the Patent Owner indicate the amount of each material that should be used to achieve the recited results. Similarly, I noted “there is no suggestion in the ‘854 patent that these commercial epoxy products would possess the claimed frictional coefficient range of 0.03-0.06.” UATP-1043, §14; *see also* UATP-1043, §15 (noting inability to find any coefficient of friction for listed epoxies in this range).

98. **The characteristics and complexity of the invention itself:** A survey of commercial epoxies designed for particular applications, such as coatings for watercraft and aircraft, fails to achieve results approaching anywhere near this level

of performance. Even when accounting for added fillers like silicone or PTFE to provide a lower coefficient of friction (against air, water, or biofouling materials, for example), a POSITA would not have expected even these commercial epoxies to have coefficients of friction in the 0.03-0.06 range, contrary to Patent Owner's claim. See UATP-1039, 8 (Fig. 5B showing 100% by weight commercial epoxy with measured average friction coefficient of about 0.53, Fig. 5D showing commercial epoxy with optimized SiC and MoS₂ lubricant filler content with measured average friction coefficient of about 0.42); UATP-1040, 5 (Figs. 2-3 showing average pin-on-disc friction measurement for unmodified epoxy of about 0.35 and epoxy composite with optimized metal particle content with pin-on-disc friction measurement of about 0.1); 6 (Figs. 4-5 showing average pin-on-disc friction measurement for unmodified epoxy of about 0.175 and epoxy composite with optimized metal particle content with pin-on-disc friction).

99. **State of the prior art:** As noted earlier in the prior two sections, the existing knowledge and technology that is available at the time of the application demonstrates that the addition of lubricants did not have a predictable linear effect. *See, e.g.*, UATP-1043, §20 (noting that presence of lubricants does not have predictable linear effect (or other predictable effect)), UATP-1039, Figs. 5C-5D and Table 1. Indeed, when more lubricant is added, the prior art documents that the coefficient of friction increases. *Id.*, 8, 9 (“When the content of modified MoS₂

continued to increase, the average coefficient of friction and volume wear rate of the modified MoS₂/SiC/EP composites increased”).



UATP-1039, FIGS. 5C (left) and 5D (right)

Table 1. Ingredients of epoxy composites.

Sample	Fillers (wt.%)		EP (wt.%)
	SiC	MoS ₂	
EP	0	0	100
SE	50	0	50
S0	55	0	45
S1	54	1	45
S2	53	2	45
S3	52	3	45
S4	51	4	45
S5	50	5	45

UATP-1039, Table 1

100. Not only are these disciplines unpredictable, but I previously opined as to why they are unpredictable. As I noted in my supplemental declaration, UATP-1039 explains that it is important to have “the appropriate amount” of lubricant filler in a composite to optimize friction and wear characteristics without having excess,

weakly-bonded, lubricant particles to decrease these properties. UATP-1043, §21; UATP-1039, 12. A POSITA would have understood that such an “appropriate amount” cannot be determined theoretically, and can only be determined with significant experimentation.

101. **Level of ordinary skill:** Not only is lubricant science wildly unpredictable, but the knowledge and expertise expected of a person in the relevant field reveals that mechanical stirring is insufficient. UATP-1043, §23 (citing UATP-1039, 3). Rather, the addition of fillers to an epoxy would require surface modification of the filler particles to aid in dispersion of the particles in the epoxy for the very reasons stated in UATP-1039. *See* UATP-1039, 1 (describing the addition of surface-modified MoS₂ particles to epoxy), 3, 7 (“The dispersion uniformity of fillers in the epoxy resin matrix directly affects the performance of the EP composites [and] this effect will be more significant when the filler is added in a large proportion.”). However, a POSITA would have understood that the addition of fillers for the purpose of improving tribological performance can have unexpected consequences on other characteristics of the compound, such as decreasing mechanical hardness or flexural strength relative to un-filled epoxy. UATP-1041, 1; UATP-1039, 9 (hardness of the composite decreased with increasing content of surface-modified MoS₂). Nowhere does ‘854 patent acknowledge the need to provide surface fillers nor is the impact on structural integrity acknowledged. *See*

