

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

YANTAI JEREH PETROLEUM EQUIPMENT &
TECHNOLOGIES CO., LTD,
Petitioner,

v.

BJ ENERGY SOLUTIONS, LLC,
Patent Owner.

PGR2021-00102
Patent 10,907,459 B1

Before KEN B. BARRETT, PATRICK R. SCANLON, and
JASON W. MELVIN, *Administrative Patent Judges*.

SCANLON, *Administrative Patent Judge*.

DECISION
Granting Institution of Post-Grant Review
35 U.S.C. § 324

I. INTRODUCTION

Yantai Jereh Petroleum Equipment & Technologies Co., Ltd. (“Petitioner”) filed a Petition (Paper 2, “Pet.”) requesting post-grant review of claims 1–28 of U.S. Patent No. 10,907,459 B1 (Ex. 1001, “the ’459 patent”). BJ Energy Solutions, LLC (“Patent Owner”) filed a Preliminary Response (Paper 15, “Prelim. Resp.”).

Under 35 U.S.C. § 324(a), a post-grant review may not be instituted “unless . . . the information presented in the petition . . . , if such information is not rebutted, would demonstrate that it is more likely than not that at least 1 of the claims challenged in the petition is unpatentable.” After considering the Petition and Patent Owner’s Preliminary Response, as well as all supporting evidence, we determine that Petitioner has satisfied the burden under 35 U.S.C. § 324(a) to show that it is more likely than not that at least one of the challenged claims is unpatentable.

II. BACKGROUND

A. Real Parties in Interest

Petitioner identifies itself as the real party in interest. Pet. 1. Patent Owner identifies itself as the real party in interest. Paper 4, 1. Patent Owner indicates that “[s]ubstantially all of [Patent Owner] is owned by Kanaci Technologies, LLC (f/k/a BJ Energy Solutions Holdings, LLC), which in turn is primarily owned by CSL Completions Co-Invest, LLC, CSL Completions Co-Invest-A, LLC, and CSL Co-Invest Holdings, LLC.” *Id.*

B. Related Matters

The parties indicate that there are no matters related to the ’459 patent. Pet. 2; Paper 4, 1. Petitioner indicates it has filed another petition for post-grant review (PGR2021-00103) challenging related U.S. Patent

No. 10,815,764, and Patent Owner has filed a petition for post-grant review (PGR2021-00060) challenging a patent owned by Petitioner. Pet. 2.

C. The '459 Patent

The '459 patent “relates to operating a fleet of pumps for hydraulic fracturing and, in particular, to systems and methods for operating a directly driven turbine fracturing pump system for hydraulic fracturing application.” Ex. 1001, 1:19–22. In general, the invention includes a method of using a controller for operating a plurality of pumps. *Id.* at 5:64–66. The controller receives a demand hydraulic horsepower (HHP) signal, which may be a signal corresponding to the demanded power for pumping stimulation fluid associated with the fracturing process. *Id.* at 6:3–9. “When the demand HHP signal is received, the controller 330 directs operation of all available pump units 302*a* thru 302*j* at a first output power.” *Id.* at 6:9–11. The first output power may be at or below the maximum continuous power (MCP) level of the pumps, where the MCP is the maximum power at which individual pump units may sustain continuous operation without any performance or reliability penalties. *Id.* at 4:16–20, 6:12–13.

During operation, the controller monitors operation of the pump units. *Id.* at 6:26–28. Upon receiving a loss or power signal from one or more of the pump units, the controller may designate one or more of the pump units as a Reduced Power Pump Unit (RPPU) and designate the remaining pump units as Operating Pump Units (OPUs). *Id.* at 6:41–45. In this instance, the controller calculates a second output power at which the OPUs must operate to maintain the needed HHP in view of the reduced operating power of the RPPU(s). *Id.* at 6:46–50. The second output power is greater than the first output power and may be in the range of approximately 70% of the MCP level to approximately the maximum intermittent power (MIP) level, where

the MIP is an elevated operating output level that the pump unit may operate intermittently throughout its operating life without excessive damage to the pump unit. *Id.* at 4:23–27, 6:50–53.

D. Challenged Claims

Petitioner challenges claims 1–28, of which claims 1 and 15 are independent. Claim 1, reproduced below, is illustrative.

1. A method of operating a plurality of pump units associated with a high-pressure, high-power hydraulic fracturing assembly, each of the pump units including a turbine engine, a driveshaft, a gearbox connected to the turbine engine and driveshaft for driving the driveshaft, and a pump connected to the driveshaft, the method comprising:

receiving a demand hydraulic horse power (HHP) signal for operation of the hydraulic fracturing assembly;

based at least in part on the demand HHP signal, operating all available pump units of the plurality of pump units at a first output power to achieve the demand HHP;

receiving a loss of power signal for one or more pump units of the plurality of pump units;

after receiving the loss of power signal, designating the one or more pump units as a reduced power pump unit (RPPU) and the remaining pump units as operating pump units (OPU); and

operating one or more of the OPUs at a second output power to meet the demand HHP signal for operation of the hydraulic fracturing assembly,

the first output power being in a selected range of a maximum continuous power (MCP) level of the plurality of pump units, the second output power being greater than the first output power and being in a selected range of the MCP level to a maximum intermittent power (MIP) level of the plurality of pump units.

Ex. 1001, 11:2–29.

E. Asserted Grounds

Petitioner contends that the challenged claims are unpatentable based on the following grounds:

Claims Challenged	35 U.S.C. §	References/Basis
1–28	103	Mu, ¹ Crowe ²
1–28	103	Luharuka ³ , API 674, ⁴ Karassik ⁵
1–28	103	Apollo Turbine Release, ⁶ API 616, ⁷ Mu
1–28	112(a)	Lack of Enablement
1–28	112(b)	Indefiniteness

Pet. 4. Petitioner relies on the Declaration of William D. Marscher, P.E. (Ex. 1003) to support its challenges. Patent Owner supports its Preliminary Response with the Declaration of Sarman Adnan, Ph.D. (Ex. 2003).

III. ANALYSIS

A. Eligibility for Post-Grant Review

As a threshold matter, we must determine whether the '459 patent is eligible for post-grant review. The post-grant review provisions set forth in section 6(d) of the Leahy-Smith America Invents Act, Pub. L. No. 112-29,

¹ WO 2020/097060 A2, published May 14, 2020 (Ex. 1007).

² US 10,415,557 B1, issued Sept. 17, 2019 (Ex. 1008).

³ US 2017/0322086 A1, published Nov. 9, 2017 (Ex. 1009).

⁴ American Petroleum Institute (2010). *Positive Displacement Pumps—Reciprocating*, API Standard 674, 3rd ed. (Ex. 1010).

⁵ Karassik et al. (2008), *Pump Handbook*, McGraw-Hill, 4th ed. (Ex. 1012).

⁶ Jerih Group, *Apollo 4500 Turbine Frac Pumper Finishes Successful Field Operation in China*, Yantai, China: Cision PR Newswire. Feb. 13, 2015, as available on Apr. 20, 2015. <https://web.archive.org/web/20150420220625/https://www.prnewswire.com/newsreleases/jerih-apollo-4500-turbine-fracpumper-finishes-successful-field-operationin-china-300035829.html>. (Ex. 1016).

