

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

GEOSYS-INTL, INC.,
Petitioner,

v.

FARMERS EDGE PRECISION CONSULTING INC.,
Patent Owner.

Case IPR2015-00709
Patent 7,171,912 B2

Before JAMES T. MOORE, JOSIAH C. COCKS, and
TIMOTHY J. GOODSON, *Administrative Patent Judges*.

GOODSON, *Administrative Patent Judge*.

FINAL WRITTEN DECISION
35 U.S.C. § 318(a) and 37 C.F.R. § 42.73

I. INTRODUCTION

Geosys-Intl, Inc. (“Petitioner”) filed a Petition (Paper 1, “Pet.”) requesting *inter partes* review of claims 1–25 of U.S. Patent No. 7,171,912 B2 (Ex. 1001, “the ’912 patent”). In support of the Petition, Petitioner also filed a Declaration of Dr. Christian J. Johannsen. Ex. 1009. Farmers Edge Precision Consulting, Inc. (“Patent Owner”) timely filed a Preliminary Response (Paper 6, “Prelim. Resp.”) to the Petition. We instituted trial as to claims 1–25 of the ’912 patent on the following proposed grounds of unpatentability:

- A. Claims 15–17 and 20–23 as unpatentable under 35 U.S.C. § 103(a) over Hauwiller¹ and the Background of the ’912 Patent;
- B. Claim 18 as unpatentable under 35 U.S.C. § 103(a) over Hauwiller, the Background of the ’912 Patent, and Dickson;²
- C. Claims 24 and 25 as unpatentable under 35 U.S.C. § 103(a) over Hauwiller, the Background of the ’912 Patent, and Shibusawa;³
- D. Claims 1–5, 8–12, and 19 as unpatentable under 35 U.S.C. § 103(a) over Hauwiller, the Background of the ’912 Patent, and Blackmer;⁴ and
- E. Claims 6, 7, 13, and 14 as unpatentable under 35 U.S.C. § 103(a) over Hauwiller, the Background of the ’912 Patent, Shibusawa, and Blackmer.

¹ U.S. Patent No. 6,236,907 B1, issued May 22, 2001 (Ex. 1006, “Hauwiller”).

² U.S. Patent App. Pub. No. 2001/0016053 A1, published Aug. 23, 2001 (Ex. 1003, “Dickson”).

³ U.S. Patent No. 6,937,939 B1, issued Aug. 30, 2005 (Ex. 1004, “Shibusawa”).

⁴ U.S. Patent No. 6,505,146 B1, issued Jan. 7, 2003 (Ex. 1005, “Blackmer”).

Paper 9, 35–36 (“Dec. to Inst.”).

After institution, Patent Owner filed a Patent Owner Response (Paper 13, “PO Resp.”) supported by a Declaration of Dr. Ronnie W. Heiniger (Ex. 2033). Petitioner then filed a Reply (Paper 15, “Reply”). Patent Owner also filed a Motion to Seal (Paper 12) and a Motion to Exclude Evidence (Paper 23), both of which are addressed below. An oral hearing was conducted on January 27, 2016. A transcript of the oral hearing is included in the record. Paper 33 (“Tr.”).

We have jurisdiction under 35 U.S.C. § 6(c). This Final Written Decision is issued pursuant to 35 U.S.C. § 318(a) and 37 C.F.R. § 42.73. For the reasons discussed below, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 1–24 are unpatentable.

A. Related Matters

The ’912 patent is the subject of a civil action between the parties in the U.S. District Court for the District of Minnesota, *Geosys-Intl, Inc. v. Farmers Edge Precision Consulting, Inc.*, Case No. 15-cv-00543-PJS-JJK. See Paper 4, 2. In addition, *inter partes* reviews involving the same parties and related U.S. Patent Nos. 6,889,620 and 7,343,867 are pending in Cases IPR2015-00708 and IPR2015-00711. See *id.*; Pet. 62.

B. The ’912 Patent

The ’912 patent is titled “Method for Prescribing Site-Specific Fertilizer Application in Agricultural Fields.” Ex. 1001, Title. The method described in the ’912 patent seeks to minimize the amount of fertilizer farmers apply to a field while maintaining the maximum yield. *Id.* at 1:15–19, 3:3–6.

The Background of the '912 patent describes prior art variable-rate fertilizer application systems that took account of certain field conditions, such as existing soil fertilizer content or soil type, and dispensed different amounts of fertilizer based on those conditions. *Id.* at 2:14–50. However, according to the '912 patent, “[t]he maximum possible crop yield . . . that a particular location in a field is able to attain may vary from location to location.” *Id.* at 2:51–54. Yet “[d]espite this potential variation in yield throughout a single field, the prior art variable-rate fertilizer application systems . . . employ a single yield goal measure for a field.” *Id.* at 2:64–67.

The '912 patent seeks to improve on these prior art systems by creating a map of “site-specific amounts of a soil nutrient needed at each site to produce the maximum possible crop yield that the site is capable of producing.” *Id.* at 3:6–9. Site-specific amounts of nutrient currently existing in the field are subtracted from the site-specific amounts of nutrient needed for the crop, thus producing a map of site-specific amounts of the soil nutrient that need to be applied to the field. *Id.* at 3:10–15.

C. Illustrative Claims

Claims 1 and 15 are independent method claims. Claims 2–7 depend, directly or indirectly, from claim 1. Claims 16–25 depend, directly or indirectly, from claim 15. Claim 8 is an independent claim directed to a computer program. Claims 9–14 depend, directly or indirectly, from claim 8. Claims 1 and 15 are illustrative of the subject matter at issue, and are reproduced below:

1. A method implemented in at least one computer program to provide a map of site-specific amounts of a soil nutrient to be

applied in fertilizer to an agricultural field divided into sites, the method comprising:

calculating site-specific measures for soil nutrient existing in the field;

calculating for the field, by use of a map of site-specific measures of a soil wetness index, a map of site-specific amounts of soil nutrients needed to produce at each site a maximum possible crop yield; and

subtracting, from the site-specific amounts of soil nutrient needed to produce at each site a maximum yield, the site-specific measures for soil nutrient existing in the field, thereby producing a map of site-specific amounts of soil nutrient to be applied in fertilizer to the field.

15. A method implemented in at least one computer program to provide a map of site-specific amounts of a soil nutrient to be applied in fertilizer to an agricultural field divided into sites, the method comprising:

calculating site-specific measures for the soil nutrient existing in the field;

calculating a map for the agricultural field of site-specific soil nutrient amount needed to produce at each site a maximum possible crop yield by use of a map of site-specific field characteristic data for the agricultural field generated using a satellite image of the agricultural field; and

subtracting, from the site-specific soil nutrient amounts for maximum yield for the field, the site-specific measures for soil nutrient existing in the field, thereby producing a map of site-specific amounts of soil nutrient to be applied in fertilizer to the field.

II. ANALYSIS

A. Claim Construction

In an *inter partes* review, claim terms in an unexpired patent are given their broadest reasonable construction in light of the specification of the patent in which they appear. 37 C.F.R. § 42.100(b); *Cuozzo Speed Techs. LLC v. Lee*, 136 S. Ct. 2131, 2144–46 (2016) (upholding the use of the broadest reasonable interpretation standard). Under the broadest reasonable construction standard, claim terms are given their ordinary and customary meaning, as would be understood by one of ordinary skill in the art in the context of the entire disclosure. *In re Translogic Tech., Inc.*, 504 F.3d 1249, 1257 (Fed. Cir. 2007).

