

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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BEFORE THE PATENT TRIAL AND APPEAL BOARD

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PERMIAN GLOBAL INC., AND  
MANTICORE FUELS, LLC  
Petitioners,

v.

FUEL AUTOMATION STATION, LLC,  
Patent Owner.

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Case IPR2023-01236

Patent No. 10,815,118

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**PATENT OWNER RESPONSE**

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## **I. INTRODUCTION**

### **A. Mobile fuel delivery**

Hydraulic fracturing, colloquially known as “fracking” or a “frac,” is an orchestration of machinery, horsepower, and manpower. It is a loud, dusty, and busy “factory” that carries out the stimulation operation of a well. On a conventional modern frac site there is a barricade of proppant, water and chemical storage and transport equipment (trailers, cars, ponds and bins), as well as frac blenders to process the powders, chemicals, gels, and liquids pumped downhole. A mobile data acquisition and control center or “data van” serves as the brains of the operation where engineers and supervisors monitor and direct a job as it is being pumped. At the center of the operation, there are tractor trailer-mounted frac pumps parked within inches of each other. The frac pumps provide the brute force that pumps the fracturing fluid (generally a blend of water and sand) downhole at extremely high pressures to fracture the formation. Over 50,000 frac horsepower may be required for modern completions. A maze of flow lines snakes between the pumps and trucks, culminating at the well-head (or multiple well-heads on some sites). The picture below depicts a common frac site plan, though the plan can vary from site to site. Ex. 2011 at ¶¶42-47.

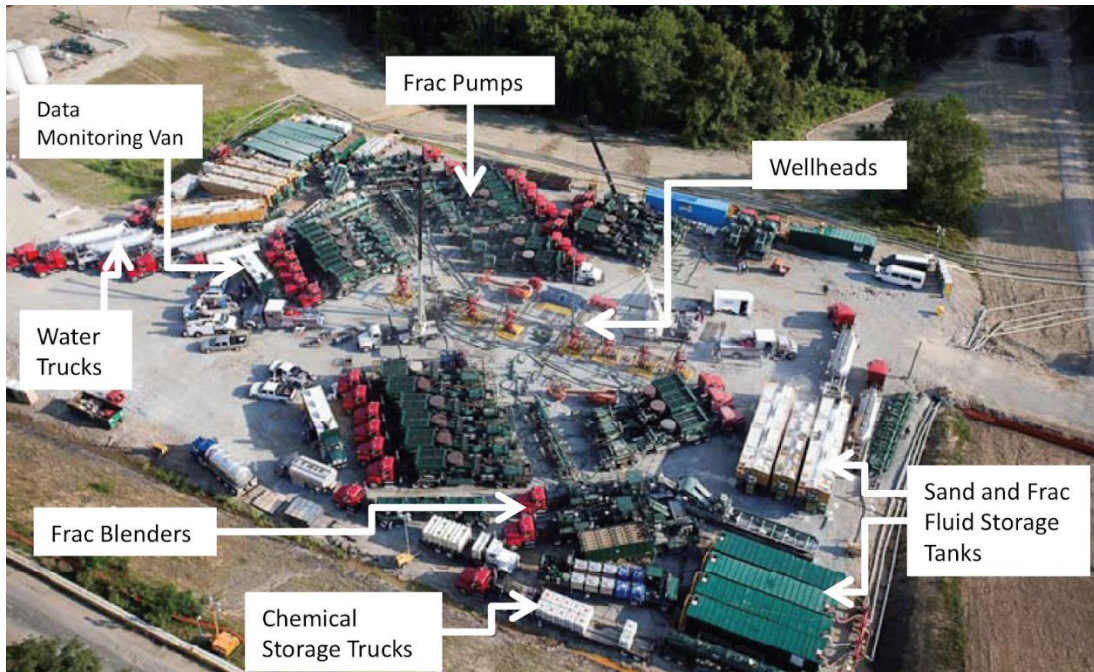


Image Credit: Kansas Geological Survey

The frac pumps are operated 24 hours a day and seven days a week, usually for days or weeks at a time. Ex. 2011 at ¶48. If a frac pump runs out of fuel, it must be taken offline, reducing the total horsepower that is available. If multiple pumps go down, the frac job may have to be shut down, which is costly and inefficient for the well operator. Ex. 2004 at ¶48.

In order to keep the frac pumps fueled and running continuously, a mobile fuel delivery station is used to automatically refuel each frac pump fuel tank when it is low on fuel, which is also known as “hot refueling” because the pumps remain running during the refueling. Ex. 2004 at ¶49. The *mobile* aspect of the station refers to transportability of the station from site-to-site with each new fracking job. Patent Owner (“PO” or “FAS”) has designated its commercial mobile fuel delivery station

as a “FAS unit,” where “FAS” is an acronym for Fuel Automation Station. The FAS units are covered under the ‘118 Patent. Ex. 2031.

FAS’s patented mobile fuel delivery station has fuel hoses that are deployed to each of the fuel tanks of the frac pumps along with level sensors that measure the fuel levels in the tanks. When the level sensors detect that one of the fuel tanks is low on fuel, a controller causes a valve associated with the hose to that fuel tank to open. Fuel is provided from an external fuel source, such as a tanker truck, into the mobile fuel delivery station, where a pump moves the fuel to a manifold and through the valve to the hose to fill the fuel tank. Once the level sensor detects that the tank for that hose has reached a threshold fill level, the controller closes the valve to cease filling the fuel tank. Each time one of the fuel tanks is low on fuel this process is repeated in order to replenish the fuel tanks with fuel, and thus enable the frac pumps to run continuously. Ex. 1001.

## **B. The invention of the ‘118 Patent**

The ‘118 Patent is directed to a unique configuration of a mobile fuel delivery station for enhanced operational reliability.

The ability to safely deliver the fuel to the frac pumps depends on reliable communication between the fuel level sensors and the controller inside of the station, which controls the opening and closing of the valves for fuel flow to the hoses. The level sensors need to send constant signals back to the controller so that the controller

can know the instantaneous fuel levels in the fuel tanks at all times. A loss of communication between the level sensors and the controller, even for a short period of time, will deprive the controller of fuel level measurements and potentially lead to several highly undesirable situations.