⁷ American Petroleum Institute (2011). *Gas Turbines for the Petroleum, Chemical, and Gas Industry Services*, API Standard 616, 5th ed. (Ex. 1011).

125 Stat. 284 (September 16, 2011) (“AIA”), apply only to patents subject to the first-inventor-to-file provisions of the AIA. *See* AIA § 6(f)(2)(A) (stating that the provisions of Section 6(d) “shall apply only to patents described in section 3(n)(1)”). Patents subject to the first-inventor-to-file provisions are those that issue from applications “that contain[] or contained at any time . . . a claim to a claimed invention that has an effective filing date as defined in section 100(i) of title 35, United States Code, that is on or after” March 16, 2013. AIA § 3(n)(1).

Our rules require that each petitioner for post-grant review certify that the challenged patent is available for post-grant review. 37 C.F.R. § 42.204(a) (2019) (“The petitioner must certify that the patent for which review is sought is available for post-grant review . . .”). In addition, “[a] petition for a post-grant review may only be filed not later than the date that is 9 months after the date of the grant of the patent or of the issuance of a reissue patent (as the case may be).” 35 U.S.C. § 321(c). Petitioner has the burden of demonstrating eligibility for post-grant review. *See Mylan Pharms. Inc. v. Yeda Res. & Dev. Co.*, PGR2016-00010, Paper 9 at 10 (PTAB Aug. 15, 2016).

The ’459 patent issued from U.S. Application No. 17/022,972, filed on September 16, 2020 (“the ’972 application”). Ex. 1001, codes (21), (22). The ’972 application was filed as a continuation of U.S. Application No. 16/946,082, filed on June 5, 2020 and now U.S. Patent No. 10,815,764. *Id.* at code (63). The ’459 patent claims the benefit of U.S. Provisional Application No. 62/899,951, filed on September 13, 2019 (“the ’951 provisional application”). *Id.* at code (60).

Petitioner contends that the ’459 patent is eligible for post-grant review because, even if entitled to the benefit of the provisional ’951

application's filing date of September 13, 2019, each of the challenged claims has an earliest effective filing date on or after March 16, 2013.

Pet. 3. Petitioner further contends that the Petition was filed within nine months of the '459 patent's issue date. *Id.* Patent Owner does not dispute these contentions in its Preliminary Response.

Based on our review of the record, we determine that Petitioner has shown that the challenged claims of the '459 patent do not have an effective filing date earlier than March 16, 2013, under AIA § 3(n)(1). We further determine that Petitioner filed the Petition within the 9-month statutory period for requesting post-grant review in accordance with 35 U.S.C. § 321(c). The '459 patent issued on February 2, 2021 (*see* Ex. 1001, code (45)), and the Petition in this proceeding was accorded a filing date of July 26, 2021 (*see* Paper 3). Thus, the Petition was filed less than 9 months after the date of issuance of the '459 patent.

Accordingly, we determine that the '459 patent is eligible for post-grant review.

B. Discretion under 35 U.S.C. § 325(d)

Section 325(d) of Title 35 of the United States Code provides, in relevant part: "In determining whether to institute or order a proceeding under this chapter, chapter 30, or chapter 31, the Director may take into account whether, and reject the petition or request because, the same or substantially the same prior art or arguments previously were presented to the Office." The Board uses a two-part framework for evaluating arguments under § 325(d):

- (1) whether the same or substantially the same art previously was presented to the Office or whether the same or substantially the same arguments previously were presented to the Office;
- and

(2) if either condition of first part of the framework is satisfied, whether the petitioner has demonstrated that the Office erred in a manner material to the patentability of challenged claims.

Advanced Bionics, LLC v. MED-EL Elektromedizinische Geräte GmbH, IPR2019-01469, Paper 6 at 8 (PTAB Feb. 13, 2020) (precedential).

Patent Owner argues that we should deny institution under § 325(d) because the “asserted prior art is the same or substantially the same and cumulative of the references presented during prosecution.” Prelim. Resp. 17. Specifically, Patent Owner contends that Crowe is cited in the ’459 patent. *Id.* Patent Owner further contends that U.S. Patent Publication No. 2019/0120024 (Ex. 2007, “Oehring”) and U.S. Patent Publication No. 2007/0277982 (Ex. 2008, “Shampine”) were cited by the Examiner, and the ’459 patent issued over these references. *Id.* (citing Ex. 2009). Patent Owner asserts that “[t]hese references together disclose the various components that [Petitioner] cites Mu and Crowe as disclosing, at least at the same level of specificity, plus more.” *Id.* According to Patent Owner, “Oehring . . . describes using engines, turbines and/or electric motors to drive fracturing, as well as sensors on pumps and control components” and using “a computer to control the pump rates and shows automated pump rate adjustment of the remaining pumps when one pump is taken offline in the event of a failure or potential failure condition,” and “Shampine . . . similarly discloses at least as much as Mu.” *Id.* (citing Ex. 2007 ¶ 95; Ex. 2008; Ex. 2003 ¶¶ 59–61).⁸

These arguments are not persuasive, however, because Patent Owner does not explain adequately how the disclosures of Oehring and Shampine are cumulative of the disclosure of Mu. In this case, the mere fact that

⁸ We note that Exhibit 2007 does not have ¶ 95 cited by Patent Owner.

Oehring and Shampine may disclose some passing similarities to Mu does not mean necessarily that the references are cumulative of Mu. For instance, Petitioner relies on Mu for allegedly disclosing several claim limitations including “receiving a demand hydraulic horse power (HHP) signal,” “the first output power being in a selected range of a maximum continuous power (MCP) level,” and “the second output power . . . being in a selected range of the MCP level to a maximum intermittent power (MIP) level.” Pet. 19–41. Patent Owner does not direct us to any disclosure in Oehring or Shampine that are cumulative of these alleged teachings in Mu.

Accordingly, we do not agree with Patent Owner that either of Oehring or Shampine is cumulative of Mu. As such, we determine that Petitioner’s reliance on Mu does not involve the same or substantially the same art or arguments previously presented to the Office, and the first part of the *Advanced Bionics* framework is not satisfied with respect to Mu. And although Crowe is cited in the ’459 patent (*see* Ex. 1001, code (56)), Petitioner’s reliance on Crowe is minimal. The ground based on Mu and Crowe, thus, does not implicate § 325(d).

Furthermore, for the reasons discussed below (*see infra* § III.E), Petitioner has shown, at this stage of the proceeding, that it is more likely than not that it would prevail with respect to its challenge based on the combination of Luharuka, API 674, and Karassik. Patent Owner does not show—or even assert—that any of these references are the same or substantially the same as prior art previously presented to the Office. Similarly, Patent Owner does not show or assert that the Apollo Turbine Release or API 616 are the same or substantially the same as prior art previously presented to the Office. Accordingly, § 325(d) is not sufficiently implicated in this situation.

For the above reasons, we do not exercise our discretion under § 325(d) to deny institution in this proceeding.

