

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

HALLIBURTON ENERGY SERVICES, INC.,
Patent Owner.

PGR2023-00023
Patent 11,373,058 B2

Before HUBERT C. LORIN, JAMES L. MAYBERRY, and
BRENT M. DOUGAL, *Administrative Patent Judges*.

DOUGAL, *Administrative Patent Judge*.

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

I. INTRODUCTION

A. *Background and Summary*

Petitioner, ProFrac Holding Corporation and U.S. Well Services, LLC, requests that we institute a post-grant review challenging the patentability of claims 1–20 (the “challenged claims”) of U.S. Patent 11,373,058 B2 (Ex. 1001, “the ’058 patent”). Paper 2 (“Petition” or “Pet.”). Patent Owner, Halliburton Energy Services, Inc., argues that Petitioner’s request is deficient and should not be granted. Paper 6 (“Preliminary Response” or “Prelim. Resp.”).

Applying the standard set forth in 35 U.S.C. § 324(a), which requires a demonstration by Petitioner that at least one claim is more likely than not unpatentable, we institute a post-grant review.¹

B. *Related Matters*

The parties identify the following pending district court litigation: *Halliburton Energy Services, Inc. v. U.S. Well Services, LCC and ProFrac Holding Corp.*, No. 6:22-cv-00906-ADA (W.D. Tex.). Pet. 1; Paper 4, 2.

C. *The ’058 Patent*

The ’058 patent is titled “System and Method for Treatment Optimization.” Ex. 1001, code (54). The ’058 patent discloses “techniques for optimizing well treatments using representative system models selected according to formation responses to stimuli indicated by sensor data.” *Id.* at 2:12–15. Techniques are described that generate a sequence of stimuli for application to a well environment in order to produce a response from the formation. *Id.* at 2:12–22. Sensor data in response to the generated sequence

¹ Our findings and conclusions at this stage are preliminary, and thus, no final determinations are made.

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.

D. Illustrative Claim

Of the challenged claims, claims 1, 9, and 16 are independent, and claim 1 is representative:

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, 11:54–67.

E. Evidence

Petitioner’s grounds of unpatentability rely on the following evidence:

Name	Patent Document	Exhibit
Pankaj	U.S. 2018/0230782 A1 (Aug. 16, 2018)	1005
Payne	U.S. 2016/0258267 A1 (Sept. 8, 2016)	1006
Dawson	U.S. 10,378,333 B2 (Aug. 13, 2019)	1024
Lecerf	U.S. 10,087,722 B2 (Oct. 2, 2018)	1027
Klumpen	U.S. 8,352,227 B2 (Jan. 8, 2013)	1019

F. Asserted Grounds

Petitioner asserts the following grounds of unpatentability (Pet. 24), supported by the declaration of Michael Nikolaou. (Ex. 1003):

Claim(s) Challenged	35 U.S.C. §	Reference(s)/Basis
1–4, 6–7, 9–12, 14, 16–19	103	Pankaj, Payne
5, 6, 13	103	Pankaj, Payne, Dawson
8, 15, 20	103	Pankaj, Payne, Lecerf
3, 11, 18	103	Pankaj, Payne, Klumpen
1–20	101	Eligibility

II. ANALYSIS

A. Introduction

The '058 patent's eligibility for post-grant review is not disputed. *See* Pet. 2; *see generally* Prelim. Resp. Thus, we first address the obviousness grounds under 35 U.S.C §103 and then address subject matter eligibility under 35 U.S.C. § 101.

B. Legal Standard under 35 U.S.C §103

Petitioner bears the burden to demonstrate unpatentability under the more likely than not standard. 35 U.S.C. § 324(a); *Dynamic Drinkware, LLC v. Nat'l Graphics, Inc.*, 800 F.3d 1375, 1378 (Fed. Cir. 2015).

A claim is unpatentable “if the differences between the claimed invention and the prior art are such that the claimed invention as a whole would have been obvious . . . to a person having ordinary skill in the art to which the claimed invention pertains.” 35 U.S.C. § 103; *see also KSR Int'l Co. v. Teleflex Inc.*, 550 U.S. 398, 406 (2007). We resolve the question of obviousness based on underlying factual determinations, including: (1) the scope and content of the prior art; (2) any differences between the prior art and the claims; (3) the level of skill in the art; and (4) when in evidence,

objective indicia of nonobviousness. *See Graham v. John Deere Co.*, 383 U.S. 1, 17–18 (1966).

We apply these principles to the Petition’s challenges.

C. Level of Ordinary Skill in the Art

We review the grounds of unpatentability in view of the understanding of a person of ordinary skill in the art at the time of the invention. *Id.* at 13, 17. Petitioner asserts that a person of ordinary skill in the art (POSA):

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. Further, a person with additional education but less professional experience, and vice-versa, may qualify.

Pet. 23–24 (citing Ex. 1003 ¶ 4). Patent Owner adopts Petitioner’s definition. Prelim. Resp. 15.

We are persuaded, on the present record, that Petitioner’s proposal is consistent with the problems and solutions in the ’058 patent and prior art of record. We adopt Petitioner’s definition of the level of skill for the purposes of this Decision.