For instance, if communication is lost during a low fuel level condition, the controller will not be able to identify that the tank needs to be refueled. If communication is not re-established, the controller will not know to refuel the tank and it will run out of fuel. Second, if communication is lost during a high fuel level condition when the tank is being refueled, the controller will not be able to identify when to close the control valve to stop refueling. If communication is not re-established, the controller will not know to close the valve to cease fuel flow and the tank will overflow fuel (fuel spill). Thus, loss of communication, even if momentary, creates risks of interrupting frac pump operation and spilling fuel -- situations which are both highly undesirable.

Though wireless communication is ubiquitous, FAS recognized that wireless would be a poor option for a mobile fuel delivery station on a well site. For instance, other electronics nearby on a well site can interfere with wireless signals. Large equipment on the well site can act as a physical barrier or source of interference for wireless signals, and vibrations from equipment at the well site can disrupt wireless

antenna alignment. All of these can lead wireless devices to drop the wireless signals, resulting in loss of communication.

FAS instead pursued a more robust and reliable communication channel that would be less likely to drop signals. In particular, FAS identified hard-wiring the fuel level sensors to the controller. Hard-wiring was counter to the prevailing choice at the time, as Frac Shack<sup>1</sup> had a preference for wireless communication. Ex. 1004, [0018] “preferably includes a wireless transceiver.”

FAS faced several technical challenges to reliably hard-wiring the level sensors to the controller. One challenge was that excessive handling and movement of the communication wires would distress and potentially damage the wires, thereby threatening reliability. Another challenge was how to route the communication wires from the level sensors to the controller, as the sensors and controller are hundreds of feet apart, with other equipment physically in between.

FAS, however, came up with solutions to address these challenges. One solution was to route the wires with the hoses. The hoses are handled/moved during “rigging up” and “rigging down” of the distribution station (which refer to setting up the station and connecting the hoses to the frac pumps at the start of the job, and then taking down the station and disconnecting the hoses from the frac pumps once

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<sup>1</sup> Frac Shack is the owner of Van Vliet's invention and has since changed its name to Energera.

the job is over, usually days or weeks later), but otherwise, once rigged-up, the hoses are not often moved. By routing the wires with the hoses, FAS limited the handling and movement of the wires to the extent that the hoses are handled and moved. To achieve this, FAS provided a sleeve around the rubber hose tube, and routed the sensor communication wire between the sleeve and the tube. The sleeve not only secured the wire with the hose, but it also shielded the wire from rocks, dirt, snow, and ice at the well site.

FAS further recognized that running the communication wires with the hoses would also provide a reliable routing of the wire into the mobile fuel delivery station to the controller. For instance, since the hoses do not extend to the controller, the wires at some point need to depart from the hoses in order to run to the controller. For this, FAS used reels in the flow path of the fuel. The ends of the hoses were connected to the flow path running through the reel and provided junctions for the wire to depart from the hose and run into the station to the controller. The reel can provide protection of the wire from the surroundings, as well a connector to help secure the wire.

The '118 Patent captures FAS's innovations of routing the wires with the hoses and connecting the hoses through the reels. Indeed, it is these features that enable reliable wired communication in the mobile fuel distribution station. PO's FAS units have enjoyed widespread use, with a total of more than 60 FAS units that

have been used to deliver over 800,000,000 gallons of fuel on well sites in Texas, Oklahoma, Colorado, North Dakota, New Mexico, and Pennsylvania, as well as internationally in Canada, Saudi Arabia, and Argentina. Ex. 2045 at ¶6.

### **C. Overview of the prior art**

The Petition relies on various combinations of prior art references across five grounds in its attempt to establish that challenged claims 1-18 of the '118 Patent are unpatentable. Petition at 5. The primary prior art reference relied upon in all of the grounds is Van Vliet, which was considered by the patent examiner in prosecution of the application that was granted as the '118 Patent. Ex. 1001 at 2 (under References Cited, US 9,346,662 to Van Vliet et al.) Van Vliet, however, is a flawed reference. It lacks flow passages running through the reels and it lacks a hose that has a tube and a sleeve. The other prior art that Petitioner cites ultimately does not cure those deficiencies of Van Vliet. For instance, Petitioner cites to Coxreels 1125 Series reels, but that reel has a brass swivel that can form deposits in the fuel that clog downstream equipment. Some models of the Coxreels 1125 Series reel have a plated swivel, but those models use an AFLAS seal that would fail in low temperature conditions found at some well sites. Petitioner also cites to Shoap for a wired conduit or hose, but Shoap's hose does not have a separate sleeve and tube, nor a fabric sleeve. Petitioner did not rely in any grounds on several additionally cited exhibits that it alleges to have fabric hoses, likely because those do not pre-

date the '118 Patent. Those references would be to no avail anyways, as they do not disclose wired hoses.

Accordingly, PO respectfully submits that Petitioner has failed to meet its burden to prove by preponderance of the evidence that any claim of the '118 Patent is unpatentable.

## **II. BACKGROUND**

The '118 Patent has three independent claims (claims 1, 10, and 15), each directed to a distribution station. Each of the claimed stations has a mobile trailer, a pump, a manifold connected with the pump, reels, hoses, valves that are operable to control fluid flow, fluid level sensors connected or connectable with the hoses, and a controller configured to operate the valves responsive to fluid level thresholds to control flow through the hoses.

### *Claim 1*

Claim 1 includes flow passages that are connected to the manifold and running through a respective one of the reels. An example of a flow passage is shown in Fig. 4 of the '118 Patent, annotated in red below. Not all reels have fluid passages to the hose. Some types of reels are only for hose storage and do not have a fluid passage. POPR at 30; Ex. 2011 at ¶64 (citing Ex. 2007).

