

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

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

v.

FUEL AUTOMATION STATION, LLC,
Patent Owner.

Case IPR2023-01236

Patent No. 10,815,118

DECLARATION OF JOHN RODGERS, Ph.D., P.E.

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I, John Rodgers, Ph.D., P.E., declare:

I. SUMMARY OF OPINIONS

1. Here is a summary of my opinions in this declaration which are supported by the rest of my declaration and the materials I have considered:

2. Based upon my knowledge and experience and my review of the prior art publications, it is my opinion that claims 1-3 are not anticipated or rendered obvious by Van Vliet.

3. Based upon my knowledge and experience and my review of the prior art publications, it is my opinion that claims 1-3 are not rendered obvious by Van Vliet in view of Coxreels.

4. Based upon my knowledge and experience and my review of the prior art publications, it is my opinion that claims 4-18 are not rendered obvious by Van Vliet in view of Shoap.

5. Based upon my knowledge and experience and my review of the prior art publications, it is my opinion that claims 4-9 and 15-18 are not rendered obvious by Van Vliet in view of Coxreels and Shoap.

6. Based upon my knowledge and experience and my review of the prior art publications, it is my opinion that claims 12-13 are not rendered obvious by Van Vliet in view of Shoap and Hosecraft.

II. QUALIFICATIONS

7. I have a B.S.E. in mechanical engineering and materials science and a second major in mathematics from Duke University. I have an M.S. from the Massachusetts Institute of Technology (“MIT”) and a Ph.D. from MIT, both from the Department of Aeronautics and Astronautics. In my research and academics at MIT, I worked with active material systems and their application to structural actuation and vibration control. Much of the work involved the development of actuation systems for helicopter vibration control and other industrial and defense applications.

8. I am a professional engineer licensed in Texas, North Dakota, and Connecticut and have twenty years of experience in the oilfield industry. I founded and have worked in my engineering consulting business, Starboard Innovations, LLC, since 2000. In my career, I have worked on a wide variety of applications across many industries, though the bulk of my work has come in the development of downhole tools where I have been focused since 2003. I have developed new mechanical tools and software tools focused on a variety of different downhole applications. Several of the tools focused on measuring and analyzing the dynamic response of downhole tools and the surrounding wellbore and formation. Other tools that I have developed involved mechanical actuation systems such as firing heads,

frac sleeves, cementing sleeves, and plugging devices. One example was a through-tubing bridge plug, designed for high expansion-ratio applications, which is now a product used in the field. Another design involved an autonomous, self-navigating wellbore plug with the option for dissolvable components. I have developed or worked on downhole tool designs for several other applications including: acoustic telemetry, measurements while drilling (MWD), test valves, fracture and cementing sleeves, and wireline fluid sensing. My involvement with many of these development projects included designing, performing engineering analyses and simulations, developing manufacturing processes, building prototypes, running qualification tests, and supporting field trials. My experience includes work on test wells in Texas and Oklahoma. In the context of testing, I have worked with high-pressure hydraulics, pressure vessels, tubing, fittings, and instrumentation including in the simulation of the downhole operating conditions.

9. I have extensive experience in directional drilling and in the development and application of downhole tools used for this purpose. I have worked as a consultant and/or expert in the drilling industry for Halliburton, Nabors, NOV, and Superior Drilling Products. Generally, my project experience includes the following areas: automated directional drilling steering software, rotary steerable tools, drillstring dynamic modeling and simulation using Finite Element Analysis

(FEA), thermal isolation and active cooling of MWD electronics, turbine power generators, MWD pulsers, thermal/vibration testing of MWD electronics, Finite Element Analysis (“FEA”) of MWD electronics, accelerated life testing of mud pulsers, failure investigation of rotary steerable systems, design of vibration monitoring sensors for MWD tools, and the simulation of high-velocity erosive-jet drilling using Computational Fluid Dynamics (“CFD”). My experience also includes analysis of operations involving rig data systems and mud pumps.

10. Additionally, I have developed downhole electronic tools incorporating electronics, sensors, wiring, and connectors in drilling, perforating, and other well completion applications. These tools involve metallic pressure housings, threaded connections, and seals—all elements involved in this case. I have worked to design, build, qualify, and field test these tools over the span of my career in the industry.

11. I have experience with developing tools and solutions and troubleshooting failures related to all phases of the well completion process including drilling, casing, cementing, perforating, fracturing, and configuring for production.

12. I am the sole and/or contributing author of over fifteen publications relating to this field. A comprehensive list of publications is in my attached

curriculum vitae. I am a member of the Society of Petroleum Engineers (SPE) and American Society of Mechanical Engineers (ASME).

13. I have been named as an inventor on over thirty U.S. Patents. A comprehensive list of my patents is contained in my attached C.V. Ex. 2032. A number of these patents involve developments related to the perforating projects described above.

III. PRIOR TESTIMONY

14. In the last four years, I have testified as an expert in the matters listed in the attachment to my C.V. Ex. 2032.

IV. ENGAGEMENT AND COMPENSATION

15. I am making this declaration at the request of Patent Owner.

16. I am being compensated at my usual consulting rate for my work on this matter.

17. I am being reimbursed at cost for my expenses.

18. My compensation is in no way dependent upon my opinions or testimony or the outcome of this proceeding.

V. MATERIALS CONSIDERED

19. In preparing this declaration, I have reviewed all filings and exhibits associated with IPR2023-01236.

VI. APPLICABLE LEGAL STANDARDS

20. I am not an attorney. I have been informed by my attorneys of the relevant legal principles and have applied them to arrive at the opinions set forth in this declaration.

A. Claim Construction

21. I understand that claim construction in an IPR is a legal question for the Board to decide. I also understand, however, that in construing claim terms, the Board asks what the terms would mean to a person of ordinary skill in the relevant art in view of the disclosures in the patent and the prosecution history of the patent. I understand that the Board may also consider external evidence, such as dictionaries. In general, however, I understand that claim terms are given the ordinary and customary meaning one of ordinary skill in the relevant art would apply to them in the context of the patent at the time of the invention. I have been informed that the relevant time frame here is October 11, 2016.

B. Anticipation

22. I understand that the following standards govern the determination of whether a patent claim is “anticipated” by the prior art.

23. I understand that, for a patent to be “anticipated” by the prior art, each and every limitation of the claim must be found, expressly, implicitly or inherently, in a single prior art reference. I further understand that the requirement of strict identity between the claim and the reference is not met if a single limitation of the claim is missing from the prior art reference.

24. I understand that claim limitations that are not expressly described in a prior art reference may still be adequately disclosed for anticipation purposes if they are implicitly disclosed by the reference or are inherent (i.e., necessarily present) in what the reference describes.

25. I have been informed that in assessing whether a limitation is implicitly disclosed by a reference, I should consider the knowledge possessed by a POSITA and consider not only the specific teachings of the reference but also the inferences a POSITA would reasonably have been expected to have drawn from those teachings in light of such knowledge.

C. Obviousness

26. I have been advised that the burden is on Petitioner to demonstrate the unpatentability of the challenged claims based on a preponderance of the evidence.

27. I have been advised that a claimed invention is not patentable under 35 U.S.C. §103 if it is obvious.

28. I understand a patent claim is unpatentable if the claimed invention would have been obvious to a person of ordinary skill in the art at the time the claimed invention was made. I have been informed that the relevant time frame here is October 11, 2016.

29. I have further been advised that the ultimate conclusion of whether a claim is obvious should be based upon several factual determinations including (1) the level of ordinary skill in the field; (2) the scope and content of the prior art; (3) what differences, if any, existed between the claimed invention and the prior art; and (4) any objective indicia of non-obviousness (i.e., secondary considerations).

