UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

EiKO Global, LLC and
Halco Lighting Technologies, LLC
Petitioners

v.

Patent Owner of
U.S. Patent No. 7,086,747 to Lyman O. Nielson and Norman B. Hess

---

Inter Partes Review Case No. Unassigned

DECLARATION OF ERIC BRETSCHNEIDER, PH.D.

TABLE OF CONTENTS

I, Eric Bretschneider, Ph.D., hereby declare as follows.

I. OVERVIEW

1. I am over the age of eighteen (18) and otherwise competent to make this declaration.

2. I have been retained as an expert witness on behalf of EiKO Global, LLC and Halco Lighting Technologies, LLC (together, "Petitioners") for the above captioned *inter partes* review (IPR). I am being compensated for my time in connection with this IPR at my standard consulting rate, which is $300 per hour. I understand that the petition for *inter partes* review involves U.S. Patent No. 7,086,747 ("the '747 patent"), Exhibit 1001. The '747 patent originated from Provisional application No. 60/432,562, filed on December 11, 2002. I further understand that, according to USPTO records, the '747 patent is currently assigned to Blackbird Technology LLC ("Patent Owner").

3. In preparing this Declaration, I have reviewed the '747 patent and considered each of the documents cited herein, in light of general knowledge in the art. In formulating my opinions, I have relied upon my experience in the relevant art. In formulating my opinions, I have also considered the viewpoint of a person of ordinary skill in the art (i.e., a person of ordinary skill in the field of light emitting diode ("LED") fixture/lamp design, defined further below in Section 0) prior to December 11, 2002. I am familiar with the technology at issue as LED

fixture/lamp design. I am also familiar with the level of a person of ordinary skill in the art with respect to the technology at issue as of the claimed December 11, 2002 priority date.

II. MY BACKGROUND AND QUALIFICATIONS

4. I am an expert in the field of LED production technologies, including LED lamp/fixture design, MOCVD hardware/process, fabrication, LED chip and package testing and reliability, optical design, thermal management, color conversion, and Solid State Lighting fixture/lamp design, integration, and reliability, and I have been an expert in this field since prior to the claimed December 11, 2002 priority date. Throughout the remainder of this declaration, I will refer to the field of LED fixture/lamp design as the relevant field or the relevant art. In formulating my opinions, I have relied upon my training, knowledge, and experience in the relevant art. A copy of my current *curriculum vitae* is provided as Exhibit 1010, and it provides a comprehensive description of my academic, employment, and publication history.

5. As an expert in the field of LED fixture/lamp design since prior to December 11, 2002, I am qualified to provide an opinion as to what a person of ordinary skill in the art would have known or concluded as of 2002. Since 2002, I have accumulated significant training and experience in the field and I have

extensive knowledge and experience relating to techniques and reasoning used in the field.

6. I received a B.S.E. degree in Chemical Engineering from the Tulane University in 1989.

7. I received a Ph.D. degree in Chemical Engineering from the University of Florida in 1997.

8. I am a member of the University of Florida Department of Chemical Engineering Advisory Board. I have been a Conference Chair for LED Measurement and Standards. I also am a member of a number of professional societies, including SPIE, Materials Research Society, and IES (the Illuminating Engineering Society).

9. My participation in IES activities includes active participation in numerous committees, most notable the Test Procedures Committee. The IES Test Procedures Committee has been the most active organization in developing standards related to LEDs and LED lighting, most of which have been adopted internationally. As a full member of the Test Procedures Committee and other IES committees, I have played an active role in developing LED related standards including: LM79 "Approved Method for Electrical and Photometric Measurements of Solid-State Lighting Products", LM80 "Approved Method for Measuring Luminous Flux and Color Maintenance of LED Packages, Arrays and Modules",

LM82 "Approved Method for the Characterization o LED Light Engines and LED Lamps for Electrical and Photometric Properties", LM84 "Approved Method for Measuring Luminous Flux and Color Maintenance of LED Lamps, Light Engines and Luminaires", LM85 "Approved Method for Electrical and Photometric Measurements of High Power LEDs", TM21 "Projecting Long Term Lumen Maintenance of LED Light Sources", TM28 "Projecting Long Term Luminous Flux Maintenance of LED Lamps and Luminaires.

10. I was the technical coordinator for LM86 "Approved Method for Measuring Luminous Flux and Color Maintenance of Remote Phosphor Components". I also developed Differential Chromaticity Analysis, the only method capable of projecting color point stability of LEDs. This method is being adopted for TM31 "Projecting Color Point Stability of LEDs". I have also played a major role in the revisions to TM21 and will be technical coordinator for a new standard related to biological effects of spectral power distributions.

11. I have direct experience with MOCVD hardware design, MOCVD process development (including AlGaAs, AlInGaP, and GaN materials), wafer characterization, die fabrication, LED test and reliability (die, package, and fixture level), LED package design (optical, thermal, and color-conversion), and design of LED lighting fixtures/lamps. I am also a member of the Society for Information

Display, which focuses on display applications including exit signs, billboards, television displays, and portable electronics.

12. I was the Director of IP for an LED public company.

13. I have extensive industry experience as set forth in my *CV* attached as Ex. 1010, and I am an inventor or named author on over 28 patents and 30 publications/presentations, including LED patents relating to national security matters. Additional contributions of mine to the field are also set forth in my current *curriculum vitae*. (Exhibit 1010).

III. LIST OF DOCUMENTS CONSIDERED IN FORMULATING MY OPINION

14. In formulating my opinion, I have considered any documents cited in this declaration, specifically including the following documents:

Description
U.S. Patent No. 7,086,747 to Nielson, et al. ('747 patent)
File History of U.S. Patent No. 7,086,747
U.S. Patent No. 5,410,453 to Ruskouski ("Ruskouski")
U.S. Patent No. 4,323,820 to Teich ("Teich")
U.S. Patent No. 7,204,602 to Archer ("Archer")
U.S. Patent No. 6,283,612 to Hunter ("Hunter")
U.S. Patent No. 5,226,724 to Kanarek ("Kanarek")
U.S. Patent No. 7,049,761 to Timmermans *et al*. ("Timmermans")
U.S. Patent No. 6,184,628 to Ruthenberg ("Ruthenberg")

IV. PERSON HAVING ORDINARY SKILL IN THE ART

15. I understand that a person having ordinary skill in the art is one who is presumed to be aware of all pertinent art, thinks along conventional wisdom in the

art, and is a person of ordinary creativity. A person having ordinary skill in the art ("PHOSITA") would have had knowledge of the literature concerning LED fixture/lamp design and related arts as of December 11, 2002.

16. Based on my review of the patent specification and file history of the '747 patent, in my opinion, a PHOSITA would have at least a B.S., or equivalent experience, in electrical engineering, chemical engineering, materials science, or a related field, including at least three years of experience designing, constructing, and/or testing LED fixtures and lamps. I would have been a PHOSITA at least by December 11, 2002.

V. OVERVIEW OF THE '747 PATENT

17. I have considered the disclosure of the '747 patent in light of the knowledge of a PHOSITA as of the claimed priority date of the '747 patent, which I understand to be December 11, 2002.

18. The '747 patent is titled "Low-Voltage Lighting Apparatus For Satisfying After-Hours Lighting Requirements, Emergency Lighting Requirements, and Low Light Requirements," and describes an energy-efficient lighting apparatus. Ex. 1001, Abstract. The lighting apparatus is described as being energy efficient because it makes use of light-emitting diodes ("LEDs"). Ex. 1001, 4:60-67. Some described purposes of the '747 patent include lighting apparatus that provide sufficient illumination to satisfy after-hours lighting

requirements, emergency lighting requirements, and low light requirements. Ex. 1001, 1:17-22. The '747 patent describes accomplishing these purposes by using LEDs for after-hours lighting in conjunction with fixtures for fluorescent lighting that are used during normal business hours, or turning on only LEDs to provide low level lighting at other times. Ex. 1001, 4:51-56, 4:58-59.

19. Claims 1 and 12 of the '747 patent are directed to a lighting apparatus and retrofit of a lighting apparatus, respectively, that include LEDs. Ex. 1001, cls. 1, 12. Claims 1 and 12 describe very similar and straightforward subject matter. Each claim describes the inclusion of a circuit-board comprising a plurality of light-emitting diodes. Ex. 1001, cls. 1, 12. Claim 1 is directed toward an embodiment where the light-emitting diodes protrude through a ballast cover, while claim 12 is directed toward an embodiment that describes a housing with light-emitting diodes protruding through for retrofit with an existing light fixture having a ballast cover. Ex. 1001, cls. 1, 12.

20. Figure 1 is an example of the claim 1 embodiment incorporating a ballast cover 110. Ex. 1001, Fig. 1, 4:35-39. In the claim 1 embodiment, the ballast cover has holes in it and the circuit board is placed adjacent to the ballast cover so that the LEDs protrude through the holes. Ex. 1001, Fig. 1, 4:41-44.

21. Figure 5 is an example of the claim 12 embodiment employing a housing 528 for retrofit with a light fixture having a ballast cover. Ex. 1001, Fig.

5, 9:1-11. In the claim 12 embodiment, the housing has two surfaces, specifically an attachment surface 530 and an illumination surface 532. Ex. 1001, Fig. 5, 9:26-35. The illumination surface is described as being opposite the attachment surface. Ex. 1001, 9:19-20, Fig. 5. Further, in the claim 12 embodiment, the illumination surface of the housing (rather than the ballast cover) has holes in it, and LEDs, which are attached to circuit board 511, protrude through these illumination surface holes. Ex. 1001, Fig. 5, 9:26-35. In the specification, the attachment surface of the housing is described as being secured to a ballast cover in the claim 12 embodiment, however claim 12 itself does not recite any such requirement. 'Ex. 1001, 9:17-19, 9:20-25. Additionally, claim 12 requires that the illumination surface and the attachment surface be secured together by way of a "fastening mechanism." Ex. 1001, cl. 12. However, the only fastening mechanism described in the specification is for "securing the attachment surface 530 to the ballast cover 528" and Figure 5 does not identify a fastening mechanism as described in claim 12. Ex. 1001, Fig. 5, 9:36-50.

