

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

FERVO ENERGY CO.,
Petitioner,

v.

ORMAT TECHNOLOGIES INC.,
Patent Owner.

Case IPR2024-00665
Patent 7,320,221 B2

PATENT OWNER PRELIMINARY RESPONSE

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I. INTRODUCTION

None of Petitioner's seven grounds shows a reasonable likelihood that a single challenged claim of the '221 Patent is unpatentable. Instead, the Petition contains assertions that: are insufficiently related to the limitations of the challenged claims, do not address all of the limitations of the challenged claims, and/or are from disparate embodiments within a single reference or disparate references with no explanation for how or why a person of ordinary skill in the art would combine them to meet the claimed subject matter. These shortcomings are fatal because an institution decision must be "based on the grounds and evidence asserted in the Petition filed, not the Petition Petitioner ... wishes it had filed." *Scanstrut, Inc. v. Nat'l Prods., Inc.*, IPR2020-01542, Paper 9 at 5 (PTAB May 6, 2021) (denying request for rehearing of institution denial).

Petitioner's request for institution of the challenged claims should be denied.

II. PETITIONER'S GROUND 1 FAILS FOR SEVERAL REASONS

Petitioner's Ground 1, like all of its grounds, fails for several, independent reasons—separated by the subsections below—with respect to each independent claim.

A. Claim 1

1. Petitioner fails to show that Rinaldi teaches claim element 1c-2

Broadly, claim 1 recites providing a first horizontal injection well at a geological layer having an elevated temperature and then providing a second horizontal production well that is vertically spaced from the first injection well by a distance dependent on the elevated temperature. More specifically, element 1c-2 of claim 1 recites that “said second, horizontal, production, geothermal well is substantially horizontally and vertically spaced from said first, horizontal, injection, geothermal well **by a distance dependent on the elevated temperature** and located at a shallower depth than said first, horizontal, injection, geothermal well.” ’221 Patent at 10:5-10 (emphasis added). The above-emphasized language was added in the July 2007 response to the April 5, 2007 Office Action. *See* Ex. 1002 at page 48 of 202. In the associated remarks, the applicant explained that “Claim 1 has been amended to further recite that the vertical distance separating the horizontal injection and production wells is dependent on the elevated temperature at the geological layer of the horizontal injection well.” *See id.* at 56/202. The applicant further explained that:

The invention is based in part on the recognition that the buoyancy of water from the injection well which has absorbed geothermal heat provides the density difference that helps drive its

upward flow to the production well. Water heated to a higher temperature will have greater buoyancy and will permit a greater vertical separation of the injection and production wells. **Thus by determining the vertical spacing of the wells based on the elevated temperature of the geological layer at the injection well**, one can tailor this spacing for maximum efficiency and effectiveness.

Id. at 58/202 (emphasis added). This feature distinguished both of the cited references on which the Office relied in its last substantive Office Action. *See id.* at 58-60/202 (distinguishing the Foster (U.S. Patent No. 4,223,729) and Fitch (U.S. Patent No. 3,863,709) references with claim element 1c-2).

Petitioner states that “Rinaldi teaches” claim element 1c-2. *See* Pet. at 22 (citing Schaaf (Ex. 1004) at ¶67). In other words, Petitioner takes the position that Rinaldi (Ex. 1006) either expressly or necessarily (inherently) teaches providing the production well such that it is **vertically spaced from the injection well by a distance that depends on the claimed temperature**. But none of Petitioner’s supporting arguments or evidence adequately supports its position.

Petitioner cites to claims 1 and 13 of Rinaldi and asserts that Rinaldi “claims methods comprising ‘drilling at least one production well bore into the formation spaced from said production well.’” Pet. at 22. But Petitioner does not explain how this statement about a **production** well bore spaced from a **production** well teaches (expressly or inherently) claim element 1c-2. Petitioner also annotates Rinaldi’s

Figs. 1 and 2 to rely on Rinaldi's "first substantially horizontal production well bore 14" (Rinaldi at 3:24-27) and Rinaldi's "first horizontal injection well bore 16" (*id.* at 3:41-43), and asserts that they are horizontally and vertically spaced apart. Pet. at 22-23. However, that assertion is not an assertion that the injection well bore 16 is provided first, and that the production well bore 14 is thereafter provided and vertically spaced from the injection well bore 16 based on the claimed temperature. *See Mantech Envtl. Corp. v. Hudson Envtl. Servs., Inc.*, 152 F.3d 1368, 1376 (Fed. Cir. 1998) ("Step (b) introduces acetic acid, via the wells provided in step (a), into the groundwater of the contaminated region. Hence, in order to accomplish step (b), the wells of step (a) [**like the injection well of '221 Patent claim 1**] must already have been provided.").

Next, Petitioner argues that Rinaldi discloses a series of steps that include "a log and drill stem test" to be performed "until the reservoir 10 is economically and properly drilled with spaced apart production and injection well bores." Pet. at 23 (citing Rinaldi at 3:28-29, 3:47-49). As a threshold matter, these cited portions of Rinaldi do not teach element 1c-2. The first well that Rinaldi discusses drilling in the cited series of steps is the production well, not the injection well. *See* Rinaldi at 3:24-27 ("3. Using the controlled reservoir production technology, as will be hereinafter set forth, drill a first substantially horizontal **production** well bore 14 into the reservoir 10." (emphasis added)). Thus, it is impossible for Rinaldi to

disclose providing a “first” well that is the injection well and providing a “second” well that is the production well and vertically spacing the second well from the first well based on anything (much less the claimed temperature) associated with the first well, as claim 1 requires. In addition, because the production well is the first-provided well in Rinaldi, it is not spaced (any) vertical distance from a non-existent (at that point) injection well.

Second, the log and drill stem test Rinaldi discusses concerns a test that is performed **after** the production well is provided, not before, much less before and for the purpose of vertically spacing the production well from a non-existent (at that point) injection well. *See* Rinaldi at 3:28-29 (“4. Log and drill stem test **this first well bore** [i.e., the production well bore referenced in the preceding step 3] in the usual manner to obtain additional reservoir data.” (emphasis added)). And while Rinaldi indicates that its steps 3 (drilling the production well), 4 (log and drill stem test of same to obtain additional reservoir data), and 6 (“Determine the placement of a first horizontal injection well bore 16 and drill the well bore 16 into the reservoir 10. Log and drill stem test this first injection well bore 16 to obtain still additional data for the model and update the model with any information ascertained by the second log and drill stem testing.”) “may be repeated until the reservoir 10 is economically and properly drilled with spaced apart production and injection well bores,” *see* Rinaldi at 3:24-49, Rinaldi—regardless of the order in which any

injection and production wells are provided—never states therein that the vertical position of a production well relative to an injection well is based to any extent on the temperature of the geological layer where that injection well is located.

Petitioner argues that a person of ordinary skill in the art (a “POSITA”) “would recognize that the reservoir data obtained by the disclosed drill stem test would include temperature at the formation” (Pet. at 23 (citing Schaaf at ¶68)), and that Rinaldi confirms “this” because “Rinaldi, in the context of discussing ‘reservoir geological characteristics,’ expressly states that things such as ‘temperature and pressure characteristics must obviously be considered’” (Pet. at 23 (citing Rinaldi at 5:34-40)). But nothing in lines 34-40 of Rinaldi’s column 5 states that a production well is vertically spaced from an injection for any particular reason, much less temperature. Moreover, the discussion in that part of Rinaldi concerns determining what is going to be injected to increase production, not where the production well should be placed. *See* Rinaldi at 5:33-39 (explaining “the benefit” of discussed measures “being a greater sweep efficiency and thus **higher oil and/or gas production**” (emphasis added)).

Petitioner also argues that Rinaldi “discloses use of these measurable characteristics to ‘construct a computer model’ that considers ‘geological data and structure characteristics,’ such as temperature, to determine the placement of wells and drill spaced apart production and injection wells. [Rinaldi] at 3:30-49.” Pet. at

23-24. But that misstates Rinaldi, which talks about using the computer model to determine “the type, volume and location of the fluids to be injected into the reservoir so as to maximize reservoir productivity.” Rinaldi at 3:37-40. The balance of lines 41-49 of Rinaldi’s column 3 that Petitioner cites does not disclose element 1c-2, as explained above.

Next, Petitioner argues that the ’221 Patent (Ex. 1001) “notes prior art as disclosing well locations being dependent on the temperature for vertically drilled injection and production wells.” Pet. at 24 (citing ’221 Patent at 1:39-52). But nothing in this cited section of the ’221 Patent’s Background section discloses that a horizontal production well should be spaced from a horizontal injection well by a vertical distance dependent on any temperature. At best, the cited section discloses only that “[t]he production location in said **vertical** geothermal wells are made at the depth where the temperature is sufficiently high and optimum extraction of the geothermal fluid (water, stem or water and steam mixture) has been established using the slotted liner or open hole [Katagiri, 1970].” ’221 Patent at 47-52 (emphasis added). And Petitioner’s next statement—“It would have been obvious for a POSITA to employ the prior art technique of placing vertical wells based on the formation’s temperature to the horizontal wells and achieve predictable fluid flow. [Schaaf] at ¶69” (Pet. at 24)—fails to allege meeting element 1c-2, which, again, requires the production well to be vertically spaced from the injection well by a

distance dependent on the claimed temperature. The cited portion of Petitioner's expert's declaration parrots the assertion verbatim, and, thus, does not help Petitioner. *See* Schaaf at ¶69. At a minimum, the assertions (both Petitioner's and the expert's identical version) are improperly conclusory and lacking in evidentiary support. *See In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006); *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418-419 (2007) ("To facilitate review, this analysis should be made explicit.").

