

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

HALLIBURTON ENERGY SERVICES, INC.
Patent Owner

Case No. IPR2023-01319
U.S. Patent 7,841,394

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U.S. Patent and Trademark Office
P.O. Box 1450
Alexandria, Virginia 22313-1450

Submitted Electronically

**PATENT OWNER'S PRELIMINARY RESPONSE
UNDER 37 C.F.R. § 42.107**

TABLE OF CONTENTS

I.	INTRODUCTION	1
II.	LEVEL OF ORDINARY SKILL IN THE ART	2
III.	CLAIM CONSTRUCTION	2
IV.	OVERVIEW OF THE '394 PATENT	3
	A. Patent Specification and Claims.....	3
	B. Priority Date	4
	C. Prosecution History	4
V.	OVERVIEW OF PRINCIPAL CITED REFERENCES	8
	A. Crossley	8
	B. Albers	12
	C. Lehman	14
VI.	THE BOARD SHOULD EXERCISE ITS DISCRETION UNDER 35 U.S.C. § 325(D) AND DENY INSTITUTION	14
	A. Factors (a), (b), and (d) demonstrate that the Patent Office already considered substantially the same art and arguments, and thus these factors weigh in favor of denying institution	16
	B. Factors (c), (e), and (f) demonstrate Petitioner has failed to show any material error by the Patent Office, and thus these factors weigh in favor of denying institution	22
VII.	PETITIONER HAS NOT SHOWN A REASONABLE LIKELIHOOD OF PREVAILING	25
	B. Grounds 1 and 2 Fail as to All Claims Because the Crossley/Albers Combination Does Not Disclose or Render Obvious Each Element of Independent Claims 1 and 24-27.	27
	1. Claim Limitations 1[D], 24[D], 25[D], 26[D], and 27[D]: “means for simultaneously flowing: a first stimulation fluid	

	to the first [well / pad / plurality of wells] and not to the second [well / pad / plurality of wells]; and a second stimulation fluid to the second [well / pad / plurality of wells] and not to the first [well / pad / plurality of wells]”	28
2.	Claims 1[E], 24[E], 25[E], and 26[E]: “wherein the first stimulation fluid and the second stimulation fluid have different compositions”	36
3.	Claim 27[A]: “a well treatment operations factory capable of manufacturing and simultaneously pumping a plurality of well stimulation fluids”	42
C.	Grounds 1 and 2 Further Fail as to All Claims Because Crossley Teaches Away From Introducing Albers’s Stimulation Fluid Using Crossley’s Operations Control System as the Petition Proposes.....	42
1.	The Petition Should Not Have Ignored Crossley’s Intervention System	43
2.	Crossley Teaches Away from the Petitioner’s Proposed Combination with Albers	45
VIII.	CONCLUSION.....	49

LIST OF EXHIBITS

Petitioner's Exhibits	
No.	Exhibit Description
1001	U.S. Patent No. 7,841,394
1002	File History of U.S. Patent No. 7,841,394
1003	Declaration of Dr. Michael Nikolaou
1004	Curriculum Vitae of Dr. Michael Nikolaou
1005	WIPO Publication No. 2005/111369 A1 to Crossley ("Crossley")
1006	U.S. Patent No. 7,451,820 to Albers et al. ("Albers")
1007	U.S. Patent No. 4,397,353 to Lacy ("Lacy")
1008	WIPO Publication No. WO2007/024383A2 to Tolman ("Tolman")
1009	U.S. Patent App. Pub. No. 2004/0050550 A1 to Lehman et al. ("Lehman")
1010	S. Dalvi, Fundamentals of Oil & Gas Industry for Beginners (Notion Press 2015) (excerpts)
1011	U.S. Patent App. Pub. No. 2013/0306322 to Sanborn et al.
1012	U.S. Patent No. 9,410,410 to Broussard et al.
1013	U.S. Patent App. Pub. No. 2012/0255734 to Coli et al.
1014	U.S. Patent No. 3,560,053 to Ortloff
1015	U.S. Patent No. 3,664,422 to Bullen
1016	Claim Construction Order
1017	WD Texas Statistics

Patent Owner's Exhibits	
No.	Exhibit Description
2001	U.S. Patent No. 4,077,428 to Weaver (“Weaver”)
2002	Joint Claim Construction Brief
2003	U.S. Patent No. 3,933,205 to Kiel (“Kiel”)

TABLE OF AUTHORITIES

	Page(s)
CASES	
<i>ActiveVideo Networks v. Verizon</i> , 694 F. 3d 1312 (Fed. Cir. 2012)	35
<i>Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GMBH</i> , IPR2019-01469, Paper 6 (P.T.A.B. Feb. 13, 2020).....	15, 16
<i>Apple Inc. v. MPH Techs. Oy</i> , No. 2021-1355, 2022 WL 4103286 (Fed. Cir. Sept. 8, 2022).....	36
<i>Arendi S.A.R.L. v. Apple Inc.</i> , 832 F.3d 1355 (Fed. Cir. 2016)	26
<i>Becton, Dickinson & Co. v. B. Braun Melsungen AG</i> , IPR2017-01586, Paper 8 (P.T.A.B. Dec. 15, 2017)	15, 25
<i>Dominion Dealer Sols., LLC v. AutoAlert, Inc.</i> , IPR2013-00223, Paper 9 (P.T.A.B. Aug. 15, 2013).....	26, 37, 38
<i>Exacq Techs., Inc. v. Jds Techs., Inc.</i> , IPR2016-00568, Paper 7 (P.T.A.B. June 14, 2016)	48
<i>Graham v. John Deere Co.</i> , 383 U.S. 1 (1966).....	26
<i>Guest Tek Interactive Ent. Ltd. v. Nomadix, Inc.</i> , IPR2019-01191, Paper 9 (P.T.A.B. Dec. 27, 2019)	48
<i>Halliburton Energy Services, Inc. v. U.S. Well Services, LLC</i> , Case No. 22-cv-00906 (W.D. Tex.), Dkt. No. 109.....	2, 50, 51
<i>InfoBionic, Inc. v. Braemer Mfg., LLC</i> , IPR2015-01704, Paper 11 (P.T.A.B. Feb. 16, 2016).....	49
<i>Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.</i> , 821 F.3d 1359 (Fed. Cir. 2016)	25

<i>Johns Manville Corporation v. Knauf Insulation Inc.</i> , IPR2015-01633, Paper 10 (P.T.A.B., Jan. 4, 2016)	49
<i>K/S HIMPP v. Hear-Wear Technologies, LLC</i> , 751 F. 3d 1362 (Fed. Cir. 2014)	25
<i>Kinetic Techs., Inc. v. Skyworks Sols., Inc.</i> , IPR2014-00529, Paper 8 (P.T.A.B. Sept. 23, 2014).....	48
<i>Nokia of America Corporation v. Alexander Soto et al</i> , IPR2023-00680 (PTAB Nov. 3, 2023).....	20
<i>Para-Ordnance Mfg., Inc. v. SGS Importers Int'l, Inc.</i> , 73 F.3d 1085 (Fed. Cir. 1995)	27
<i>Personal Web Techs., LLC v. Apple</i> , 848 F.3d 987 (Fed. Cir. 2017)	26, 27
<i>Rohm & Haas Co. v. Brotech Corp.</i> , 127 F.3d 1089 (Fed. Cir. 1997)	48
<i>SAS Institute, Inc. v. Iancu</i> , 138 S. Ct. 1348 (2018).....	36
<i>TQ Delta, LLC v. CISCO Sys., Inc.</i> , 942 F.3d 1352 (Fed. Cir. 2019)	48
<i>W.L. Gore & Associates, Inc. v. Garlock, Inc.</i> , 721 F.2d 1540 (Fed. Cir. 1983), <i>cert. denied</i> , 469 U.S. 851 (1984)	27, 43
STATUTES	
35 U.S.C. § 312(a)(3).....	25
35 U.S.C. § 314(a)	25, 49
OTHER AUTHORITIES	
37 C.F.R. § 42.65(a).....	48
37 C.F.R. § 42.100(b)	2
37 C.F.R. § 42.104(b)(4).....	25

37 C.F.R. § 42.108(c).....	25
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I. INTRODUCTION

Halliburton Energy Services, Inc. (“Patent Owner”) respectfully submits this Preliminary Response in accordance with 35 U.S.C. § 313 and 37 C.F.R. § 42.107, responding to the Petition for *inter partes* review (the “Petition”) filed by Profrac Holding Corporation and U.S. Well Services, LLC (“Petitioner”) challenging Claims 1-27 (the “challenged claims”) of U.S. Patent No. 7,841,394 (the “’394 Patent”).

The Board should exercise its discretion to deny institution of *inter partes* review the ’394 Patent under 35 U.S.C. § 325(d). One of the Petition’s three main references, Albers, was substantially considered by the Patent Office during prosecution and overcome based on arguments similar to those presented herein. The other references, Crossley and Lehman, are cumulative to references that were considered by the Patent Office during prosecution.

Moreover, Petitioner fails to show that Crossley, Albers, or their combination, teaches (i) “simultaneously flowing: a first stimulation fluid to the first [well / pad / plurality of wells] and not to the second [well / pad / plurality of wells]; and a second stimulation fluid to the second [well / pad / plurality of wells] and not to the first [well / pad / plurality of wells]” or (ii) simultaneously flowing a first stimulation fluid and a second stimulation fluid “wherein the first stimulation fluid and the second stimulation fluid have different compositions.” In addition, Crossley teaches

away from the Petition's proposed use of Crossley's system to pump the well stimulation fluid of Albers. For the reasons set forth more fully below, institution should be denied.

II. LEVEL OF ORDINARY SKILL IN THE ART

Solely for purposes of this Patent Owner's Preliminary Response ("POPR") only, Patent Owner applies Petitioner's definition of a person of ordinary skill in the art ("POSITA"). Petition at 3-4. Patent Owner reserves the right to propose its own definition if this IPR is instituted.

III. CLAIM CONSTRUCTION

The Petition states that it applies the construction of "means for simultaneously flowing" as agreed by the parties and entered by the district court in the parallel litigation.¹ Pet. at 5-6; Ex. 2002 at 3. For purposes of this POPR, Patent Owner applies this same construction of "means for simultaneously flowing" and otherwise interprets the claims "in accordance with the ordinary and customary meaning" as understood by a POSITA. 37 C.F.R. § 42.100(b).

¹ Since the Petition was filed, the parallel district court litigation was stayed pending resolution of this and two other post-grant proceedings at the Patent Trial and Appeal Board. *Halliburton Energy Services, Inc. v. U.S. Well Services, LLC*, Case No. 22-cv-00906 (W.D. Tex.), Dkt. No. 109.

