UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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PROFRAC HOLDING CORPORATION
and
U.S. WELL SERVICES, LLC,
Petitioners,

v.

HALLIBURTON ENERGY SERVICES, INC.,
Patent Owner.

_____

Case PGR2023-00023
Patent No. 11,373,058

_____

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PATENT OWNER'S PRELIMINARY RESPONSE

UNDER 37 C.F.R. § 42.207

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2002	U.S. District Courts – Federal Court Management Statistics (March 31, 2023) (W.D. Texas), *available at* https://www.uscourts.gov/sites/default/files/data_tables/fcms_na_distprofile0331.2023.pdf
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2004	Dkt. 64, Order Setting *Markman* Hearing, *Halliburton Energy Servs., Inc. v. U.S. Well Servs., LLC*, No. 6:22-cv-00906-ADA-DTG (W.D. Tex. Mar. 27, 2023)
2005	Defendants' Preliminary Invalidity Contentions, *Halliburton Energy Servs., Inc. v. U.S. Well Servs., LLC*, No. 6:22-cv-00906-ADA-DTG (W.D. Tex. Jan. 17, 2023)
2006	2019 Revised Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019)
2007	USPTO, *October 2019 Update: Subject Matter Eligibility* (Oct. 17, 2019), published at https://www.uspto.gov/sites/default/files/documents/peg_oct_2019_update.pdf
2008	USPTO, *Appendix 1 to the October 2019 Update: Subject Matter Eligibility Life Sciences & Data Processing Examples* (Oct. 17, 2019), available at https://www.uspto.gov/sites/default/files/documents/peg_oct_2019_app1.pdf

2009	Website Printout from the Internet Archive – *Hydraulic fracturing*, SCHLUMBERGER OILFIELD GLOSSARY (Jul. 11, 2018), https://web.archive.org/web/20180711054502/http:/www.glossary.oilfield.slb.com/Terms/h/hydraulic_fracturing.aspx
2010	Website Printout from the Internet Archive – *Stimulation*, SCHLUMBERGER OILFIELD GLOSSARY (Jul. 9, 2018), https://web.archive.org/web/20180703103747/http:/glossary.oilfield.slb.com/en/Terms/s/stimulation.aspx
2011	Excerpts (pdf) of *Sequence*, NEW OXFORD AMERICAN DICTIONARY (3d ed. 2010).
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I. INTRODUCTION

The Board should exercise its discretion to deny institution of post-grant review of U.S. Patent No. 11,373,058 (the "'058 Patent") under *Fintiv*. Patent Owner has asserted the '058 Patent, as well as six other patents, against Petitioners in *Halliburton Energy Servs., Inc. v. U.S. Well Servs., LLC*, No. 6:22-cv-00906-ADA-DTG (W.D. Tex.) (complaint filed Sept. 1, 2022). The Petition challenges all of the claims asserted in the district court litigation, and Petitioners have asserted § 101 grounds and the *Pankaj* reference for invalidity in the district court litigation. Thus, there is extensive overlap between the issues and parties involved in this PGR proceeding and the district court litigation. Moreover, the trial in the district court proceeding is set to occur June 24, 2024—several months ***before*** the Board's final written decision would be due. There is no evidence that the parallel district court proceeding will be stayed pending post-grant review. As such, instituting this PGR would duplicate the efforts of the Board, the District Court, and the parties, and create the potential for inconsistent results. The Board should therefore exercise its discretion to deny institution in view of the parallel district court litigation.

Additionally, the Board should deny institution of the '058 Patent because Petitioners have not shown a reasonable likelihood that they will prevail. First, Petitioners have not shown how claims 1–20 are invalid under § 101 and the *Alice* two-step framework, because they have not shown how the Challenged Claims are

directed to invalid subject matter. The Petition's identification of an alleged abstract idea is overbroad and ignores the claim language of the'058 Patent. And the claims of the '058 Patent are directed to an improved method for controlling electrical fracturing equipment for fracturing a well—hardly the "mental processes" Petitioners claim. Second, Petitioners have not shown that the Challenged Claims are obvious, because they have failed to establish that all claim limitations are present in the cited art. The Petition fails to show that the cited references disclose or render obvious multiple limitations of the '058 Patent. For at least these reasons, and as further described below, Patent Owner respectfully requests that the Board deny institution of the Petition.

II. THE BOARD SHOULD EXERCISE ITS DISCRETION TO DENY THE PETITION

A. Discretionary Denial Under the *Fintiv* Factors Is Appropriate

This is a case where *Fintiv* requires denial even under the Director's updated guidance. *See* Ex. 2001. In particular, there is a co-pending related district court litigation involving the same '058 Patent and the same parties—*Halliburton Energy Servs., Inc. v. U.S. Well Servs., LLC*, No. 6:22-cv-00906-ADA-DTG (W.D. Tex.)—that is set for trial in less than one year, on June 24, 2024. *See infra* Section II.B.2. Petitioners waited until the eve of the statutory deadline to file the Petition, and by the time of the Institution Decision, several milestones will have occurred in the

district court case, including the *Markman* Hearing, four months of fact discovery, and Final Infringement and Invalidity Contentions.

Moreover, the Petition fails to establish a "compelling unpatentability challenge." *See* Ex. 2001, 4–5. As discussed below, Petitioners' challenge to the '058 Patent on § 101 grounds fails to show how the '058 Patent covers unpatentable subject matter. *See infra* Section III.E. Additionally, for its prior art grounds the Petition primarily focuses on the *Pankaj* reference but fails to establish the obviousness of several claim limitations. *See infra* Section III.F.

No *Sotera* stipulation could undo the duplication of efforts and eliminate the unfairness of providing Petitioners with two bites at the invalidity apple, because Petitioners' parallel litigation invalidity contentions assert § 101 grounds and rely on the *Pankaj* reference.

Finally, Petitioners made no attempt to analyze the *Fintiv* factors in their Petition, choosing instead to rely only on the median time to trial in the parallel district court. The parallel litigation, however, is set to go to trial in June 2024, well before the median time to trial for the Western District of Texas. As further explained below, Petitioners fail to show why the Board should not exercise its discretion to deny institution here.

B. All of the *Fintiv* Factors Weigh Against Institution

The Board exercises its discretion in view of the purposes of AIA trial proceedings, which were "to establish a more efficient and streamlined patent system that will improve patent quality and limit unnecessary and counterproductive litigation costs." H.R. Rep. No. 112-98, pt. 1, at 40 (2011), 2011 U.S.C.C.A.N. 67, 69. The Board routinely denies Petitions where a trial challenging the validity of the claims of the same challenged patent will already have occurred before the Board could reach its final written decisions, because instituting in such situations "would not be consistent with 'an objective of the AIA . . . to provide an effective and efficient alternative to district court litigations.'" *NHK Spring Co. v. Intri-Plex Techs., Inc.*, IPR2018-00752, Paper 8 at 20 (P.T.A.B. Sept. 12, 2018) (precedential).

In view of the above, the Board evaluates the six factors discussed below to decide whether parallel proceedings justify denying institution. *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 11 at 5–6 (P.T.A.B. Mar. 20, 2020) (precedential). An analysis of the *Fintiv* factors considering the Director's updated guidance shows that the Board should exercise its discretion to deny institution.

1. Factor 1: Whether the court granted a stay or evidence exists that one may be granted if a proceeding is instituted

No stay has been requested in the district court litigation related to this proceeding, nor is one likely to be granted given the proximity of the trial date, which is currently set to begin on June 24, 2024. *See infra* Section II.B.2 (Factor 2).

2. Factor 2: Proximity of the court's trial date to the Board's projected statutory deadline for a final written decision

The Board's final written decision is projected to be issued by November 2024. The parallel district court case was filed on September 1, 2022. Under the Interim Procedures, "[p]arties may present evidence regarding the most recent statistics on median time-to-trial for civil actions in the district court in which the parallel litigation resides" for the Board's consideration. Ex. 2001, 8–9. In this case, the most recent statistics for the twelve-month period ending March 31, 2023, indicate that the Western District of Texas's median time-to-trial for civil cases is 28.2 months. Ex. 2002. This would place a trial around January 2025 if the trial were to occur according to the median timeline.

The district court, however, has already set a trial date for this case for summer of 2024. The trial is set to begin on June 24, 2024. The Board's final written decision would not be due for several months after the completion of the trial.

Because trial is set to begin before the Board's final written decision is due, instituting a Proceeding in this forum would be a waste of time and resources, unfair to the Patent Owner, and would be inconsistent with the objectives of the AIA, as noted above. At trial, Petitioners will have a full and fair opportunity to make their invalidity arguments on the merits. At trial, Petitioners will either be successful or fail in invalidating the '058 Patent. If Petitioners succeed, then the patent will be invalidated and PGR proceedings would be a wasteful, irrelevant exercise; Patent

Owner can appeal directly from the district court litigation on the invalidity issue. If Petitioners fail to prove invalidity, then they should not get a second bite at the invalidity apple before the Board. Indeed, permitting such a duplicative proceeding would put the Board in the position of potentially impeaching the jury verdict. The Board's discretionary power to deny institution allows it to avoid this potentially problematic outcome.

Accordingly, this factor weighs against institution.

3. Factor 3: Investment in the parallel proceeding by the court and the parties

The district court proceeding is very advanced given the pending trial date in June 2024. As a result, both the court and the parties have already invested significant resources in the parallel proceeding. Claim Construction briefing is complete, and the court held its *Markman* Hearing on July 26, 2023. Ex. 2003, Ex. 2004. The parties have submitted technical tutorials, served infringement and invalidity contentions, served third-party subpoenas, and served interrogatories.

The reason the district court litigation is so advanced is because Petitioners unreasonably delayed in filing this Petition. Petitioners waited until March 28, 2023—the very last day before the expiration of the nine-month bar—to file. "[U]nder certain circumstances, considerations of the state of a parallel proceeding may require petitioners to act more quickly than the maximum amount of time permitted by Congress." *Apple Inc. v. Fintiv, Inc.*, IPR2020-00019, Paper 15 at 11

(P.T.A.B. May 13, 2020) (informative). Here, Petitioners have been aware of the primary prior-art reference on which they rely in the Petition for several months before filing the present Petition. Petitioners served their preliminary invalidity contentions in the district court proceeding on January 17, 2023. These preliminary invalidity contentions identified *Pankaj*—the primary reference on which Petitioners rely for challenging all claims of the '058 Patent. *See* Ex. 2005, 10 (Defendants' Preliminary Invalidity Contentions). Petitioners provide no explanation for waiting until the statutory bar date to file this Petition when they knew about the references much earlier.