VI. CLAIM CONSTRUCTION

22. I understand that the challenged claims must be given their broadest reasonable interpretations in light of the intrinsic record of the '747 patent, which means that the words of the claims should be given their broadest possible meaning consistent with the specification of the '747 patent.

23. I understand that Petitioners have proffered the following constructions of terms in the '747 patent:

- *An energy-efficient lighting apparatus, comprising:* not limiting preamble
- *An energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, comprising*: not limiting preamble
- *Housing*: "structure that encloses other components"
- *Ballast cover*: "structure that encloses wiring"

24. I also understand that the Patent Owner took the position in an unrelated District Court proceeding that "housing" should be construed to mean "an enclosure that covers or protects other components."

25. I have applied the constructions above throughout my declaration. I agree that the above constructions are correct.

VII. LEGAL STANDARDS

A. Prior Art

26. It is my understanding that to qualify as prior art, a document must meet the requirements of 35 U.S.C. § 102(a), (b), (d), (e), or (g).

B. Anticipation

27. It is my understanding that a prior art reference anticipates a claim if it discloses each and every element recited in the claim, arranged as in the claim, so

as to enable one of skill in the art to make and use the claimed invention without the need for undue experimentation in light of the general knowledge available in the art. I understand that in order to anticipate an invention, a prior art reference must be enabling to a PHOSITA.

28. I understand that without expressly disclosing a claimed limitation, a prior art reference may inherently disclose that limitation if that missing characteristic is necessarily present in the single anticipating reference.

29. I understand that the express and inherent disclosures of a prior art reference may be relied upon. However, I understand that the fact that a certain result or characteristic may occur or may be present in the prior art is not sufficient to establish the inherency of that result or characteristic.

30. The factors that I have considered in determining whether a reference sets forth the elements of a claim in a sufficient manner such that a PHOSITA could have readily made and used the claimed invention without undue experimentation include: the breadth of the claim, the nature of the invention, the state of the prior art, the level of one of ordinary skill, the level of predictability in the art, the amount of direction provided by the reference, the existence of working examples, and the quantity of experimentation needed to make or use the invention claimed.

C. Obviousness

31. I understand that even if a patent is not anticipated, it is still invalid if the differences between the claimed subject matter and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person of ordinary skill in the pertinent art.

32. I understand that a person of ordinary skill in the art provides a reference point from which the prior art and claimed invention should be viewed. This reference point prevents one from using his or her own insight or hindsight in deciding whether a claim is obvious.

33. I also understand that an obviousness determination includes the consideration of various factors such as (1) the scope and content of the prior art; (2) the differences between the prior art and the asserted claims; (3) the level of ordinary skill in the pertinent art; and (4) the existence of secondary considerations such as commercial success, long-felt but unresolved needs, failure of others, etc.

34. I am informed that secondary indicia of non-obviousness may include (1) a long felt but unmet need in the prior art that was satisfied by the invention of the patent; (2) commercial success or lack of commercial success derived from the invention the patent; (3) unexpected results achieved by the invention; praise of the invention by others skilled in the art; (4) taking of licenses under the patent by others; and (5) deliberate copying of the invention. I also understand that there must be a relationship, or nexus, between any such secondary indicia and the

invention. I further understand that contemporaneous and independent invention by others is a secondary consideration supporting an obviousness determination.

35. I understand that an obviousness evaluation can be based on a combination of multiple prior art references. I understand that the prior art references themselves may provide a suggestion, motivation, or reason to combine, but other times the nexus linking two or more prior art references is simple common sense or ordinary knowledge available to a person of ordinary skill in the art. I further understand that obviousness analysis recognizes that market demand, rather than scientific literature, often drives innovation, and that a motivation to combine references may be supplied by the direction of the marketplace.

36. I understand that if a technique has been used to improve one device, and a person of ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.

37. I also understand that practical and common sense considerations should guide a proper obviousness analysis, because familiar items may have obvious uses beyond their primary purposes. I further understand that a person of ordinary skill in the art looking to overcome a problem will often be able to fit the teachings of multiple publications together like pieces of a puzzle. I also understand that these puzzle pieces need not fit together perfectly. I understand

that obviousness analysis takes into account the inferences and creative steps that a person of ordinary skill in the art would employ under the circumstances.

38. I understand that a particular combination may be proven obvious by showing that it was obvious to try the combination. For example, when there is a design need or market pressure to solve a problem and there are a finite number of identified, predictable solutions, a person of ordinary skill has good reason to pursue the known options within his or her technical grasp because the result is likely the product not of innovation, but of ordinary skill and common sense.

39. The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results. When a work is available in one field of endeavor, design incentives and other market forces can prompt variations of it, either in the same field or a different one. If a person of ordinary skill can implement a predictable variation, it is not likely patentable.

40. It is further my understanding that a proper obviousness analysis focuses on what was known or obvious to a person of ordinary skill in the art, not just the patentee. Accordingly, I understand that any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed.

41. I understand that a claim can be obvious in light of a single reference, without the need to combine references, if the elements of the claim that are not found explicitly or inherently in the reference can be supplied by the common sense of one of skill in the art.

42. I understand that a person of ordinary skill in the art could have combined two pieces of prior art or substituted one prior art element for another if the substitution can be made with predictable results, even if the swapped-in element is different from the swapped-out element. In other words, the prior art need not be like two puzzle pieces that must fit together perfectly. The relevant question is whether prior art techniques are interoperable with respect to one another, such that that a person of ordinary skill in the art would view them as a design choice, or whether a person of ordinary skill in the art could apply prior art techniques into a new combined system.

43. In sum, my understanding is that prior art teachings are properly combined where a person of ordinary skill in the art having the understanding and knowledge reflected in the prior art and motivated by the general problem facing the inventor and would have been led to make the combination of elements recited in the claims. Under this analysis, the prior art references themselves, or any need or problem known in the field of endeavor at the time of the alleged invention, can

provide a reason for combining the elements of multiple prior art references in the claimed manner.

44. I have been informed and understand that the obviousness analysis requires a comparison of the properly construed claim language to the prior art on a limitation-by-limitation basis.

VIII. ANALYSIS OF INVALIDITY GROUNDS

45. I understand that the ground on which EiKO seeks to invalidate the claims of the ’747 patent is as follows:

Ground	35 USC	Index of References	Claims
1	§ 103	U.S. Patent No. 5,410,453 to Ruskouski in combination with U.S. Patent No. 4,323,820 to Teich	1, 12
2	§ 102	U.S. Patent No. 7,204,602 to Archer	1, 12
3	§ 103	U.S. Patent No. 7,204,602 to Archer in combination with U.S. Patent No. 6,184,628 to Ruthenberg	12
4	§ 103	U.S. Patent No. 6,283,612 to Hunter in combination with U.S. Patent No. 5,226,724 to Kanarek and U.S. Patent No. 7,049,761 to Timmermans *et al*.	12

46. The prior art discussed below renders claims 1 and 12 of the ’747 patent anticipated and/or obvious. Claims 1 and 12 of the ’747 patent should be found invalid and canceled.

A. Ground 1: Claims 1 and 12 Are Obvious over Ruskouski in View of Teich.

1. Claim 1

(a) An energy-efficient lighting apparatus, comprising:

47. Ruskouski discloses an energy efficient apparatus as claimed in claim 1. A PHOSITA at the time of the invention would have understood that that using LEDs as a lighting source was a well known way to build an energy-efficient lighting apparatus. It was well known in the art at the time of the '747 patent that fluorescent lamps were an energy efficient alternative to incandescent lamps, and that the use of LEDs in a fixture or luminaire was a more energy-efficient solution than both the use of incandescent and fluorescent lamps in a similar device. Thus, a PHOSITA at the time of the invention would have understood that a device making use of LEDs is more energy efficient than a device using incandescent or fluorescent lamps. Ruskouski discloses this by stating, "[a] major drawback is that the incandescent bulbs use large amounts of electric power thus requiring a relatively large emergency battery power supply for use during emergency lighting situations" and "To alleviate the drawbacks associated with incandescent bulbs, many manufacturers are beginning to utilize light emitting diodes (LEDs) rather than incandescent bulbs in exit signs." Ex. 1004, 1:26-43. Moreover, Ruskouski makes use of LEDs. Ex. 1004, 1:44-46. As described above in Section VI, "An energy-efficient lighting apparatus, comprising" should be construed to be a non-limiting preamble.

48. To the extent the preamble to claim 1 is limiting, Ruskouski discloses "an energy-efficient lighting apparatus" as described above.

49. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski discloses "an energy-efficient lighting apparatus" as claimed in claim 1 of the '747 patent.

(b) a ballast cover

50. As described above in Section VI, "ballast cover" should be construed to mean "structure that encloses wiring."

51. Ruskouski discloses a ballast cover. Figure 10 of Ruskouski depicts an elongated plastic housing 38A, which corresponds to the claimed "ballast cover" of claim 1. Ex. 1004, Fig. 10. It is my opinion that element 38A of Ruskouski meets the proposed construction of "ballast cover" because element 38A of Ruskouski has inside it both a circuit board 42A, and a battery charger and converter 50A, which is circuitry, or wiring, used to rectify the alternating current, amongst other purposes. Ex. 1004, 6:3-26. Thus element 38A is a "structure that encloses wiring" as required by the construction and as described by claim 1. Element 38A is the combination of element 68, which is the rear half of the ballast cover, and element 66, which is the front half of the ballast cover. Ex. 1004, 6:3-4.

52. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski discloses "a ballast cover" as claimed in claim 1 of the '747 patent.

(c) a plurality of ballast cover holes in the ballast cover

53. Ruskouski discloses a plurality of ballast cover holes in the ballast cover. Figure 10 of Ruskouski depicts frustoconical apertures 40A in the elongated housing 38A, which correspond to the plurality of ballast cover holes in the ballast cover of claim 1. Ex. 1004, 1:67-2:6, 6:3-8. For example, Ruskouski describes "[t]he front portion 66 has frustoconical aperture 40A for light emitting diodes 44A." Ex. 1004, 6:4-6. A PHOSITA at the time of the invention would have understood that the term "aperture" is just another word for "hole," and "frustoconical" describes the shape of that hole.

54. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski discloses "a plurality of ballast cover holes in the ballast cover" as claimed in claim 1 of the '747 patent.

(d) a circuit board comprising a plurality of light-emitting diodes

55. Ruskouski discloses a circuit board comprising a plurality of light-emitting diodes. Figure 10 of Ruskouski depicts a circuit board 42A that includes light emitting diodes 44A, which correspond to the circuit board comprising a plurality of light-emitting diodes of claim 1. Ex. 1004, Fig. 10, 2:22-27, 3:57-60; 5:66-6:2, 6:3-8. For example, Ruskouski describes these elements as "[t]he

plurality of light emitting diodes are mounted on a printed circuit board." Ex. 1004, 2:22-27.

56. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski discloses "a circuit board comprising a plurality of light-emitting diodes" as claimed in claim 1 of the '747 patent.

(e) wherein the circuit board is positioned adjacent the ballast cover so that the plurality of light-emitting diodes protrude through the plurality of ballast cover holes in the ballast cover

57. Ruskouski discloses that the circuit board is positioned adjacent the ballast cover so that the plurality of light-emitting diodes protrude through the plurality of ballast cover holes in the ballast cover. Ruskouski's description of the frustoconical apertures 40A being for LEDs 44A mounted on printed circuit board 42A corresponds to the claimed circuit board and is positioned adjacent to the ballast cover so that the plurality of light-emitting diodes protrude through the plurality of ballast cover holes in the ballast cover of claim 1. Ex. 1004, 1:67-2:6, 6:5-7.

58. Additionally, Ruskouski describes having two embodiments, the embodiment disclosed in Figures 1-9, and the embodiment disclosed in Figure 10. Ex. 1004, 5:62-64. Ruskouski further teaches that its two embodiments have very similar arrangements, with identical components. Ex. 1004, 5:66-6:2. Thus, a

PHOSITA would understand that descriptions relating to components in the first embodiment would also be descriptions for components in the second embodiment. For example, Ruskouski teaches "essentially all components [in Figure 10] are identical to the arrangement in FIGS. 1-9 and like components have been designated with like reference numerals except for the addition of the reference character A." Ex. 1004, 5:66-6:2. Thus, the frustoconical apertures 40A in Figure 10 correspond to the frustoconical apertures 40 in Figures 1-9, the printed circuit board 42A in Figure 10 corresponds to the printed circuit board 42 in Figures 1-9, the LEDs 44A in Figure 10 correspond to the LEDs 44 in Figures 1-9, and the arrangement in Figure 10 of elements 40A, 42A and 44A corresponds to the arrangement in Figures 1-9 of elements 40, 42 and 44. Ruskouski describes "[o]ne light emitting diode 44 is positioned to extend into each of the frustoconical apertures 40," which explains that the LEDs extend into, or protrude through, the holes in the ballast cover as described by claim 1. Ex. 1004, 3:60-62. Accordingly, Ruskouski discloses that the LEDs mounted on the circuit board are positioned such that the LEDs protrude through the holes in the ballast cover.

59. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski discloses "wherein the circuit board is positioned adjacent the ballast cover so that the plurality of light-emitting diodes protrude through the plurality of ballast cover holes in the ballast cover" as claimed in claim 1 of the '747 patent.

(f) wherein the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch.

60. This limitation is obvious based on a combination of Ruskouski and Teich. Teich discloses a lighting apparatus. Teich's description of an "emergency light [that] is an 'exit sign'" corresponds to the lighting apparatus of claim 1, which is described in the '747 patent as providing emergency lighting. Ex. 1001, 1:17-22, 3:61-64, 4:51-67; Ex. 1005, 1:10-16, 1:26-32. Teich further discloses that the lighting apparatus "is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch." Ex. 1005, 1:4-9, 2:20-25, 2:58-66, 3:6-23, cl. 1. For example, Teich discloses that "detection circuitry is provided with the emergency lighting system for distinguishing between a loss of power at the fixture which results from turning off of the wall switch" and "[i]f the wall switch is open, power to the lamp from the secondary power source is cut off." Ex. 1005, 2:58-66, 3:6-23. This disclosure in Teich describes a system where an emergency light comprising an exit sign is connected to and controlled by a wall switch and also has a battery backup system. The system is designed to turn off the exit sign when a light switch is turned off, but otherwise have the exit sign remain on in the event of a power failure. Because the system is designed to turn off the exit sign when the power switch is turned off,

the exit sign is controllable based upon the position of the wall switch, as required by claim 1. Teich teaches that this improvement over other exit sign art allows an exit sign to be turned off at night so as to not engage and drain the battery backup when no one will make use of the sign. Ex. 1005, 1:47-62.

61. A PHOSITA would have been motivated to combine the teachings of Ruskouski and Teich. Both Ruskouski and Teich are in the field of emergency lighting devices. Ex. 1004, Abstract; Ex. 1005, 1:10-16, 1:26-32. Further, Both Ruskouski and Teich are attempting to solve the same problem, the problem of how to power an exit sign in the event of a power failure, and address this problem in the same way by using a battery backup. Ex. 1004, 1:8-16, 1:47-51; Ex. 1005, 2:58-66, 3:6-23. Thus a PHOSITA attempting to solve a stated problem of the '747 patent—a lighting apparatus to provide "sufficient illumination to satisfy…emergency lighting requirements,"—would look to both Ruskouski and Teich.

62. Additionally, A PHOSITA at the time of the invention would have understood Teich to teach an improvement to exit signs that use a battery backup. Specifically, Teich allows an exit sign with a battery backup to be turned off with a wall switch without triggering the battery backup, thus allowing the exit sign to be powered down via a wall switch. Ex. 1004, 1:4-9, 2:20-25, 2:58-66, 3:6-23, cl. 1. A PHOSITA would have further understood that the improvement taught by Teich

could be implemented in exit signs other than the one described in Teich, resulting in exit signs that would remain powered in an emergency lighting situation, but could be turned off through the use of a wall switch. For example, a PHOSITA would have understood that the circuitry of Teich that allows an exit sign to be turned off with a wall switch could have implemented by the exit sign disclosed in Ruskouski, producing the predictable result that the exit sign of Ruskouski could be powered down at night by use of a wall switch without draining the battery backup.

63. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski in combination with Teich discloses "wherein the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch" as claimed in claim 1 of the '747 patent, and a PHOSITA would have been motivated to combine the disclosures of Ruskouski and Teich to arrive at this claim limitation.

2. Claim 12

(a) An energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, comprising:

64. Ruskouski discloses an energy efficient apparatus as claimed in claim 12. A PHOSITA at the time of the invention would have understood that that using LEDs as a lighting source was a well known way to build an energy-efficient

lighting apparatus. It was well known in the art at the time of the '747 patent that fluorescent lamps were an energy efficient alternative to incandescent lamps, and that the use of LEDs in a fixture or luminaire was a more energy-efficient solution than both the use of incandescent and fluorescent lamps in a similar device. Thus, a PHOSITA at the time of the invention would have understood that a device making use of LEDs is more energy efficient than a device using incandescent or fluorescent lamps. Ruskouski discloses this by stating, "[a] major drawback is that the incandescent bulbs use large amounts of electric power thus requiring a relatively large emergency battery power supply for use during emergency lighting situations" and "To alleviate the drawbacks associated with incandescent bulbs, many manufacturers are beginning to utilize light emitting diodes (LEDs) rather than incandescent bulbs in exit signs." Ex. 1004, 1:26-43. Moreover, Ruskouski makes use of LEDs. Ex. 1004, 1:44-46. As described above in Section VI, "[a]n energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, comprising" should be construed to be a non-limiting preamble.

65. To the extent the preamble to claim 12 is limiting, Ruskouski discloses an energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover as claimed in claim 12. As described above, Ruskouski discloses an energy-efficient lighting apparatus. Further, Ruskouski discloses that the exit sign is equipped with "standard screw type lamp sockets 36"

which describe lamp sockets that accept traditional, standard incandescent light bulbs. Ex. 1004, 3:49-51. Thus, Ruskouski's disclosure that a light emitting diode device fits into these standard sockets is a disclosure of a retrofit as described by claim 12. Ex. 1004, 4:24-31.

66. It is my opinion that element 24 of Ruskouski meets the proposed construction of "ballast cover" because Ruskouski discloses that the exit sign includes "a wiring compartment 24…[that] contains an appropriate wiring harness 30 and battery power pack module 32 for powering two 1-watt direct current light emitting diode lighting devices 34." Ex. 1004, 3:41-51. Thus element 38A is a "structure that encloses wiring" as required by the construction and as described by claim 12.

67. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski discloses "an energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, comprising" as claimed in claim 12 of the '747 patent.

