

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

LIBERTY ENERGY, INC. AND LIBERTY OILFIELD SERVICES LLC
Petitioners,

v.

U.S. WELL SERVICES, LLC
Patent Owner.

Case No. IPR2025-00031
Patent 10,655,435

PETITIONERS' REPLY TO PATENT OWNER'S RESPONSE

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EXHIBIT LIST

Exhibit No.	Description
1001	U.S. Patent No. 10,655,435, Jared Oehring et al., “Smart Fracturing System and Method” (the “’435 Patent”), filed October 25, 2018, issued on May 19, 2020.
1002	File History for U.S. Patent No. 10,655,435.
1003	Declaration of Dr. Robert Durham
1004	PCT International Patent Publication No. 2017/040921 to Norris et al., “Pump Synchronization and Method” (“Norris”), filed September 2, 2016 and published on March 9, 2017.
1005	PCT International Patent Publication No. 2016/019219 to Omont et al., “Monitoring Health of Additive Systems” (“Omont”), filed July 31, 2015, published February 4, 2016.
1006	U.S. Patent Publication No. 2009/0053072 to Borgstadt et al., “Integrated ‘One Pump’ Control of Pumping Equipment” (“Borgstadt”), filed on August 21, 2007 and published on February 26, 2009.
1007	U.S. Patent Publication No. 2008/0236818 to Dykstra, “Method and Apparatus for Controlling the Manufacture of Well Treatment Fluid” (“Dykstra”), filed March 27, 2007, published October 11, 2012.
1008	U.S. Provisional Patent Application 62/577,056, Jared Oehring et al., “Automated Fracturing Pump System”, filed October 25, 2017.
1009	Complaint, <i>U.S. Well Services, LLC et al. v. Liberty Energy, Inc. et al.</i> , No. 4:24-cv-00839 (S.D. Tex. March 6, 2024)
1010	Plaintiff’s Motion for Leave to File the Second Amended Complaint, <i>U.S. Well Services, LLC et al. v. Liberty Energy, Inc. et al.</i> , No. 4:24-cv-00839 (S.D. Tex. September 19, 2024)
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1012	Federal Court Management Statistics (Mar. 31, 2022), available at < https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_appprofile1231.2023.pdf >
1013	PCT International Patent Publication No. 2014/0379300 to Devine et al., “Pump Efficiency Determining System and Related Method for Determining Pump Efficiency,” filed February 1, 2013 and published on December 25, 2014.
1014	Claim Listing for Claims of U.S. Patent No. 10,655,435, Jared Oehring et al., “Smart Fracturing System and Method” (the “435 Patent”), filed October 25, 2018, issued on May 19, 2020.
1015	Michael Morton, “Unlocking the Earth: A Short History of Hydraulic Fracturing,” GEO ExPro, Vol. 10, No. 6, December 2013 (https://geoexpro.com/unlocking-the-earth-a-short-history-of-hydraulic-fracturing/) (last accessed November 30, 2023)
1016	B.A. Wells and K.L. Wells. “Shooters – A “Fracking” History.” American Oil & Gas Historical Society, (https://aoghs.org/technology/hydraulic-fracturing) (last accessed November 30, 2023)
1017	Carl T. Montgomery and Michael B. Smith, “Hydraulic Fracturing: History of an Enduring Technology,” <i>Journal of Petroleum Technology</i> , Vol. 62, Issue 12 (Dec. 2010)
1018	Bourgoyne, A. T., Jr., K. K. Millheim, M. E. Chenevert and F. S. Young, Jr. (1986). <u>Applied Drilling Engineering</u> , Society of Petroleum Engineers,
1019	Vassiliou, M. S. (2018), <u>Historical Dictionary of the Petroleum Industry</u> , Rowman & Littlefield,
1020	U.S. Patent Application Publication No. 2013/0306322 to Sanborn <i>et al.</i> entitled “System and Process for Extracting Oil and Gas by Hydraulic Fracturing” (“ <i>Sanborn</i> ”),
1021	U.S. Patent Publication No. 2012/0255734 to Coli <i>et al.</i> entitled “Mobile, Modular, Electrically Powered System for Use in Fracturing Underground Formations” (“ <i>Coli</i> ”),

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1022	Tomlinson, HI, Ac Byrd, And Cf Vanberg. 1988. Spe 17315 "Fracturing Process Control And Automation." In Permian Basin Oil And Gas Recovery Conference, Onepetro.
1023	Stephenson, SV, EL Woodall, CD Donaghe, and RE Dant. 1993. "Fracturing process control and automation: Phase 2." In Petroleum Computer Conference. OnePetro.
1024	U.S. Patent Application Publication No. 2008/0236818 to Dykstra <i>et al.</i> entitled "Method and Apparatus for Controlling the Manufacture of Well Treatment Fluid." ("Dykstra 818")
1025	U.S. Patent Application Publication No. 2008/0183415 to Dykstra <i>et al.</i> entitled "methods to Monitor System Sensor and Actuator Health and Performance." ("Dykstra 415")
1026	<i>Modbus over Serial Line Specification and Implementation Guide V1.02</i> , Dec. 20, 2006, available at https://www.modbus.org/docs/Modbus_over_serial_line_V1_02.pdf
1027	<i>IEEE Standard for Ethernet</i> , IEEE Std 802.3™-2018, IEEE Computer Society, approved June 14, 2018 (excerpted).
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1033	<i>Variation</i> , Merriam-Webster's Collegiate Dictionary (11 th Ed. 2014).