30. I have been advised that, in determining the level of ordinary skill in the field that someone would have had at the time the claimed invention was made, I should consider: (1) type of problems encountered in the art; (2) prior art solutions to those problems; (3) rapidity with which innovations are made; (4) sophistication of the technology; and (5) educational level of active workers in the field.

31. I have been advised that a patent claim composed of several elements is not proved obvious merely by demonstrating that each of its elements was independently known in the prior art. In evaluating whether such a claim would have been obvious, I may consider whether there is a reason that would have prompted a person of ordinary skill to combine the elements or concepts from the prior art in the same way as in the claimed invention. I understand that for obviousness to be found, the proposed obviousness ground must be supported by an articulated reason with a rational underpinning, as opposed to a mere conclusory statement.

32. I understand that all words in a claim must be considered when judging the patentability of a claim against the prior art. I also understand that the each and every element of a claim must be addressed in order to render the claim obvious.

33. I understand if a claim element is alleged to be present in a certain prior art reference, then the claim element must be shown to be present, with certainty, in that prior art reference. If the claim element is not proven to be present in the prior art with certainty, I understand it is inappropriate to rely on common sense to fill in the missing structural element.

34. I have also been advised that I must be careful not to evaluate the question of obviousness using the benefit of hindsight. Rather, I should put myself in the position of a person of ordinary skill at the time the claimed invention was

made and I should not consider what is known today or what is learned from the teachings of the patent.

35. I have been advised that secondary considerations can serve as evidence of non-obviousness. Such secondary considerations include licensing, commercial success, long felt but unsolved needs, failure of others, unexpected results, copying, and industry praise. The secondary considerations should have a nexus to the claimed invention. I understand secondary considerations help guard against slipping into use of hindsight when making a determination of obviousness.

36. I have been advised that any obviousness rationale for modifying or combining prior art must include a showing that a person of ordinary skill would have had a reasonable expectation of success.

D. Priority Date

37. I have been advised that the “priority date” of a patent is the earlier of: (a) the date on which a patent application is filed; or (b) the date on which an earlier-filed patent application is filed if the patentee claims the benefit of priority to that earlier-filed patent application. I have been informed that the relevant date here is October 11, 2016.

VII. GENERAL OVERVIEW OF CASE

38. I understand that this case was brought by Petitioner in an effort by Petitioner to render the claims of the '118 Patent invalid.

39. Petitioner has raised various proposed grounds under which Petitioner argue that the claims would have been anticipated or obvious.

40. I understand that Patent Owner submitted a preliminary response to the Petition.

41. I understand the Board granted institution of this case.

VIII. TECHNOLOGY AT ISSUE

42. Hydraulic fracturing, referred to as “fracking,” is a technique for extracting oil or natural gas from underground rock formations. Fracking involves injecting a high-pressure fluid mixture into the rock formation to create fractures in the rock. These fractures allow the oil or gas to flow more freely to the wellbore, where it can be brought to the surface for collection.

43. A hydraulic fracture is formed by pumping fracturing fluid into a wellbore at a rate sufficient to increase pressure at the target depth to exceed that of the fracture gradient of the rock.

44. Hydraulic fracturing equipment used at frac sites usually consists of slurry blenders and fracturing pumps. The pumps, blenders, and other machinery employed in hydraulic fracturing are typically stationed at the surface of the well site. These components conventionally run until they require refueling, which necessitates shutting them down temporarily. Shutdowns are costly and inefficient.

45. A frac site is an orchestration of machinery, horsepower, and manpower. It is a loud, dusty, and busy “factory” that carries out the hydraulic fracturing stimulation operation of a well.

46. On a typical 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.

47. 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. 2033].

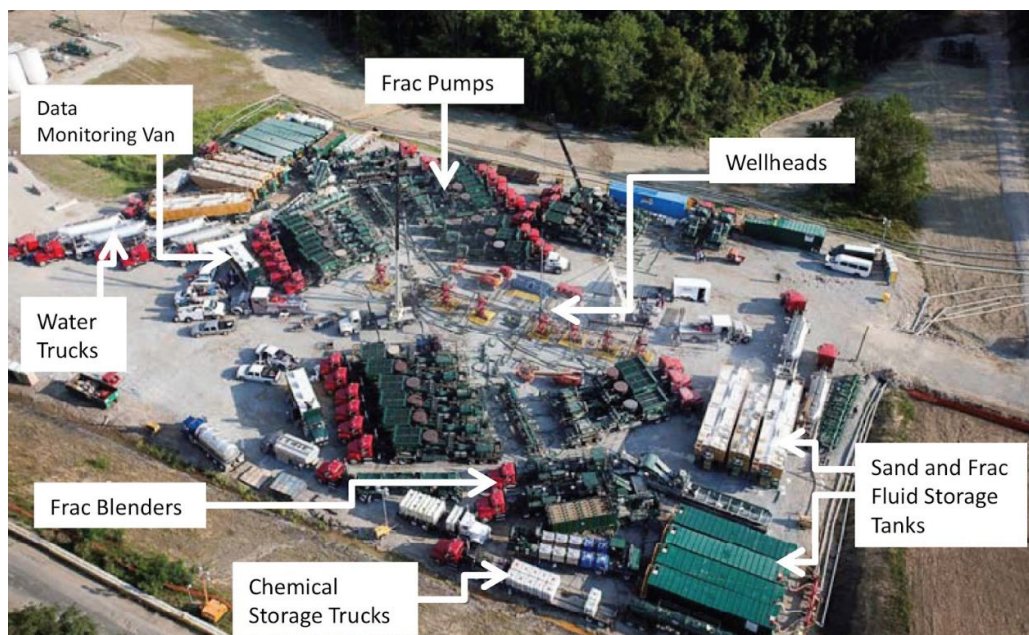


Image Credit: Kansas Geological Survey

48. The frac pumps are operated 24 hours a day and seven days a week, usually for days or weeks at a time. If a frac pump runs out of fuel, it must be taken off-line. If multiple pumps go down, then the frac job may have to be shut down, which is costly and inefficient for the well operator.

49. In order to keep the frac pumps fueled and running continuously, a mobile fuel delivery station, such as Patent Owner's patented Fuel Automation

Station (“FAS unit”), may be 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.

50. I have seen a FAS unit in person and have witnessed its operation in Victoria, Texas.

51. The ability to continuously run the frac pumps 24/7 is only as good as the reliability of the mobile fuel delivery station that refuels the frac pumps. If the mobile fuel delivery station malfunctions or breaks down, fuel delivery to the frac pumps may cease and the frac operation may shut down. If the mobile fuel delivery station experiences a safety event, fuel delivery to the frac pumps may cease and the frac operation may shut down. In other words, any issue that hinders operation of the mobile fuel delivery station also hinders the delivery of fuel and the operation of the frac job.

52. Additionally, insofar as a mobile fueling station ever breaks down while on the frac site, the station may be repaired on-site. However, as access to well sites are restricted and the tools and parts required for a repair may be unavailable on-site, a station that needs repair is often transported from the well site to another location for repair/maintenance. As a result, a breakdown of the station may not only shut

down a frac operation but may also require a station be taken out of commission, resulting in economic loss to the owner or lessee of the station.

53. The mobile fuel delivery station also must be operable under harsh environmental conditions. For instance, the well site may be located in regions that can be extremely cold, such as North Dakota or northern Canada in the winter where well-site temperatures can fall below -30 °F, or in regions that can be extremely hot, such as Texas in the summer where well-site temperatures can exceed 120 °F. Moreover, rain, snow, and wind expose the station to ice and dirt that can infiltrate the station, contaminate the equipment, and even cause corrosion of the equipment.

54. Thus, the station must operate reliably over a wide range of conditions, including a temperature range of sub-zero to more than 120°F, that challenge the durability of the station.