4. Factor 4: Overlap between issues raised in the petition and in the parallel proceeding

This factor weighs against institution. Petitioners raise similar arguments in the Petition and in the parallel proceedings; that is Petitioners rely upon *Pankaj* in the Petition and in the parallel proceeding. *Compare* Pet. i–ii, *with* Ex. 2005, 8 & 10. Moreover, Petitioners have not entered any stipulation consistent with *Sotera Wireless, Inc. v. Masimo Corp.*, IPR2020-01019, Paper 12 (P.T.A.B. Dec. 1, 2020), that if the Board institutes, Petitioners will not pursue in the parallel proceeding the same invalidity grounds as those asserted in the Petition or grounds that could have been reasonably raised in the Petition.

5. Factor 5: Whether the petitioner and the defendant in the parallel proceeding are the same party

The Petitioners and the defendant in the parallel proceeding are the same parties. This factor weighs against institution, because delivering a final written decision several months after the district court's trial would directly implicate the duplication and unfairness in permitting the same parties to serially challenge the validity of the same patent that the exercise of discretion embodied by the *Fintiv* factors is meant to prevent.

6. Factor 6: Other circumstances that impact the Board's exercise of discretion, including the merits

The Petition's weaknesses merit discretionary denial. The Interim Procedures provide that the Board will not discretionarily deny institution where the Petition has "compelling merits" or contains "evidence, if unrebutted in trial, would plainly lead to a conclusion that one or more claims are unpatentable by a preponderance of the evidence." Ex. 2001, 3–4. However, that is not the case here, where Petitioners cannot show even a reasonable likelihood of prevailing.

The arguments presented below in Section III demonstrate the flaws of Petitioners' proposed Grounds 1–5. For instance, Petitioners fail to show how the claims are invalid under 35 U.S.C. § 101 or how the *Pankaj* reference discloses multiple claim elements of the '058 Patent. Such weaknesses preclude a finding that the Petition "presents a compelling unpatentability challenge."

7. A holistic view of *Fintiv* factors weighs against institution

In evaluating the relevant factors, "the Board takes a holistic view of whether efficiency and integrity of the system are best served by denying or instituting review." *Fintiv*, Paper 11 at 6. Given the close proximity of the trial date, the considerable resources already invested by the parties in the parallel litigation, and the opportunity Petitioners have had to use Patent Owner's positions and discovery in the co-pending litigation to develop arguments in their Petition, the *Fintiv* factors weigh against institution. Petitioners have not exhibited diligence in filing this Petition, waiting until the final day before expiration of the nine-month bar to file their Petition. Thus, a holistic view of the *Fintiv* factors weighs against institution.

III. PETITIONERS HAVE NOT SHOWN A REASONABLE LIKELIHOOD OF PREVAILING

A. Overview of U.S. Patent No. 11,373,058

1. The '058 Patent

The '058 Patent, entitled "System and Method for Treatment Optimization," was issued by the USPTO on June 28, 2022. As the title suggests, the '058 Patent discloses "techniques for optimizing well treatments using representative system models selected according to formation responses to stimuli indicated by sensor data." Ex. 1001, 2:12–15. The patent explains that a representative system model may be used to, for example, determine pump settings of an electric fracturing pump. *Id.* at 1:19–23. One problem with prior approaches to using representative system

models during well treatment, however, is that "the representative system model may be a static construct and may not accurately reflect the well to which it has been drilled." *Id.* at 1:23–26. The techniques described and claimed in the '058 Patent address this problem by generating a sequence of stimuli for application to a well environment in order to produce a response from the formation. *Id.* at 7:12–22. Sensor data in response to the generated sequence of stimuli can then be received from sensors deployed throughout the well (*e.g.*, surface sensors, downhole sensors, wireline sensors, etc.). *Id.* The stimuli and response combination "can be mapped to respective system models maintained in an accessible data store." *Id*. at 3:44–49. The representative system model is then used to "control fracturing operations," such as the settings on an electric fracturing pump. *Id.* at 4:8–12, 8:45–49.

Figure 1B, reproduced below, illustrates a "diagrammatic view of a surface electric frac pump and environment," according to various embodiments. *Id.* at 1:46–48. Figure 1B depicts a "wellbore 155" that "extends from the surface 160 of the earth through the formation 165 formed by a drilling device from a previous drilling operation[.]" *Id.* at 5:37–42. "A plurality of sensors 162 may be provided along the length of the wellbore to detect temperature, pressure, strain, vibration, or flow rate." *Id.* at 5:46–48. Pump equipment 172 (*i.e.*, electrical pumps) are used to pump a treatment fluid (*i.e.*, a combination of a carrier fluid and a proppant) through

a line 192 into the entrance 185 of the wellbore 155 via fracturing tree 194. *See id.* at 5:52–66.

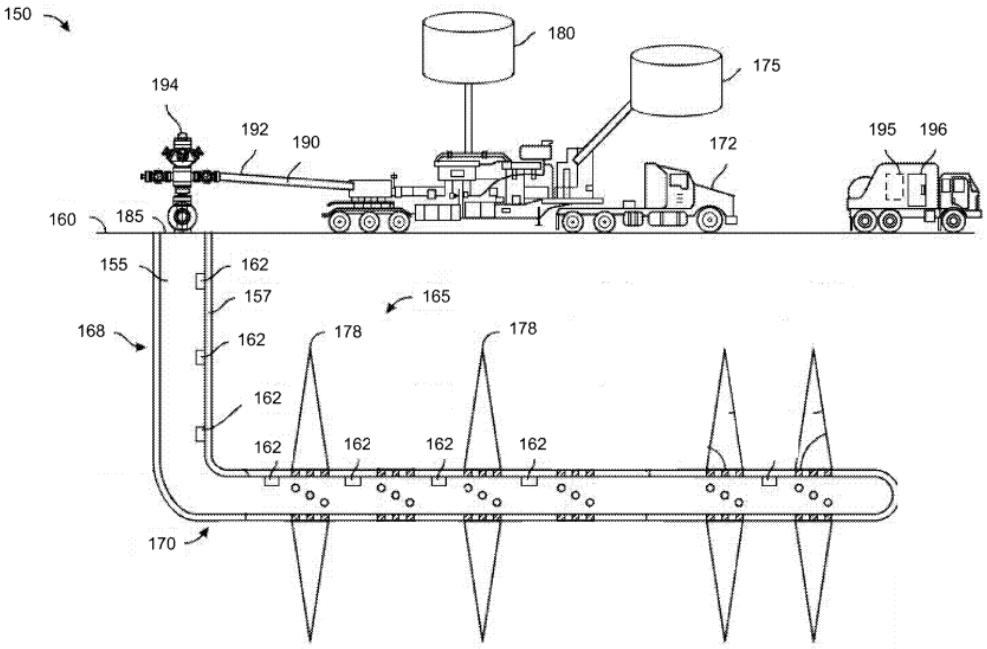

FIG. 1B

Ex. 1001, Fig. 1B.

Figure 3 illustrates "a block diagram of an operating environment 300 in which a treatment optimization system 302 may be deployed." *Id.* at 7:1–3. The treatment optimization system 302 is communicatively coupled to a model store 304, an electric frac pump system 306, and well sensors 310 in well environment 308. *Id.* at 7:15–17. Treatment optimization system 302 sends commands to electric frac pump system 306 (*e.g.*, to adjust settings such as pressure levels, flow rates, composition and/or presence of proppant, diverter, or other chemicals within a

pumped fluid) and receives sensor data from values from sensors 310. *Id.* at 7:22–34.

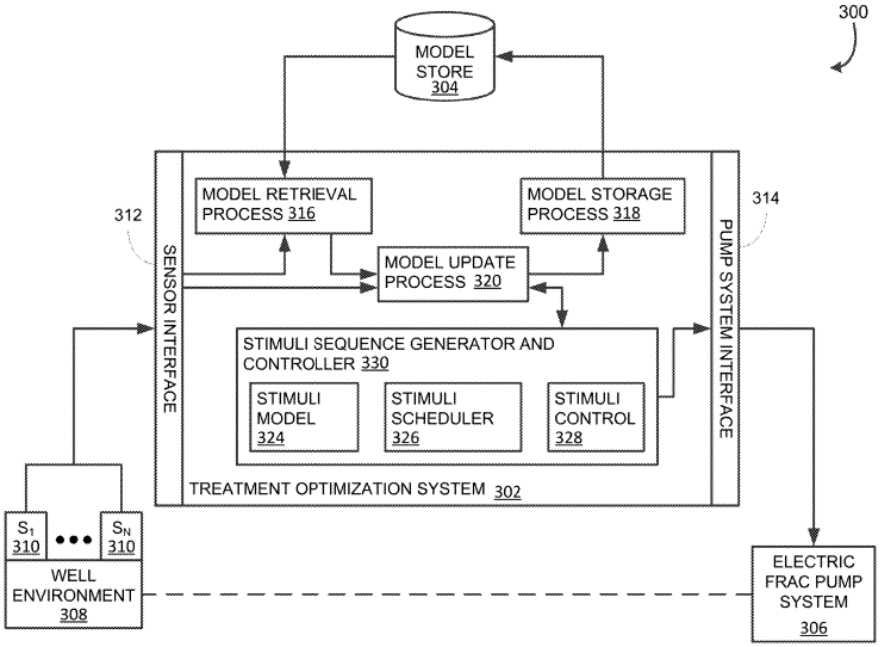

FIG. 3

Ex. 1001, Fig. 3. The system includes a stimuli sequence generator and controller that generates "a sequence of stimuli which are provided as commands to electric frac pump system 306" that is used to "produce a response, and resulting sensor data from sensors 310, from well environment 308." *Id.* at 7:52–57. A model retrieval process 316 retrieves a system model based on the response information from well environment 308 as a result of stimuli sequence generator and controller 330. *Id.* at 7:58–61.

Figure 4 "is a flowchart of a method 400 for selecting and executing a representative system model" that may be performed by treatment optimization

system 302. *Id.* at 8:22–25. In step 402, "a sequence of stimuli, such as a treatment cycle or the like, is applied to a well environment tooled with one or more sensors." *Id.* at 8:26–28. "At step 404, sensor data is received from the well environment sensors in response to the sequence of stimuli." *Id.* at 8:29–30.

