

Filed on behalf of Weatherford U.S., L.P.

By: Douglas R. Wilson
Michelle E. Armond
Monica Arnold
ARMOND WILSON LLP
4685 MacArthur Court, Suite 390
Newport Beach, CA 92660
Telephone: (949) 932-0778
Email: ipr@armondwilson.com

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

WEATHERFORD U.S., L.P.,
Petitioner,

v.

HALLIBURTON ENERGY SERVICES, INC.,
Patent Owner.

Case No. IPR2024-00990
U.S. Patent No. 11,333,007

**PETITIONER'S SUR-REPLY OPPOSING
PATENT OWNER'S REVISED MOTION TO AMEND**

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Unless noted, all emphasis is added to quoted material in this brief.

TABLE OF EXHIBITS

Exhibit No.	Description
1001	U.S. Patent No. 11,333,007 (“’007 Patent”)
1002	File History for U.S. Patent No. 11,333,007
1003	Declaration of Michael R. Chambers Sr. (“Chambers Decl.”)
1004	CV of Michael R. Chambers Sr.
1005	U.S. Patent No. 9,797,226 (“Yeh”)
1006	IPTC 12549 (“Yeh2”)
1007	U.S. Patent No. 4,945,991 (“Jones”)
1008	U.S. Patent No. 5,113,935 (“Jones2”)
1009	L.G. Jones et al., <i>Alternate Path Gravel Packing</i> , Society of Petroleum Engineers, SPE 22796 (Oct. 1991)
1010	U.S. Patent No. 7,661,476
1011	<i>ExxonMobil Awards Alternate Path Technology License to Weatherford</i> , ExxonMobil Press Release (Aug. 27, 2013)
1012	U.S. Patent No. 5,588,487
1013	G. Hurst et al., <i>Alternate Path Completions: A Critical Review and Lessons Learned From Case Histories With Recommended Practices for Deepwater Applications</i> , Society of Petroleum Engineers, SPE 86532 (Feb. 2004) (“Hurst”)
1014	K.W. Lagrone et al., <i>A New Development in Completion Methods The Limited Entry Technique</i> , Society of Petroleum Engineers, SPE 530 (July 1963) (“Lagrone”)
1015	M.T. Hecker et al., <i>Extending Openhole Gravel Packing Capability: Initial Field Installation of Internal Shunt Alternate Path Technology</i> , Society of Petroleum Engineers, SPE 135102 (Sept. 2010) (“Hecker”)
1016	A. Bonner et al., <i>Design and Validation of an Improved Shunt Tube System</i> , Society of Petroleum Engineers, SPE-169440-MS (2014) (“Bonner”)

Exhibit No.	Description
1017	API Technical Report 5C3, published in December 2008 with an Addendum in October 2015 (excerpts)
1018	ASTM A554-16: Standard Specification for Welded Stainless Steel Mechanical Tubing (2016) (excerpts)
1019	Declaration of Christine Diedrich of the Society of Petroleum Engineers
1020	Complaint for Patent Infringement, <i>Halliburton Energy Servs. v. Weatherford U.S. L.P.</i> , Case No. 24-cv-00090 (W.D. La. Jan. 22, 2024)
1021	U.S. District Courts – Combined Civil and Criminal Federal Court Management Statistics (March 31, 2023), available at https://www.uscourts.gov/statistics-reports/federal-court-management-statistics-march-2023
1022	Shahryar Saebi, <i>The Evolution of Completion Designs Using Alternate Path (Shunt-Tubes) Technology</i> , Society of Petroleum Engineers SPE 155129 (Mar. 2012)
1023	U.S. Patent No. 5,476,143
1024	U.S. Patent No. 7,938,184
1025	Larry G. Myers et al., <i>Case History in Achieving High Rate Producers in Sub Sea Gravel Packed Completions</i> , Society of Petroleum Engineers, SPE 39433 (Feb. 1998)
1026	Raymond Tibbles, et al., <i>Design and Execution of a 3000-ft Horizontal Gravel-Packed Completion (A Kazakhstan Case History)</i> , Society of Petroleum Engineers, SPE 64410 (Oct. 2000)
1027	M.D. Barry et al., <i>Openhole Gravel Packing With Zonal Isolation</i> , Society of Petroleum Engineers, SPE 110460 (Nov. 2007)
1028	U.S. Patent No. 5,890,533
1029	ASTM A500/A500M-13: Standard Specification for Cold-Formed Welded and Seamless Carbon Steel Structural Tubing in Rounds and Shapes (2013) (excerpts)
1030	U.S. Patent No. 4,629,218
1031	Declaration of Stephen McNamee
1032	Fischer Stainless Steel Tubing - Part Number List