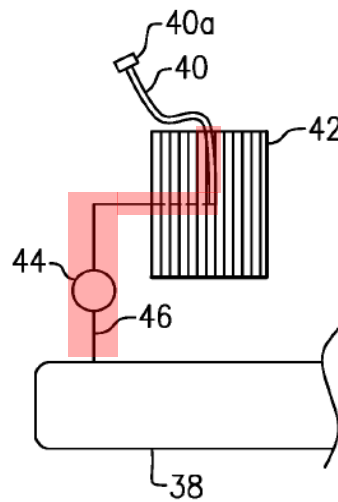


**FIG.4**

*Claims 10 and 15*

Claims 10 and 15 include a tube and a sleeve that circumscribes the tube. An example of a tube and a sleeve is shown in Fig. 5 of the '118 Patent, annotated below. The sensor communication line is routed radially between the sleeve and the tube (dependent claim 4). As shown below in annotated Fig. 7 from the '118 Patent, the sensor communication line is routed through the reel (dependent claims 6 and 8) and connects to a connector on the reel (dependent claim 7), which then connects to the controller. At the other end of the hose, at the fuel cap, the sensor communication line has another connector that connects with the fuel level sensor. The sleeve and the reel permit the sensor communication line to be run from the fuel level sensor back to the controller in the station.



### III. LEVEL OF ORDINARY SKILL IN THE ART

For purposes of this proceeding only, PO does not dispute Petitioner's definition of the level of ordinary skill in the art. Petition at 16-17. PO's expert, Dr. Rodgers, is qualified to provide opinions concerning what a POSITA would have known and understood as of Oct. 11, 2016. As reflected in his qualifications, he is more than qualified as a POSITA at all relevant times under the definition. Ex. 2011 at ¶¶7-13 and 65-67; Ex. 2032.

### IV. CLAIM CONSTRUCTION

The Board applies the same claim construction standard used in district court actions under 35 U.S.C. § 282(b), namely that articulated in *Phillips v. AWH Corp.*, 415 F.3d 1303 (Fed. Cir. 2005) (en banc). *See* 37 C.F.R. § 42.100(b) (2021). In applying that standard, claim terms generally are given their ordinary and customary meaning as would have been understood by a person of ordinary skill in the art at the time of the invention and in the context of the entire patent disclosure. *Phillips*, 415 F.3d at 1312–13. “In determining the meaning of the disputed claim limitation, we look principally to the intrinsic evidence of record, examining the claim language itself, the written description, and the prosecution history, if in evidence.” *DePuy Spine, Inc. v. Medtronic Sofamor Danek, Inc.*, 469 F.3d 1005, 1014 (Fed. Cir. 2006) (citing *Phillips*, 415 F.3d at 1312–17).

**A. Claims 5-18: “a tube and a sleeve that circumscribes the tube”**

In the Institution Decision, the PTAB construed the phrase “a tube and a sleeve that circumscribes the tube.” Ins. Dec. at 5. The PTAB noted that claim construction begins and ends with the actual words of the claim, and that by its plain terms, the claim language contemplates that the tube and the sleeve are separate and distinct structures where one “circumscribes” the other. The PTAB agreed with PO that the phrase would be rendered meaningless if the tube and sleeve were construed as encompassing the same structure. Moreover, the PTAB noted that the fact that the tube and sleeve are listed separately in the claim raises a presumption that those elements are separate and distinct structures absent evidence to the contrary, such as the specification indicating that they can be the same structure. *See Becton, Dickinson & Co. v. Tyco Healthcare Grp., LP*, 616 F.3d 1249, 1254–55 (Fed. Cir. 2010). Ins. Dec. at 6. The PTAB rejected Petitioner's assertion that PO's construction improperly added new limitations to the claims. Accordingly, the PTAB appears to have adopted PO's construction that the phrase requires a tube and a physically separate sleeve that encircles the tube.

Dr. Rodgers has also reviewed the Petition, the POPR, the Institution Decision, and the '118 Patent and its prosecution history and agrees that the phrase should be construed to require a tube and a physically separate sleeve that encircles the tube. Ex. 2011 at ¶¶68-75.

A claim construction analysis always begins with intrinsic evidence. The first stop is the language of the claim itself. When that does not resolve the dispute, guidance from the specification is considered, because as enunciated in *Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005), the specification is often the single best guide to the meaning of the claim.

Here, by its plain terms, the claim language compels an understanding that the tube and the sleeve are separate and distinct structures where one “circumscribes” the other. The sleeve circumscribes the tube, and unless the tube and the sleeve are separate structures, the word “circumscribes” would be contextually nonsensical. In particular, if the tube and the sleeve were the same structure, the phrase “circumscribes the tube” would, in essence, require that the structure encircles itself, which is physically unreasonable. Accordingly, the claim phrase cannot have a reasonable physical meaning unless the tube and the sleeve are physically separate structures. Ex. 2011 at ¶71-72.

The disclosure of the '118 Patent bolsters the construction above that the tube and the sleeve are separate and distinct structures. Ex. 2011 at ¶72-73. For instance, the '118 Patent in Fig. 5 uniquely numbers the tube 62 and the sleeve 64 and shows these elements as separate structures. Additionally, the '118 Patent describes an example in which the tube is elastomeric and the sleeve is a fabric sleeve, and that the sleeve is generally loosely arranged around the tube. A further example indicates

that the sleeve may closely fit on the tube to prevent slipping of the sleeve relative to the tube. Ex. 1001, col. 5, ll. 22-29. The description of different materials for the tube and the sleeve, as well as the ability of the sleeve to slip on the tube, indicates that the tube and sleeve are separate structures. *Id.* Additionally, bands may be tightened around the hose to prevent slipping and secure the sleeve, which further indicates that the sleeve is separate from the tube. Ex. 2011 at ¶74. The '118 Patent only describes the tube and sleeve in terms of being separate and distinct structures. Ex. 2011 at ¶72.

Table 1 below shows extrinsic evidence of the dictionary definition for each material portion of the phrase. Ex. 2001. Based on the dictionary definitions and the claim context, the term is understood to mean:

"a hollow cylinder that conveys fluid [tube] and a physically separate case [sleeve] that encircles [circumscribes] the tube."

Table 1: Claim constructions

| Phrase                        | Definition                                                                     | Source                                                                |
|-------------------------------|--------------------------------------------------------------------------------|-----------------------------------------------------------------------|
| "a tube"                      | a hollow cylinder, especially one that conveys fluid or functions as a passage | "Tube." The American Heritage Dictionary, 2011. FAS2001 at 5.         |
| "a sleeve"                    | a case into which an object or device fits                                     | "Sleeve." The American Heritage Dictionary, 2011. FAS2001 at 4.       |
| "that circumscribes the tube" | to encircle                                                                    | "Circumscribe." The American Heritage Dictionary, 2011. FAS2001 at 3. |

Accordingly, for purposes of this IPR, the PTAB should adopt the construction that the claimed tube and sleeve are separate and distinct structures where the sleeve "circumscribes" the tube.