55. In addition to reliable operation, a mobile fuel delivery station must also operate safely, to avoid fuel spills and to protect workers from injuries. Indeed, in hot refueling there is a risk that spilled fuel will ignite and cause a fire, which may destroy property and expose workers on the frac site to serious injuries, or worse. [Ex. 2012 – Page 17].

56. I understand that Petitioner has been issued U.S. Patent No. 11,305,979 titled “Automatic fueling system and method for hydraulic fracturing equipment.”

57. There are various dangers associated with frac sites. As Petitioner notes in its own patent, fracking equipment and machinery works in very high temperature and pressure, and the chances of explosion and fire are significant and the associated risks of damage to life and equipment are high.

58. As also noted in Petitioner's patent, "the need for a mobile refueling system is in huge demand as these systems provide efficient and time-saving technique along with great safety for the workers during filling of fuel into multiple tanks around the work site."

59. If a mobile fuel delivery station is not reliable it will break down or malfunction and be unable to keep the frac pumps running continuously, and if a mobile fuel delivery station is not safe it will expose workers to injuries or death.

60. In the early 2010's, prior to automated fueling of frac pumps, the practice for refueling the pumps was one of the most dangerous jobs at a frac site. [Ex. 2014].

61. The frac pumps were loud (250 decibels, roughly double of a jet engine) and operated at pressures of 15,000 psi and temperatures of more than 300°C. To refuel the pumps, a worker would take a fuel hose and slide sideways in between a line of frac pumps to get to the fuel tanks. The worker would have one hand on the hose and use the other hand to unscrew the fuel cap. If it was nighttime, the worker

would also have a flashlight held under his chin so that he could see to put the hose into the fuel tank. Unable to see into the fuel tank, the worker hoped to have filled the tank -- but not too much because it could over-fill and splash back in his face. Once filled, the worker would move down the line of frac pumps to fill the next one. Once at the end of the line, the worker would start all over again because the first pump would just about be out of fuel. From time to time, over-pressure would cause a pipe to blow, but hopefully not at the time the worker was passing by. Workers did this for 12 hours shifts, day and night.

62. Around 2013, a company named Frac Shack came into the industry with an automated fueler. The automated fueler took the worker out of the hot zone in and around the frac pumps. Instead, the worker sat in the fueler shack and watched a screen to monitor filling. This was a tremendous advancement in safety, as workers no longer had to slide between frac pumps. Like anything new, however, automated fueling was unfamiliar to the industry, and even after a couple of years there was there were well operators that still needed to be convinced to adopt this new practice.

63. While removal of workers from the hot zone around the frac pumps was a great leap in safety, there was still work to be done to improve safety and reliability. Public perception of the oil and gas industry in general was poor, as there was public distrust over environmental performance, governance, and transparency. [Ex. 2015].

64. A POSITA would have known that not all hose reels have fluid passages to the hose. Many types of hose reels are only for hose storage and do not provide a fluid passage. As one example, the hose reel in Exhibit 2007 is for storage but does not provide a fluid passage. As disclosed, “Hose end E of hose H, see FIG. 5, is next inserted through slot 31 in the manner indicated, whereupon the clutch pin 38 is caused to reengage a selected hole 39 of respective hub 25.”

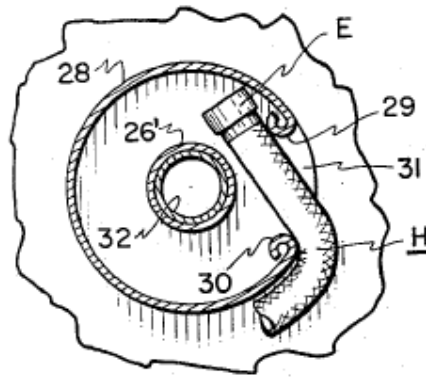


FIG. 5

IX. LEVEL OF ORDINARY SKILL

65. I understand that Petitioner's proposed definition of a person having ordinary skill in the art (POSITA) is:

As of the earliest claimed priority date, a person of ordinary skill in the art. ("POSITA") would have either (1) a Bachelor of Science in Mechanical Engineering, Electrical Engineering, Petroleum Engineering or an equivalent field as well as at least 2 years of academic or industry experience in the oil and gas industry, including well drilling, completion, or production, or (2) at least four years of industry experience in the oil and gas industry including well drilling, completion, or production. This definition is approximate, and more education may substitute for industry experience or *vice versa*.

See Petition at pages 16 and 17.

66. I have no opinion on Petitioner's definition. However, applying Petitioner's definition, at the time of the invention I was a POSITA under this definition because I had at least a bachelor's degree in mechanical engineering and at least 2 years of academic or industry experience in the oil and gas industry.

67. Based on my education and background, I am qualified to provide opinions as to what a POSITA would have known and understood by October 11, 2016. I am more than qualified as a POSITA as of October 11, 2016. Unless otherwise stated, my testimony herein refers to the knowledge of a POSITA as of October 11, 2016.

X. CLAIM CONSTRUCTION

A. “a tube and a sleeve that circumscribes the tube”

68. I understand that each of claims 5-18 require “a tube and a sleeve that circumscribes the tube.”

69. I have reviewed the Petition, the POPR, the Institution Decision, and the '118 Patent and its prosecution history and agree with the 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.

70. The claim language establishes to a POSITA that the tube and the sleeve are separate and distinct structures where one “circumscribes” the other.

71. 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.

72. I note that the specification of the '118 patent describes the “sleeve” and the “tube” only as being physically separate structures. [Ex. 1001].

73. Figure 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. Another 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.

74. Additionally, it is disclosed that bands may be tightened around the hose to prevent slipping and secure the sleeve. *Id.* This again indicates the hose and tube are separate structures.

75. I agree with the PTAB that the phrase “a tube and a sleeve that circumscribes the tube” would be rendered meaningless if the tube and sleeve were construed as encompassing the same structure. The PTAB should adopt the construction that the claimed tube and the sleeve are separate and distinct structures where the sleeve “circumscribes” the tube.

XI. PRIOR ART REFERENCES RELIED ON IN GROUNDS 1-3

76. In Grounds 1-3, Petitioners rely on prior art references to Van Vliet (Ex. 1004), Coxreels (Ex. 1005), and Shoap (Ex. 1006). I have reviewed these references. I summarize them below.

A. Van Vliet

77. Van Vliet describes in its Abstract a fuel delivery system and method for reducing the likelihood that a fuel tank of equipment at a well site during fracturing of a well will run out of fuel. A fuel source has plural fuel outlets, a hose on each fuel outlet of the plural fuel outlets, each hose being connected to a fuel cap on a respective one of the fuel tanks for delivery of fuel to the fuel tank. At least a manually controlled valve at each fuel outlet controls fluid flow through the hose at the respective fuel outlet. [Ex. 1004].

78. Van Vliet lists its “technical field” to be “fuel delivery systems and methods.” [Ex. 1004, at ¶1].

79. Van Vliet's schematic Figure 1 shows flow passages through manifolds 36, 38 and hoses 24, but does not show the flow passages that run through reels 30.

80. Permian's expert, Dr. Durham, acknowledges that Van Vliet's schematic Figure 1 “is a high-level representation and is not intended to depict the physical appearance or form” of the system's components. Ex. 1003 ¶112 n.146.