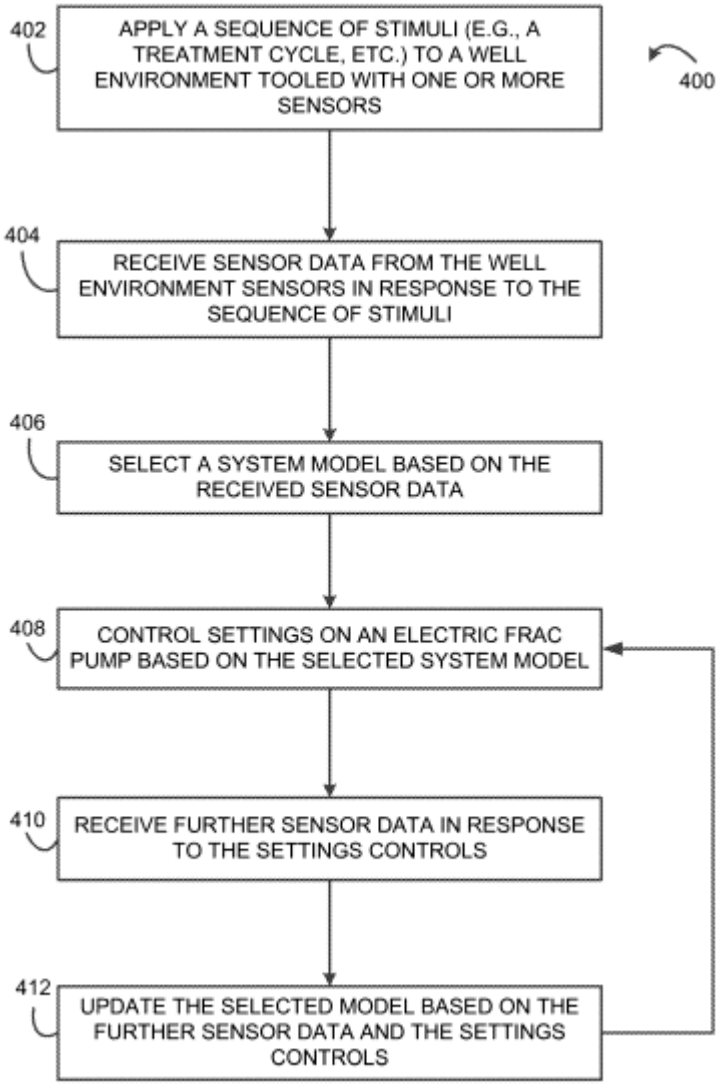

FIG. 4

Ex. 1001, Fig. 4. "At step 406, a representative system model is selected based on the received sensor data." *Id.* at 8:37–39. Then, "[a]t step 408, setting on an electric

frac pump are controlled based on the selected representative system model." *Id.* at 8:45–46. The settings may include, for example, pressure, flow rate, chemical (*e.g.*, proppant, diverter, etc.) composition of a pumped fluid. *Id.* at 8:47–49. In some embodiments, at step 410 further sensor data is received in response to the setting controls and at step 412, the selected model can be updated based on the further sensor data and the sensor controls. *Id.* at 8:49–52.

The techniques for optimizing well treatments described and claimed in the '058 Patent, which select a representative system model based on the sequence of stimuli and formation response data, advantageously provide for selection of a representative system model that more accurately reflects the well to which it has been deployed.

2. Prosecution History of the '058 Patent

The application leading to the '058 Patent claims earliest priority to U.S. Patent Application No. 16/573,448 filed on September 17, 2019. After a thorough prior art search (*see* Ex. 1002, 33–34, 44–63), the Examiner allowed the claims because:

> The cited references do not disclose generating a sequence of stimuli for application to a well environment, the sequence of stimuli comprising one or more of particulate concentrations, chemical concentrations, or a pump rate

control, selecting a representative system model based on the received formation response data from downhole or surface sensors and sequence of stimuli, and controlling an electric fracturing pump based on the representative system model.

Ex. 1002, 24. Thereafter, the'058 Patent issued on June 28, 2022. Ex. 1001 at Cover.

B. Level of Ordinary Skill in the Art

The Petition alleges that a person of ordinary skill in the art ("POSITA") would have had a B.S. in Chemical Engineering, Mechanical Engineering, Materials Science, or Metallurgical Engineering or an equivalent field and at least two years of academic or industry experience in the oil and gas industry, including experience with process control systems. Pet. 23–24. Additionally, the Petition alleges that "a person with additional education but less professional experience, and vice-versa, may qualify." *Id.* For purposes of the Preliminary Response only, Patent Owner applies Petitioners' definition of a POSITA.

C. Claim Construction

The Challenged Claims of the '058 Patent are construed herein "using the same claim construction standard that would be used to construe the claim in a civil action under 35 U.S.C. § 282(b)." 37 C.F.R. § 42.200(b). Petitioners "do not believe

claim construction" is required for the '058 Patent, and proposed construing all claim terms according to their "common and ordinary meaning." Pet. 25. Patent Owner does not dispute Petitioners' constructions and applies plain and ordinary meaning for the purposes of this Preliminary Response. Patent Owner reserves all rights to later dispute Petitioners' constructions of any terms in this proceeding.

D. Overview of the Cited Art

1. Pankaj

U.S. Patent Application Publication No. 2018/0230782 by Pankaj *et al.* (Ex. 1005) was a patent application assigned to Schlumberger Technology Corporation entitled "Method of Performing Integrated Fracture and Reservoir Operations for Multiple Wellbores at a Wellsite." Ex. 1005. This patent application issued as U.S. Patent No. 10,787,887 to Pankaj *et al.* with the same title and same assignee. The *Pankaj* application was filed on February 7, 2018, and published on August 16, 2018. *Pankaj* describes methods for performing fracture or stimulation operations and production operations at a wellsite having multiple wellbores. The wellsite operations methods apply to multiple wellbores through a natural fracture network and include generating a hydraulic fracture network grid based on wellsite data, generating reservoir parameters with an updated mechanical earth model, generating wellsite parameters with an integrated earth model by integrating the

fracture parameters with the reservoir parameters, and performing production operations based on the integrated wellsite parameters.

2. Payne

U.S. Patent Application Publication No. 2016/0258267 by Payne *et al.* (Ex. 1006) was a patent application assigned to Stewart & Stevenson, LLC entitled "Well Fracturing Systems with Electrical Motors and Methods of Use." Ex. 1006. This patent application issued as U.S. Patent No. 10, 246,984 to Payne *et al.* with the same title. The *Payne* application was filed on March 3, 2016, and published on September 8, 2016. *Payne* describes systems and methods for stimulating oil and gas wells using electrically powered hydraulic fracturing pumps.

3. Dawson

U.S. Patent No. 10,378,333 to Dawson *et al.* (Ex. 1024) is a patent entitled "Determining Diverter Effectiveness in a Fracture Wellbore" that issued to assignee Reveal Energy Services, Inc. Ex. 1024. *Dawson* issued on August 13, 2019, from a patent application filed on June 24, 2016. Dawson describes systems and methods for using pressure to assess the effectiveness of a divertor in a stimulation wellbore. *Id.* at Abstract. The system utilizes pressure sensors in direct communication with fluid between two wellbores to sense the pressure differential between different parts of the two wellbores after a divertor drop is performed in one of the wellbores. *Id.* at 2:6–30.

4. Lecerf

U.S. Patent No. 10,087,722 to Lecerf *et al.* (Ex. 1027) is a patent entitled "System and Method for Performing Downhole Stimulation Operations" that issued to assignee Schlumberger Technology Corporation. Ex. 1027. *Lecerf* issued on October 2, 2018, from a patent application filed on August 6, 2015. *Lecerf* discloses a method for performing stimulation operations that involves the use of composite quality indictors composed from a plurality of well logs and separated into good and bad classifications. *Id.* at 19:26–28. *Lecerf* further discloses that the composite quality indicator determines a characteristic of the wellbore environments (*i.e.*, good-good (GG), good-bad (GB) bad-good (BG), and bad-bad (BB)). *Id.* at 19:32–33.

5. Klumpen

U.S. Patent No. 8,352,227 to Klumpen *et al.* (Ex. 1019) is a patent entitled "System and Method for Performing Oilfield Simulation Operations" that issued to assignee Schlumberger Technology Corporation. Ex. 1019. *Klumpen* issued on January 8, 2013, from a patent application filed on October 30, 2007. *Klumpen* discloses a method for performing oilfield simulation operations utilizing an oilfield simulator and uncertainty parameters that are based on "a plurality of probable values each corresponding to a weighted probability[.]" *Id.* at 4:28–30. *Klumpen* further discloses that the modeling method utilizes uncertainty parameters in order

to optimize the net present value of oilfield productions based on the levels of risk associated with reservoir uncertainty and financial uncertainty. *Id.* at 3:65 to 4:2.

E. Ground 5 Fails Because Claims 1–20 Are Not Invalid Under 35 U.S.C. § 101 and the *Alice* Two-Step Test

The Challenged Claims are not directed to patent-ineligible subject matter. Rather, as discussed below, the Challenged Claims recite an improved technique for controlling electrical fracturing equipment for fracturing a well that enables selection of a representative system model that more accurately reflects the well to which it is deployed and thereby provides for more effective control of an electrical fracturing pump. The Petition's arguments alleging that the Challenged Claims are directed to an abstract idea and do not recite an inventive concept lack merit.

1. Legal Standard

Section 101 of the Patent Act defines the subject matter eligible for patent protection. It provides that "[w]hoever invents or discovers any new and useful process, machine, manufacture, or composition of matter, or any new and useful improvement thereof, may obtain a patent therefor, subject to the conditions and requirements of this title." 35 U.S.C. § 101. The Supreme Court, however, has "held that this provision contains an important implicit exception: Laws of nature, natural phenomena, and abstract ideas are not patentable." *Alice Corp. v. CLS Bank Int'l.*, 573 U.S. 208, 216 (2014) (quoting *Association for Molecular Pathology v. Myriad Genetics, Inc.*, 569 U.S. 576, 589 (2013)). The Board, however, must "tread

carefully" in construing the three limited exceptions to patentability because "at some level, 'all inventions . . . embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas.'" *Alice*, 573 U.S. at 217 (quoting *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 71 (2012)).

Thus, the Board must distinguish between patents that claim the building blocks of human ingenuity and those that integrate the building blocks into something more. *Id.* If the patent's subject matter has a "concrete or tangible application," it is not a patent-ineligible abstract idea. *See Ultramercial, Inc. v. Hulu, LLC*, 772 F.3d 709, 715 (Fed. Cir. 2014); *see also Alice*, 573 U.S. at 214 (applications of abstract concepts to a new and useful end remain eligible for patent protection).