**V. GROUND 1: AS TO CLAIMS 1[e] AND 1[f], VAN VLIET FAILS TO DISCLOSE FLOW PASSAGES RUNNING THROUGH THE REELS OR HOSES CONNECTED WITH THE FLOW PASSAGES VIA THE REELS**

According to Petitioner, Van Vliet shows that the reels are fluidly connected to the hoses and manifolds, and one skilled in the art would have understood that the reel is part of the fluid stream, and, therefore, the flow passage passes through the reel. Petition at 28. However, the PTAB disagreed and indicated that Petitioner did

not meet its burden establishing that Van Vliet alone discloses or otherwise suggests claim elements 1[e] and 1[f]. Ins. Dec. at 8-10.

Indeed, Van Vliet alone does not disclose or otherwise suggest to a POSITA claim elements 1[e] and 1[f]. Ex. 2011 at ¶¶96-109. Van Vliet's figures are schematic and may show flow passages through the manifolds (36, 38) and hoses 24, but nowhere does Van Vliet disclose that there are flow passages "running through" the reels 30 as required by claim 1. Ex. 2011 at ¶¶97-99. As Petitioner's expert acknowledges, the figure of Van Vliet "is a high-level representation and is not intended to depict the physical appearance or form" of the system's components. Ex. 1003, ¶112, footnote 146. At most, the figure indicates the flow passage of the hose as wrapping around a reel, rather than "running through" the reel, as claimed. Van Vliet does describe that "hoses 24 are preferably stored on reels 30," but nowhere does it mention or suggest that the hoses are connected with the flow passages via the reels. Ex. 1004 ¶15. In fact, to the contrary, Van Vliet explains that "each hose 24 is connected to a fuel outlet 22 by a dry connection 60 and to a cap 26 by a dry connection 62." *Id.* ¶ 22. Thus, the hose 24 of Van Vliet cannot be connected to reel 30 if the ends of the hose are connected to dry connections 60 and 62, which are not part of the reel. The implication is that the flow passage of the hose is not capable of "running through" the reel, as required by claim 1. Ex. 2011 at ¶¶96-101.

Petitioner also contends that Van Vliet's disclosure that the hose reels 30 may leak fluid confirms that the reels include flow passages, but that contention is without merit. Petition at 29. Leaking fluid does not necessitate a fluid passage running through the reels (Ex. 2011 at ¶¶103-107), nor does Petitioner explain how such leaking inherently requires that. It is not necessary for the hoses to be connected to the reels for a pan as in Van Vliet to catch leaking fluid. All that would be needed is for the pan to be positioned below in order to catch the fluid, which would be true regardless of the exact source of the leak. Ex. 2011 at ¶105. If the hoses are stored on the reels after use, without connection to the flow passage through the reels, fuel that is still in the hose could leak onto the reels and then from the reels to the pan, or the fluid could leak from other locations in the system that may be near the reels, such as valves 28 or 58 or dry connection 60. Ex. 1004 at 2. Ex. 2011 at ¶107. Van Vliet discloses that the hoses are *stored* on the reels (*Id.* at 9, [0027]) and that the hoses are connected to the fuel outlet 22 by dry connection 60 (*Id.* at 8, [0022]). There is nothing in Van Vliet that suggests that the hoses are connected to flow passages running through the reels. Ex. 2011 at ¶¶96-109.

Petitioner relies on the same or substantially same arguments for claim feature 1[f] (Petition at 30), and Petitioner thus fails to identify the claim feature 1[f] for the same reasons as above. Additionally, Petitioner relies on flow passages “discussed in Section VI, *supra*.” *Id.* Notably, Section VI contains multiple sub-sections, none

of which Petitioner specifically refers to, nor do any of the sub-sections appear to discuss flow passages. For this additional reason, Petitioner's allegation that Van Vliet discloses claim features 1[f] is entirely lacking support.

Accordingly, for the reasons above, Ground 1 does not establish unpatentability. Ground 2 as to dependent claims 4-9 relies on Ground 1 as applied to independent base claim 1 and does not establish unpatentability for the same reasons.<sup>2</sup>

## **VI. GROUNDS 1A AND 2A: A POSITA WOULD NOT MODIFY VAN VLIET WITH COXREELS**

### **A. The Coxreels 1125 Series reel is not for fracking or automated fuel delivery.**

Coxreels may have been marketed for the oil industry, but it is not directed in particular to automated fuel delivery, let alone fuel delivery in fracking. For instance, Coxreels provides a bullet point list of 14 different “Possible Fields of Application” of the 1125 Series reel. Ex. 1015 at 1. The list does not explicitly list automated fuel delivery. Insofar as Coxreels suggests use of the 1125 Series in the oil industry, a POSITA would understand that the “oil industry” is too broad to be of practical guidance. The “oil industry” covers a wide variety of areas, such as exploration,

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<sup>2</sup> The Petition does not explicitly identify that Ground 2 as to claims 4-9 relies on Ground 1 as applied to independent base claim 1. However, since the combination of Van Vliet and Shoap (Ground 2) is not asserted against claim 1, the only possible basis in the Petition against independent base claim 1 (as it pertains to Ground 2) is Ground 1 (Van Vliet alone).

extraction, refining, and transportation, and each of these areas would have its own sub-categories with unique technological challenges. A POSITA would, therefore, have drawn the reasonable conclusion that the marketing by Coxreels of the 1125 Series reel in the oil industry was not a representation that the reel is suited to every possible application across the entire oil industry, or automated fuel delivery in particular. Ex. 2011 at ¶¶113-116. In fact, each of the 14 fields listed are themselves so enormously broad that it would be virtually impossible for a POSITA to have determined from the list whether the 1125 Series reel would have been suited a particular field that is not listed. For instance, the listing of “Chemical Fluid Transfer” is unhelpful to determining whether the reel would be suited for automated fuel delivery. All fluids are necessarily “chemicals” and such a broad reference does not particularly inform a POSITA that the 1125 Series reel is suited for fuel delivery in an automated fueling station. Likewise, the other listed categories are so broad that they do not particularly inform a POSITA that the 1125 Series reel is suited for fuel delivery in an automated fueling station. Ex. 2011 at ¶¶117-119.