(b) a housing having an attachment surface and an illumination surface;

68. As described above in Section VI, "housing" should be construed to mean "structure that encloses other components."

69. Ruskouski discloses a housing having an attachment surface and an illumination surface. Figure 10 of Ruskouski depicts an elongated plastic housing 38A, which corresponds to the claimed "housing" of claim 12. Ex. 1004, Fig. 10. It is my opinion that element 38A meets the proposed construction of "housing" because element 38A of Ruskouski has inside it both a circuit board 42A, and a battery charger and converter 50A, which is circuitry, or wiring, used to rectify the alternating current, amongst other purposes. Ex. 1004, 6:3-26. Thus element 38A is a "structure that encloses other components" as required by the construction as described by claim 12. Element 38A is the combination of element 68, which is the rear half of the housing, and element 66, which is the front half of the housing. Ex. 1004, 6:3-4. Thus element 66 corresponds to the claimed "illumination surface" of claim 12, and element 68 corresponds to the claimed "attachment surface" of claim 12.

70. I have reviewed the file history of the '747 patent, including the April 27, 2005 Office Action where the patent Examiner rejected all 32 claims of the application that led to the '747 patent, including claims 1 and 12. Ex. 1002, April 27, 2005 Office Action at 2-4. It is my opinion that there is a typo in the Examiner's justification for his rejection of claim 12. With regard to the Examiner's justification that Ruskouski meets the "housing" limitation of the '747 patent, the Examiner mistakenly identified element 72 as the attachment surface.

Ex. 1002 at 4. A PHOSITA would understand from additional context in this Office Action that the PHOSITA meant to identify element 68 instead of element 72. For example, the Examiner identifies elements 70 and 72 as the "fastening mechanism," and not the attachment surface with regard to the "fastening mechanism" limitation of the '747 patent. Ex. 1002 at 4. The Examiner goes on to identify the Figure 10 showing the attachment surface secured to the ballast cover by identifying elements 66 and 68, further supporting that the Examiner meant to identify element 68 as attachment surface and not element 72. Finally, the specification of Ruskouski supports this understanding, as it describes element 68 as the "rear half" of the "elongated plastic housing 38A." Ex. 1004, 6:3-4. The specification of Ruskouski describes element 72 as "openings in the rear portion 68 to hold portions 66, 68 in assembly," which a PHOSITA would understand do not constitute an "attachment surface." Ex. 1004, 6:3-8.

71. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski discloses "a housing having an attachment surface and an illumination surface" as claimed in claim 12 of the '747 patent.

(c) a plurality of illumination surface holes in the illumination surface;

72. Ruskouski discloses a plurality of illumination surface holes in the illumination surface. Figure 10 of Ruskouski depicts frustoconical apertures 40A

in the elongated housing 38A, which correspond to the plurality of illumination surface holes in the illumination surface of claim 12. Ex. 1004, 1:67-2:6, 6:3-8. For example, Ruskouski describes "[t]he front portion 66 has frustoconical aperture 40A for light emitting diodes 44A." Ex. 1004, 6:4-6. A PHOSITA at the time of the invention would have understood that the term "aperture" is just another word for "hole," and "frustoconical" describes the shape of that hole.

73. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski discloses "a plurality of illumination surface holes in the illumination surface" as claimed in claim 12 of the '747 patent.

(d) a circuit board comprising a plurality of light-emitting diodes,

74. Ruskouski discloses a circuit board comprising a plurality of light-emitting diodes. Figure 10 of Ruskouski depicts a circuit board 42A that includes light emitting diodes 44A, which correspond to the circuit board comprising a plurality of light-emitting diodes of claim 12. Ex. 1004, Fig. 10, 2:22-27, 3:57-60; 5:66-6:2, 6:3-8. Further, Ruskouski describes these elements as "[t]he plurality of light emitting diodes are mounted on a printed circuit board." Ex. 1004, 2:22-27.

75. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski discloses "a circuit board comprising a plurality of light-emitting diodes" as claimed in claim 12 of the '747 patent.

(e) wherein the circuit board is positioned adjacent the housing so that the plurality of light-emitting diodes protrude through the plurality of illumination surface holes in the illumination surface;

76. Ruskouski discloses that the circuit board is positioned adjacent the housing so that the plurality of light-emitting diodes protrude through the plurality of illumination surface holes in the illumination surface. Ruskouski's description of the frustoconical apertures 40A being for LEDs 44A mounted on printed circuit board 42A corresponds to the claimed circuit board and is positioned adjacent to the housing so that the plurality of light-emitting diodes protrude through the plurality of illumination surface holes in the illumination surface of claim 12. Ex. 1004, 1:67-2:6, 6:5-7.

77. Additionally, Ruskouski describes having two embodiments, the embodiment disclosed in Figures 1-9, and the embodiment disclosed in Figure 10. Ex. 1004, 5:62-64. Ruskouski further teaches that its two embodiments have very similar arrangements, with identical components. Ex. 1004, 5:66-6:2. Thus, a PHOSITA would understand that descriptions relating to components in the first embodiment would also be descriptions for components in the second embodiment. For example, Ruskouski teaches "essentially all components [in Figure 10] are identical to the arrangement in FIGS. 1-9 and like components have been designated with like reference numerals except for the addition of the reference

character A." Ex. 1004, 5:66-6:2. Thus, the frustoconical apertures 40A in Figure 10 correspond to the frustoconical apertures 40 in Figures 1-9, the printed circuit board 42A in Figure 10 corresponds to the printed circuit board 42 in Figures 1-9, the LEDs 44A in Figure 10 correspond to the LEDs 44 in Figures 1-9, and the arrangement in Figure 10 of elements 40A, 42A and 44A corresponds to the arrangement in Figures 1-9 of elements 40, 42 and 44. Ruskouski describes "[o]ne light emitting diode 44 is positioned to extend into each of the frustoconical apertures 40," which explains that the LEDs extend into, or protrude through, the holes in illumination surface as described by claim 12. Ex. 1004, 3:60-62. Accordingly, Ruskouski discloses that the LEDs mounted on the circuit board are positioned such that the LEDs protrude and through the holes in the illumination surface.

78. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski discloses "wherein the circuit board is positioned adjacent the housing so that the plurality of light-emitting diodes protrude through the plurality of illumination surface holes in the illumination surface" as claimed in claim 12 of the '747 patent.

(f) a fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface,

79. Ruskouski discloses a fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface. Figure 10 of Ruskouski depicts spring clips 70 of front portion 66 that interact with openings 72 of rear portion 68, which correspond to the fastening mechanism of claim 12. Ex. 1004, Fig. 10. These elements are described as "interacting…to hold the portions 66, 68 together," corresponding to a fastening mechanism for securing the attachment surface (element 68) to the illumination surface (element 66) of claim 12.

80. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski discloses "a fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface" as claimed in claim 12 of the '747 patent.

(g) wherein the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch.

81. This limitation is obvious based on a combination of Ruskouski and Teich. Teich discloses a lighting apparatus. Teich's description of an "emergency light [that] is an 'exit sign'" corresponds to the lighting apparatus of claim 12, which is described in the '747 patent as providing emergency lighting. Ex. 1001, 1:17-22, 3:61-64, 4:51-67; Ex. 1005, 1:10-16, 1:26-32. Teich further discloses that

the lighting apparatus "is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch." Ex. 1005, 1:4-9, 2:20-25, 2:58-66, 3:6-23, cl. 1. For example, Teich discloses that "detection circuitry is provided with the emergency lighting system for distinguishing between a loss of power at the fixture which results from turning off of the wall switch" and "[i]f the wall switch is open, power to the lamp from the secondary power source is cut off." Ex. 1005, 2:58-66, 3:6-23. This disclosure in Teich describes a system where an emergency light comprising an exit sign is connected to and controlled by a wall switch and also has a battery backup system. The system is designed to turn off the exit sign when a light switch is turned off, but otherwise have the exit sign remain on in the event of a power failure. Because the system is designed to turn off the exit sign when the wall switch is turned off, the exit sign is controllable based upon the position of the wall switch, as required by claim 12. Teich teaches that this improvement over other exit sign art allows an exit sign to be turned off at night so as to not engage and drain the battery backup when no one will make use of the sign. Ex. 1005, 1:47-62.

82. A PHOSITA would have been motivated to combine the teachings of Ruskouski and Teich. Both Ruskouski and Teich are in the field of emergency lighting devices. Ex. 1004, Abstract; Ex. 1005, 1:10-16, 1:26-32. Further, Both Ruskouski and Teich are attempting to solve the same problem, the problem of

how to power an exit sign in the event of a power failure, and address this problem in the same way by using a battery backup. Ex. 1004, 1:8-16, 1:47-51; Ex. 1005, 2:58-66, 3:6-23. Thus a PHOSITA attempting to solve a stated problem of the '747 patent—a lighting apparatus to provide "sufficient illumination to satisfy…emergency lighting requirements,"—would look to both Ruskouski and Teich.

83. Additionally, A PHOSITA at the time of the invention would have understood Teich to teach an improvement to exit signs that use a battery backup. Specifically, Teich allows an exit sign with a battery backup to be turned off with a wall switch without triggering the battery backup, thus allowing the exit sign to be powered down via a wall switch. Ex. 1004, 1:4-9, 2:20-25, 2:58-66, 3:6-23, cl. 1. A PHOSITA would have further understood that the improvement taught by Teich could be implemented in exit signs other than the one described in Teich, resulting in exit signs that would remain powered in an emergency lighting situation, but could be turned off through the use of a wall switch. For example, a PHOSITA would have understood that the circuitry of Teich that allows an exit sign to be turned off with a wall switch could have implemented by the exit sign disclosed in Ruskouski, producing the predictable result that the exit sign of Ruskouski could be powered down at night by use of a wall switch without draining the battery backup.