In *Alice* and *Mayo*, the Supreme Court laid out a two-step framework for assessing eligibility. Step one asks whether the claims are directed to a judicial exception, such as an abstract idea. *See Alice*, 573 U.S. at 217. If not, the claims are eligible. *Id.* If the claims are directed to an abstract idea, however, step two determines whether the claims recite an "inventive concept." *Id.* at 217–18. Both steps are informed by the specification. *See Amdocs (Israel) Ltd. v. Openet Telecom, Inc.*, 841 F.3d 1288, 1299 (Fed. Cir. 2016).

At step one, the claims must be "considered in their entirety to ascertain whether ***their character as a whole*** is directed to excluded subject matter." *McRO,*

Inc. v. Bandai Namco Games Am. Inc., 837 F.3d 1299, 1312 (Fed. Cir. 2016) (emphasis added) (citations omitted). This often involves examining the patent's "'claimed advance' to determine whether the claims are directed to an abstract idea." *Finjan, Inc. v. Blue Coat Sys., Inc.*, 879 F.3d 1299, 1303 (Fed. Cir. 2018) (citation omitted). Importantly, an invention is not ineligible "simply because it involves an abstract concept." *Alice*, 573 U.S. at 217. Nor can it be said that "claims directed to software, as opposed to hardware, are inherently abstract." *Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1335 (Fed. Cir. 2016).

Step two considers "the elements of each claim both individually and 'as an ordered combination' to determine whether the additional elements 'transform the nature of the claim' into a patent eligible application." *Berkheimer v. HP Inc.*, 881 F.3d 1360, 1367 (Fed. Cir. 2018) (citations omitted). A claim recites an inventive concept "when the claim limitations 'involve more than performance of well-understood, routine, [and] conventional activities previously known to the industry.'" *Id.* Whether an element or combination of elements "is well-understood, routine and conventional to a skilled artisan in the relevant field is a question of fact." *Id.* at 1368. This inquiry "goes beyond what was simply known in the prior art" and "[t]he mere fact that something is disclosed in a piece of prior art . . . does not mean it was well-understood, routine, and conventional." *Id.* at 1369.

The USPTO has issued subject matter eligibility guidance that explains how Office personnel should evaluate claims for patent subject matter eligibility under 35 U.S.C. § 101 (the "Guidance").[1] "All USPTO personnel are, as a matter of internal agency management, expected to follow the guidance." *KioSoft Techs., LLC v. PayRange Inc.*, PGR2022-00035, Paper 7 at 23–24 (P.T.A.B. Dec. 6, 2022) (applying the Guidance in denying institution of post-grant review). The Guidance has been incorporated into the Manual of Patent Examination Procedure ("MPEP"), particularly in sections 2103 through 2106.07(c).[2] The MPEP sets forth a two-part test. *See* MPEP § 2106(III). Step 1 relates to the statutory categories and confirms that the claim falls within one of the four statutory categories of invention. *See id.* Step 2, a two-part test, embodies the Supreme Court's *Alice/Mayo* test. *See id.*

Under the Board's rules, Petitioners bear the burden of proving that the claims are directed to ineligible subject matter. *See, e.g.*, *Gain Capital Holdings, Inc. v.*

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[1] Including the 2019 Revised Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019) (Ex. 2006) and the October 2019 Update Patent Eligibility Guidance Update (Oct. 17, 2019) (Ex. 2007).

[2] *See Subject matter eligibility*, USPTO.GOV, available at https://www.uspto.gov/patents/laws/examination-policy/subject-matter-eligibility (last accessed July 21, 2023).

Oanda Corp., CBM2020-00022, Paper 10 at 27 (P.T.A.B. Mar. 18, 2021) ("The burden is on Petitioner . . . to establish that it is more likely than not that at least one of the challenged claims is unpatentable[.]"). This burden never shifts to the patent owner. *See Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

2. Claim 1 *Is* Directed to Patent-Eligible Subject Matter

Petitioners contend that independent claim 1 is representative of claims 9 and 16 for purposes of eligibility. Pet. 87. Although Patent Owner does not concede that claim 1 is representative, for purposes of this Preliminary Response Patent Owner addresses Petitioners' arguments regarding claim 1. Claim 1 is directed to eligible subject matter, as are the other challenged claims.

a) Guidance Step 1

Step 1 asks: "Is the claim to a process, machine, manufacture or composition of matter?" MPEP § 2106.03(II). The undisputed answer is "Yes." Pet. 93. Claim 1 recites "[a] computer-implemented method for controlling electrical fracturing equipment for fracturing a well[.]" Ex. 1001, cl. 1. Claim 1 is therefore directed to a patent-eligible "process." *See* MPEP § 2106(I) ("The term 'process' means

process, art, or method[.]"). "Petitioners do not contest the challenged 058 patent claims fall within one or more of the four statutory categories." Pet. 93 n.7.[3]

b) Guidance Step 2A / *Alice* Inquiry

Step 2 of the Guidance "is the Supreme Court's *Alice/Mayo* test." MPEP § 2106(III). This is a "two-part test to identify claims that are directed to a judicial exception (Step 2A) and to then evaluate if additional elements of the claim provide an inventive concept (Step 2B) (also called 'significantly more' than the recited judicial exception)." *Id.* Step 2A "is a two-prong inquiry." MPEP § 2106.04(II)(A). Prong One asks whether a claim recites a judicial exception. *Id.* If so, Prong Two considers whether the judicial exception is integrated into a practical application. *Id.*

Petitioners do not meaningfully address the Guidance, which is reason enough to deny institution. In fact, the Petition relegates its purported "analysis" of the eligibility of the claims under the Guidance to two footnotes. Pet. 93 n.7 (addressing Guidance Steps 1, 2, and 2A), 98 n.8 (addressing Guidance Step 2B). As such, Petitioners' arguments need not be considered and institution should be denied. *See Sawai USA, Inc. v. Astellas Pharma Inc.*, IPR2018-00079, Paper 7 at 18 n.3

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[3] Claim 9 recites "[a] system for controlling electrical fracturing equipment for fracturing a well." Ex. 1001, cl. 9. Claim 16 recites "[a] non-transitory computer readable medium[.]" *Id.* at cl. 16.

(P.T.A.B. May 4, 2018) ("We decline to consider an argument made entirely in footnotes.") (citing *SmithKline Beecham Corp. v. Apotex Corp.*, 439 F.3d 1312, 1320 (Fed. Cir. 2006)).

Regardless, the Challenged Claims are eligible whether they are considered under the approach set forth in the Guidance or *Alice* and its progeny. The Board need go no further than Step 2A to resolve Petitioners' subject matter eligibility challenge. The Challenged Claims do not recite, and are not directed to, an abstract idea, let alone the abstract idea identified in the Petition, which is overbroad and untethered to the specific elements of the claims. That ends the inquiry at Prong One. Even if the Challenged Claims did recite the alleged abstract idea of selecting a plan for a desired result based on information received in response to one or more inquiries—which they plainly do not—the claims integrate the alleged abstract idea into a practical application. As such, the Challenged Claims are eligible.

(1) Guidance Step 2A, Prong 1

The Challenged Claims do not recite an abstract idea (*i.e.*, they do not set forth or describe an abstract idea) and therefore "cannot be directed to a judicial exception." *See* MPEP § 2106.04(II)(A)(1). Contrary to Petitioners' argument, the '058 Patent's claims are not an attempt to patent the alleged abstract concept of selecting a plan for a desired result based on information received in response to one or more inquiries. Pet. 87. The subject matter of claim 1 is much narrower and

covers a specific, improved "method for controlling electrical fracturing equipment for fracturing a well" that is patent eligible, not an abstract idea. Ex. 1001, 11:54–56. *See, e.g.*, *Adasa Inc. v. Avery Dennison Corp.*, 55 F.4th 900, 908 (Fed. Cir. 2022), *cert. denied*, No. 22-822, 2023 WL 3696138 (U.S. May 30, 2023) ("If the focus of the claim is a specific and concrete technological advance, for example an improvement to a technological process or in the underlying operation of a machine, our inquiry ends and the claim is eligible.").

(a) The claims of the'058 Patent do not recite an abstract idea.

Hydraulic fracturing is a stimulation treatment often performed on oil and gas wells in low-permeability reservoirs to restore or enhance the productivity of a well. Ex. 2009, 3; Ex. 2010, 3. During hydraulic fracturing, "[s]pecially engineered fluids are pumped at high pressure and rate into the reservoir interval to be treated, causing a vertical fracture to open." Ex. 2009, 3. Proppant, such as grains of sand, is mixed with the treatment fluid to keep the fracture open when the treatment is complete. *Id.* This process "creates high-conductivity communication with a large area of formation" (*id.*) that "create[s] a highly conductive flow path between the reservoir and the wellbore." Ex. 2010, 3. This allows the flow of the desired gas or oil to the well, and eventually, to the surface for collection. *See* Ex. 1008 at [0004].

Claim 1 of the '058 Patent recites an improved "method for controlling electrical fracturing equipment used for fracturing a well." Ex. 1001, cl. 1. The

specification of the ’058 Patent explains that one problem with using representative system models in hydraulic fracturing is that “the representative system model may be a static construct and may not accurately reflect the well to which it has been deployed.” Ex. 1001, 1:23–26. The ’058 Patent solves this problem by “provid[ing] techniques for optimizing well treatments using representative system models selected according to formation responses to stimuli indicated by sensor data.” Ex. 1001, 2:12–16.

The disclosed technique involves generating a sequence of stimuli in a treatment well that is applied to a well environment tooled with one or more sensors. *Id.* at 2:16–19; 8:26–28. For example, “[a] given sequence of stimulus of the sequence of stimuli can be achieved by adjusting surface pressure values, flow rates, particulate composition (e.g., proppants, diverters, etc.), and/or chemical composition (e.g., friction reducers, surfactants, viscosifiers, etc.).” *Id.* at 2:25–30. The ’058 Patent explains:

> Stimuli can include, for example and without imputing limitation, a selection of surface concentrations of particulates and/or chemicals pumped downhole, an adjustment to fluid rate, or an adjustment to pressure, etc. Further, stimuli may be modified over a span of time as part of a sequence of stimuli.

Ex. 1001, 3:26–31. The '058 Patent also provides that:

> Stimuli sequence generator and controller 330 includes a stimuli model 324, a stimuli scheduler 326, and a stimuli control 328. Stimuli model 324 may be used to determine which stimuli to produce and/or modify to generate, update, or apply a representative system model. Stimuli scheduler 326 may ***generate a stimuli sequence based on the stimuli determined by stimuli model*** 324. Stimuli control 328 may execute the generate stimuli sequence by generating respective commands, based on the scheduled sequence, to provide to pump system interface 314.