IV. OVERVIEW OF THE '394 PATENT

A. Patent Specification and Claims

The background of the '394 Patent explains that “[t]he servicing and stimulation of wells can require a series of coordinated operations that begin with the supply by truck of equipment, supplies, fuel, and chemicals to the wellhead.” *Id.* at 1:24-27. “The equipment is then set up and made ready with proppant and chemicals.” *Id.* at 1:27-28. “After completion of the well services, equipment must be broken down and made ready for transport to the next pad for service.” *Id.* at 1:28-30. The '394 Patent explains that “[t]his movement of equipment and supplies has environmental impacts, and the exposure of mobile equipment to adverse weather conditions can jeopardize well treatment operations and worker safety.” *Id.* at 1:35-38. To address these concerns, the '394 Patent relates to “methods and apparatuses for simultaneously treating multiple wells from a centralized location and simultaneously connecting multiple wells to a single manifold, so as to conserve labor, infrastructure, and environmental impact.” Ex. 1001 at 1:7-11.

The '394 Patent discloses systems for centralized well operations that include a well treatment operations factory which manufactures and pumps a well stimulation fluid, a first connection between a first location (*e.g.*, a well, pad, or plurality of pads) and the factory, and a second connection between a second location (*e.g.*, a well, pad, or plurality of pads) and the factory. *Id.* at 1:61-66, Cl. 1-27. The

systems for centralized well operations also include a means for simultaneously flowing a first stimulation fluid to the first location and a second stimulation fluid to the second location. *Id.* at 1:66-2:3. The '394 Patent discloses that the stimulation fluids can be “any combination of proppant, fracturing fluid, gelling agent, friction reducer, and acid.” *Id.* at 2:3-5. The majority of the claims require that the first stimulation fluid and the second stimulation fluid have different compositions. *Id.* at Cl. 1-26.

B. Priority Date

U.S. Patent Application No. 11/291,496 (the “’496 Application”) leading to the '394 Patent was filed on December 1, 2005. The Petition acknowledges that “Patent Owner represented during the prosecution underlying the ‘394 Patent that it is entitled to a priority date of August 5, 2005,” and the Petition does not dispute this priority date. Pet. at 3.

C. Prosecution History

The '496 Application was filed with 39 claims, with claims 1, 5, 11, 34, and 35 being independent. Ex. 1002 at 18-24. The Examiner issued an Office Action on May 3, 2007, with a restriction requirement that required election between the method claims (claims 1-10), system claims (11-33), and apparatus claims (34-39). *Id.* at 143-146. Applicant’s representative had provisionally elected the system claims (11-33), and in the Office Action, the Examiner rejected claims 11-33 under

several different grounds, including rejections under 35 U.S.C. §§ 102 and 103 over U.S. Patent No. 4,305,463 to Zakiewicz (“Zakiewicz”) and U.S. Patent No. 5,515,920 to Luk (“Luk”). *Id.* at 147-149. In a response dated July 26, 2007, Applicant argued against these rejections without amending the claims. *Id.* at 159-164.

The Examiner issued a Final Office Action on October 16, 2007, that maintained the prior rejections over Zakiewicz and Luk. *Id.* at 221-227. Applicant filed a request for continued examination on January 9, 2008, with a response that amended independent claim 11 and added independent claims 40 and 41. *Id.* at 232-240. The Examiner issued an Office Action on August 21, 2008, that maintained the prior rejections over Zakiewicz and Luk. *Id.* at 403-409. In a response dated December 17, 2008, Applicant amended independent claim 11 as follows:

11. (Currently Amended) A system for centralized well operations comprising:
 - a well treatment operations factory which manufactures and pumps a well stimulation fluid;
 - a first connection between a first well location and the well operations factory;
 - a second connection between a second well location and the well operations factory; and
 - means for simultaneously flowing:
 - a first stimulation fluid [[only]] to the first well location and not to the second well location; and
 - a second stimulation fluid [[only]] to the second well location and not to the first well location.

Id. at 508-511. The response made similar amendments to independent claims 40 and 41 and added new independent claim 43. *Id.* at 516-517.

The Examiner issued a Final Office Action on March 11, 2009, that rejected the pending claims under several different grounds, including rejections under 35 U.S.C. § 112 and 35 U.S.C. §§ 102 and 103 over Tolman. *Id.* at 544-556. In a response dated May 6, 2009, Applicant argued that Tolman does not qualify as prior art and further that Tolman does not disclose a well treatment operations factory which manufactures a well stimulation fluid. *Id.* at 617-638.

The Examiner issued another Office Action on May 19, 2009, that rejected the pending claims under 35 U.S.C. § 102 over U.S. Patent No. 6,644,844 to Neal (“Neal”). *Id.* at 662-667. On July 21, 2009, Applicant’s representative conducted an interview with the Examiner during which Applicant proposed further amending claim 11 to include the limitation wherein the first and second fluids are fluids having different compositions. *Id.* at 691-692. On August 12, 2009, Applicant filed a response that amended independent claims 11 and 40-41, and 43 to include “wherein the first stimulation fluid and the second stimulation fluid have different compositions,” cancelled independent claim 33, and added independent claim 44. *Id.* at 695-709.

The Examiner issued a Final Office action on May 13, 2010, that rejected the pending claims under several different grounds, including rejections under 35 U.S.C.

§§ 102 and 103 over the prior publication of Albers (US 2006/0243437). *Id.* at 850-59. Applicant filed a request for continued examination on August 10, 2010, with a response that amended the claims to replace “well location” with well, pad, or plurality of wells and argued that Albers does not disclose at least two wells. *Id.* at 897-910.

On October 14, 2010, the Examiner issued a notice of allowance, withdrawing the rejections over Albers and allowing all pending claims 11-32 and 40-44. *Id.* at 952-56. In the notice of allowance, the Examiner noted there were several references that teach a system for centralized well operations, including U.S. Patent No. 4,077,428 by Weaver (“Weaver”), but none of the references disclose, teach, or suggest the combination of limitations that provide for the claimed system. *Id.* at 955-56. The Examiner also noted that the prior art fails to teach or suggest “simultaneous flowing of a first and second stimulation fluid having different compositions” as well as “simultaneous flowing of stimulations fluids having different compositions to each of the wells.” Ex. 1001 at 955-56. The ’496 Application issued as the ’394 Patent on November 30, 2010, including claims 1-27 with claims 1, 24, 25, 26, and 27 being independent. Ex. 1001.

V. OVERVIEW OF PRINCIPAL CITED REFERENCES

A. Crossley

International Patent Publication WO2005/111369 to Crossley *et al.* is entitled “System and Vessel for Supporting Offshore Fields.” Ex. 1005. Crossley was filed on February 23, 2005 and published on November 24, 2005. *Id.*

Crossley “generally relate[s] to a system for supporting a plurality of hydrocarbon-bearing wells, including systems for providing **production operations** in multiple-well-site, offshore fields.”² *Id.* at [0002]. Each well-site has one or more wells. *Id.* at [0008]. For example, in Figure 1 below, “the three fields 10, 20, 30 are being produced through three separate subsea well-sites” 110, 120, 130, and each well-site “has a plurality of wells 112, 122, 132 clustered together.” *Id.* at [0043].

Crossley’s system “comprises a floating vessel [150] that is relocatable from a first subsea well-site to a second subsea CD well-site.” *Id.* at Abstract, [0008], [0018]. “The system also comprises two separate systems: (1) **an operations control system** for providing subsea well-site operations such as power and communications” (annotated in blue in Figure 1 below), “and (2) **an intervention system** for conducting intervention services to an individual subsea well such as workover services and maintenance services” (annotated in red in Figure 1 below). *Id.*

² Emphasis added throughout unless otherwise indicated.

hydraulic fluid to selected subsea equipment, the delivery of low voltage electrical power for control equipment, and the delivery of electrical power for high power production equipment.” *Id.*

Specifically with respect to Figure 1, Crossley discloses that “[t]he operations control system 180 preferably employs two control links”—first, “a surface vessel control link 182 that extends from the relocatable vessel 150, downward to one of the collection manifolds, e.g., manifold 115,” and second, “an inter well-site controls network 184 that connects the subsea well-sites 110, 120, 130 together.” *Id.* at [0049]. With respect to “the delivery of chemicals to selected flowlines,” Crossley teaches that “[c]ontrol operations may further include the injection of chemicals such as **hydrate, paraffin, or wax inhibitors** into flow lines.” *Id.* at [0048]. Figure 4 of Crossley provides “an illustrative integrated line as may be used to transmit control features for the system.” *Id.* at [0015]. “Lines 428 and 428’ are preserved for the delivery of chemicals, such as hydrate inhibition fluids.” *Id.* at [0050]. “Chemicals may be delivered from the lines 428, 428’ and then through the manifold 115 for treatment of flow lines, valves, and even the wellbores as appropriate.” *Id.*

Unlike Crossley’s operations control system that simultaneously provides control operations to two separate wells or well-sites, Crossley’s intervention system (red) is “for conducting intervention services to an **individual** well.” *Id.* at [0020]; *see also id.* at Abstract, [0010], [0025], [0026], [0030], [0037], [0038], [0056],

[0061], Cl. 1 (disclosing intervention services for only one “an individual well” at a time). As shown in Figure 1, “the well intervention system 170 operates through the use of a workover riser 172 and an ROV system 508.” *Id.* at [0054]. “The riser 172 extends from the relocatable vessel 150, downward through the ocean to the wellhead of an individual well.” *Id.* at [0056]. “[T]he riser 172 may be disconnected from the wellhead of well 112, and reconnected to the wellhead of any other well in that subsea well-site 110,” or “[a]lternatively, the vessel 150 may be relocated to a second subsea well-site, e.g., site 120, where the workover riser 172 may be connected to a production or injection well in that second well-site, e.g., well 122.” *Id.*

“The intervention services include at least one of workover services and maintenance services.” *Id.* at [0010]. As used in Crossley, “‘workover’ refers to both major and minor well interventions.” *Id.* at [0037]. “Major interventions are those that require the pulling of tubing from the well” where as “[m]inor interventions, on the other hand, do not require the pulling of tubing.” *Id.* One example of a minor intervention provided in Crossley is “**the injection of acid or other treating fluids.**” *Id.* As used in Crossley, “‘[m]aintenance’ refers to the maintaining of equipment at the mudline or the wellhead platform, including equipment associated with the wellhead, the collection manifold, and any subsea fluid separators.” *Id.*

B. Albers

U.S. Patent No. 7,451,820 to Albers *et al.* is entitled “Method For Fracture Stimulating Well Bores.” Ex. 1006. Albers was filed on April 29, 2005 and issued on November 18, 2008. *Id.*

Albers is directed to “a method for fracture stimulating well bores using gaseous nitrogen and/or liquid carbon dioxide combined with substantially dehydrated proppant.” *Id.* at 1:65-67. As shown in Figure 1, Albers discloses “conventional” equipment used to manufacture and pump a fracturing fluid into a wellbore, including “[a] conventional blender unit (1),” “[a] conventional sand trailer (4),” “a conventional high-pressure pump (5),” “a conventional sand intensifier unit (7),” and “[a] first nitrogen/carbon dioxide storage tank and pump (10).” *Id.* at 3:56-4:4. This equipment is attached to “a manifold connection ... which is in turn connected to a first wellhead conduit (13) that extends directly to the wellhead.” *Id.* at 4:8-11. “A second nitrogen/carbon dioxide storage tank and pump (14) is shown extending directly to the wellhead via a second wellhead conduit (13a), bypassing the sand intensifier unit (7) altogether.” *Id.* at 4:11-14.