C. Level of Ordinary Skill in the Art

In determining whether an invention would have been obvious at the time it was made, 35 U.S.C. § 103 requires us to resolve the level of ordinary skill in the pertinent art at the time of the effective filing date of the claimed invention. *Graham v. John Deere Co.*, 383 U.S. 1, 17 (1966). The person of ordinary skill in the art is a hypothetical person who is presumed to have known the relevant art. *In re GPAC, Inc.*, 57 F.3d 1573, 1579 (Fed. Cir. 1995). Factors that may be considered in determining the level of ordinary skill in the art include, but are not limited to, the types of problems encountered in the art, the sophistication of the technology, and educational level of active workers in the field. *Id.* In a given case, one or more factors may predominate. *Id.*

Relying on the testimony of Mr. Marscher, Petitioner submits that a person of ordinary skill in the art “would be expected to have a bachelor’s degree in mechanical engineering, and at least 5 years of work experience in the design or manufacturing of reciprocating pumps and power pumps for industrial applications, including for use in the oil and gas industry.” Pet. 12 (citing Ex. 1003 ¶ 20).

Patent Owner contends that a person of ordinary skill in the art “would have a Bachelor’s degree in electrical engineering and five years of work experience in control systems and control systems software for hydraulic fracturing operations in the oil and gas industry,” and “[a] greater level of specific work experience can substitute for the stated educational background.” Prelim. Resp. 7 (citing Ex. 2003 ¶¶ 17–25). Patent Owner argues that Petitioner’s definition is incorrect because “it fails to identify the

specialized knowledge of control systems, particularly computerized control systems, that are at the heart of the claimed invention.” *Id.* (citing Ex. 1001, cols. 1–2, 8:4–9:16, Fig. 7). Patent Owner also argues that the claimed invention requires knowledge of electrical engineering and control systems and is not the work of a mechanical engineer. *Id.*

This dispute presents a factual issue best decided on a complete record. Accordingly, for purposes of the Decision, we determine that no express finding is necessary, and that the level of ordinary skill in the art is reflected by the prior art of record. *See Okajima v. Bourdeau*, 261 F.3d 1350, 1355 (Fed. Cir. 2001). We note, however, that our obviousness analysis in this Decision would not differ if we adopted either Petitioner’s or Patent Owner’s definition.

Lastly, on the current record, we disagree with Patent Owner’s argument that Mr. Marscher is not qualified to serve as an expert in this proceeding. *See* Prelim. Resp. 8. Mr. Marscher’s declaration and *curriculum vitae* show that he has extensive education and experience in relevant fields. Ex. 1003 ¶¶ 8–17; Ex. 1004.

D. Claim Construction

We construe the claims using the same claim construction standard that is applied in civil actions under 35 U.S.C. § 282(b). 37 C.F.R. § 42.200(b) (2021); *see also Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). In so doing, we construe a claim “in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent.” 37 C.F.R. § 42.200(b) (2021).

Petitioner discusses certain claim terms: (1) “maximum intermittent power” in claims 1 and 15; and (2) “third output power” in claims 2 and 16.

Pet. 9–10. Patent Owner discusses those claim terms and also discusses (1) “receiving [or receive] a demand hydraulic horse power (HHP) signal” in claims 1 and 15, (2) “receiving [or receive] a loss of power signal” in claims 1 and 15, and (3) “maximum continuous power” in claims 1 and 15. Prelim. Resp. 9–16.

Based on the current record and for purposes of this Decision, we discuss below the terms “maximum continuous power” and “maximum intermittent power.” We also discuss the phrases “the first output power being in a selected range of a maximum continuous power (MCP) level” and “the second output power . . . being in a selected range of the MCP level to a maximum intermittent power (MIP) level” from claims 1 and 15. We do not discern a need to construe explicitly any of the other claim language because doing so would not change the result of the analysis below. *See Nidec Motor Corp. v. Zhongshan Broad Ocean Motor Co.*, 868 F.3d 1013, 1017 (Fed. Cir. 2017) (stating that “we need only construe terms ‘that are in controversy, and only to the extent necessary to resolve the controversy’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

1. “maximum continuous power”

Patent Owner asserts that “[t]he specification clearly defines ‘maximum continuous power’ as ‘the maximum power at which individual pump units may sustain continuous operation without any performance or reliability penalties.’” Prelim. Resp. 11–12 (citing Ex. 1001, 4:16–20). Petitioner does not offer a construction for this term.

We agree with Patent Owner that the Specification provides a definition for this term. Accordingly, we preliminarily construe “maximum continuous power” as “the maximum power at which individual pump units

may sustain continuous operation without any performance or reliability penalties.”

2. “*maximum intermittent power*”

Petitioner argues that “maximum intermittent power” should be construed to mean “an elevated operating output level near or at the maximum power output value.” Pet. 9. In support of this argument, Petitioner notes that “[t]he specification states ‘[t]he Maximum Intermittent Power (“MIP”) level of a pump unit 302a thru 302j is an elevated operating output level that the pump unit may operate intermittently throughout its operating life without excessive damage to the pump unit.’”⁹ *Id.* (citing Ex. 1001, 4:18–22). Petitioner then argues that “the thrust of the [Specification’s] definition is that the MIP level is an ‘elevated operating output level,’” and the Specification “qualifies that ‘elevated’ level, tying it to a level at which ‘the pump unit may operate intermittently throughout its operating life without excessive damage to the pump unit.’” *Id.* at 9–10.

Patent Owner argues that “maximum intermittent power” should be construed to mean “an elevated operating output level that the pump unit may operate intermittently throughout its operating life without excessive damage to the pump unit, typically an amount above the maximum continuous power level and typically (though not necessarily) less than 110% of the rated maximum continuous power level.” Prelim. Resp. 12–13 (citing Ex. 2003 ¶ 74; Ex. 1001, 4:23–39). Patent Owner disputes Petitioner’s proposed construction, asserting that it is not directed to pump units as required by the Specification. *Id.* at 13. Patent Owner also asserts

⁹ We address Petitioner’s assertion that “excessive damage” is an indefinite term of degree below in § III.H.

that “it is unclear whether [Petitioner’s] use of ‘maximum power output value’ refers to the maximum power for which the pump unit is rated for normal use (*i.e.*, MCP) or instead refers to some other maximum.” *Id.*

We agree with Patent Owner that Petitioner has not explained sufficiently what a “maximum power output value” means in the context of the ’459 patent. Nor has Petitioner explained sufficiently why “maximum intermittent power” should be tied to the “maximum power output value.” In contrast, Patent Owner’s proposed construction is supported by the Specification, although we do not agree with the last clause of the construction because the references to “typical” values do not assist in understanding the claim language. Accordingly, for purposes of this Decision, we preliminarily construe “maximum intermittent power” to mean “an elevated operating output level that the pump unit may operate intermittently throughout its operating life without excessive damage to the pump unit.”