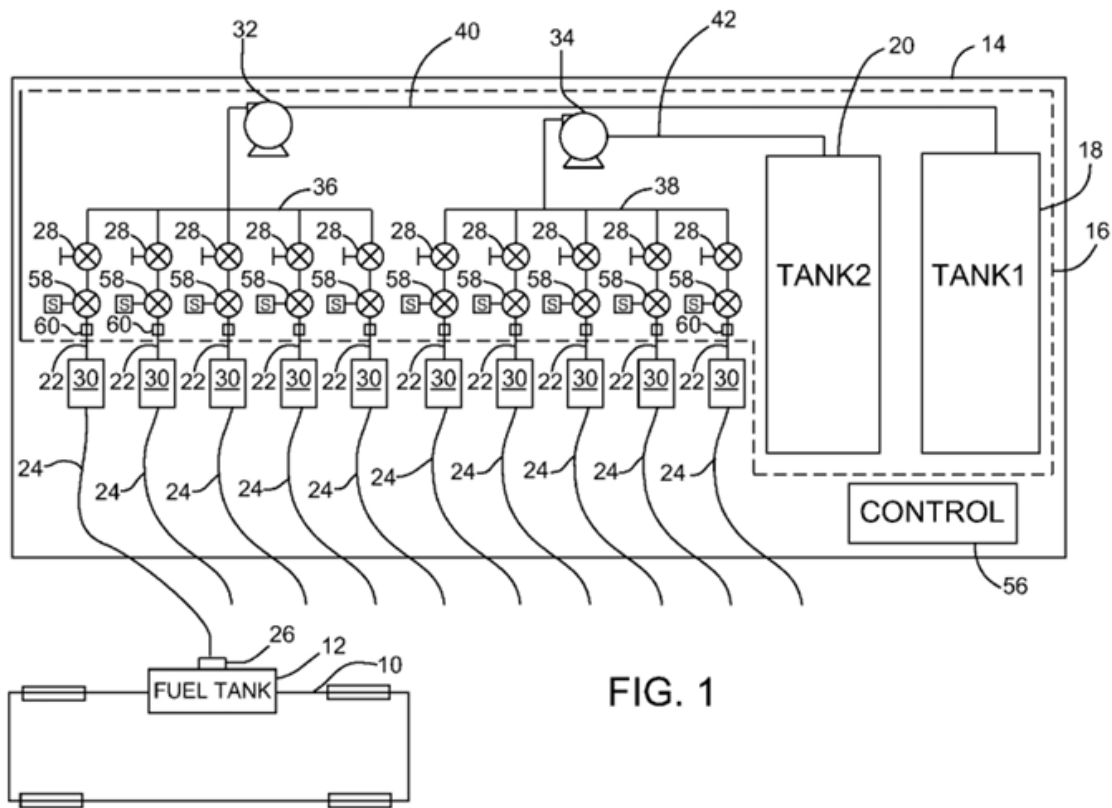


FIG. 1

81. Figure 1 of Van Vliet indicates the hose's flow passage as wrapping around the reel, rather than “running through” the reel.

82. Van Vliet describes that “hoses 24 are preferably stored on reels 30,” but it does not disclose or suggest that the hoses are fluidly connected to the reels. [Ex. 1004, ¶15].

83. 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. Van Vliet's

hose 24 therefore is not connected to reel 30 because the ends of the hose are connected to dry connection 60, which is not part of the reel.

84. Van Vliet disclosed dangers to the existing way of proceeding as including extreme operating temperatures and pressures, extreme noise levels, and fire hazard from fuel and fuel vapors. [Ex. 1004, ¶2].

B. Coxreels

85. Petitioner relies on the Coxreels 1125 Series reel as alleged prior art. As shown below, Coxreels lists 14 different “Possible Fields of Application” of the 1125 Series reel. [Ex. 1005 at 1].



86. The “possible fields of application” list does not include automated fuel delivery.

87. According to Coxreels, the 1125 Series reels were available in 24 different models, which are shown in the table at pages 1 and 2 in Coxreels. The models provide a variety of physical sizes (i.e., reel weight), hose diameters, and hose capacities (i.e., hose lengths).

REEL			CAPACITY			OPT. CAPACITY			PSI	SIZE INDEX			Add to Quote
MODEL	LBS	HOSE	I.D.	O.D.	FT.	I.D.	O.D.	FT.		W	H	L	
1125-4-100	36	N	1/2"	7/8"	100	3/8"	3/4"	140'	3000	18-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-200	39	N	1/2"	7/8"	200	3/8"	3/4"	300'	3000	25-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-325	48	N	1/2"	7/8"	325	3/8"	3/4"	450'	3000	31-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-450	52	N	1/2"	7/8"	450	3/8"	3/4"	625'	3000	37-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-500	58	N	1/2"	7/8"	500	3/8"	3/4"	700'	3000	41-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-5-50	38	N	3/4"	1-1/4"	50	1/2"	7/8"	100'	3000	20-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-100	42	N	3/4"	1-1/4"	100	1/2"	7/8"	200'	3000	26-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-175	50	N	3/4"	1-1/4"	175	1/2"	7/8"	325'	3000	32-3/4"	18-3/4"	17-5/8"	Add to Quote

PERMIAN GLOBAL, INC. AND MANTICORE FUELS, LLC EXHIBIT 1005, Page 1
<https://web.archive.org/web/20140408035634/http://www.coxreels.com/products/hand-crank/1125-series>

5/31/23, 6:15 PM	Coxreels 1125 Series "Competitor" hand crank and motorized hose reels have the features demanded by industry professionals.												
1125-5-200	55	N	3/4"	1-1/4"	200	1/2"	7/8"	450'	3000	38-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-250	59	N	3/4"	1-1/4"	250	1/2"	7/8"	500'	3000	42-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-6-35	50	N	1"	1-7/16"	35	3/4"	1-1/4"	50'	3000	26"	18-1/2"	17-5/8"	Add to Quote
1125-6-50	55	N	1"	1-7/16"	50	3/4"	1-1/4"	75'	3000	32"	18-1/2"	17-5/8"	Add to Quote
1125-6-75	62	N	1"	1-7/16"	75	3/4"	1-1/4"	120'	3000	38-1/2"	18-1/2"	17-5/8"	Add to Quote
1125-6-100	69	N	1"	1-7/16"	100	3/4"	1-1/4"	150'	3000	44-1/2"	18-1/2"	17-5/8"	Add to Quote
1125-4-100-C	39	N	1/2"	7/8"	100	3/8"	3/4"	140'	3000	19-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-200-C	42	N	1/2"	7/8"	200	3/8"	3/4"	300'	3000	25-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-325-C	51	N	1/2"	7/8"	325	3/8"	3/4"	450'	3000	31-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-450-C	55	N	1/2"	7/8"	450	3/8"	3/4"	625'	3000	37-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-500-C	61	N	1/2"	7/8"	500	3/8"	3/4"	700'	3000	41-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-5-50-C	41	N	3/4"	1-1/4"	50	1/2"	7/8"	100'	3000	20-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-100-C	45	N	3/4"	1-1/4"	100	1/2"	7/8"	200'	3000	26-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-175-C	53	N	3/4"	1-1/4"	175	1/2"	7/8"	325'	3000	32-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-200-C	58	N	3/4"	1-1/4"	200	1/2"	7/8"	450'	3000	38-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-250-C	62	N	3/4"	1-1/4"	250	1/2"	7/8"	500'	3000	42-3/4"	18-3/4"	17-5/8"	Add to Quote

88. Neither the Petition nor Dr. Durham have identified a particular 1125 Series model to be used with Van Vliet. However, in his deposition when discussing the models and hose lengths Dr. Durham asserted, “I think 700 feet probably would be a good number for a maximum length [of hose] at a fracturing site.” [Ex. 2029 – Page 69].