Finally, on Petition pages 24-25, Petitioner states:

Further, Rinaldi also teaches determining which wells to be activate [sic] based on the formation characteristics. EX1004 at ¶70. Rinaldi discloses a configuration of multiple drilled injection and production wells (*see* EX1006 at 4:45-56) and states that the injection and production wells "may be provided with valves, nozzle or other suitable" injection/intake means for either the injection or retrieval of fluid. EX1006 at 4:62-5:3. Rinaldi then describes using a computer model that measures reservoir characteristics (e.g., temperature) to determine "the location and operational state of the control valves." *Id.* at 3:36-37.

A POSITA would recognize that controlling which injection and production valves are open and closed necessarily has the effect of controlling the spacing between the active injection and production wells based on the measured reservoir characteristics. EX1004 at ¶70.

With respect to Petitioner’s 4:45-56 Rinaldi citation: Rinaldi discloses in Figs. 1 and 2 multiple injection well bores 16 and multiple production well bores 14, and, in Figs. 3 and 4, Rinaldi discloses “a single production well bore 24 in spaced relation to a single injection well bore 26” and notes that multiple substantially horizontally extending well bores 28 may be extended from the production well 24 and multiple substantially horizontally extending well bores 30 may be extended from the injection well bore 26. However, none of this discloses element 1c-2. And Petitioner’s description of Rinaldi’s discussion at 4:62-5:3 is inaccurate: there, Rinaldi only discloses “suitable intake means or valve means 34” for the production well.

Furthermore, Petitioner’s next statement—“Rinaldi then describes using a computer model that measures reservoir characteristics (e.g., temperature) to determine ‘the location and operational state of the control valves[]’ [Rinaldi] at 3:36-37”—is wrong. The disclosed computer model does not measure anything to determine the location and operational state of the control valves. The full sentence of Rinaldi states, “Concurrent with drilling the wells, construct a computer model that can simulate the actual subsurface fluid reservoir conditions and characteristics, including geological data and structure characteristics, information about the reservoir fluids, the location of the injection and production wells in the reservoir and the location and operational state of the control valves.” Rinaldi at 3:30-37. So,

Rinaldi describes constructing a model that can simulate the **existing** location/operational state of the control valves; it does not state that the computer model determines where to locate the control valves, as Petitioner asserts.

As a result, Petitioner's last statement about what a POSITA would recognize about controlling which injection and production valves are open and closed (Pet. at 25), which is predicated in part on the above inaccurate characterizations, necessarily fails. Moreover, the claimed temperature is not necessarily disclosed in any of the cited portions of Rinaldi as affecting any control decision.

2. Petitioner fails to show that Rinaldi teaches claim element 1c-3

Claim element 1c-3 recites that the claimed second production well is located at a shallower depth than the first injection well. Petitioner maps Rinaldi's "first horizontal injection well bore 16" to the claimed first injection well. *See* Pet. at 19-20 (contending Rinaldi "teaches" claim element 1a, and citing injection well bore 16 in FIG. 2 and at Rinaldi at 3:41-43).¹

¹ Petitioner also references Rinaldi claim 1's "drilling at least one injection well bore into the formation" (*see* Pet. at 21), but does not assert that this Rinaldi claim 1 disclosure meets claim element 1c-3.

Petitioner then maps Rinaldi’s “substantially horizontal production well bore 14” to the claimed second production well. *See* Pet. at 22 (contending Rinaldi “teaches” claim element 1c-1, and citing production well bore 14 in Fig. 2 and at Rinaldi at 3:25-27). Petitioner does not reference anything from Rinaldi’s claim 1 with respect to claim element 1c-1.

Petitioner then asserts that Rinaldi “teaches” claim element 1c-3. *See* Pet. at 25. However, this assertion fails because Petitioner does not address on Petition page 25 the vertical location of production well bore 14 from Rinaldi’s Fig. 2 relative to that of injection well bore 16 from Rinaldi’s Fig. 2. Instead, Petitioner toggles to an assertion concerning two different well bores shown in Rinaldi’s Fig. 3 and described without reference to Fig. 2. *See* Pet. at 25. Petitioner’s expert’s cited declaration paragraph (¶72) is a verbatim copy of Petitioner’s faulty assertion, and thus does not help Petitioner. *See Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15 (PTAB Aug. 24, 2022) (precedential); 37 C.F.R. § 42.65(a). Petitioner’s unexplained switching from the Rinaldi embodiment of Figs. 1 and 2 to the Rinaldi embodiment of Fig. 3 is improper because it lacks the particularity required by Section 312(a)(3) and otherwise fails to address how or why a POSITA would have combined the disclosures of different embodiments within Rinaldi to arrive at the subject matter of claim 1. *See* 35 U.S.C. § 312(a)(3); *Hewlett Packard Enter. Co. v. Intellectual Ventures II LLC*, IPR2022-00115, Paper 9 at 17 (PTAB

Mar. 29, 2022) (“Similarly, we also find neither Petitioner nor its expert explains sufficiently, let alone with particularity, how or why the proposed combination of select features from different embodiments in Harari represents an identical showing of every element *arranged as in claim 1.*”); *Nuance Comms., Inc. v. MModal Services Ltd.*, IPR2019-00794, Paper 7 at 26-30 (PTAB Sep. 10, 2019).

3. Petitioner fails to show that Rinaldi teaches claim element 1d

Claim element 1d recites recovering geothermal fluid from the second production well. And while Petitioner asserts that Rinaldi “teaches” this element (*see* Pet. at 26), Petitioner fails to assert, much less show, that Rinaldi teaches recovering geothermal fluid from production well bore 14. Instead, Petitioner relies on the language “removing produced fluid from said at least one production well bore” in Rinaldi’s claims 1 and 7. *See* Pet. at 26. But Petitioner did not rely on “at least one production well bore” from Rinaldi’s claim 1 or claim 7 as meeting the claimed second production well. *See* Pet. at 22 (addressing claim element 1c-1). This lack of particularity is improper. *See* 35 U.S.C. § 312(a)(3); *Hewlett Packard*, IPR2022-00115, Paper 9 at 17; *Nuance Comms.*, IPR2019-00794, Paper 7 at 26-30. Petitioner then relies on the Rinaldi language at 1:64-65 that “[t]he fluids are then forced by a back pressure to flow towards the production wells” (Pet. at 26), but that language at most discloses fluid flowing **toward** production wells; it does not

disclose **recovering any fluid from** any production well. Petitioner's expert's cited declaration paragraph (§73) is a verbatim copy of Petitioner's faulty assertion, and thus does not help Petitioner. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15; 37 C.F.R. § 42.65(a).

4. Petitioner fails to show that Rinaldi teaches claim element 1e

Claim element 1e recites, in part, “[g]enerating a water density difference ... between said first horizontal, injection well and said second horizontal, production well.” ’221 Patent at 10:12-14.

Petitioner states that “Rinaldi teaches” element 1e. *See* Pet. at 26 (citing Schaaf at §75). In other words, Petitioner takes the position that Rinaldi either expressly or necessarily (inherently) teaches generating the claimed water density difference. But none of the three sections of Rinaldi that Petitioner cites does so.

First, Petitioner argues that “Rinaldi discloses generating the density difference, noting: ‘the oil bearing fluids contained within the subsurface formation 29 may be forced either upwardly or downwardly, as desired, dependent upon the density of the fluids used in the process ... lighter fluids will tend to flow up and over the heavier fluids, to the higher set of production wells 28.’ [’221 Patent] at 5:43-52.” Pet. at 27. But this argument lacks sufficiently particularity because the cited portion of Rinaldi concerns Fig. 3, not Fig. 2, which contains injection well

bore 16 and production well bore 14 that Petitioner mapped to the claimed first injection well and the claimed second production well. *See* 35 U.S.C. § 312(a)(3); *Hewlett Packard*, IPR2022-00115, Paper 9 at 17; *Nuance Comms.*, IPR2019-00794, Paper 7 at 26-30. The same particularity deficiency exists with respect to Petitioner’s citation and quotation of Rinaldi 2:45-48 and Rinaldi 5:29-33. Further, even setting these deficiencies aside, Petitioner fails to assert that, much less explain why, a POSITA would have recognized that one of the referenced fluids (i.e., “the oil bearing fluids” or the “fluids used in the process”) was water. And while there is no citation to Schaaf’s expert report pertaining to the above Rinaldi citations, even if Petitioner had cited to Schaaf ¶76 it would not have mattered, because that paragraph is a verbatim duplicate of the first full paragraph of Petition page 27. It thus suffers the same shortcomings and, regardless, deserves little weight. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

Petitioner’s expert-sponsored explanation of the “fundamental physics of fluid dynamics and thermodynamics” is limited to the claim language and fails to reference Rinaldi, much less the aspects of Rinaldi’s Fig. 2 that must be (but are not) addressed. *See* Pet. at 27. Moreover, it cites no objective evidence and thus is entitled to little weight. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

5. Petitioner fails to show that Rinaldi teaches claim element 1f

Claim element 1f recites “inducing geothermal fluid into” the second production well from the geological layer because of buoyancy of the water and the pressure difference between the first injection well and the second production well. Petitioner asserts that Rinaldi “teaches” this element (*see* Pet. at 28), but none of Petitioner’s positions establish such a teaching.

First, none of Petitioner’s Rinaldi buoyancy/density-difference citations/quotations (Rinaldi at 5:43-52, 2:45-48, 2:45-59, 5:29-39) concern the wells from Rinaldi’s Fig. 2 on which Petitioner relies as meeting the claimed first injection and second production wells. For this reason alone, Petitioner’s claim element 1f position fails because it lacks the required particularity. *See* 35 U.S.C. § 312(a)(3); *Hewlett Packard*, IPR2022-00115, Paper 9 at 17; *Nuance Comms.*, IPR2019-00794, Paper 7 at 26-30.