D. Claim Construction

In post-grant review, we construe claims 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), including construing the claim in accordance with the ordinary and customary meaning of such claim as understood by one of ordinary skill in the art and the prosecution history pertaining to the patent. 37 C.F.R. § 42.200(b) (2022).

Neither Petitioner nor Patent Owner provides constructions of any claim terms. Pet. 25; Prelim. Resp 15–16.

We determine that no terms need to be construed at this time. *See Realtime Data, LLC v. Iancu*, 912 F.3d 1368, 1375 (Fed. Cir. 2019) (“The Board is required to construe ‘only those terms . . . that are in controversy, and only to the extent necessary to resolve the controversy.’” (quoting *Vivid Techs., Inc. v. Am. Sci. & Eng’g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999))).

E. 35 U.S.C. § 103 – Pankaj, Payne

Petitioner argues that the combination of Pankaj and Payne renders obvious claims 1–4, 6–7, 9–12, 14, and 16–19. Pet. 25–82. Patent Owner disagrees. Prelim Resp. 50–60.

In our below analysis, we first address the teachings of Pankaj and Payne. We then address the parties’ arguments with respect to independent claims 1, 9, and 16. This is followed by our analysis of claims 4, 12, and 19, and then the remaining claims. We conclude that Petitioner shows that claims 1, 9, and 16 are more likely than not unpatentable.

1. Pankaj

Pankaj is entitled “Method of Performing Integrated Fracture and Reservoir Operations for Multiple Wellbores at a Wellsite.” Ex. 1005, code (54). Pankaj describes methods for performing fracture or stimulation operations and production operations at a wellsite having multiple wellbores. *Id.* at Abstr. The 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. *Id.*

2. *Payne*

Payne is entitled “Well Fracturing Systems with Electrical Motors and Methods of Use,” and discloses a fracturing system using electrical motors, such as “electrical pump motors” and “electrical fracturing motor[s].” Ex. 1006, code (54), ¶¶ 14–15, 42.

3. *Claims 1, 9, 16*

Petitioner argues that Pankaj teaches most of the features of independent claims 1, 9, and 16.² Pet. 38–52. Petitioner relies on Payne for teaching that the fracturing pump can be electrical. *Id.* at 31, 49–51.

Petitioner also provides reasons why one of skill in the art would combine Pankaj and Payne. *Id.* at 31–38, 51. Patent Owner disagrees, while addressing claims 1, 9, and 16 together. Prelim. Resp. 50–57. For clarities sake, we address the arguments focusing on claim 1, though the arguments apply equally to claims 9 and 16.

a) *Uncontested Limitations*

Claim 1 includes:

1. A computer-implemented method for controlling electrical fracturing equipment for fracturing a well, the method comprising:

...

receiving formation response data comprising data from one or more downhole sensors or surface sensors;

...; and

² Petitioner argues that, with the exception of the preambles, claims 9 and 16 “are materially identical to the four steps in claim 1.” Pet. 52. We do not opine as to whether Petitioner has correctly identified the preambles.

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

Ex. 1001, 11:54–67.

As noted above, Petitioner argues that Pankaj teaches these features with the exception of the electrical fracturing pump being taught by Payne. Pet. 31–52. In particular, Petitioner points to Figure 11 of Pankaj, reproduced below, which shows a “method for performing an integrated oilfield” operation. *Id.* at 39, 43, 50 (each reproducing a clean or marked-up version of Fig. 11).