In the Decision to Institute, we construed the phrase “calculating a map”⁵ in claims 1, 6, 8, 13, 15, 17–19, and 24 to mean “performing calculations to produce a map.” Dec. to Inst. 7. With respect to the phrase “maximum possible crop yield” in claims 1, 8, and 15, we declined to adopt Petitioner’s proposed construction of “yield goal” and instead applied the ordinary and customary meaning of the claim language. *Id.* at 8–9. We further determined that no other claim term required express construction. *Id.* at 9. Following institution, neither party challenged those constructions or proposed other terms for construction. Therefore, for the reasons explained in the Decision to Institute, we maintain the constructions set forth therein.

⁵ We understand the phrase “calculating a map” to have the same construction, regardless of whether it appears as “calculating . . . a map,” “calculate . . . a map,” or “calculating a map.”

B. Principles of Law

To prevail in its challenges to the patentability of the claims, a petitioner must establish facts supporting its challenges by a preponderance of the evidence. 35 U.S.C. § 316(e); 37 C.F.R. § 42.1(d). A claim is unpatentable under § 103(a) 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 having ordinary skill in the art to which said subject matter pertains. *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). The question of obviousness is resolved based on underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the claimed subject matter and the prior art; (3) the level of skill in the art; and (4) where in evidence, so-called secondary considerations. *Graham v. John Deere*, 383 U.S. 1, 17–18 (1966). We also recognize that prior art references must be “considered together with the knowledge of one of ordinary skill in the pertinent art.” *In re Paulsen*, 30 F.3d 1475, 1480 (Fed. Cir. 1994) (citing *In re Samour*, 571 F.2d 559, 562 (CCPA 1978)).

We analyze the instituted grounds of unpatentability in accordance with the above-stated principles.

C. Level of Skill in the Art

In determining the level of skill in the art, we consider the type of problems encountered in the art, the prior art solutions to those problems, the rapidity with which innovations are made, and the sophistication of the technology. *Custom Accessories, Inc. v. Jeffrey-Allan Indus. Inc.*, 807 F.2d 955, 962 (Fed. Cir. 1986). Also, we are guided by the level of skill in the art as reflected by the prior art of record. *Okajima v. Bourdeau*, 261 F.3d 1350,

1355 (Fed. Cir. 2001).

Petitioner’s declarant, Dr. Johannsen, testifies that a person of ordinary skill in the field of this invention “would have had at least a Bachelor of Science degree in Agricultural Systems Management, Agriculture, Agronomy, or a related degree and would have had several years of experience with precision farming.” Ex. 1009 ¶ 16. Patent Owner’s declarant, Dr. Heiniger, testifies that a person of ordinary skill in this field would have “at least a Bachelor of Science degree in agronomy or a related field, and at least a Masters Degree in a discipline that involves engineering systems using remote sensing data or comparable work experience. Such a person would have had some practical experience integrating these remote sensing systems.” Ex. 2033 ¶ 18; *see also* PO Resp. 26 (same). Although Dr. Heiniger’s position is not exactly the same as Dr. Johannsen’s, Dr. Heiniger adds that the “[d]ifferences between who Dr. Johannsen and I view as a person of ordinary skill in the art are not material to my opinions” Ex. 2033 ¶ 19.

The differences between Dr. Johannsen’s and Dr. Heiniger’s articulations of the level of ordinary skill in the art are fairly minor. Our analysis below, including the conclusions we reach, would be substantially the same under either proposal. Nevertheless, after considering the evidence of record, we adopt Dr. Heiniger’s definition of the level of ordinary skill in the art.

D. Obviousness Grounds Based on Hauwiller

1. Claims 15–17 and 20–23

Petitioner argues that claims 15–17 and 20–23 are unpatentable under 35 U.S.C. § 103(a) over Hauwiller in view of the Background of the ’912

patent. Pet. 39–44. Patent Owner contests Petitioner’s position. See PO Resp. 27–40.

a. Summary of Hauwiller

Hauwiller describes a system and method for creating variable rate application maps that “allow the user to vary the dispensing rate of the dispensing materials at various locations depending upon different field conditions at different field locations.” Ex. 1006, 1:15–19. According to Hauwiller, this system improved on previous approaches in which dispensing materials were applied uniformly across a field. *Id.* at 1:23–34.

Hauwiller describes that the process begins by inputting attribute data and geographical data into the system for use in determining optimum treatment systems. *Id.* at 8:20–23. The input data preferably also includes recommendation equations, which “are the mathematical formulas that express the relationship between existing field conditions and the desired crop yield (i.e., relate field data to desired output) for determining the amount of dispensing material, and may be derived from the empirical data sources or determined by an expert. . . .” *Id.* at 8:27–28, 8:36–42. Hauwiller further states that recommendation equations may determine dispensing rates based on soil sample data and “defined yield potential or productivity for a particular crop based upon field characteristics or conditions.” *Id.* at 9:29–32. Hauwiller also discloses the following:

Desired yield potential varies depending upon the soil characteristics by location. Thus, the expert system may calculate dispensing rates by location based upon the desired recommendation equation which incorporates a yield goal map based upon soil properties, or alternatively the recommendation equation may use a constant yield goal for a field. Preferably, a soil characteristic map is inputted to the system to construct a

yield goal map for creating an application map based upon site specific yield goals.

Id. at 9:32–41.

b. Claim 15

Petitioner has explained how the subject matter of claim 15 would have been obvious in view of Hauwiller in combination with the description of the prior art in the Background of the '912 patent. Pet. 39–42. Specifically, Petitioner asserts that Hauwiller teaches “calculating site-specific measures for the soil nutrient existing in the field” because it describes that geographical data 204 inputted into the system can be “spatial data such as soil property data 236 [and] soil sample data 210. . . .” Pet. 40 (quoting Ex. 1006, 8:20–32).⁶ We note that Hauwiller describes that soil sample data may consist of soil samples which are tested “for the current condition of the soil in a field as it relates to crop growth. These tests may include soil nutrient levels . . . and others that are important for a given crop.” Ex. 1006, 6:1–9.

Regarding the limitation in claim 15 of “calculating a map for the agricultural field of site-specific soil nutrient amounts needed to produce at each site a maximum possible crop yield,” Petitioner argues that Hauwiller discloses this step insofar as it teaches “to construct a yield goal map for creating an application map based upon site specific yield goals.” Pet. 41 (quoting Ex. 1006, 9:38–41); *see also id.* (citing Ex. 1006, 3:60–66, 9:29–

⁶ Neither party’s briefing specifically addresses whether the preamble to claim 15 constitutes a limitation, but Petitioner argues that Hauwiller discloses what is recited in the preamble and Patent Owner does not rebut that argument. See Pet. 39–40 (citing Ex. 1006, 4:2–4, 3:24–30). We agree with Petitioner that Hauwiller teaches a method as recited in the preamble.

31). Although “maximum possible crop yield” is not the same as “yield goal” as a matter of claim construction (*see supra* § II.A.), the record indicates that maximizing crop yield was, nevertheless, a known and common yield goal in the prior art. *See, e.g.*, Ex. 1003 ¶ 3 (“Maximization of crop yields is critical to the agricultural industry. . . .”); Ex. 1004, 32:53–60; Ex. 1005, 1:46–48, 3:62–64.

Claim 15 also specifies that this map of site-specific soil nutrient amounts needed to produce maximum possible crop yield is calculated “by use of a map of site-specific field characteristic data for the agricultural field generated using a satellite image of the agricultural field.” Petitioner points out that Hauwiller teaches that “[p]referably, a soil characteristic map is inputted into the system to construct a yield goal map. . . .” Pet. 41 (Ex. 1006, 9:38–41). Petitioner’s declarant, Dr. Johannsen, refers to the description in the Background of the ’912 patent of a prior art technique for preparing a digital soil map from an aerial infrared photograph. Ex. 1009 ¶ 69 (citing Ex. 1001, 2:36–50). Dr. Johannsen testifies that it would have been obvious to substitute a satellite approach for the aerial approach in preparing a soil map, noting that “satellite images would have made the capturing of field characteristic data very fast and efficient.” *Id.* ¶ 71.