**B. A POSITA would have recognized that the Coxreels 1125 Series reel would have been unsuited for an automated fueling station as in Van Vliet.**

In selecting components such as a reel for an automated fueling station, a POSITA would have at least conducted an initial analysis of the reel to determine whether it is likely to work or not. This would have included preliminary evaluation

of the information and design details provided by the manufacturer. Ex. 2011 at ¶120. In particular, a POSITA would not have relied solely on manufacturer representations, as the manufacturer would not have been likely to be familiar with the design, requirements and operation of an automated fueling station. This is especially true where, as here, the manufacturer representations are so broad. Ex. 2011 at ¶121.

From the preliminary evaluation, a POSITA would have found that the Coxreels 1125 Series reel would have been unsuited for an automated fueling station as in Van Vliet. The Coxreels 1125 Series reel uses a solid brass swivel inlet. Ex. 1015 at 1, see also annotated picture below. Copper and copper-containing alloys, i.e., brass (a copper-zinc alloy), should not be used with fuel. Ex. 2011 at ¶112. Copper can promote fuel degradation and can produce mercaptide gels, and zinc can react with water or organic acids in fuel to form gels. These gels can form deposits in downstream equipment that can plug lines, orifices, filter screens, and the like. Ex. 2011 at ¶¶123-124. Additionally, metals such as copper and zinc (brass) promote fuel degradation. Fuel degradation can lead to the formation of insoluble gums and particulate materials than can adhere to surfaces, limit fuel flow, or clog small clearances in fuel systems, causing problems such as injector malfunction or seizures. Ex. 2011 at ¶124. Therefore, a POSITA would have understood that the brass swivel would have made the Coxreels 1125 Series reel an unacceptable choice

for a mobile fuel delivery station, such as in Van Vliet, because it could have led to formation of gels, insoluble gums, and particulates that could interfere with operation of downstream equipment. Ex. 2011 at ¶125. Accordingly, a POSITA would have found the Coxreels 1125 Series reel to have been an unacceptable choice to use or to even try in a mobile fuel delivery station such as in Van Vliet.



The Coxreels 1125 Series reel also comes in a 1 inch model that has a nickel-plated steel swivel instead of a brass swivel. However, a POSITA would not have found that option to be acceptable either. As indicated in Coxreels, the swivel seals of the 1 inch models have seals made with AFLAS material (Ex. 1015 “AFLAS on 1" models”). AFLAS is a registered trademark of AGC INC. for heat and chemical resistant fluororubber. Ex. 2026. AFLAS was known to have a service temperature range of -5 °C to 200 °C and a glass transition temperature of -3 °C or -13 °C, depending on the exact grade. Ex. 2011 at ¶¶127-130. A mobile fuel delivery station

may be used in extreme conditions, such as North Dakota in the winter where well-site temperatures can fall below -30 °F (-34 °C). A POSITA would have found a reel with an AFLAS seal to have been unacceptable because use in an environment of -30 °F (-34 °C) would have been lower than the minimum service temperature and glass transition temperature of the AFLAS material, which suggests that the seal would be likely to fail. Ex. 2011 at ¶131. Additionally, the models of the Coxreels 1125 Series reel that were available in the one inch inner diameter only had capacity for a 100 foot hose. Depending on where the mobile fuel delivery station is located on the well site, the frac pumps may be located as far as 450 feet away. A POSITA would have understood this and would have arrived at the conclusion that a reel with only a 100 foot hose capacity would not have been sufficient. Ex. 2011 at ¶¶132-133. Accordingly, a POSITA would have found the Coxreels 1125 Series 1 inch model reel to also have been an unacceptable choice to use or to even try in a mobile fuel delivery station such as in Van Vliet. *Id.*

**C. The Coxreels 1125 Series reel would have resulted in an undesirable operating configuration.**

The Coxreels 1125 Series reels were available in 24 different models, which are shown in the table in Coxreels. Ex. 2011 at ¶134. Neither the Petition nor Dr. Durham's declaration appear to identify a particular model, but in his deposition, when discussing the models and hose lengths, Dr. Durham asserts, "I think 700 feet probably would be a good number for a maximum length [of hose] at a fracturing

site” (Ex. 2029 at 68). There are two models of the 1125 Series reel that have 700 ft hose capacity, which are models 1125-4-500 and 1125-4-500-C. Ex. 1005 at 1-2. Both of these models are configured for a 700 ft. long, 3/8 in. inner diameter hose (hereafter the “Durham configuration” refers to model 1125-4-500 or 1125-4-500-C with a 700 ft. long, 3/8 in. inner diameter hose). Ex. 2011 at ¶135. The Durham configuration, however, if implemented in Van Vliet would lead to an undesirable operating configuration.

A “small” frac operation may require 7,500 gallons of diesel in a 12-hr period, a “large” frac operation may require 12,000 gallons in a 12-hr period, and a “superfrac” may require 24,000 gallons or more in a 12 hour period. Ex. 2011 at ¶137. The flow rates that would be required to meet such fuel volumes for a mobile fuel delivery station such as Van Vliet can be calculated based on the hose diameter, a pump pressure, and an assumption of a “duty cycle.” Ex. 2011 at ¶138 and Ex. Appendix A.

A “duty cycle” is the percentage of time of a 12 hour period that the pump is ON and pumping fuel through the hoses at maximum flow rate in order to meet a given fuel demand. For instance, a 90% duty cycle means that the pump is operating to supply the maximum flow rate for 90% of the 12 hour period. In the remaining 10% of the time (i.e., “off-duty time”) there is little or no fuel flow through the hoses, which accounts for start-up and shut-down transients and switching valves between

different output hoses. A 90% duty cycle would be extreme because any downtime that causes the off-duty time to exceed 10% would prevent the station from meeting the given fuel demand, and a frac pump would then likely need to be taken offline (at the least). A 90% duty cycle would have represented a highly undesirable operating configuration. Ex. 2011 at ¶139-140.