89. There are two models of the 1125 Series reel that have 700 ft 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.

REEL			CAPACITY			OPT. CAPACITY				SIZE INDEX			Add to Quote
MODEL	LBS	HOSE	I.D.	O.D.	FT.	I.D.	O.D.	FT.	PSI	W	H	L	
										Overall Dimensions			
1125-4-100	36	N	1/2"	7/8"	100	3/8"	3/4"	140'	3000	19-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-200	39	N	1/2"	7/8"	200	3/8"	3/4"	300'	3000	25-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-325	48	N	1/2"	7/8"	325	3/8"	3/4"	450'	3000	31-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-450	52	N	1/2"	7/8"	450	3/8"	3/4"	625'	3000	37-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-500	58	N	1/2"	7/8"	500	3/8"	3/4"	700'	3000	41-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-5-50	38	N	3/4"	1-1/4"	50	1/2"	7/8"	100'	3000	20-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-100	42	N	3/4"	1-1/4"	100	1/2"	7/8"	200'	3000	26-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-175	50	N	3/4"	1-1/4"	175	1/2"	7/8"	325'	3000	32-3/4"	18-3/4"	17-5/8"	Add to Quote

PERMIAN GLOBAL, INC. AND MANTICORE FUELS, LLC EXHIBIT 1005, Page 1
<https://web.archive.org/web/20140408035634/http://www.coxreels.com/products/hand-crank/1125-series>

5/31/23, 6:15 PM Coxreels 1125 Series "Competitor" hand crank and motorized hose reels have the features demanded by industry professionals. |

1125-5-200	55	N	3/4"	1-1/4"	200	1/2"	7/8"	450'	3000	38-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-250	59	N	3/4"	1-1/4"	250	1/2"	7/8"	500'	3000	42-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-6-35	50	N	1"	1-7/16"	35	3/4"	1-1/4"	50'	3000	26"	18-1/2"	17-5/8"	Add to Quote
1125-6-50	55	N	1"	1-7/16"	50	3/4"	1-1/4"	75'	3000	32"	18-1/2"	17-5/8"	Add to Quote
1125-6-75	62	N	1"	1-7/16"	75	3/4"	1-1/4"	120'	3000	38-1/2"	18-1/2"	17-5/8"	Add to Quote
1125-6-100	69	N	1"	1-7/16"	100	3/4"	1-1/4"	150'	3000	44-1/2"	18-1/2"	17-5/8"	Add to Quote
1125-4-100-C	39	N	1/2"	7/8"	100	3/8"	3/4"	140'	3000	19-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-200-C	42	N	1/2"	7/8"	200	3/8"	3/4"	300'	3000	25-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-325-C	51	N	1/2"	7/8"	325	3/8"	3/4"	450'	3000	31-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-450-C	55	N	1/2"	7/8"	450	3/8"	3/4"	625'	3000	37-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-4-500-C	61	N	1/2"	7/8"	500	3/8"	3/4"	700'	3000	41-1/2"	18-3/4"	17-5/8"	Add to Quote
1125-5-50-C	41	N	3/4"	1-1/4"	50	1/2"	7/8"	100'	3000	20-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-100-C	45	N	3/4"	1-1/4"	100	1/2"	7/8"	200'	3000	26-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-175-C	53	N	3/4"	1-1/4"	175	1/2"	7/8"	325'	3000	32-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-200-C	58	N	3/4"	1-1/4"	200	1/2"	7/8"	450'	3000	38-3/4"	18-3/4"	17-5/8"	Add to Quote
1125-5-250-C	62	N	3/4"	1-1/4"	250	1/2"	7/8"	500'	3000	42-3/4"	18-3/4"	17-5/8"	Add to Quote

90. The Coxreels 1125 Series reel uses a solid brass swivel inlet for most models. [Ex. 1005, at 1].

SWIVEL

- External fluid path with machined from solid brass 90° full-flow NPT swivel inlet (Nickel plated steel swivel on 1" models)
- Swivel Seals: NITRILE (AFLAS on 1" models)

91. The Coxreels 1125 Series reel uses AFLAS seals on 1" models. [Ex. 1005, at 1].

C. Shoap

92. Shoap discloses in its Abstract "a system [that] contains a plurality of conduit segments and at least one electrically-powered pump. At least one conduit connector joins the conduit segments and the electrically-powered pumps, thereby mating at least one fluid path. A plurality of electric power wires are coupled with the conduit segments and connected to the electrically-powered electric pumps. At least one electrical connector, within said conduit connectors, mates corresponding electric power wires between the conduit segments. An electric power source electrically connected to the electrically-powered pump via the electric power wires." [Ex. 1006].

93. 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].

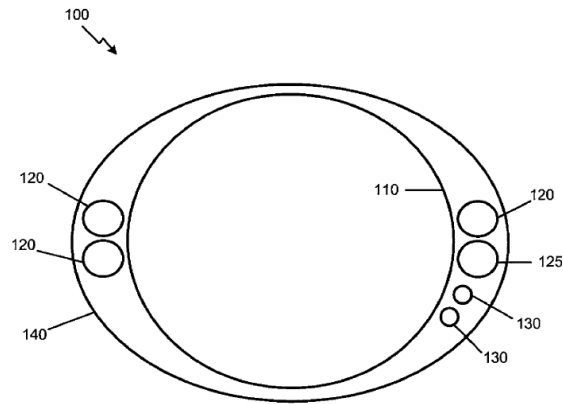


FIG. 1A

94. As shown in Shoap's Fig. 1A, the surfaces 110 and 140 are of the same structure, namely the conduit 100.

95. Shoap is directed to transporting water. [Ex. 1006, col. 1, ll. 24-33].

XII. THE CHALLENGED CLAIMS ARE NOT ANTICIPATED OR OBVIOUS

A. Ground 1: Claims 1-3 are not anticipated or rendered obvious by Van Vliet

96. Van Vliet does not disclose or otherwise suggest to a POSITA at least claim elements 1[e] (“a plurality of flow passages, each said flow passage being connected to the manifold and running through a respective one of the reels”) and 1[f] (“a plurality of hoses, each said hose being connected with a respective one of the flow passages via a respective one of the reels”).

97. As Petitioner's expert acknowledges, Figure 1 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].



98. Van Vliet's Figure 1 schematic may show flow passages through the manifolds (36, 38) and hoses 24. [Ex. 1004]. But Van Vliet does not disclose anywhere that there are flow passages "running through" the reels 30 as required by claim 1.

99. At most, Figure 1 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 to a POSITA that the hoses are fluidly connected to the reels.
[Ex. 1004 ¶15].

100. In fact, to the contrary, Van Vliet explains that “each hose 24 is connected to a fuel outlet 22 by a dry connection 60.” *Id.* ¶ 22.

101. A POSITA would have understood that the hose 24 of Van Vliet therefore cannot be connected to reel 30 if the end of the hose is connected to dry connections 60, which is not part of the reel as clearly depicted in Fig. 1 above.

102. Petitioner’s flowchart at page 28 of the Petition ignores this disclosure about the dry connection 60 in Van Vliet and is not how a POSITA would interpret Van Vliet’s flowpath.

103. Van Vliet discloses that “One or more spill containment pans (not shown) may be provided with the system, for example a pan of sufficient size to catch leaking fluids from the system during use. The pan or pans may be positioned to catch fluids leaking from each or both manifolds, and hose reels 30. Each manifold may have a pan, or a single pan may be used for both manifolds.” [Ex. 1004].

104. Petitioner’s contention that this disclosure confirms that Van Vliet’s reels include flow passages is misplaced. (Petition at 29). A POSITA would not interpret Van Vliet in this way. Leaking fluid does not necessitate a fluid passage

running through the reels, and there is no explanation how such leaking inherently requires that.

105. I understand that for a feature to be inherent it must be necessarily present. A POSITA would have realized 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.

106. If the hoses are stored on the reels after use, without connection to the reels, a POSITA would understand that fuel still in the hose could leak onto the reels and then from the reels to the pan, or that 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 shown in Fig. 1 of Van Vliet, or even from a leak along the length of the hose itself. [Ex. 1004].