Ex. 1001, 8:12–21.

"Sensor data in response to the generated sequence of stimuli can then be received from sensors deployed throughout the well[.]" *Id.* at 2:19–22. The sensor data is "indicative of formation responses," which allows "formation responses to the sequence of stimuli" to be "determined from the resulting sensor data." *Id.* at 2:61–64; *see also id.* at 7:47–61 (describing how the generated sequence of stimuli is used to produce a response, and resulting sensor data, from the well environment). "The responsive sensor data may be used to select a pre-defined representative system model for stage and/or well treatment schedules (e.g., treatment sequences,

compositions, etc.)." *Id.* at 2:38–41. For example, "stimuli and response combination can be mapped to respective system models maintained in an accessible data store." *Id.* at 3:47–49. The representative system model may be used to "control fracturing operations at the same well used to generate the system model or at another well, such as in the case where the representative system model is generated at an observation well or the like." *Id.* at 4:8–12. In one example embodiment, "settings [*e.g.*, pressure, flow rate, and/or chemical composition of a pumped fluid] on an electric frac pump are controlled based on the selected representative system model." *Id.* at 8:45–49.

The disclosed technique for optimizing well treatments using representative system models is captured in claim 1, which recites:

> 1. A computer implemented method for controlling electrical fracturing equipment for fracturing a well, the method comprising:
>
> generating a sequence of stimuli for application to a well environment, the sequence of stimuli comprising one or more of particulate concentrations, chemical concentrations, or a pump rate control;
>
> receiving formation response data comprising data from one or more downhole sensors or surface sensors;
>
> selecting a representative system model based on the received formation response data and sequence of stimuli; and

controlling an electrical fracturing pump based on the representative system model.

Ex. 1001, cl. 1. By applying a sequence of stimuli to the actual well, and selecting a representative model based on ***both*** the sequence of stimuli and formation response data, the technique described and claimed in the '058 Patent advantageously enables the selection of a representative system model that accurately reflects the well to which it is deployed. This enables more effective control of the electric fracturing pumps, thereby improving the fracturing process.

Thus, the improved "method for controlling electrical fracturing equipment used for fracturing a well" recited in claim 1 is analogous to other claims found eligible at step one. Ex. 1001, cl. 1. *See, e.g.*, *Canrig Drilling Tech. Ltd. v. Trinidad Drilling L.P.*, No. H–15–0656, 2015 WL 5458576, at *4 (S.D. Tex. Sept. 17, 2015) (claims addressing specific challenges in directional drilling with a concrete process for controlling drill string rotation not directed to an abstract idea); *Nabors Drilling Techs. USA Inc. v. Helmerich & Payne Int'l Drilling Co.*, No. 3:20-cv-03126-M 2022 WL 4589093, at *9 (N.D. Tex. Sept. 28, 2022) (claims to a method for steering a hydraulic motor found not abstract).

Indeed, claim 1 is analogous to the claims found eligible in *Diamond v. Diehr*, 450 U.S. 175 (1981). In *Diehr*, the Supreme Court confirmed the eligibility of patent claims directed to a process of curing synthetic rubber that used a computer to

repeatedly calculate cure time based on sensor data (*i.e.*, temperature measurements) and signal a device to open a press when the actual time that has elapsed equals the recalculated cure time. *Id.* at 178–79, 187. The Court explained:

> [W]e think that a physical and chemical process for molding precision synthetic rubber products falls within the § 101 categories of possibly patentable subject matter. That respondents' claims involve the transformation of an article, in this case raw, uncured synthetic rubber, into a different state or thing cannot be disputed. The respondents' claims describe in detail a step-by-step method for accomplishing such, beginning with the loading of a mold with raw, uncured rubber and ending with the eventual opening of the press at the conclusion of the cure. Industrial processes such as this are the types which have historically been eligible to receive the protection of our patent laws.

Id. at 184; *see also Alice*, 573 U.S. at 223 ("[T]he claims in *Diehr* were patent eligible because they improved an existing technological process[.]"). The method for controlling electrical fracturing equipment for fracturing a well recited in claim 1 of the '058 Patent is similarly a type of industrial process historically eligible for

patent protection. Like the physical and chemical process for molding precision synthetic rubber products in *Diehr*, the method of claim 1 begins with physically stimulating the well by "generating a sequence of stimuli for application to a well environment" in order to elicit "formation response data" to allow for selecting a representative system model based on the formation response data ***and*** sequence of stimuli. Ex. 1001, cl. 1. And like the claims in *Diehr*, the process ends with "controlling an electrical fracturing pump" based on the selected representative system model.

Claim 1 is also analogous to the claims found eligible in *Thales Visionix Inc. v. United States*, 850 F.3d 1343 (Fed. Cir. 2017). In *Thales*, the Federal Circuit found a method claim involving "determining an orientation of an object relative to a moving reference frame" based on sensor data eligible for similar reasons to those in *Diehr*. *Id.* at 1345–46, 1348. The claims at issue in *Thales* "use inertial sensors in a non-conventional manner to reduce errors in measuring the relative position and orientation of a moving object on a moving reference frame." *Id.* at 1348–49. Like the claims in *Thales*, claim 1 of the '058 Patent also uses sensor data in an unconventional way. In particular, the claim uses formation response data ("formation response data comprising data from one or more downhole sensors or surface sensors") received in response to a sequence of stimuli applied to the well, then uses the formation response data ***and*** the sequence of stimuli to select the

representative system model that will be used to control an electrical fracturing pump. Ex. 1001, cl. 1. Just as the claims in *Thales* eliminated many "complications" inherent in previous solutions for determining position and orientation of an object on a moving platform (*Thales*, 850 F.3d at 1348), the improved method of claim 1 of the '058 Patent addresses the problem that representative system models "may not accurately reflect the well to which it has been deployed" as discussed above. Ex. 1001, 1:23–26.

Ultimately, there is nothing abstract about the process recited in claim 1 of the '058 Patent. The claim involves subjecting a well environment to a sequence of stimuli and using formation response data and the sequence of stimuli to select a more accurate representative system model that is then used to control an electrical fracturing pump. There is no merit to the Petition's arguments that claim 1 is directed to an abstract idea.

(b) The Petition's identification of the alleged abstract idea is overbroad and ignores the claim language.

The Petition fails to demonstrate that the Challenged Claims are directed to, or even recite, an abstract idea. The Petition's characterization of the alleged abstract idea that claim 1 is purportedly directed to is overbroad and untethered to the claim language. *See McRO*, 837 F.3d at 1313 ("Whether at step one or step two of the *Alice* test, in determining the patentability of a method, a court must look to the

claims as an ordered combination, without ignoring the requirements of individual steps."). As detailed above, claim 1 of the '058 Patent is directed to an improved method for controlling electrical fracturing equipment for fracturing a well. The alleged abstract idea identified in the Petition, however, has nothing to do with fracturing and nothing to do with the control of electrical fracturing equipment.

Rather, the Petition contends that claim 1 is directed to the alleged abstract idea of selecting a plan for a desired result based on information received in response to one or more inquiries. Pet. 87. Petitioners' alleged abstract idea oversimplifies claim 1 to such an extent that it cannot be correct. *See McRO*, 837 F.3d at 1313 ("We have previously cautioned that courts 'must be careful to avoid oversimplifying the claims' by looking at them generally and failing to account for the specific requirements of the claims."). The alleged abstract idea identified in the Petition fails to account for any of the specific requirements of the method for controlling electrical fracturing equipment for fracturing a well recited in claim 1. And claim 1 lacks any recitation of selecting a plan for a desired result based on information received in response to one or more inquiries.

The Petition fails to adequately support its contention that what claim 1 is "directed to" is the alleged abstract idea of selecting a plan for a desired result based on information received in response to one or more inquiries. Pet. 87. The Petition's "analysis" for why claim 1 is purportedly directed to this alleged abstract idea

amounts to no more than two sentences on page 87 of the Petition. *Id.* The first sentence quotes limited excerpts of the language of claim 1. *Id.* The second sentence states in conclusory fashion that claim 1 is directed to the alleged abstract idea, using terse parentheticals quoting even more limited and out-of-context excerpts from claim 1 that Petitioners apparently contend map to aspects of the alleged abstract idea. *Id.* In fact, the Petition devotes more attention to explaining how its alleged abstract idea encompasses allergy skin tests and wireless messaging communication systems than it devotes to explaining why claim 1 is "directed to" the alleged abstract idea. *Id.* at 87–88.

The Federal Circuit has cautioned that characterizing claims at a "high level of abstraction and untethered from the language of the claims all but ensures that the exceptions to § 101 swallow the rule." *Enfish*, 822 F.3d at 1337. Thus, courts must "ensure at step one that we articulate what the claims are directed to with enough specificity to ensure the step one inquiry is meaningful." *Thales*, 850 F.3d at 1347. The Petition's purported examples of how this alleged abstract idea "has been employed for years in multiple environments" demonstrate that the abstract idea is over-generalized and not sufficiently tied to the language of the claims. *See Gain Capital*, Paper 10 at 26 ("Prior Board decisions in post-grant proceedings have found § 101 arguments deficient in similar circumstances where the petitioner asserted an over-generalized abstract idea and fails to sufficiently tie that alleged idea to the

language of the claims."); *Yahoo! Inc. v. AlmondNet, Inc.*, CBM2017-00046, Paper 8 at 17 (P.T.A.B. Oct. 16, 2017) (denying institution where petitioner's asserted abstract idea over-generalized the claims, as the petitioner failed to explain how multiple concepts recited in the claims are embodied in the petitioner's alleged abstract idea). Petitioners' suggestion that the method for controlling electric hydraulic fracturing equipment for fracturing a well in claim 1 is directed to the same underlying concept as an allergy skin test or the use of probe messages in a wireless communication system is not credible.

(c) The '058 Patent's claims are not directed to an abstract mental process.

The Petition's assertion that "[t]he '058 patent claims also fail *Alice* step one because they are effectively directed to mental processes" lacks merit. The MPEP explains that the "mental processes" grouping of abstract ideas includes "concepts performed in the human mind (including an observation, evaluation, judgment, opinion)[.]" MPEP § 2106.04(a). The claimed technique for controlling electrical fracturing equipment for fracturing a well is a far cry from an abstract mental process. The Petition fails to support its assertions otherwise.