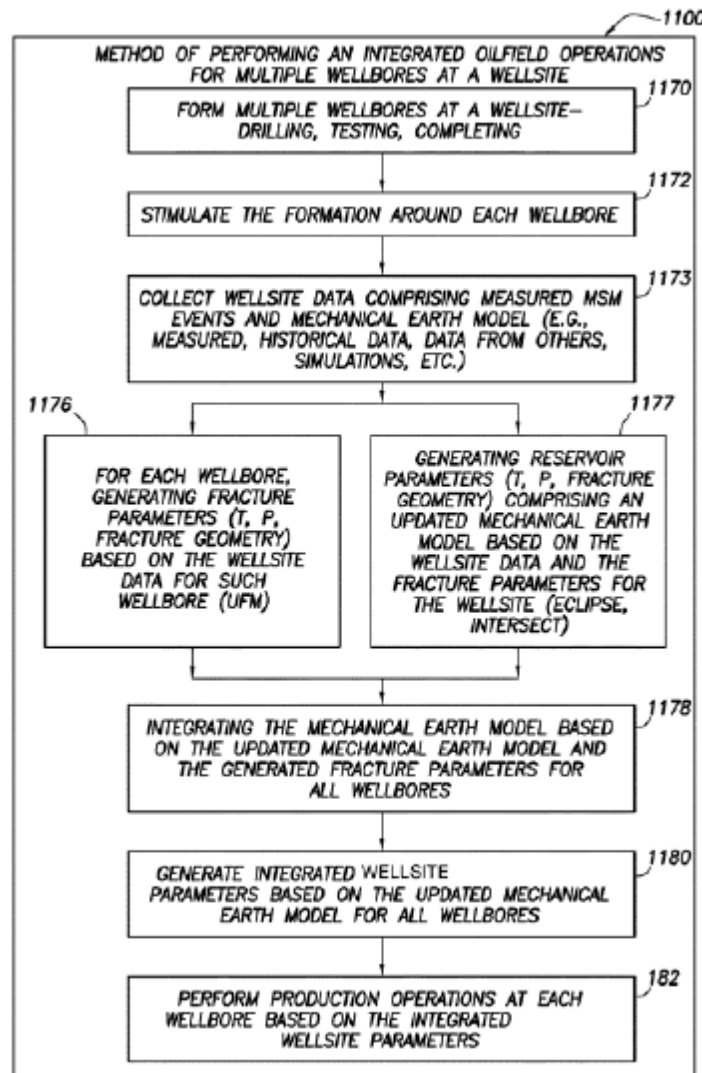


FIG. 11

Pankaj Figure 11 is a flowchart illustrating a method which generally involves gathering data about a wellsite, applying a model to the wellsite, and then performing operations at the wellsite based on the model. For this reason, Petitioner relies on Pankaj Figure 11 for teaching the above noted limitations of claim 1. For example, step 1173 involves collecting data from the wellsite, which Petitioner argues is done with sensors, and steps 1176 and 1177 involve generating certain parameters from the wellsite data. Pet. 43–45. Petitioner argues that these teachings read on the claimed “receiving formation response data comprising data from one or more downhole sensors or surface sensors.” *Id.*

Petitioner also relies on Pankaj Figure 11 to disclose the preamble and the final limitation, with the exception of the fracturing pump/fracturing equipment being electrical. *See* Pet. 38–40 (discussing e.g., Pankaj’s control method in Figure 11, teachings of computer implementation), 49–51 (discussing e.g., Pankaj’s controlling of production operations, including a fracturing pump). As previously noted, Petitioner relies on Payne for teaching that the fracturing pump can be electrical. *Id.* at 31, 49–51. Petitioner also provides reasons why one of skill in the art would combine Payne’s electrical fracturing pump with Pankaj’s fracturing system. *Id.* at 31–38, 51.

Patent Owner does not contest that the combination of Pankaj and Payne teaches the above noted limitations. *See generally*, Prelim. Resp. 50–57.

b) Sequence of Stimuli

Claim 1 also includes:

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.

Ex. 1001, 11:57–60.

Similar to the prior limitations, Petitioner points to Pankaj Figure 11 for teaching aspects of this limitation. Pet. 40–41. Petitioner states that “step 1172 discloses ‘*stimulating* the formation around each wellbore (e.g., *perforating, injecting*).’” *Id.* at 41 (citing Ex. 1005 ¶ 97). Petitioner also cites Pankaj as teaching “that ‘*injection* may be manipulated by *adjusting the material being injected and/or the way it is injected* to achieve the fractures.’” *Id.* at 42 (citing Ex. 1005 ¶ 61). Petitioner argues that a person of skill in the art would thus understand “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 way it is injected’).” *Id.* (citing Ex. 1003 ¶ 83).

Patent owner argues that “the Petition [does not] discuss or demonstrate how *Pankaj* discloses generation of a *sequence* of stimuli.” Prelim. Resp. 53. Patent Owner acknowledges that the Petition identifies that Pankaj teaches “‘adjusting one or more properties of the fracturing fluid’ such as its volume, concentration of proppant, or its pumping rate,” but argues that the Petition is deficient because it does not explain how this “discloses the generation of a *sequence* of stimuli.” *Id.* at 54.

We disagree. As noted by Patent Owner, the ’058 patent teaches that “stimuli may be modified over a span of time as part of a sequence of stimuli.” Ex. 1001, 3:29–31; *see also* Prelim. Resp. 52. Under the more likely than not standard, we determine that Pankaj’s teaching of manipulating injection, teaches, or least suggests, modifying stimuli over a

span of time, i.e., “a sequence of stimuli,” consistent with the disclosure of the ’058 patent.

c) Representative System Model

Claim 1 also includes:

selecting a representative system model based on the received formation response data and sequence of stimuli.

Ex. 1001, 11:63–65.

Petitioner argues that one of skill in the art would have understood Pankaj to teach this limitation because “the updated mechanical earth model is selected (*‘selecting a representative system model’*) based on both the wellsite data (*‘the received formation response data’*) and fracture parameters/stimulating step (*‘sequence of stimuli’*). Pet. 48 (citing Ex. 1003 ¶ 93). Among other things, Petitioner again points to various aspects of Figure 11. For example, Petitioner argues that Pankaj’s wellsite data is collected (step 1173) in response to stimulating the wellbore (step 1172). *Id.* at 47 (citing Ex. 1003 ¶ 92). Petitioner then argues that the “the fracture parameters [(step 1176)] and reservoir parameters [(step 1177)] are generated in response to both the wellsite data and the stimulation step” and used to select the updated mechanical earth model (step 1177). *Id.* at 47–48. Petitioner also identifies that the reservoir parameters define at least some of the parameters used to stimulate the wellbore. *Id.* at 47 (citing Ex. 1005 ¶ 119 (“The reservoir parameters (e.g., pressure, flow rate, permeability, viscosity etc.) may be determined based on the wellsite data and the generated fracture parameters 1176.”)).