3. *“the first output power being in a selected range of a maximum continuous power (MCP) level”*

Neither party proposes a construction for this phrase. The Specification states

The first output power may be at a percentage rating at or below the MCP level of the pump units 302a thru 302j. In one example, the first output power may be in the range of approximately 70% to 100% of MCP. By way of an example, the controller 330 may command all the available pump units 302a thru 302j to operate at 100% of rated MCP based on the demand HHP Signal. In other instances, the controller 330 may command the available pump units 302a thru 302j to operate at a rated MCP of 70%, 80%, or 95%, based on the requested HHP demand. Alternatively, the controller 330 may command the available pump units 302a thru 302j to operate at a rated

MCP below 70%, or any other rated MCP below 100% without departing from the disclosure.

Ex. 1001, 6:12–25. As such, the Specification makes clear that the first output power can be at or below the MCP. Thus, for purposes of this Decision, we preliminarily construe “the first output power being in a selected range of a maximum continuous power (MCP) level” to mean that the first output power is less than or equal to the MCP. We invite the parties to brief the proper construction of “the first output power being in a selected range of a maximum continuous power (MCP) level” during trial, if desired, and we will address this limitation on the complete trial record, including any claim construction analysis to the extent included in the record.

4. *“the second output power . . . being in a selected range of the MCP level to a maximum intermittent power (MIP) level”*

Neither party proposes a construction for this phrase. The Specification states “[i]n one embodiment, the second output power is greater than the first output power and may be in the range of approximately 70% of the MCP level to approximately the MIP level.” Ex. 1001, 6:50–53; *see also id.* at 7:4–7 (The second output power “may be in the range of approximately 70% of the MCP level to approximately the MIP level.”); *id.* at 7:13–16 (The pump units are operated at a second output power “that exceeds the MCP level or approaches or exceeds the MIP level.”).

As such, the Specification makes clear that the second output power can range from a value below the MCP level up to the MIP level. The claim language, however, does not suggest a second output power that is below the MCP level. Thus, for purposes of this Decision, we preliminarily construe “the second output power . . . being in a selected range of the MCP level to a maximum intermittent power (MIP) level” to mean that the second output

power is greater than or equal to the MCP but does not exceed the MIP. We invite the parties to brief the proper construction of “the second output power . . . being in a selected range of the MCP level to a maximum intermittent power (MIP) level” during trial, if desired, and we will address this limitation on the complete trial record, including any claim construction analysis to the extent included in the record.

E. Asserted Obviousness Based on Luharuka, API 674, and Karassik

Petitioner contends the challenged claims are obvious over Luharuka, API 674, and Karassik. Pet. 57–82. Patent Owner provides arguments addressing this asserted ground of unpatentability. Prelim. Resp. 47–62. We first summarize the references and then address the parties’ contentions.

1. Luharuka

Luharuka relates to a method for monitoring wellsite equipment that uses thermal imaging to identify one or more equipment units. Ex. 1009, code (57). In one embodiment, the equipment unit is plunger pump 101 comprising prime mover 106 that drives a crankshaft through transmission 110 and driveshaft 112 that drives one or more plungers in the pump. *Id.* ¶ 21, Fig. 1. Thermal imaging device 150 is positioned a distance from equipment unit 101 and is in communication with computational device 160. *Id.* ¶¶ 22–23, Fig. 1. Computational device 160 processes thermal images generated by thermal imaging device 150 to identify one or more components or equipment units. *Id.* ¶ 23. Computational unit 160 may be in communication with control unit 170, which may activate or control one or more parameters of equipment unit 101. *Id.* ¶ 24. For instance, “[u]pon diagnosing a problem or undesired change in fluid flow conditions, the computational device may send a signal to the control unit of the equipment

unit to alter the fluid flow conditions, including for example, shutting off one or more components in the equipment unit.” *Id.*

Luharuka also discloses pumping system 200 for pumping fluid to wellbore 122 during a hydraulic fracturing operation. *Id.* ¶ 29, Fig. 2. “The amount of hydraulic horsepower needed from the pumping system in order to carry out the fracturing operation may be determined based on an estimate of the well pressure and the fracturing fluid flow rate required to create the desired fractures in the wellbore.” *Id.* ¶ 31. In one example, pump system 200 would need at least five plunger pumps rated at 2182 hydraulic horsepower to supply 10,000 hydraulic horsepower. *Id.* But each pump could be operated well under its maximum operating capacity to prevent overloads. *Id.* ¶ 32. “Operating pumps under their maximum operating capacity may also allow for one pump to fail and the remaining pumps to be run at a higher speed in order to make up for the absence of the failed pump.” *Id.*

2. API 674

API 674 is a standard for “Positive Displacement Pumps—Reciprocating” from the American Petroleum Institute (“API”). Ex. 1010, 1. This edition was first published in 2010. *Id.* The document “covers the minimum requirements for reciprocating positive displacement pumps and pump units for use in the petroleum, petrochemical, and gas industry services.” *Id.* at 7.

3. Karassik

Karassik is a text titled “Pump Handbook.” Ex. 1012, 1. The text is intended to be a “comprehensive work on pumps” that presents sufficient information “to assist engineers in designing, analyzing, testing, and troubleshooting all sizes and configurations of these machines.” *Id.* at 18.

4. *Independent Claim 1*

Petitioner contends that the proposed combination of Luharuka, API 674, and Karassik discloses the limitations of claim 1. Pet. 61–71. To support its arguments, Petitioner identifies certain passages in the cited references and explains the significance of each passage with respect to the corresponding claim limitation. *Id.* Petitioner also articulates reasons to combine the relied-upon aspects of the references with a reasonable expectation of success. *Id.* at 58–61. Patent Owner argues that Petitioner has failed to show that the cited references disclose several limitations of claim 1 and has failed to provide sufficient reasoning to combine the references. Prelim. Resp. 48–54.

We have reviewed Petitioner’s contentions with respect to the limitations of claim 1, and for the reasons discussed below, we are persuaded that the Petition shows that it is more likely than not that claim 1 would have been obvious based on Luharuka, API 674, and Karassik. We also address Patent Owner’s arguments below.

a) A method of operating a plurality of pump units associated with a high-pressure, high-power hydraulic fracturing assembly, each of the pump units including a turbine engine, a driveshaft, a gearbox connected to the turbine engine and driveshaft for driving the driveshaft, and a pump connected to the driveshaft

To the extent the preamble is limiting, Petitioner argues that Luharuka discloses a plurality of pump units such as plunger pump 101 including prime mover 106 that drives a crankshaft through transmission 110 and driveshaft 112 that drives one or more plungers in the pump. Pet. 61–64 (citing Ex. 1009 ¶¶ 21, 29, 31, 32, 56, Figs. 1, 2; Ex. 1003 ¶¶ 298–300). Petitioner also argues that, to the extent Luharuka does not disclose using a turbine engine, API 674 teaches that the driver or prime mover shall be sized

to meet “the maximum specified operating conditions” and “all process variations.” *Id.* at 64–65 (citing Ex. 1010, 38 (§§ 7.1.1.1, 7.1.1.2)). Thus, according to Petitioner, “[g]iven that turbine engines are known as advantageous and sized for use with fracturing and as described above, [a person having ordinary skill in the art] would understand API 674 to support their use in the Luharuka’s system.” *Id.* at 65 (citing Ex. 1003 ¶¶ 301–302). Petitioner adds that Karassik teaches that a gas turbine engine is a beneficial prime mover. *Id.* (citing Ex. 1012, 101, 104 (§§ 3.76, 3.79), Table 1; Ex. 1003 ¶¶ 303–304).