Second, Petitioner’s reliance on Rinaldi at 1:61-65 for the effect of the alleged pressure difference does not disclose inducing geothermal fluid **into** the claimed production well from the claimed geological layer; it merely asserts that fluid flows **toward** production wells. *See* Pet. at 28. Petitioner also cites/quotes Rinaldi at 2:21-26, but does not explain how the cited/quoted Rinaldi text maps to the claimed second production well or the claimed pressure difference between the claimed first

injection well and the claimed second production well. *See* Pet. at 28-29. Petitioner's predicate assertion concerning claim element 1e only references Rinaldi at 2:19-21 (*see* Pet. at 26), and thus does not help Petitioner.

Third, Petitioner's expert-sponsored assertions on pages 29 and 30 of the Petition cite no objective evidence and thus are entitled to little weight. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

B. Claim 9

1. Petitioner fails to show that Rinaldi teaches claim element 9b

Claim element 9b recites, in part, that the claimed second production well is located at a shallower depth than the claimed first injection well. Petitioner asserts that Rinaldi "teaches" this element and cites, in relevant part, to its analysis of claim element 1c-3. *See* Pet. at 34. But Petitioner's predicate mappings of Rinaldi's disclosure to the claimed first injection well and the claimed second production well are based on its analyses of claim elements 1a and 1c-1 (*see* Pet. at 34, regarding claim elements 9a and 9b). Accordingly, Petitioner's shallower-depth assertion based on its analysis of claim element 1c-3 fails for the same reasons as its claim element 1c-3 analysis, as set forth above in Section II.A.2.

2. Petitioner fails to show that Rinaldi teaches claim element 9c

Claim element 9c recites “means for producing a water density difference and a pressure difference between said first horizontal, injection well and said horizontal, production well.” ’221 Patent at 10:59-61. Petitioner’s position (*see* Pet. at 34) fails for multiple reasons.

First, claim element 9c includes the terms “means for,” which are presumed to invoke means-plus-function treatment under Section 112. *See Samsung Electronics Co., Ltd. v. Power2B Inc.*, IPR2022-01378, Paper 12 at 11 (PTAB Mar. 15, 2023) (citing *Williamson v. Citrix Online, LLC*, 792 F.3d 1339, 1348 (Fed. Cir. 2015) (en banc in relevant part)). Under Rule 104(b)(3), Petitioner had an obligation to provide a construction of claim element 9c that includes both the claimed function and the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function. *See* Patent Trial and Appeal Board Consolidated Trial Practice Guide (November 2019; hereinafter “PTAB Consolidated TPG”) at 45 (interpreting the requirements of 37 C.F.R. § 42.104(b)(3)); *Samsung Electronics*, IPR2022-01378, Paper 12 at 11. Petitioner failed to do that here and, moreover, failed to assert, much less establish, that means-plus-function treatment of claim element 9c is not required. *See* Pet. at 34. Those failure are fatal, including because claim element 9c does not recite sufficient

structure to avoid means-plus-function treatment. *See Samsung Electronics*, IPR2022-01378, Paper 12 at 11-14.

Second, Petitioner relies solely on its analysis of claim element 1e to show that Rinaldi “teaches” claim element 9c. *See* Pet. at 34. As a result, and for at least the same reasons set forth above in Section II.A.4 with respect to the water density difference recited in claim element 1e, Petitioner fails to show that Rinaldi teaches the recited water density difference of claim element 9c.

3. Petitioner fails to show that Rinaldi teaches claim element 9d

Claim element 9d recites the first injection well has an open slotted outlet and the second production well has an open slotted inlet. Petitioner asserts that Rinaldi “teaches” this element. *See* Pet. at 35. In other words, Petitioner takes the position that Rinaldi either expressly or necessarily (inherently) teaches generating the claimed open slotted outlet and open slotted inlet. But Petitioner fails to make this showing.

Petitioner points at Petition page 35 to its analysis of claim elements 1b (*see* Pet. at 21) and 1f (*see id.* at 28-30), but neither of those address a slotted outlet or a slotted inlet. Petitioner then asserts that “Rinaldi discloses that the wells ‘may be provided with valves, nozzle or other suitable injection means’ ([Rinaldi] at 4:63-5:3) that were ‘well known.’” Pet. at 35. But that mis-states Rinaldi, which says

what is “well known” is that “[t]he production wells 28 may be provided with suitable intake means or valve means 34 disposed in the proximity of the planes A and B or in the medium therebetween for retrieval of the fluid therefrom.” Rinaldi at 4:67-5:3. Rinaldi does not say that “valves, nozzle or other suitable injection means 32” (Rinaldi at 4:62-67) are well known.

This misstatement also undercuts Petitioner’s next failed assertion, which is that, “[b]y 2004, a POSITA would understand that open slotted outlets are suitable injection means well known in the art at the time to suit different reservoir conditions and production requirement [sic]. [Schaaf] at ¶110.” Pet. at 35. In other words, Petitioner’s misstatement of Rinaldi—that suitable injection means are well known—cannot serve as a basis for Petitioner’s contention about the identity of an alleged well-known suitable injection means. Petitioner’s additional two, expert-sponsored statements (the expert’s statements (Schaaf at ¶110) are identical to Petitioner’s statements (Pet. at 35)) about “slotted liners” in hydrocarbon extraction and “slotted liners or similar mechanisms” in geothermal energy production cannot cure that deficiency and, in any event, are conclusory, unsupported assertions entitled to little weight. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

Moreover, and for the same reasons set forth above in Section II.A.2 with respect to the explanation of Petitioner’s reliance on well bores 14 and 16 of

Rinaldi's Fig. 2 for the claimed first and second injection and production wells of claim 1, Petitioner's expert-sponsored statements about claim element 9d fail for a lack of adequate particularity because the portion of Rinaldi on which Petitioner and its expert identically opine (Rinaldi at 4:63-5:3) does not concern the Rinaldi wells that Petitioner mapped to the claimed first injection well (i.e., Rinaldi's well bore 16 in Fig. 2) or the claimed second production well (i.e., Rinaldi's well bore 14 in Fig. 2). *See* Pet. at 34 (citing to Petitioner's analysis of claim element 1a for the first injection well of claim element 9a and to Petitioner's analysis of claim element 1c-1 for the second production well of claim element 9b); *see* 35 U.S.C. § 312(a)(3); *Hewlett Packard*, IPR2022-00115, Paper 9 at 17; *Nuance Comms.*, IPR2019-00794, Paper 7 at 26-30.

C. Claim 34

Petitioner relies on Rinaldi's well bore 16 in Fig. 2 as at least the claimed first, horizontal, geothermal well connected to the injection well of claim element 34-I. *See* Pet at 39 (citing to Petitioner's analysis of claim element 1a). Petitioner also relies on Rinaldi's well bore 14 in Fig. 2 as at least the claimed second, horizontal, geothermal well connected to the production well of claim element 34-III. *See* Pet. at 39 (citing to Petitioner's analysis of, in relevant part, claim element 1c-1).

1. Petitioner fails to show that Rinaldi teaches claim element 34-IV

Claim element 34-IV recites “[r]ecovering geothermal fluid from said production well.” ’221 Patent at claim element 34-IV. Petitioner asserts that Rinaldi “teaches” this element, and relies on its claim element 1d analysis as the sole support for its assertion. *See* Pet. at 40. Given Petitioner’s reliance on Fig. 2 of Rinaldi for the claimed production well, as explained above in Section II.C, Petitioner’s claim element 34-IV analysis fails for at least the same reasons—set forth above in Section II.A.3—as its claim element 1d analysis.

2. Petitioner fails to show that Rinaldi teaches claim element 34-V

Claim element 34-V recites “[g]enerating a water density difference ... between said first horizontal well and said second horizontal well by providing a fluid pump connected to said second horizontal well.” ’221 Patent at claim element 34-V. Petitioner asserts that Rinaldi “teaches” this claim element, and relies on its analysis of claim elements 1e and 3 as the sole support for its assertion. *See* Pet. at 40. Petitioner’s reliance on its claim 1e analysis fails with respect to the claim 34-V water density difference for the reasons explained above in Section II.A.4. This failure is not cured by Petitioner’s claim 3 analysis, which does not address the claimed water density difference. Furthermore, Petitioner’s claim 3 analysis does not identify a fluid pump connected to Rinaldi’s well bore 14 in Fig. 2; instead, the

only “fluid pump” Petitioner’s claim 3 analysis identifies is one that is allegedly shown in Rinaldi’s Fig. 3. *See* Pet. at 31-32. Thus, Petitioner’s claim 34-V analysis fails for this independent reason—a lack of adequate particularity—as well. *See* 35 U.S.C. § 312(a)(3); *Hewlett Packard*, IPR2022-00115, Paper 9 at 17; *Nuance Comms.*, IPR2019-00794, Paper 7 at 26-30.

3. Petitioner fails to show that Rinaldi teaches claim element 34-VI

Claim element 34-VI recites “[i]nducing geothermal fluid into” the second horizontal geothermal well from the geological layer because of buoyancy of the water and the pressure difference between the horizontal injection and horizontal production wells. Petitioner asserts that Rinaldi “teaches” this element, and relies on its claim element 1f analysis as the sole support for its assertion. *See* Pet. at 40. Given Petitioner’s reliance on well bores 16 and 14 in Fig. 2 of Rinaldi for the claimed first and second horizontal wells, as explained above in Section II.C, Petitioner’s claim element 34-VI analysis fails for at least the same reasons—set forth above in Section II.A.5—as its claim element 1f analysis.