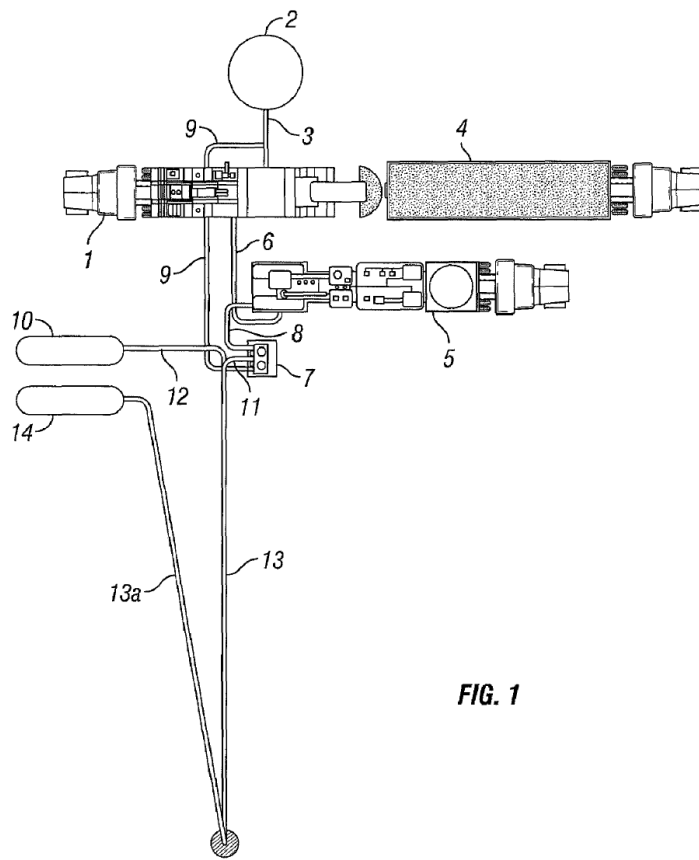


FIG. 1

This conventional equipment in Albers is used to combine partially dehydrated or “wet” proppant with nitrogen/carbon dioxide and deliver it to a wellhead at a rate and pressure sufficient to fracture stimulate the formation. *See, e.g., id.* at 2:25-27, 2:58-67, Cl. 1. Albers discloses two alternative procedures for delivering the wet proppant to **a single wellhead overtime**: (1) a “step” procedure and (2) a “ramp” procedure. *Id.* at 6:50-7:25. In the “step” procedure, “a measured of amount of proppant is introduced into the formation, followed by an increased amount, followed by a further increased amount, and so on until the proper proppant concentration is attained.” *Id.* at 6:52-56, FIGS. 5-6. In the “ramp” procedure, “an

initially small, but steadily and constantly increasing amount of proppant is introduced into the formation until the proper concentration is attained.” *Id.* at 7:3-7, FIGS. 7-8.

C. Lehman

U.S. Patent Pub. No. 2004/0050550 to Lehman *et al.* is entitled “Re-use Recovered Treating Fluid.” Ex. 1009. Lehman was filed on September 16, 2002 and published on March 18, 2004. *Id.*

Lehman is directed to “treating fluid production and subterranean formation treatment methods as well as compositions for treating fluids, all of which relate to reuse of at least part of a prior treating fluid.” *Id.* at [0018]. One method includes “treating a Subterranean formation intersected by a well, comprising performing a treatment on a well using a treating fluid residual recovered from a prior treatment, wherein using a treating fluid residual recovered from a prior treatment includes conditioning the recovered treating fluid residual.” *Id.* at [0020].

VI. THE BOARD SHOULD EXERCISE ITS DISCRETION UNDER 35 U.S.C. § 325(D) AND DENY INSTITUTION

The Board should exercise its discretion under 35 U.S.C. § 325(d) to deny institution because “the same or substantially the same prior art or arguments previously were presented to the Office.” 35 U.S.C. § 325(d). When evaluating whether to deny institution under § 325(d), the Board has identified “the following non-exclusive factors:

(a) the similarities and material differences between the asserted art and the prior art involved during examination;

(b) the cumulative nature of the asserted art and the prior art evaluated during examination;

(c) the extent to which the asserted art was evaluated during examination, including whether the prior art was the basis for rejection;

(d) the extent of the overlap between the arguments made during examination and the manner in which petitioner relies on the prior art;

(e) whether petitioner has pointed out sufficiently how the examiner erred in its evaluation of the asserted prior art; and

(f) the extent to which additional evidence and facts presented in the petition warrant reconsideration of the prior art or arguments.” *Advanced Bionics, LLC v. Med-El Elektromedizinische Geräte GMBH*, IPR2019-01469, Paper 6 at n.10 (P.T.A.B. Feb. 13, 2020) (precedential) (citing *Becton, Dickinson & Co. v. B. Braun Melsungen AG*, IPR2017-01586, Paper 8 (P.T.A.B. Dec. 15, 2017)).

“If, after review of factors (a), (b), and (d)” the Board “determine[s] that the same or substantially the same art or arguments previously were presented to the Office, then factors (c), (e), and (f) relate to whether the petitioner has demonstrated a material error by the Office.” *Id.* at 10-11. “[I]f the alleged error is a disagreement with a specific finding of record by the Office, then ordinarily the petitioner’s

required showing of material error must overcome persuasively that specific finding of record.” *Id.*

Advanced Bionics provides that “[i]f a condition in the first part of the framework is satisfied and the petitioner fails to make a showing of material error, the Director generally will exercise discretion not to institute inter partes review.” *Id.* at 8-9. The *Advanced Bionics* “framework reflects a commitment to defer to previous Office evaluations of the evidence of record unless material error is shown.” *Id.* at 9.

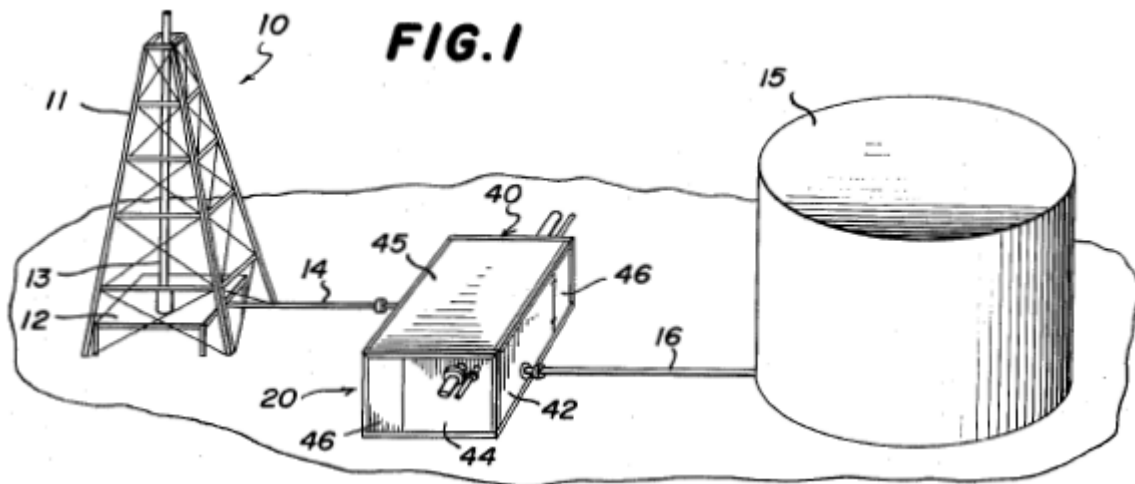
A. Factors (a), (b), and (d) demonstrate that the Patent Office already considered substantially the same art and arguments, and thus these factors weigh in favor of denying institution

The Petition presents two grounds that both include the combination of Crossley and Albers. The Petition states that “Crossley and Albers were not considered during prosecution.” Pet. at 65. This is untrue. The Patent Office relied on the prior publication of Albers (US 2006/0243437) in a Final Office Action, dated May 13, 2010, as the basis for rejection of the same limitations that issued in the ’394 Patent. Ex. 1002 at 850-859. More specifically, the Examiner relied on Albers for every limitation in the independent claims, including “manufactur[ing] a well stimulation fluid” and “a first stimulation fluid” and “a second stimulation fluid.” Ex. 1002 at 852. Patent Owner overcame the Patent Office’s rejections over Albers by arguing Albers does not disclose two wells, pads, or a plurality of wells. *Id.* at

906-910. Petitioner again relies on Albers' fracturing equipment and procedures for delivering fracturing fluid to a single wellhead overtime for the limitations of "manufactur[ing] a well stimulation fluid;" "means for simultaneously flowing: a first stimulation fluid to the first well and not to the second well; and a second stimulation fluid to the second well and not to the first well;" and "wherein the first stimulation fluid and the second stimulation fluid have different compositions." Pet. at 20-23, 27, 29-34. Patent Owner again explains herein that Albers does not disclose manufacturing and pumping two different well stimulation fluids for two different wells, pads, or plurality of wells. *See infra* § VII.B.2. Thus the same art and arguments are used in this proceeding with respect to Albers as were used during Examination.