also UATP-1043, §26 (“In some cases, ‘the lubricant and the thermal conductor are mixed into or blended into a solvent carrier... to form a first intermediate mixture [which] is then mixed or blended into the resin to form a second intermediate mixture [which] is then mixed or blended with the hardening or curing agent to form the dry lubricant material which can then be applied to the slide surface.’ UATP-1001, 9:11-18. This is hardly a ‘roadmap’ for how to navigate determining an appropriate amount of lubricant to add in order to achieve frictional coefficients in the lowest claimed range, and the ’854 patent’s treatment of the preparation of the dry lubricant coating, along with Patent Owner’s statement, disregard the additional considerations and problems in adding fillers (like lubricants and thermal conductors) to epoxies of which a POSITA would have been aware.

102. **Predictability of the art:** In addition, I noted that this field is highly unpredictable. Adding metal particles to an epoxy composite also requires consideration of a variety of factors that influence tribological and mechanical characteristics of the composite. *See, e.g.*, UATP-1040, 2 (“It has been reported in literature that curing temperature has a significant effect on a variety of properties – especially mechanical ones, friction, tensile bond strength, electrical resistivity, etc. of cured epoxies”). UATP-1043, §27. As I noted, metal coating risks oxidation, which “show high friction in both cases.” Quite simply, UATP-1040 illustrates that the incorporation of such metal materials into an epoxy composite is not as

straightforward as suggested by the '854 patent and the Patent Owner, and a POSITA would have understood this well-known fact.

103. **Amount of direction:** The '854 patent provides minimal guidance as to how the composite should be mixed and provides no guidance as to how the concerns noted above as it relates to friction tied to surface particles and barrier layer morphology should be addressed. The '854 specification purports that conventional mixing should be used. See UATP-43, 26 (“[t]he dry lubricant material... is prepared by mixing the components together using any conventional mixing apparatus”. As to process, the '854 specification simply notes, “In some cases, ‘the lubricant and the thermal conductor are mixed into or blended into a solvent carrier...to form a first intermediate mixture [which] is then mixed or blended into the resin to form a second intermediate mixture [which] is then mixed or blended with the hardening or curing agent to form the dry lubricant material which can then be applied to the slide surface.’”) UATP-1001, 9:11-18. As noted with respect to the *Wands* predictability factors, these techniques result in increased friction.

104. **Existence of working examples:** Nowhere does the inventor acknowledge working samples that achieve the specified coefficient of friction of .03. When asked if he did any coefficient testing on initial slides installed at a Sky

Zone location, he noted, “To -- my knowledge, no”.² Nor did he keep a lab notebook. UATP-1047, 34. Indeed, the inventor refused to even credit the impact of a lubricant on the coefficient of friction, when asked, “if you add a lubricant like PTFE to a polymer slide surface whether the coefficient of friction would be reduced?” Mr. Schmit simply noted, “that's a very general question I'm not qualified to answer.”

105. **Quantity of experimentation:** The amount of experimentation that Mr. Schmit admitted was performed underscores that the claimed range was not enabled. When asked if he selected the materials that were used in the launch slide, he noted, “I experimented with hundreds of different materials over many, many years.” UATP-1047, 27. He then noted, “it was continued failure after failure, back to the drawing board that went on for many years.” When asked about the extent of testing required, he noted “hundreds” of combinations and tests no fewer than sixteen times in his testimony. When noting the impact of one variable on another in test, he noted that “there’s just too many variables to list.” UATP-1047, 43 (tests involved “experimenting and failing and experimenting and failing and -- just kept going and going”). Yet, nowhere did the document provide any roadmap for others to others to realize the fruits of this effort. Instead, he noted, “other than some scratch

² “Q: And so to arrive at the Launch Slide that was eventually delivered to a Sky Zone location, you relied only on that field testing process, observations, trial and error, and at that point didn’t perform any coefficient of friction testing?” UATP-1047, 34

pieces of paper, everything was pretty much in my head.” UATP-1047, 34. In recognizing the complexity of his testing regimen, he noted, “it was just a matter of just hundreds of different materials, trial and error, both in my garage tests and on the actual slide test itself. There’s too many to list.” *Id.* When asked if each test was time consuming, he answered, “Years.” *Id.* Each test would require, “Hours or sometimes weeks.” He only measured, “the distance that [the ride vehicle] came off the slide.” *Id.*