Claim 15 further recites “subtracting, from the site-specific soil nutrient amounts for maximum yield for the field, the site-specific measures for soil nutrient existing in the field, thereby producing a map of site-specific amounts of soil nutrient to be applied in fertilizer to the field.” Petitioner asserts that “the Background of the ’912 Patent discloses what is characterized as ‘[a] conventional method for calculating nitrogen needs for a field.’” Pet. 42 (emphasis omitted) (quoting Ex. 1001, 1:39–40). The

referenced portion of the '912 patent identifies an equation for the nitrogen calculation. In that equation, the fertilizer recommendation is calculated from several variables, including crop yield goal, the pre-plant soil profile NO_3 content, and the organic nitrogen mineralization. *Id.* Petitioner contends that it would have been obvious to combine the equation from the Background of the '912 Patent with Hauwiller “because the equation is conventional and, as such, is the likely way to implement a system attempting to establish an amount of nutrient to add.” *Id.* at 42–43. In addition, Dr. Johannsen testifies that “subtraction of existing nutrients from the nutrient amount was a conventional thing to do particularly because it helps reduce leaching due to over fertilization.” Ex. 1009 ¶ 71.

The '912 patent describes the equation as a “conventional method for calculating nitrogen needs for a field.” Ex. 1001, 1:39–40. Hauwiller’s system is open to a variety of recommendation equations, as Patent Owner’s declarant agrees. *See* Ex. 1006, 8:36–48, 9:18–21, 9:34–38, 13:30–35, 13:39–45; Ex. 1020, 8:11–16. This openness supports the obviousness of employing within Hauwiller’s system a conventional equation (or certain aspects of a conventional equation) such as the one set forth in the Background of the '912 patent. Further, while the conventional equation includes several variables, a basic teaching of the equation is that in calculating the fertilizer recommendation, the amount of nitrogen already present should be subtracted from the nitrogen needed to realize the yield goal. *See* Ex. 1001, 1:39–50. Dr. Johannsen’s testimony that “subtraction of existing nutrients from the nutrient amount was a conventional thing to do particularly because it helps reduce leaching due to over fertilization” is

consistent with this understanding of the conventional equation. *See* Ex. 1009 ¶ 71.

We also recognize that the '912 patent describes the equation as being a conventional approach for calculating nitrogen needs “for a field” rather than for a specific site within the field. Ex. 1001, 1:39–40. But Hauwiller recognizes that “[d]esired yield potential varies depending upon the soil characteristics by location” and, for that reason, describes the desirability of constructing “a yield goal map for creating an application map *based upon site specific yield goals.*” Ex. 1006, 9:32–41 (emphasis added). Thus, Hauwiller teaches the advantages and desirability of a site specific approach. We agree with Petitioner that the “subtracting” step would have been obvious by applying the teachings of the equation in the Background of the '912 patent to the site-specific approach of Hauwiller.

The evidence supports Petitioner’s contentions summarized above, and we agree with Petitioner that claim 15 would have been obvious based on Hauwiller and the prior art described in the Background of the '912 patent, even taking into account the secondary considerations discussed in Section II.E. below. We have considered Patent Owner’s arguments to the contrary, but we do not find them persuasive for the reasons discussed below.

First, Patent Owner argues that combining the recommendation equation from the Background of the '912 patent with Hauwiller’s site specific methods would not have been obvious because skilled artisans at the time of the invention were skeptical that field recommendations should be applied in a site-specific way. PO Resp. 28–29 (citing Ex. 2033 ¶ 195). The particular skepticism Patent Owner describes is uncertainty as to whether “a

grower's economics would improve by applying field practices to each site.” *Id.* In this regard, Dr. Heiniger testifies that “[s]ite-specific application of N recommendations . . . could result in lower potential profit in good years or higher potential losses in bad years if sites were managed the same way a field had been.” Ex. 2033 ¶ 195. Relatedly, Patent Owner argues, based on Dr. Heiniger’s testimony, that skilled artisans were skeptical that site-specific variable-rate nitrogen fertilizer applications “could be cost effective in pre-plant applications because N fertilizer would move or leach.” PO Resp. 29 (citing Ex. 2033 ¶ 196). And because variations are magnified at the sub-field level compared to the field level, skilled artisans did not have confidence that applying a field recommendation equation at a sub-field level would improve productivity and economics. *Id.* (citing Ex. 2033 ¶ 198).

We do not find these arguments persuasive because, as Petitioner points out, they focus on economic rather than technical considerations. *See* Reply 9. Even if Patent Owner is correct that skilled artisans were doubtful that applying a field equation site-specifically would save farmers money, we do not view that assertion as undermining Petitioner’s obviousness case. *See In re Farrenkopf*, 713 F.2d 714, 718 (Fed. Cir. 1983) (“That a given combination would not be made by businessmen for economic reasons does not mean that persons skilled in the art would not make the combination because of some technological incompatibility. Only the latter fact would be relevant.”).

Next, Patent Owner argues that in the 2005 edition of Havlin, the 1999 textbook from which the equation in the Background of the ’912 patent was taken, “the same equation appears in essentially the same form.” PO

Resp. 30. According to Patent Owner, this demonstrates that it was not obvious to apply the equation in a site-specific way at the time of the invention.⁷ *Id.* The evidence Patent Owner cites does not support its assertion that “this same equation appears in essentially the same form” in the 1999 and 2005 editions of Havlin because no equation, in any form, appears on any of the cited pages. *See id.* (citing Ex. 2007, 4; Ex. 2011, 33; Ex. 2012, 33–35). In any event, even if the Patent Owner had shown that the same equation appeared in a later edition of the Havlin textbook, this would not dissuade us from Petitioner’s arguments regarding the obviousness of applying aspects of that equation site-specifically. Patent Owner speculates from Havlin’s alleged repetition of the equation in 1999 and 2005 without a discussion of applying that equation in a site-specific manner that Havlin did not appreciate that it could be applied in that way. *Id.* Yet there are myriad reasons why a textbook author might choose not to describe a particular application for an equation aside from a failure to appreciate that potential application. Moreover, whether Havlin appreciated the possibility of applying the equation site-specifically in 1999 or 2005 is beside the point, as “[t]he issue of obviousness is determined entirely with reference to a hypothetical ‘person having ordinary skill in the art.’” *Standard Oil Co. v. American Cyanamid Co.*, 774 F.2d 448, 454 (Fed. Cir. 1985).

Patent Owner also argues that research after the invention confirmed the skepticism of applying field recommendation approaches site-specifically. PO Resp. 30. In particular, Patent Owner discusses a technical

⁷ The earliest claimed priority date in the ’912 patent is February 28, 2001. *See* Ex. 1001, at [60], 1:8–11. Petitioner’s arguments assume that this priority date is applicable for all challenged claims. *See* Pet. 5–6.

paper by Ferguson published in 2002 that “conclude[d] that the spatial application of the existing recommendation algorithm developed for uniform application may be inappropriate.” *Id.* (citing Ex. 2015, 1). According to Patent Owner, the Ferguson paper confirms that mechanically applying a non-site-specific recommendation equation in a site-specific manner “simply does not work.” *Id.*

This argument misapprehends Petitioner’s obviousness case. Petitioner does not propose a mechanical application of Havlin’s equation on a site-specific basis. Rather, Petitioner simply uses the equation as evidence that it would have been obvious to subtract existing nutrients because that is part of what was done in the conventional equation. *See* Reply 7 (arguing that Patent Owner “fails to recognize that the claims do not require every aspect of the equation to applicable on a site-specific basis. The claims merely require that soil nutrient be subtracted from the nutrient needed for a site.”). The technical paper Patent Owner cites does not suggest otherwise. The Ferguson paper explains that a known generalized equation for all soils and climatic regions across Nebraska may not be the most appropriate model in every soil-climate situation and, therefore, suggests that development of equations specific to major soils and climatic regions may be necessary. Ex. 2015, 9. We do not discern that the Ferguson paper detracts from the persuasiveness of Petitioner’s obviousness case.