The Petition does not allege that "generating a sequence of stimuli for application to a well environment" as claimed can be performed in the human mind. At most, the Petition alludes to two of the four claimed steps involving "selecting a system model based on the received sensor data and then controlling the settings on

the pump" as actions that "can be and were done by humans." Pet. 91. The Petition, however, fails to show how the mere fact that some steps have previously been performed manually renders the claim as a whole directed to an abstract mental process. Notably, controlling the settings on an electrical fracturing pump is not something that can be performed in the human mind.

Furthermore, the Petition's argument highlights that Petitioners are looking at claim elements in isolation, and not considering the claim "as a whole" for purposes of the eligibility analysis. *See McRO*, 837 F.3d at 1312 (the claims must be "considered in their entirety to ascertain whether ***their character as a whole*** is directed to excluded subject matter"). Considered as a whole, claim 1 of the '058 Patent is nothing like the "mental process of 'a search algorithm for identifying people who may be eligible for SSDI benefits they are not receiving'" addressed in *In re Killian*, 45 F.4th 1373, 1379 (Fed. Cir. 2022) relied upon by the Petition. Pet. 91.

(d) The Petition relies on inapposite cases.

The Petition's reliance on cases such as *TDE Petroleum Data Sols., Inc. v. AKN Enter. Inc.*, 657 F. App'x 991, 992 (Fed. Cir. 2016) and *FairWarning IP, LLC v. Iatric Sys.*, 839 F.3d 1089, 1092 (Fed. Cir. 2016) is misplaced. Pet. 88–89.

The Petition primarily relies on *TDE Petroleum* because it is allegedly "in the same field as the '058 patent claims and closely matches claim 1 thereof." Pet. 89.

Even a cursory review of the Federal Circuit's decision, however, reveals that the claims at issue in *TDE Petroleum* do not "closely match[]" claim 1 of the '058 Patent as alleged. The claim at issue in *TDE Petroluem* involved only "the most ordinary of steps in data analysis." 657 Fed. App'x. at 993. The claim at issue in *TDE Petroleum* recited:

> 1. An automated method for determining the state of a well operation, comprising:
>
> storing a plurality of states for a well operation;
>
> receiving mechanical and hydraulic data reported for the well operation from a plurality of systems; and
>
> determining that at least some of the data is valid by comparing the at least some of the data to at least one limit, the at least one limit indicative of a threshold at which the at least some of the data do not accurately represent the mechanical or hydraulic condition purportedly represented by the at least some of the data; and
>
> when at least some of the data are valid, based on the mechanical and hydraulic data, automatically selecting one of the states as the state of the well operation.

Id. at 992. The Federal Circuit recognized that this claim merely involves "collecting information" and "analyzing it." *Id.* at 993. In contrast, claim 1 of the '058 Patent recites *significantly more* than collecting and analyzing data, including the steps of "generating a sequence of stimuli for application to a well environment," "selecting

a representative system model based on the received formation response data and sequence of stimuli; and controlling an electrical fracturing pump based on the representative system model." Ex. 1001, cl. 1.

FairWarning is equally inapposite. *FairWarning* dealt with claims directed "to the concept of analyzing records of human activity to detect suspicious behavior," which is far afield from the method for controlling electrical fracturing equipment for fracturing a well recited in claim 1 of the '058 Patent. *FairWarning*, 839 F.3d at 1093. The *FairWarning* claims were found to be directed to the abstract idea of "collecting and analyzing information to detect misuse and notifying a user when misuse is detected." *Id.* at 1094. Unlike *FairWarning*, where the "focus" of the claims was "on certain independently abstract ideas that use computers as tools," *Id.* at 1095, claim 1 of the '058 Patent improves upon the process of controlling electrical fracturing equipment for fracturing a well by applying a sequence of stimuli to the actual well and selecting a representative model for controlling a fracturing pump based on ***both*** the sequence of stimuli and formation response data. Ex. 1001, cl. 1. This enables the selection of a representative system model that accurately reflects the well to which it is deployed and thereby improves the fracturing process by enabling more effective control of the electric fracturing pumps.

The Petition's attempt to analogize claim 1 of the '058 Patent to the claim at issue in *FairWarning* is unavailing. Pet. 89–90. First, the Petition identifies no analog in *FairWarning* to the claimed step of "generating a sequence of stimuli for application to a well environment." Second, the Petition's suggestion that "the '058 'model' is akin to the *FairWarning* 'rule,' the 'sensor data' is akin to the audit log data, and controlling the pump is akin to providing a notification of misuse" is underdeveloped and conclusory. Pet. 89–90. The Petition's comparison oversimplifies the '058 Patent claims and fails to take into account the claim as a whole. Considered as whole, claim 1 is directed to an improved method for controlling electrical fracturing equipment for fracturing a well that takes into account a geological formation's response to a specific sequence of stimuli in order to select a more accurate representative system model to use for controlling an electrical fracturing pump. Ex. 1001, cl. 1. The subject matter of claim 1 is nothing like the method claimed in *FairWarning* that merely involved applying a generated rule to audit log data and, if an event has occurred, storing the event and providing a notification that it occurred. *FairWarning*, 839 F.3d at 1092.

(e) The Petition's contention that claim 1 merely automates a manual process mischaracterizes the '058 Patent.

The Petition's repeated mischaracterizations of the Background section of the '058 Patent further highlight the deficiencies in its § 101 arguments. Pet. 83.

The Petition alleges that "the claims merely automate a method that was – as the '058 patent itself confirms – previously performed manually." *Id.*; *see also id.* at 90 (alleging that the '058 Patent's claims merely use "computers to automate a process that the '058 Patent ***admits*** was typically performed by technicians"). In support of this assertion, the Petition provides an excerpt from the '058 Patent's Background section that, even riddled with ellipses as it is, still fails to support the Petition's assertion that the "invention merely uses a computer to perform known steps that, according to the patent, were typically done by a person." *Id.* at 83.

Yet again, the Petition's arguments depend on ignoring aspects of the claimed invention. At most, the Background section of the '058 Patent acknowledges that "typically, settings [for electric frac pumps] are performed manually based on manually appraised information retrieved from the downhole environment" and that, when a representative system model is used, it is "typically manually selected by a technician based on observed sensor data." Ex. 1001, 1:11–26. It does not follow that the method of claim 1 merely automates a method previously performed manually as alleged in the Petition.

For example, nothing in the Background section suggests that it was known to generate a sequence of stimuli for application to a well environment in order to obtain formation response data and then select a representative system model to use for controlling an electrical fracturing pump based on the received formation

response data and sequence of stimuli. *Id.* at 1:11–26. Accordingly, the Petition's contention that "the '058 patent itself confirms" that the claims merely automate a method that was previously performed manually lacks merit.

(2) Guidance Step 2A, Prong 2

The Board need not reach Step 2A, Prong 2 because claim 1 does not "recite" the Petition's alleged abstract idea of selecting a plan for a desired result based on information received in response to one or more inquiries. Pet. 87. To the extent the Board finds otherwise, however, claim 1 is not "directed to" that abstract idea because claim 1 recites additional elements beyond the alleged abstract idea that "integrate" the alleged abstract idea "into a practical application." MPEP § 2106.04(II)(A)(2).

"A claim that integrates a judicial exception into a practical application will apply, rely on, or use the judicial exception in a manner that imposes ***a meaningful limit*** on the judicial exception[.]" MPEP § 2106.04(d). Examples include "[a]n improvement in the functioning of a computer, or an improvement to other technology or technical field" and "[a]pplying or using the judicial exception in some other meaningful way[.]" MPEP § 2106.04(d)(I). Claim 1 is eligible because it recites additional elements that improve how electrical fracturing equipment is controlled for fracturing a well.

As discussed above, the Petition's alleged abstract idea is overbroad and does not reflect the actual claim elements. Thus, the "additional elements" properly considered at Step 2A, Prong Two include all of the elements of the claim that confine it to a particular solution for controlling electrical fracturing equipment for fracturing a well, none of which are reflected in the Petition's identification of the alleged abstract idea. The claimed steps—generating a sequence of stimuli for application to a well environment, receiving formation response data comprising data from one or more downhole sensors or surface sensors, selecting a representative system model based on the received formation response data and sequence of stimuli, and controlling an electrical fracturing pump based on the representative system model—improve the process of controlling electrical fracturing equipment and therefore apply the alleged abstract idea in a meaningful way. By applying a sequence of stimuli to the actual well, and selecting a representative model based on ***both*** the sequence of stimuli and formation response data, the technique described and claimed in the '058 Patent advantageously enables the selection of a representative system model that accurately reflects the well to which it is deployed. This enables more effective control of the electric fracturing pumps, thereby improving the fracturing process.

The additional elements of claim 1 do more than merely limit the application of the alleged abstract idea to a particular technological environment. Claim 1

recites a specific series of steps that solve the problem of representative system models failing to "accurately reflect the well to which it has been deployed." Ex. 1001, 1:23–26. This is achieved by generating a sequence of stimuli for application to a well environment and using formation response data and the sequence of stimuli to select a representative system model for controlling the electrical fracturing pump as claimed. Accordingly, claim 1 integrates the alleged abstract idea into a practical application and is therefore eligible.

Indeed, claim 1 is analogous to eligible claim 2 in Example 45 in Appendix 1 to the October 2019 Update: Subject Matter Eligibility *Life Sciences & Data Processing Examples*. Ex. 2008, 23–24. In Example 45, claim 2 recites a controller configured to "send control signals to the injection molding apparatus . . . instructing the apparatus to open the mold and eject the molded polyurethane from the mold." *Id.* at 20. This is analogous to "controlling an electrical fracturing pump based on the representative system model" in claim 1 of the '058 Patent. Ex. 1001, 11:56–57. Example 45 confirms that such a limitation "does not merely link the judicial exceptions to a technical field, but instead adds a meaningful limitation in that it employs the information provided by the judicial exceptions [*i.e.*, the selected plan] . . . to control the operation of" the electrical fracturing pump in claim 1 in a particular way (based on the representative system model). Ex. 2008, 24.

(a) The Board should deny institution because the Petition failed to meet its burden as to Step 2A, Prong 2.