Exhibit No.	Description
1034	Langewis, Jr., C. and Gleeson, C. W., “Practical Hydraulics of Positive Displacement Pumps for High-Pressure Waterflood Installations,” Society of Petroleum Engineers, February 1971.

I. INTRODUCTION

PO has not raised any reason to find the challenged claims nonobvious.

For Grounds 1, 2, and 5, PO argues *Norris* does not disclose the claimed “acceptable threshold.” But PO’s own dictionary equates *Norris*’s disclosure of “desired settings” with the claimed “acceptable threshold.” PO also attempts to narrowly construe “acceptable threshold” as relating to damage control, but the Institution Decision (“ID”) already found this argument unpersuasive, as the ’435 specification places no such limits on the term.

For Ground 3, PO disputes *Omont*’s teaching of claim element 1[e][i]. First, PO requires *Omont* to “explicitly” disclose this claim element, which is not the test for obviousness. Second, PO addresses *Omont* in isolation, without considering *Omont* in combination with *Norris*. PO’s attacks on *Omont* in isolation are deficient as a matter of law. And PO does not even address (or dispute) *Norris*’s teaching of claim element 1[e][i] in the *Norris-Omont* combination. Accordingly, claim element 1[e][i] is obvious over *Omont* and the undisputed *Norris-Omont* combination.

For Ground 4, PO’s Response addresses the disclosure of *Borgstadt* in isolation, without considering the combination of *Borgstadt* with *Norris*. Again, PO’s attacks on *Borgstadt* in isolation are deficient as a matter of law. PO then raises two arguments: (1) that the Petition mixes and matches different devices in *Borgstadt* as the claimed “second device,” and (2) that the Petition mixes and

matches different parameters in *Borgstadt* as the claimed “first parameter.” But PO’s mix-and-match arguments misconstrue the claim and misread what the Petition states plainly. The *Norris-Borgstadt* combination teaches the claimed “second device” and “first parameter.”

Petitioners respectfully submit the Board should find the challenged claims obvious in each of Grounds 1-5.

II. GROUND 1, 2, AND 5: NORRIS DISCLOSES THE CLAIMED “ACCEPTABLE THRESHOLD”

PO argues *Norris*’s disclosure of controlling pumping operations based on “desired settings” differs from controlling pumping operations based on an “acceptable threshold.” Response, §VI.A. But PO’s own definition confirms that *Norris* discloses an “acceptable threshold,” and PO’s narrow construction of the term “acceptable threshold” finds no support in the ’435 specification.

A. PO’s own definition shows *Norris* discloses an “acceptable threshold”

PO defines “desired” as “yearned or wished for; coveted” and distinguishes what is “wished for” from what is “acceptable.” Resp., 21. But a closer look at PO’s definition of “desired” includes the claimed “acceptable threshold.” The dictionary PO submits also defines “desired” as “deemed correct or proper; selected; required,”

a definition far more appropriate for fracturing operations than “yearned or wished for.”¹ EX2015.

PO’s expert, Dr. Nikolaou, confirms that the terms “acceptable threshold” and “desired setting” substantially overlap when applying the right definition of “desired.” Dr. Nikolaou agrees the “acceptable threshold” would be “set” or “selected” by an operator of the fracturing operation. EX1031, 72:16-18 (“Q. Who selects the acceptable threshold? A. The people that are responsible for the operation.”), 73:19-22, 74:19-75:9. This is precisely how *Norris* describes its “desired settings” – as parameters “set” or “selected” by an operator. In *Norris*, “[t]he operational parameters *input* ... determine the desired pressure and flow rates ...” EX1004, [0037]; *see also id.*, [0039] (disclosing “inputted desired” settings). Similarly, the system is “programmed with the desired operational parameters” EX1004, [0048]. PO’s definition of “desired” as “wished for” is wishful thinking;

¹ And even if “desired” meant “wished for,” PO’s expert admitted this includes what is “acceptable.” Dr. Nikolaou testified that “an acceptable threshold” could be set at “whatever value has been deemed to be a good value.” EX1031, 83:2-9. This is far different than PO’s characterization of an “acceptable” threshold as a “merely adequate” limit. Resp., 18.

Norris's "desired settings," like the claimed "acceptable threshold," are settings "selected" and "set" by an operator.

Norris's "desired settings" also disclose the claimed "acceptable threshold" if "desired" is properly defined as "required." *See* EX2015. PO alleges that Dr. Durham's testimony supports some distinction between what is "desired" and what is "acceptable." Resp., 16-17. But Dr. Durham's testimony regarding the term "acceptable," as referenced by PO, was based on that term as used in *Langewis*, a background reference cited in Dr. Durham's declaration. EX2012, 15:5-20:4 (discussing the term "acceptable" in *Langewis*). And *Langewis* itself states a "minimum pressure ... for **acceptable** pump performance" is a "minimum pressure **required**." EX1034, 6. Accordingly, both *Norris* and *Langewis* use the terms "desired" and "acceptable" interchangeably to describe parameter settings or values that are "required" in fracturing operations. *See* EX1005, [0037], [0039], [0048].