Patent Owner argues that “the disclosure of turbine engines in API 674 is not simply combinable with Luharuka, given the complexity of engineering considerations accompanying the choice of a prime mover.” Prelim. Resp. 48 (citing Ex. 2003 ¶¶ 208–212). In addition, Patent Owner argues that Petitioner’s assertion that turbine engines are merely “advantageous” or “beneficial” is insufficient to combine the teachings of API 674 and Karassik with Luharuka. *Id.* at 49. Relying on the testimony of Dr. Adnan, Patent Owner argues that “a turbine engine is not simply interchangeable with other types of prime movers, such as a diesel engine. Rather, they each provide very different performance curves and require different gearboxes, transmissions and other associated equipment.” *Id.* (citing Ex. 2003 ¶ 84).¹⁰

At this stage of the proceeding, we do not find Patent Owner’s arguments persuasive. Karassik discloses that turbine engines can be used to drive pumps. Ex. 1012, 101, 104 (§§ 3.76, 3.79). Luharuka discloses that its

¹⁰ Although Patent Owner cites ¶ 84 of Exhibit 2003, it appears that the referenced testimony actually appears in ¶ 87.

pump is driven by a “prime mover” without specifying a particular type of device. Ex. 1009 ¶ 21. Thus, we agree with Petitioner that one of ordinary skill in the art would have been led to use a turbine engine as the prime mover in Luharuka’s system as suggested by API 674 and Karassik. We are persuaded that determining the performance curves and the gearboxes and transmission needed to implement a turbine engine would have been within the ability of an ordinarily skilled artisan.

Accordingly, at this stage of the proceeding and on the current record, we are persuaded that Petitioner has made a sufficient showing that the combination of Luharuka, API 674, and Karassik discloses the preamble.

*b) receiving a demand hydraulic horse power (HHP) signal
for operation of the hydraulic fracturing assembly*

Petitioner argues that Luharuka teaches determining the hydraulic horse power needed to carry out a fracturing operation (i.e., the demand HHP) based on an estimate of the well pressure and flow rate required to create the fractures. Pet. 65 (citing Ex. 1009 ¶ 31). Petitioner also argues that Luharuka’s disclosure that “[t]he amount of hydraulic horsepower needed for the operation and the horsepower rating of the pumps’ can dictate the number of pumps used for a given fracturing operation” confirms that a demand HHP signal is received. *Id.* (citing Ex. 1009 ¶ 32; Ex. 1003 ¶¶ 305–306).

Patent Owner argues that “Luharuka does not disclose a demand HHP *signal*, and does not disclose *receiving* such a signal,” and “[t]he mere fact that something perhaps similar to a demand HHP value was calculated does not entail, as [Petitioner] suggests, receiving a demand HHP signal.” Prelim. Resp. 50 (citing Ex. 2003 ¶ 326).

We agree that Luharuka does not *explicitly* disclose receiving a demand HHP signal. The issue before us, however, is whether Petitioner has demonstrated that one of ordinary skill in the art would have understood Luharuka as implicitly disclosing (i.e., suggesting) receiving a demand HHP signal. *See IXI IP, LLC v. Samsung Elecs. Co.*, 903 F.3d 1257, 1262–65 (Fed Cir. 2018) (analyzing an implicit disclosure theory in an appeal from the PTAB); *see also In re Burckel*, 592 F.2d 1175, 1179 (CCPA 1979) (“Under 35 U.S.C. § 103, a reference must be considered not only for what it expressly teaches, but also for what it fairly suggests.”); *In re Lamberti*, 545 F.2d 747, 750 (CCPA 1976) (“[T]he question under 35 U.S.C. § 103 is not merely what the references expressly teach, but what they would have suggested to one of ordinary skill in the art at the time the invention was made.”). On the record before us, we are persuaded that one of ordinary skill in the art would have understood Luharuka as suggesting that a demand HHP signal is received.

For these reasons, we are persuaded at this stage of the proceeding that Petitioner has made a sufficient showing that the combination of Luharuka, API 674, and Karassik discloses this limitation.

c) based at least in part on the demand HHP signal, operating all available pump units of the plurality of pump units at a first output power to achieve the demand HHP

Petitioner argues that Luharuka discloses using at least five pumps to supply 10,000 HHP to a fracturing fluid and thus discloses operating each of the pumps at a first power of 2,000 HHP to achieve the demand of 10,000 HHP. Pet. 65–66 (citing Ex. 1009 ¶ 31; Ex. 1003 ¶¶ 307–308). Patent Owner argues that “[b]ecause Luharuka does not disclose ‘receive a demand HHP signal,’ it likewise does not disclose operation of the pump units ‘based

at least in part on the demand HHP signal.” Prelim. Resp. 50 (citing Ex. 2003 ¶¶ 223–226).

We do not find Patent Owner’s argument persuasive because, for the reasons discussed above, we disagree that Luharuka does not disclose receiving a demand HHP signal. Accordingly, at this stage of the proceeding and on the current record, we are persuaded that Petitioner has made a sufficient showing that the combination of Luharuka, API 674, and Karassik discloses this limitation.

d) receiving a loss of power signal for one or more pump units of the plurality of pump units

Petitioner argues that “Luharuka contemplates various forms of equipment failure, including leakage and other losses occurring during operation of the plunger pump,” and “[l]eakage, slip, and other forms of loss due to failures described by Luharuka result in reduced or a loss of power output.” Pet. 66 (citing Ex. 1009 ¶ 33; Ex. 1003 ¶¶ 309–310). Petitioner also argues that Luharuka discloses a control unit that receives a signal from a computational device upon the diagnosis of a problem, such as leakage. *Id.* (citing Ex. 1009 ¶ 24).

In response, Patent Owner argues that Luharuka does not disclose receiving a loss of power signal. Prelim. Resp. 50. Specifically, Patent Owner argues that the signal sent from the computational device to the control unit is a control signal that alters fluid flow conditions and is not a “loss of power signal.” *Id.* at 51 (citing Ex. 2003 ¶¶ 227–229).

Luharuka, however, discloses that computational device 160 diagnoses “problem[s] or undesired change[s] in fluid flow conditions,” including the identification of leaks. Ex. 1009 ¶ 24. At this stage of the proceeding, we are persuaded by Petitioner’s argument that such leakage

would result in a loss of power. As such, we are persuaded that a signal from the computational device identifying leakage would comprise a “loss of power signal.”

For these reasons, based on the record before us, we are persuaded that Petitioner has made a sufficient showing that the combination of Luharuka, API 674, and Karassik discloses this limitation.

e) after receiving the loss of power signal, designating the one or more pump units as a reduced power pump unit (RPPU) and the remaining pump units as operating pump units (OPU)

Petitioner argues that Luharuka discloses that when one pump fails the remaining pumps can be run at a higher speed to make up for the failed pump. Pet. 67 (citing Ex. 1009 ¶ 31).¹¹ Petitioner contends that in this example, the failing pump is a reduced power pump unit (RPPU) and the remaining pumps are operating pump units (OPUs). *Id.* (citing Ex. 1003 ¶¶ 313–315).