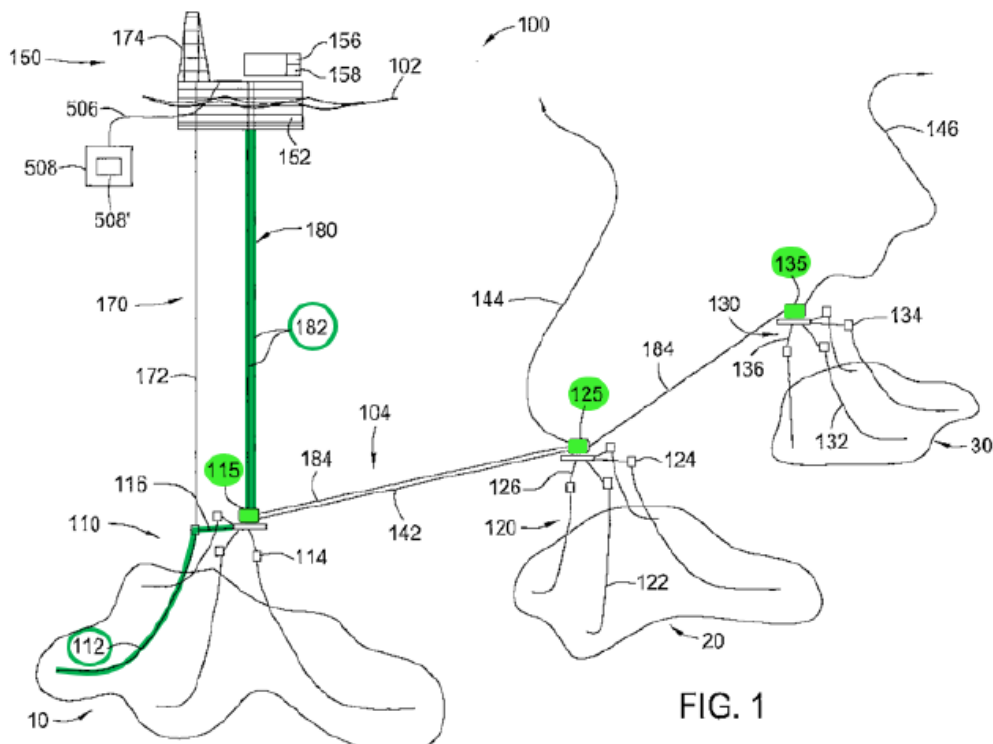
Although the Patent Office did not consider Crossley during prosecution, the Patent Office considered Weaver, which presents a similar system to that of Crossley. Ex. 1002 at 955-956. The Patent Office argued that Weaver "discloses a transportable water injection plant for water flooding and secondary recovery operations; the plant provides connection between the plant and a first and second well as well as a means for simultaneously flowing water to the wells." *Id.* at 955. More specifically, Fig. 1 of Weaver illustrates a "water injection well 10 [] connected by a water pipe 14 to a basic portable water injection plant unit or module [20]"

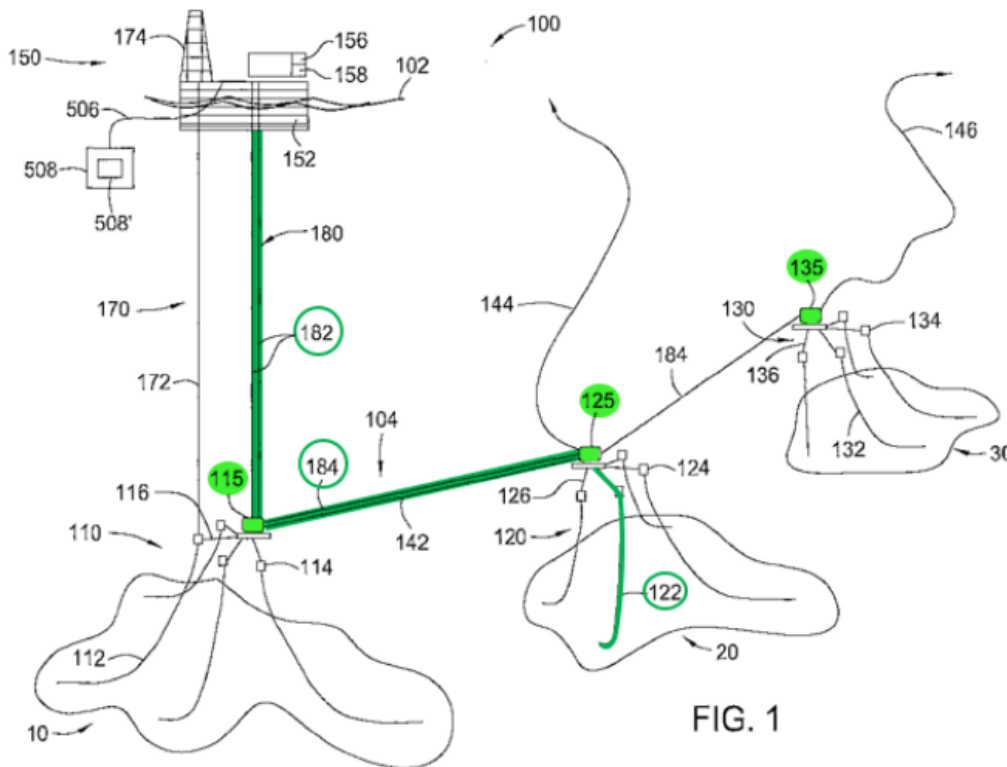
which “is in turn connected by a water pipe 16 to a water storage tank 15.” Ex. 2001 3:10-16.



Id. at Fig.1. Weaver adds that “in normal secondary recovery operation, an array of water injection wells 10 is arranged in a predetermined formation with respect to the underground oil formation and with respect to the oil recovery wells for optimizing the efficiency of oil recovery from the underground formation.” *Id.* at 24-29. The Patent Office determined that Weaver “fails to disclose, teach, or suggest the simultaneous flowing of stimulation fluids having different compositions to each of the wells.” *Id.* at 956. Crossley similarly discloses a transportable system for oil and gas recovery operations that may include production wells as well as injection wells that aid production. Ex. 1005 at [0006], [0008], [0038], [0044]. Similar to the Examiner’s reliance on Weaver, Petitioner relies on Crossley’s connection between a vessel and a first and second well as well as a means for simultaneously flowing production chemicals to the wells. *Id.* at [0009], [0049]. For example, Petitioner

argues that Figure 1 illustrates a vessel including “a first connection” (control link 182, flow line jumper 116, manifold 115, tree) to “a first well” (well 112) and “a second connection” (control link 182, flow line jumper 126, manifold 125) to “a second well” (well 122). Pet. at 23-25.





However, also like Weaver, Crossley fails to disclose, teach, or suggest the simultaneous flowing of stimulation fluids having different compositions to each of the wells, as discussed below. *See infra* § VII.B.1-2. Thus, Crossley's disclosure of simultaneous delivery of fluids to multiple wells is merely cumulative of Weaver's disclosure of the same. *See Nokia of America Corporation v. Alexander Soto et al*, IPR2023-00680 (PTAB Nov. 3, 2023) (finding that IPR references were cumulative of the prosecution references when Petitioner applied the IPR references in the same manner as the prosecution references). Because Crossley's disclosure is cumulative to that of Weaver, the Patent Office substantively considered Crossley's disclosure through consideration of Weaver.

The Patent Office has thus already considered the substance of this Petition regarding the independent claims. Moreover, even Petitioner's additional reference and arguments regarding the dependent claims is cumulative. The Petition relies on Lehman in Ground 2 for dependent claims 11 and 13. Although the Patent Office did not consider Lehman during prosecution, the Patent Office considered Kiel, which presents similar disclosure to that of Lehman. Kiel discloses "allowing the well to flow back during at least some portion of the initial period of discontinuation of fluid injection." Ex. 2003 at 25:5-7. Kiel further explains:

This reverse flow lowers the pressure in the fracture at a faster rate and to a lower level than does merely shutting the well in and allowing fluid loss from the fracture to the formation to lower fracture pressure. Reverse flow causes a higher rate of pressure change and thus creates a greater pressure differential between the formation and the fracture. This pressure differential causes a higher rate of flow of the fracturing fluid across the fractureformation [*sic*] interface.

Ex. 2003 25:8-16. Petitioner relies on Lehman for its proposition that it was well-known in the art that "during the fracturing treatment, typically the well is shut-in and then reopened whereupon at least part of the fracturing fluid [] in the fracture [] is forced out by the fracture closure pressure as known in the art. At least part of this fluid flows back to the surface as the flow-back fluid or fracturing fluid residual

[] represented in FIG. 1.” Pet. at 64. Lehman is thus cumulative of Kiel as it is applied in the same way for its discussion of flow back of stimulation fluid from a well. However, neither Kiel nor Lehman disclose, teach, or suggest flow back of stimulation fluid from a first well to a manifold or a second well to a manifold, as Petitioner acknowledges with respect to Lehman in its Petition. (Petitioner relies on Crossley’s flow line jumper transportation of production fluid from a well to a collection manifold for this aspect of the limitation.) Pet. at 62. Accordingly, the Patent Office has substantively considered Lehman through the consideration of Kiel.

Because all of Petitioner’s references were substantively considered during prosecution, factors (a), (b), and (d) favor denying institution.

B. Factors (c), (e), and (f) demonstrate Petitioner has failed to show any material error by the Patent Office, and thus these factors weigh in favor of denying institution

As discussed above, Petitioner relies upon three references in its argument that the Patent Office erred in granting the ’394 Patent: Crossley, Albers, and Lehman. Petitioner argues that its references are “not substantially the same as any considered references” but provides no support for its argument and never attempts to distinguish the references from any art considered during the prosecution. Pet. at 65. However, Albers was evaluated during examination, despite Petitioner’s statement to the contrary. The Examiner used Albers as a basis for rejection under

102(e). *See, e.g.* Ex. 1002 at 852. As further discussed above, the subject matter of Crossley and Lehman were substantively evaluated through the disclosures of Weaver and Kiel. Weaver was analyzed in Examiner's notice for allowance for failure "to disclose, teach, or suggest the simultaneous flowing of stimulation fluids having different compositions to each of the wells." Ex. 1002 at 955-956. Kiel was cited by the Applicant and is listed on the face of the '394 Patent. Ex. 1001 at (56); Ex. 1002 at 677. Thus, actual or cumulative disclosure from all of the relevant asserted art was substantively evaluated during examination of the application that led to the '394 Patent. As such, factor (c) favors denying institution.

Petitioner has not pointed out sufficiently how the examiner erred in its evaluation of the asserted prior art. *Supra* § VI.A. Petitioner argues that the Examiner erred by not considering any art with "substantially the same teachings" as the Petitioner's art and therefore erred by failing to reject the claims based on the references asserted in the Petition. As previously discussed, the Examiner considered Albers during the prosecution and substantively considered Crossley and Lehman through Weaver and Kiel. *Supra* § VI.A. The Petitioner is incorrect and the Examiner *did* consider substantially the same teachings as the Petitioner's prior art. Factor (e) further favors denying institution.

Petitioner has not provided any additional evidence beyond that which is discussed above that persuasively warrants reconsideration of the prior art or

prosecution arguments. Although Petitioner claims “the Examiner also did not have the benefit of Dr. Nikolaou[’s] detailed testimony and the further evidence of record,” Dr. Nikolaou relies heavily on Tolman (Ex. 1008)⁴ to support the alleged motivation to combine Crossley and Albers. *See, e.g.*, Ex. 1003 at ¶¶ 58, 61, 85, 95 (citing Ex. 1008). However, the Patent Office also relied on Tolman as a basis for rejection during prosecution of the application that led to the ’394 Patent. Ex. 1002 at 548-556. Thus, Dr. Nikolaou’s testimony based on Tolman does not warrant

⁴ Tolman does not qualify as prior art to the ’394 Patent, and the Petition does not assert that it does. Tolman was filed on July 24, 2006 and published on March 1, 2007, *see* Ex. 1008—both after the ’394 Patent’s December 2, 2005 filing date. Thus, Tolman does not qualify as prior art under 35 U.S.C. §§ 102(a) or 102(b). Tolman also claims priority to a U.S. provisional application filed on August 19, 2005. However, the Petition has not established that Tolman is entitled to its priority claim. And even if it did, that date is insufficient to qualify Tolman as prior art under 35 U.S.C. § 102(e). As Patent Owner explained during prosecution of the ’394 Patent, Tolman does not qualify as prior art because under 35 U.S.C. § 102(e) because the invention of the subject matter claimed in the ’394 Patent pre-dates Tolman’s August 19, 2005 effective date. *See* Ex. 1002 at 632-658; *see also supra* § IV.B.

reconsideration of the prior art or prosecution arguments. As such, factor (f) further favors denying institution.