Exhibit No.	Description
1033	L.G. Jones et al., <i>Gravel Packing Horizontal Wellbores with Leak-Off Using Shunts</i> , Society of Petroleum Engineers, SPE 38640 (Oct. 1997)
1034	D.W. Bryant & L.G. Jones, <i>Completion and Production Results from Alternate-Path Gravel-Packed Wells</i> , SPE Drilling & Completion, SPE 27359 (Sept. 1995)
1035	U.S. Patent No. 6,588,506
1036	Halliburton Cementing Tables (1979) (excerpts)
1037	Introduction to Otis Multi-Position Gravel Pack System, Otis Engineering Corporation, Technical Manual 2004/88 (excerpts)
1038	Johnson Oil and Gas Well Screens Catalog (1991) (excerpts)
1039	U.S. Patent No. 2,905,245
1040	U.S. Patent No. 8,839,861
1041	U.S. Patent No. 5,842,516
1042	Order granting stay, <i>Halliburton Energy Servs. v. Weatherford U.S. L.P.</i> , Case No. 24-cv-00090 (W.D. La. June 17, 2024)
1043	Transcript of May 15, 2025 Deposition of Dr. Robert A. Durham
1044	Second Declaration of Michael R. Chambers Sr. (“Second Chambers’ Decl.”)
1045	U.S. Patent App. Pub. No. 2005/0121192 (“Hailey”)
1046	U.S. Patent No. 7,784,532
1047	Baker Oil Tech Facts Engineering Handbook (1994) (excerpts)
1048	Halliburton Cementing Tables (1979) (excerpts) (updated EX1036)
1049	Weatherford Openhole Shunted Screen System (2011), available at https://www.weatherford.com/documents/technical-specification-sheet/products-and-services/completions/openhole-shunted-screen-system/
1050	Schumberger OptiPac System specification (2014), available at https://www.slb.com/-/media/files/sand-control/product-sheet/optipac-alternatepath-ps.pdf , and at https://web.archive.org/web/20160803161036/http://www.slb.com/%7E/media/Files/sand_control/product_sheets/optipac_alternatepath_ps.pdf

Exhibit No.	Description
1051	Y. Cengel & J. Cimbala, <i>Fluid Mechanics, Fundamentals and Applications</i> (McGraw-Hill, 3d ed. 2014) (excerpts)
1052	Third Declaration of Michael R. Chambers Sr. (“Third Chambers Decl.”)
1053	[Not Filed] Declaration of Christie Higgins
1054	[Not Filed] Internet Archive Declaration re: https://web.archive.org/web/20160803161036/http://www.slb.com/%7E/media/Files/sand_control/product_sheets/optipac_alternatepath_ps.pdf [EX1050]
1055	[Not Filed] Library of Congress Record re: Y. Cengel & J. Cimbala, <i>Fluid Mechanics, Fundamentals and Applications</i> (McGraw-Hill, 3d ed. 2014) [EX1051]
1056	Transcript of September 17, 2025 Deposition of Dr. Robert A. Durham

LISTING OF SUBSTITUTE CLAIMS¹

Claim 24 (Substitute for Claim 3)	
24[preamble]	The completion assembly of claim 1,
24[a]	wherein the first sand screen assembly further comprises a junction block from which the transport tube and the packing tube extend, the plurality of nozzles being spaced apart from the junction block;
24[b]	wherein the second sand screen assembly further comprises a junction block from which the transport tube and the packing tube extend, the plurality of nozzles being spaced apart from the junction block,
24[c]	wherein <u>a</u> distance between the first sand screen assembly junction block and the packing tube nozzles is greater in the first sand screen assembly than <u>a</u> distance between the second sand screen assembly junction block and the packing tube nozzles in the second sand screen assembly;
24[d]	<u>wherein the second sand screen assembly further comprises a second shunt tube assembly in addition to the shunt tube assembly of the second sand screen assembly; and wherein a spacing between adjacent nozzles of the second shunt tube assembly is different than a spacing between adjacent nozzles of the shunt tube assembly of the second sand screen assembly.</u>
Claim 25 (Substitute for Claim 6)	
25[preamble]	The completion assembly of claim 1,
25[a]	wherein the second end of the first sand screen assembly base pipe is connected to the first end of the second sand screen assembly base pipe forming a joint therebetween;
25[b]	the completion assembly further comprising a coupling

¹ Proposed amendments unchanged from Patent Owner's MTA (Paper 11) are annotated in blue, and proposed amendments first introduced in Patent Owner's revised MTA (Paper 21) are annotated in orange.