84. Therefore, it is my opinion that a PHOSITA would understand that Ruskouski in combination with Teich discloses "wherein the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch" as claimed in claim 12 of the '747 patent, and a PHOSITA would have been motivated to combine the disclosures of Ruskouski and Teich to arrive at this claim limitation.

85. Therefore, based on the above, it is my opinion that claims 1 and 12 of the '747 patent would have been obvious to a PHOSITA based on the teachings of Ruskouski in combination with Teich.

B. Ground 2: Claims 1 and 12 Are Anticipated by Archer

1. Claim 1

(a) An energy-efficient lighting apparatus, comprising:

86. Archer discloses an energy efficient lighting apparatus as claimed in claim 12. A PHOSITA at the time of the invention would have understood that that using LEDs as a lighting source was a well known way to build an energy-efficient lighting apparatus. It was well known in the art at the time of the '747 patent that fluorescent lamps were an energy efficient alternative to incandescent lamps, that the use of LEDs in a fixture or luminaire was a more energy-efficient solution than both the use of incandescent and fluorescent lamps in a similar device. Thus, a PHOSITA at the time of the invention would have understood that

that using LEDs as a lighting source was a well known way to build an energy-efficient lighting apparatus. Further, a PHOSITA at the time of the invention would have understood that a device making use of LEDs is more energy efficient than a device using incandescent lamps. Archer makes note of this by disclosing "the present invention provides an LED lighting assembly that may operate with a low voltage, 12 or 24-volts, for example, thereby eliminating the need, and the risk, of connecting a 110-votlage source to a traditional incandescent lamp fixture." Ex. 1006, 5:43-55. Archer also explains that the 5 mm LED bulbs used require only "about 20 mA, or 1/5 a watt of power," which a PHOSITA at the time of the '747 patent would understand to be an energy-efficient lighting source. As described above in Section VI, "An energy-efficient lighting apparatus, comprising" should be construed to be a non-limiting preamble.

87. To the extent the preamble to claim 1 is limiting, Archer discloses an "energy-efficient lighting apparatus" as described above.

88. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "an energy-efficient lighting apparatus, comprising" as claimed in claim 1 of the '747 patent.

(b) a ballast cover;

89. As described above in Section VI, "ballast cover" should be construed to mean "structure that encloses wiring."

90. Archer discloses a ballast cover. Figure 2 of Archer depicts a lightweight fixture 17, which corresponds to the claimed "ballast cover" of claim 1. Ex. 1005, Fig. 2. This ballast cover 17 is described by Archer as consisting of two parts, which I will refer to as a "body" and an "end cap," with the "body" being inverted stair step configuration 46, and the "end cap" being plate 12. Ex. 1006, 4:65-5:8. It is my opinion that element 17 of Archer meets the proposed construction of "ballast cover" because element 17 has inside of it "electronics" which are "under the white plate 12." Ex. 1006, 3:53-59. Thus, element 17 is "a structure that encloses wiring" as required by the construction and as described by claim 1.

91. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "a ballast cover" as claimed in claim 1 of the '747 patent.

(c) a plurality of ballast cover holes in the ballast cover;

92. Archer discloses a plurality of ballast cover holes in the ballast cover. Figure 2 depicts LEDS protruding through gaps, or perforations in the end cap, plate 12, of the ballast cover 17, which correspond to the plurality of ballast cover holes in the ballast cover of claim 1. Ex. 1006, Fig. 2. Further, Archer repeatedly refers to the end cap, plate 12, as comprising "a plurality of perforations," and a PHOSITA at the time of the '747 patent would have understood that the term "perforations" is another word for "holes."

93. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "a plurality of ballast cover holes in the ballast cover" as claimed in claim 1 of the '747 patent.

(d) a circuit board comprising a plurality of light-emitting diodes,

94. Archer discloses a circuit board comprising a plurality of light-emitting diodes. Figure 2 depicts LEDs (element 10 in the specification) connected by leads 18 to a printed circuit board assembly (element 20 in the specification), which correspond to the circuit board comprising a plurality of light-emitting diodes of claim 1. Ex. 1006, Figs. 1, 2, 1:66-2:15, 2:16-36, 3:17-27, 3:38-59, 5:7-8. Further, Archer discloses "each LED 10 in an array 16" (Ex. 1006, 4:38-39) and that "[t]he LED array 16 is attached to a printed circuit board assembly 20, covered by white plate 12." Ex. 1006, 5:7-8.

95. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "a circuit board comprising a plurality of light-emitting diodes" as claimed in claim 1 of the '747 patent.

(e) wherein the circuit board is positioned adjacent the ballast cover so that the plurality of light-emitting diodes protrude through the plurality of ballast cover holes in the ballast cover,

96. Archer discloses that the circuit board is positioned adjacent the ballast cover so that the plurality of light-emitting diodes protrude through the

plurality of ballast cover holes in the ballast cover. Archer's description of the "printed circuit board 20, covered by white plate 12" corresponds to the claimed circuit board that is positioned adjacent the end cap of the ballast cover of claim 1. Ex. 1006, 5:7-8. Further, Archer's description that "each LED bulb protrudes through a respective perforation of the plurality of perforations [formed through the reflective plate]" corresponds to the plurality of light-emitting diodes protruding through the plurality of ballast cover holes in the ballast cover of claim 1. Ex. 1006, 2:2-7, 2:22-27, 3:28-29.

97. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "wherein the circuit board is positioned adjacent the ballast cover so that the plurality of light-emitting diodes protrude through the plurality of ballast cover holes in the ballast cover" as claimed in claim 1 of the '747 patent.

(f) wherein the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch.

98. Archer discloses that the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch. Figure 3 of Archer depicts a wall switch that is used to control the illumination of LEDs based on pressing the switch, which corresponds to the "lighting apparatus is coupled to a wall switch and wherein the

illumination of the light-emitting diodes is controllable based upon the position of the wall switch" limitation of claim 1. Ex. 1006, Fig. 3 (50), 2:11-15, 2:31-36, 5:18-42. Further, Archer discloses "a switch 50, such as a light switch or a push button switch, is the controller that determines patters of light emitted by the array 16." Ex. 1006, 5:18-21.

99. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "wherein the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch" as claimed in claim 1 of the '747 patent.

2. Claim 12

(a) An energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, comprising:

100. Archer discloses an energy efficient lighting apparatus as claimed in claim 1. A PHOSITA at the time of the invention would have understood that that using LEDs as a lighting source was a well known way to build an energy-efficient lighting apparatus. It was well known in the art at the time of the '747 patent that fluorescent lamps were an energy efficient alternative to incandescent lamps, that the use of LEDs in a fixture or luminaire was a more energy-efficient solution than both the use of incandescent and fluorescent lamps in a similar device. Thus, a PHOSITA at the time of the invention would have understood that a device making

use of LEDs is more energy efficient than a device using incandescent lamps. Archer makes note of this by disclosing "the present invention provides an LED lighting assembly that may operate with a low voltage, 12 or 24-volts, for example, thereby eliminating the need, and the risk, of connecting a 110-votlage source to a traditional incandescent lamp fixture." Ex. 1006, 5:43-55. Archer also explains that the 5 mm LED bulbs used require only "about 20 mA, or 1/5 a watt of power," which a PHOSITA at the time of the '747 patent would understand to be an energy-efficient lighting source. Further, a PHOSITA at the time of the '747 patent would have been aware of Haitz's law, an observation that the cost per lumen of LEDs decreases by a factor of 10 and the light output of LEDs increases by a factor of 20 every decade. Thus a PHOSITA would have understood that the energy-efficient LEDs described in Archer would become even more energy-efficient over time. As described above in Section VI, "[a]n energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, comprising" should be construed to be a non-limiting preamble.

101. To the extent the preamble to claim 12 is limiting, Archer discloses an energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, as claimed in claim 12. As described above, Archer discloses an energy-efficient lighting apparatus. Archer further explains that the Figure 2 embodiment "is designed to retrofit existing pool lighting fixtures 40," which

describes the retrofit with an existing light fixture" of claim 12. Ex. 1006, 4:54-57. Additionally, it is my opinion that element 17 of Archer meets the proposed construction of "ballast cover" because element 17 has inside of it "electronics" which are "under the white plate 12." Ex. 1006, 3:53-59. Thus, element 17 is "a structure that encloses wiring" as required by the construction and as described by claim 12..

102. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "an energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, comprising" as claimed in claim 12 of the '747 patent.

(b) a housing having an attachment surface and an illumination surface;

103. As described above in Section VI, "housing" should be construed to mean "structure that encloses other components."

104. Archer discloses a housing having an attachment surface and an illumination surface. Figure 2 of Archer depicts a lightweight fixture 17, which corresponds to the claimed "housing" of claim 12. Ex. 1005, Fig. 2. This housing 17 is described by Archer as consisting of two parts, which I will refer to as a "body" and an "end cap," with the "body" being inverted stair step configuration 46, and the "end cap" being plate 12. Ex. 1006, 4:65-5:8. Here, the body (inverted

stair step configuration 46) corresponds to the "attachment surface" of claim 12, and the end cap (plate 12) corresponds to the "illumination surface" of claim 12. Ex. 1006, 4:65-5:8. It is my opinion that element 17 of Archer meets the proposed construction of "housing" because element 17 has inside of it "electronics" which are "under the white plate 12." Ex. 1006, 3:53-59. Thus, element 17 is a "structure that encloses other components" as required by the construction and as described by claim 12.

105. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "a housing having an attachment surface and an illumination surface" as claimed in claim 12 of the '747 patent.