Patent Owner further argues that using Havlin’s equation in Hauwiller would not make sense because “[s]oil properties are the starting point for Hauwiller’s recommendations. It would not be efficient or logical to compute the amount of fertilizer needed based on nutrient amounts already in the soil, and then to subtract those same soil nutrient amounts.” PO Resp.

31 (citing Ex. 2033 ¶ 201); *see also id.* at 34–35 (“Hauwiller uses first and foremost a system that evaluates soil characteristics via soil testing.”). We are not persuaded by Patent Owner’s assertion that in Hauwiller, soil properties must be “*the* starting point.” *Id.* at 31 (emphasis added). In support of its characterization of Hauwiller, Patent Owner points to the following disclosure in Hauwiller:

It is preferable that system 200 utilize a combination of attribute data 202 and geographical data 204 in combination with specific user data 208 (i.e. application rate equations). The user inputs instructions to the system for creating a particular map via user input 208. The geographical data 204 preferably includes field boundary data 212 and soil sample data 210. Soil sample data 210 may include soil test data in either systematic or random form of soil nutrient levels, soil pH, soil texture and characteristics, organic matter, etc.

Ex. 1006, 4:4–13; *see also* PO Resp. 34. This description indicates preferences for the types of inputs that the system can use, and does not support Patent Owner’s argument that soil data is the exclusive starting point in Hauwiller’s system. Patent Owner also cites Dr. Heiniger’s testimony, but the cited paragraph in Dr. Heiniger’s declaration does not point to any specific disclosure in Hauwiller that supports this narrow understanding of the reference’s disclosure. *See* Ex. 2033 ¶ 201. On cross-examination, Dr. Heiniger agreed that Hauwiller “could take other sources of information” beyond soil test value. *See* Ex. 1020, 9:6–24. Dr. Heiniger also agreed that Hauwiller uses field data to create an application map, and that field data is broader than just soil data. *See id.* at 23:8–20. We agree with Petitioner that Patent Owner’s argument oversimplifies Hauwiller’s teachings, and that Hauwiller contemplates a variety of inputs, not only soil properties. *See* Reply 1–2 (citing Ex. 1006, 3:60–67, 9:45–51, 14:58–62). Moreover, even

in the case where Hauwiller uses soil properties as a starting point, we are not persuaded that subtracting the soil nutrient already existing in the field to determine the amount of fertilizer to apply would have been considered illogical.

Patent Owner additionally challenges Petitioner's use of a reference called Ortlip. PO Resp. 31–32. As summarized above, Dr. Johannsen's testimony refers to the description in the Background of the '912 patent of a prior art technique, disclosed in a patent to Ortlip, for preparing a digital soil map from an aerial infrared photograph. See Ex. 1009 ¶ 69 (citing Ex. 1001, 2:36–50). Patent Owner argues that Ortlip only determines which of three soil types exist at each pixel in the image of a field and selects a dispensing rate based on which of the three soil types is present. PO Resp. 32 (citing Ex. 2016, 1:38–48, 3:49–4:5, 7:61–67). Accordingly, Patent Owner argues, Ortlip does not calculate a map of site-specific soil nutrient amounts needed to produce at each site a maximum possible crop yield, as recited in claim 15. *Id.*

Patent Owner's argument attacks Ortlip individually and does not respond to the obviousness case as Petitioner has presented it. See *In re Merck & Co.*, 800 F.2d 1091, 1097 (Fed. Cir. 1986) (“Non-obviousness cannot be established by attacking references individually where the rejection is based upon the teachings of a combination of references.”). Petitioner does not rely on Ortlip (or the summary of Ortlip in the Background of the '912 patent) as disclosing the entire “calculating a map” step. Ortlip's role in Petitioner's obviousness case is as support for the contention that use of aerial or satellite imaging was a known and obvious way of preparing a map of field characteristic data. See Ex. 1009 ¶ 69. That

Ortliip's map is only used to distinguish among three categories of soil type does not rebut Dr. Johannsen's testimony that it was known to prepare a digital soil map through aerial imaging. Similarly, Patent Owner's argument that Hauwiller does not disclose the "calculating a map" step as recited in claim 15 (*see* PO Resp. 33–34) attacks Hauwiller individually and is also unpersuasive.

For the foregoing reasons, even taking into account the secondary considerations discussed in Section II.E. below, we conclude that Petitioner has shown by a preponderance of the evidence that claim 15 would have been obvious in view of Hauwiller and the Background of the '912 patent.

c. Analysis of Claim 16

Claim 16 depends from claim 15 and recites that "the field characteristic is a measure of biomass produced by the field in one or more past growing seasons." By virtue of its dependency from claim 15, claim 16 also requires that the map of field characteristic data is "generated using a satellite image of the agricultural field."

Petitioner asserts that Hauwiller discloses "inputting data, including yield monitor data, field history data, and previous and future crop information, including planting population and yield received, into the system for determining optimum treatment. Pet. 43 (citing Ex. 1006, 8:20–35, 6:53–55). Based on this disclosure, Petitioner argues that Hauwiller considers field characteristics that would be a measure of the amount of plant life. Petitioner also asserts that the Background of the '867 patent admits that biomass "is known to be directly related to crop yield." *Id.* (citing Ex. 1001, 1:59–63).

Patent Owner asserts that the combination of Hauwiller and the '867 patent background do not disclose the limitation recited in claim 16. PO Resp. 35. Patent Owner argues that Hauwiller does not render the claim obvious because Hauwiller measures the nutrients available in the soil, while crop data such as yield measures the plant's nutrient uptake. *Id.* at 36. Moreover, Patent Owner argues that yield and biomass are not the same thing. *Id.*

We determine that Petitioner's evidence of unpatentability with regard to claim 16 outweighs Patent Owner's evidence. We find that previous crop information and field history includes biomass, which is known to be "directly related to crop yield." Ex. 1001, 1:59–63. Hauwiller also uses geographic data in forming its maps. Ex. 1006, 5:60–64. Finally, we find that capturing the set of biomass by prior satellite photography would have been an obvious methodology substitution for aerial photography, as both use remote sensing.

Accordingly, we determine that the Petitioner has shown by a preponderance of the evidence that claim 16 is unpatentable.

d. Analysis of Claim 17

Petitioner explains how dependent claim 17, which relates to leaf area index as a measure of biomass, would have been obvious in view of Hauwiller in combination with the teachings of the Background of the '912 patent. Pet. 43–44. Petitioner's contentions regarding this claim are persuasive. Petitioner discusses the disclosure in the Background of the '912 patent that leaf area index was a known measure of biomass and that it could be sensed remotely. *See id.* (citing Ex. 1001, 1:61–2:8). Petitioner also argues persuasively that combining the leaf area index measures with

Hauwiller would have been obvious in order to “capture[] crop information over a large area and allow[] for quickly ascertaining the relative yield potential of particular areas.” *Id.* at 44; *see also* Ex. 1009 ¶ 73.