III. PETITIONER’S GROUND 2 FAILS FOR SEVERAL REASONS

Petitioner’s Ground 2 allegations all require Swenson (Ex. 1008). *See* Pet. at 41-50. However, Petitioner’s Ground 2 does not sufficiently show that any of claims 1-11 and 23-27 would have been obvious over the asserted combination of Rinaldi

and Swenson because Petitioner has failed to “identify, with particularity, evidence sufficient to establish a reasonable likelihood that [Swenson] was publicly accessible before the critical date of the challenged patent and therefore that there is a reasonable likelihood that it qualifies as a printed publication.” *Hulu, LLC v. Sound View Innovations, LLC*, IPR2018-01039, Paper 29 at 13 (PTAB Dec. 20, 2019) (precedential). Instead, Petitioner merely asserts that Swenson was “published in 1995” and cites to page 2553 thereof. *See* Pet. at 41. But “1995” does not appear on page 2553 of Swenson or any other page thereof. *See* Swenson at 2553-2558. Moreover, Petitioner does not assert where or how Swenson was published, or why it was “disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art[,] exercising reasonable diligence, [could] locate it.” *SRI Int’l, Inc. v. Internet Sec. Sys., Inc.*, 511 F.3d 1186, 1194 (Fed. Cir. 2008) (quoting *Bruckelmyer v. Ground Heaters, Inc.*, 445 F.3d 1374, 1378 (Fed. Cir. 2006)). Thus, Petitioner has failed to meet its burden of showing there is a reasonable likelihood that Swenson qualifies as a printed publication.

Regardless of this failing, Petitioner has failed to demonstrate a reasonable likelihood that any of claims 1-11 and 23-27 would have been obvious over the asserted combination of Rinaldi and Swenson for the additional reasons discussed below.

A. Claim 1

1. Petitioner fails to show claim element 1c-2 is met

Petitioner asserts that Rinaldi “teaches” claim element 1c-2 and cites its analysis thereof from Ground 1. *See* Pet. at 43. That assertion fails for at least the same reasons set forth above in Section II.A.1.

Petitioner also asserts that “[a]dditionally, Swenson teaches element 1c-2. [Schaaf] at ¶152.” *See* Pet. at 43. Petitioner then quotes from page 2558 of Swenson and cites page 2553 of Swenson with a parenthetical explanation. But neither the quoted text of page 2558 of Swenson nor Petitioner’s parenthetical explanation of page 2553 of Swenson discloses (expressly or inherently) vertically spacing a second horizontal production well from a first (i.e., prior-provided) horizontal injection well by a distance dependent on the claimed temperature. For this reason, Petitioner’s Ground 2 fails with respect to claim 1 and its challenged dependent claims.

Additionally, Petitioner’s Ground 2 fails with respect to claim 1 and its challenged dependent claims because Petitioner does not explain how or why a POSITA would have combined Swenson’s alleged showing of claim element 1c-2 with the aspects of Rinaldi on which Petitioner relies for other claim 1 elements, such as claim elements 1a and 1d, to meet the subject matter of claim 1. *See* Pet. at 43; *Unigene Labs, Inc. v. Apotex, Inc.*, 655 F.3d 1352, 1360 (Fed. Cir. 2011) (“Obviousness requires more than a mere showing that the prior art includes separate

references covering each separate limitation in a claim under examination. Rather, obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention.” (citations omitted)).

Petitioner’s “Overview of Swenson” section on Petition pages 41 and 42 does not cure this deficiency. There, separate from its analysis of claim element 1c-2, Petitioner quotes a portion of the last page of Swenson that states that “GEOCRACK indicates that reservoir operators could engineer systems with extensive lifetimes and profitable thermal productivity by appropriate well spacing and limiting energy production rates” and asserts through identical expert testimony that “[a] POSITA would recognize performing such analysis is an economic, efficient, and predictable way to improve fluid extraction in Rinaldi” and “[a]s such, a POSITA would have found it obvious and have been motivated to use the modeling in Swenson for improving fluid extraction techniques in Rinaldi to increase flow extraction.” *See* Pet. at 41-42. But these general assertions, which Petitioner does not reference in its analysis of claim element 1c-2, do not cure Petitioner’s above-described failure because they do not explain how a POSITA would have modified any particular disclosure in Rinaldi to meet any particular limitation of claim 1. *See also* 35 U.S.C.

§ 312(a)(3) (the petition must identify, with particularity, the grounds of challenge for each claim and the evidence supporting each ground).

2. Petitioner fails to show that Rinaldi teaches claim element 1c-3

Petitioner asserts that Rinaldi “teaches” claim element 1c-3 and cites its analysis thereof from Ground 1. *See* Pet. at 43. That assertion fails for at least the same reasons set forth above in Section II.A.2.

3. Petitioner fails to show that Rinaldi teaches claim element 1d

Petitioner asserts that Rinaldi “teaches” claim element 1d and cites its analysis thereof from Ground 1. *See* Pet. at 42. That assertion fails for at least the same reasons set forth above in Section II.A.3.

4. Petitioner fails to show claim element 1e is met

Petitioner asserts that Rinaldi “teaches” claim element 1e and cites its analysis thereof from Ground 1. *See* Pet. at 43. That assertion fails for at least the same reasons set forth above in Section II.A.4.

Petitioner also asserts that “[a]dditionally, Swenson teaches this element. [Schaaf] at ¶153.” *See* Pet. at 43. However, Petitioner does not discuss the claimed water density difference, which does not cure the failure identified above in Section II.A.4. Regardless, Petitioner’s assertions also fails to show that Swenson discloses the claimed pressure difference, including due to a lack of particularity. *See* 35

U.S.C. § 312(a)(3); *Harmonic Inc. v. Avid Tech., Inc.*, 815 F.3d 1356, 1363 (Fed. Cir. 2016); *Intelligent Bio-Sys., Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (“It is of the utmost importance that petitioners in the IPR proceedings adhere to the requirement that the initial petition identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’” (quoting 35 U.S.C. § 312(a)(3))).

Petitioner asserts that Swenson’s Table 2 “shows the pressure difference generated between the injection and production wells,” and circles the words “Pressure Difference” in Table 2, but does not indicate which of the cited pressure differences it relies on. *See* Pet. at 43-44. That is improper because Table 2 includes data for both Fenton Hill, which is the New Mexico location of an actual reservoir (*see* Swenson at 2553, Abstract paragraph one), and GEOCRACK, which is modeled (not actual) data (*see* Swenson at 2556 (“Table 2: Actual and modeled flows under different wellhead pressure conditions.”))).

Petitioner also cites the Swenson sentence preceding Table 2 on page 2556 that states “[b]oth GEOCRACK and actual Fenton Hill data shows that the level of outflow can be maintained even with a smaller driving pressure difference across the reservoir (Duteau and Brown, 1993).” Pet. at 44. But nowhere does Petitioner (or its expert) identify or otherwise explain where in Swenson the asserted “injection and production wells” are located, or why they are both horizontally **and** vertically

displaced from each other, as predicate claim element 1c-2 requires, in order for the claimed pressure difference therebetween of claim element 1e to be met. The GEOCRACK data cannot itself meet any limitation in claim 1 because it is not actual data, and Petitioner has not explained how data modeling flow in one-dimension (*see* Swenson at 2553 (“The flow is assembled to be one-dimensional (planar) in a fluid flow path.”)) can be relevant to horizontal wells that are horizontally **and** vertically displaced from one another.

And while Petitioner asserts that Swenson discloses claim element 1b— “[i]njecting water into said injection well, whereby the injected water is heated”— by quoting from Swenson’s description of the creation and operation of a non-specific HDR system (*see* Pet. at 42-43 (citing and quoting from Swenson at 2553, first paragraph beneath “1. INTRODUCTION”)), Petitioner never relies on any particular aspect of that Swenson paragraph as satisfying the predicate wells that claim element 1e concerns: the “first, horizontal, geothermal well in the ground at a geological layer having an elevated temperature, which is used as said injection well” of claim element 1a and the “second, horizontal, geothermal well in the ground, which is used as said production well” of claim element 1c-1 (*see* Pet. at 42-43 (relying exclusively on Rinaldi for these claim elements)). Thus, Petitioner’s approach fails because it lacks the required particularity. *See* 35 U.S.C. § 312(a)(3);

Hewlett Packard, IPR2022-00115, Paper 9 at 17; *Nuance Comms.*, IPR2019-00794, Paper 7 at 26-30.

Additionally, Petitioner's Ground 2 fails with respect to claim 1 and its challenged dependent claims because Petitioner does not explain how or why a POSITA would have combined Swenson's alleged showing of claim element 1e with the aspects of Rinaldi on which Petitioner relies for other claim 1 elements, such as claim elements 1a and 1d, to meet the subject matter of claim 1. *See* Pet. at 43; *Unigene Labs*, 655 F.3d at 1360. Petitioner's "Overview of Swenson" section on Petition pages 41 and 42 does not cure this deficiency for at least the same reasons as those given above in Section III.A.1.

5. Petitioner fails to show claim element 1f is met

Petitioner asserts that Rinaldi "teaches" claim element 1e and cites its analysis thereof from Ground 1. *See* Pet. at 44. That assertion fails for at least the same reasons set forth above in Section II.A.5.

Petitioner also asserts that "[a]dditionally, Swenson teaches this element. [Schaaf] at ¶155." *See* Pet. at 44. Petitioner cites its claim 1e analysis of Swenson (*id.*), but does not explain how that analysis shows "[i]nducing geothermal fluid into said second horizontal geothermal well from the geological layer because of buoyancy of the water and the pressure difference between the horizontal injection and horizontal production wells," as required to meet claim element 1f. Similarly,

neither Petitioner nor its expert explain how Swenson's statement that "[b]oth GEOCRACK and actual Fenton Hill data shows that the level of outflow can be maintained even with a smaller driving pressure difference across the reservoir (Duteau and Brown, 1993)" meets the "[i]nducing geothermal fluid into said second horizontal geothermal well from the geological layer because of buoyancy of the water and the pressure difference between the horizontal injection and horizontal production wells," as required to meet claim element 1f, at least because the GEOCRACK data is not actual data and the Fenton Hill data is not tied by Petitioner to any wells meeting claim 1's horizontal injection and production wells. *See* Pet. at 44.