For a given flow rate, there is also a pump pressure that would be needed in order to achieve the that flow rate. For safety purposes, pump pressure should be limited to approximately 60 psi. Limiting the pump pressure limits the rate at which fuel, if it spills, would leak out in the event of damage to a hose. Additionally, the number of hoses that are open and providing fuel simultaneously should also be limited, for safety and practical considerations. Ex. 2011 at ¶141. For instance, the greater the number of hoses that are open simultaneously, the greater the burden on the operator(s) to safely monitor and manage those hoses. As an example, a limit of three simultaneously open hoses means that once three hoses are open and providing fuel, if there is a demand for fuel from a fourth hose, the opening of the valve for the fourth hose would be delayed until one of the first three hoses has completed filling a tank and the valve is closed. A limit of three open hoses would be considered very safe. A limit of five or six hoses would be considered marginally safe, and a limit of seven hoses or more would likely be a safety risk. Some of the safety risk could be mitigated with a greater number of operators -- but at the expense of increasing

safety risks elsewhere (e.g., more personnel on the well site, more opportunity for human error, etc.). Ex. 2011 at ¶142.

A pressure loss for a desired flow rate through the internal plumbing of the station from the pump, through a fuel filter, a manifold, an elbow fitting, and a hose can also be determined based on a pump outlet pressure limit. Ex. 2011 at ¶143.

For the Durham configuration operating with 3 hoses delivering fuel simultaneously and a comfortable 50% duty cycle, the estimated pressure required to meet the fuel delivery for even a small frac job with 7,500 gallons in 12 hours would be 440 psi. This configuration would increase safety risk because, if there were to be a leak, the higher pump pressure would cause more fuel to be leaked (than 60 psi) and at that pressure the leak may also spew fuel into the air, adding risk of spraying onto an operator or onto a hot surface that could ignite the fuel. Additionally, the pressure would exceed the maximum pressure rating of Brent Hose 3106 that Dr. Durham indicated in IPR2023-01236 to be “designed for use on engines and fuel lines.” Ex. 2011 at ¶144. This is clearly not an acceptable operating configuration due to the high pressure, the limited fuel delivery, and risk of hose burst. Ex. 2011 at ¶145

With an increase to seven simultaneously open hoses and a 90% duty cycle, the Durham configuration could achieve delivery of 7,500 gallons in a 12 hr period with a pump pressure under 60 psi. The use of seven simultaneously open hoses at

the 90% duty cycle would have been considered a “redline” operating configuration because there would be a safety risk associated with having seven of Van Vliet’s ten hoses being simultaneously open and the use of the extreme 90% duty cycle. There also would be no margin for error with this configuration, as a problem with any hose would immediately risk a fuel shortfall and, consequently, a frac pump having to be taken offline. More importantly, even at this “redline” configuration, the fuel volume output could only barely meet the fuel requirement of a small frac job and would not be able, without pressing the limits more, to deliver enough fuel for a larger frac or superfrac. Ex. 2011 at ¶¶146-147.

In order to deliver 12,000 gal. for a large frac, the pump pressure for the Durham configuration would have to be increased to 85 psi with seven simultaneously open hoses and a 90% duty cycle - still at *redline* operation for number of hoses and duty cycle. This pump pressure of this configuration would also pose a higher safety risk if there were to be a leak, as discussed earlier above. Additionally, the pressure would be approaching the maximum pressure rating of Brent Hose 3106 (discussion above) Ex. 2011 at ¶¶144, 148. This too is clearly not an acceptable operating configuration due to the high pressure, extreme duty cycle, and risk of hose burst.

In order to provide 24,000 gal. of fuel required for a superfrac over 12 hours, the pump pressure for the Durham configuration would have to be increased to 280

psi, with seven simultaneously open hoses and a 90% duty cycle. This would be an extreme safety risk due to the use of seven simultaneously open hoses at the 90% duty cycle, the capacity for a large volume leak, and likelihood of leaked fuel spraying into the air. Moreover, such a pressure level would also be several multiples in excess of the hose pressure rating (discussion above), resulting in a likely hose burst. Ex. 2011 at ¶150.

The Durham configuration with the Coxreels 1125 Series reel and the 3/8 inch hose would lead to undesirable, unsafe operating configurations in order to meet fuel demand. A POSITA would have understood this and therefore would have found the Durham configuration to be unacceptable in a mobile fuel delivery station such as Van Vliet. Ex. 2011 at ¶151.

**VII. GROUNDS 2, 2A, AND 3: SHOAP DOES NOT TEACH A HOSE HAVING A TUBE AND A SLEEVE CIRCUMSCRIBING THE TUBE**

As discussed earlier, the PTAB appears to adopt PO's construction that the phrase “a tube and a sleeve that circumscribes the tube” requires a tube and a physically separate sleeve that encircles the tube. In view of that construction, Petitioner cannot show by a preponderance of the evidence that claims 5-18 of the '118 patent are unpatentable under Grounds 2, 2A, or 3.

Shoap does not disclose a tube and a physically separate sleeve that encircles the tube. Ex. 2011 at ¶¶153-154. Petitioner argues that the inner conduit surface 110 of Shoap maps to the claimed tube, and that the outer conduit surface 140 maps to

the claimed sleeve. Petition at 47-48. As Petitioner seems to concede, the alleged tube and sleeve are both part of the same structure, namely the conduit 100. Indeed, Fig. 1A of Shoap shows a single structure, conduit 100, with inner 110 and outer 140 surfaces. Ex. 1006 at 3; at 32-33 col. 5, ll. 1-3. While the conduit 100 conveys fluid, the alleged sleeve is not a physically separate structure that encircles the tube. Rather, as shown in Shoap's Fig. 1, the surfaces 110 and 140 are of the same structure, the conduit 100. Thus, according to the claim construction, Shoap does not teach a tube and a physically separate sleeve that encircles the tube. Ex. 2011 at ¶156.

Petitioner also contends that if the claim requires that the tube and the sleeve are physically separate structures, this feature would have been an obvious matter of design choice. Petition at 48-49. To support a conclusion that a feature is an obvious matter of design choice, there must be a “convincing line of reasoning” as to why a POSITA would have found the claimed feature to have been obvious. *Ex parte Clapp*, 227 U.S.P.Q. 972, 973 (BPAI 1985). Petitioner falls short of meeting this burden. For instance, Petitioner summarily asserts that this feature is obvious because the structure “could be” formed using two thinner concentric conduits. Petitioner provides no basis in the prior art for this hypothesis, and the assertion thus amounts to a conclusory statement. More importantly, Petitioner does not articulate

any reason that would prompt a POSITA to use its proposed hypothetical two thinner concentric conduits.