	interconnecting one end of a jumper tube to the transport tube of the first sand screen assembly, the other end of the jumper tube in fluid communication with <u>a</u> junction block of the second sand screen assembly whereby the jumper tube straddles the joint between the first and second sand screen assemblies;
25[c]	<u>and wherein the cross-sectional flow area of the transport tube of the shunt tube assembly of the first sand screen assembly is less than the cross-sectional flow area of the transport tube of the shunt tube assembly of the second sand screen assembly.</u>
Claim 26 (Substitute for Claim 7)	
26[preamble]	The completion assembly of claim 1,
26[a]	wherein the shunt tube assembly of the first sand screen assembly has a pressure rating between 5000 psi and 10000 psi, and the shunt tube assembly of the second sand screen assembly has a pressure rating of no more than 5000 psi;
26[b]	<u>wherein a cross-sectional flow area of the base pipe of the first sand screen assembly is the same as a cross-sectional flow area of the base pipe of the second sand screen assembly; and wherein an outer diameter of the first sand screen assembly is the same as an outer diameter of the second sand screen assembly.</u>
Claim 27 (Substitute for Claim 8)	
27[preamble]	The completion assembly of claim 1,
27[a]	wherein the shunt tube assembly of the first sand screen assembly has a pressure rating of between 5000 and 10000 psi
27[b]	<u>and the packing tube of the shunt tube assembly of the first sand screen assembly is interconnected to a junction block of the second sand screen assembly.</u>
Claim 28 (Substitute for Claim 9)	
28[preamble]	The completion assembly of claim 1,
28[a]	wherein the shunt tube assembly of the first sand screen assembly has a pressure rating of over a select threshold and the shunt tube assembly of the second sand screen assembly has a pressure rating of no more than the select threshold,
28[b]	<u>and wherein the first sand screen assembly and the second sand screen assembly are eccentric assemblies.</u>

Claim 29 (Substitute for Claim 11)	
29[preamble]	A completion assembly for deployment in a wellbore, the completion assembly comprising:
29[a]	a source of pressurized working fluid;
29[b]	a first <u>eccentric</u> sand screen assembly attached to a second <u>eccentric</u> sand screen assembly,
29[c]	wherein the first <u>eccentric</u> sand screen assembly comprises a shunt tube assembly with a first burst pressure and the second <u>eccentric</u> sand screen assembly comprises a shunt tube assembly with a burst pressure less than the first burst pressure, and
29[d]	wherein the shunt tube assembly with the first burst pressure is fluidly coupled between the source of pressurized working fluid and the shunt tube assembly with the burst pressure less than the first burst pressure.
Claim 30 (Substitute for Claim 12)	
30[preamble]	The completion assembly of claim <u>29</u> ,
30[a]	wherein the shunt tube assembly of the first <u>eccentric</u> sand screen assembly is disposed to operate at pressures between 5000 psi and 10000 psi and the shunt tube assembly of the second <u>eccentric</u> sand screen assembly is disposed to operate at pressures of no more than 5000 psi;
30[b]	<u>and wherein a cross-sectional flow area of a packing tube of the shunt tube assembly of the first sand screen assembly is less than the cross-sectional flow area of a packing tube of the shunt tube assembly of the second eccentric sand screen assembly.</u>
Claim 31 (Substitute for Claim 14)	
31[preamble]	A method of installing a completion assembly in a wellbore, the method comprising:
31[a]	identifying an elongated production zone having an upstream proximal end and a downstream distal end with respect to a source of pressurized working fluid;
31[b]	determining a shunt tube system operating pressure associated with the proximal end of the production zone and selecting a high pressure shunt tube system based on the proximal end determined pressure;

31[c]	determining a shunt tube system operating pressure associated with the distal end of the production zone and selecting a low pressure shunt tube system based on the distal end determined pressure;
31[d]	installing a first <u>eccentric</u> sand screen assembly in a wellbore adjacent the <u>downstream</u> distal downstream end of the elongated production zone;
31[e]	attaching a second <u>eccentric</u> sand screen assembly to the first <u>eccentric</u> sand screen assembly at the proximal upstream end of the elongated production zone, wherein the first <u>eccentric</u> sand screen assembly has the low pressure shunt tube system and the second <u>eccentric</u> sand screen assembly has the high pressure shunt tube system, such that a downstream end of the high pressure shunt tube system is coupled to an upstream end of the low pressure shunt tube system; and
31[f]	coupling the source of pressurized working fluid to an upstream end of the high pressure shunt tube system.
Claim 32 (Substitute for Claim 15)	
32[preamble]	The method of claim <u>31</u> , further comprising:
32[a]	installing a plurality of interconnected first <u>eccentric</u> sand screen assemblies in a wellbore adjacent the production zone;
32[b]	and attaching a plurality of second <u>eccentric</u> sand screen assemblies to an uppermost first <u>eccentric</u> sand screen assembly upstream of the first <u>eccentric</u> sand screen assemblies.
Claim 33 (Substitute for Claim 16)	
33[preamble]	The method of claim <u>31</u> ,
33[a]	further comprising introducing a working fluid into the shunt <u>tube</u> systems, wherein the working fluid is pressurized in accordance with the operating pressure of the high pressure shunt tube system;
33[b]	<u>and wherein a packing tube of the high pressure shunt tube system is interconnected to a shunt tube junction block of the low pressure shunt tube system.</u>
Claim 34 (Substitute for Claim 17)	
34[preamble]	The method of claim <u>31</u> ,