Patent Owner argues that Dr. Johannsen’s testimony regarding the use of leaf area index is inconsistent with an article he authored in 2000 indicating that improvements in remote sensing capabilities were needed before a predicted yield map made from remotely sensed images could be used to help develop maps to guide varied application rates. PO Resp. 39 (citing Ex. 2013, 5). We are not persuaded that the 2000 publication contradicts Dr. Johannsen’s testimony concerning claim 17. The cited page does not discuss leaf area index, nor does it call into question Dr. Johannsen’s testimony that it would have been obvious to use leaf area index because it would provide a fast and efficient way to determine nutrient amounts. Ex. 1009 ¶ 73.

Even taking into account the secondary considerations discussed in Section II.E. below, we conclude that Petitioner has shown by a preponderance of the evidence that claim 17 would have been obvious in view of Hauwiller and the Background of the ’912 patent.

e. Analysis of Claims 20–23

Claims 20–23 depend from claim 15 and recite specific types of soil nutrients. Petitioner contends that the recited nutrients were all known in the prior art, and that it would have been obvious to employ those nutrients in the asserted combination. Pet. 44, 56–58 (citing Ex. 1001, 1:23–27; Ex. 1002, 6:28–30; Ex. 1006, 17:36–40). In addition, Dr. Johannsen testifies as to the obviousness of using the recited nutrients for fertilizing crops. Ex. 1009 ¶¶ 94, 96, 98. Apart from noting their dependency from claim 15,

Patent Owner does not present any argument for the patentability of claims 20–23. *See* PO Resp. 40; *see also* 37 C.F.R. § 42.23(a) (providing, with respect to oppositions, that “[a]ny material fact not specifically denied may be considered admitted”); 37 C.F.R. § 42.120(a) (“A patent owner response is filed as an opposition.”). Upon reviewing the unchallenged contentions and supporting evidence in the Petition, and even taking into account the secondary considerations discussed in Section II.E. below, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 20–23 would have been obvious in view of Hauwiller and the Background of the ’912 patent.

2. Claim 18

Claim 18 depends from claim 15 and recites “calculating, from a map of site-specific image data taken of the field during one or more past growing seasons, a map of site-specific measures of a vegetation index, the vegetation index serving as a measure of biomass produced by the field.” Petitioner argues that claim 18 is unpatentable under 35 U.S.C. § 103(a) over Hauwiller in view of the Background of the ’912 patent and Dickson. Pet. 44–45.

a. Summary of Dickson

Dickson describes an imaging system for determining nitrogen levels in vegetation. Ex. 1003 ¶ 29. The imaging system detects light from the vegetation and non-vegetation background at a plurality of wavelengths, such as near infrared, red, and green. *Id.* ¶ 31. A vegetation image is produced by separating out the non-vegetation portions using the characteristics of light reflected at the near infrared and red wavelength ranges. *Id.* ¶ 34. “The preferred embodiment calculates a normalized

difference vegetative index (NDVI) as an index value to separate the vegetation pixels from non-vegetation pixels.” *Id.* ¶ 57. The vegetation image is then analyzed based on the green wavelength range to determine the nitrogen status of the crop. *Id.* ¶ 35. The image analysis can evaluate crop status in other ways also, such as plant population and percent canopy measurements. *Id.* ¶ 61.

b. Analysis of Claim 18

Petitioner asserts that Dickson teaches generating a vegetation map from measures of a vegetative index, and using the resulting vegetation image to determine the amount of plant life. Pet. 45 (citing Ex. 1003 ¶¶ 57, 61). Petitioner contends that, based on Dickson and the Background of the ’912 patent, it would have been obvious to use NDVI measurements as a measure of biomass “because NDVI is a known way to measure biomass and is a simple substitutable alternative to using leaf area index.” *Id.*

Patent Owner counters that there was no motivation to combine Hauwiller, Background, and Dickson. PO Resp. 40. More specifically, Patent Owner contends that Dickson does not provide any measure of biomass, only describing an imaging system which yields pixels of “vegetation” or “non-vegetation.” *Id.* According to Patent Owner, Dickson does not relate to pre-planting fertilization, but is real-time for use during the growing season. *Id.* at 41. Dr. Heiniger testifies that Dickson seeks to provide corrective fertilization during the same growing season. Ex. 2033 ¶ 212. Moreover, according to Dr. Heiniger, Dickson suggests not to use NDVI for analysis of plant material because Dickson does not use NDVI when measuring quantities of interest from which to make nutrient additions. *Id.* ¶ 215.

Patent Owner's arguments are unpersuasive because they are premised on a bodily incorporation of the Dickson method into Hauwiller. *See, e.g. In re Keller*, 642 F.2d 413, 425 (CCPA 1981) ("The test for obviousness is not whether the features of a secondary reference may be bodily incorporated into the structure of the primary reference Rather, the test is what the combined teachings of the references would have suggested to those of ordinary skill in the art.").

We find Petitioner's contentions more persuasive. NDVI is a known alternative which could be used to measure the vegetation present in a field. As discussed above, using prior year field data was also known, as was the use of satellite imagery. Patent Owner urges that Dickson's use of NDVI fails to teach a vegetation index serving as a measure of biomass. PO Resp. 44. More specifically, Patent Owner argues that the combination of Hauwiller, Background, and Dickson does not render obvious "calculating, from a map of site-specific image data taken of the field during one or more past growing seasons, a map of site-specific measures of a vegetation index, the vegetation index serving as the measure of biomass produced by the field" as recited in claim 18. *Id.*

However, each of these elements was individually known in the field of high precision farming – taking satellite data, using prior years' data, using biomass, and using a vegetation index in order to learn about the field characteristics. Petitioner has also articulated a reason, supported by rational underpinnings, why it would be obvious to combine those teachings in the manner recited in claim 18. *See* Pet. 45 ("NDVI is a known way to measure biomass and is a simple substitutable alternative to using leaf area index"); Ex. 1009 ¶ 76 ("One of skill in the art would have thought to combine NDVI

with the teachings of Hauwiller et al. because it would provide a fast and efficient way to develop site-specific values of yield and, thus, provide a fast and efficient way to develop nutrient amounts.”). For these reasons, Petitioner has demonstrated that a preponderance of evidence supports the conclusion that claim 18 is unpatentable in view of Hauwiller, the Background of the ’867 patent, and Dickson.

3. Claims 24 and 25

Claims 24 and 25 depend from claim 15. Claim 24 recites, among other things, “calculating the site-specific measures of the soil nutrient existing in the field from at least a map of site-specific measures of soil brightness.” Claim 25 recites that the site-specific measures of soil nutrient existing in the field are calculated from at least a map of soil electrical conductivity. Petitioner argues that claims 24 and 25 are unpatentable under 35 U.S.C. § 103(a) over Hauwiller in view of the Background of the ’912 patent and Shibusawa. Pet. 45–47.

Shibusawa describes an apparatus and method for measuring soil properties. Ex. 1004, 3:3–11. A soil map that correlates the soil properties at each position can be created, which can be used for precise field management. *Id.* at 4:14–22.

Petitioner has explained how the subject matter of claim 24 would have been obvious over Hauwiller, the Background of the ’912 patent, and Shibusawa. Pet. 45–47. Petitioner argues that Shibusawa discloses measuring soil brightness from a map of bare soil, and teaches that there is a correlation between soil brightness and organic matter in soil. Pet. 46 (citing Ex. 1004, 28:1–6). Petitioner also cites Dr. Johannsen’s testimony, which indicates that calculating soil brightness from bare soil images was well

known at the time of the invention and that airborne and satellite-borne instruments for measuring soil reflectance (another term for soil brightness) had been in use for many decades. *Id.*; Ex. 1009 ¶ 77–78. According to Dr. Johannsen, it was known in the art that “[t]he surface darkness shown on remotely sensed images of soil surfaces would provide an indication of the amount of organic matter,” and that “[t]he amount of organic matter content in the soil is the best estimate of nitrogen content.” Ex. 1009 ¶ 78).

