

**IN THE UNITED STATES DISTRICT COURT  
FOR THE EASTERN DISTRICT OF TEXAS  
MARSHALL DIVISION**

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GEODYNAMICS, INCORPORATED,	§	
	§	
<i>Plaintiff,</i>	§	
	§	
v.	§	Case No. 2:15-CV-1546-RSP
	§	
DYNAENERGETICS US, INC., <i>et al.</i> ,	§	
	§	
<i>Defendants.</i>	§	
	§	
	§	

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**MEMORANDUM OPINION AND ORDER**

On August 2, 2016, the Court held a hearing to determine the proper construction of the disputed claim terms in United States Patent Nos. 9,080,431 (“the ’431 Patent”). The Court has considered the arguments made by the parties at the hearing and in their claim construction briefs. (Dkt. Nos. 62, 66, & 68). The Court has also considered the intrinsic evidence and made subsidiary factual findings about the extrinsic evidence. *See Phillips v. AWH Corp.*, 415 F.3d 1303, 1314 (Fed. Cir. 2005); *Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015). The Court issues this Claim Construction Memorandum and Order in light of these considerations.

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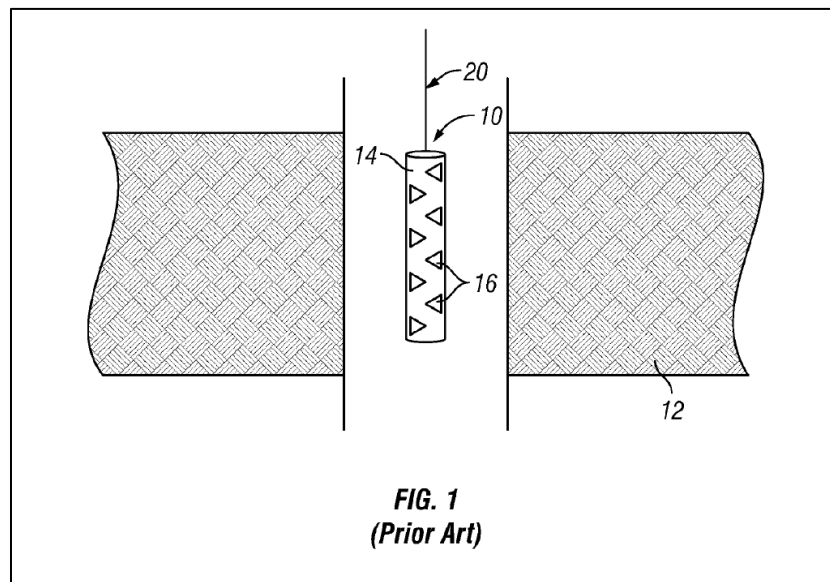
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## I. BACKGROUND

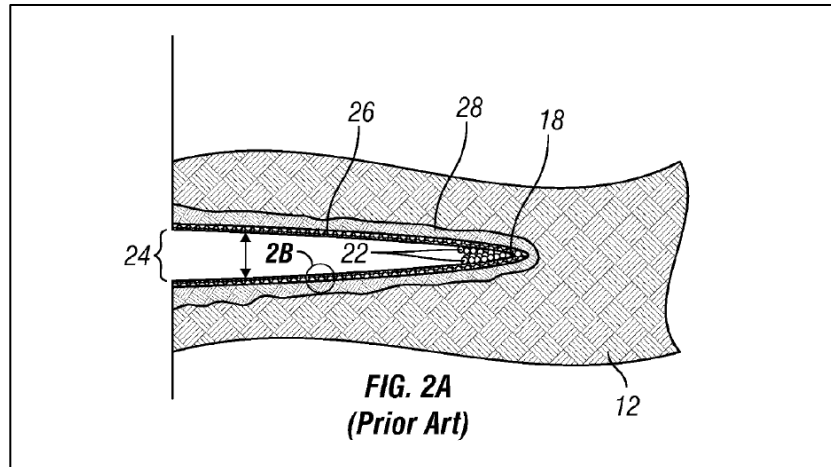
The '431 Patent generally relates to reactive shaped charges used in the oil and gas industry to explosively perforate well casing and underground hydrocarbon bearing formations. See '431 Patent at Abstract.<sup>1</sup> The specification indicates that “FIG. 1 illustrates a perforating gun 10 consisting of a cylindrical charge carrier 14 with explosive charges 16 (also known as perforators) lowered into the well by means of a cable, wireline, coil tubing or assembly of jointed pipes 20.” *Id.* at 1:37–42.