PO's Response also makes much of the claimed "threshold" referring to a "limit," claiming *Norris*'s "desired rates" do not involve any limit. Resp., 19-20. But the Board already found that, even if "the claim term 'acceptable threshold' [is] referring to a limit," "this is how *Norris*'s control system operates." ID., 32. As the Board noted, the Petition relies on *Norris*'s disclosure of "variation from the desired settings" as teaching the claimed parameter "outside of an acceptable threshold." ID., 31-32; Pet., 16-17. The term "variation" means "a change or difference in

condition, amount, or level, typically *within certain limits*” (EX1032) or “the extent to which or the *range in which* a thing varies” (EX1033). *Norris* thus discloses control based on parameters “within certain limits” or within a “range” of operation, that is, within a “threshold” as in Claim 1.

PO’s own definition equates an “acceptable threshold” and a “desired setting,” both of which are “selected” by an operator, and PO ignores how *Norris*’s disclosure of “variation from the desired settings” discloses control based on the claimed “threshold.”

B. The ’435 specification does not support PO’s attempt to narrowly construe “acceptable threshold”

PO also seeks to distinguish an “acceptable threshold” from a “desired setting” by construing an “acceptable threshold” as an “operational limit.” Resp., 23-24. PO then attempts to further narrow an “operational limit” by requiring any such limit to identify “component degradation and/or failure conditions.” Resp., 25. These attempts are transparent and unavailing.

In proposing narrow constructions, PO’s Response reiterates POPR arguments the Board already found unpersuasive. POPR, 20. The ID stated: “[W]e reject Patent Owner’s additional claim construction position that the claim term ‘acceptable’ requires that the limit must be an ‘operational limit’ representing a potential failure condition” ID, 32-33. PO’s Response asks the Board to

“reconsider” PO’s construction based on purported “additional evidence and argument” in its Response. Resp., 25. But as noted above, PO’s additional definition of “desired” encompasses an “acceptable threshold.” *Supra* §II.A. And Dr. Nikolaou just reiterates arguments from the POPR. *Compare* EX2010, ¶79 (opining that an “acceptable threshold” provides “the ability to identify failing and/or degrading components,” which “results in shutting down one or more pumps”) *with* POPR, 20-21 (arguing “acceptable threshold” “trigger[s] automatic responses,” including “shut[ting] the out-of-limit pumps down” so that “failures may be reduced”); EX1031, 70:18-71:7, POPR, 18. PO’s Response offers no new evidence or argument meriting a different result after institution.

And the ID rightly rejected PO’s construction, as it improperly reads various embodiments into the term “acceptable threshold.” Resp., 22-24, 25-27; *see Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (“[W]e have repeatedly warned against confining the claims to [specific] embodiments”). PO’s construction requires an “acceptable threshold” “to identify ... component degradation and/or failure conditions” (Resp., 25), such that the system makes “adjustments in response” to degradation or failure (Resp., 26-27).

But the ’435 specification does not in fact limit “adjusting” pumps operating “outside of an acceptable threshold” to responding to degradation or failure conditions. The specification explains that “[e]quipment can prevent failures, reduce

continual damage, *and control operation* based on live and continuous data readings.” EX1001, 7:51-53. The ’435 specification further explains how it “control[s] operation” generally, not just for damage control:

The components may also [allow] *for real time conditional monitoring*. This would allow equipment to *adjust rates, pressure, operating conditions* such as ... *individual fracture pump’s rates as well as collective system rates, ...*

EX1001, 5:51-5:65. And the specification reiterates that “adjusting” means that pump “rates” and “pressure[s]” may be generally controlled:

The *individual pressure at each pump may be automatically adjusted* based on the automated instructions. *The combined or overall pump rate* of the plurality of pumps *may also be controlled*

EX1001, 10:44-48.

As the Board already recognized, the ’435 specification elsewhere describes adjusting operations to perform “most efficiently,” not just to avoid degradation or failure. ID, 32 (citing EX1001, 5:51-6:9, 6:40-41, 7:41-54, 8:1-9). Dr. Nikolaou confirmed a parameter “outside of an acceptable threshold” may not indicate a “potential failure condition.” EX1031, 91:22-92:11. And Dr. Durham explained how control systems such as those described in the ’435 Patent were well-known in fracturing operations, both for improving operating efficiency and avoiding degradation and failure. EX1003, §IX.E (explaining control systems “improve execution” and “failures are prevented or caught more quickly”).

In sum, the '435 specification does not limit the purpose of an “acceptable threshold” “to identify[ing] and respond[ing] to degradation and/or failure conditions.” *See* Resp., 20; EX1031, 74:19-21 (noting that “avoid[ing] damage” is just “one purpose” of the “acceptable threshold”). Nor does Claim 1 recite this purpose for the “acceptable threshold.” *See In re Casey*, 370 F.2d 576, 579 (C.C.P.A. 1967) (“The claim must stand or fall upon the elements recited therein.”).

And even were the Board to accept PO’s representation that the purpose of the “acceptable threshold” is damage control, *Norris* still discloses and renders obvious an “acceptable threshold.” *Norris* teaches that a pump “will be taken off-line” “in the event of a failure,” so identifying failing pumps is part of managing operation to achieve *Norris*’s “desired” rates. *See* EX1004, [0048]. Nothing in PO’s limiting construction is new or inventive.

III. GROUND 3: THE COMBINATION OF *NORRIS* AND *OMONT* TEACHES BOTH CLAIM ELEMENTS THAT PO DISPUTES

PO’s Response to Ground 3 argues Claim 1 is valid because *Omont* does not “explicitly” disclose claim element 1[e][i]. PO ignores the obviousness combination of *Omont* with *Norris*, which also relies on *Norris*’s disclosure of claim element 1[e][i], and ignores the test for obviousness. The Board should ignore PO’s arguments for Ground 3 as irrelevant and unhelpful.