Similar to the prior discussion, Patent Owner argues that the Petition fails to discuss how Pankaj teaches or suggests “selecting a representative system model *based on the sequence of stimuli.*” Prelim. Resp. 55–56.

Patent Owner notes that the Petition does not refer back to its prior discussion of the sequence of stimuli. *Id.* at 56. Patent Owner acknowledges Petitioner’s discussion of reservoir parameters and fracture parameters, but argues that this is insufficient to show how Pankaj teaches or suggests “selecting a representative system model ***based on the sequence of stimuli.***” *Id.* at 55–56.

Though the Petition does not refer back to the prior discussion of sequence of stimuli, it does rely on the same teachings previously discussed. For example, in discussing the reservoir parameters and fracture parameters, the Petition cites to Pankaj paragraph 61. Pet. 47. We previously determined herein, that Pankaj’s teaching of manipulating injection in paragraph 61, teaches, or least suggests, modifying stimuli over a span of time, i.e., “a sequence of stimuli,” consistent with the disclosure of the ’058 patent. Petitioner relies on this same teaching in discussing the reservoir parameters and fracture parameters, i.e., that this is one of those parameters used when selecting the updated mechanical earth model, and thus we do not fault Petitioner for not merely referring to the prior discussion.

d) Conclusion for Claims 1, 9, 16

In view of the above, and based on the current record, we determine that Petitioner has established that it is more likely than not that claims 1, 9, and 16 are unpatentable.

4. Claims 4, 12, 19

Petitioner argues that the limitations added by claims 4, 12, and 19 are taught by Pankaj. Pet. 57–59. Patent Owner disagrees. Prelim Resp. 57–60.

Claim 4 requires:

The method of claim 1, 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, 12:7–14. Claims 12 and 19 include similar limitations. *Id.* at 12:57–64, 14:9–17.

Petitioner argues that Pankaj identifies a number of linear equations and non-linear equations “that represent a mathematical relationship between fracture parameters (*‘sequence of stimuli’*) and modeled wellsite data (*‘formation response data’*).” Pet. 57 (citing Ex. 1003 ¶ 110), 58 (citing Ex. 1003 ¶ 111); *see also id.* at 57–58 (citing Ex. 1005 ¶¶ 106–112) (discussing the various equations).

Concerning the claimed “updating,” Petitioner argues that Pankaj teaches that using updated models integrated dynamic wellsite parameters are generated at step 1180 of Figure 11 and fracture and/or production operations can then be performed at one or more of the wellbores based on the integrated wellsite parameters. *Id.* at 58–59 (citing Ex. 1005 ¶¶ 140–141). The Petition then concludes that a person of skill in the art “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.” *Id.* at 59 (citing Ex. 1003 ¶ 114; Ex. 1005 ¶¶ 76, 141, Fig. 4.2).

Patent Owner argues that

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.”

Prelim. Resp. 59. Patent Owner further argues that

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.

Prelim. Resp. 59–60.

We agree with Patent Owner that the Petition does not include extensive explanations for Petitioner’s position in this regard. We further agree that the Petition does not readily identify how the embodiment in *Pankaj* Figure 4.2 is related to Figure 11, or how the various equations in *Pankaj* are related to Figure 11.

5. *Claims 2, 3, 6, 9–12, 14, 17, 18*

The Petition provides argument and supporting evidence to support its position that dependent claims 2, 3, 6, 9–12, 14, 17, and 18 are also unpatentable over *Pankaj* and *Payne*. Pet. 53–56, 59–63. Patent Owner does not provide any arguments specific to these claims. *See generally* Prelim. Resp. 50–60.

Having determined that it is more likely than not that Petitioner would prevail with respect to at least the independent claims, we decline to further address these dependent claims at this time.

F. 35 U.S.C. § 103 – Pankaj and Payne with Dawson, Lecerf, or Klumpen

Petitioner argues that the combination of Pankaj, Payne, and Dawson renders obvious claims 5, 6, and 13. Pet. 63–69. Petitioner argues that the combination of Pankaj, Payne, and Lecerf renders obvious claims 8, 15, and 20. Pet. 69–76. Petitioner argues that the combination of Pankaj, Payne, and Klumpen renders obvious claims 3, 11, and 18. Pet. 77–82. Each of these claims depend from one of claims 1, 9, and 16.

Patent Owner does not substantively address the limitations added by these claims. Prelim. Resp. 60. Having determined that it is more likely than not that Petitioner would prevail with respect to at least the independent claims, we decline to further address these dependent claims at this time.