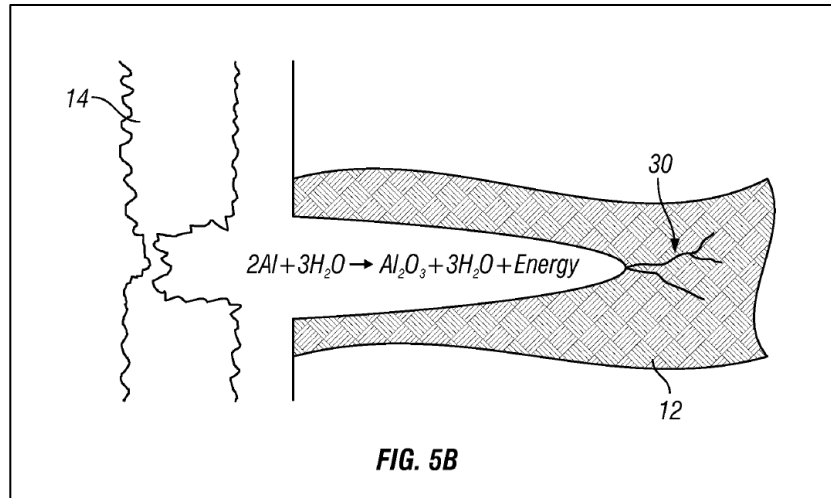
The specification adds that “the explosive charges 16 fire outward from the charge carrier 14 and puncture holes in the wall of the casing and the hydrocarbon bearing formation 12.” *Id.* at 1:46–48. Figure 2A depicts a tunnel created in the rock formation 12 by the explosive charges 16. *Id.* at 1:51–52.

<sup>1</sup> The Abstract of the '431 Patent follows:

By substantially eliminating the crushed zone surrounding a perforation tunnel and expelling debris created upon activation of a shaped charge with first and second successive explosive events, the need for surge flow associated with underbalanced perforating techniques is eliminated. The break down of the rock fabric at the tunnel tip, caused by the near-instantaneous overpressure generated within the tunnel, further creates substantially debris-free tunnels in conditions of limited or no underbalance as well as in conditions of overbalance.



Turning to the disclosed invention, the specification describes it as “an improved method for explosively perforating a well casing and its surrounding underground hydrocarbon bearing formation under balanced or near-balanced pressure conditions.” *Id.* at 1:16–19. Specifically, the specification states that “[i]t has been found that by activating a perforating gun having reactive shaped charges which produce a second, local reaction following the creation of perforation tunnels, superior inflow and/or outflow performance is delivered compared to that achieved with conventional shaped charges, without establishing a pressure differential.” *Id.* at 3:46–51. The specification adds that “[e]ven when perforating at balanced or near-balanced pressure conditions, reactive shaped charges deliver unobstructed tunnels with unimpaired tunnel walls, which results in improved inflow and/or outflow potential and improved inflow and outflow distribution of produced or injected fluids across the perforated interval.” *Id.* at 3:51–56. The specification indicates that Figure 5B is a cross-sectional view of the perforation tunnel after the secondary explosive reaction has occurred. *Id.* at 4:47–49, 6:57–7:10.