* * * * *

Because all of the *Becton Dickinson* factors weigh in favor of a discretionary denial of institution under § 325(d), the Board should decline to institute an IPR proceeding here.

VII. PETITIONER HAS NOT SHOWN A REASONABLE LIKELIHOOD OF PREVAILING

A. Legal Requirements of a Petition Asserting Obviousness

Petitioner bears the burden of demonstrating a reasonable likelihood that it would prevail in showing unpatentability on the grounds asserted in the Petition. 37 C.F.R. § 42.108(c); 35 U.S.C. § 314(a). The grounds asserted must be described with “particularity” in the petition. 35 U.S.C. § 312(a)(3); *Intelligent Bio-Systems, Inc. v. Illumina Cambridge Ltd.*, 821 F.3d 1359, 1369 (Fed. Cir. 2016) (“It is of the utmost importance that petitioners . . . adhere to the requirement that the initial petition identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’” (quoting 35 U.S.C. § 312(a)(3))). Specifically, the Petition “must specify where each element of the claim is found in the prior art patents or printed publications relied upon.” 37 C.F.R. § 42.104(b)(4). Petitioner must therefore show that “the structural features of [the challenged claims] were **known prior art elements.**” *K/S HIMPP v. Hear-Wear Technologies, LLC*, 751 F.3d 1362, 1365-66

(Fed. Cir. 2014); *Personal Web Techs., LLC v. Apple*, 848 F.3d 987, 991 (Fed. Cir. 2017).

Under 35 U.S.C. § 103, Petitioner must prove that the claimed subject matter would have been obvious to a POSITA at the time of the invention. In considering obviousness, the Board must determine the scope and content of the prior art and differences between the prior art and the claims and the level of ordinary skill in the pertinent art. *Graham v. John Deere Co.*, 383 U.S. 1, 17-18 (1966).

A claim limitation must be proven to be in the prior art; it cannot be proven by conclusory testimony unsupported by concrete evidence. *See Arendi S.A.R.L. v. Apple Inc.*, 832 F.3d 1355, 1363-66 (Fed. Cir. 2016) (reversing the Board’s obviousness determination, which relied on “common sense,” because the petitioner’s expert declaration lacked “evidence and a reasoned explanation”). Petitioner must offer “a sufficient explanation of how the references may be combined, from the perspective of one with ordinary skill in the art, to arrive at the claimed invention, and **why the proffered combination accounts for all the features of each claim.**” *Dominion Dealer Sols., LLC v. AutoAlert, Inc.*, IPR2013-00223, Paper 9 at 19 (P.T.A.B. Aug. 15, 2013); *see also Arendi*, 832 F.3d at 1362 (“[O]ur cases repeatedly warn that references to ‘common sense’—whether to supply a motivation to combine or a missing limitation—cannot be used as a wholesale substitute for reasoned analysis and evidentiary support . . .”).

“[A] clear, evidence-supported account of the contemplated workings of the combination is a prerequisite” to concluding “that a relevant skilled artisan would have been motivated to make the combination and reasonably expect success in doing so.” *Personal Web Techs. LLC v. 848 F.3d* at 994. Moreover, “[o]bviousness may not be established using hindsight or in view of the teachings or suggestions of the inventor.” *Para-Ordnance Mfg., Inc. v. SGS Importers Int’l, Inc.*, 73 F.3d 1085, 1087 (Fed. Cir. 1995); *W.L. Gore & Associates, Inc. v. Garlock, Inc.*, 721 F.2d 1540, 1553 (Fed. Cir. 1983), *cert. denied*, 469 U.S. 851 (1984).

B. Grounds 1 and 2 Fail as to All Claims Because the Crossley/Albers Combination Does Not Disclose or Render Obvious Each Element of Independent Claims 1 and 24-27.

The Petition relies on Crossley’s “operations control system” for the vast majority of the limitations in independent claims 1 and 24-27, but states that “Crossley does not expressly disclose ‘*manufactur[ing] a well stimulation fluid.*’” *See* Pet. at 21, 57-61. For that limitation, the Petition proposes to modify Crossley’s vessel to include Albers’s fracture-stimulating equipment shown in Figure 1, *see id.* at 11-12, and then to pump Albers’s well stimulation fluid through the fluid distribution lines in Crossley’s operations control system that are used to inject “chemicals such as hydrate, paraffin, or wax inhibitors,” *see id.* at 7, 20, 27-33. Even if it would have been obvious to combine the teachings of Crossley and Albers as

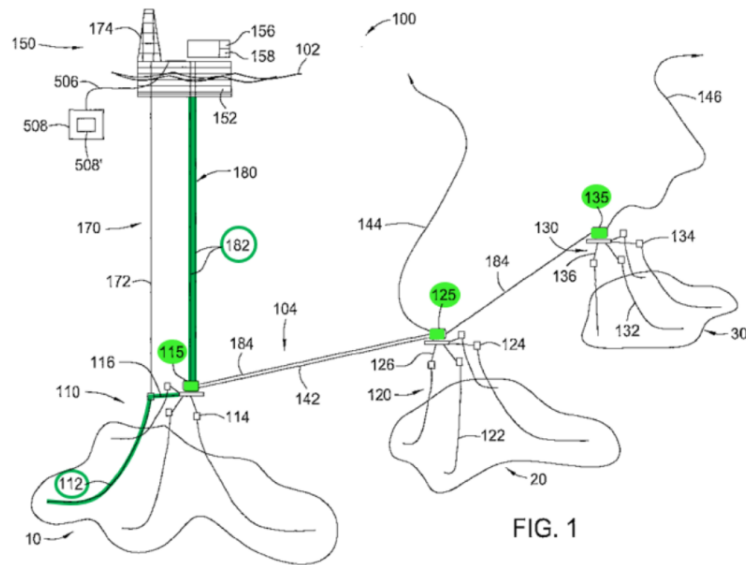
proposed in the Petition, *see* Pet. at 11-17, which Patent Owner does not concede,⁵ the Petition fails to show how the Crossley/Albers combination discloses or suggests the limitations required by independent claims 1 and 24-27.

1. ***Claim Limitations 1[D], 24[D], 25[D], 26[D], and 27[D]: “means for simultaneously flowing: a first stimulation fluid to the first [well / pad / plurality of wells] and not to the second [well / pad / plurality of wells]; and a second stimulation fluid to the second [well / pad / plurality of wells] and not to the first [well / pad / plurality of wells]”***

The Petition fails to establish that the Crossley/Albers combination discloses or suggests a means for **simultaneously flowing**: (1) a first stimulation fluid to the first well / pad / plurality of wells **and not to** the second well / pad / plurality of wells, and (2) a second stimulation fluid to the second well / pad / plurality of wells **and not to** the first well / pad / plurality of wells, as required by independent claims 1 and 24-27. The Petition relies on the same connection 182 in Crossley (shown in green in the below annotated figures from the Petition) as part of the means for flowing both “a first stimulation fluid” and “a second stimulation fluid” from the vessel 150 to a first well, pad, or plurality of wells and a second well, pad, or plurality of wells, respectively:

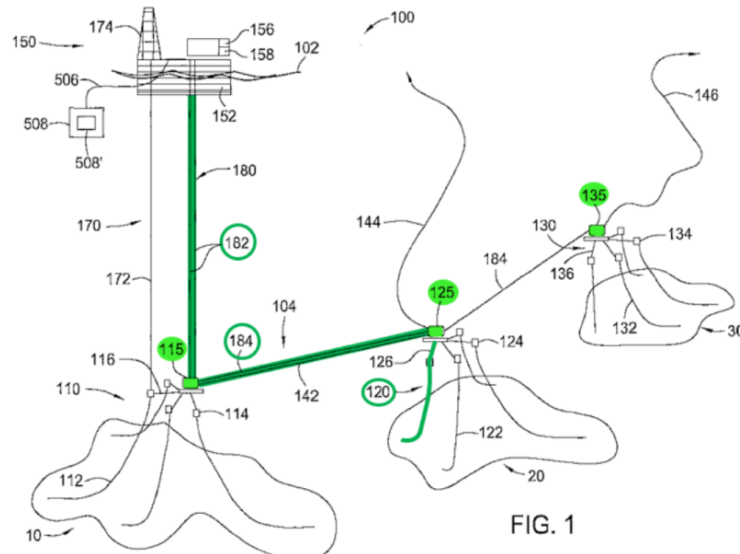
⁵ Patent Owner reserves all rights to challenge the Petition’s motivation to combine Crossley and Albers should the *inter partes* review be instituted.

Petition's Path For First Stimulation Fluid

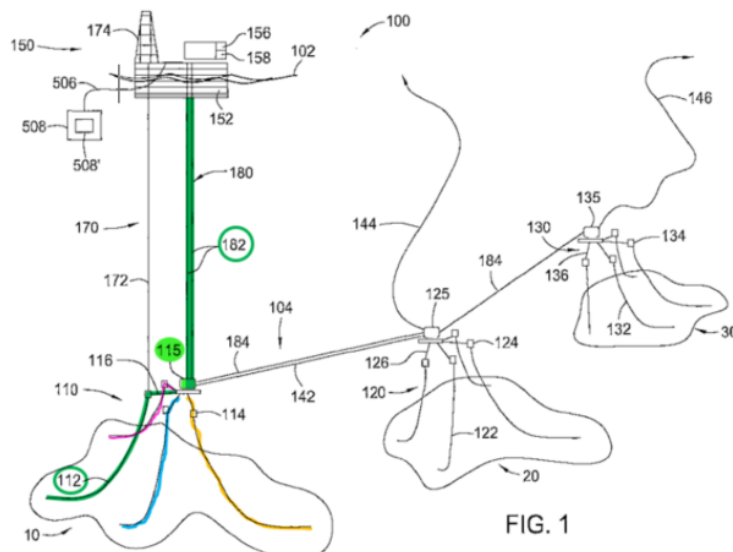


Pet. at 29-30 (“Crossley/Albers would direct one stimulation fluid flowing from the vessel to well-site 110 and well 112 (‘a first well’) via connection 180 and jumper 116 and associated tree (a ‘first connection’) and through manifold 115.”).

Petition's Paths For Second Stimulation Fluid



Id. at 30-31 (“the vessel would selectively direct a ‘*second stimulation fluid*’ directed to well-site 120 and well 122 (‘*a second well*’) via manifolds 115 and 125 and control line 184 and jumper 126 and associated tree (‘*a second connection*’)).⁶



Id. at 31-32 (“Alternatively . . . the ‘*second stimulation fluid*’ would be directed to a ‘*second well*’ at well-site 110”).