G. Legal Standard under 35 U.S.C § 101 – Eligibility

1. Section 101

An invention is patent-eligible if it claims a “new and useful process, machine, manufacture, or composition of matter.” 35 U.S.C. § 101. However, the U.S. Supreme Court has long interpreted 35 U.S.C. § 101 to include implicit exceptions: “[l]aws of nature, natural phenomena, and abstract ideas” are not patentable. *E.g., Alice Corp. Pty. Ltd. v. CLS Bank Int’l*, 573 U.S. 208, 216 (2014).

In determining whether a claim falls within an excluded category, we are guided by the Court’s two-part framework, described in *Mayo* and *Alice*. *Id.* at 217–18 (citing *Mayo Collaborative Servs. v. Prometheus Labs., Inc.*, 566 U.S. 66, 75–77 (2012)). In accordance with that framework, we first determine what concept the claim is “directed to.” *See Alice*, 573 U.S. at 219 (“On their face, the claims before us are drawn to the concept of intermediated settlement, *i.e.*, the use of a third party to mitigate settlement

risk.”); *see also Bilski v. Kappos*, 561 U.S. 593, 611 (2010) (“Claims 1 and 4 in petitioners’ application explain the basic concept of hedging, or protecting against risk.”).

Concepts determined to be abstract ideas, and thus patent ineligible, include certain methods of organizing human activity, such as fundamental economic practices (*Alice*, 573 U.S. at 219–20; *Bilski*, 561 U.S. at 611); mathematical formulas (*Parker v. Flook*, 437 U.S. 584, 594–95 (1978)); and mental processes (*Gottschalk v. Benson*, 409 U.S. 63, 67 (1972)). Concepts determined to be patent eligible include physical and chemical processes, such as “molding rubber products” (*Diamond v. Diehr*, 450 U.S. 175, 191 (1981)); “tanning, dyeing, making water-proof cloth, vulcanizing India rubber, smelting ores” (*id.* at 182 n.7 (quoting *Corning v. Burden*, 56 U.S. 252, 267–68 (1853))); and manufacturing flour (*Benson*, 409 U.S. at 69 (citing *Cochrane v. Deener*, 94 U.S. 780, 785 (1876))).

In *Diehr*, the claim at issue recited a mathematical formula, but the Court held that “a claim drawn to subject matter otherwise statutory does not become nonstatutory simply because it uses a mathematical formula.” *Diehr*, 450 U.S. at 187; *see also id.* at 191 (“We view respondents’ claims as nothing more than a process for molding rubber products and not as an attempt to patent a mathematical formula.”). Having said that, the Court also indicated that a claim “seeking patent protection for that formula in the abstract . . . is not accorded the protection of our patent laws, and this principle cannot be circumvented by attempting to limit the use of the formula to a particular technological environment.” *Id.* (citation omitted) (citing *Benson* and *Flook*); *see, e.g., id.* at 187 (“It is now commonplace that an *application* of a law of nature or mathematical formula to a known structure or process may well be deserving of patent protection.”).

If the claim is “directed to” an abstract idea, we turn to the second step of the *Alice* and *Mayo* framework, where “we must examine the elements of the claim to determine whether it contains an ‘inventive concept’ sufficient to ‘transform’ the claimed abstract idea into a patent-eligible application.” *Alice*, 573 U.S. at 221. “A claim that recites an abstract idea must include ‘additional features’ to ensure ‘that the [claim] is more than a drafting effort designed to monopolize the [abstract idea].’” *Id.* (alterations in original) (quoting *Mayo*, 566 U.S. at 77). “[M]erely requir[ing] generic computer implementation[] fail[s] to transform that abstract idea into a patent-eligible invention.” *Id.*

2. USPTO Section 101 Guidance (MPEP)

Office policy dictates that the Board follow the 2019 Revised Guidance on the application of § 101. 2019 Revised Patent Subject Matter Eligibility Guidance, 84 Fed. Reg. 50 (Jan. 7, 2019) (“2019 Revised Guidance”). The Office issued further guidance on October 17, 2019, clarifying the 2019 Revised Guidance.³ These have been incorporated into the Manual of Patent Examination Procedure (“MPEP”). *See* MPEP, Ninth Edition, Revision 07.2022, published February 2023; Section 2106 Patent Subject Matter Eligibility.

According to the guidance set forth in the MPEP, we look to see whether a claim is directed to a judicial exception. MPEP 2106.04 Eligibility Step 2A. “Step 2A is a two-prong inquiry, in which [the Board] determine[s] in Prong One whether a claim recites a judicial exception, and if so, then determines in Prong Two if the recited judicial exception is integrated into a

³ USPTO, *October 2019 Update: Subject Matter Eligibility* (the “October 2019 Update”) (available at https://www.uspto.gov/sites/default/files/documents/peg_oct_2019_update.pdf).

practical application of that exception. Together, these prongs represent the first part of the Alice/Mayo [framework], which determines whether a claim is directed to a judicial exception.” *Id.*

Step 2B of the Office’s eligibility analysis is the second part of the *Alice/Mayo* framework. “Step 2B asks: Does the claim recite additional elements that amount to significantly more than the judicial exception?” MPEP 2106.05 Eligibility Step 2B.