A. PO improperly attacks references individually, and nowhere addresses the Petition’s combination of *Norris* and *Omont*

PO’s Response does not contest the Petition’s combination of *Norris* and *Omont*. Resp. PO’s expert, Dr. Nikolaou, admitted he did not consider the combination of *Norris* and *Omont*. EX1031, 99:10-22 (“There is no section that has those looked at in combination”). Instead, the Response attacks the *Norris* and *Omont* references individually. Resp., §§VI-VII (attacking Norris’s disclosure of claim element 1[e][ii] and *Omont*’s disclosure of claim element 1[e][i]). As a matter of law, PO’s attacks on individual references cannot overcome the obviousness showing in the Petition. *Bradium Techs. LLC v. Iancu*, 923 F.3d 1032, 1050 (Fed. Cir. 2019) (“A finding of obviousness ... cannot be overcome ‘by attacking references individually where the rejection is based upon the teachings of a combination of references.’”); *see also In re Kavanagh*, 851 Fed. App’x 1028, 1034 (Fed. Cir. 2021) (finding claim obvious over three references, each teaching different claim element).

And rightly so, as PO’s attacks on an individual reference ignore disclosure in the other reference. For example, PO argues *Norris* standing alone does not disclose an “acceptable threshold,” when the Petition also relied on *Omont* (and the *Norris-Omont* combination) for that claim element. Resp., §VI (nowhere mentioning *Omont*); Pet., 43-44, §VIII.C.1. And PO’s *only* argument for Ground 3 is that *Omont*

standing alone does not disclose claim element 1[e][i], but PO ignores the Petition’s reliance on *Norris* in the *Norris-Omont* combination as teaching that claim element. Resp., §VII (nowhere mentioning *Norris*); Pet., 14-16, 43-44, §VIII.C.1. Faced with similar arguments, the Federal Circuit held that the Board “erred by looking at the references individually” and not considering the combination. *Palo Alto Networks, Inc. v. Centripetal Networks, LLC*, 122 F.4th 1378, 1385 (Fed. Cir. 2024); *see also Shockwave Med., Inc. v. Cardiovascular Sys., Inc.*, 142 F.4th 1371, 1384 (Fed. Cir. 2025).

PO’s attacks on individual references also ignore the test for obviousness. “The test for obviousness is not ... that the claimed invention must be expressly suggested in any one or all of the references.” *In re Keller*, 642 F.2d 413, 425 (C.C.P.A. 1981); *KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 415 (2007) (applying “expansive and flexible approach” to obviousness). According to PO, Claim 1 is not obvious because a single reference (*Omont*) does not “explicitly disclose” all claim limitations. Resp., §VII, 61-64 (asking if individual paragraphs of *Omont* “expressly” or “explicitly” disclose certain features); *see also* EX2012, 45:21 (defining “explicitly” as, what “it says in words,” excluding what a POSITA “might infer from a statement”). But the law does not require “explicitly” stating a claim limitation to render it obvious.

PO cannot argue that Petition’s obviousness theories were unclear. The Petition’s Ground 3 expressly stated “the combination of *Norris* and *Omont* renders obvious” the challenged claims. Pet., §VIII.C. The Petition detailed the motivation to combine *Norris* and *Omont*. Pet., §VIII.C.1. The Petition described the motivation to implement features of *Omont*’s local control with *Norris*’s local controllers and features of *Omont*’s system-wide control with *Norris*’s system-wide controller. Pet., 34-38, 41-42. The Petition made clear “a POSITA would have compared operational parameters to thresholds, as taught in *Omont*, throughout *Norris*’s system.” Pet., 45. The Petition also explained a POSITA would have combined *Omont*’s “‘diagnostic tool’ and related methods”—which perform the threshold comparison of claim element 1[e][ii]—with *Norris*’s system. Pet., 44-45; *see also id.*, 38; EX1005, [0075], [0094], [00143], Fig. 5.

The Petition explained how *Omont* teaches claim element 1[e][i], including with specific examples. Pet., 42-43, 47-50. The Petition stated for Ground 3 that *Norris* discloses “each limitation” of Claim 1. Pet., 33. The Petition then expressly stated in Ground 3 that “*Norris* [also] discloses the amended elements” of claim element 1[e][i]. Pet., 44; *see also id.*, 14-16, 19-20, 21-22, 24-25. Ground 3 of the Petition incorporated *Norris*’s disclosure of claim element 1[e][i] from Ground 1, noting that “*Omont* **further** teaches” that claim element. Pet., 42 (citing §VIII.A.1(f), which explains *Norris*’s disclosure of claim element 1[e][i]). The Petition also

explained how a POSITA, well versed in industrial communication networks, would have understood that *Norris* established networks of processing devices and controllers to communicate parameters as in claim element 1[e][i]. Pet., 14-15; EX1003, §XI.A.6. PO simply fails to address Petitioner’s reliance on *Norris* in Ground 3.

B. PO does not dispute that *Omont* teaches claim element 1[e][ii]

As discussed above for Grounds 1, 2, and 5, PO disputes *Norris*’s teaching of an “acceptable threshold.” But in Ground 3, Petitioners also rely on *Omont* as teaching the claimed “acceptable threshold.” Pet., 44-45. And PO’s Response does not dispute that *Omont* teaches an “acceptable threshold.”² See Resp., §VII. Nor did PO’s expert consider *Omont*’s disclosure of an “acceptable threshold.” EX2010, §IX; EX1031, 99:10-22, 100:6-14.