The Petition, however, fails to explain how a first fluid traveling from the vessel 150 through connection 182 could flow to well 112 **and not to** a well at well-site 120 such as well 122 (or, alternatively, a second well within well-site 110) **while simultaneously** a second fluid traveling from the vessel 150 through **the same**

⁶ The annotated figure in the Petition highlights an unlabeled well at well-site 120 as the second well; however, the Petition text maps well 122 as the second well.

connection 182 could flow to a well at well-site 120 such as well 122 (or, alternatively, a second well within well-site 110) **and not to** well 112. The Petition relies on Crossley's disclosures that its operations control system 180 controls the "valve, pump, line or sensor . . . associated with the collection manifold or with an individual well or flowline" and that "[t]he trees of each well—depicted as a box (e.g., 114) on each well—'have valves for controlling or shutting off fluid.'" Pet. at 24, n.1, 27 (citing Ex. 1005 at [0036], [0044]). The Petition further relies on Crossley's "surface vessel control link selectively connectible with the control module at the first well-site and the control module at a second well-site" and from this disclosure concludes that Crossley's "manifolds are used to selectively deliver fluids from vessel 150." Pet. at 28. Dr. Nikolaou then states that "by selectively controlling Crossley's manifolds . . . Crossley's system would be configured to direct the field-optimizing well-stimulation fluids of Albers to flow using different paths." Pet. at 29. Dr. Nikolaou further states that various configurations of Crossley's manifolds 115, 125, and 135 "would selectively direct" Albers' stimulation fluid to various wells. Pet. at 29-32. Finally, Dr. Nikolaou states that fluid distribution lines 428 and 428' "would expressly permit the 'simultaneous' distribution of [Albers'] well-stimulation fluids to a single well or to two different wells—one through 428 and second through 428'."

The Petition's explanation for this limitation is based on a hindsight-laden reading of Crossley. At best, Crossley discloses control lines for "valves, gauges, and other subsea equipment" that include "chemical delivery lines to be delivered from the ocean surface, downward to the clustered wells." Ex. 1005 at [0005]. This disclosure does not amount to *selective* control over manifolds, or more specifically, *selective* control over manifolds that would enable simultaneous flow of one fluid to one well and another fluid to another well. Petitioner's analysis jumps to this conclusion using the '394 Patent as a guide.

Furthermore, with respect to Figure 4, even if Crossley associated the individual fluid distribution lines 428 and 428' with the manifold valves or some type of structure to control fluid flow, there's nothing in Crossley that would teach or suggest that distribution line 428 would deliver fluid to one well while distribution line 428' would simultaneously deliver another fluid to another well. There is no such teaching of simultaneous flow of different fluids to different wells in Albers either. Notably, the Petition does not argue that Crossley, Albers, or that the combined system would be modified to do this, nor does the Petition provide any reasons that would motivate a POSITA to make such modifications. The Petition simply argues that certain configurations would implement the claimed functionality without showing that such configurations are disclosed or how or why one would modify the references to teach them.

Indeed, Crossley does not disclose, teach or suggest flow of one fluid to one well and simultaneous flow a different fluid to another well. Crossley provides limited disclosure related to the operation of its collection manifolds 115, 125, and 135. For instance, Crossley discloses that control modules may be incorporated into collection manifolds 115, 125, and 135 and used, in relevant part, to direct fluids to subsea equipment; but it omits any specifics as to how such fluids are directed aside from the general disclosure that the collection manifolds 115, 125, and 135 have an associated “valve or pump.” *See, e.g.*, Ex. 1005 at [0049], [0057]. Moreover, Crossley’s disclosure that “the trees 114, 124, 134 of each well have valves for controlling or shutting off fluid flow from the wellbores” makes clear that the valve to each well is either: (1) open to permit fluid from connection 182 to flow to the well, or (2) closed to prevent fluid from connection 182 from flowing to the well. Ex. 1005 at [0044]. For there to be simultaneous flow to both well 112 and well 122 (or, alternatively, a second well within well-site 110), as proposed in the Petition, then the valves to both well 112 and well 122 must be open and whatever fluid is traveling from vessel 150 through connection 182 would necessarily flow to both wells. This does not meet the claim language. And nowhere does Crossley disclose or suggest anything that would.

The Petition next focuses on Crossley’s disclosure of “fluid distribution lines 428, [and] 428’” that are “**preserved for the delivery of chemicals**, such as hydrate

inhibition fluids,” *see* Pet. at 32-33 (citing Ex. 1005 at [0050]), and relies on the conclusory statement of its expert, Dr. Nikolaou, that “lines 428 and 428’ ... **expressly permit** the ‘*simultaneous*’ distribution of well-stimulation fluids to a single well **or two different wells**—one through 428 and one through 428’.” Ex. 1003 at ¶ 91; Pet. at 33 (citing Ex. 1003 at ¶ 91) (bold emphasis added). But this still does not cure the Petition’s deficiencies. Dr. Nikolaou again fails to provide any explanation as to how fluid distribution lines 428, 428’ “expressly permit” simultaneous distribution to two different wells, as required by independent claims 1 and 24-27. To the contrary, Crossley discloses, and the Petition even acknowledges, that fluid distribution lines 428, 428’ are integrated into a single line 420, as shown in Figure 4:

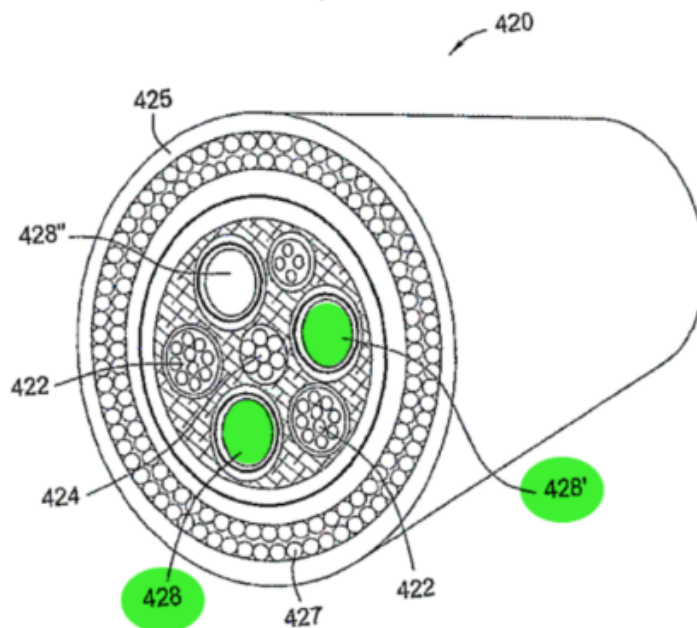


FIG. 4

Pet. at 33 (annoting Ex. 1005 at FIG. 4); Ex. 1005 at [0050].

Neither the Petitionnor Dr. Nikolaou, whose declaration merely parrots the Petition, *see supra* VII.D, provides any explanation as to why a POSITA would have understood it possible that the fluid in line 428 would or could travel to a first well, pad, or plurality of wells and not a second well, pad, or plurality of wells while the fluid in line 428' would simultaneously travel to the second well, pad or pluarlity of wells and not the first well, pad, or plurality of wells, as required by independent claims 1 and 24-27. To the contrary, Crossley discloses that “[c]hemicals may be delivered from the lines 428, 428’ and then through the manifold 115 for treatment of flow lines, valves, and even the wellbores as appropriate,” Ex. [1005] at [0050], which indicates that the chemicals in both line 428 and line 428’ travel **together** into manifold 115 and are distributed **together** into any flowlines, valves, or wellbore that are open.

The Petitioner’s and its expert’s conclusory assertions, devoid of reasoning or supporting evidence, are insufficient to support an argument of obviousness. *See ActiveVideo Networks v. Verizon*, 694 F. 3d 1312, 1327 (Fed. Cir. 2012) (finding non-obviousness as a matter of law where “[t]he expert failed to explain ... how any specific combination would operate or read on the asserted claims”). As the Federal Circuit noted in *ActiveVideo*, this slipshod approach to obviousness fails because it “is fraught with hindsight bias.” *Id.* That is especially the case here as Petitioner and

its expert rely heavily on International Patent Publication WO2007/024383 by Tolman *et al.* that does not qualify as prior art. *See* Pet. at 28-29 (citing Ex. 1008); Ex. 1003 at ¶ 85 (citing Ex. 1008). *See supra* n.4.

Because Petitioner has failed to offer this necessary explanation to support its obviousness arguments as part of its Petition, and because the Board is limited in this proceeding to the arguments and theories raised in the Petition, the Petition should be denied. *Apple Inc. v. MPH Techs. Oy*, No. 2021-1355, 2022 WL 4103286 (Fed. Cir. Sept. 8, 2022) (nonprecedential) (“We have previously reversed Board decisions that found a motivation to combine where the petitioner presented only threadbare arguments to support its combination”); *see also SAS Institute, Inc. v. Iancu*, 138 S. Ct. 1348, 1357 (2018) (“[T]he petitioner’s contentions . . . define the scope of the litigation all the way from institution through to conclusion.”).

2. Claims 1[E], 24[E], 25[E], and 26[E]: “wherein the first stimulation fluid and the second stimulation fluid have different compositions”

The Petition’s deficiencies are even more apparent in view of the additional requirement in independent claims 1 and 24-26 that “the first stimulation fluid and the second stimulation fluid have different compositions.” The Petition does not sufficiently explain its combination of Albers with Crossley for this limitation. Even if Petitioner had provided a sufficient explanation of the combination, the Petition fails to show that Albers’s fracture-stimulating equipment is capable of

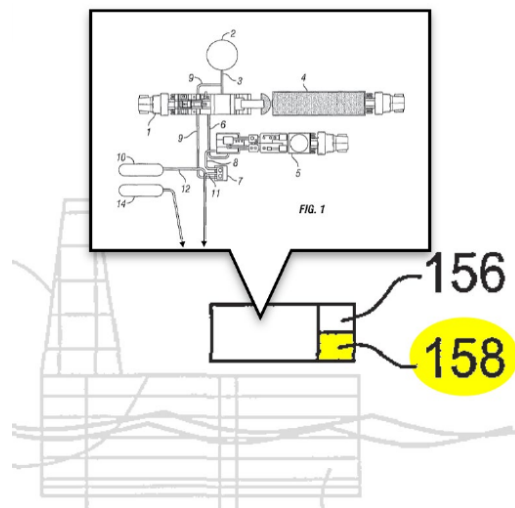
manufacturing two different stimulation fluids having two different compositions that could be simultaneously flowed into two different wells using Crossley's operations control system.