Petitioner points to Swenson's description of the creation and operation of a non-specific HDR system (*see* Pet. at 44 (citing and quoting from Swenson at 2553, first paragraph beneath "1. INTRODUCTION")), but, again, Petitioner never relies on any particular aspect of that Swenson paragraph as satisfying the predicate wells that claim element 1f concerns: the "first, horizontal, geothermal well in the ground at a geological layer having an elevated temperature, which is used as said injection well" of claim element 1a and the "second, horizontal, geothermal well in the ground, which is used as said production well" of claim element 1c-1 (*see* Pet. at 42-43 (relying exclusively on Rinaldi for these claim elements)). Again, Petitioner's approach fails because it lacks the required particularity. *See* 35 U.S.C. § 312(a)(3);

Hewlett Packard, IPR2022-00115, Paper 9 at 17; *Nuance Comms.*, IPR2019-00794, Paper 7 at 26-30.

Additionally, Petitioner's Ground 2 fails with respect to claim 1 and its challenged dependent claims because Petitioner does not explain how or why a POSITA would have combined Swenson's alleged showing of claim element 1f with the aspects of Rinaldi on which Petitioner relies for other claim 1 elements, such as claim elements 1a and 1d, to meet the subject matter of claim 1. *See* Pet. at 44; *Unigene Labs*, 655 F.3d at 1360. Petitioner's "Overview of Swenson" section on Petition pages 41 and 42 does not cure this deficiency for at least the same reasons as those given above in Section III.A.1.

B. Claim 9

1. Petitioner fails to show that claim element 9b is met

Petitioner cites, in part, its analyses of claim elements 1c-2, 1c-3, and 1d for claim element 9b. Pet. at 47. Those analyses fail with respect to claim element 9b for the same reasons given above in Sections III (Petitioner failed to show that Swenson is a printed publication), III.A.1 (claim element 1c-2), III.A.2 (claim element 1c-3), and III.A.3 (claim element 1d).

2. Petitioner fails to show that claim element 9c is met

Petitioner cites its claim element 1e analysis for claim element 9c. *See* Pet. at 47. Petitioner's position fails for several reasons. First, claim element 9c includes

the terms “means for,” which are presumed to invoke means-plus-function treatment under Section 112. *See Samsung Electronics*, IPR2022-01378, Paper 12 at 11. Under Rule 104(b)(3), Petitioner had an obligation to provide a construction of claim element 9c that includes both the claimed function and the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function. *See* PTAB Consolidated TPG at 45 (interpreting the requirements of 37 C.F.R. § 42.104(b)(3)); *Samsung Electronics*, IPR2022-01378, Paper 12 at 11. Petitioner failed to do that here and, moreover, failed to assert, much less establish, that means-plus-function treatment of claim element 9c is not required. *See* Pet. at 43, 47. Those failures are fatal, including because claim element 9c does not recite sufficient structure to avoid means-plus-function treatment. *See Samsung Electronics*, IPR2022-01378, Paper 12 at 11-14.

Second, Petitioner’s reliance on its claim 1e analysis fails for claim element 9c for the same reasons given above in Section III.A.4.

3. Petitioner fails to show that claim element 9d is met

Petitioner cites, in part, its analyses of claim element 1f for claim element 9d. Pet. at 47. That analysis fails with respect to claim element 9d for the same reasons given above in Section III.A.5.

C. Claim 34

1. Petitioner fails to show that claim element 34-III is met

Petitioner cites, in part, its analyses of claim elements 1c-2 and 1c-3 for claim element 34-III. Pet. at 49. Those analyses fail with respect to claim element 34-III for the same reasons given above in Sections III (Petitioner failed to show that Swenson is a printed publication), III.A.1 (claim element 1c-2) and III.A.2 (claim element 1c-3).

2. Petitioner fails to show that claim element 34-IV is met

Petitioner cites its analysis of claim elements 1d for claim element 34-IV. Pet. at 49. That analysis fails with respect to claim element 34-IV for the same reasons given above in Section III.A.3.

3. Petitioner fails to show that claim element 34-V is met

Petitioner cites its analysis of claim elements 1e for claim element 34-V. Pet. at 49. That analysis fails with respect to claim element 34-V for the same reasons given above in Section III.A.4.

4. Petitioner fails to show that claim element 34-VI is met

Petitioner cites its analysis of claim elements 1f for claim element 34-VI. Pet. at 50. That analysis fails with respect to claim element 34-VI for the same reasons given above in Section III.A.5.

IV. PETITIONER’S GROUND 3 SHARES THE DEFICIENCIES OF GROUND 1

A. Claim 1

Petitioner asserts that Rinaldi “teaches” claim 1 “as discussed in Ground 1.” Pet. at 51. Petitioner’s Ground 3 positions for claim 1 therefore fail for the same reasons set forth above in Sections II.A.1 (claim element 1c-2), II.A.2 (claim element 1c-3), II.A.3 (claim element 1d), II.A.4 (claim element 1e), and II.A.5 (claim element 1f).

B. Claim 9

Petitioner asserts that Rinaldi “teaches” claim 9 “as discussed in Ground 1.” Pet. at 51. Petitioner’s Ground 3 positions for claim 9 therefore fail for the same reasons set forth above in Sections II.B.1 (claim element 9b), II.B.2 (claim element 9c), and II.B.3 (claim element 9d).

C. Claim 34

Petitioner asserts that Rinaldi “teaches” claim 34 “as discussed in Ground 1.” Pet. at 51. Petitioner’s Ground 3 positions for claim 34 therefore fail for the same reasons set forth above in Sections II.C.1 (claim element 34-IV), II.C.2 (claim element 34-V), and II.C.3 (claim element 34-VI).

V. PETITIONER’S GROUND 4 FAILS FOR SEVERAL REASONS

A. Claim 1

1. Petitioner fails to show that Mims teaches claim elements 1c-1 and 1c-2

Claim elements 1c-1 and 1c-2 require providing a second horizontal production well after providing the first horizontal injection well at a geological layer having an elevated temperature (as recited in claim element 1a), and providing the second horizontal production well so that it is vertically spaced from the first horizontal injection well by a distance dependent on the elevated temperature of the geological layer at the first injection well. *See* Ex. 1002 at 58/202. Petitioner fails to allege, must less show, that Mims (Ex. 1007) discloses providing a first horizontal injection well and **then** providing a second horizontal production well, much less then providing a second horizontal production well that is spaced vertically from the first horizontal injection well by a distance dependent on the elevated temperature of the geological layer at the first injection well. *See* Pet. at 64-65. At best Mims is silent as to which horizontal well is provided first and, at worst for Petitioner, Mims indicates the “first” well is the production well, not an injection well. *See* Mims at 1:65-68 (“[t]he first well is placed relatively near the top of a hydrocarbon interval”); *id.* at 2:43-47 (same); *id.* at 4:9-11 and Fig. 2 (well 11 is “first” well).

Setting this failure aside, Petitioner’s assertion that “Mims teaches” claim element 1c-2 independently fails. *See* Petition at 64 (citing Schaaf at ¶211). First,

Petitioner cites 4:31-39 of Mims (Pet. at 64), but this passage does not disclose—expressly or inherently—that the vertical spacing between any two wells is dependent on the claimed temperature.

Second, Petitioner also states that “[a] POSITA would further understand that Mims teaches well spacing dependent upon many factors known to those skilled in the art, including the characteristics of the formation, which at the time of the earliest priority data of the ’221 patent would have included temperature ([Mims] at 4:27-47). [Schaaf] at ¶214.” Pet. at 65. But what Mims actually states is:

The diameter and length of the horizontal wells and their perforation intervals are not critical, except that such factors will affect the well spacing and the economics of the process. Optimum well spacing may vary considerably from formation to formation and may depend upon many factors known to those skilled in the art. It is not necessary that the well spacings in a particular pattern be equal. Such decisions should be determined by conventional drilling criteria, the characteristics of the specific formation, the economics of a given situation and the well known art of drilling horizontal wells.

Mims at 4:27-39. Temperature is not listed as a “characteristic[] of the specific formation.” And while Schaaf asserts—verbatim to Petitioner’s assertion—that “[a] POSITA would further understand that Mims teaches well spacing dependent upon many factors known to those skilled in the art, including the characteristics of the formation, which at the time of the earliest priority data of

the '221 patent would have included temperature” (Schaaf at ¶214), Schaaf’s assertion is entitled to little weight because it is conclusory and unsupported. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

Third, even accepting Petitioner’s/Schaaf’s assertion as true—that a POSITA would have understood temperature to be a characteristic of a formation—the assertion is too generic (at best, that injection and production wells are substantially horizontally and vertically spaced from each other dependent on formation temperature) to satisfy claim element 1c-2, which requires the second horizontal production well to be vertically spaced from the first horizontal injection well by a distance dependent on the **elevated temperature of the geological layer at the first injection well**.

2. Petitioner fails to show that claim element 1e is met

Claim element 1e recites, in part, “[g]enerating a water density difference ... between said first horizontal, injection well and said second horizontal, production well.” ’221 Patent at 10:12-14. Petitioner states that “[i]n combination with Mims, a POSITA’s general knowledge at the time of the invention would have disclosed this element.” Pet. at 66 (citing Schaaf at ¶220 and Mims at 3:61-68). While the cited portion of Mims states that “[a]ny recovery fluid known in the art of enhanced oil recovery may be employed in the invention process” and “[e]xamples of possible recovery fluids are[] water,” Mims does not disclose (nor does Schaaf ¶220) the

claimed “generating a water density difference.” Petitioner’s cited claim element 1e discussion of a POSITA’s general knowledge fails to support its Ground 4 claim element 1e position for the same reasons given above in Section II.A.4.