The Petition fails to meaningfully address Guidance Step 2A, Prong 2. Pet. 93 n.7. At most, the Petition includes a footnote that alleges in conclusory fashion that "the 058 patent claims do not integrate the alleged abstract idea into a practical application" because the claims allegedly "do not reflect 'an improvement in the functioning of a computer[.]'" *Id.* Step 2A, Prong 2, however, evaluates whether the "additional elements" integrate the exception into a practical application (individually or in combination). The Petition does not adequately address the additional elements of claim 1. By failing to address all additional elements of the claims, Petitioners cannot have met their burden. *See Supercell Oy v. GREE, Inc.*, PGR2018-00061, Paper 27 at 25 (P.T.A.B. Oct. 15, 2019) (petitioner failed to carry its burden under Prong Two by failing to address all of the additional elements). The additional elements of claim 1 integrate the alleged abstract idea into a practical application for the above-described reasons. The Petition fails to show otherwise.

Rather, the Petition's analysis confirms that claim 1 applies, relies on, or uses the alleged abstract idea in a manner that imposes a meaningful limit on the alleged abstract idea of selecting a plan for a desired result based on information received in response to one or more inquiries. The Petition contends that the alleged abstract idea "has been employed for years in multiple environments," such as allergy skin

tests and wireless communication systems. Pet. 87–88. To the extent allergy skin tests, wireless messaging communication systems, and the method for controlling electrical fracturing equipment for fracturing a well each applies the same alleged abstract idea, the additional elements of claim 1 meaningfully limit the alleged abstract idea such that the claim is more than a drafting effort designed to monopolize the judicial exception. It cannot be credibly asserted that the improved method for controlling electrical fracturing equipment in claim 1 would read on, let alone preempt, the techniques for allergy skin tests and wireless messaging communication systems described in the Petition.

c) Guidance Step 2B

Because claim 1 integrates the alleged abstract idea into a practical application, the Board need not reach Step 2B. Regardless, the additional elements of claim 1—individually and as an ordered combination—constitute inventive concepts.

The individual claim elements recite an inventive concept. Claim 1 recites the unconventional steps of "generating a sequence of stimuli for application to a well environment" and "selecting a representative system model based on [] received formation response data ***and sequence of stimuli***" that is used to control an electrical fracturing pump. Ex. 1001, cl. 1. The Petition introduces no evidence that it was well understood, routine, or conventional activity in the industry to select a

representative system model based on ***both*** formation response data responsive to a sequence of stimuli applied to a well ***and*** the sequence of stimuli. As discussed below, even the prior art relied upon in the Petition's obviousness grounds fails to disclose or suggest such a technique. These steps result in improved control of electrical fracturing equipment (*e.g.*, an electrical fracturing pump), because they enable the selection of a representative system model that accurately reflects the well to which it is deployed, thereby enabling more effective control of the electric fracturing pumps, which improves the fracturing process.

The ordered combination of claim elements also constitutes an inventive concept. As discussed above, the ordered combination of elements in claim 1 provides an improved method for controlling electrical fracturing equipment for fracturing a well by selecting a representative system model based on formation response data produced in response to a sequence of stimuli ***and*** the sequence of stimuli itself, then using the selected representative system model to control an electrical fracturing pump. Ex. 1001, cl. 1. This combination of elements in the claimed process, which enables the selection of a representative system model that accurately reflects the well to which it is deployed, was not well-understood, routine, or conventional activity previously known in the industry. *Id.* The Petition has not identified a single reference that describes a system that operates in the manner of claim 1. As such, Petitioners have not met their burden to show that the ordered

combination of the claim steps is well-understood, routine, and conventional activity previously known in the industry. The deficiencies in Petitioners' mapping, discussed below, further demonstrate the unconventional nature of the combination of elements recited in claim 1. *See infra* Section III.F.

(1) The Board should deny institution because the Petition fails to conduct a proper Step 2B analysis

The Petition acknowledges that this step considers the "additional elements" of the claim. Pet. 93. As discussed above, in view of the Petition's overbroad identification of the abstract idea, the additional elements include all of the elements of the claim that confine it to a particular solution for controlling electrical fracturing equipment for fracturing a well. The Petition fails to address these limitations, however, opting instead to focus only on the so-called "structural elements" in the claim. Pet. 94. The Petition cannot have met its burden because it failed to consider the additional elements individually and as an ordered combination.

The Petition's analysis of the alleged "structural elements" in isolation is insufficient to meet its burden. The Petition alleges that: (1) "stimulating a well using 'one or more of particulate concentrations, chemical concentrations, or pump rate control" was well known; (2) "using sensors to generate well data was ubiquitous[;]" (3) "[t]he use of 'system models' for controlling well site equipment was also known[;]" and (4) "using electric fracturing pumps was also well-known." Pet. 94–97. Petitioners, however, fail to show how the recited use of these structural

elements (as opposed to merely the structural elements themselves) was conventional and is not indicative of an innovative concept. Accordingly, the Petition fails to articulate adequately and with particularity why claim 1 is patent ineligible. *See KioSoft Techs. LLC v. PayRange Inc.*, PGR2021-00093, Paper 38 at 46 (P.T.A.B. Dec. 14, 2022) ("We agree that Petitioner has not explained, for example, how the recited *use* of an accelerometer (as opposed to merely the accelerometer itself) was conventional and is not indicative of an innovative concept. We determine that Petitioner fails to articulate adequately and with particularity why dependent claim 7 is patent ineligible under § 101."). Moreover, simply asserting that the use of these elements "as a general concept was known does not explain adequately, for example, whether the use as recited in the claim and in conjunction with the [other claim elements] is indicative that an inventive concept may be present or simply appends well-understood, routine, conventional activities previously known to the industry." *Id.* at 47. The testimony of Petitioners' expert, Dr. Nikolaou, fails to make up for the deficiencies of the Petition. Like the Petition, Dr. Nikolaou's analysis of the "structural elements recited in the claims of the '058 Patent" fails to explain how the recited use of these structural elements (as opposed to merely the structural elements themselves) was purportedly conventional. Ex. 1003 at ¶¶ 191–93. Dr. Nikolaou's testimony is also insufficient to show lack of an inventive concept because it merely purports to show that isolated elements of the

claim were allegedly disclosed in one or two prior art references. *See id.* But the inquiry "goes beyond what was simply known in the prior art" and "[t]he mere fact that something is disclosed in a piece of prior art . . . does not mean it was well-understood, routine, and conventional." *Berkheimer*, 881 F.3d at 1369.

The Board should also deny institution because the Petition fails to consider the claim elements as an ordered combination, focusing instead on the individual elements in isolation. *See, e.g.*, *KioSoft*, PGR2022-00035, Paper 7 at 28 (rejecting petitioner's arguments as unpersuasive "because the arguments fail to address the claimed subject matter as an ordered combination"); *Intermix Media, LLC v. Bally Gaming, Inc.*, CBM2015-00154, Paper 10 at 7–8 (P.T.A.B. Jan. 20, 2016) ("Petitioner's failure to do a full analysis under *Alice* constitutes a breach of 37 C.F.R. § 42.304(b)(4), as well as 35 U.S.C. § 322(a)(3), which requires identifying the grounds 'with particularity.'"). Accordingly, the Petition fails to show that alleged representative claim 1 is directed to patent-ineligible subject matter.

F. Ground 1 Fails Because *Pankaj* in View of *Payne* Does not Render Claims 1–4, 6–7, 9–12, 14, and 16–19 Unpatentable

To show that the challenged claims are obvious, the Petition must establish that all claim elements are present in the cited art. *See Pers. Web Techs., LLC v. Apple, Inc.*, 848 F.3d 987, 993 (Fed. Cir. 2017) (reversing obviousness determination for failing to explain how the cited art "disclose all of the elements recited in the

challenged claims"). The Petition fails to show that the cited references disclose or render obvious multiple limitations of the '058 Patent.

1. The *Pankaj*-Payne Combination does not disclose or render obvious Limitations [1A], [9A], and [16A]

The Board should deny institution, because the Petition fails to demonstrate how the *Pankaj-Payne* combination discloses or renders obvious generation of a ***sequence*** of stimuli for application to a well environment. Ex. 1001, cls. 1, 9, & 16; *see also* 37 C.F.R. § 42.104(b)(4) ("The petition must specify where each element of the claim is found in the prior art patents or printed publications relied upon."). Claim 1 requires, in part, "generating a ***sequence*** of stimuli for application to a well environment, the ***sequence*** of stimuli comprising one or more of particulate concentrations, chemical concentrations, or a pump rate control." Claims 9 and 16 require similar limitations. *See* 1001, cls. 9 & 16.

As noted above, the parties propose that each claim term be afforded its plain and ordinary meaning and do not separately construe any term from limitation [1A]. *See supra* Section III.C. Consistent with the requirements of independent claims 1, 9, and 16, the '058 Patent describes that:

> Stimuli can include, for example and without imputing limitation, a selection of surface concentrations of particulates and/or chemicals pumped downhole, an adjustment to fluid rate, or an adjustment to pressure, etc.

> Further, ***stimuli may be modified over a span of time as part of a sequence of stimuli***.

Ex. 1001, 3:26–31. The '058 Patent also provides that:

> Stimuli sequence generator and controller 330 includes a stimuli model 324, a stimuli scheduler 326, and a stimuli control 328. Stimuli model 324 may be used to determine which stimuli to produce and/or modify to generate, update, or apply a representative system model. Stimuli scheduler 326 may ***generate a stimuli sequence based on the stimuli determined by stimuli model*** 324. Stimuli control 328 may execute the generate stimuli sequence by generating respective commands, ***based on the scheduled sequence***, to provide to pump system interface 314.

Ex. 1001, 8:12–21. The discussion of a ***sequence*** of stimuli in the '058 Patent is consistent with an ordinary meaning of the term. For example, the *New Oxford American Dictionary* definition of "sequence" is "a particular ***order*** in which related events, movements, or things follow each other." Ex. 2011 (*Sequence*, NEW OXFORD AMERICAN DICTIONARY (3d ed. 2010) (emphasis added)); *see also* Ex. 2012 (*Sequence*, AMERICAN HERITAGE DICTIONARY OF THE ENGLISH LANGUAGE (5th ed. 2016) ("A following of one thing after another; succession.")).

The Petition fails to demonstrate how the *Pankaj-Payne* combination discloses or renders obvious generation of a ***sequence*** of stimuli for application to a well environment, the ***sequence*** of stimuli comprising one or more of particulate concentrations, chemical concentrations, or a pump rate control. When addressing limitation [1A], the Petition refers to step 1172 of Figure 11 of *Pankaj* and its related description which discloses "stimulating the formation around each wellbore (e.g., perforating, injecting)." Ex. 1005 at [0097]. The Petition states that "[a] POSITA would understand 'perforating' and 'injecting' refer to fracturing treatment processes" and quotes various portions of *Pankaj* related to pumping and injection of stimulation fluids. Pet. 41–42. The Petition then provides a conclusory statement that:

> A POSITA would understand the cited teachings of *Pankaj* to disclose applying a sequence of stimuli to the well ("stimulate the formation") by adjusting one or more properties of the fracturing fluid such as the volume of fluid and/or concentration of proppant ("adjusting the material being injected") or its pumping rate ("the wait it is injected").