(c) a plurality of illumination surface holes in the illumination surface;

106. Archer discloses a plurality of illumination surface holes in the illumination surface. Figure 2 depicts LEDS protruding through gaps, or perforations, in the end cap (plate 12) that correspond to the plurality of illumination surface holes in the illumination surface of claim 1. Ex. 1006, Fig. 2. Further, Archer repeatedly refers to the end cap (plate 12) as comprising "a plurality of perforations," which a PHOSITA at the time of the '747 patent would have understood to mean that the plate 12 has a plurality of holes because the term "perforations" is just another word for "holes."

107. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "a plurality of illumination surface holes in the illumination surface" as claimed in claim 12 of the '747 patent.

(d) a circuit board comprising a plurality of light-emitting diodes,

108. Archer discloses a circuit board comprising a plurality of light-emitting diodes. Figure 2 depicts LEDs (element 10 in the specification) connected by leads 18 to a printed circuit board assembly (element 20 in the specification), which correspond to the circuit board comprising a plurality of light-emitting diodes of claim 12. Ex. 1006, Figs. 1, 2, 1:66-2:15, 2:16-36, 3:17-27, 3:38-59, 5:7-8. Further, Archer discloses "each LED 10 in an array 16" (Ex. 1006, 4:38-39) and that "[t]he LED array 16 is attached to a printed circuit board assembly 20, covered by white plate 12." Ex. 1006, 5:7-8.

109. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "a circuit board comprising a plurality of light-emitting diodes" as claimed in claim 12 of the '747 patent.

(e) wherein the circuit board is positioned adjacent the housing so that the plurality of light-emitting diodes protrude through the plurality of illumination surface holes in the illumination surface;

110. Archer discloses that the circuit board is positioned adjacent the housing so that the plurality of light-emitting diodes protrude through the plurality

of illumination surface holes in the illumination surface. Archer's description of the "printed circuit board 20, covered by white plate 12" corresponds to the claimed circuit board that is positioned adjacent the end cap of the housing of claim 12. Ex. 1006, 5:7-8. Further, Archer's description that "each LED bulb protrudes through a respective perforation of the plurality of perforations [formed through the reflective plate]" corresponds to the plurality of light-emitting diodes protruding through the plurality of illumination surface holes in the illumination surface of claim 1. Ex. 1006, 2:2-7, 2:22-27, 3:28-29.

111. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "wherein the circuit board is positioned adjacent the housing so that the plurality of light-emitting diodes protrude through the plurality of illumination surface holes in the illumination surface" as claimed in claim 12 of the '747 patent.

(f) a fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface,

112. Archer discloses a fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface. As described above, the illumination surface is the end cap (plate 12), and the attachment surface of the lighting apparatus is the body (inverted stair step configuration 46). Archer describes the end cap as being "connected" to the body. Ex. 1006, 4:60-5:6. A

PHOSITA at the time of the '747 patent would understand that "connected" is a term that when used in reference to a lighting fixture describes that two elements are secured together, and that this is necessarily accomplished by a fastening mechanism. This is because lighting fixtures, such as the one described in Archer, are designed to be manipulated, such as being "screwed into an Edison-style base" (Ex. 1006, 4:64) on its side, and thus the individual components must be fastened together with a fastening mechanism or they would fall apart. The body described in Archer would be fastened to the end cap by fastening mechanisms of the type described in the '747 specification, "a magnet, clips, screws, etc" (Ex. 1001, 9:47-51), with the "etc." meaning any mechanism that fastens the two components together. Thus, the end cap and the body of the housing must necessarily be secured together by a fastening mechanism because the lighting apparatus is designed to be installed sideways in a recessed niche in a swimming pool, and a lighting device in such a swimming pool niche would be expected to stay together in order to be operable. It is my opinion that because "a fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface" is necessarily present in Archer, this limitation is inherently disclosed by Archer.

113. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "a fastening mechanism for securing the attachment surface of the

lighting apparatus to the illumination surface" as claimed in claim 12 of the '747 patent.

(g) wherein the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch.

114. Archer discloses that the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch. Figure 3 of Archer depicts a wall that is used to control the illumination of LEDs based on pressing the switch, which corresponds to the "lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch" limitation of claim 12. Ex. 1006, Fig. 3 (50), 2:11-15, 2:31-36, 5:18-42. Further, Archer discloses "a switch 50, such as a light switch or a push button switch, is the controller that determines patters of light emitted by the array 16." Ex. 1006, 5:18-21.

115. Therefore, it is my opinion that a PHOSITA would understand that Archer discloses "wherein the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch" as claimed in claim 12 of the '747 patent.

116. Therefore, based on the above, it is my opinion that claims 1 and 12 of the '747 patent would have been understood to a PHOSITA to have been anticipated by the teachings of Archer.

C. Ground 3: Claim 12 Is Obvious over Archer in View of Ruthenberg

1. Independent Claim 12

117. It is my opinion that Archer discloses the elements "an energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, comprising," "a housing having an attachment surface and an illumination surface," "a plurality of illumination surface holes in the illumination surface," "a circuit board comprising a plurality of light-emitting diodes," "wherein the circuit board is positioned adjacent the housing so that the plurality of light-emitting diodes protrude through the plurality of illumination surface holes in the illumination surface," and "wherein the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch" as claimed in claim 12 of the '747 patent, as described above. To the extent it is found that Archer does not inherently disclose the "fastening mechanism" limitation of claim 12 of the '747 patent, it is my opinion that this limitation would have been obvious to a

PHOSITA based on the disclosure of Archer combined with the disclosure of Ruthenberg.

(a) a fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface

118. Like Archer, Ruthenberg describes a lighting apparatus for use in a swimming pool. Ex. 1006, 4:54-57; Ex. 1013, 1:6-8. For example, Ruthenberg discloses that it is directed to "lamp construction using light emitting diode (LED) technology to provide multicolor effects in pools and spas." Ex. 1013, 1:6-8.

119. Additionally, like Archer, Ruthenberg makes use of LEDs that are mounted to a circuit board. Ex. 1006, Figs. 1, 2, 1:66-2:15, 2:16-36, 3:17-27, 3:38-59, 5:7-8; Ex. 1013, 1:56-58. For example, Ruthenberg discloses "[a] plurality of different colored light emitting diode (LED) bulbs are mounted in a predetermined spaced-apart arrangement on a circuit board wafer." Ex. 1013, 1:56-58.

120. . Also similar to Archer, Ruthenberg makes use of a housing that contains the circuit board. Ex. 1006, Fig. 2, 3:53-59; Ruthenberg 3:22-37 (Ex. 1013). The housing in Archer and Ruthenberg both consist of two parts, and end cap and a body, that correspond to the illumination surface and the attachment surface respectively. As described above in Archer, the "body" corresponds to inverted stair step configuration 46, and the "end cap" corresponds plate 12. Ex.

1006, 4:65-5:8. In Ruthenberg, the "body" corresponds to "hollow lamp body 12" and the "plate" corresponds to "lens 22." Ex. 1013, Fig. 1, 3:22-37.

121. Further, in both Archer and Ruthenberg, the end cap is described as being connected to the body. Archer Fig. 2, 4:60-5:6 (Ex. 1006); Ex. 1013, Fig. 1, 3:34-37, 5:1-4. Unlike Archer, Ruthenberg goes on to describe the specific fastening mechanism used to connect the body to the end cap. Specifically, Ruthenberg discloses that the end cap (lens 22) contains a "mating recess portion 54" and the body contains "ridge portion 52," and that ridge portion 52 "cooperatively engages" the mating recess portion 54. Ex. 1013, 5:1-4. Ruthenberg's disclosure of the combination of the ridge portion 52 and the mating recess portion 54 being cooperatively engaged corresponds to the "fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface" as claimed in claim 12 of the '747 patent.

122. A PHOSITA would have been motivated to combine the teachings of Archer and Ruthenberg. Archer directs a PHOSITA to use Ruthenberg as an example of a known LED assembly for in-ground pools that house LED arrays, and the use of LED arrays for different colored LEDs to replace incandescent pool lights, which is the lighting application that Archer teaches. Ex. 1006, 1:45-63. Therefore, if a PHOSITA wanted to understand how to build the LED lighting assembly described in Archer, it would be directed to Ruthenberg, especially

regarding how to secure plate 12 in Archer with the inverted stair step configuration 46. Ex. 1006, Fig. 2, 4:60-5:6.

123. Additionally, a PHOSITA would have been motivated to combine the teachings of Archer and Ruthenberg because both references are in the field of underwater pool lights and attempt to improve LED technology for underwater use in the same way, through the use of multicolor LED lamp bulbs. Ex. 1006, 1:8-10, 1:45-63; Ex. 1013 1:1-9, 2:57-63. In fact, Archer and Ruthenberg describe very similar underwater pool lights. Ex. 1006, Fig. 2; Ex. 1013, Fig. 1.

124. Further, a PHOSITA at the time of the invention would have understood Ruthenberg to teach an improvement to underwater pool lights. Specifically, Ruthenberg teaches a mechanism for connecting the end cap of a pool light with the body of a pool light, thus creating a watertight and hermetically sealed apparatus to hold the wiring. Ex. 1013, 3:22-37, 5:1-4. A PHOSITA would have understood the improvement taught by Ruthenberg could be implemented in underwater pool lights other than the one described in Ruthenberg, resulting in underwater pool lights that would create a hermetically sealed apparatus to hold the wiring. For example, a PHOSITA would have understood that the connecting mechanism of Ruthenberg could have been implemented in the underwater pool light disclosed in Archer, producing the predictable result that the underwater pool light in Archer would be watertight and hermetically sealed.

125. Therefore, it is my opinion that a PHOSITA would understand that Archer in combination with Ruthenberg discloses "a fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface" as claimed in claim 12 of the '747 patent, and a PHOSITA would have been motivated to combine the disclosures of Archer and Ruthenberg to arrive at this claim limitation.