3. Petitioner fails to show that claim element 1f is met

Claim element 1f recites “inducing geothermal fluid into” the second production well from the geological layer because of buoyancy of the water and the pressure difference between the first injection well and the second production well. Petitioner states that “[i]n combination with Mims, a POSITA’s general knowledge at the time of the invention would have disclosed this element.” Pet. at 66 (citing Schaaf at ¶228). Petitioner also states, “[a]s discussed in Ground 1, Element 1f, the buoyancy and pressure difference are obvious and well understood features of geothermal circulation systems. [Schaaf] at ¶229.” Pet. at 67. But neither Petitioner nor its expert identifies a “geothermal fluid” that is induced into Mims’ “first well” because of buoyancy of the water injected into Mims’ “second well” or “third well” and the claimed pressure difference. Petitioner’s claim element 1f position fails for this reason alone. Additionally, Petitioner’s expert-sponsored assertions on pages 29 and 30 of the Petition cite no objective evidence and thus are entitled to little weight. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

B. Claim 9

1. Petitioner fails to show that claim element 9b is met

Petitioner cites, in part, its analyses of claim elements 1c-1 and 1c-2 for claim element 9b. Pet. at 70. Those analyses fail with respect to claim element 9b for the same reasons given above in Section V.A.1.

2. Petitioner fails to show that claim element 9c is met

Petitioner cites its claim element 1e analysis for claim element 9c. *See* Pet. at 70. Petitioner's position fails for several reasons. First, claim element 9c includes the terms "means for," which are presumed to invoke means-plus-function treatment under Section 112. *See Samsung Electronics*, IPR2022-01378, Paper 12 at 11. Under Rule 104(b)(3), Petitioner had an obligation to provide a construction of claim element 9c that includes both the claimed function and the specific portions of the specification that describe the structure, material, or acts corresponding to each claimed function. *See* PTAB Consolidated TPG at 45; *Samsung Electronics*, IPR2022-01378, Paper 12 at 11. Petitioner failed to do that here and, moreover, failed to assert, much less establish, that means-plus-function treatment of claim element 9c is not required. *See* Pet. at 66-67, 70. Those failures are fatal, including because claim element 9c does not recite sufficient structure to avoid means-plus-function treatment. *See Samsung Electronics*, IPR2022-01378, Paper 12 at 11-14.

Second, Petitioner's reliance on its claim 1e analysis fails for claim element 9c for the same reasons given above in Section V.A.2.

3. Petitioner fails to show that claim element 9d is met

Petitioner states "Mims teaches this element. [Schaaf] at ¶247-251." However, none of paragraphs 247-251 of Schaaf's declaration states that Mims explicitly or inherently discloses the open slotted outlet of the claimed first horizontal injection well or the open slotted inlet of the claimed second horizontal production well. *See* Schaaf at ¶¶247-251. Instead, Schaaf states in paragraph 247 that "[i]n addition to the Mims disclosures discussed in Section VIII.D, it is my opinion that a POSITA's knowledge on the open slots used for injection means would render this claim limitation obvious." Schaaf at ¶247. But, first, nowhere else in Schaaf's Section VIII.D (i.e., paragraphs 199-246) are slotted inlets or slotted outlets discussed, much less identified in Mims. An assertion that a reference teaches a limitation is not the same thing as an assertion that a POSITA would have found the limitation to be obvious in view of a POSITA's knowledge. Thus, Petitioner's assertion that Mims teaches element 9d fails.

Second, Petitioner's citation to and reliance on five paragraphs of Schaaf (¶¶247-251) without explaining that testimony amounts to an improper incorporation by reference of that testimony, which should therefore not be considered. *See* PTAB Consolidated TPG at 35-36 (interpreting the requirements of

37 C.F.R. § 42.63(a)(3)); *Cisco Systems, Inc. v. C-Cation Techs., LLC*, Case IPR2014-00454, Paper 12 at 9-10 (PTAB Aug. 29, 2014) (informative); 37 C.F.R. § 42.104(b)(5) (“The Board may exclude or give no weight to evidence where a party has failed to state its relevance or to identify specific portions of the evidence that support the challenge.”).

Third, even if considered, Schaaf’s testimony at paragraphs 247-251 is conclusory and unsupported and therefore entitled to little weight. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

Fourth, even if considered, Schaaf’s testimony improperly does not explain how or why a POSITA would have modified any particular well in Mims with any particular “slotted liner.” *See* Schaaf at ¶¶247-251; *Unigene Labs*, 655 F.3d at 1360.

Next, Petitioner cites, in part, its analysis of claim element 1f for claim element 9d. Pet. at 70. That analysis fails with respect to claim element 9d for the same reasons given above in Section V.A.3. Petitioner also cites its Ground 1, claim element 9d analysis “for the POSITA knowledge on the open slots used for injection means.” Pet. at 70. But that analysis fails with respect to Ground 4 claim element 9d for the same reasons given above in Section II.B.3 and, in any event, relies on statements in paragraph 110 of Schaaf that are substantively identical to the statements in paragraphs 248-250, which cannot and do not support Petitioner’s position for the reasons just discussed.

C. Claim 34

1. Petitioner fails to show that claim element 34-III is met

Petitioner cites, in part, its analyses of claim elements 1c-1 and 1c-2 for claim element 34-III. Pet. at 73. Those analyses fail with respect to claim element 34-III for the same reasons given above in Section V.A.1.

2. Petitioner fails to show that claim element 34-V is met

Petitioner cites its analysis of claim elements 1e for claim element 34-V. Pet. at 74. That analysis fails with respect to claim element 34-V for the same reasons given above in Section V.A.2. Petitioner also asserts that, “Mims, along with the general knowledge of a POSITA, teaches this element. [Schaaf] at ¶287-290.” Pet. at 74. But that assertion fails for several reasons.

First, Petitioner’s citation to and reliance on at least two paragraphs of Schaaf (¶¶288-289) without explaining that testimony amounts to an improper incorporation by reference of that testimony, which should therefore not be considered. *See* PTAB Consolidated TPG at 35-36; *Cisco Systems*, Case IPR2014-00454, Paper 12 at 9-10; 37 C.F.R. § 42.104(b)(5).

Second, even if considered, Schaaf’s testimony at ¶288 is conclusory and unsupported and therefore entitled to little weight. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

Third and fourth, even if considered, Schaaf’s testimony does not identify a “fluid pump” in Mims or in his explanation of a POSITA’s knowledge, and Schaaf’s testimony improperly fails to assert how or why it would have been obvious to have connected a fluid pump to the claimed second horizontal well to generate the claimed water density difference and the claimed pressure difference. *See* Schaaf at ¶¶287-290; *Unigene Labs*, 655 F.3d at 1360.

3. Petitioner fails to show that claim element 34-VI is met

Petitioner cites its analysis of claim elements 1f for claim element 34-VI. Pet. at 74. That analysis fails with respect to claim element 34-VI for the same reasons given above in Section V.A.3. Petitioner also asserts that, “Mims, along with the general knowledge of a POSITA, teaches this element. [Schaaf] at ¶¶291-293.” Pet. at 74. But that assertion fails for several reasons.

First, Petitioner’s citation to and reliance on Schaaf’s testimony without explaining it amounts to an improper incorporation by reference of that testimony, which should therefore not be considered. *See* PTAB Consolidated TPG at 35-36; *Cisco Systems*, Case IPR2014-00454, Paper 12 at 9-10; 37 C.F.R. § 42.104(b)(5).

Second, even if considered, Schaaf’s testimony at ¶292—“As discussed in Section VIII.A, the buoyancy and pressure difference are obvious and well understood features of geothermal circulation systems.”—improperly refers generally to Schaaf’s Ground 1 discussion, which, if it is meant to refer to his Ground

1, claim element 1f discussion, fails for at least the reasons given above in the last paragraph of Section II.A.5 and is otherwise conclusory and unsupported and therefore entitled to little weight. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

VI. PETITIONER’S GROUND 5 FAILS FOR SEVERAL REASONS

A. Claim 1

1. Petitioner fails to show that Mims teaches claim element 1c-1

Petitioner relies on its Ground 4, claim element 1c-1 analysis for this claim element. *See Pet.* at 77. Its Ground 5 position for claim element 1c-1 therefore fails for the same reasons given above with respect to claim element 1c-1 in Section V.A.1.

2. Petitioner fails to show that claim element 1c-2 is met

Petitioner asserts that “Mims teaches element 1c-2 as set forth in Ground 4, Section VIII.D, which is incorporated by reference.” *Pet* at 78. That assertion fails for the same reasons given above with respect to claim element 1c-2 in Section V.A.1. Petitioner also asserts that “Swenson also teaches this element” and uses the same supporting explanation as it used for the same claim element on page 43 of the petition. *See Pet.* at 78, 43. That Swenson-based assertion fails for the same reasons as set forth above in Sections III (Petitioner failed to show that Swenson is a printed publication) and III.A.1 (claim element 1c-2).

Additionally, Petitioner's Ground 5 fails with respect to claim 1 and its challenged dependent claims because Petitioner does not explain how or why a POSITA would have combined Swenson's alleged showing of claim element 1c-2 with the aspects of Mims on which Petitioner relies for other claim 1 elements, such as claim elements 1a and 1d, to meet the subject matter of claim 1. *See* Pet. at 78; *Unigene Labs*, 655 F.3d at 1360 ("Obviousness requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination. Rather, obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention." (citations omitted)).