107. A POSITA would have recognized that Van Vliet discloses that the hoses are stored on the reels (*Id.* at [0027]) and that the hoses are connected to the fuel outlet 22 by dry connection 60 (*Id.* at [0022]). There is nothing in Van Vliet that suggests to a POSITA that the hoses are connected to flow passages running through the reels.

108. At least for the reasons set forth above, Van Vliet's flow passage does not run through the reel, as required by claim 1.

109. Accordingly, claims 1-3 are not anticipated by or rendered obvious by Van Vliet under Ground 1 or Ground 2 as to dependent claims 4-9 that relies on Ground 1.¹

B. Grounds 1A and 2A: Claims 1-3 are not rendered obvious by Van Vliet in view of Coxreels; Claims 4-9 and 15-18 are not rendered obvious by Van Vliet in view of Coxreels and Shoap

110. I disagree with Petitioner's contention as to grounds 1A and 2A that a POSITA would have been motivated to combine *Coxreels* with *Van Vliet*.

Petitioner asserts that a POSITA would have recognized the advantage of using Coxreels' reel in Van Vliet's mobile fuel delivery system to connect Van Vliet's hoses to Coxreels' reel flow passages. Petition at 36. But Petitioner neglects to identify or explain, however, what "the advantage" is. Petitioner points to support in its expert's declaration (*Id.* citing to Ex. 1003 at ¶150), but that paragraph also fails to identify or explain any particular advantage. Furthermore, as discussed below, a

¹ 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).

POSITA would find the Coxreels 1125 Series reel to be unsuited, not advantageous, for an automated refueling station as in Van Vliet.

111. In my opinion, Petitioner and Dr. Durham have failed to step into the shoes of a POSITA and assess the Coxreels 1125 Series reel beyond the representations of the manufacturer or with an eye to the safety and reliability needs of an automated fueling station.

112. A POSITA would find the Coxreels 1125 Series reel to be unsuited, not advantageous, for an automated refueling station as in Van Vliet.

1. The Coxreels 1125 Series reel is not for fracking or automated fuel delivery

113. I have evaluated the Coxreels 1125 Series reel and determined that a POSITA would not have chosen to use it in an automated fueling station such as that of Van Vliet.

114. Coxreels may have been marketed for the oil industry, but it is not directed in particular to fuel delivery, let alone automated fueling delivery in a fracking environment. For instance, Coxreels provides a bullet point list of 14 different “Possible Fields of Application” of the 1125 Series reel. [Ex. 1005 at 1].

POSSIBLE FIELDS OF APPLICATION

- Industrial Plant & Ground Maintenance
- Fire Suppression
- Farming
- Construction Sites
- Landscaping
- Pest & Weed Control
- Golf Course Maintenance
- Air Compressor
- Washdown
- High-Flow Watering
- Hydro Seeding
- Pressure Washing
- Agricultural Spraying
- Chemical Fluid Transfer

115. The list of fields of application does not explicitly include fuel delivery, let alone automated fueling in a fracking environment. To the extent Coxreels suggested use of the 1125 Series in the oil industry, a POSITA would have understood that the “oil industry” is too broad to be of practical use.

116. The “oil industry” covers a wide variety of areas, such as exploration, extraction, refining, and transportation, and each of these areas would have its own sub-categories with unique technological challenges. In view of this, a POSITA would 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, particularly, automated fuel delivery.

117. Each of the 14 possible fields of application listed are themselves so enormously broad that it would have been virtually impossible for a POSITA to determine from the list whether the 1125 Series reel would be suited for some other unlisted field.

118. For example, 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.

119. 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. Exhibit 1009 does not cure these deficiencies.

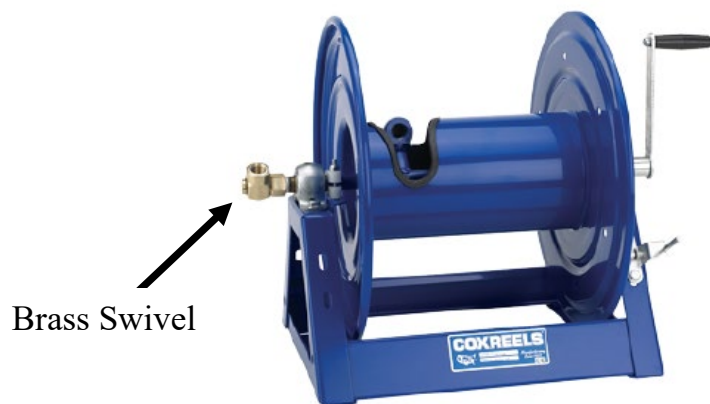
2. A POSITA would have recognized that the Coxreels 1125 Series reel would have been unsuited for an automated fueling station as in Van Vliet.

120. In selecting components such as a reel for an automated fueling station, a POSITA would at least conduct an initial analysis of the component to determine whether it is likely to work or, conversely, whether it is likely to have safety concerns

or reliability problems. This would include preliminary evaluation of the information and design details provided by the manufacturer.

121. In particular, a POSITA would not have relied solely on manufacturer representations of a component, as the manufacturer is not responsible for, or 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. Indeed, a POSITA would recognize that the manufacturer has a financial interest in listing possible applications broadly, and would have exercised skepticism regarding these representations.

122. 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.



123. A POSITA would have known that 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. 2024 – Page 10].

124. A POSITA would have known that 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. 2025 – Page 14].

125. Therefore, a POSITA would have understood that a component made of brass, such as the swivel of the Coxreels 1125 Series reel, would have been an unacceptable choice for a mobile fuel delivery station, such as in Van Vliet,

because it could lead to formation of gels and insoluble gums and particulates that could interfere with operation of downstream equipment.

126. For these reasons, a POSITA would have understood that the Coxreels 1125 Series reel would have been unreliable and that, as a result, the reel would not have been a suitable choice to use or to even try in a mobile fuel delivery station such as in Van Vliet.

127. The Coxreels 1125 Series reel also comes in a 1-inch model that has a nickel-plated steel swivel instead of a brass swivel. [Ex. 1005]. However, a POSITA would not have found that option to be acceptable either.

128. As indicated in Coxreels, the swivel seals of the 1-inch models are made with AFLAS material (Ex. 1005 “AFLAS on 1" models”).

129. I understand that AFLAS is a registered trademark of AGC INC. for heat and chemical resistant fluororubber. [Ex. 2026].

130. AFLAS was known to have a service temperature of -5 °C to 200 °C and a glass transition temperature of -3 °C or -13 °C, depending on the exact grade. [Ex. 2027; Ex. 2028]

131. A POSITA would have known that a mobile fuel delivery station like the one disclosed in Van Vliet would 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 the expected 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 seal, leading to failure of the seal.

132. 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. A POSITA would have known that, 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. As one reference, AFD discloses that it utilizes 300-450' of 1-inch hoses “allowing for greater flexibility in tight locations.” [Ex. 1007 in IPR2023-01237]

133. A POSITA would have therefore 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.

3. The Coxreels 1125 Series reel would result in an undesirable operating configuration.

134. The Coxreels 1125 Series reels were available in 24 different models, shown in the table in Coxreels.

135. Neither the Petition nor Dr. Durham’s declaration 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 – Page 69]. As set forth above, there are two models of the 1125 Series reel that have 700 ft 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).

136. A POSITA would have recognized that the Durham configuration, if implemented in Van Vliet, would require an undesirable operating configuration.

137. A “small” frac operation may require 7,500 gallons of diesel in a 12-hour period, a “large” frac operation may require 12,000 gallons in a 12-hour period, and a “superfrac” may require 24,000 gallons or more in a 12-hour period. [Ex. 2030]. To support these numbers, I refer to a BJ Energy study of fuel consumption on four case study frac jobs. For a Tier 2 emissions-standard diesel engine, the consumption ranged from 14,000 to 31,000 gallons per 12 hours of operation. While the particular job parameters varied quite a bit between jobs, the

consumption study provides a quantified reference for comparison in-line with the typical jobs and conservative as to the maximum fuel required.