Ground 3 of the Petition clearly relies on *Omont*’s teaching of an “acceptable threshold.” Pet., 44-45 (“[A]s the Examiner explained, *Omont* teaches unamended claim limitations, including ‘detect[ing] that the first parameter is outside of an

² Notably, for Ground 5 PO argues the secondary *Dykstra* reference does not disclose the “acceptable threshold.” Resp., 15. PO thus recognizes that either reference in an obviousness combination may supply disclosure that renders a claim element obvious.

acceptable threshold.”). The Petition also explained how *Omont*’s diagnostic tool and methods performing comparison to a “threshold” would be combined with *Norris*’s system. Pet., 45, §VIII.C.1.

And PO cannot credibly argue *Omont* does not teach the claimed “acceptable threshold.” *Omont* compares a “parameter ... to a predetermined threshold” to identify defects and issue warnings. EX1005, [0093]. *Omont*’s system monitors “process parameter[s]” to “confirm that such values meet predetermined thresholds or are within predetermined ranges.” EX1005, [0094]; *see id.* [00119] (“[A]larms may be triggered when values of certain ... parameters exceed, fall below, or fall within a predetermined or selected threshold and/or range”), [00143]. During prosecution, the Examiner found *Omont* discloses an “acceptable threshold.” EX1002, 1130-31. And as PO notes, other claim elements were amended to obtain allowance. *See* Resp., 45-46; Pet., 43-44.

Omont’s disclosure of the “acceptable threshold” is not in dispute.

C. PO does not dispute *Norris* teaches claim element 1[e][i]

Similarly, PO disputes for Ground 3 that *Omont* discloses claim element 1[e][i], and specifically “transmit[ting] the first parameter” from a first device “to a second device.” Resp., §VII. But PO’s Response does not dispute that *Norris* teaches that claim element. Resp., §VI (arguing only that *Norris* fails to disclose or render obvious the “acceptable threshold” element). PO’s expert admits he did not consider

whether *Norris* teaches claim element 1[e][i]. EX1031, 97:9-16 (“Limitation 1[e][i], I didn’t focus on that ...”). PO attacks the *Omont* reference individually and completely ignores that, in the *Norris-Omont* combination, *Norris* also teaches claim element 1[e][i]. Pet., 14-16, §VIII.C.1.

Again, the Petition made abundantly clear *Norris* teaches claim element 1[e][1]: “one or more processing devices configured to receive a first parameter from a first device ... and transmit the first parameter to a second device” The Petition explained *Norris*’s disclosure of transmitting and receiving operating parameters between “sensors,” “data processors,” and “controllers” containing the claimed “processing devices.” Pet., 14-16. The Petition explained how *Norris*’s “datalinks” communicate parameters. Pet., 14-16. The Petition provided specific examples in *Norris* disclosing claim element 1[e][i]. Pet., 19-20, 21-22, 24-25. Ground 3 relied on all these teachings in *Norris*, stating that “*Norris* [also] discloses the amended elements” of claim element 1[e][i]. Pet., 44; *see also id.*, 42 (citing Section VIII.A.1(f) on *Norris*’s disclosure of claim element 1[e][i] and stating *Omont* “further” teaches the claim element); *supra* §III.A (summarizing Petition’s explanation of the *Norris-Omont* combination).

PO’s Response has nothing to say to any of this. And PO is well aware that Ground 3 relies on *Norris*’s for claim element 1[e][i], as Petitioner emphasized *Norris*’s disclosure in briefing before institution. Paper 7, 4 (“PO does not Challenge

Petitioner's reliance on *Norris* for [claim element 1[e][i]] in Ground 3"). The combination with *Norris* in Ground 3 is uncontested and renders obvious Claims 1-7 and 10-17.

D. In addition to *Norris*, *Omont* also teaches claim element 1[e][i]

Omont also teaches claim element 1[e][i]. Pet., 42-43, 49-50. PO argues Example 3B in the Petition cannot teach claim element 1[e][i]. Example 3B explains how *Omont*'s sensors communicate parameters to *Omont*'s subsystems, including subsystem portions implemented as control hardware. Pet. 49-50. In PO's words, sensors "are part" of subsystems, and "a device transmitting to itself" (subsystem → subsystem) cannot teach communication "from a first device" and "to a second device." Resp., 56-58.³ But the Petition makes clear "subsystems ... have 'portions' implemented as 'control hardware' that 'receive[s] information generated by the

³ PO also states *Omont*'s subsystems are not "of the pumps, the distribution system, or the wellhead." Resp., 56 n.7. But PO's Response elsewhere admits *Omont*'s "subsystems" include "pump assemblies 150." Resp., 53. And PO explains the '435 Patent "uses processing devices that are subcomponents within each subsystem." Resp., 3. That's exactly how *Omont* describes its "control hardware," as a subcomponent forming "portions of the subsystems." EX1005, [0060]-[0065], Figs. 2-3, 4.

sensors.” Pet., 50. The Board recognized that *Omont*’s sensors and control hardware may be separate devices. ID, 44 (“Patent Owner’s objection concerning a device being unable to transmit information to itself is unavailing”). PO’s Response again reiterates POPR arguments that the Board already found unpersuasive.