H. 35 U.S.C § 101 – Claims 1, 9, 16

Petitioner argues that claim 1 is representative of the independent claims. Pet. 86–87 (citing *Content Extraction & Transmission LLC v. Wells Fargo Bank, Nat. Ass’n*, 776 F.3d 1343, 1348 (Fed. Cir. 2014) (“The Board may consider a representative claim when other claims are ‘substantially similar and linked to the same abstract idea.’”). Patent Owner does not concede this point, but only addresses claim 1 under 35 U.S.C § 101. Prelim. Resp. 23. We also address claim 1 as representative.

As a preliminary matter, Patent Owner argues that the Petition is deficient and institution should be denied because, *inter alia*, “Petitioners do not meaningfully address the Guidance.” *Id.* at 24. Providing arguments in the format of the Guidance is helpful. But whether or not Petitioner provides an analysis that follows the Guidance so as to “meaningfully address the Guidance,” is not, of itself, reason to deny the Petition.

1. Step 1

Step 1 asks whether the claimed subject matter falls within the four statutory categories of patentable subject matter identified by 35 U.S.C. § 101: process, machine, manufacture, or composition of matter.

Claim 1 recites “[a] computer-implemented method for controlling electrical fracturing equipment for fracturing a well,” and corresponding

steps. Ex. 1001, 11:54–55. Claim 1, thus, falls within the process category. *See* Prelim. Resp. 23–24; Pet. 93 n.7.

2. *Step 2A, Prong One*

In order to determine whether claim 1 is directed to an abstract idea, under Step 2A, Prong One, we first determine whether claim 1 recites an abstract idea (i.e., mathematical concepts, certain methods of organizing human activity such as a fundamental economic practice, or mental processes).

In that regard, Petitioner identifies certain claim limitations which it contends recite an abstract idea; that is,

a “computer-implemented method for controlling electrical fracturing equipment” requiring four steps: (1) generating a “sequence of stimuli for application to a well environment;” (2) receiving “response data ... from one or more downhole sensors or surface sensors;” (3) selecting a “representative system model based on” the sensor data and stimuli; and (4) controlling an electric fracturing pump “based on the representative system model.”

Pet. 87. Based on these claim limitations, Petitioner asserts that “[c]laim 1 is [] directed to the abstract idea of *selecting a plan* (‘representative system model’) *for a desired result* (‘controlling’ a pump) *based on information received* (‘response data’) *in response to one or more inquiries* (‘sequence of stimuli’).” Pet. 87.

Patent Owner argues that “[t]he Petition’s characterization of the alleged abstract idea . . . is overbroad and untethered to the claim language.” Prelim. Resp. 33; *see also id.* at 33–36. Patent Owner continues, “[t]he alleged abstract idea . . . has nothing to do with fracturing and nothing to do with the control of electrical fracturing equipment.” *Id.* at 34.

At this stage, we are satisfied that Petitioner has tied its characterization of the abstract idea to the identified claim limitations, thereby tethering the abstract idea to the claim. *See* Pet. 87. Petitioner’s position that the claim is *directed to* an abstract idea is not undermined by Petitioner having characterized the abstract idea to which the claim is *directed to* at a level of abstraction higher than claim limitations it has identified as reciting an abstract idea. Although Petitioner could have provided a characterization of the abstract idea that more closely aligns with the wording of the identified claim limitations, “[a]n abstract idea can generally be described at different levels of abstraction.” *Apple, Inc. v. Ameranth, Inc.*, 842 F.3d 1229, 1240 (Fed. Cir. 2016).

The Board’s slight revision of its abstract idea analysis does not impact the patentability analysis. The Supreme Court has recognized that “all inventions ... embody, use, reflect, rest upon, or apply laws of nature, natural phenomena, or abstract ideas.” *Alice*, 134 S.Ct. at 2354 (quoting *Mayo*, 132 S.Ct. at 1293). But not all claims are *directed to* an abstract idea. *See, e.g., Enfish, LLC v. Microsoft Corp.*, 822 F.3d 1327, 1334–36 (Fed. Cir. 2016); *McRO, Inc. v. Bandai Namco Games Am. Inc.*, 837 F.3d 1299, 1316 (Fed. Cir. 2016).

Id. at 1241 (emphasis original).

Petitioner further explains that the abstract idea it contends the claim is directed to (based on the identified claim limitations it contends recites an abstract idea) – “selecting a plan [] for a desired result [] based on information received [] in response to one or more inquiries []” (Pet. 87) – is the type that has been “repeatedly been found abstract by the Federal Circuit.” Pet. 87–88 (discussing *TDE Petroleum Data Solutions, Inc. v. AKN Enter.*, 657 F. App’x 991 (Fed. Cir. 2016) and *FairWarning IP, LLC v. Iatric Sys.*, 839 F.3d 1089 (Fed. Cir. 2016)).

We agree with Patent Owner that *TDE Petroleum Data Solutions* and *FairWarning* are not a perfect fit. Prelim. Resp. 37–40. We recognize, for instance, that *TDE Petroleum Data Solutions* does not include a step similar to the “controlling” step in claim 1. However, *TDE Petroleum Data Solutions*, in particular, is informative given the similarity between the “receiving,” “determining” and “selecting” steps in that case (*see id.* at 38) and at least the “receiving” and “selecting” steps in claim 1.