Patent Owner argues that “[b]ecause Luharuka does not disclose ‘receive a loss of power signal,’ it likewise does not disclose operation/designation of the pump units ‘after receiving the loss of power signal.’” Prelim. Resp. 51 (citing Ex. 2003 ¶¶ 235–237).

We do not find Patent Owner’s argument persuasive because, for the reasons discussed above, we disagree that Luharuka does not disclose receiving a loss of power signal. Accordingly, at this stage of the proceeding and on the current record, we are persuaded that Petitioner has made a sufficient showing that the combination of Luharuka, API 674, and Karassik discloses this limitation.

¹¹ Although Petitioner cites ¶ 31 of Luharuka, it appears that the referenced disclosure actually appears in ¶ 32.

f) operating one or more of the OPU's at a second output power to meet the demand HHP signal for operation of the hydraulic fracturing assembly

Petitioner argues that “Luharuka discloses that if one pump fails, ‘the remaining pumps [can] be run at a higher speed in order to make up for the absence of the failed pump,’” and “Luharuka’s operation of a pump (*i.e.*, OPU) ‘at a higher speed’ results in a higher second output power to meet the demand HHP signal, in view of the failing pump.” Pet. 67 (citing Ex. 1009 ¶ 31; Ex. 1003 ¶¶ 316–317) (alteration in original).¹²

Patent Owner argues that “[b]ecause Luharuka fails to disclose ‘receive a demand HHP signal,’ . . . Luharuka also does not disclose operating one or more of the OPU's at a second power ‘to meet the demand HHP signal.’” Prelim. Resp. 52 (citing Ex. 2003 ¶¶ 238–239).

We do not find Patent Owner’s argument persuasive because, for the reasons discussed above, we disagree that Luharuka does not disclose receiving a demand HHP signal. Accordingly, at this stage of the proceeding and on the current record, we are persuaded that Petitioner has made a sufficient showing that the combination of Luharuka, API 674, and Karassik discloses this limitation.

g) the first output power being in a selected range of a maximum continuous power (MCP) level of the plurality of pump units, the second output power being greater than the first output power and being in a selected range of the MCP level to a maximum intermittent power (MIP) level of the plurality of pump units

Regarding the first output power portion of this limitation, Petitioner argues that “Luharuka discloses operating its plurality of pumps at a first

¹² Although Petitioner cites ¶ 31 of Luharuka, it appears that the referenced disclosure actually appears in ¶ 32.

output power to achieve the demand HHP where the pumps are operated at or near their ‘maximum [hydraulic horsepower] rating.’” Pet. 68 (citing Ex. 1009 ¶ 31 (referring to example of operating five 2,182 HHP-rated pumps at 2,000 HHP to supply 10,000 HHP)) (alteration in original). Petitioner also argues that one of ordinary skill in the art would have understood that the maximum HHP rating discussed in Luharuka corresponds to the MCP level. *Id.* (citing Ex. 1009 ¶ 31; Ex. 1003 ¶ 321).

At this stage of the proceeding, Petitioner’s assertions about the first output power (which Patent Owner does not specifically dispute) are persuasive. As discussed above (*see supra* § III.D.3), we preliminarily construe “a selected range of a maximum continuous power (MCP) level” to mean the first output power is less than or equal to the MCP. Petitioner has shown sufficiently that, prior to any pump failure, Luharuka discloses operating its pumps at an output power level that is less than or equal to the MCP.

Regarding the second output power portion of this limitation, Petitioner argues that “Luharuka also discloses a different operating range for its pump unit in terms of ‘maximum operating capacity’ so as to allow ‘one pump to fail and the remaining pumps to be run at a higher speed in order to make up for the absence of the failed pump.’” Pet. 69 (citing Ex. 1009 ¶ 32; Ex. 1003 ¶ 324). According to Petitioner, Luharuka discloses that “[o]peration of the remaining pumps *at their maximum capacity* would result in the pumps being run at a power that is higher than the ‘maximum continuous power.’” *Id.* (emphasis added).

Patent Owner argues that “[n]one of Luharuka, Karassik and API 674 disclose operating pump units at an MIP range that is above MCP, and they therefore fail to disclose a ‘second output power.’” Prelim. Resp. 52. More

specifically, Patent Owner argues that Luharuka “nowhere discloses operation at a level higher than maximum rated capacity.” *Id.* (citing Ex. 2003 ¶¶ 240–265). Our preliminary construction of “a selected range of the MCP level to a maximum intermittent power (MIP) level,” however, provides that the second output power is greater than or *equal to* the MCP. *See supra* § III.D.4. As such, Patent Owner’s argument that Luharuka fails to disclose operating pump above MCP is not persuasive. And although Petitioner appears to inconsistently equate Luharuka’s maximum rating or capacity with both MCP and a power higher than MCP (*compare* Pet. 68, *with id.* at 69), as noted above, Petitioner contends that Luharuka discloses operating the remaining pumps *at their maximum capacity*. *Id.* at 69. Indeed, Patent Owner agrees that “Luharuka discloses pump operation at up to its maximum rated capacity.” Prelim. Resp. 52 (citing Ex. 1009 ¶ 31). On the current record, we are thus persuaded that, after failure of at least one pump, Luharuka discloses operating its remaining pumps at an output power level that is equal to the MCP.

In view of the above, we are persuaded, at this stage of the proceeding and on the current record, that Petitioner has made a sufficient showing that the combination of Luharuka, API 674, and Karassik discloses this limitation.

h) Conclusion

For the above reasons, we determine, based on the current record, that the Petition shows that it is more likely than not that Petitioner would prevail in demonstrating that claim 1 is unpatentable over the combination of Luharuka, API 674, and Karassik.

5. *Independent Claim 15*

Independent claim 15 recites a system to control operation of a plurality of pump units associated with a hydraulic fracturing assembly, which comprises a controller including one or more processors and memory having computer-readable instructions stored therein. Ex. 1001, 12:7–15. The computer-readable instructions are operable by the processor to perform limitations that are substantially similar to the limitations recited in claim 1. *Compare id.* at 11:8–29, *with id.* at 12:16–37. For its analysis of these limitations of claim 15, Petitioner refers back to its analysis of claim 1. Pet. 80.

Patent Owner argues that “[e]ven assuming *arguendo* that Luharuka discloses the physical components disclosed in claim [15], any computer-readable instructions contained thereon are not ‘operable by the processor to’ perform the steps claimed in claim [15], for all of the reasons set forth above in relation to claim 1.” Prelim. Resp. 58; *see also id.* at 59 (citing arguments made in connection with the method steps of claim 1). These arguments are unpersuasive for the same reasons discussed with respect to claim 1 above. *See supra* § III.E.4.

Accordingly, based on the current record, we determine that the Petition shows that it is more likely than not that Petitioner would prevail in demonstrating that claim 15 is unpatentable over the combination of Luharuka, API 674, and Karassik.