Given *Omont*’s clear teaching that sensors and control hardware may be separate devices, PO alleges that the “control hardware” that “receives information generated by the sensors” is not in *Omont*’s subsystems. Resp., 60-61. But PO’s expert admits *Omont* is “fairly explicit” that sensors communicate parameters to control hardware that is a component of each subsystem. In Dr. Nikolaou’s words, *Omont* “is fairly explicit that ... the control hardware 400, may receive information generated by sensors 204, 214, and 222.”⁴ EX1031, 29:21-30:12. And Dr. Nikolaou testified that *Omont* is “fairly explicit that components of each subsystem 202, 212, 220 may each be implemented as an instance of control hardware 400 shown in figure 4.” EX1031, 33:5-14. Petitioner’s expert, Dr. Durham, agrees. EX1003, §XII.B.4; Pet. 42-43, 49-50. Dr. Durham explains how “*Omont* states ... components of each subsystem ... may be implemented as ... control hardware having one or more processors.” *Id.* (internal quotations omitted). Dr. Durham further explains that in

⁴ Dr. Nikolaou also confirmed claim element 1[e][i]’s “first parameter” may be communicated “directly” or indirectly. EX1031, 62:14-63:12; EX1030.

Omont, “a sensor ... transmits measured parameters to *Omont*’s control hardware” “located in *Omont*’s subsystems.” *Id.* Despite PO’s best efforts, both experts agree *Omont* explicitly discloses control hardware in *Omont*’s subsystems receiving parameters from *Omont*’s sensors.

And even were *Omont* not “explicit,” obviousness turns on “what the combined teachings of the references would have suggested to those of ordinary skill in the art,” not what a reference “explicitly” states. *See In re Keller*, 642 F.2d 413, 425 (C.C.P.A. 1981). PO’s argument requires a POSITA to overlook *Omont*’s express disclosure of subsystems containing subcomponents in sensors, control hardware, and controllable devices. Resp., 57-58; EX1005, [0060]-[0065], Figs. 2-4. PO’s argument requires a POSITA to entirely ignore that *Omont* paragraphs 60-65 describe the same “control hardware,” or instances thereof. Resp., 60-64; EX1005, [0060]-[0065], Fig. 4. And PO’s argument requires a POSITA to disregard the clear and ubiquitous instruction (in both *Omont* and *Norris*) to monitor operating parameters and use those parameters to perform both local and global control. Resp., 60-64 (requiring *Omont* to “explicitly” disclose claim element 1[e][i]); Pet., 12-13, 16-18, §VIII.C.1, 40-41, 45-56. A POSITA would not have been so obtuse and imperceptive. *See KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 421 (2007) (“A person of ordinary skill is also a person of ordinary creativity, not an automaton.”).

PO's Response also makes much of amendments made to claim element 1[e][i] obtained allowance.⁵ Resp., 44-46. But Dr. Nikolaou explained that the "communication" described in claim element 1[e][i] is "not a key" feature of Claim 1 and could be implemented "in any reasonable way." EX1031, 51:22-54:9. Dr. Nikolaou's testimony is consistent with Dr. Durham's explanation that a POSITA would have known how to implement claim element 1[e][i] based on the teachings of *Norris* and *Omont* and knowledge of common industrial communication protocols. EX1003, §§IX.E, XI.A.6, XII.B.4 (explaining POSITA's ability to implement the claimed "processing devices" using "standard industrial communication protocols"); Pet., 32, 42. In contrast to the prosecution history, both experts agree that implementing the communications of claim element 1[e][i] in "any reasonable way" was well within the skill of a POSITA.

⁵ During prosecution, the Examiner did not consider *Omont*'s disclosure of control hardware receiving parameters from sensors. EX1002, 969-70, 1131 (limiting Claim 1's "processing devices" to *Omont*'s SCM "306" disclosed at [0038] and [0043]). The Petition thus relies on teachings related to *Omont*'s "control hardware" that the Examiner overlooked. Pet., 42-43, 49-50 (explaining *Omont*'s disclosure of control hardware receiving parameters from sensors, with reference to [0060]-[0065]).

Omont’s “fairly explicit” teaching of control hardware receiving parameters from sensors discloses claim element 1[e][i]. Both experts agree. And while PO argues solely that *Omont* does not disclose claim element 1[e][i], the Board may find claim element 1[e][i] obvious based on *Norris*’s undisputed disclosure, based on the *Omont*’s disclosure, and based on the combined teachings of *Norris* and *Omont*.

IV. GROUND 4: PO’S OBJECTIONS TO *BORGSTADT* MISCONSTRUE THE CLAIMS, MISREAD THE PETITION, AND FAIL TO CONSIDER THE COMBINATION WITH *NORRIS*

For Ground 4, PO again fails to consider the combination and instead attacks *Borgstadt* in isolation. And PO’s attacks on *Borgstadt* have no merit. PO’s first argument—that the Petition mixes and matches different devices in *Borgstadt* as the claimed “second device”—misconstrues Claim 1 to assign the “second device” an expansive, and incorrect, scope. PO’s second argument—that the Petition mixes and matches different parameters in *Borgstadt* as the claimed “first parameter”—ignores the Petition, which spells out that any one of multiple parameters may be the claimed “first parameter.”

A. PO nowhere addresses the Petition’s combination of *Norris* and *Borgstadt*

Just as in Ground 3, PO again fails to address the combination of references in Ground 4. PO’s expert, Dr. Nikolaou admitted he did not consider the combination of *Norris* and *Borgstadt*. EX1031, 101:19-102:1 (“Combination, no, I don’t believe we considered that.”). Instead, the Response attacks *Borgstadt* individually. Resp.,

§§VIII (attacking *Borgstadt*'s disclosure of Claim 1's "first parameter" and "second device"). And again, PO's Response nowhere disputes that *Norris* teaches the "first parameter" and "second device" purportedly missing from *Borgstadt*. Resp., §VI.