34[a]	further comprising injecting the working fluid into <u>an</u> annulus adjacent the shunt tube systems so as to form a gravel pack in the annulus;
34[b]	<u>wherein a cross-sectional flow area of a packing tube of the high pressure shunt tube system is less than a cross-sectional flow area of a packing tube of the low pressure shunt tube system.</u>
Claim 35 (Substitute for Claim 18)	
35[preamble]	The method of claim <u>31</u> ,
35[a]	wherein the high pressure shunt tube system is disposed to operate at pressures of 5000 psi and the low pressure shunt tube system is disposed to operate at pressures of no more than 5000 <u>psi</u> ;
35[b]	<u>and wherein a cross-sectional flow area of a transport tube of the high pressure shunt tube system is oval shaped.</u>
Claim 36 (Substitute for Claim 19)	
36[preamble]	The method of claim <u>31</u> ,
36[a]	wherein the high pressure shunt tube system is disposed to operate at pressures above a select threshold and the low pressure shunt tube system is disposed to operate at pressures of no more than the select threshold;
36[b]	<u>and wherein the low pressure shunt tube system is disposed to allow a larger volume of fluid to flow therethrough than the high pressure shunt tube system is disposed to allow to flow therethrough.</u>
Claim 37 (Substitute for Claim 20)	
37[preamble]	The method of claim <u>31</u> ,
37[a]	wherein installing the first <u>eccentric</u> sand screen assembly and attaching the second <u>eccentric</u> sand screen assembly include disposing the first <u>eccentric</u> sand screen assembly and the second <u>eccentric</u> sand screen assembly in a horizontal portion of the wellbore;
37[b]	<u>and wherein a cross-sectional flow area of a base pipe of the first eccentric sand screen assembly is the same as a cross-sectional flow area of a base pipe of the second eccentric sand screen assembly; and wherein an outer diameter of the first eccentric sand screen assembly is the same as an outer diameter of the second</u>

	<u>eccentric sand screen assembly.</u>
Claim 38 (Substitute for Claim 21)	
38[preamble]	A completion assembly for deployment in a wellbore, the completion assembly comprising:
38[a]	a source of pressurized working fluid;
38[b]	a first <u>eccentric</u> sand screen assembly comprising a base pipe having perforations therein and extending between a first end and a second ends, a sand screen disposed around a portion of the base pipe, and a shunt tube assembly disposed outwardly of the sand screen, the shunt tube assembly having a transport tube and a packing tube, where each of the tubes has a passageway defined therein, the packing tube further including a plurality of nozzles spaced apart from each other, wherein each of the tubes and each nozzle has a cross-sectional flow area; and
38[c]	a second <u>eccentric</u> sand screen assembly comprising a base pipe having perforations therein and extending between a first end and a second ends, a sand screen disposed around a portion of the base pipe, and a shunt tube assembly disposed outwardly of the sand screen, the shunt tube assembly having a transport tube and a packing tube, the packing tube including a plurality of nozzles spaced apart from each other, wherein each of the tubes and each nozzle has a cross-sectional flow area;
38[d]	wherein the first and second <u>eccentric</u> sand screen assemblies are arranged end to end relative to one another so that the base pipes are in fluid communication with one another and the transport tubes are in fluid communication with one another and the source of pressurized working fluid, the transport tube of the second <u>eccentric</u> sand screen assembly fluidly coupled to the source of pressurized working fluid downstream of the transport tube of the first <u>eccentric</u> sand screen assembly; and
38[e]	wherein the transport tube of the first <u>eccentric</u> sand screen assembly is formed of a first material and the transport tube of the second <u>eccentric</u> sand screen assembly is formed of a second material, the first material having a greater tensile strength than the second material.

Claim 39 (Substitute for Claim 22)	
39[preamble]	The completion assembly of claim 38 ,
39[a]	wherein the transport tube of the first eccentric sand screen assembly has a first wall thickness and the transport tube of the second eccentric sand screen assembly has a second wall thickness, the first wall thickness being greater than the second wall thickness;
39[b]	and wherein a cross-sectional flow area of the packing tube of the shunt tube assembly of the first eccentric sand screen assembly is less than a cross-sectional flow area of the packing tube of the shunt tube assembly of the second eccentric sand screen assembly.
Claim 40 (Substitute for Claim 23)	
40[preamble]	The completion assembly of claim 38 ,
40[a]	wherein the first eccentric sand screen assembly has a shunt tube assembly with a first pressure rating and the second eccentric sand screen assembly has a shunt tube assembly with a second pressure rating less than the first pressure rating;
40[b]	and the packing tube of the shunt tube assembly of the first eccentric sand screen assembly is interconnected to a shunt tube junction block of the second eccentric sand screen assembly.

I. INTRODUCTION

After abandoning all but a few of its original claims, Halliburton now jettisons claims with shunt tube cross-sectional area requirements (Revised Motion to Amend (“RMTA”) Claims 25, 30, 34-35, 39) and limitations requiring a high-pressure shunt tube assembly with a higher-pressure rating compared to the low-pressure shunt tube assembly pressure rating (RMTA Claims 26-30, 40).