Petitioner contends that it would have been obvious to use soil brightness to determine nitrogen fertilization calculations and recommendation maps as recited in claim 24 because doing so “allows for capturing a large amount of information about a large area without needing to take individual soil tests.” Pet. 46–47.

The evidence supports Petitioner’s contentions summarized above, and we agree with Petitioner that claim 24 would have been obvious based on Hauwiller, the prior art described in the Background of the ’912 patent, and Shibusawa, even taking into account the secondary considerations discussed in Section II.E. below. We have considered Patent Owner’s rebuttal arguments, but they are not persuasive. *See* PO Resp. 46–49. Patent Owner’s argument that employing Shibusawa’s system “would have been too expensive” (*id.* at 46) does not identify any technical reasons why the proposed combination would not have been obvious. *See Farrenkopf*, 713 F.2d at 718. Patent Owner also argues that Shibusawa’s system is not a remote sensing system, but instead is mounted on a tractor and driven around the field to capture underground images of the soil. PO Resp. 47. Patent Owner cites Dr. Heiniger’s testimony that unlike a remote sensing system such as satellite imaging, Shibusawa’s system utilizes active

illumination of the subsoil. *Id.* (citing Ex. 2033 ¶ 240). Although we agree with Patent Owner that Shibusawa itself does not teach to produce a soil brightness map through satellite imaging, Patent Owner does not rebut persuasively Dr. Johannsen’s testimony that use of satellite images to produce soil brightness maps was well known in the prior art. *See* Ex. 1009 ¶¶ 77–78.

However, Patent Owner’s arguments do identify a deficiency in Petitioner’s case against claim 25. By virtue of its dependency from claim 15, claim 25 requires that the map of site-specific field characteristic data is “generated using a satellite image of the agricultural field.” Petitioner argues that Shibusawa discloses a map of measurements of soil electrical conductivity (Pet. 47 (citing Ex. 1004, 20:11–16, 23:14–17)), but Petitioner does not provide sufficient evidence or argument showing that it was known to use satellite imaging to produce a site-specific map of soil electrical conductivity. Dr. Johannsen’s testimony concerning claim 25 states that “electrical conductivity of soil is commonly known as a soil property that can be measured” (Ex. 1009 ¶ 80), but does not address whether it was known or obvious to create a map of soil electrical conductivity through satellite imaging. Accordingly, we agree with Patent Owner that Petitioner, in its Petition, has not met its burden to show that the subject matter of claim 25 would have been obvious in view of the cited references.

For the foregoing reasons, even taking into account the secondary considerations discussed in Section II.E. below, we conclude that Petitioner has shown by a preponderance of the evidence that claim 24 would have been obvious in view of Hauwiller, the Background of the ’912 patent, and Shibusawa. Petitioner has not, however, met its burden to show that claim

25 would have been obvious in view of Hauwiller, the Background of the '912 patent, and Shibusawa.

4. *Claims 1–5, 8–12, and 19*

Petitioner argues that claims 1–5, 8–12, and 19 are unpatentable under 35 U.S.C. § 103(a) over Hauwiller in view of the Background of the '912 patent and Blackmer. Pet. 48–54. Patent Owner contests Petitioner's position. See PO Resp. 52–57.

a. *Summary of Blackmer*

Blackmer is directed to methods of spatial evaluation of field characteristics including crop performance and environmental conditions. Ex. 1005, 1:8–12. Blackmer notes that genetic crop type can greatly affect yield because certain genetic crop types are particularly suitable for certain conditions. *Id.* at 1:36–42. “Yields can therefore be maximized if farmers can evaluate and control genetic crop performance on a small scale. However, traditional analysis of crop performance [is] confounded by genotype by genotype by environment (GxE) variance. . . .” *Id.* at 1:46–50. Specifically, in previous efforts to evaluate genetic performance of a crop, environment varied significantly enough, even within a single field, that crop performance information was of little use due to GxE variation. *Id.* at 2:1–3. Blackmer sought to address the need for a method that permitted comparisons between environmentally homogenous regions. *Id.* at 2:3–5.

Blackmer describes “a technique for the cell (length unit) based comparison of field characteristics.” *Id.* at 5:67–6:1. According to Blackmer, the method it teaches allows a smaller area of comparison and permits production of data maps for commercial agricultural production fields. *Id.* at 6:1–8. As part of Blackmer's process, “after a field has been

prepared, spatially-referenced field characteristic data is obtained.” *Id.* at 6:66–67.

For example, the field characteristic data may simultaneously comprise measurements of an environmental condition variable and a crop performance variable. In this way, crop performance can be measured as a function of the environmental conditions, giving valuable new information that will allow a farmer to maximize yields.

Id. at 7:1–7. Field characteristic data can include “an environmental condition variable, including . . . information concerning watering or rainfall levels (to evaluate moisture dependency and drought hardiness). . . .

Alternatively, the field characteristic data may comprise crop performance data such as moisture content. . . .” *Id.* at 7:20–35. Blackmer explains that “[a] correlation also may be calculated between an environmental condition variable and the crop performance variable. This will provide information regarding the performance of a crop under various conditions, thus allowing farmers to maximize crop production.” *Id.* at 3:60–64.

b. Analysis of Claims 1–5

Petitioner has explained how the subject matter of claim 1 would have been obvious in view of Hauwiller in combination with the description of the prior art in the Background of the ’912 patent and Blackmer. For limitations that claim 1 shares in common with claim 15, Petitioner’s analysis is the same as that discussed above in Section II.D.1.b. *See* Pet. 48–49. Petitioner argues that using a map of site-specific measures of a soil wetness index as recited in claim 1 would have been obvious in view of Blackmer. *See id.* at 49. In particular, Petitioner asserts that Blackmer teaches to obtain field characteristic data, including soil moisture. *Id.* at 50 (citing Ex. 1005, 7:21–33, 28:13–16). Citing the testimony of Dr.

Johannsen, Petitioner argues that wetness index is a conventional way to characterize a location's moisture. *Id.* (citing Ex. 1009 ¶ 82). Further, Petitioner asserts that Blackmer discloses correlating the field characteristic with yield to maximize crop production. *Id.* (citing Ex. 1005, 3:60–67). Petitioner contends that it would have been obvious to combine Blackmer's soil moisture mapping procedures with Hauwiller because doing so “would allow for placement of fertilizer in areas more likely to have higher yields due to the presence of moisture.” *Id.*

We agree with Petitioner that claim 1 would have been obvious based on Hauwiller, the prior art described in the Background of the '912 patent, and Blackmer. We have considered Patent Owner's arguments to the contrary, but we do not find them persuasive. Patent Owner challenges Petitioner's stated reason for combining Blackmer, arguing that moisture is “not necessarily indicative of higher yields” because in certain instances, more moisture will lead to lower yields. PO Resp. 52. The absence of a perfect correlation between moisture and higher yields does not rebut persuasively Petitioner's argument that the presence of moisture is likely to provide higher yields. The evidence supports Petitioner's argument that moisture availability was known to have a direct relationship with yield. *See* Ex. 1009 ¶ 82; Ex. 1001, 9:36–38 (“Previous research has shown a direct relationship between the amount of water available and yield variability in a field.”). Even granting Patent Owner's argument that moisture presence alone is not an accurate predictor of high yields, Petitioner's argument does not require that moisture presence is used as the sole factor. We note that the claim recites that the calculation of the amount of soil nutrients needed to maximize crop yield is performed “by use of a map of site-specific measures

of soil wetness index,” but does not preclude the inclusion of other factors or variables in that calculation.