PO also makes no attempt to dispute *Borgstadt*'s disclosure of the claimed "acceptable threshold" that is purportedly missing from *Norris*. Nor could it. *Borgstadt* teaches comparing to a "threshold efficiency value" in diagnostics. EX1006, [0033], Fig. 3; Pet., 67. *Borgstadt* also explains this "threshold" comparison identifies pump degradation or failure, the very feature PO alleges as the distinguishing feature of the claimed "acceptable threshold." EX1006, [0033] ("[A] lower efficiency value may be an indication of cavitation or an indication that the seals in the pump are wearing beyond the normal limits or that a pump has failed completely."); Resp., 25-27. When asked about the "combination of *Norris* and *Borgstadt*", Dr. Nikolaou responded: "*Norris* is not about threshold control. So where would that come from?" EX1031, 101:12-18. It would come from *Borgstadt*, as the Petition explained. Pet., 67. Accordingly, PO's arguments against Ground 4 fail to rebut Petitioner's showing of obviousness, based on the *Norris-Borgstadt* combination, for the same reasons discussed above in Ground 3. *See supra* §III.A.

And PO cannot blame its deficient Response on any lack of particularity in the Petition. The Petition's Ground 4 clearly relied on the combination of *Norris* with *Borgstadt*. The Petition explained the motivation to combine *Norris* and

Borgstadt. Pet., §VIII.D.1. The Petition detailed how “*Borgstadt*’s techniques” would “improve *Norris*’s system.” Pet., 61. The Petition explained that features of *Borgstadt*’s local control could be implemented in *Norris*’s local controllers. Pet., 62, 64-65. The Petition explained that features of *Borgstadt*’s central control could be implemented in *Norris*’s central controller. Pet., 62, 64-65. The Petition explained that Ground 4 relies on not only *Borgstadt*’s, but also on *Norris*’s, teaching of “comparing actual operating parameters to desired parameters.” Pet., 67. The Petition expressly incorporated *Norris*’s teachings, described in Ground 1, into Ground 4. Pet., 59. For the claim elements that PO argues *Borgstadt* does not teach (a “first parameter,” a “second device”), Ground 4 of the Petition also expressly relies on *Norris*’s teaching of those claim elements. Pet., 66-68 (citing to *Norris*’s disclosure, in §VIII.A, of claim elements 1[e][i]-[iii] and 1[f]). The Petition is clear, and PO again fails to apply the proper obviousness standard.

B. PO’s argument that the Petition maps different devices in *Borgstadt* to the claimed “second device” misconstrues the claim and misreads the Petition

PO’s arguments against *Borgstadt* in isolation also fail. First, PO argues the Petition “mixes and matches” different devices as Claim 1’s “second device.” Resp., §VIII.A. This argument both misconstrues the claim and misreads the Petition.

PO’s Response misconstrues Claim 1 to impose requirements on the “second device” that are not in the claim. PO’s Response states “the claimed ‘second device’

... is required to both ‘generate automated control instructions’ and ‘automatically adjust[] one or more of’ its functions according to those instructions.” Resp., 67. Claim 1 in fact recites “*one or more processing devices* ... generate automated control instructions at the second device” and “*one or more control devices* ... automatically adjust one or more aspects of the second device.” EX1001, Claim 1. The “second device” is thus not required to perform either function PO assigns to it, as “processing devices” and “control devices” perform these functions. *HTC Corp. v. Cellular Commc'ns Equip., LLC*, 701 Fed. App’x 978, 982 (Fed. Cir. 2017) (“The separate naming of two structures in the claim strongly implies that the named entities are not one and the same structure.”). PO’s mix-and-match theory for the “second device” is premised on the second device performing these functions. Resp., 68-70 (labeling “Petition’s Mapping of Second Device” to different devices because “Second Device Must Perform the Following Steps”).

Dr. Nikolaou confirms the claimed “control devices” and the “second device” “could be separate.” EX1031, 77:21-78:9. And he also admits that “processing devices,” not necessarily the second device, “generate automated control instructions at the second device.” EX1031, 79:1-8. The Board should disregard PO’s mix-and-match theory for the “second device” because PO’s construction

incorrectly lumps “processing devices” and “control devices” into the “second device.”⁶

PO’s response also misreads the Petition to manufacture the allegedly improper “mix[ing] and match[ing].” The Petition makes clear that “*each* of master controller, pump modulator, and local pump controllers” in *Borgstadt* “generate automated control instructions.” Pet., 67. Accordingly, any of *Borgstadt*’s master controller, pump modulator, or local pump controller may “generate automated control instructions,” which does not preclude also generating instructions at another

⁶ An example illustrates how PO goes astray by ignoring the *Norris-Borgstadt* combination. The Petition explains that *Borgstadt*’s local pump controller may “generate automated control instructions” (Pet., 67-68), and “features of *Borgstadt*’s local pump control could be implemented in *Norris*’s local pump control.” Pet., 62, 64-65. The Petition details how *Norris*’s “ECM” (electronic control module) “receives control instructions” from *Norris*’s local pump control. Pet., 18, 21, 23, 25-26. The Petition explains that the ECM adjusts engine, drivetrain, and pump operation. Pet., 18; EX1031, 25:20-27:22. PO’s mix-and-match argument is irrelevant because it ignores *Norris*’s disclosure of “processing” and “control devices” and addresses only one exemplary disclosure from *Borgstadt* of those elements. Resp., 67-70.

device. *Id.* This is wholly consistent with “one or more processing devices” generating automated control instructions in Claim 1. EX1001, Claim 1. But PO’s misconstruction requires that any device “generat[ing] automated control instructions” must be the “second device.” Resp., 68-70. So PO accuses the Petition of inconsistently mapping the master controller, pump modulator, and local pump controller to the “second device.” Resp., 68-70. PO’s first error, misconstruing Claim 1, leads to PO’s second error, misreading the Petition.