For its remaining RMTA Claims, Halliburton fails to address Weatherford’s prior art teachings as a whole in context with the robust industry-specific literature that would be known by a skilled artisan long before the ’007 Patent’s priority date. Moreover, its proposed overly narrow construction of RMTA Claim 36 ignores both the claim language and *Phillips* precedent. All its RMTA Claims should be rejected.

II. HALLIBURTON’S RMTA CLAIMS ARE UNPATENTABLE

A. RMTA Claims 28-40: Bonner Disclosed a High-Pressure Eccentric Screen

These claims require an eccentric high-pressure shunt tube assembly. Halliburton does not respond to Weatherford’s assertion that as one of two identified predictable solutions (concentric or eccentric), substituting Bonner’s eccentric screen for Yeh’s concentric screen was obvious to try. RMTA Opp’n (Paper 26), 9. The Board may reject these claims on this basis alone. To the extent it does respond, Halliburton relies on two incorrect premises: (1) Bonner did not disclose a high-pressure screen because a POSITA would apply a +1.33 safety factor to the 5000-psi

pressure rating to determine the operating pressure, RMTA Reply (Paper 30), 3-5;
(2) replacing Yeh's concentric screen and crossover tool with Bonner's eccentric screen ignored Yeh's fundamental principle of operation, *id.*, 2.

Halliburton's position that Bonner did not disclose a high-pressure eccentric screen is disingenuous. When asked about Bonner's pressure rating and 1.33 safety factor, Mr. Chambers explained:

I believe, one, for Bonner you would use the actual failure pressure and divide that by 1.33. But Bonner's whole goal was to get to greater than 5,000 psi working pressure for the system, and I think he achieved that.... [Bonner] says [b]urst pressure, design pressure – design specification requirement value, and that was 5,000 psi.... [5000 psi is] the design.... [T]he burst must be higher than the design.

EX2015, 40:21-41:18; *see id.*, 43:1-16; *see also* EX1044 ¶¶18-19, 66. Dr. Durham previously agreed that Bonner's high-pressure shunt tube could tolerate 5000 psi. EX1043, 123:7-14. And like Mr. Chambers, Dr. Durham was unwilling to limit a pressure rating by a safety factor. EX1043, 73:16-74:14 (“***I prefer to stick with pressure rating***...the designer of the device said, you can only put 3000 psi, for example... that was still a rating of the device.”); *see also id.*, 122:8-21 (Dr. Durham when asked the impact of Bonner's safety factor: “I wouldn't know.”).

Now that Dr. Durham needs to support Halliburton's position, he suddenly can apply a safety factor and indeed finds it mandatory. *See* EX2014 ¶58. Yet his

earlier deposition testimony agreed with Mr. Chambers’ in that “every operator treats safety factor different.... Way back [at Mobil], we didn’t even use safety factors. We had a system based on probability of failure where we had went out and measured actual tubulars.... [T]he industry does not agree on that, I would say, safety factors.” See EX2015, 33:14-34:4; EX1043, 73:3-15 (Dr. Durham: “safety factor probably varies from design to design, manufacturer to manufacturer”).

Halliburton incorrectly asserts that Bonner’s system was not intended to improve pressure rating. RMTA Reply, 3. But Bonner expressly teaches trying to resolve leaks in its shunt tube system with the new design. EX1016, 3. Halliburton also omits that Bonner’s eccentric screen was “developed... to *enhance* sand screens for gravel packing *in long production intervals*.” See EX1016, Abstract; RMTA Opp’n, 8-9 (citing EX1016, 1-2); EX1044 ¶¶10-13, 65-67. Indeed, Bonner was aware of traditional shunt systems disclosed in Hurst (EX1013), Tibbles (EX1026), and Jones’ group at Mobil (EX1033, EX1034), as these were “existing industry-proven designs” Bonner sought to improve upon. See EX1016, 1-2 (citing EX1013, EX1026, EX1033, EX1034).

Additionally, Dr. Durham’s further reliance on Yeh’s ’476 Patent (EX1010) and Barry (EX1027) purportedly disclosing a safety factor is misleading. See EX2014 ¶¶62. Both explicitly do not teach a safety factor: “6,000 psi would be required to pump through the entire 5,000 ft of shunt tubes, therefore, the pressure

integrity of the shunt system *must be rated higher than 6,000 psi.*” EX1010, 24:62-66; EX1027, 4 (same). Neither reference ties the 10,000-psi test pressure to the 6,000-psi operating pressure or the alternative 6,500-psi operating pressure. EX1010, 24:59-25:6; EX1027, 4. When asked why Barry would test at 10,000 psi, Mr. Chambers explained, “If he wanted to pump 5 barrels per minute or 6 barrels per minute, he would need[] a higher pressure-rated system.” EX2015, 32:14-17. That’s what Mr. Chambers referred to as “Petroleum Engineering 101,” EX2015, 32:22-33:1, not adding a safety factor between burst and operating, as falsely attributed to him by Halliburton, RMTA Reply, 4.