Petitioner's "Overview of Swenson" section on Petition pages 41 and 42, to the extent considered, does not cure this deficiency. There, separate from its analysis of claim element 1c-2, Petitioner quotes a portion of the last page of Swenson that states that "GEOCRACK indicates that reservoir operators could engineer systems with extensive lifetimes and profitable thermal productivity by appropriate well spacing and limiting energy production rates" and asserts through identical expert testimony that "[a] POSITA would recognize performing such analysis is an economic, efficient, and predictable way to improve fluid extraction in Rinaldi" and "[a]s such, a POSITA would have found it obvious and have been motivated to use

the modeling in Swenson for improving fluid extraction techniques in Rinaldi to increase flow extraction.” *See* Pet. at 41-42. But these general assertions, which Petitioner does not reference in its analysis of claim element 1c-2, and which do not even concern Mims, do not cure Petitioner’s above-described failure because they do not explain how a POSITA would have modified any particular disclosure in Mims (or Kruger (Ex. 1010)) to meet any particular limitation of claim 1. *See also* 35 U.S.C. § 312(a)(3) (the petition must identify, with particularity, the grounds of challenge for each claim and the evidence supporting each ground).

3. Petitioner fails to show that claim element 1e is met

Claim element 1e recites, in part, “[g]enerating a water density difference ... between said first horizontal, injection well and said second horizontal, production well.” ’221 Patent at 10:12-14. Petitioner asserts that “Mims teaches element 1e of Claim 1 as set forth in Ground 4, Section VIII.D, which is incorporated herein.” Pet. at 79. This assertion fails for the same reasons set forth above in Section V.A.2. Petitioner also asserts that “Swenson teaches this element” and uses the same supporting explanation as it used for the same claim element on pages 43 and 44 of the petition. *See* Pet. at 79, 43-44. That assertion fails because Petitioner has not sufficiently established that Swenson is a printed publication, for the reasons set forth above in Section III. Regardless, Petitioner’s Swenson-based assertion also fails for the same respective reasons as set forth above in Section III.A.4. In

particular, it fails because Petitioner does not explain how or why a POSITA would have combined Swenson's alleged showing of claim element 1e with the aspects of Mims on which Petitioner relies for other claim 1 elements, such as claim elements 1a and 1d, to meet the subject matter of claim 1. *See* Pet. at 43; *Unigene Labs*, 655 F.3d at 1360 ("Obviousness requires more than a mere showing that the prior art includes separate references covering each separate limitation in a claim under examination. Rather, obviousness requires the additional showing that a person of ordinary skill at the time of the invention would have selected and combined those prior art elements in the normal course of research and development to yield the claimed invention." (citations omitted)). And Petitioner's "Overview of Swenson" section on Petition pages 41 and 42 does not cure this deficiency for at least the same reasons as those given above in Section III.A.1.

Finally, Petitioner states:

Kruger also teaches that "cold water is forced into the fracture zone through the deeper well," and that "[p]umping is discontinued when natural convection in the cycle is achieved." [Kruger] at 11-12. A POSITA would understand that this discloses generating a water density difference and a pressure difference between an injection well and a production well in the context of geothermal energy extraction. [Schaaf] at ¶323.

Pet. at 79-80. First, Petitioner has failed to "identify, with particularity, evidence sufficient to establish a reasonable likelihood that [Kruger] was publicly accessible

before the critical date of the challenged patent and therefore that there is a reasonable likelihood that it qualifies as a printed publication.” *Hulu*, IPR2018-01039, Paper 29 at 13. Petitioner does not assert where or how Kruger was published, or why it was “disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art[,] exercising reasonable diligence, [could] locate it.” *SRI Int’l*, 511 F.3d at 1194. Thus, Petitioner has failed to meet its burden of showing there is a reasonable likelihood that Kruger qualifies as a printed publication.

Second, Schaaf’s paragraph 323 states the second quoted sentence above, verbatim, without explaining what about the quoted Kruger language would lead a POSITA to have understood such language discloses generating a water density difference and a pressure difference between an injection well and a production well in the context of geothermal energy extraction. Such conclusory testimony deserves little weight. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

Third, neither Petitioner nor Schaaf tie Kruger’s disclosure to the balance of the Mims disclosures on which Petitioner relies for meeting other claim elements, such as claim elements 1c-1 to 1c-3. *See Pet.* at 79-80, 77, 78; Schaaf at ¶323. In other words, Petitioner fails to explain how or why a POSITA would have modified Mims in view of Kruger. Instead, Petitioner pivots to its discussion of claim element

1e from Ground 1 “for a POSITA’s general knowledge.” *See* Pet. at 80. But that discussion fails to help Petitioner for the same reasons given above in the last paragraph of Section II.A.4.

Fourth, and moreover, Petitioner’s claim element 1e approach fails for a lack of adequate particularity under Section 312(a)(3) and/or because it is not the Board’s job to piece together a coherent ground from Petitioner’s disparate reference citations. *See Trend Micro, Inc. v. Open Text Inc.*, IPR2023-00692, Paper 8 at 27 (PTAB Nov. 6, 2023) (“[W]e agree that the Board tends to reject a ‘pick-and-choose’ approach to the presentation of evidence, which is ‘challenging to follow and makes it difficult to piece together in order to understand Petitioner’s proposed combination or modification.’”); *cf. Microsoft Corp. v. FG SRC, LLC*, 860 F. App’x 708, 713 (Fed. Cir. 2021) (non-precedential) (“It is not the Board’s job to cobble together assertions from different sections of a petition or citations of various exhibits in order to infer every possible permutation of a petitioner’s arguments. Arguments in a petition must be made with particularity, not opacity.”).

4. Petitioner fails to show that claim element 1f is met

Claim element 1f recites “inducing geothermal fluid into” the second production well from the geological layer because of buoyancy of the water and the pressure difference between the first injection well and the second production well.

Petitioner states that “[e]lement 1f is obvious to a POSITA in view of Mims as set forth in Ground 4, Section VIII.D, which is incorporated herein.” Pet. at 80. This assertion fails for the same reasons set forth above in Section V.A.3.

Petitioner then asserts that “Swenson discloses ‘outlet flow’ through the production well maintained with ‘a small driving pressure difference.’ [Swenson] at 2556. Further, as ‘fluid circulates ... it removes the heat from the rock’ [Swenson] at 2553.” Pet. at 80. But Petitioner has not sufficiently established that Swenson is a printed publication, as explained above in Section III. Regardless, Petitioner made the verbatim assertion on Petition page 40, and that assertion fails for the same respective reasons given above in Section III.A.5. In particular, neither Petitioner nor its expert explain how Swenson’s statement that “[b]oth GEOCRACK and actual Fenton Hill data shows that the level of outflow can be maintained even with a smaller driving pressure difference across the reservoir (Duteau and Brown, 1993)” meets the “[i]nducing geothermal fluid into said second horizontal geothermal well from the geological layer because of buoyancy of the water and the pressure difference between the horizontal injection and horizontal production wells,” as required to meet claim element 1f, at least because the GEOCRACK data is not actual data and the Fenton Hill data is not tied by Petitioner to any wells meeting claim 1’s horizontal injection and production wells. *See* Pet. at 44, 80.

Petitioner points to Swenson’s description of the creation and operation of a non-specific HDR system (*see* Pet. at 44 (citing and quoting from Swenson at 2553, first paragraph beneath “1. INTRODUCTION”)), but, again, Petitioner never relies on any particular aspect of that Swenson paragraph as satisfying the predicate wells that claim element 1f concerns: the “first, horizontal, geothermal well in the ground at a geological layer having an elevated temperature, which is used as said injection well” of claim element 1a and the “second, horizontal, geothermal well in the ground, which is used as said production well” of claim element 1c-1 (*see* Pet. at 76-77 (relying incongruently on Mims and Kruger for claim element 1a and on Mims for claim element 1c-1)). Nor does Petitioner explain how or why a POSITA would have modified Mims in view of Swenson. *See Unigene Labs*, 655 F.3d at 1360.

Next, Petitioner states that “[a]s discussed in Ground 1, Element 1f, the buoyancy and pressure difference are obvious and well understood features of geothermal circulation systems. [Schaaf] at ¶326.” Pet. at 80. But those referenced expert-sponsored assertions on pages 29 and 30 of the Petition cite no objective evidence and thus are entitled to little weight. *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

Finally, Petitioner cites to a discussion in Kruger of what the “[p]reliminary results” of a “two-dimensional, quasi-steady state, finite-difference numerical model [that] is being developed” suggest. *See* Pet. at 80; Kruger at 20. But Petitioner has

not sufficiently established that Kruger is a printed publication, as explained above in Section VI.A.3. Regardless, Petitioner and its expert (through verbatim language) assert that the foregoing suggestion's reference to "buoyant circulation of pressurized water" "discloses the concept of utilizing buoyancy and pressure difference to drive fluid movement within a geothermal system." Pet. at 80-81; Schaaf at ¶327. Petitioner then concludes that "[a] POSITA would understand these disclosures describe the extraction of geothermal energy using buoyant circulation of pressurized water, as described in element 1f. [Schaaf] at ¶328." Pet. at 81. But neither Petitioner nor its expert have relied on Kruger for all the other elements of claim 1. See Pet. at 76-80. And Petitioner fails to explain how or why a POSITA would have modified Mims in view of Kruger. See *Unigene Labs*, 655 F.3d at 1360.

Moreover, Petitioner's claim 1f analysis fails for a lack of adequate particularity under Section 312(a)(3) and/or because it is not the Board's job to piece together a coherent ground from Petitioner's disparate reference citations. See *Trend Micro*, IPR2023-00692, Paper 8 at 27; cf. *Microsoft Corp. v. FG SRC, LLC*, 860 F. App'x at 713; see also *Baker Hughes Oilfield Operations, LLC v. Hirshfeld*, Appeal No. 2020-1032, Slip Op. at 5-7 (Fed. Cir. Sep. 16, 2021) (non-precedential) (finding an APA violation where the Board at the final written decision stage untangled the petitioner's muddled Ground 3 after stating at institution that it would not do so and

that it was only instituting on that ground to comply with *SAS Inst., Inc. v. Iancu*, S. Ct. 1348, 1359-60 (2018)).