Patent Owner argues that “Blackmer is incongruent with Hauwiller” because “Hauwiller is directed to testing physical soil samples to determine the amount of fertilizer needed,” whereas Blackmer “is directed to evaluating correlations between certain environmental conditions and crop performance.” PO Resp. 53. We disagree with Patent Owner’s unduly narrow characterization of Hauwiller because, as discussed above with reference to claim 15, soil testing is only one exemplary type of input in Hauwiller’s system. Moreover, Patent Owner’s argument that Blackmer is not concerned with fertilizer application does not persuasively rebut Petitioner’s argument that it would have been obvious to apply Blackmer’s teachings regarding the relationship between environmental conditions and crop performance in determining how much fertilizer to apply.

Patent Owner additionally argues that Blackmer does not disclose a soil wetness index as recited in claim 1. *Id.* at 54. According to Patent Owner, wetness index was not well-known at the time of the invention for creating yield goals. PO Resp. 55–56. However, the record supports Petitioner’s argument that soil wetness index is, as its name implies, a measure of a location’s moisture or wetness. *See* Ex. 1009 ¶ 82. Dr. Heiniger agrees that wetness index correlates to soil water contents. Ex. 1020, 107:2–15. Patent Owner does not persuasively rebut Petitioner’s argument that using soil wetness index would have been obvious based on Blackmer’s teachings to use the relationship of field characteristic data, including soil moisture, and crop performance to “giv[e] valuable new

information that will allow a farmer to maximize yields.” See Ex. 1005, 7:21–33, 3:60–4:4, Pet. 50; Ex. 1020, 107:25–109:20.

Claims 2–5 depend from claim 1 and recite specific types of soil nutrients. Petitioner’s arguments for these claims are similar to those presented for claims 20–23. See Pet. 54. Apart from noting their dependency from claim 1, Patent Owner does not present any argument for the patentability of claims 2–5. PO Resp. 57. Upon reviewing the unchallenged contentions and supporting evidence in the Petition, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 2–5 would have been obvious in view of Hauwiller, the Background of the ’912 patent, and Blackmer.

For the foregoing reasons, even taking into account the secondary considerations discussed in Section II.E. below, we conclude that Petitioner has shown by a preponderance of the evidence that claims 1–5 would have been obvious in view of Hauwiller, the Background of the ’912 patent, and Blackmer.

c. Analysis of Claims 8–12

Independent claim 8 is directed to a computer program having instructions for causing a computer to carry out a process very similar to that required by claim 1. Petitioner’s argument and evidence concerning claim 8 closely track those discussed above for claim 1. See Pet. 51–52. Likewise, Patent Owner’s rebuttal for claim 8 is the same as for claim 1. PO Resp. 52–57. For the same reasons discussed in the preceding subsection, we find Petitioner’s contentions persuasive.

Claims 9–12 depend from claim 8 and recite specific types of soil nutrients. Petitioner’s arguments for these claims are similar to those

presented for claims 20–23. *See* Pet. 54. Apart from noting their dependency from claim 8, Patent Owner does not present any argument for the patentability of claims 9–12. PO Resp. 57. Upon reviewing the unchallenged contentions and supporting evidence in the Petition, we conclude that Petitioner has demonstrated by a preponderance of the evidence that claims 9–12 would have been obvious in view of Hauwiller, the Background of the '912 patent, and Blackmer.

Accordingly, even taking into account the secondary considerations discussed in Section II.E. below, we conclude that Petitioner has shown by a preponderance of the evidence that claims 8–12 would have been obvious in view of Hauwiller, the Background of the '912 patent, and Blackmer.

d. Analysis of Claim 19

Claim 19 depends from claim 15 and recites “calculating, from a topographic map for the field, a map of site-specific measures of a soil wetness index, the wetness index serving as the field characteristic.” Petitioner presents similar arguments for this claim as for claims 1 and 8, discussed above. *See* Pet. 52–54. Regarding the claim 19 limitation that the wetness index is calculated “from a topographic map for the field,” which does not appear in claims 1 or 8, Petitioner cites testimony of Dr. Johannsen that field topography has a well-known correlation with wetness, and that it would have been obvious to use a topographic map to calculate wetness index because doing so avoids the need for aerial or satellite imaging or soil testing. Pet. 53 (citing Ex. 1009 ¶ 58). Patent Owner presents the same arguments regarding claim 19 as for claims 1 and 8. *See* PO Resp. 52–56. For the same reasons discussed, we find Petitioner’s contentions persuasive.

Thus, even taking into account the secondary considerations discussed in Section II.E. below, we conclude that Petitioner has shown by a preponderance of the evidence that claim 19 would have been obvious in view of Hauwiller, the Background of the '912 patent, and Blackmer.

5. Claims 6, 7, 13, and 14

Petitioner argues that claims 6, 7, 13, and 14 are unpatentable under 35 U.S.C. § 103(a) over Hauwiller in view of the Background of the '912 patent, Shibusawa, and Blackmer. These claims recite similar limitations to claims 24 and 25, but depend from a different base claim. Petitioner's argument concerning these claims is similar to its case against claims 24 and 25, which is summarized above in Section II.D.3. *See* Pet. 54–56. Likewise, Patent Owner's rebuttal for these claims simply refers back to its arguments regarding claims 24 and 25. *See* PO Resp. 57–59.

We find Petitioner's contentions regarding these claims to be persuasive. The deficiency in Petitioner's case against claim 25 discussed in Section II.D.3. does not apply to claims 6, 7, 13, and 14 because none of these claims (or any of the claims from which they depend) requires use of a satellite image to generate a map of soil electrical conductivity. We have also considered the other arguments that Patent Owner presented regarding claims 6, 7, 13, and 14, but we do not find them persuasive.

Therefore, even taking into account the secondary considerations discussed in Section II.E. below, we conclude that Petitioner has shown by a preponderance of the evidence that claims 6, 7, 13, and 14 would have been obvious in view of Hauwiller, the Background of the '912 patent, Shibusawa, and Blackmer.

E. Secondary Considerations

Factual inquiries for an obviousness determination include secondary considerations based on evaluation and crediting of objective evidence of nonobviousness. *Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966). Notwithstanding what the teachings of the prior art would have suggested to a skilled artisan, the totality of the evidence submitted, including objective evidence of nonobviousness, may lead to a conclusion that the challenged claims would not have been obvious to one with ordinary skill in the art. *In re Piasecki*, 745 F.2d 1468, 1471–72 (Fed. Cir. 1984). Secondary considerations, when present, must always be considered as part of an obviousness inquiry. *Transocean Offshore Deepwater Drilling, Inc. v. Maersk Drilling USA, Inc.*, 699 F.3d 1340, 1349 (Fed. Cir. 2012). Secondary considerations may include any of the following: long-felt but unsolved need, failure of others, unexpected results, commercial success, copying, licensing, and praise. *See Graham*, 383 U.S. at 17–18; *Leapfrog Enters., Inc. v. Fisher-Price, Inc.*, 485 F.3d 1157, 1162 (Fed. Cir. 2007).

To be accorded substantial weight, there must be a nexus between the merits of the claimed invention and the evidence of secondary considerations. *In re GPAC Inc.*, 57 F.3d 1573, 1580 (Fed. Cir. 1995). “Nexus” is a legally and factually sufficient connection between the objective evidence and the claimed invention, such that the objective evidence should be considered in determining nonobviousness. *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988). The burden of showing that there is a nexus lies with the Patent Owner. *Id.*; *see In re Paulsen*, 30 F.3d 1475, 1482 (Fed. Cir. 1994).