In one embodiment, the reactive shaped charges are described as comprising “a liner that contains a metal, which is propelled by a high explosive, projecting the metal in its molten state into the perforation created by the shaped charge jet. The molten metal is then forced to react with water that also enters the perforation, creating a reaction locally within the perforation.” *Id.* at 6:8–14. The specification further states that “[r]eactive shaped charges, suitable for the present invention, are disclosed in U.S. Pat. No. 7,393,423 to Liu and U.S. Patent Application Publication No. 2007/0056462 to Bates et al. . . .” *Id.* at 6:20–23.

Plaintiff brings suit alleging infringement of claims 1-6, 8-9, and 11 of the '431 Patent. Claim 1 of the '431 Patent is an exemplary claim and recites the following elements (disputed term in italics):

1. A method for perforating a wellbore comprising the steps of:
  - a) loading at least one charge comprising a reactive shaped charge within a charge carrier;
  - b) positioning the charge carrier down the wellbore *adjacent to* an underground hydrocarbon bearing formation, the wellbore being in a pressure condition;
  - c) *without changing the pressure condition of the wellbore to a more underbalanced condition after the step of positioning*, detonating the at least one charge in the wellbore to create a first and second *explosive event*,

wherein the first *explosive event* creates at least one perforation tunnel within the adjacent formation, said perforation tunnel being surrounded by a crushed zone, and wherein the second *explosive event* is created by an exothermic intermetallic reaction between shaped charge liner components, the second *explosive event eliminating a substantial portion of said crushed zone* and clearing debris from within said perforation tunnel.

## II. APPLICABLE LAW

### A. Claim Construction

“It is a ‘bedrock principle’ of patent law that ‘the claims of a patent define the invention to which the patentee is entitled the right to exclude.’” *Phillips v. AWH Corp.*, 415 F.3d 1303, 1312 (Fed. Cir. 2005) (en banc) (quoting *Innova/Pure Water Inc. v. Safari Water Filtration Sys., Inc.*, 381 F.3d 1111, 1115 (Fed. Cir. 2004)). To determine the meaning of the claims, courts start by considering the intrinsic evidence. *Id.* at 1313; *C.R. Bard, Inc. v. U.S. Surgical Corp.*, 388 F.3d 858, 861 (Fed. Cir. 2004); *Bell Atl. Network Servs., Inc. v. Covad Commc’ns Group, Inc.*, 262 F.3d 1258, 1267 (Fed. Cir. 2001). The intrinsic evidence includes the claims themselves, the specification, and the prosecution history. *Phillips*, 415 F.3d at 1314; *C.R. Bard, Inc.*, 388 F.3d at 861. The general rule—subject to certain specific exceptions discussed *infra*—is that each claim term is construed according to its ordinary and accustomed meaning as understood by one of ordinary skill in the art at the time of the invention in the context of the patent. *Phillips*, 415 F.3d at 1312–13; *Alloc, Inc. v. Int’l Trade Comm’n*, 342 F.3d 1361, 1368 (Fed. Cir. 2003); *Azure Networks, LLC v. CSR PLC*, 771 F.3d 1336, 1347 (Fed. Cir. 2014) (“There is a heavy presumption that claim terms carry their accustomed meaning in the relevant community at the relevant time.”) (vacated on other grounds).

“The claim construction inquiry . . . begins and ends in all cases with the actual words of the claim.” *Renishaw PLC v. Marposs Societa’ per Azioni*, 158 F.3d 1243, 1248 (Fed. Cir. 1998).

“[I]n all aspects of claim construction, ‘the name of the game is the claim.’” *Apple Inc. v. Motorola, Inc.*, 757 F.3d 1286, 1298 (Fed. Cir. 2014) (quoting *In re Hiniker Co.*, 150 F.3d 1362, 1369 (Fed. Cir. 1998)). First, a term’s context in the asserted claim can be instructive. *Phillips*, 415 F.3d at 1314. Other asserted or unasserted claims can also aid in determining the claim’s meaning, because claim terms are typically used consistently throughout the patent. *Id.* Differences among the claim terms can also assist in understanding a term’s meaning. *Id.* For example, when a dependent claim adds a limitation to an independent claim, it is presumed that the independent claim does not include the limitation. *Id.* at 1314–15.