138. A POSITA would have recognized that the flow rates 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.” [Appendix A]

139. 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.

140. 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.

141. For a given flow rate, there is also a required pump pressure needed to achieve 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.

142. 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 that 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.).

143. 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.

144. 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 pose a higher 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. 1031]. Brent lists five hose sizes and the 10 mm size is closest to the 3/8 inch of the Durham configuration and has a pressure rating of 90 psi. *Id.*

145. A POSITA would have recognized that this is clearly not an acceptable operating configuration due to the high pressure, the limited fuel delivery, and risk of hose burst.

146. 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.

147. There 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, without pressing the limits more, be unable to deliver enough fuel for a larger frac or superfrac.

148. 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 the “red line” for number of hoses and duty cycle. This configuration would also pose a higher safety risk if there were to be a leak, as discussed earlier above.

149. Additionally, the pressure would be approaching 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.” This too is clearly not an acceptable operating configuration due to the high pressure, extreme duty cycle, and risk of hose burst.

150. 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.

151. In view of the above, the Durham configuration with the Coxreels 1125 Series reel and the 3/8 inch hose would lead to an undesirable, unsafe operating configuration. 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.

C. Grounds 2, 2A, and 3: Shoap does not teach a hose having a tube and a sleeve circumscribing the tube

152. I understand that each of Grounds 2, 2A and 3 rely on the Shoap reference.

153. I understand that each of claims 5-18 require “a tube and a sleeve that circumscribes the tube.” I have proposed what I believe to be the correct claim construction for this term above. I understand that the PTAB appears to have adopted this construction.

154. Shoap does not disclose a tube and a physically separate sleeve that encircles the tube.

155. I understand that 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. Petitioner seems to concede that the alleged tube and sleeve are both part of the same structure, namely the conduit 100.

156. 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 case that encircles the hollow cylinder. Instead, as shown in Shoap's Figure 1, the surfaces 110 and 140 are of the same structure – the conduit 100. Thus, according to the adopted claim

construction, Shoap does not teach a tube and a physically separate sleeve that encircles the tube.

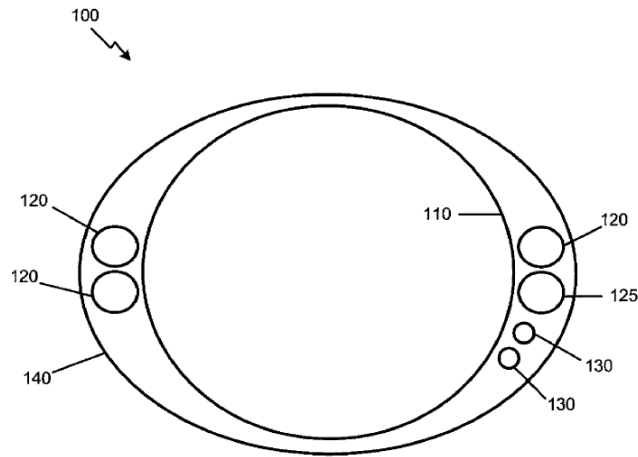


FIG. 1A

157. I understand that Petitioner also alleges 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). I disagree.

158. Petitioner asserts that this feature is obvious because the structure “could be” formed using two thinner concentric conduits, without any further support. Petitioner does not provide any reason that would prompt a POSITA to use two thinner concentric conduits.

159. To the contrary, a POSITA would have understood that two thinner concentric conduits would be highly undesirable in a mobile fuel delivery system.

160. 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, a POSITA would have recognized that 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.

161. Petitioner has hypothesized the two thinner concentric conduits, and did not glean it from the prior art they rely on.

162. A POSITA would have found that arrangement to be highly undesirable because it would have prevented the location of a leak from being immediately identified.

163. Further, a POSITA would have recognized that 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.

164. In view of the above, a POSITA would not have been prompted to use two thinner concentric conduits in a mobile fuel delivery system.

165. I understand that 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. (emphasis added). Petitioner has given no indication why a POSITA necessarily would have been led to a wired hose. A POSITA would have known that it was a common and acceptable practice to run wires, cables, and other lines along the ground at a well site.

166. As shown in the screenshots below, this video from Patriot, available at <https://www.youtube.com/watch?v=KR9rNzHl57Q&t=1s> (2015), has several views of data and control cables on the ground as part of the monitoring and control of the frac.



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.

168. 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.

169. 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.”

170. I understand that 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. I disagree. A POSITA would have understood that Shoap’s slip-ring would have been dangerous in Van Vliet.

171. A POSITA would have recognized that 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 those of Shoap transfer electrical signals or power across a rotating shaft, from the rotating frame to the nonrotating frame. Petitioner and Dr. Durham failed to consider use of Shoap's slip-ring in a fuel vapor environment, as would be present in Van Vliet.

172. Shoap's slip-ring functions in 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. (Ex. 1006, 14:22-15:3). 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.

173. 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, because water is the fluid. But, for safety reasons, this would have strongly discouraged a POSITA from using a slip-ring contact as in Shoap in the fuel delivery system of Van Vliet.

174. Claim 11 recites “wherein the sleeve is a fabric sleeve.” Shoap does not disclose a fabric sleeve, nor any separate sleeve as discussed above.

175. I understand that Petitioner 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. Petition asserts that 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. I disagree with this assertion.

176. In alleged support for its assertion of design choice, I understand that Petitioner relies on Dr. Durham’s expert declaration. [Petition at 56; Ex. 1003, ¶208]. In ¶208, Dr. Durham refers to section VIII.C. of his report in support of the conclusion that many 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.”

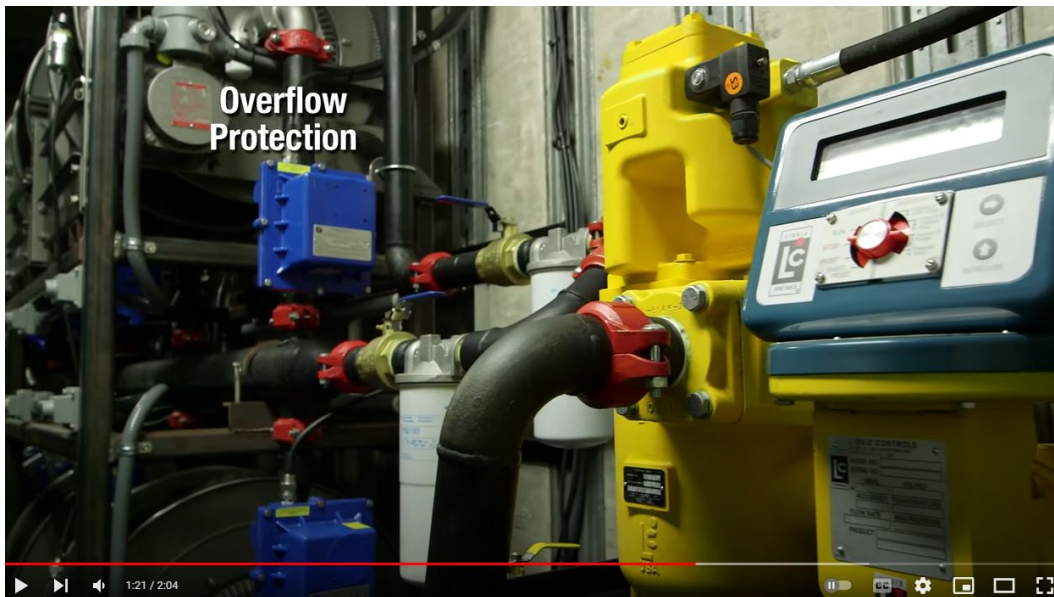
177. However, Dr. Durham failed to point out that Hose 3106 is a fuel injection hose and is specified under DIN73379, which is a German standard for *fuel hoses of road vehicles*. [see, e.g., https://www.intertekinform.com/en-us/standards/din-73379-1-1997-11-414751_saig_din_din_938758/; <https://www.standardssupply.com/product/DIN-73379/>;

<https://www.hydraulicmegastore.com/images/data-sheets/Winster%20Hose/Cotton%20Overbraided%20Fuel%20Hose.pdf>].