126. Therefore, based on the above, it is my opinion that claim 12 of the '747 patent would have been obvious to a PHOSITA based on the teachings of Archer in combination with Ruthenberg.

D. Ground 4: Claim 12 Is Obvious over Hunter in view of Kanarek and Timmermans

1. Independent Claim 12

(a) An energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, comprising:

127. Hunter discloses an energy-efficient lighting apparatus, as claimed in claim 12. A PHOSITA at the time of the invention would have understood that that using LEDs as a lighting source was a well known way to build an energy-efficient lighting apparatus. It was well known in the art at the time of the '747 patent that fluorescent lamps were an energy efficient alternative to incandescent lamps, and that the use of LEDs in a fixture or luminaire was a more energy-efficient solution than both the use of incandescent and fluorescent lamps in a

similar device. Thus, a PHOSITA at the time of the invention would have understood that a lighting apparatus using LEDs is more energy efficient than a device using incandescent lamps. Hunter discloses the use of LEDs and the energy efficiency that results by stating "[a]n important object of the invention is that the use of LED's reduces power consumption to a bare minimum as each device uses only 0.0124 Watts of power and is extremely efficient as far as illumination is concerned." Ex. 1007, 2:27-29. Hunter goes compare the efficiency of LEDs to halogen lamps, mercury vapor, and fluorescent lights, finding that LEDs are the most efficient. Ex. 1007, 2:30-40. As described above in Section VI, "[a]n energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, comprising" should be construed to be a non-limiting preamble.

128. To the extent the preamble to claim 12 is limiting, this limitation is obvious based on a combination of Hunter, Kanarek and Timmermans. Hunter describes an "energy-efficient lighting apparatus" as described above.

129. To the extent the preamble to claim 12 is limiting, Kanarek discloses a light fixture having a ballast cover, as claimed in claim 12. Kanarek discloses a modular lighting system. Ex. 1008, 1:9-11. Further, one object of the alleged inventions disclosed by Kanarek is to "provide a modular lighting system, comprised of modules…each holding a single fluorescent tube and the necessary starter/ballast circuitry for that tube." Ex. 1008, 2:64-68. A PHOSITA at the time

of the '747 patent would understand this disclosure to mean that the ballast of Kanarek is contained by the modules, and thus the modules enclose, or cover, the ballast. Therefore, the modules are the ballast covers claimed in claim 12.

130. To the extent the preamble to claim 12 is limiting, Timmermans discloses an energy efficient lighting apparatus for retrofit with an existing light fixture. As discussed above, a PHOSITA at the time of the invention would have understood that a device making use of LEDs is more energy efficient than a device using incandescent lamps. Timmermans makes use of LEDs. Ex. 1009, 1:11-13. Further, one of the stated goals of Timmermans is to "provide a light tube and power supply circuit which…consume low amounts of power [and] operate on a low voltage," which is the energy efficient lighting apparatus of claim 12. Ex. 1009, 1:30-36. Timmermans also discloses that "the present invention can be mounted in a conventional fluorescent light tube socket," which is the lighting apparatus for retrofit with an existing light fixture claimed in claim 12. Ex. 1009, 2:24-29. Thus, Timmermans' disclosure that a light emitting diode device fits into conventional sockets is a disclosure of a retrofit as described by claim 1.

131. Timmermans describes a light tube illuminated by LEDs which are packaged inside a light tube. Ex. 1009, 1:11-13. Timmermans further discloses that the use of LEDs in a light tube is an improvement over fluorescent light tubes for a number of reasons, including energy efficiency. Ex. 1009, 1:16-38.

Timmermans further discloses that the light tube illuminated by LEDs described can be mounted in a conventional fluorescent light tube socket. Ex. 1009, 2:24-29. Based on this disclosure, a PHOSITA at the time of the '747 patent would understand that Timmermans discloses an improvement to lighting devices making use of a fluorescent light tube, where the fluorescent light tube can be removed, and replaced with the light tube containing LEDs. A PHOSITA would understand that replacing a fluorescent light tube with the LED light tube disclosed in Timmermans would yield the results described in Timmermans, such as energy efficiency, voltage reduction, long life expectancy and resistance to vibration failure. Ex. 1009, 1:14-38. As described above, Kanarek discloses a modular lighting system that includes a ballast cover, fluorescent tubes, and a fluorescent light socket. Ex. 1008, 1:9-11, 2:64-68. Therefore, a PHOSITA would have understood that replacing the fluorescent tube of Kanarek with the LED light tube disclosed in Timmermans would have improve Kanarek as described in Timmermans, including by making the Kanarek modules more energy efficient.

132. The LED light tube described by Timmermans includes LEDs mounted to a circuit board inside of a light tube. Ex. 1009, 1:31-48. Hunter also describes a lighting emitting diode strip, consisting of LEDs mounted on a circuit board, inside a transparent or translucent tube. Ex. 1007, 1:4-7. Hunter improves on Timmermans' LED-on-circuit-board design by including a reflective surface on

the upper face of the circuit board. Ex. 1007, 4:40-42. This improvement is described as resulting in light from the LEDs being reflected to the light tube's immediate surroundings. Ex. 1007, 4:40-42. A PHOSITA at the time of the '747 patent would understand that this mirroring creates a more efficient lighting tube because more light from the LEDs is sent out of the tube through the mirroring process. A PHOSITA at the time of the '747 patent would also understand that the reflective surface of Hunter could be applied to the LED-on-circuit-board design disclosed in Timmermans to improve Timmermans in the same way described in Hunter, including by reflecting more light to the tube's immediate surroundings.

133. A PHOSITA would have been motivated to combine the teachings of Timmermans and Hunter. Both Timmermans and Hunter are in the field of light tubes. Further, both Timmermans and Hunter are attempting to solve the same problem, the problem of creating an energy-efficient light tube, and address this problem in the same way, but using light emitting diodes as the lighting source of the light tube. Ex. 1007, 1:4-7, 2:27-40, 4:35-38; Ex. 1009, 1:11-48. Thus a PHOSITA attempting to create an energy-efficient light tube would look to both Timmermans and Hunter.

134. Additionally, a PHOSITA would have understood that Hunter discloses an improvement to circuit boards containing LEDs, which is using a reflective surface or layer on top of the circuit board to more efficiently direct light

in a desired direction. Ex. 1007, 4:40-42. A PHOSITA would have further understood that this improvement taught by Hunter could be implemented on other circuit boards using LEDs as a lighting source, resulting in LED devices more efficiently directing light from the LEDs in a desired direction. For example, a PHOSITA would have understood that the circuit board in Timmermans, which employs LEDs as a lighting source, could have implemented the improvement described by Hunter, producing the predictable result that the circuit board and LED combination of Timmermans would more efficiently direct light in the desired direction.

135. A PHOSITA would have been motivated to combine Timmermans and Kanarek. A PHOSITA would have understood that Timmermans discloses an improvement to fluorescent light tube lighting apparatuses, which is to replace the fluorescent tube with an LED-based tube that fits into the same socket. Ex. 1009, 1:16-38. A PHOSITA would have further understood that this improvement taught by Timmermans could be implemented in other lighting apparatuses using fluorescent tubes as a lighting source, resulting in lighting apparatuses which are more energy efficient. For example, a PHOSITA would have understood that the fluorescent light tubes of Kanarek could have implemented the improvement described by Timmermans, replacing the fluorescent light tubes with LED light

tubes, producing the predictable result that the lighting apparatus would be more energy efficient.

136. A PHOSITA would have further been motivated to combine Hunter, Timmermans and Kanarek. As described above, Timmermans describes an improvement to a lighting apparatus making use of a fluorescent tube, by replacing the tube with an LED light tube, making the device more energy efficient. As further described above, Hunter describes an improvement to an LED light tube by coating the circuit board of the LED light tube with a reflective surface. A PHOSITA would have understood that the lighting apparatus disclosed in Kanarek could have implemented the improvement taught by Timmermans, and at the same time implement the improvement taught by Hunter. The resultant device, the lighting apparatus of Kanarek, with the fluorescent tube replaced with an LED tube making use of a circuit board with a reflective surface on top, would have predictably been more energy efficient and would have predictably directed more light in the desired direction.

137. Therefore, a PHOSITA would have been motivated to improve upon Kanarek by replacing the fluorescent tube with the LED light tube described in Timmermans, and would have been motivated to improve upon this combination by including the reflective-surface-containing circuit board of Hunter inside the LED light tube of Timmermans. This combination describes an energy-efficient

lighting apparatus for retrofit with an existing light fixture having a ballast cover as claimed in claim 12.

138. Therefore, it is my opinion that a PHOSITA would understand that Hunter, in combination with Kanarek and Timmermans, discloses "An energy-efficient lighting apparatus for retrofit with an existing light fixture having a ballast cover, comprising" as claimed in claim 12 of the '747 patent, and a PHOSITA would have been motivated to combine the disclosures of Hunter, Kanarek and Timmermans to arrive at this claim limitation.

(b) a housing having an attachment surface and an illumination surface

139. As described above in Section VI, I understand that the Patent Owner has taken the position that "housing" should be construed as "portion of lighting apparatus that covers or protects other components."

140. Applying Patent Owner's construction of "housing," Hunter discloses a housing having an attachment surface and an illumination surface. Hunter describes a "tube 20" which is the attachment surface claimed in claim 12. Ex. 1007, 4:35-38. Hunter describes a "reflective surface on [the circuit board's] upper face," which is the "illumination surface" claimed in claim 12. Ex. 1007, 4:40-42. It is my opinion that the combination of the reflective layer and the tube 20 meets the proposed construction of "housing" because the reflective layer covers the

circuit board and the tube 20 also covers the circuit board 22 in that the circuit board 22 is described as being disposed "within the tube 20.". Ex. 1007, 4:35-38. Thus the reflective layer and the tube 20 is a "portion of lighting apparatus that covers or protects or covers other components" as required by the patent holder's construction as described by claim 12.