B. Claim 9

Petitioner asserts that all the elements of claim 9 “are obvious to a POSITA in view of Mims. Accordingly, those arguments from Ground 4 are incorporated herein.” Pet. at 81. Petitioner’s Ground 5 positions for claim 9 therefore fail for the same reasons set forth above in Sections V.B.1 (claim element 9b), V.B.2 (claim element 9c), and V.B.3 (claim element 9d).

C. Claim 34

Petitioner asserts that all the elements of claim 34 “are obvious to a POSITA in view of Mims. Accordingly, those arguments from Ground 4 are incorporated herein.” Pet. at 81. Petitioner’s Ground 5 positions for claim 34 therefore fail for the same reasons set forth above in Sections V.C.1 (claim element 34-III), V.C.2 (claim element 34-V), and V.C.3 (claim element 34-VI).

VII. PETITIONER’S GROUND 6 SHARES THE DEFICIENCIES OF GROUND 4

A. Claim 1

Petitioner asserts that “Mims teaches” claim 1 “as discussed in Ground 4. Accordingly, those arguments are incorporated herein.” Pet. at 83. Petitioner’s Ground 6 positions for claim 1 therefore fail for the same reasons set forth above in

Sections V.A.1 (claim elements 1c1 and 1c-2), V.A.2 (claim element 1e), and V.A.3 (claim element 1f).

B. Claim 9

Petitioner asserts that “Mims teaches” claim 9 “as discussed in Ground 4. Accordingly, those arguments are incorporated herein.” Pet. at 83. Petitioner’s Ground 6 positions for claim 9 therefore fail for the same reasons set forth above in Sections V.B.1 (claim element 9b), V.B.2 (claim element 9c), and V.B.3 (claim element 9d).

C. Claim 34

Petitioner asserts that “Mims teaches” claim 34 “as discussed in Ground 4. Accordingly, those arguments are incorporated herein.” Pet. at 83. Petitioner’s Ground 6 positions for claim 34 therefore fail for the same reasons set forth above in Sections V.C.1 (claim element 34-III), V.C.2 (claim element 34-V), and V.C.3 (claim element 34-VI).

VIII. PETITIONER’S GROUND 7 FAILS FOR SEVERAL REASONS

A. Claim 1

1. Petitioner fails to show claim elements 1d, 1e, and 1f are met

Petitioner asserts that claim elements 1d, 1e, and 1f “are obvious over Rinaldi in view of Swenson. *See* Ground 1 [sic, 2], Claim 1, Section VIII.B. Accordingly, those arguments are incorporated as if set forth herein.” Pet. at 85. These assertions

fail for the same reasons set above, with respect to Ground 2, in Sections III (Petitioner failed to show that Swenson is a printed publication), III.A.3 (claim element 1d), III.A.4 (claim element 1e), and III.A.5 (claim element 1f).

2. Petitioner fails to show claim elements 1c-2 and 1c-3 are met

Petitioner asserts that claims elements 1c-2 and 1c-3 “are obvious over Rinaldi in view of Swenson. *See* Elements 1c-[2 and 1c-3], Sections VIII.A and VIII.B.” Pet. at 85. This assertion fails for lacking the particularity required by Section 312(a)(3). *See* 35 U.S.C. § 312(a)(3); *Hewlett Packard*, IPR2022-00115, Paper 9 at 17; *Nuance Comms.*, IPR2019-00794, Paper 7 at 26-30. Petitioner’s “Section VIII.A” (i.e., Ground 1) analyses of claim elements 1c-2 and 1c-3 does not include an assertion that these elements are obvious over Rinaldi in view of Swenson. *See* Pet. at 22-25. To the extent considered, these Ground 1 analyses fail here for the reasons given above in Section II.A.1 (claim element 1c-2) and II.A.2 (claim element 1c-3). Petitioner’s “Section VIII.B” (i.e., Ground 2) analysis of claim element 1c-3 also does not include an assertion that this element is obvious over Rinaldi in view of Swenson. *See* Pet. at 43. To the extent Petitioner’s “Section VIII.B” (i.e., Ground 2) analyses of claim elements 1c-2 and 1c-3 are considered here, they fail for the same reasons set above in Sections III (Petitioner failed to show that Swenson is a printed publication), III.A.1 (claim element 1c-2) and III.A.2 (claim element 1c-3).

Next, Petitioner states “Alkhasov [(Ex. 1012)] further teaches that the production well is spaced from the injection well by a distance dependent on the elevated temperature. [Schaaf] at ¶360.” Pet. at 85. That assertion fails, however, for several reasons.

First, Petitioner has failed to “identify, with particularity, evidence sufficient to establish a reasonable likelihood that [Alkhasov] was publicly accessible before the critical date of the challenged patent and therefore that there is a reasonable likelihood that it qualifies as a printed publication.” *Hulu*, IPR2018-01039, Paper 29 at 13. Petitioner does not assert where or how Alkhasov was published, or why it was “disseminated or otherwise made available to the extent that persons interested and ordinarily skilled in the subject matter or art[,] exercising reasonable diligence, [could] locate it.” *SRI Int’l*, 511 F.3d at 1194. Thus, Petitioner has failed to meet its burden of showing there is a reasonable likelihood that Alkhasov qualifies as a printed publication.

Second, Petitioner’s assertion that “Alkhasov further teaches that the production well is spaced from the injection well by a distance dependent on the elevated temperature” fails because it does not address the relevant aspects of claim element 1c-2 that Petitioner has failed to show that “Rinaldi in view of Swenson” discloses: i.e., that the claimed second horizontal production well is provided **after** a first horizontal injection well is provided and (regardless of the order provided)

that the second horizontal production well is provided so that it is **vertically spaced from the first horizontal injection well by a distance dependent on the elevated temperature of the geological layer at the first horizontal injection well**. None of Petitioner's (or its expert's verbatim) remaining three, Alkhasov-related assertions on Petition pages 85 and 86 cures this deficiency. Moreover, Alkhasov indicates that, of the "three (1,2,3) technological schemes of GSC [geothermal circulating system – Akhasov at 1] construction," the wells in the scheme involving "3- one production horizontal and one injection horizontal wells" (Alkhasov at 2) had the same depth (i.e., were not vertically spaced from each other): 4850 meters (Alkhasov at 3, Table 1, first row). *See also* Alkhasov at 2, Fig. 1 (showing "[t]echnological scheme of GPP [geothermal electric power plants – Akhasov at 1] with horizontal wells" and illustrating the horizontal legs in the same plane (i.e., not vertically spaced from each other).

Third, those remaining three assertions by Petitioner and its expert (in verbatim fashion) were improperly unsupported by a tie to Alkhasov's actual disclosure (i.e., Schaaf's ¶361 statement that "[Alkhasov] also instructs on various geothermal pressure and temperature differentials that determine the placement and length of the wells" is not based on a citation to or discussion of any aspect of Alkhasov) or any objective evidence about why a POSITA would have recognized

what Petitioner/Schaaf allege (i.e., Schaaf's ¶362 statements). *See Xerox Corp.*, IPR2022-00624, Paper 9 at 15-16; 37 C.F.R. § 42.65(a).

Finally, Petitioner's Alkhasov statements fail because Petitioner does not explain how or why a POSITA would have modified Rinaldi and/or Swenson in view of Alkhasov, including to arrive at the subject matter of claim element 1c-2. *See Unigene Labs*, 655 F.3d at 1360. It is not the Board's job to do Petitioner's work. *See Trend Micro*, IPR2023-00692, Paper 8 at 27; *cf. Microsoft Corp. v. FG SRC, LLC*, 860 F. App'x at 713; *see also Baker Hughes Oilfield Operations*, Appeal No. 2020-1032, Slip Op. at 5-7.

B. Claim 9

Petitioner asserts that "Rinaldi in view of Swenson" teaches claim 9 "as discussed in Ground 2. Accordingly, those arguments are incorporated" herein. Pet. at 86. Petitioner's Ground 7 positions for claim 9 therefore fail for the same reasons set forth above in Sections III (Petitioner failed to show that Swenson is a printed publication), III.B.1 (claim element 9b), III.B.2 (claim element 9c), and III.B.3 (claim element 9d).

C. Claim 34

Petitioner asserts that "Rinaldi in view of Swenson" teaches claim 34 "as discussed in Ground 2. Accordingly, those arguments are incorporated" herein. Pet. at 86. Petitioner's Ground 7 positions for claim 34 therefore fail for the same reasons

set forth above in Sections III (Petitioner failed to show that Swenson is a printed publication), III.C.1 (claim element 34-III), III.C.2 (claim element 34-IV), III.C.3 (claim element 34-V), and III.C.4 (claim element 34-VI).

IX. CONCLUSION

Institution of the Petition should be denied.

Dated: June 27, 2024

/Mark T. Garrett/
Mark T. Garrett

CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. § 42.24, the undersigned certifies that this Paper—excluding its sections that do not contribute to the word count—includes 13,315 words.

/Mark T. Garrett/

Mark T. Garrett (Reg. No. 44,699)

Case IPR2024-00665

Patent 7,320,221 B2

CERTIFICATE OF SERVICE

Pursuant to 37 C.F.R. § 42.6(e), the undersigned certifies that on June 27, 2024, a complete copy of this Patent Owner Preliminary Response was served on Lead Counsel and Back-Up Counsel for Petitioner via email (by agreement) to:

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