Halliburton argues that Yeh, Yeh2, and Bonner do not teach thickening walls but teach away from it. *See* RMTA Reply, 3-4. But this ignores Yeh’s express disclosure that wall thickness is necessary “to maintain the mechanical integrity... of secondary flowpaths.” EX1005, 28:20-24; Pet., 41-42; EX1003 ¶¶291-93; Reply (Paper 16), 4-5. Dr. Durham agreed that a POSITA understood there was a direct relationship between wall thickness and pressure rating. EX1043, 66:21-68:14, 96:12-97:5; *see also* EX2002, ¶¶96, 100, 103; EX1044 ¶49; Reply, 6.

Finally, Weatherford’s proposed substitution of Bonner’s eccentric screen for Yeh’s concentric screen does not ignore Yeh’s fundamental principle of operation. *See* RMTA Reply, 2. One of skill is not an automaton but instead “a person of ordinary creativity,” who “in many cases... will be able to fit the *teachings* of

multiple patents together like pieces of a puzzle.” *KSR Int’l v. Teleflex*, 550 U.S. 398, 420-21 (2007). Halliburton and Dr. Durham have already conceded that Yeh recognized the same problem as the ’007 Patent and close to the same solution: “the need for higher sand screen pressure ratings.” POR (Paper 10), 30-31 (citing EX1005, 30:13-20); EX1043, 49:12-50:12; EX2002 ¶¶46, 99, 103, 115. Particularly, “placing the higher pressure rated components at an upstream location and lower pressure rated components at a downstream location.” EX1002, 573; EX2002 ¶46. Halliburton’s proposed rule requiring that once Yeh identified the problem, one of skill could only solve it in precisely the same way as Yeh would eliminate obviousness as a defense. Substituting Bonner’s high-pressure eccentric screen for Yeh’s concentric screen accomplishes this concept, either unmodified or with thicker-walled shunt tubing, depending on the demands of the application. RMTA Opp’n, 10-11. Thus, *Medtronic* and *Plas-Pak Industries* are inapposite. See RMTA Reply, 2; *Medtronic v. Teleflex Innovations S.à.r.l.*, 69 F.4th 1341, 1349 (Fed. Cir. 2023) (finding modification would remove prior art catheter’s capability to provide embolic protection, which was its entire premise); *Plas-Pak Indus. v. Sulzer Mixpac AG*, 600 F. App’x 755, 758-59 (Fed. Cir. 2015) (finding replacing the valves and pumps of a prior art device directed at preventing backflow with a cylindrical cartridge would “fail to achieve comparable backflow prevention”).

B. RMTA Claims 27, 33, 40: There Is No Dispute That Shunt Tube

Assemblies Were Interconnected

These claims require the packing tube of the high-pressure shunt tube assembly to be “interconnected to a junction block of the second sand screen assembly.” Halliburton and Dr. Durham concede that Yeh, Yeh2, and Bonner disclose that the packing tube of an upstream sand screen is fluidly connected to a downstream manifold or junction block via transport tube and jumper tube. *See* RMTA Reply, 7-9; EX1043, 111:22-112:7, 114:12-20 (referring to EX1016 (Bonner) at Fig. 42); EX2014 ¶82.

To get around these disclosures and the Board’s Preliminary Guidance (Paper 19), 14-16, Halliburton asserts that “interconnected” requires a direct connection between the *distal end* of the upstream packing tube and the downstream junction block. *See* RMTA Reply, 8 (citing EX1001, 10:61-67, 7:13-29; EX2014 ¶¶82-83).

Halliburton’s cited disclosures do not support such a narrow interpretation of “interconnected.” *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1315 (Fed. Cir. 2005) (en banc) (“[T]he specification... ‘is the single best guide to the meaning of a disputed term.’” (citation omitted)). Its citation to EX1001, 7:13-29 refers to Figure 3, which Dr. Durham agrees shows packing tube distal ends *not* directly connected to a downstream junction block but in which the “shunt tube assemblies” are nevertheless described as “interconnected.” *See* EX1001, 8:38-59, Fig. 3; EX1056, 29:8-32:3. Halliburton’s other support describes a “method 500 of installing” the

previously disclosed assemblies in which “as described above [i.e., Fig. 3], adjacent shunt tube assemblies are interconnected using jump tubes” and “[i]n particular, the packing tube of an upstream sand screen assembly is interconnected to the shunt tube junction block of a downstream sandscreen assembly.” EX1001, 10:34-38, 10:61-67; *see also* RMTA, 10-11 (27[b]), 15-16 (33[b]), 22 (40[b]) (citing EX1002, 15:4-7 (i.e., EX1001, 10:61-64), Figs. 1-3). The only such embodiment “described above” is Figure 3, which Halliburton asserted provided written description support for its amendment, RMTA, 10-11, but now contends does not meet the amended claims.