6. *Dependent Claims 2–14 and 16–28*

For claims 2–14, which depend from independent claim 1, and claims 16–28, which depend from independent claim 15, Petitioner contends that the proposed combination of Luharuka, API 674, and Karassik discloses each of the limitations. Pet. 71–82. To support its arguments, Petitioner

identifies certain passages in the cited references and explains the significance of each passage with respect to the corresponding claim limitation. *Id.* Patent Owner presents arguments disputing many of Petitioner’s assertions regarding the dependent claims. Prelim. Resp. 54–58, 60–62.

Because Petitioner has demonstrated that it is more likely than not that at least one claim of the ’459 patent is unpatentable, we institute on all grounds and all claims raised in the Petition. *See SAS Inst., Inc. v. Iancu*, 138 S. Ct. 1348, 1354, 1359–60 (2018); 37 C.F.R. § 42.208(a) (“When instituting post-grant review, the Board will authorize the review to proceed on all of the challenged claims and on all grounds of unpatentability asserted for each claim.”). Therefore, at this stage of the proceeding, it is not necessary for us to provide a detailed assessment of Petitioner’s analysis of the dependent claims.

F. Asserted Obviousness Based on Mu and Crowe and Apollo Turbine Release, API 616, and Mu

Petitioner contends the challenged claims are obvious over the combination of Mu and Crowe and the combination of Apollo Turbine Release, API 616, and Mu. Pet. 13–57, 82–98. Patent Owner provides arguments addressing these asserted grounds of unpatentability. Prelim. Resp. 22–46, 62–86.

1. Mu

Mu relates to a system that includes one or more processors and a control interface that transmits control signals for controlling the pumps of a hydraulic fracturing operation. Ex. 1007, code (57). In one embodiment, Mu discloses a method 1610 that uses controller telemetry block 1612 for receiving data from a fleet of pumps 1630-1 to 1630-N. *Id.* ¶ 210, Fig. 16.

The method uses control block 1622 to issue control signals for individually controlling one or more of pumps 1630-1 to 1630-N. *Id.* ¶ 213. Based on health scores, the method can ramp up or maintain the adjusted pumping rate for a period of time. *Id.* ¶ 215. The method also uses analytics block 1616 to compute an overall maximum power output value such that the control system can make determinations regarding the pumping rate. *Id.* ¶ 217. For example, “where the overall maximum power output value decreases to a value that is less than a threshold, one or more notifications may be issued, which may call for action or actions (e.g., replanning of one or more hydraulic fracturing operations, etc.).” *Id.*

2. Crowe

Crowe relates to a pumping system that includes an array of pump-engine assemblies and a master controller coupled to each assembly. Ex. 1008, code (57). Each pump-engine assembly comprises a pump and a gas turbine engine that drives the pump. *Id.* Crowe discloses that the pump can be used for various applications, including hydraulic fracturing operations. *Id.* at 16:51–53.

3. Apollo Turbine Release

The Apollo Turbine Release is a press release titled “Apollo 4500 Turbine Frac Pumper Finishes Successful Field Operation in China.” Ex. 1016, 1.

4. API 616

API 616 is a standard for “Gas Turbines for the Petroleum, Chemical, and Gas Industry Services” from the American Petroleum Institute (“API”). Ex. 1011, 1. This edition was first published in 2011. *Id.* The document “covers the minimum requirements for open, simple, and regenerative-cycle

combustion gas turbine units for services of mechanical drive, generator drive, or process gas generation.” *Id.* at 8.

5. Discussion

For the Mu-Crowe ground, Petitioner asserts that Mu discloses the claim 1 limitation “receiving a demand hydraulic horse power (HHP) signal for operation of the hydraulic fracturing assembly.” Pet. 22–24. Specifically, Petitioner argues that Mu discloses computing “an overall maximum power output value” and, thus, discloses receiving a demand HHP signal. *Id.* at 22–23 (citing Ex. 1007 ¶¶ 217, 213, 367, Fig. 16; Ex. 1003 ¶¶ 158–159). Petitioner relies on the same disclosure of Mu as teaching this limitation for the ground based on the combination of Apollo Turbine Release, API 616, and Mu. *Id.* at 87.

Patent Owner argues that Mu’s “‘overall max power output value’ is different from the demand HHP signal needed to operate the claimed assembly.” Prelim. Resp. 28. According to Patent Owner, “[t]he demand HHP signal represents how much power is currently needed to operate the hydraulic fracturing assembly as a whole,” but the overall maximum power output value “is some undefined, theoretical calculation as to how much power the fleet of pumps can deliver.” *Id.* (citing Ex. 2003 ¶ 102).

We agree with Patent Owner. The term “overall maximum power output value” refers the maximum amount of power that can be produced by the fleet of pumps, rather than the power needed or desired for a particular fracturing operation. Indeed, Mu refers to “a desired overall rate and/or pressure” and “an overall desired pump rate”—not the overall maximum power output value—when discussing operating the pumps for a fracturing job. Ex. 1007 ¶¶ 281, 284. Thus, based on the current record, we question whether Petitioner establishes sufficiently that either combination of

references cited by Petitioner discloses “receiving a demand hydraulic horse power (HHP) signal for operation of the hydraulic fracturing assembly.”

Nevertheless, we include these grounds in the instituted post-grant review.

See SAS, 138 S. Ct. at 1354, 1359–60; 37 C.F.R. § 42.208(a).

G. Asserted Lack of Enablement

Petitioner argues that independent claims 1 and 15 are not enabled under 35 U.S.C. § 112(a) “because the specification would not have taught a [person having ordinary skill in the art] how to make and use the full scope of the claimed invention without undue experimentation.” Pet. 98.

Specifically, Petitioner argues that “[t]he claims require that an unspecified ‘pump’ be operated across a range of output powers,” and one of ordinary skill in the art “could not have practiced the claimed invention without undue experimentation because the specification does not contain sufficient information to enable a [person having ordinary skill in the art] to make and use the full scope of the claimed ranges for all pumps.” *Id.* at 98–99 (citing Ex. 1003 ¶¶ 543–547). Petitioner contends that the Specification discloses only a single example of a pump assembly in which the intermittent power rating of the helical gearbox is only 106.36% of the constant running power and, thus, not commensurate with the scope of the claims that recite intermittent power levels as high as 107% of the continuous power level. *Id.* at 99 (citing Ex. 1001, 9:55–58; Ex. 1003 ¶¶ 545–546).

Patent Owner argues that “the specification provides more than sufficient direction to allow a [person having ordinary skill in the art] to practice the claimed output power ranges without undue experimentation.” Prelim. Resp. 87 (citing Ex. 1001, 4:33–54). Patent Owner also argues that Petitioner’s arguments fail to contemplate the factors set forth in *In re Wands*, 858 F.2d 731, 737 (Fed. Cir. 1988). *Id.* at 86–87.

For purposes of this Decision, we are not persuaded that the Petition shows more likely than not that Petitioner would prevail in demonstrating that claims 1 and 15 are not enabled by the Specification. “[T]o be enabling, the specification of a patent must teach those skilled in the art how to make and use *the full scope of the claimed invention* without undue experimentation.” *Trs. of Boston Univ. v. Everlight Elecs. Co.*, 896 F.3d 1357, 1362 (Fed. Cir. 2018) (alteration in original) (emphasis added). We consider certain factors to determine whether a disclosure satisfies the enablement requirement, including:

(1) the quantity of experimentation necessary, (2) the amount of direction or guidance presented, (3) the presence or absence of working examples, (4) the nature of the invention, (5) the state of the prior art, (6) the relative skill of those in the art, (7) the predictability or unpredictability of the art, and (8) the breadth of the claims.