In this regard, we would encourage the parties to consider any similarity between the claims here and the claims involved in *Automation Middleware Solutions, Inc. v. Invensys Systems, Inc.*, 737 Fed. Appx. 1005 (Fed. Cir. 2018).

Petitioner further asserts that “[t]he ’058 patent claims also fail *Alice* step one because they are effectively directed to mental processes.” Pet. 91. Under this argument, Petitioner defines the mental process as “claimed steps of selecting a system model based on the received sensor data and then controlling the settings on the pump.” *Id.*; *see also* Prelim. Resp. 36–37. The Petition does not characterize “[t]he claimed steps of applying a sequence of stimuli and receiving sensor data” as part of the abstract idea, but argues “that these steps were conventional in the industry.” Pet. 92 n.6.

Petitioner goes on to argue that the “claimed steps of selecting a system model based on the received sensor data and then controlling the settings on the pump” are mental processes because it was known that they could be performed by a human as admitted by the ’058 patent. *Id.* at 91 (citing Ex. 1001, 1:9–26).

In response, Patent Owner argues that performance by a human is not the same thing as a mental process and “[n]otably, controlling the settings on

an electrical fracturing pump is not something that can be performed in the human mind.” Prelim. Resp. 36–37.

We agree with Patent Owner that not all activities performed by a human can be characterized as a mental process. However, Petitioner’s reliance on the teachings of the ’058 patent does support the position that some of the claim elements are mental processes and that some of the claim elements were known.

Petitioner relies on the following from the Background of the ’058 patent to support its argument that the specification admits that many of the claimed steps have been “performed by a human.” Pet. 91.

In the oil and gas industry, electric frac pumps are often controlled in order to achieve certain downhole environment responses. However, typically *settings are performed manually based on manually appraised information retrieved from the downhole environment*. For example, *a technician may review sensor data* and, based on experience, *adjust various settings such as flow rate, pressure values, chemical compositions, etc., on an electric frac pump*. In some cases, *a representative system model may be used for determining pump settings based on sensor information*; however, the representative system model is typically *manually selected by a technician based on observed sensor data*. Additionally, the representative system model may be a static construct and may not accurately reflect the well to which it has been deployed.

Ex. 1001, 1:9–26 (emphasis added). Petitioner’s reliance on the teachings of the ’058 patent, especially the Background, does support the position that some of the claim elements are mental processes.

We make the following additional observation. Comparing claim 1 with the Background, it will be understood that much of claim 1 was known to “be performed by a human.” At a minimum, this shows that the following activities were known: receiving formation response data from sensors and

the downhole environment, adjusting settings on (i.e. controlling) an electrical fracturing pump, selecting a representative system model based on sensor information, and controlling an electrical fracturing pump based on the representative system model.⁴ Further, adjusting settings on an electrical fracturing pump is also how the '058 patent teaches to generate a sequence of stimuli. Ex. 1001, 2:25–33 (“A given stimulus of the sequence of stimuli can be achieved by adjusting . . . flow rates In some examples, a sequence can include a particular stimulus (e.g., injection rate) being stepped through a sequence of various amplitudes (e.g., high, medium, low, etc.).”). Thus, generating a sequence of stimuli and receiving formation response data appear to be known. The Background would also appear to support the idea that “controlling an electrical fracturing pump based on the representative system model” is also known.

Be that as it may, the Background teaches that “the representative system model is typically manually *selected by a technician based on observed sensor data*,” which supports Petitioner’s position that the claimed step of “selecting a representative system model based on the received formation response data and sequence of stimuli” is a mental process. Patent Owner does not expressly contest that “selecting a representative system model based on the received formation response data and sequence of stimuli” is properly characterized as a mental process. Prelim. Resp. 37. The teaching that “*a technician may review sensor data*” also support’s

⁴ We agree with Patent Owner that the Background does not support a position that claim 1 merely automates a method that was entirely known to be performed manually. *See* Prelim. Resp. 41. At a minimum, the Background does not appear to teach selecting a representative system model based on the sequence of stimuli.

Petitioner's position that "receiving formation response data comprising data from one or more downhole sensors or surface sensors" is a mental process.

Regarding the step of "controlling an electrical fracturing pump," as we have noted, Patent Owner argues that this is not a mental process. Prelim. Resp. 37, 39. However, "the inability for the human mind to perform each claim step does not alone confer patentability." *FairWarning*, 839 F.3d at 1098 ("As we have explained, 'the fact that the required calculations could be performed more efficiently via a computer does not materially alter the patent eligibility of the claimed subject matter.'" *Bancorp Servs.*, 687 F.3d at 1278.").

We encourage the parties to further develop their arguments in regard to whether claim 1 is directed to a mental process, which claim elements are mental processes, and the relationship between any mental process and other claim elements.