In fact, a POSITA would have understood that two thinner concentric conduits would be highly undesirable in a mobile fuel delivery system. Ex. 2011 at ¶¶158-159. Insofar as understood in the absence of basis in the prior art, Petitioner's proposal of two thinner concentric conduits suggests that the conduit would be provided in two thinner layers that are equal to a single thicker layer, i.e., a "hose-within-a-hose." In a hose-within-a-hose, if a leak were to develop in the inner conduit, the presence and location of the leak would not be readily identifiable because the outer conduit would block visibility of the inner conduit and the leak. Ex. 2011 at ¶160. A POSITA would have found that to be highly undesirable because it would have prevented the location of a leak from being immediately identified. Moreover, a leak in the inner conduit would "flood" the interface between the inner and outer conduits with fuel, where the fuel would then be trapped. The fuel trapped in the interface would be in direct contact with the wires between the conduits, creating an incendiary risk and thus a safety risk. Ex. 2011 at ¶163. For these reasons, a POSITA would not be prompted to use two thinner concentric conduits in a mobile fuel delivery system. Ex. 2011 at ¶164.

There is also a gap in Petitioner's logic that exposes its challenge based on Shoap as a hindsight analysis. In particular, Petitioner asserts that a POSITA

designing the system of Van Vliet to employ communication through a wired channel *would have looked to existing hose designs* that enable compact, safe, and convenient wire placement. Petition at 43. In other words, Petitioner jumps directly to a wired hose and assumes, without any explanation, that a POSITA would have looked to a wired hose to achieve a wired communication channel. This is an unmistakable hindsight analysis to recreate the claims, as Petitioner has given no indication why a POSITA necessarily would have been led to a wired hose in the first place. In fact, it was a common and acceptable practice to run wires, cables, and other lines along the ground at a well site. Ex. 2011 at ¶¶165-167. Since wires and cables running on the ground was already an accepted common practice, a POSITA designing the system of Van Vliet to employ communication through a wired channel would have run the sensor communication lines on the ground back to the controller in the trailer. Furthermore, since running cables and wires on the ground was already a common and accepted practice, a POSITA would not have gone through the trouble of incorporating the communications lines into the hoses. *Id.* The practice of running wires and cables on the ground at a well site does not rise to the level of being a safety concern that would have prompted a POSITA to abandon known practice and instead jump to using wired hoses. Ex. 2011 at ¶168.

**VII. GROUNDS 2 AND 2A SHOULD BE SEPARATELY DISMISSED AS TO CLAIM 7.**

Claim 7 recites “a plurality of connectors, each of the connectors being mounted on a respective different one of the reels and each of the connectors receiving a respective different one of the sensor communication lines.”

Petitioner argues that it would have been an obvious design choice to mount connectors on the reel, relying on Ex. 1003, ¶192 in which Dr. Durham points to Shoap’s slip-ring to conclude that claim 7 is obvious. However, a POSITA would have understood that Shoap’s slip-ring would have been dangerous in Van Vliet. Ex. 2011 at ¶¶169-170. In particular, Shoap is directed to transporting water, such as through a hose. Ex. 1006, col. 1, ll. 24-33. Unlike fuel, water typically is not an ignition concern. Slip-rings like that of Shoap transfer electrical signals or power across a rotating shaft, from the rotating frame to the nonrotating frame. Petitioner and Dr. Durham did not consider use of Shoap’s slip-ring in a fuel vapor environment, as would be present in Van Vliet. Ex. 2011 at ¶171. The way that Shoap's slip-ring works is that there are metal band contacts on a rotating shaft and brush contacts on the opposing nonrotating side such that the brushes drag across the bands as they rotate and maintain electrical continuity. As the brushes drag across the band, the sliding contact may create small sparks that would act as an incendiary in a volatile fuel-vapor environment. Ex. 2011 at ¶172. A POSITA would have understood that generating sparks in the fuel vapor environment of Van Vliet would have been problematic because the sparks could be an ignition source to fuel vapors.

This is not a concern in Shoap, where water is the fluid, but for safety reasons it would have strongly discouraged a POSITA from using a slip-ring contact as in Shoap in the system of Van Vliet. Ex. 2011 at ¶173.

**IX. GROUND 2 SHOULD BE SEPARATELY DISMISSED AS TO CLAIM 11**

Claim 11 recites, “wherein the sleeve is a fabric sleeve.” Shoap does not disclose a fabric sleeve, nor any separate sleeve as discussed above. Petitioner, however, contends that it would have been an obvious design choice to make the outer surface [of the hose of Shoap] out of fabric. Petition at 56. In alleged support, Petitioner asserts that a fabric hose sleeve was commercially available at the time of the '118 patent, and was part of a finite set of known options for protecting hoses from damage, though Petitioner does not explain what those finite options are.

Petitioner has used “design choice” as a surrogate for claim features that are not found in the cited prior art of Ground 2. Such a use of design choice is improper. In *Fanduel, Inc. v. Interactive Games LLC*, 966 F.3d 1334, 1343-1344 (Fed. Cir. 2020) the Federal Circuit considered the situation where there was an evidentiary gap where the prior art was missing a claim limitation. In *Fanduel* the Court agreed that calling the addition of that limitation “an obvious matter of design choice” did not fill that gap. Additionally, “All claim limitations must be taught or suggested by the prior art to establish obviousness of a claimed invention.” *In re Miller*, 2022 U.S. App. LEXIS 5207, \*10-11 (Fed. Cir. February 28, 2022). “A claimed invention may

be obvious even when the prior art does not teach each claim limitation, so long as the record contains some reason why one of skill in the art would modify the prior art to obtain the claimed invention.” *In re Asset Guard Prods. Inc.*, 2022 U.S. App. LEXIS 9909, \*16 (Fed. Cir. April 13, 2022) (citation omitted); *see also CRFD Research, Inc. v. Matal*, 876 F.3d 1330, 1345 (Fed. Cir. 2017).