“[C]laims ‘must be read in view of the specification, of which they are a part.’” *Id.* (quoting *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 979 (Fed. Cir. 1995) (en banc)). “[T]he specification ‘is always highly relevant to the claim construction analysis. Usually, it is dispositive; it is the single best guide to the meaning of a disputed term.’” *Id.* (quoting *Vitronics Corp. v. Conceptor, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *Teleflex, Inc. v. Ficoso N. Am. Corp.*, 299 F.3d 1313, 1325 (Fed. Cir. 2002). But, “[a]lthough the specification may aid the court in interpreting the meaning of disputed claim language, particular embodiments and examples appearing in the specification will not generally be read into the claims.” *Comark Commc’ns, Inc. v. Harris Corp.*, 156 F.3d 1182, 1187 (Fed. Cir. 1998) (quoting *Constant v. Advanced Micro-Devices, Inc.*, 848 F.2d 1560, 1571 (Fed. Cir. 1988)); *see also Phillips*, 415 F.3d at 1323. “[I]t is improper to read limitations from a preferred embodiment described in the specification—even if it is the only embodiment—into the claims absent a clear indication in the intrinsic record that the patentee intended the claims to be so limited.” *Liebel-Flarsheim Co. v. Medrad, Inc.*, 358 F.3d 898, 913 (Fed. Cir. 2004).

The prosecution history is another tool to supply the proper context for claim construction because, like the specification, the prosecution history provides evidence of how the U.S. Patent and Trademark Office (“PTO”) and the inventor understood the patent. *Phillips*, 415 F.3d at 1317. However, “because the prosecution history represents an ongoing negotiation between the PTO and the applicant, rather than the final product of that negotiation, it often lacks the clarity of the specification and thus is less useful for claim construction purposes.” *Id.* at 1318; *see also Athletic Alternatives, Inc. v. Prince Mfg.*, 73 F.3d 1573, 1580 (Fed. Cir. 1996) (ambiguous prosecution history may be “unhelpful as an interpretive resource”).

Although extrinsic evidence can also be useful, it is “less significant than the intrinsic record in determining the legally operative meaning of claim language.” *Phillips*, 415 F.3d at 1317 (quoting *C.R. Bard, Inc.*, 388 F.3d at 862). Technical dictionaries and treatises may help a court understand the underlying technology and the manner in which one skilled in the art might use claim terms, but technical dictionaries and treatises may provide definitions that are too broad or may not be indicative of how the term is used in the patent. *Id.* at 1318. Similarly, expert testimony may aid a court in understanding the underlying technology and determining the particular meaning of a term in the pertinent field, but an expert’s conclusory, unsupported assertions as to a term’s definition are entirely unhelpful to a court. *Id.* Generally, extrinsic evidence is “less reliable than the patent and its prosecution history in determining how to read claim terms.” *Id.* The Supreme Court recently explained the role of extrinsic evidence in claim construction:

In some cases, however, the district court will need to look beyond the patent’s intrinsic evidence and to consult extrinsic evidence in order to understand, for example, the background science or the meaning of a term in the relevant art during the relevant time period. *See, e.g., Seymour v. Osborne*, 11 Wall. 516, 546 (1871) (a patent may be “so interspersed with technical terms and terms of art that the testimony of scientific witnesses is indispensable to a correct understanding of



its meaning”). In cases where those subsidiary facts are in dispute, courts will need to make subsidiary factual findings about that extrinsic evidence. These are the “evidentiary underpinnings” of claim construction that we discussed in *Markman*, and this subsidiary factfinding must be reviewed for clear error on appeal.

*Teva Pharm. USA, Inc. v. Sandoz, Inc.*, 135 S. Ct. 831, 841 (2015).