C. PO’s argument that Petitioner maps different parameters to the claimed “first parameter” misreads the Petition

Second, PO argues the Petition relies on “efficiency” as the claimed “first parameter” for some claim elements, but then switches to other parameters, “output flow rate” and “output pressure,” as the claimed “first parameter” elsewhere in the Petition. Resp., §VIII.B. A quick read of the Petition proves this false.

For claim element 1[e][i] reciting receiving and transmitting a “first parameter,” the Petition states that “output 118 parameters of each pump unit,” illustrated in Figure 1, are received and transmitted. Pet., 66. Dr. Nikolaou confirmed the “output 118 parameters” include flow rate, pressure, and efficiency. EX1031, 20:4-10 (agreeing *Borgstadt* “says clearly that output parameters include these three,” “output flow rate, output pressure, and output efficiency.”); 17:2-19, 18:9-17. The Petition also describes “receiv[ing] a pump unit’s current efficiency value”

or “*other pump parameters*.” Pet., 66. From the outset, the Petition identified any one of flow rate, pressure, or efficiency as the “first parameter.”

For claim element 1[e][ii] reciting “detect[ing] that the first parameter is outside of an acceptable threshold,” the Petition states “*Borgstadt* teaches comparing measured parameters to a threshold” before providing an “example” of comparing to a “threshold efficiency value.” Pet., 67. Referring back to claim element 1[e][i], the Petition stated “*Borgstadt* Figure 1 illustrates measured parameters” that may be the claimed “first parameter.” Pet., 66. Thus, any “measured parameter”⁷ of Figure 1—flow rate, pressure, efficiency—may be used in *Borgstadt*’s “threshold” comparison.

And *Borgstadt* makes clear its methods may apply to any one of these parameters: efficiency, output flow rate, output pressure. *Borgstadt* paragraph 33 spells it out in plain terms: “Although the *pump unit's efficiency is used as a* parameter in this *example*, as would be appreciated by those of ordinary skill in the

⁷ PO’s confusion may stem from its separating pump “efficiency” from flow rate and pressure, labeling the latter “measured parameters” or “operational parameters.” Resp., 75. *Borgstadt* makes no such distinction, and describes flow rate, pressure, and efficiency together as “measured” parameters. EX1006, [0023].

art, with the benefit of this disclosure, *other pump parameters may be used* during the diagnosing process.” EX1006, [0033]; Pet. 66-67 (citing EX1006, [0033]).

For claim element 1[e][iii] reciting “generat[ing] automated control instructions ... based ... on the first parameter,” the Petition points to several disclosures in *Borgstadt* adjusting operations based on “measured parameters.” Pet., 67 (citing EX1006, [0010], [0022]-[0026]); EX1006, [0024] (describing, for example, how controllers “use different measured parameters at the output of their respective pump units 110 to adjust the performance of the pump unit 110.”). The Petition further refers to an example of using “measured parameters ... to adjust the performance of the pump unit,” and cites to Figure 1, which illustrates the same “measured parameters”—flow rate, pressure, and efficiency—that the Petition described for claim elements 1[e][i]-1[e][ii].⁸ Pet., 67, 69.

Accordingly, the Petition consistently relies on *Borgstadt*’s “measured parameters”—flow rate, pressure, efficiency—as the claimed “first parameter.” PO’s Response takes isolated statements out of context and should not be credited.

⁸ PO’s Response claims the Petition’s description of a “first parameter” for claim element 1[e][iii] is limited to *Borgstadt* paragraph 24. Resp., 76. cursory review of the Petition, which cites several other disclosures, proves this false. Pet., 67-69 (citing EX1006, [0010], [0022]-[0026], Fig. 1).

V. CONCLUSION

Petitioner respectfully submits the challenged claims are unpatentable for each of Grounds 1-5.

Respectfully submitted,

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**CERTIFICATE OF COMPLIANCE WITH TYPE-VOLUME
LIMITATION, TYPEFACE REQUIREMENTS, AND TYPE STYLE
REQUIREMENTS**

1. This **Petitioners' Reply to Patent Owner's Response** complies with the type-volume limitation of 5,600 words, comprising 5584 words, excluding the parts exempted by 37 C.F.R. § 42.24(a).

2. This **Petitioners' Reply to Patent Owner's Response** complies with the general format requirements of 37 C.F.R. § 42.6(a) and has been prepared using Microsoft® Word in 14-point Times New Roman.

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CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. § 42.6(e), the undersigned certifies that on the 13th day of November 2025, a complete and entire copy of this **PETITIONERS' REPLY TO PATENT OWNER'S RESPONSE** and Exhibits 1030-1034 were served on Patent Owner via electronic mail at the following addresses:

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