Here, Patent Owner argues that the licensing and acquisition history of the '912 patent supports the nonobviousness of the claimed invention. PO Resp. 59–60. Specifically, Patent Owner points to agreements that Petitioner entered with a previous owner of the '912 patent, which included licenses to the '912 patent. *Id.* (citing Exs. 2022, 2023, 2024). Patent Owner also asserts that its own acquisition of the '912 patent as part of a settlement of a patent infringement suit constitutes additional evidence of nonobviousness. *Id.* at 60 (citing Ex. 2026, 2027). Finally, Patent Owner argues that Petitioner's commercial success during the licensing period and Petitioner's acquisition by Land O'Lakes supports nonobviousness. *Id.* at 60 (citing Exs 2028, 2029, 2030).

Petitioner responds that Patent Owner has not established a nexus between the licensing activity and the invention, as the agreements between Petitioner and the former owner of the '912 patent were entered for reasons other than recognition and acceptance of the subject matter claimed. Reply 14. Petitioner further contends that Patent Owner provides insufficient detail regarding the acquisition of the '912 patent to permit a determination that the acquisition related to the merits of the patented invention. *Id.* at 15. Petitioner also challenges Patent Owner's evidence of commercial success, arguing that “no consideration has been provided for other factors such as Geosys's global expertise, customer relationships, technical expertise, the strength of its IT and workforce, or its own goodwill and other intellectual property.” *Id.*

We agree with Petitioner that Patent Owner has not shown the required nexus between the alleged objective indicia of nonobviousness and the merits of the claimed invention. Although the agreements between

Petitioner and the former owner of the '912 patent convey rights under the '912 patent, they involve significantly more than the pertinent licenses. The 2008 and 2011 agreements convey licenses to a broader portfolio of U.S. and Canadian patents as well as copyrights, trademarks, and a domain name. Ex. 2022, 4–6; Ex. 2023, 4–6. Moreover, the licenses to intellectual property are just one facet of these agreements, the primary purpose of which is “to set forth the terms upon which Geosys shall provide sales, marketing and support for Field InSite as part of the Geosys FarmSat Platform.” Ex. 2022, 2; Ex. 2023, 2. Similarly, the 2012 agreement conveys rights beyond the '912 patent. Ex. 2024, 2–3. Patent Owner does not point to, and we do not find, any portion of these agreements assigning a particular royalty rate or value for the '912 patent. Given the breadth of the agreements and the absence of evidence or explanation from Patent Owner concerning nexus, any determination of how much of the value of the agreements is attributable to the '912 patent would be speculative. *See In re Cree*, 818 F.3d 694, 703 (Fed. Cir. 2016).

Further, the 2012 agreement calls for a lump sum payment for all of the rights conveyed, the amount of which is less than a reasonable estimate of potential litigation costs. Ex. 2024, 2–3. This detracts further from Patent Owner’s argument that the agreements support the nonobviousness of the '912 patent. *See EWP Corp. v. Reliance Universal Inc.*, 755 F.2d 898, 907–08 (Fed. Cir. 1985) (noting that licensing programs “are not infallible guides to patentability. They sometimes succeed because they are mutually beneficial to the licensed group or because of business judgments that it is cheaper to take licenses than to defend infringement suits, or for other reasons unrelated to the unobviousness of the licensed subject matter.”).

Patent Owner's argument based on its acquisition of the '912 patent is also unpersuasive. The evidence that Patent Owner cites in support of that argument shows only that The Mosaic Company filed and subsequently dismissed a Canadian patent infringement suit against Patent Owner. *See* Exs. 2025, 2026.⁸ Patent Owner does not cite to the agreement by which ownership of the '912 patent was transferred, nor does Patent Owner provide the details of that agreement. The evidence Patent Owner relies on does not support Patent Owner's argument that its decision to acquire the '912 patent constitutes objective evidence of nonobviousness of the '912 patent.

Finally, the commercial success argument Patent Owner presents in a single sentence at the end of its brief is undeveloped and unpersuasive. *See* PO Resp. 60. Patent Owner does not present evidence or argument sufficient to establish that any product of Petitioner's embodying the '912 patent was commercially successful, nor that the commercial success was due to the merits of the claimed invention.

For these reasons, we determine that Petitioner's evidence of obviousness outweighs the evidence of secondary considerations of nonobviousness submitted by Patent Owner. Accordingly, we conclude that Petitioner has established by a preponderance of the evidence that claims 1–24 are unpatentable as obvious under 35 U.S.C. § 103.

F. Patent Owner's Motion to Exclude Evidence

Patent Owner moves to exclude Exhibits 1014–17. Paper 23, 1. This Decision does not rely upon any of the content that Patent Owner seeks to

⁸ Patent Owner also cites an Exhibit 2027, but the record in this case does not include such an exhibit. *See* PO Resp. 60.

exclude. Accordingly, we *dismiss as moot* Patent Owner’s Motion to Exclude.

G. Patent Owner’s Motion to Seal

Patent Owner filed a motion to seal Exhibits 2022–24 pursuant to 37 C.F.R. § 42.54. Paper 12. The exhibits that Patent Owner seeks to have sealed are license agreements, the content and terms of which Patent Owner represents are confidential and commercially sensitive. *Id.* at 1–2. In support of its motion, Patent Owner submitted a Proposed Protective Order, to which both parties have agreed. *See id.* at 3, Ex. 2034. Patent Owner represents that the Proposed Protective Order is identical to the default protective order in the Office Patent Trial Practice Guide except that it additionally states that the protective order may be superseded by agreement of the parties and approval of the Board. *See id.* at 3; Ex. 2035, 1.

There is a strong public policy in favor of making information filed in an *inter partes* review open to the public, especially because the proceeding determines the patentability of claims in an issued patent and, therefore, affects the rights of the public. Under 35 U.S.C. § 316(a)(1) and 37 C.F.R. § 42.14, the default rule is that all papers filed in an *inter partes* review are open and available for access by the public; however, a party may file a concurrent motion to seal and the information at issue is sealed pending the outcome of the motion. It is only “confidential information” that is protected from disclosure. 35 U.S.C. § 316(a)(7); *see* Office Patent Trial Practice Guide, 77 Fed. Reg. 48,756, 48,760 (Aug. 14, 2012). The standard for granting a motion to seal is “good cause.” 37 C.F.R. § 42.54(a). The party moving to seal bears the burden of proof in showing entitlement to the requested relief, and must explain why the information sought to be sealed

constitutes confidential information. 37 C.F.R. § 42.20(c). As set forth in the Trial Practice Guide (77 Fed. Reg. at 48,761), there is an expectation that information will be made public if identified in this Final Written Decision.

We have reviewed the exhibits at issue and find that Patent Owner has made a sufficient showing that they contain confidential information and that there exists good cause to have those exhibits remain under seal. Accordingly, we enter the Protective Order submitted as Exhibit 2034 and grant Patent Owner's motion to seal.

The record will be maintained undisturbed pending the outcome of any appeal taken from this decision. At the conclusion of any appeal proceeding, or if no appeal is taken, the documents will be made public. *See* Trial Practice Guide, 77 Fed. Reg. at 48,760–61. Further, either party may file a motion to expunge the sealed documents from the record pursuant to 37 C.F.R. § 42.56. Any such motion will be decided after the conclusion of any appeal proceeding or the expiration of the time period for appealing.

III. CONCLUSION

We conclude that Petitioner has shown by a preponderance of the evidence that claims 1–24 would have been obvious. However, Petitioner has not shown that claim 25 would have been obvious.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that claims 1–24 of the '912 patent are held unpatentable;

FURTHER ORDERED that Patent Owner's Motion to Seal is
granted;

FURTHER ORDERED that the Proposed Protective Order appearing in Exhibit 2034 is hereby *entered* in this proceeding;

FURTHER ORDERED that Patent Owner's Motion to Exclude is
dismissed as moot; and

FURTHER ORDERED that, because this is a Final Written Decision,
parties to this proceeding seeking judicial review of the decision must
comply with the notice and service requirements of 37 C.F.R. § 90.2.

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