141. Therefore, it is my opinion that a PHOSITA would understand that Hunter discloses "a housing having an attachment surface and an illumination surface" as claimed in claim 12 of the '747 patent.

(c) a plurality of illumination surface holes in the illumination surface

142. Hunter discloses a plurality of illumination surface holes in the illumination surface. As described above, the illumination surface in Hunter is the reflective layer that covers circuit board 22. Figure 11 of Hunter shows that the LEDs 44 rest on top of circuit board 22, and anode 46 and cathode 48 penetrate all the way through the circuit board by means of holes in the circuit board. Ex. 1007, Fig. 11, 4:35-42, 4:64-5:9. Figure 13 and 14 of Hunter depict the holes 34 that anode and cathode 48 penetrate, which correspond to the illumination surface holes in the illumination surface claimed in claim 12. Ex. 1007, Fig. 13, Fig. 14, 4:35-42, 4:64-5:9. A PHOSITA would understand that in order for the anode 46 and

cathode 48 to penetrate through circuit board 22, the reflective layer on top of circuit board 22 would also include holes 34.

143. Therefore, it is my opinion that a PHOSITA would understand that Hunter discloses "a plurality of illumination surface holes in the illumination surface" as claimed in claim 12 of the '747 patent.

(d) a circuit board comprising a plurality of light-emitting diodes

144. Hunter discloses a circuit board comprising a plurality of light-emitting diodes. Figures 3, 11 and 12 all depict a "plurality of light emitting diodes 44 are disposed at the center of the top 24 of the printed circuit board 22" which corresponds to the circuit board comprising a plurality of light-emitting diodes claimed in claim 12. Ex. 1007, Fig. 3, Fig. 11, Fig. 12, 4:64-5:15.

145. Therefore, it is my opinion that a PHOSITA would understand that Hunter discloses "a circuit board comprising a plurality of light-emitting diodes" as claimed in claim 12 of the '747 patent.

(e) wherein the circuit board is positioned adjacent the housing so that the plurality of light-emitting diodes protrude through the plurality of illumination surface holes in the illumination surface

146. Hunter discloses that the circuit board is positioned adjacent the housing so that the plurality of light-emitting diodes protrude through the plurality of illumination surface holes in the illumination surface. As described above, the

illumination surface in Hunter is the reflective layer that covers circuit board 22. A PHOSITA at the time of the '747 patent would understand that Hunter's description of the reflective layer "covering" the circuit board indicates that the reflective layer is positioned adjacent to the circuit, which constitutes the circuit board being positioned adjacent the housing as claimed in claim 12. Additionally, Hunter describes the LEDs 44 as including an anode 46 and a cathode 48, and that the cathode and anode penetrate through the holes 34. Ex. 1007, Fig. 11, 4:35-42, 4:64-5:9. Because the anode and cathode are described as part of the LEDs, and the anode and cathode penetrate through the holes 34 which correspond to the illumination surface holes, the LEDs penetrate through the holes in the illumination surface which corresponds to the plurality of light-emitting diodes protrude[ing] through the plurality of illumination surface holes in the illumination surface as claimed in claim 12.

147. Therefore, it is my opinion that a PHOSITA would understand that Hunter discloses "wherein the circuit board is positioned adjacent the housing so that the plurality of light-emitting diodes protrude through the plurality of illumination surface holes in the illumination surface" as claimed in claim 12 of the '747 patent.

(f) a fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface

148. Hunter discloses a fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface. Hunter describes a pair of end caps 50 and a gasket 58 that captivate the printed circuit board 22 within the tube 20. Ex. 1007, Fig. 1, Fig. 5, Fig. 11, Fig., 5:30-46. For example, Hunter states "A resilient gasket 58 is disposed between the printed circuit board 22 and each end cap 50 for positioning and holding the printed circuit board 22 captive within the hollow tube 20. As described above, the illumination surface in Hunter is the reflective layer that covers circuit board 22, and the attachment surface of the lighting apparatus is the tube 20. A PHOSITA at the time of the '747 patent would understand the phrase "of the lighting apparatus" here to refer to the lighting apparatus of claim 12. Thus, the end caps 50 and the gasket 58 are a fastening mechanism used to securing the attachment surface of the lighting apparatus to the illumination surface as claimed by claim 12.

149. Therefore, it is my opinion that a PHOSITA would understand that Hunter discloses "a fastening mechanism for securing the attachment surface of the lighting apparatus to the illumination surface" as claimed in claim 12 of the '747 patent.

(g) wherein the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch

150. Kanarek discloses that a lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch. Figure 13 of Kanarek depicts a wall switch 152 coupled to the illumination modules 52 which corresponds to the lighting apparatus coupled to a wall switch as claimed in claim 12. Ex. 1008, Fig. 13, 10:49-68. Kanarek describes this wall switch as a "push on, push-off or rocker design." A PHOSITA at the time of the '747 patent would understand the phrase "push on, push off or rocker design" to mean a light switch that is pushed to turn the lighting device on and is pushed again to turn the lighting device off, or a light switch that rocks back and forth to turn the light on or off. An example of such a light switch is depicted below. Kanarek also teaches that since at least 1960, lighting apparatus were coupled to wall switches in rooms by means of plugging a lighting apparatus into an electrical outlet in a wall that is controlled by a wall switch. Ex. 1008, 1:29-42, 14:16-19. This description of a wall switch coupled to a lighting apparatus also corresponds to the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch as claimed in claim 12.

151. As described above, Kanarek also teaches that since at least 1960, lighting apparatus were coupled to wall switches in rooms by means of plugging a lighting apparatus into an electrical outlet in a wall that is controlled by a wall switch. Ex. 1008, 1:29-42, 14:16-19. Hunter describes plugging the lighting apparatus of Hunter into an electrical outlet in a wall. Ex. 1007, Fig. 5, Fig. 7, Fig. 8, 6:51-65. For example, Hunter describes that the "cable 50 is located at the side of the cabinet 68 and the power supply 64 is positioned on the floor connected to an electrical outlet 70 in an adjacent wall." Ex. 1007, 6:51-65. Therefore, a PHOSITA at the time of the '747 patent would have understood that the lighting apparatus of Hunter could be plugged into an electrical outlet connected to a wall switch as described in Kanarek, with the predictable result that the lighting apparatus of Hunter would then be controllable based upon the position of the wall switch as claimed in claim 12.

152. Additionally, Kanarek describes the improvement of adding an on/off wall switch to the power cord of a lighting apparatus, so that the lighting apparatus could be controlled by a wall switch that was not already coupled to an electrical outlet. Ex. 1008, Kanarek Fig. 13, 4:10-13, 14:1-15. For example, Kanarek discloses a goal of the invention as "[t]o provide a modular lighting system where an optional (push-on, push-off or rocker) switch may be installed on the power cable to enable connection to an unswitched power outlet. Hunter also describes a lighting system connected to a power cable. Ex. 1007, 6:51-65. A PHOSITA at the time of the '747 patent would have understood that the improvement of adding an on/off switch to the power cord described in Kanarek could have been applied to the power cord described in Hunter with the predictable result that the illumination of the lighting apparatus in Hunter would be controllable based upon the position of the wall switch as claimed in claim 12.

153. A PHOSITA would have been motivated to combine the teachings of Hunter and Kanarek. As described above, a PHOSITA would have understood that Kanarek teaches two different improvements to lighting apparatuses, both resulting in the same effect, the ability to use a wall switch to control whether the lighting apparatus is powered on or off through use of a power cord. Ex. 1008, 1:29-42, 4:10-13, 14:1-15, 14:16-19. The first implementation allows using a power cord to plug the lighting apparatus into an electrical outlet that is already

coupled to a light switch. Ex. 1008, 1:29-42, 14:16-19. The second implementation allows attaching a wall switch directly to the power cord of the lighting apparatus. Ex. 1008, 4:10-13, 14:1-15. A PHOSITA would have understood that this improvement taught by Kanarek could be implemented in other lighting apparatuses that make use of power cords, resulting in lighting apparatuses which can be turned on or off by changing the position of the wall switch. For example, a PHOSITA would have understood that the power cord connecting Hunter to an electrical outlet could have implemented the improvement described by Kanarek, either by plugging the Hunter device into an electrical outlet already coupled to a wall switch or by attaching a wall switch directly to the power cord, producing the predictable result that the lighting apparatus would be able to turn on or off based on the position of the wall switch. Ex. 1007, Fig. 7 (58), Fig. 5 (50), Fig. 8 (58), 6:51-65.

154. Therefore, it is my opinion that a PHOSITA would understand that Hunter in combination with Kanarek discloses "wherein the lighting apparatus is coupled to a wall switch and wherein the illumination of the light-emitting diodes is controllable based upon the position of the wall switch" as claimed in claim 12 of the '747 patent, and a PHOSITA would have been motivated to combine the disclosures of Hunter and Kanarek to arrive at this claim limitation.

155. Therefore, based on the above, it is my opinion that claim 12 of the '747 patent would have been obvious to a PHOSITA based on the teachings of Hunter in combination with Kanarek and Timmermans.

156. Further, based on the above and on a construction of finding the preamble to not be a limitation, it is my opinion that claim 12 of the '747 patent would have been obvious to a PHOSITA based on the teachings of Hunter in combination with Kanarek.

IX. JURAT

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

158. I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine

or imprisonment, or both, under Section 1001 of Title 18 of the United States Code.

Date: February 27, 2017

Respectfully submitted,

Eric Bretschneider, Ph.D.