### **B. Departing from the Ordinary Meaning of a Claim Term**

There are “only two exceptions to [the] general rule” that claim terms are construed according to their plain and ordinary meaning: “1) when a patentee sets out a definition and acts as his own lexicographer, or 2) when the patentee disavows the full scope of the claim term either in the specification or during prosecution.”<sup>2</sup> *Golden Bridge Tech., Inc. v. Apple Inc.*, 758 F.3d 1362, 1365 (Fed. Cir. 2014) (quoting *Thorner v. Sony Computer Entm’t Am. LLC*, 669 F.3d 1362, 1365 (Fed. Cir. 2012)); *see also GE Lighting Solutions, LLC v. AgiLight, Inc.*, 750 F.3d 1304, 1309 (Fed. Cir. 2014) (“[T]he specification and prosecution history only compel departure from the plain meaning in two instances: lexicography and disavowal.”). The standards for finding lexicography or disavowal are “exacting.” *GE Lighting Solutions*, 750 F.3d at 1309.

To act as his own lexicographer, the patentee must “clearly set forth a definition of the disputed claim term,” and “clearly express an intent to define the term.” *Id.* (quoting *Thorner*, 669 F.3d at 1365); *see also Renishaw*, 158 F.3d at 1249. The patentee’s lexicography must appear “with reasonable clarity, deliberateness, and precision.” *Renishaw*, 158 F.3d at 1249.

To disavow or disclaim the full scope of a claim term, the patentee’s statements in the specification or prosecution history must amount to a “clear and unmistakable” surrender. *Cordis Corp. v. Boston Sci. Corp.*, 561 F.3d 1319, 1329 (Fed. Cir. 2009); *see also Thorner*, 669 F.3d at

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<sup>2</sup> Some cases have characterized other principles of claim construction as “exceptions” to the general rule, such as the statutory requirement that a means-plus-function term is construed to cover the corresponding structure disclosed in the specification. *See, e.g., CCS Fitness, Inc. v. Brunswick Corp.*, 288 F.3d 1359, 1367 (Fed. Cir. 2002).

1366 (“The patentee may demonstrate intent to deviate from the ordinary and accustomed meaning of a claim term by including in the specification expressions of manifest exclusion or restriction, representing a clear disavowal of claim scope.”) “Where an applicant’s statements are amenable to multiple reasonable interpretations, they cannot be deemed clear and unmistakable.” *3M Innovative Props. Co. v. Tredegar Corp.*, 725 F.3d 1315, 1326 (Fed. Cir. 2013); *see also Avid Tech., Inc. v. Harmonic, Inc.*, 812 F.3d 1040, 1045 (Fed. Cir. 2016) (“When the prosecution history is used solely to support a conclusion of patentee disclaimer, the standard for justifying the conclusion is a high one.”).

Although a statement of lexicography or disavowal must be exacting and clear, it need not be “explicit.” *See Trs. of Columbia Univ. v. Symantec Corp.*, 811 F.3d 1359, 1364 (Fed. Cir. 2016) (“a patent applicant need not expressly state ‘my invention does not include X’ to indicate his exclusion of X from the scope of his patent”). Lexicography or disavowal can be implied where, *e.g.*, the patentee makes clear statements characterizing the scope and purpose of the invention. *See On Demand Mach. Corp. v. Ingram Indus., Inc.*, 442 F.3d 1331, 1340 (Fed. Cir. 2006) (“[W]hen the scope of the invention is clearly stated in the specification, and is described as the advantage and distinction of the invention, it is not necessary to disavow explicitly a different scope.”). Nonetheless, the plain meaning governs “[a]bsent implied or explicit lexicography or disavowal.” *Trs. of Columbia Univ.*, 811 F.3d at 1364 n.2.