178. Dr. Durham's omission that Hose 3106 is a fuel injection hose for road vehicles gives that erroneous impression that Hose 3106 was represented for use in all fuel lines. A POSITA would have understood that Van Vliet is not a road vehicle and does not have a fuel injector hose, and 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 be spooled onto and off of a reel.

XIII. SECONDARY CONSIDERATIONS

179. Based on my physical inspection of a FAS Unit and review of publicly available information on the FAS Unit (<https://www.youtube.com/watch?app=desktop&v=pl6NjmFUDHc>), the FAS Unit includes each and every limitation of at least the independent claims (1, 10, and 15) of the '118 Patent. The FAS Unit I inspected in person is similar in all relevant ways (to the patent claim terms) to the FAS Unit depicted in the video cited above and screenshotted below.



(Screenshot showing FAS Unit manifolds and reels with fluid passage connected to the manifolds; source: <https://www.youtube.com/watch?app=desktop&v=pl6NjmFUDHc>)



(Screenshot showing FAS Unit manifolds and reels with fluid passage connected to the manifolds; aisle walkway between reels; source: <https://www.youtube.com/watch?app=desktop&v=pl6NjmFUDHc>)



(Screenshot showing FAS Unit having 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; source:

<https://www.youtube.com/watch?app=desktop&v=pl6NjmFUDHc>)

XIV. CONCLUSION

180. I understand and have been warned that willful false statements and the like are punishable by fine or imprisonment, or both (18 U.S.C. § 1001). I declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true, and further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under § 1001 of title 18 of the United States Code.

181. I declare under penalty of perjury that the foregoing is true and correct.

A handwritten signature in black ink, appearing to read "J. Rodgers", is written over a horizontal line.

By: John Rodgers

Dated: 5/31/2024

APPENDIX A

Flow Calculations

5/28/2024

<https://energy-models.com/pipe-sizing-charts-tables>

<https://ntrs.nasa.gov/api/citations/19660024205/downloads/19660024205.pdf>

Assumptions:

1. Turbulent flow regime

2. Fluid properties

Fluid: diesel at 60 de specific gravity 0.88
dyn viscosity ft^2/s 4.31E-05

Schiller Darcy-Weisbach eqn
 $0.0054 + 0.396/R \cdot dP = f \cdot L \cdot \rho / 2 \cdot v^2 / D$

total flow rate, gpm 11.5
max duty cycle 50%
total fuel per 12 hrs gal 4100
Number of hoses 3
hose flow rate, gpm 3.8
P max psi 155

	Part	ID , in.	Length (ft)	L/D	velocity, ft/s	Re (vD/nu)	f	dP (psi)	total P (psi)	Notes
A	filter	2.00			0.39	1.52E+03	0.049	3.59		dP approximation per FAS
	manifold to reel	2.00	10.00	60.00	0.39	1.52E+03	0.049	0.00		
	manifold	4.00	30.00	90.00	0.10	7.58E+02	0.060	0.00		
	manifold welded tee	2.00		45.00	0.39	1.52E+03	0.049	0.00		
	elbow	2.00		45.00	0.39	1.52E+03	0.049	0.00		
	elbow	2.00		45.00	0.39	1.52E+03	0.049	0.00		
	hose	1.00	200	2400.00	1.57	3.03E+03	0.041	1.43	5.04	
B	filter	2.00			0.39	1.52E+03	0.049	3.59		dP approximation per FAS
	manifold to hose	1.00	6.00	72.00	1.57	3.03E+03	0.041	0.04		
	elbow	0.50		45.00	6.26	6.06E+03	0.034	0.36		
	hose	0.38	200	6400.00	11.14	8.08E+03	0.032	150.57	154.56	

Flow Calculations

5/28/2024

J. Rodgers

	Typical	Large	Superfrac
Peak Fuel Consumption (gal) per 12 hr.	7500	12000	24000
Avg Flow Rate (gpm)	10	17	33
Avg. Duty Cycle	90%	90%	90%
Total flow rate required (gpm)	12	19	37
Avg. Duty Cycle	50%	50%	50%
Total flow rate required (gpm)	21	33	67

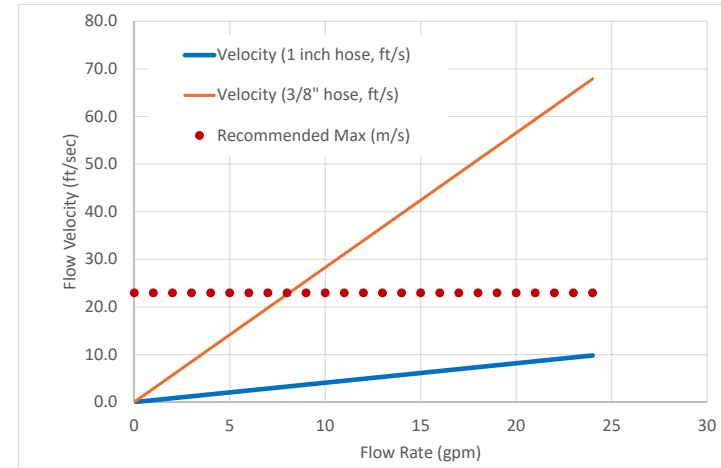
per information from FAS

assumed start-up and shut-down time required, max duty cycle achievable

comfortable duty cycle for nominal operations

Flow Calculations
5/28/2024

Flow Rate (gpm)	Velocity (1 inch hose, ft/s)	Velocity (3/4 inch hose, ft/s)	Velocity (1/2 inch hose, ft/s)	Velocity (3/8" hose, ft/s)	Recommended Max (m/s)	
0	0.0	0.0	0.0	0.0	0.0	23
1	0.4	0.7	1.6	2.8	2.8	23
2	0.8	1.5	3.3	5.7	5.7	23
3	1.2	2.2	4.9	8.5	8.5	23
4	1.6	2.9	6.5	11.3	11.3	23
5	2.0	3.6	8.2	14.1	14.1	23
6	2.5	4.4	9.8	17.0	17.0	23
7	2.9	5.1	11.4	19.8	19.8	23
8	3.3	5.8	13.1	22.6	22.6	23
9	3.7	6.5	14.7	25.5	25.5	23
10	4.1	7.3	16.3	28.3	28.3	23
11	4.5	8.0	18.0	31.1	31.1	23
12	4.9	8.7	19.6	33.9	33.9	23
13	5.3	9.4	21.2	36.8	36.8	23
14	5.7	10.2	22.9	39.6	39.6	23
15	6.1	10.9	24.5	42.4	42.4	23
16	6.5	11.6	26.1	45.3	45.3	23
17	6.9	12.3	27.8	48.1	48.1	23
18	7.4	13.1	29.4	50.9	50.9	23
19	7.8	13.8	31.0	53.7	53.7	23
20	8.2	14.5	32.7	56.6	56.6	23
21	8.6	15.3	34.3	59.4	59.4	23
22	9.0	16.0	35.9	62.2	62.2	23
23	9.4	16.7	37.6	65.1	65.1	23
24	9.8	17.4	39.2	67.9	67.9	23



Flow Calculations

5/28/2024

Hose Size (in)	1	0.38
Hose length (ft)	200	700
Hose volume (gal)	8.2	4.1