In re Wands, 858 F.2d at 737.

We agree with Patent Owner that Petitioner fails to provide a systematic analysis of the *Wands* factors in the context of this case. At best, Petitioner’s arguments relate to factors 2 and 3 above. Moreover, we do not find these arguments persuasive. For instance, the Specification explains that the pumps “may operate at approximately 80% MCP to deliver the 41,000 HHP required for the fluid pumping system 400.” Ex. 1001, 4:20–23. The Specification also states that:

The MIP power level of the pump units 302a thru 302j is typically an amount above the MCP level and may typically range from 101% of rated MCP to 110% of rated MCP. In an embodiment of the disclosure, the MIP level may be set at 107% of rated power. In other embodiments, the MIP level may be greater than 110% of rated MCP without departing from the disclosure.

Id. at 4:33–39. Furthermore, the Specification also states that:

As indicated in FIG. 4, the pump units 302a-302j (as an example, 5000 HP pump units are shown) may operate in typical operating range of approximately 75% to 95% of MCP to deliver the required HHP of the fluid pumping system 400 for a particular well site. The corresponding percentage of MCP of the pump units 302a-302j is indicated by the 75%, 85%, and 95% lines that are parallel to the 100% MCP line. Any operation of the pump unit 302a thru 302j beyond the 100% MCP curve should be an intermittent occurrence to avoid damage to the pump unit. In one example, the MIP is indicated at 110% MCP, but the MIP may be other percentages to the right of the 100% MCP line without departing from the disclosure.

Id. at 4:42–54. These disclosures provide adequate guidance regarding the output power of the pumps.

For these reasons, at this stage of the proceeding and on the current record, we determine that Petitioner has not made a sufficient showing that claims 1 and 15 (and the claims depending therefrom) lack enablement. Because the Petition shows it is more likely than not that Petitioner would prevail with respect to at least one of the challenged claims based on at least one of the asserted grounds (*see supra* § III.E), we include this asserted ground in the instituted post-grant review. *See SAS*, 138 S. Ct. at 1354, 1359–60; 37 C.F.R. § 42.208(a).

H. Asserted Indefiniteness

1. Claims 1 and 15

Petitioner argues that claims 1 and 15 are indefinite because they recite the term “maximum intermittent power,” which is defined in the Specification using only an indefinite term of degree: “an elevated operating output level that the pump unit may operate intermittently throughout its operating life without ***excessive damage*** to the pump unit.” Pet. 100 (citing Ex. 1001, 4:23–27; *Nautilus, Inc. v. Biosig Instruments, Inc.*, 572 U.S. 898,

901 (2014)). According to Petitioner, “[t]he term ‘excessive damage’ provides insufficient notice of its scope as it depends ‘on the unpredictable vagaries of any one person’s opinion.’” *Id.* (citing *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014), *cert. denied*, 577 U.S. 913 (2015)).

In response, Patent Owner argues that

“a patentee need not define his invention with mathematical precision in order to comply with the definiteness requirement.” *Oakley, Inc. v. Sunglass Hut Int’l*, 316 F.3d 1331, 1341 (Fed. Cir. 2003). And the Federal Circuit has expressly “rejected the proposition that claims involving terms of degree are inherently indefinite.” *Sonix Tech. Co. v. Publications Int’l, Ltd.*, 844 F.3d 1370, 1377 (Fed. Cir. 2017).

Prelim. Resp. 90. Patent Owner also argues that “[c]ourts have specifically held that terms like ‘excessive’ and ‘elevated’ are not indefinite.” *Id.* at 91 (citing *U.S. Well Services, LLC v. TOPS Well Services*, No. 3:1-cv-00237, 2020 WL 9439469, *31 (S.D. Tex., Sept 18, 2020); *Azko Nobel Coatings, Inc. v. Dow Chem. Co.*, 811 F.3d 1334, 1344–45 (Fed. Cir. 2016); *All Cell Technologies, LLC v. Chervon North America Inc.*, No. 18C1419, 2021 WL 2986286, *14 (N.D. Ill. July 15, 2021)). In addition, Patent Owner contends that the Specification provides significant details regarding the MIP level, which explain to one of ordinary skill in the art how to achieve the claimed MIP level. *Id.* (citing Ex. 1001, 4:30–36).

As used in the Specification, the term “excessive damage” introduces at least a degree of subjectivity. The portion of the Specification cited by Patent Owner as providing significant details describes MIP in terms of percentages of MCP and does not appear to shed much light on the meaning of “excessive damage.” At this stage of the proceeding, however, we

decline to reach a determination regarding indefiniteness as this dispute presents a factual issue best decided on a complete record.

2. Claims 5 and 9

First, Petitioner argues that, in claims 5 and 9, “the limitation ‘wherein a selected range of a [MCP] level of the plurality of pump units comprises a range of approximately 70% to 100%’ does not particularly point out and distinctly claim the invention. It is thus entirely unclear what this limitation requires.” Pet. 102 (alteration in original). Patent Owner responds that “[t]his language simply specifies that, in these dependent claims, the second output power is approximately 70% to 100% of MCP. This is a subset of the range specified in claim 1, and is supported by the specification.” Prelim. Resp. 92–93 (citing Ex. 1001, claim 1, 6:43–46).

On the current record, we are not persuaded that the recitation in question clearly conveys that the second output power is approximately 70% to 100% of MCP. Accordingly, at this stage of the proceeding, we determine that Petitioner has made a sufficient showing that claims 5 and 9 are indefinite on this basis.

Second, Petitioner argues that claims 5 and 9 are indefinite because they “define ‘the first output power’ as ‘in the range of approximately 70% of the MCP level to approximately a [MIP] level,’” which contradicts independent claims 1 and 15. Pet. 102 (alteration in original). Patent Owner argues that claims 5 and 9, as corrected by a certificate of correction filed by Patent Owner with its Preliminary Response, are sufficiently definite. We decline to consider the definiteness of claims 5 and 9 on this basis at this time because Petitioner has not had an opportunity to address the corrected claim language. If Petitioner continues to assert that claims 5 and 9 are

indefinite on this basis, that would be an issue better decided on a complete record.

IV. CONCLUSION

For the foregoing reasons, we conclude that the information presented in the Petition demonstrates that it is more likely than not that at least one of the claims challenged in the Petition is unpatentable.

At this stage of the proceeding, the Board has not made a final determination as to the construction of any claim term or the patentability of any challenged claim.

V. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, pursuant to 35 U.S.C. § 324, a post-grant review of claims 1–28 of the '459 patent is instituted with respect to all grounds set forth in the Petition; and

FURTHER ORDERED that, pursuant to 35 U.S.C. § 324 and 37 C.F.R. § 42.4(b), post-grant review of the '459 patent shall commence on the entry date of this Order, and notice is hereby given of the institution of a trial.

PGR2021-00102
Patent 10,907,459 B1

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