### C. Definiteness Under 35 U.S.C. § 112, ¶ 2 (pre-AIA) / § 112(b) (AIA)<sup>3</sup>

Patent claims must particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112, ¶ 2. A claim, when viewed in light of the intrinsic evidence,

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<sup>3</sup> Because the Asserted Patents have an effective filing date before September 16, 2012, the effective date of the America Invents Act (“AIA”), the Court refers to the pre-AIA version of § 112.

must “inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2129 (2014). If it does not, the claim fails § 112, ¶ 2 and is therefore invalid as indefinite. *Id.* at 2124. Whether a claim is indefinite is determined from the perspective of one of ordinary skill in the art as of the time the application for the patent was filed. *Id.* at 2130. As it is a challenge to the validity of a patent, the failure of any claim in suit to comply with § 112 must be shown by clear and convincing evidence. *Id.* at 2130 n.10. “[I]ndefiniteness is a question of law and in effect part of claim construction.” *ePlus, Inc. v. Lawson Software, Inc.*, 700 F.3d 509, 517 (Fed. Cir. 2012).

When a term of degree is used in a claim, “the court must determine whether the patent provides some standard for measuring that degree.” *Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1378 (Fed. Cir. 2015) (quotation marks omitted). Likewise, when a subjective term is used in a claim, “the court must determine whether the patent’s specification supplies some standard for measuring the scope of the [term].” *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1351 (Fed. Cir. 2005); *accord Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1371 (Fed. Cir. 2014) (citing *Datamize*, 417 F.3d at 1351).

### III. CONSTRUCTION OF AGREED TERMS

The parties have agreed to the construction of the following terms:

Claim Term/Phrase	Agreed Construction
“re-perforate”/“re-perforating”	No construction required. <sup>4</sup>
“within microseconds”	No construction required.

<sup>4</sup> The terms “re-perforate”/“re-perforating” and “within microseconds” were identified as disputed terms in the Joint Claim Construction and Prehearing Statement. (Dkt. No. 61-1 at 7, 9). Plaintiff presented arguments for these terms in its opening brief. (Dkt. No. 62 at 18-21, 22). Defendants did not present arguments for either of these terms in their responsive brief. (Dkt. No. 66). The terms were not included in the Joint Claim Construction Chart. (Dkt. No. 73).

“exothermic intermetallic reaction”	“a reaction between a least two metals resulting in a release of heat”
“balanced”	$P(w) = P(r)$  (where $P(w)$ is the pressure of the wellbore and $P(r)$ is the pressure of the reservoir)
“overbalanced”	$P(w) > P(r)$
“underbalanced”	$P(w) < P(r)$

Dkt. No. 73-1 at 2 (Joint Claim Construction Chart).<sup>5</sup> In view of the parties’ agreements on the proper construction of each of the identified terms, the Court hereby **ADOPTS** the parties’ agreed constructions.

#### IV. CONSTRUCTION OF DISPUTED TERMS

The parties’ dispute the meaning and scope of five terms/phrases in the ’431 Patent.

##### 1. “adjacent to”

<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>
“adjacent to”	ordinary meaning	“abutting”

##### a) The Parties’ Positions

The parties dispute whether the term “adjacent to” requires construction. Plaintiff argues that the term does not require construction because it is one that would be easily understood by the jury. (Dkt. No. 62 at 11). Plaintiff contends that Defendants’ construction uses a different word with no support in the either the specification or the prosecution history. (*Id.*). Plaintiff also argues that resorting to extrinsic evidence is inappropriate since the term is not ambiguous. (*Id.*).

Defendants respond that there are a number of potential meanings for the term “adjacent to.” (Dkt. No. 66 at 13). Defendants argue that courts have construed the term “adjacent” in

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<sup>5</sup> Unless otherwise indicated, all citations to documents filed with the Court are to the ECF page number assigned by the Court’s filing system.

numerous cases when the specification gives no insight as to which of the meanings fits. (*Id.* at 13-14). Defendants further argue that it is common for courts to use words not found in the specification in rendering claim constructions. (*Id.* at 14). Defendants contend that a court in this district has construed “adjacent to” as “abutting” (or “next to”). (*Id.*) (citing *STMicroelectronics, N.V. v. Motorola, Inc.*, 327 F. Supp. 2d 687, 710 (E.D. Tex. 2004)). Defendants also argue that “abutting” is consistent with the specification because it depicts “the charge carrier [14] abutting the underground hydrocarbon bearing formation [12]—that is, with nothing in between the charge carrier and the underground formation.” (Dkt. No. 66 at 14) (citing ’431 Patent at Figures 1, 3, 5A, 5B). Defendants further argue that common dictionary definitions further support their construction. (Dkt. No. 66 at 15) (citing Dkt. Nos. 66-4, 66-5, 66-6, & 66-7).