3. Step 2A, Prong Two

Under Step 2A, Prong Two, if a claim recites a judicial exception, we determine whether the recited judicial exception is integrated into a practical application of that exception by (a) identifying whether there are any additional elements recited in the claim beyond the judicial exception(s); and (b) evaluating those additional elements individually and in combination to determine whether they integrate the exception into a practical application. 2019 Revised Guidance, 84 Fed. Reg. at 54–55. If the recited judicial exception is integrated into a practical application, the claim is not directed to the judicial exception. *Id.*

Petitioner argues that "[t]here is no inventive concept in the '058 patent claims" and that all structural elements were known. Pet. 94.

Petitioner discusses each claim limitation and cites the Background of the '058 patent, Pankaj, and certain other references in support. *Id.* at 94–97.

Petitioner further argues that “the 058 patent claims do not integrate the abstract idea into a practical application. For the reasons explained, the claims do not reflect an ‘improvement in the functioning of a computer’ but merely use a computer as a tool.” Pet. 93 n.7.

Patent Owner on the other hand argues that claim 1 is directed to a technological advance. Prelim. Resp. 26–33. Patent Owner argues that the claims are directed to a “method for controlling electrical fracturing equipment for fracturing a well.” *Id.* at 25–26. In support, Patent Owner discusses “hydraulic fracturing” generally, and identifies that the Specification discusses “hydraulic fracturing,” as well as, concepts related to features in claim 1. *Id.* at 26–29. Patent Owner then describes the benefits of the claimed system. *Id.* at 30. Patent Owner states that:

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.

Id.; *see also id.* at 42–44.

However, at the current stage, and in view of our analysis under 35 U.S.C. § 103, we do not agree that claim 1 is patentable or directed to a technological advance in the manner suggested. Rather, as outlined by Petitioner, claim 1 seems to cover steps that are conventional, or at least known, as taught by the Background of the '058 patent and/or Pankaj.

Patent Owner also argues that claim 1 is eligible under § 101, because the “controlling” step “adds a meaningful limitation” and “does not merely link the judicial exceptions to a technical field.” Prelim. Resp. 44 (citing Ex. 2008, 23–24) (comparing the controlling step in claim 1 to claim 4 in Example 45 in Appendix 1 to the October 2019 Update).

We do not agree that the controlling step “adds a meaningful limitation” to the claim. Claim 1 includes “controlling an electrical fracturing pump based on the representative system model.” The controlling step generically applies the selected representative system model to the electrical fracturing pump without adding anything specific to the control. Thus, it would appear to merely link the judicial exception to a technical field.

4. *Step 2B*

Under Step 2B, only if a claim (1) recites a judicial exception and (2) does not integrate that exception into a practical application, do we then look to whether the claim: (3) adds a specific limitation beyond the judicial exception that is not “well-understood, routine, [and] conventional” in the field; or (4) simply appends well-understood, routine, conventional activities previously known to the industry, specified at a high level of generality, to the judicial exception. 2019 Revised Guidance, 84 Fed. Reg. at 56.

The Federal Circuit in *Berkheimer* made clear that “not every § 101 determination contains genuine disputes over the underlying facts material to the § 101 inquiry.” *Berkheimer v. HP, Inc.*, 881 F.3d 1360, 1368 (Fed. Cir. 2018). In fact, the Federal Circuit in *Berkheimer* did not require evidentiary support for independent claim 1 because “[t]he limitations [of claim 1] amount to no more than performing the abstract idea of parsing and comparing data with conventional computer components.” *Id.* at 1370.

Petitioner argues that “the claims ‘amount to nothing more than applying the ... abstract idea using techniques that are, whether considered individually or as an ordered combination, well-understood, routine, and conventional.’ *cxLoyalty Inc. v. Maritz Holdings Inc.*, 986 F.3d 1367, 1377 (Fed. Cir. 2021).” Pet. 97.

Patent Owner again argues that the claims are inventive and unconventional. Prelim. Resp. 46–48. Patent Owner also argues that Petitioner’s analysis under this prong is insufficient. *Id.* at 48–50.

These arguments overlap with issues already addressed herein. Based on the current record, we determine that claim 1 does not include any specific limitation beyond the judicial exception that is not “well-understood, routine, [and] conventional” in the field.

I. 35 U.S.C § 101 – Dependent Claims

Petitioner provides argument that the dependent claims are also patent ineligible under 35 U.S.C. § 101. Pet. 99–105. Patent Owner does not address the dependent claims under this ground. *See* Prelim. Resp. 19–50.

We decline to address the dependent claims at this time.

III. CONCLUSION

For the foregoing reasons, we have determined that it is more likely than not that Petitioner would prevail with respect to at least one claim challenged in the Petition. We, therefore, institute trial as to all challenged claims on all grounds stated in the Petition.

IV. ORDER

In consideration of the foregoing, it is hereby:

ORDERED that, post-grant review of claims 1–20 of U.S. Patent 11,373,058 B2 is instituted; and

FURTHER ORDERED that pursuant to 35 U.S.C. § 324(c) and 37 C.F.R. § 42.4, notice is hereby given of the institution of a trial; the trial will commence on the entry date of this decision.

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Patent 11,373,058 B2

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