Petitioner must offer "a sufficient explanation of how the references may be combined, from the perspective of one with ordinary skill in the art, to arrive at the claimed invention, and why the proffered combination accounts for all the features of each claim." *Dominion Dealer Sols., LLC v. AutoAlert, Inc.*, IPR2013-00223, Paper 9 at 19 (P.T.A.B. Aug. 15, 2013). For this limitation, the Petition relies upon Albers's disclosure that "different concentrations may be appropriate based on the formation to be fracture-stimulated." Pet. at 34 (citing Ex. 1006 at 5:28-30). The Petition states that "a POSITA would have understood that Crossley's vessel, as modified by the teachings of Albers, would deliver different concentration of stimulation fluids depending upon the formation (or well-site) to be fracture-stimulated." Pet. at 34. "As modified, the Crossley/Albers system would pump two different well-stimulation fluids (*i.e.*, manipulating the concentration of well-stimulation fluid per formation) simultaneously into two different wells" Pet. at 34-35.

The Petition's description of the modifications to Crossley's vessel in view of Albers is insufficient. Petitioner never explains what features of Alber's fracture-stimulating equipment may be combined with Crossley's vessel in order to "pump

two different well-stimulation fluids (*i.e.*, manipulating the concentration of well-stimulation fluid per formation) simultaneously into two different wells.” Pet. at 34-35. Because the Petition does not explain what features are taken from Albers and Crossley to make the combination, the Petition fails to explain why the combination “accounts for all of the features of each claim.” *Dominion Dealer*, IPR2013-00223, Paper 9 at 19. The Petition generally discusses features of the Crossley/Albers combination in other parts of the Petition: “Albers’ fracture-stimulating equipment (and associated dynamic fluid manufacturing and optimized oil well-stimulation fluid techniques), would have been implementable on Crossley’s ‘vessel 150’—depicted below in annotated Figure 1 of Crossley with an excerpt of Figure 1 of Albers superimposed—and in conjunction with the “control delivery system 158.” Pet. at 11-12 (annotated Figure reproduced below); *see also* Pet. at 14-15 (“It would have been obvious to combine the teachings of Albers’s techniques related to formation-dependent and dynamically manufactured well-stimulation fluid techniques with Crossley’s teachings of a centralized oilfield operations system (well-stimulation techniques and fluids, pumps, manifolds, and other conventional oil-well equipment) with each performing the same function it has been known to perform (gas and oil production and well-stimulation techniques) and yielding not more than what one would expect from such an arrangement (centralized well operations including

simultaneous and optimized well-stimulation techniques)...”); Pet. at 23 (“Albers describes dynamically manufacturing well-stimulation fluids: the ‘blender unit (1) draws fluid from the fluid storage device (2) through the first conduit (3), and further draws proppant from the sand trailer (4) and **mixes the two in the blender tub** (not shown) to form a slurry.’”).



Pet. at 12.

However, these explanations in other parts of the Petition do not address the features of Crossley and/or Albers or modifications thereto that would specifically meet this limitation, and in particular the features of Crossley and/or Albers that would supply the *means for simultaneous flow* of two stimulation fluids having different compositions.

Regardless, any combination of Albers and Crossley that Petitioner could propose would not account for all of the features of the claim. As discussed above, *see supra* § V.B, Albers discloses manufacturing a **single** well treatment fluid for a

single well having a concentration of proppant that changes **over time** using either a “step” procedure or a “ramp” procedure. Ex. 1006 at 6:50-7:25, FIGS. 1, 5-8. For example, Figure 6 of Albers (reproduced below) shows “the proppant concentration being introduced into the formation **over time** (represented by the solid line) effectively forms a series of ‘steps’,” *id.* at 6:65-7:2:

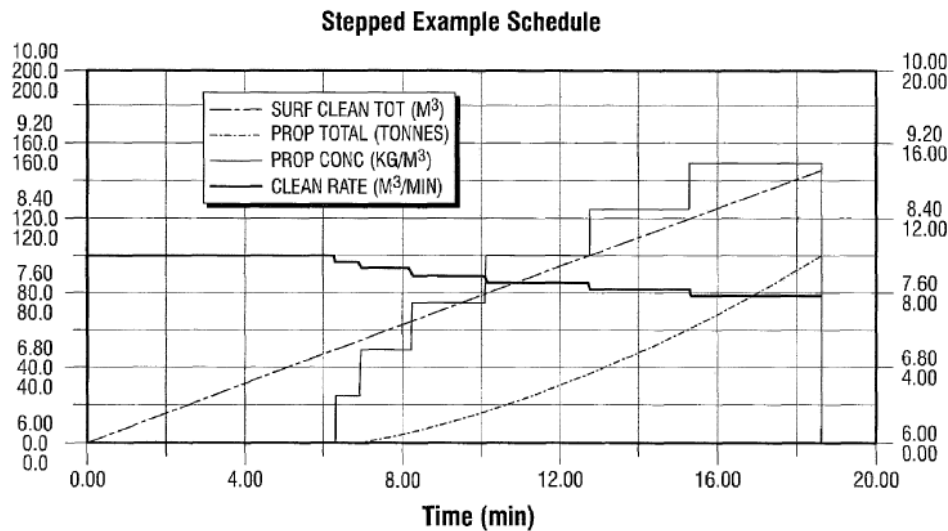


FIG. 6

Similarly, Figure 8 of Albers (reproduced below) shows “the proppant concentration being introduced into the formation **over time** (represented by the solid line) effectively forms a ‘ramp’,” *id.* at 7:21-23 (emphasis added):

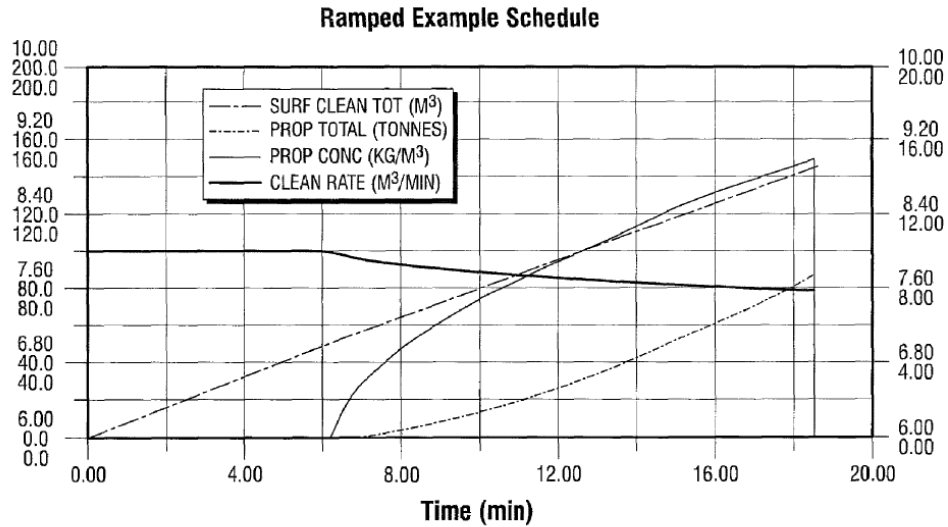


FIG. 8

Thus, while Albers's fracture-stimulating equipment manufactures a single fluid having two different compositions **over time** (or can even two different fluids having two different compositions **over time**), Albers does not disclose manufacturing two different well stimulation fluids **at the same time** where each has a different composition, such that those two fluids could be **simultaneously** flowed into two different wells, pads, or plurality of wells, as required by independent claims 1 and 24-26. Neither Petitioner nor its expert offers any modification of Albers's fracture-stimulating equipment that would enable the claimed simultaneous flow of two different well stimulation fluids having two different concentrations.

3. ***Claim 27[A]: “a well treatment operations factory capable of manufacturing and simultaneously pumping a plurality of well stimulation fluids”***

Unlike the other independent claims, independent claim 27 requires “a well treatment operations factory capable of manufacturing and simultaneously pumping a plurality of well stimulation fluids.” The Petition, however, does not separately address this limitation and instead relies upon the same arguments presented for limitations 1[A], 1[D] and 1[E]. *See* Pet. at 61. As discussed above, the Petition fails to establish that the Crossley/Albers combination discloses or suggests limitations 1[D] and 1[E]. The Petition likewise fails to establish that the Crossley/Albers combination discloses or suggests limitation 27[A] for these same reasons. More specifically, the Petition fails to establish that Albers’s fracture-stimulating equipment is capable of manufacturing and simultaneously pumping a plurality of well stimulation fluids. And neither Petitioner nor its expert offers any modification that would enable it to do so.

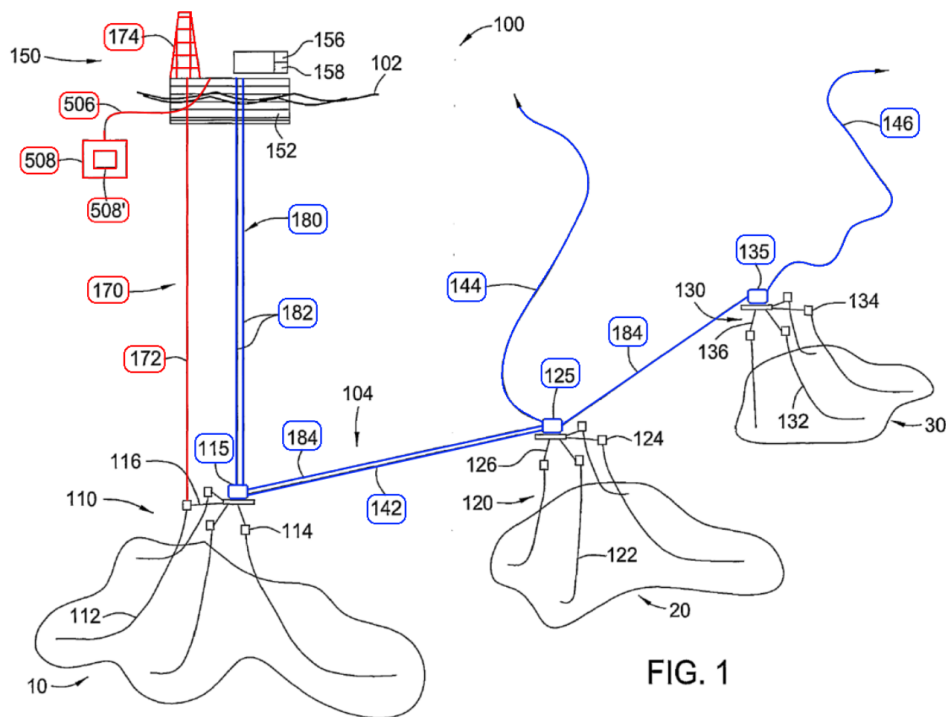
C. Grounds 1 and 2 Further Fail as to All Claims Because Crossley Teaches Away From Introducing Albers’s Stimulation Fluid Using Crossley’s Operations Control System as the Petition Proposes

Even if a POSITA was motivated to incorporate Albers’s fracture-stimulating equipment on Crossley’s vessel as proposed in the Petition, which Patent Owner does not concede, the Petition fails to establish that a POSITA would have been motivated to pump Albers’s well stimulation fluid to the wells, pads, and plurality

of pads through Crossley's operations control system. Crossley actually teaches away from doing so.