106. Dr. Spiegelberg agreed that no such path or roadmap was provided. He was asked, “But, Dr. Spiegelberg ... does this paragraph describe how they would be combined?” He responded, “It does not provide any information about how they are mixed together.” He was then asked, “does this paragraph describe the process by which they’d be combined?” He similarly answered, “No.” Dr. Spiegelberg was given additional opportunities to identify relevant portions of the ’845 specification that are responsive to lack of enablement arguments. For example, he was asked, “Does it describe the order of with which the materials may be combined? No. Does it describe the temperature? No. Does it describe the curing process? It includes description of a hardener. But does it describe the time for curing? No.”

107. Dr. Spiegelberg fails to identify which formulation of the compounds would achieve the recited range. “Do any of those embodiments describe a

coefficient of friction of .03·specifically? I didn't -- don't see that they do.” Nor did I see Dr. Spiegelberg rule out that the combination of materials rule out a coefficient of friction above the recited range. He was asked “is it possible that the dry lubricant material includes the four materials disclosed in claim 8 that the coefficient of friction could be greater than .06? I can’t say. You’d have to measure it.” Nor did he rule out that it could exceed .2 in subsequent questions. Dr. Spiegelberg’s testimony provides no additional insight into how the materials described in the ’854 specification should be combined or processed to achieve performance associated with the recited coefficient of friction. I believe that the testimony of Dr. Spiegelberg further supports my opinion that the recited range is not enabled.

108. When asked about the formulation of the coating compositions and where he obtained the chemicals, Mr. Schmit simply noted that they used, “[e]xisting products” or they were “creating our own, the list goes on. Again, hundreds over the course of years. ... There’s things that go wrong, like temperature, velocity, wear and abrasion. Just -- there – there’s so many -- there's so much room for error that it just -- it takes a lot when you start going down the material science's rabbit hole.” Mr. Schmit then conceded that he did not do coefficient of friction testing on any of these samples. Id (Q: “[Y]ou didn't have a coefficient of friction testing equipment for those tests? ... A: I did not. Q. And you didn't arrive at a numeric coefficient of friction value in those tests? ... No.”).

109. Mr. Schmit further acknowledged the complexity by talking about how a consultant, Dr. Jerry Lawson, “guided me down some paths of saving me probably years of time.” This was at a time “when I was spinning my wheels.” UATP-1047, 92. The complexity of the testing cannot be understated. When asked about how Dr. Lawson saved in testing, Mr. Schmit noted, “How much time have you got? Hundreds, if not thousands. ... hundreds, if not thousands of variables. ... There's just too many -- there's too many variables. There -- there isn't one. So dozens of variables. Anyone can blow the technology up.... It's just there's too many to list”

XI. Ground 3B: Indefiniteness (Claims 5 and 26)

110. I note that in the testimony of Mr. Schmit, he noted that multiple coatings may be applied during their testing. When asked, “when you were doing that – that testing, did they apply the slide coating, or did they provide the bare fiberglass substrate of the slide and you prepared and applied the slide surface?”, Mr. Schmit responded, “we generally would either overapply or reapply or strip down. So, yeah, we just had a fiberglass substrate that we worked from.” UATP-1047, 36. Based on this testimony, it is unclear whether Mr. Schmit intended claim 5 to recite overapplied coatings, reapplied coatings, or coatings that were applied after being stripped down. I maintain that claim 5 remains indefinite, for this additional reason.

111. Likewise, claim 26 appears to be indefinite because it is susceptible to multiple distinct interpretations, as set forth in my original analysis.

XII. An oil applied to the slide surface would impact the interaction between the ride vehicle bottom and the slide surface

112. I note that the '854 patent briefly mentions an "oil." EX1001, 4:66-7:2. I note that application of a liquid oil between the ride vehicle bottom and the slide surface would impact the interaction between those surfaces. In particular, a POSITA would have recognized the presence of the oil to impact the coefficient of friction between the slide surface and ride vehicle. Silicone oil was known to a POSITA to act as a lubricant, and would have been expected by a POSITA to reduce frictional interaction between the slide surface and ride vehicle.