Dr. Durham’s attempt to rely on Figure 2 disclosing shunt tubes 224 connected to jumper tube 240 at his deposition fares no better. *See* EX1056, 33:4-34:10; EX1001, 6:10-13. Although shunt tubes 224 in Figure 2 are “in the form of a transport tube or a packing tube,” EX1001, 5:22-26, the Figure 2 embodiment does not contain a junction block, precluding its disclosure of RMTA Claims 27, 33, and 40. *See* EX1001, 5:5-6:33, Fig. 2. Thus, no embodiment in the ’007 Patent discloses a packing tube distal end directly coupled to a downstream junction block, as Halliburton contends its amended claims should be interpreted.

C. RMTA Claims 26, 37: A POSITA Knew How to Design First and Second Sand Screens with the Same Claimed Dimensions

Claims 26 and 37 require high- and low-pressure sand screens share the same

base pipe internal cross-sectional area and overall outer diameter. Halliburton's reply does not directly rebut Weatherford's arguments. It does not dispute that the production casing or open hole diameter determines the tool outer diameter, that maximization of production fluid flow constrained sand screen base pipe size, that uniform base pipe internal diameter facilitated internal tool passage, or that designing a first and second sand screen (concentric-eccentric or eccentric-eccentric) to have the same base pipe cross-sectional area and sand screen outside diameter was within the knowledge of a skilled artisan before the priority date. *See* RMTA Opp'n, 5-6; RMTA Reply, 10-12.

Halliburton asserts that the Opposition "identifies one example" of the same outer diameter, RMTA Reply, 10, when it identified four examples, RMTA Opp'n, 5. The reply criticizes one of them as being a concentric screen with certain alleged tubing wall thickness without addressing the point that all screens going into 8.5" open holes have to be about the same outer diameter. RMTA Reply, 10-11. It next criticizes addressing the outer diameter and base pipe limitations "in isolation," RMTA Reply, 12, but one of skill designed to constraints, and these are both design constraints. The cited evidence proves they are routinely met.

D. RMTA Claim 24: Adjusting Nozzle Spacing Was a Known Solution to Compensate for Friction Pressure Drop

Claim 24 requires the low-pressure sand screen assembly include a second

shunt tube assembly that has different nozzle spacing compared to the other second shunt tube assembly. Halliburton does not dispute that a shunt tube assembly with two packing tubes like Jones2's Figure 3 satisfies the claim.

Instead of addressing the proposed obviousness combination, Halliburton disingenuously asserts that Hurst (EX1013) did “not teach *to vary* nozzle size or spacing along or across packing tubes.” See RMTA Reply, 6 (emphasis in original). Hurst contradicts Halliburton's assertion, see EX1013, 3-4, and Dr. Durham admitted that one of skill understood Hurst to teach adjustment of nozzle size and frequency to control gravel slurry flow, see EX1043, 134:2-135:1; EX2014 ¶¶91 (“As Mr. Chambers stated in this proceeding, *it was well known* that nozzle size and frequency affected volume flowing through the nozzles.”) (citing EX1003 ¶¶303); see also EX1003 ¶¶299-307, 324-26.

Also, Halliburton's assertion that Weatherford ignored that “increasing nozzle size or decreasing spacing would negatively impact other performance metrics by increasing friction pressure and leakoff from the gravel slurry,” disregards that Limitation 24[d] is directed to the second (low-pressure) sand screen assembly meant for placement in more distal regions of the interval. See RMTA Reply, 6. Despite his written testimony opining the contrary, see EX2014 ¶¶71-72, Dr. Durham agreed at deposition that Yeh2's Figure 15 shows as gravel slurry concentrated while traveling down the interval, both friction pressure drop and

leakoff rate declined, *see* EX1056, 19:21-20:2; *see also id.* at 18:1-21:19; *see also* EX1006 (Yeh2), Fig. 15, such that increasing packing tube nozzles benefits rather than harms these issues. And, as Mr. Chambers opined, the effects of leakoff are less concerning in distal regions near the toe. *See, e.g.*, EX1003 ¶300; EX1044 ¶39.

Similarly, Dr. Durham’s position that a skilled artisan would not understand to apply the teachings of Jones2 (EX1008) about varying nozzle diameter or frequency to Hurst (EX1013) or Yeh2 (EX1006) because Hurst and Yeh2 had already optimized nozzle diameter and spacing, EX2014 ¶¶68-70, assumes the POSITA is an automaton, *see, e.g.*, EX2013, 30:17-32:12 (Mr. Chambers opining that design choices were impacted by economics of the hole and intended application). Further, Dr. Durham admitted that Jones2’s disclosure (EX1008) regarding shunt assemblies with varying nozzle spacing and diameter (Figure 3) contributed to gravel slurry flow out of nozzles and could be manipulated by modifying nozzle characteristics. *See* EX1043, 138:12-19; *see also* EX1056, 21:20-28:1 (acknowledging that Jones2 disclosed increased nozzle density in distal ends of packing tubes (Figure 2) and nozzle spacing and diameter across a packing tube (Figure 3)).