1. The Petition Should Not Have Ignored Crossley's Intervention System

A prior art reference must be considered in its entirety, i.e., as a whole, including portions that would lead away from the claimed invention. *W.L. Gore & Assoc.*, 721 F.2d at 1551. As described above, *see supra* § V.A., Crossley's vessel contains an intervention system (annotated in red in Figure 1 below) that is completely separate from its operations control system (annotated in blue in Figure 1 below):



Ex. 1005 at FIG. 1 (annotated). The intervention system and operations control system are used for different purposes. Crossley discloses that its operations

control system is used for “control operations,” which may include “the injection of chemicals such as hydrate, paraffin, or wax inhibitors into flow lines” and may also “include pumps and other electrically or hydraulically actuated equipment.” EX-1005, [0048]. EX-1003-¶66. The intervention system, on the other hand, is used for, among other things interventions such as “the injection of **acid or other treating fluids.**” Ex. 1005 at [0037] (emphasis added).

The Petition relies entirely on Crossley’s operations control system. More specifically, the Petition relies on Crossley’s operations control system as “a first connection between a first well and the well operations factory” and “a second connection between a second well and the well operations factory.” Pet. at 23-26. The Petition also relies on Crossley’s operations control system in combination with Albers’ “fracture-stimulating equipment (and associated dynamic fluid manufacturing and optimized oil well-stimulation fluid techniques)” for the “well treatment operations factory which manufactures and pumps a well stimulation fluid” and the “means for simultaneously flowing” Albers’ well stimulation fluid. Pet. at 11-17, 20-23, 27-33.

The Petition completely ignores Crossley’s intervention system in its analysis. *See, e.g.*, Pet. at 7 (noting “Crossley’s system describes a vessel 150 comprising two systems,” but only discussing the “operations control system 180”). However, it is Crossley’s intervention system and not the operations control system that would

flow the types of fluids that are the subject of the '394 Patent claims, *i.e.*, “injection of **acid or other treating fluids**.” Ex. 1005 at [0037]. As the Petition acknowledges, the '394 Patent describes that the well **treatment** fluid or stimulation fluid flowed to the wells during “[s]timulation and **treatment** processes” can be “any combination of proppant, fracturing fluid, gelling agent, fraction reducer, and **acid**.” See Ex. 1001 at 1:15-2:57, cl. 21-22; Pet. at 4, 21; *see also* Ex. 1001 at 1:15-17 (“In the production of oil and gas in the field, it is often required to **stimulate and treat** several well locations within a designated amount of time.”). Despite the clear relevance of Crossley’s intervention system’s to the '394 Patent’s claims, Petitioner failed to consider Crossley in its entirety by omitting the intervention system from its Petition.

2. Crossley Teaches Away from the Petitioner’s Proposed Combination with Albers

Albers’s well stimulation fluid is precisely the type of fluid that a POSITA would flow using Crossley’s intervention system and not Crossley’s operations control system. Like the acids and other treating fluids that are injected by Crossley’s intervention system, Albers describes different types of fracturing fluids used for “**treating**” formations. Ex. 1006 at 1:38-44.

If Albers’s fracture-stimulating equipment was included on Crossley’s vessel as proposed in the Petition, a POSITA would have been led to introduce a well stimulation fluid manufactured by Albers’s fracture-stimulating equipment to the

wells, pads, and plurality of wells shown in Crossley using Crossley's intervention system, because Crossley's intervention system is already used to introduce the same type of fluid. As a result, a POSITA would have been led in a direction divergent from the path that was taken by Patent Owner in the '394 Patent—namely, **simultaneous** flow of two different stimulation fluids to two different wells, pads, or plurality of wells—because Crossley's intervention system is used “for conducting intervention services to an **individual** well.” Ex. 1005 at [0020]; *see also id.* at Abstract, [0010], [0025], [0026], [0030], [0037], [0038], [0056], [0061], Cl. 1 (disclosing intervention services for only one “an individual well” at a time).

The Petition fails to account for Crossley's intervention system or provide any reason a POSITA would have been motivated to use Crossley's operations control system instead of Crossley's intervention system, which is already designed to introduce the exact type of fluid manufactured by Albers's fracture-stimulating equipment. Indeed, Crossley's operations control system is used to inject “production chemicals,” such as “hydrate, paraffin, or wax inhibitors,” which serve an entirely different purpose than the acid or other treating fluids of Crossley and the well stimulation fluid of Albers. Ex. 1005 at [0009], [0049]; *compare* Ex. 1010 at 97 (describing maintenance activities that are implemented **during or after the production stage** including pumping fluids inside the well bore through the production tree including “**chemicals used to inhibit the scales and hydrates**, and

to ensure smooth flow of hydrocarbones through the well”), with Ex. 1010 at 102 (describing reservoir simulation treatments that are implemented **prior to the production stage** such as “chemical injection, **acid treatment**, explosive blasting etc. that are carried out on reservoir **to improve its productivity**”) (emphasis added). A POSITA would have naturally followed the path already set out in Crossley—namely, using the interventions system to introduce a well stimulation fluid separately to each individual well, which does not meet the limitation of the ’394 Patent’s claims. As discussed above, this is also consistent with how the same fluid is introduced to the well in Albers. *Supra* § VII.B.2.

While Crossley discloses an operations control system that can provide “well-site operations simultaneously to each of the first well-site and a second well-site,” the system in Crossley that would be used to provide stimulation fluids (*i.e.*, the intervention system) only provides stimulation fluids to wells on an individual basis. This type of activity does not meet the claim limitations of the ’394 Patent. Because Crossley teaches away from using its operations control system to introduce Albers’s well stimulation fluid, the Petition fails to establish that the combination of Crossley/Albers renders obvious the claims of the ’394 Patent.

D. Dr. Nikolaou’s Declaration Merely Parrots the Petition and Is Entitled to Little or No Weight

Wide swathes of Dr. Nikolaou’s declaration merely provide conclusory and unsupported opinions that substantively mirror the Petition. *E.g.*, compare Pet. at

27-33 *with* Ex. 1003 at ¶¶ 82-91; *compare* Pet. at 34-35 *with* Ex. 1003 at ¶¶ 94-95. Such conclusory and unsupported opinions are entitled to little or no weight. *TQ Delta, LLC v. CISCO Sys., Inc.*, 942 F.3d 1352, 1359 (Fed. Cir. 2019) (“This court’s opinions have repeatedly recognized that conclusory expert testimony is inadequate to support an obviousness determination on substantial evidence review”); *see also Rohm & Haas Co. v. Brotech Corp.*, 127 F.3d 1089, 1092 (Fed. Cir. 1997) (“Nothing in the rules or in our jurisprudence requires the fact finder to credit the unsupported assertions of an expert witness”). Crediting such testimony “risks allowing the challenger to use the challenged patent as a roadmap to reconstruct the claimed invention using disparate elements from the prior art.” *TQ Delta, LLC*, 942 F.3d at 1361.

The Board has repeatedly held that conclusory expert declarations that merely copy attorney argument are entitled to “little or no weight.” *Exacq Techs., Inc. v. Jds Techs., Inc.*, IPR2016-00568, Paper 7 at 22 (P.T.A.B. June 14, 2016) (citing 37 C.F.R. § 42.65(a)); *Guest Tek Interactive Ent. Ltd. v. Nomadix, Inc.*, IPR2019-01191, Paper 9 at 38 (P.T.A.B. Dec. 27, 2019) (denying institution where supporting expert declaration paragraphs “largely mirror the language of the Petition and are equally conclusory”); *Kinetic Techs., Inc. v. Skyworks Sols., Inc.*, IPR2014-00529, Paper 8 at 15 (P.T.A.B. Sept. 23, 2014) (“Merely repeating an argument from the Petition in the declaration of a proposed expert does not give that argument enhanced

probative value”); *Johns Manville Corporation v. Knauf Insulation Inc.*, IPR2015-01633, Paper 10 at 13 (P.T.A.B., Jan. 4, 2016) (“We have broad discretion to assign weight to be accorded witness testimony”); *InfoBionic, Inc. v. Braemer Mfg., LLC*, IPR2015-01704, Paper 11 at 6 (P.T.A.B. Feb. 16, 2016) (finding expert declaration unpersuasive when it “repeats the Petitioner’s arguments and offers little or no elaboration”). The Board should thus decline to accord weight to Dr. Nikolaou’s conclusory and duplicative opinions because such opinions do not offer enhanced probative value.

* * * * *

Accordingly, Petitioner has not demonstrated a reasonable likelihood that it would prevail under 35 U.S.C. § 314(a).

VIII. CONCLUSION

For the foregoing reasons, Patent Owner respectfully requests that the Board decline to institute *inter partes* review of the ’394 Patent.

December 27, 2023

Date

/Chad C. Walters/

Chad C. Walters (Reg. No. 48,022)

BAKER BOTTS L.L.P.

2001 Ross Avenue, Suite 900

Dallas, Texas 75201

214.953.6511

Lindsay Volpenhein Cutié (Reg. No. 75,474)

BAKER BOTTS L.L.P.

910 Louisiana

Houston, Texas 77002
713.229.1476

*Attorneys for Patent Owner, Halliburton
Energy Services, Inc.*

CERTIFICATE OF WORD COUNT

The undersigned certifies that the foregoing Preliminary Response has a word count of 9,789, as defined by 37 C.F.R. § 42.24 using the word count feature of Microsoft Word 2010.

December 27, 2023

Date

/Chad C. Walters/

Chad C. Walters (Reg. No. 48,022)

BAKER BOTTS L.L.P.

2001 Ross Avenue, Suite 900

Dallas, Texas 75201

214.953.6511

Lindsay Volpenhein Cutié (Reg. No. 75,474)

BAKER BOTTS L.L.P.

910 Louisiana

Houston, Texas 77002

713.229.1476

*Attorneys for Patent Owner, Halliburton
Energy Services, Inc.*

CERTIFICATE OF SERVICE

In accordance with 37 C.F.R. § 42.6(e), the undersigned certifies that on the 27th day of December, 2023, a complete and entire copy of PATENT OWNER'S PRELIMINARY RESPONSE UNDER 37 C.F.R. § 42.107 and related documents were served on Petitioner via electronic mail to counsel for Petition at the following addresses:

- beferguson@winston.com
- sborder@winston.com
- mhopkins@winston.com
- IPR-Profrac-USWell@winston.com

December 27, 2023

Date

/Chad C. Walters/

Chad C. Walters (Reg. No. 48,022)

BAKER BOTTS L.L.P.

2001 Ross Avenue, Suite 900

Dallas, Texas 75201

214.953.6511

Lindsay Volpenhein Cutié (Reg. No. 75,474)

BAKER BOTTS L.L.P.

910 Louisiana

Houston, Texas 77002

713.229.1476

*Attorneys for Patent Owner, Halliburton
Energy Services, Inc.*