In alleged support for its assertion of design choice Petitioner relies on its expert. Petition at 56; Ex. 1003, ¶208. In ¶208, Dr. Durham refers to section VIII.C. of his report in support of the conclusion that fabric covered hose sleeves were commercially available at the time of the ‘118 Patent. In section VIII.C. at ¶70, Dr. Durham submits that Desihose offered Brent Oil/Fuel Hose 3106 that is allegedly designated for “use on engines and fuel lines.” However, Dr. Durham did not point out that Hose 3106 is a fuel injection hose and is specified under DIN73379, which is a German standard for *fuel hoses of road vehicles*. Ex. 2011 at ¶176-177. Dr. Durham’s omission that Hose 3106 is a fuel injection hose for road vehicles gives an erroneous impression that Hose 3106 was represented for use in any fuel line. As the system of Van Vliet is not a road vehicle and does not have a fuel injector hose, Petitioner has not established how a POSITA would have understood Hose 3106 to be suitable to meet the needs of a system as in Van Vliet, where the hose would be dragged on the ground and would onto and off of a reel. Ex. 2011 at ¶178.

In section VIII.C. at ¶¶71-72, Dr. Durham also points to Rhino Sleeve HT marketed by SRM Industries. Ex. 1032, Ex. 1033. However, as Dr. Durham acknowledges, Ex. 1032 has a date of October 25, 2016. Additionally, Ex. 1033 includes a Wayback designation from the year 2018 at the bottom left of the pages, as well as a copyright marking of 2018. As the priority date of the ‘118 Patent is October 11, 2016 (Ex. 1001, face of patent), neither Ex. 1032 nor Ex. 1033 qualify as prior art or are representative of what was available at the time of the ‘118 Patent. As a result, Petitioner has failed to establish that the claimed fabric sleeve was obvious as a matter of design choice from hose sleeves available at the time.

## **X. SECONDARY CONSIDERATIONS**

The nonobviousness of the challenged claims is strongly supported by a number of objective indicia of nonobviousness, including industry praise, commercial success, licensing, and copying by others. When present, secondary considerations of nonobviousness must be considered. To be given weight, there must be some nexus between the secondary consideration and a novel feature of the claimed invention. However, secondary considerations are presumptively attributed to the patented invention where a marketed product embodies the claimed features and is coextensive with them. *Muniauction, Inc. v. Thomson Corp.*, 532 F.3d 1318, 1328 (Fed. Cir. 2008) (citation omitted). As it relates to the products discussed

below, including the FAS Unit, the secondary considerations should presumptively apply.

**A. The Claimed Technology Has Received Industry Praise**

The FAS Unit, embodying claim elements, has received praise and recognition within the United States oil and gas industry in connection with its safety. Specifically, in 2018, the inventor of the FAS Unit, Ricky Dean Shock, was named an Industry Leader at the Texas Oil & Gas Awards for the FAS Unit's improvements in safety. Ex. 2045 at ¶5.

The FAS Unit is covered by the challenged claims, creating a presumption that this secondary consideration of nonobviousness should apply. Dr. Rodgers has testified that the FAS Unit meets each and every limitation of at least the challenged claims. Ex. 2011 at ¶ 179. Patent Owner marks each of its FAS Units with the '118, '805, and '955 patents. Ex. 2031.

**B. The Claimed Technology Was Copied by Others, Including Petitioner**

Multiple entities have copied the claimed configuration. First, Petitioner is the owner of US Patent No. 11,305,979. During prosecution of the '979 patent, on December 26, 2019, Petitioner filed an Information Disclosure Statement citing the '805 Patent as prior art. (Ex. 2046 at 1). In spite of this knowledge of the '805 Patent, Petitioner offered its CORE Automated Fueling Solution commercially, complete

with the claimed features in the '805 Patent – a mobile trailer, a pump, manifolds, a set of reels on each side of the trailer, and an aisle walkway between the sets of reels. A first group of the hoses are deployable from the first trailer side wall and a second group of the hoses are deployable from the second trailer side wall.





The publicly available photos above showing these claimed features in Petitioner's product were included in the Complaint Patent Owner filed against Petitioner for patent infringement, *Fuel Automation Station, LLC. V. Permian Global, Inc.*, Case No. 1-22-cv-008001 (WDTX Aug. 10, 2022). Ex. 2045.

Patent Owner also asserted the '118 and '955 patents in litigation against Comanche Gas Solutions, LLC in connection with their Comanche fuel distribution system. This matter was captioned 21-cv-01007-MN in the District of Delaware. The Comanche fuel distribution system included a mobile trailer, first and second manifolds on the trailer, reels on opposing sides of the trailer, with an aisle walkway between the sets of reels. Ex. 2043.





### **C. Licensing**

Patent Owner has granted licenses under the '118, '805, and '955 patents to Comanche Gas Services LLC, in which Comanche pays Patent Owner a royalty for the use of automated fracking fuel delivery systems. Ex. 2045 at ¶4.

### **D. Commercial Success**

The invention has also achieved significant commercial success, demonstrating market demand and consumer approval that is directly attributable to the inventive features of the patented fuel delivery system. Indeed, a total of more than 60 FAS units have been used to deliver over 800,000,000 gallons of fuel on well sites in Texas, Oklahoma, Colorado, North Dakota, New Mexico, and Pennsylvania, as well as internationally in Canada, Saudi Arabia, and Argentina. Ex.

2045 at ¶6. Again, each FAS Unit embodies the claim elements of the ‘118, ‘805, and ‘955 patents.

## **XI. CONCLUSION**

For the foregoing reasons, Patent Owner respectfully submits that Petitioner has not established by preponderance of evidence that any claims of the ‘118 Patent are unpatentable.

Respectfully Submitted,

**CARLSON, GASKEY & OLDS, P.C.**

Dated: May 31, 2024

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**STATEMENT OF COMPLIANCE**

Pursuant to 37 C.F.R. § 42.24(b)(1), the undersigned hereby certifies that the foregoing document is produced using a 14-point Times New Roman font and contains 8,582 words (excluding a table of contents, table of authorities, certificate of service, and appendix of exhibits), which is fewer than the 14,000 words permitted by PTAB rules. Counsel relies on the word count of the computer program used to prepare the brief.

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**CERTIFICATE OF SERVICE**

I HEREBY CERTIFY that on May 31, 2024, a true and correct copy of the foregoing document was served electronically via e-mail in its entirety on counsel identified below by Petitioner for service at [DLPermianIPR@bakerbotts.com](mailto:DLPermianIPR@bakerbotts.com).

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