Id. at 42. Nowhere, however, does the Petition discuss or demonstrate how *Pankaj* discloses generation of a ***sequence*** of stimuli. For example, there is no discussion

of any order or timing of various stimuli to meet the requirement that a ***sequence*** be generated. The Petition, instead, appears to completely ignore this requirement. Indeed, the only mention of "sequence" in the analysis of limitation [1A] is when the Petition is parroting the claim language. There is no attempt to explain how "adjusting one or more properties of the fracturing fluid" such as its volume, concentration of proppant, or its pumping rate (referenced in the conclusory sentence quoted above) discloses the generation of a ***sequence*** of stimuli. The declaration cannot save the Petition, as it merely copies what is in the Petition. Ex. 1003 at ¶ 83. This Board has found that where an expert's declaration "merely repeats, *verbatim*, the conclusory assertion for which it is offered to support" without citing "any additional supporting evidence or provid[ing] any technical reasoning to support [their] statement[,]" then the declaration "adds little to the conclusory assertion for which it is offered to support, and is entitled to little weight." *Xerox Corp. v. Bytemark, Inc.*, IPR2022-00624, Paper 9 at 15 (P.T.A.B. Aug. 24, 2022) (precedential) (citations omitted) (denying institution because petitioners' expert's declaration repeated the same conclusory statements as the petition without any support). This is a major defect that cannot be corrected by Petitioners. *See Unified Pats. Inc. v. SMTM Techs., LLC*, IPR2019-00434, Paper 6 at 19–20 (P.T.A.B. July 30, 2019) (denying institution when petitioner did not address a claim limitation and therefore did not show a reasonable likelihood of prevailing).

Despite the Petition's assertion in the conclusory sentence quoted above that *Pankaj* "discloses" applying a sequence of stimuli to the well, in the very next and last sentence of the section addressing limitation [1A], the Petition states "[t]hus, a POSITA would understand that *Pankaj* discloses ***(or renders obvious)***" the limitation. Pet. 42. It is not clear from this cursory statement what portion of the limitation, if any, the Petition is contending is not disclosed but rendered obvious by *Pankaj*. Regardless, this conclusory statement cannot support an obviousness assertion. Even if it is assumed that *Pankaj* discloses stimuli for a fracturing application, the Petition provides no explanation or analysis and does not even attempt to show an "articulated reasoning with some rational underpinning to support the legal conclusion of obviousness" with respect to generation of a ***sequence***. *KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 418 (quoting *In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006)).

The Petition does not allege that *Payne* makes up for the deficiencies of *Pankaj*. Accordingly, for at least the foregoing reasons, the *Pankaj-Payne* combination fails to disclose or render obvious "generating a sequence of stimuli for application to a well environment" as required in limitation [1A].

2. The *Pankaj*-Payne Combination does not disclose or render obvious Limitations [1C], [9C], and [16C]

Similarly, the Board should deny institution, because the Petition fails to demonstrate how the *Pankaj-Payne* combination discloses or renders obvious

selecting a representative system model ***based on the sequence of stimuli***. Ex. 1001, cls. 1, 9, & 16; *see also* 37 C.F.R. § 42.104(b)(4). Claim 1 of the '058 Patent at limitation [1C] requires, in part, "selecting a representative system model ***based on the*** received formation response data and ***sequence of stimuli***," referring back to the sequence of stimuli generated in limitation [1A]. Claims 9 and 16 require similar limitations. *See* Ex. 1001, cls. 9 & 16.

In its discussion of limitation [1C], the Petition does not reference its discussion of limitation [1A] that includes the generation of the "sequence of stimuli," but instead appears to suggest that "fracture parameters and stimulation step" of *Pankaj* satisfy the sequence of stimuli upon which a representative system model is selected. Pet. 47 ("Selecting the appropriate model is based on both wellsite data ('*received formation response data*'), . . . and fracture parameters and stimulation step ('*sequence of stimuli*') . . . ."). The Petition also states that "[r]eservoir simulations likewise use models determined from generated fracture parameters ('*sequence of stimuli*') and wellsite data ('*the received formation response data*')." *Id.* Here, for limitation [1C], the Petition appears to allege that "fracture parameters" of *Pankaj* are the sequence of stimuli upon which a representative system model is selected.

Similar to limitation [1A], the Petition does not address or explain how the fracture parameters or stimulation step of *Pankaj* disclose a ***sequence*** of stimuli, let

alone such a ***sequence*** upon which a representative system model is selected. There is no discussion of any order or timing of the fracture parameters or stimulation step to meet the requirement of a ***sequence***. The Petition again ignores this requirement. And as was the case for limitation [1A], the declaration merely parrots what is in the Petition. Ex. 1003 at ¶¶ 91–94; *see also Xerox*, Paper 9 at 15.

The Petition does not allege that *Payne* makes up for the deficiencies of *Pankaj* with respect to limitation [1C]. Accordingly, for at least the foregoing reasons, the *Pankaj-Payne* combination fails to disclose or render obvious "selecting a representative system model based on the received formation response data and sequence of stimuli."

3. The *Pankaj*-Payne Combination does not disclose or render obvious Claims 4, 12, and 19

The Petition fails to demonstrate how the *Pankaj-Payne* combination discloses or renders obvious updating one of a linear or a non-linear relationship based on multiple iterations of the generated sequence of stimuli. Ex. 1001, cls. 4, 12, & 19; *see also* 37 C.F.R. § 42.104(b)(4). Claim 4 recites "wherein selecting the representative system model further comprises:

> determining one of a linear or a non-linear relationship between the sequence of stimuli and received formation response data; and

updating the one of the linear or the non-linear relationship based on multiple iterations of the generated sequence of stimuli."

Ex. 1001, cl. 4; *see also id.* at cls 12 & 19. The Petition alleges that these limitations "are disclosed" by *Pankaj*. Pet. 57.

For the determination of "one of a linear or a non-linear relationship between the sequence of stimuli and received formation response data," the Petition references equations (1)–(5) discussed in paragraphs [0106]–[0110] of *Pankaj* and alleges that they represent a linear relationship between the sequence of stimuli and received formation response data. Pet. 57–58. The Petition also references *Pankaj*'s disclosure that combining equations (1)–(5) and discretizing the fracture network into small elements may lead to a nonlinear system of equations in terms of fluid pressure p in each element. *Id.* at 58 (citing Ex. 1005 at [0111]).

When addressing the "updating the one of the linear or the non-linear relationship based on multiple iterations of the generated sequence" aspect of the limitation, the Petition references aspects of *Pankaj* that discuss generating integrated dynamic wellsite parameters at step 1180 of Figure 11 and performing fracture and/or production operations at one or more of the wellbores based on the integrated wellsite parameters at step 1180. Pet. 58–59 (citing Ex. 1005 at [0140]–[0141]). The Petition then summarily concludes that a POSITA "would have

understood that this means the updated parameters are both (i) used for fracture and/or production operation and (ii) factored into the linear (or nonlinear) mathematical relationship mentioned above for future models." Pet. 59. But the Petition makes no attempt to explain why or how disclosure of steps 1180 and 1182 of *Pankaj* relate in any way to equations (1)–(5) relied on for both a linear and nonlinear relationship between the sequence of stimuli and received formation response data, let alone why or how steps 1180 and 1182 disclose "updating" those alleged relationships "based on multiple iterations of the generated sequence of stimuli." This is particularly noteworthy given that steps 1180 and 1182 occur well after the steps of Figure 11 relied on in the Petition as satisfying the generating a sequence of stimuli (relying on step 1172); receiving formation response data (relying on step 1173), and selecting a representative system model (relying on steps 1176–1177). *See id*. at 40–42 (addressing limitation [1A]), 43–45 (addressing limitation [1B]), 45–48 (addressing limitation [1C]). Notably, the declaration adds nothing, as it is almost a verbatim copy of what is in the Petition. *Compare* Ex. 1003 at ¶ 114, *with* Pet. 58–59. *See also Xerox*, Paper 9 at 15.

With respect to the claim requirement that the linear/non-linear relationships be updated "based on multiple iterations of the generated sequence of stimuli," the Petition includes a mere parenthetical cite to Figure 4.2 of *Pankaj* and suggests this figure "show[s] loop ('*multiple iterations*') with matching exercise to change

reservoir properties, fracture design parameters, and fluid properties." Pet. 59. Figure 4.2 of *Pankaj*, however, depicts "[a]n example workflow for using simulations to design operations to facilitate production." Ex. 1005 at [0070]. Both the Petition and declaration are devoid of any explanation of how such a workflow supports—or even relates to—an update of the alleged linear/non-linear relationships of equations (1)–(5) relied on in the Petition. *Compare* Ex. 1003 at ¶ 114, *with* Pet. 59.

The Petition does not allege that *Payne* makes up for the deficiencies of *Pankaj*. Accordingly, for at least the foregoing reasons, the *Pankaj-Payne* combination fails to disclose or render obvious the limitations of claims 4, 12, and 19.

G. Grounds 2–4 Fail for the Same Reasons Discussed for Ground 1

Grounds 2–4 addressing dependent claims 3, 5–6, 8, 11, 13, 15, 18, and 20 do not rely on any additional references or arguments for the unpatentability challenges to independent claims 1, 9, and 16. These grounds thus fail for the same reasons discussed above for Ground 1.

IV. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board decline to institute post-grant review of the '058 Patent.

Date: August 3, 2023

Respectfully submitted,

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CERTIFICATE OF COMPLIANCE

Pursuant to 37 C.F.R. § 42.24(d), the undersigned certifies that the foregoing Patent Owner Preliminary Response, exclusive of the exempted portions provided in 37 C.F.R. § 42.24(a), contains no more than 13,550 words and therefore complies with the type-volume limitations of 37 C.F.R. § 42.24(b).

Dated: August 3, 2023

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CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. §§ 42.6(e) and 42.205(a), the undersigned certifies that on the 3rd day of August, 2023, a complete and entire copy of PATENT OWNER'S PRELIMINARY RESPONSE UNDER 37 C.F.R. § 42.207 and related documents were served on Petitioners via electronic mail at the below addresses:

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