E. The Plain Meaning of Claim 36 Renders It Impossible

Halliburton’s assertion that Limitation 36[b] should be redrafted to maintain its validity is contrary to legal precedent and should be disregarded. To avoid Weatherford’s §§ 101 and 112 arguments, Halliburton reimagines “the low pressure

shunt tube system is disposed to allow a larger volume of fluid to flow therethrough...” to be directed narrowly to packing tube nozzle characteristics. *See* RMTA Reply, 9-10. But Halliburton cannot ignore that it is the “low pressure shunt tube system” that must “allow a larger volume of fluid to flow therethrough,” not packing tube nozzles or even just packing tubes. Claim 36 does not recite a packing tube. *See Generation II Orthotics v. Med. Tech.*, 263 F.3d 1356, 1365 (Fed. Cir. 2001) (“However, claims can only be construed to preserve their validity where the proposed claim construction is ‘practicable,’ is based on sound claim construction principles, and does not revise or ignore the explicit language of the claims.”); *see also Phillips*, 415 F.3d at 1327 (citing *Generation II Orthotics*).

Halliburton’s assertion that its proposed narrow construction should be adopted because Weatherford’s construction is “clearly untenable” fails. *See* RMTA Reply, 10 (citing *Athletic Alternatives v. Prince Mfg.*, 73 F.3d 1573, 1581 (Fed. Cir. 1996)). Limitation 36[b] is not ambiguous, and *Athletic Alternatives* is inapposite. Its ruling does not “requir[e] that courts choose a narrow definition of a claim limitation whenever there is a dispute over meaning and ambiguity in the intrinsic evidence.... [But instead] considers the case where reasoned analysis leads to two clear and distinct definitions of claim language.” *N. Telecom Ltd. v. Samsung Elecs. Co.*, 215 F.3d 1281, 1295 (Fed. Cir. 2000); *see also Phillips*, 415 F.3d at 1327 (“[W]e have limited the maxim [of construing claims to preserve their validity] to cases in

which ‘the court concludes, after applying all available tools of claim construction, that the claim is still ambiguous.’” (citation omitted)). There is no reasonable way to limit the “volume of fluid to flow therethrough” to packing tube nozzles when Claim 36 does not even recite a packing tube. The “low pressure shunt tube system” must permit a larger volume of flow, which is impossible. RMTA Opp’n, 19-20. Dr. Durham agrees. EX2014 ¶90 (“I agree with Mr. Chambers that ‘Flow C’ could not exceed ‘Flow A’....”).

III. HALLIBURTON WAIVED ITS DISPUTE FOR CERTAIN CLAIMS

Halliburton does not even attempt to rebut Weatherford’s obviousness arguments regarding RMTA Claims 25, 34, 35, and Limitations 30[b] and 39[b], which relate to cross-sectional flow areas of transport or packing tubes. Neither does Halliburton respond to Weatherford’s arguments regarding RMTA Claims 26-30 and 40, which require a high-pressure shunt tube assembly having a higher-pressure rating compared to the low-pressure shunt tube assembly. Halliburton’s silence should be construed as waiver. *See In re Google Tech. Holdings LLC*, 980 F.3d 858, 862-63, 863 n.8 (Fed. Cir. 2020) (finding that the “failure to raise... arguments, inadvertent or not, compels a finding of forfeiture,” and recognizing that the PTAB used “waiver” when referring to the doctrine of forfeiture).

IV. CONCLUSION

Weatherford requests the Board deny Halliburton’s RMTA.

Weatherford U.S. v. Halliburton
Patent No. 11,333,007 – IPR2024-00990

ARMOND WILSON LLP

Dated: October 3, 2025

By: /Douglas R. Wilson/
Douglas R. Wilson (Reg. No. 54,542)
Michelle E. Armond (Reg. No. 53,954)
Monica Arnold (Reg. No. 77,262)
Attorneys for Weatherford U.S., L.P.

CERTIFICATE OF SERVICE

The undersigned certifies that pursuant to 37 C.F.R. § 42.6(e), a true copy of the foregoing **PETITIONER’S SUR-REPLY OPPOSING PATENT OWNER’S REVISED MOTION TO AMEND** and **EXHIBIT 1056** are being served electronically on October 3, 2025 to the following counsel for Patent Owner to the following email addresses:

Chad C. Walters
chad.walters@bakerbotts.com

Jacob McDonald
jacob.mcdonald@bakerbotts.com

ARMOND WILSON LLP

Dated: October 3, 2025

By: /Douglas R. Wilson/
Douglas R. Wilson (Reg. No. 54,542)
Michelle E. Armond (Reg. No. 53,954)
Monica Arnold (Reg. No. 77,262)
Attorneys for Weatherford U.S., L.P.