Plaintiff replies that Defendants are attempting to unnecessarily limit the scope of the term “adjacent to” by reference to extrinsic dictionary definitions. (Dkt. No. 68 at 13). Plaintiff argues that this is improper. (*Id.*). Plaintiff further argues that Defendants’ construction attempts to import limitations from the specification into the claims. (*Id.*).

For the following reasons, the Court finds that the term “**adjacent to**” should be given its plain and ordinary meaning.

#### **b) Analysis**

The term “adjacent to” appears in asserted claims 1 and 9 of the ’431 Patent. The Court finds that the term is used consistently in the claims and is intended to have the same meaning in each claim. The Court further finds that the term does not require construction, because the term is unambiguous, and is easily understandable by a jury, and should be given its plain and ordinary meaning. Indeed, Defendants’ expert did not opine that “adjacent to” was a technical term that had a unique meaning to a person of ordinary skill in the art. *See, e.g.*, Dkt. No. 66-1.

Defendants contend that there are a number of potential meanings for the term “adjacent to.” (Dkt. No. 66 at 13). Although this may be true, Defendants propose a construction that is inconsistent with the intrinsic evidence. Both in their brief and during the claim construction hearing, Defendants argue that “abutting” means that there can be “nothing in between the charge carrier and the underground formation.” (Dkt. No. 66 at 14). According to Defendants, not even the well casing that the recited “charge” is intended to perforate can be located between the charge carrier and the underground formation. The Court finds that Defendants’ position is untenable and would contradict the intrinsic evidence. Moreover, the Court is not persuaded that it should redraft the claims to replace a term used in the specification with one that is not, particularly when doing so would not provide any additional clarity. ’431 Patent at 5:24–36, Figure 4.

Defendants argue that their understanding of “abutting” is consistent with Figures 1, 3, 5A, and 5B of the ’431 Patent. (Dkt. No. 66 at 14). The Court disagrees. The specification states that “[t]he present invention relates generally to reactive shaped charges used in the oil and gas industry to *explosively perforate well casing and underground hydrocarbon bearing formations*, and more particularly to *an improved method for explosively perforating a well casing and its surrounding underground hydrocarbon bearing formation under balanced*” ’431 Patent at 1:10–19 (emphasis added). The specification further states that “[w]ellbores are typically completed with *a cemented casing* across the formation of interest to assure borehole integrity and allow selective injection into and/or production of fluids from specific intervals within the formation.” *Id.* at 1:23–26 (emphasis added). Thus, the specification indicates that the disclosed well casing and cement may be between the charge carrier and the underground formation. Although Figures 1, 3, 5A, and 5B do not illustrate the disclosed well casing and cement, a person of ordinary skill

in the art would understand that they are not excluded from the scope of the claims by the use of the term “adjacent to,” as Defendants contend.

To the extent that Defendants argue that there can be nothing in between the charge carrier and the underground formation, the Court expressly rejects this argument. Having resolved the parties’ claim construction dispute, the Court finds that the term “adjacent to” should be given its plain and ordinary meaning. Finally, in reaching its conclusion, the Court has considered the extrinsic evidence submitted by the parties, and given it its proper weight in light of the intrinsic evidence.

**c) Court’s Construction**

The term “**adjacent to**” will be given its plain and ordinary meaning.

2. **“without changing the pressure condition of the wellbore to a more underbalanced condition after the step of positioning” and “without changing the balance or overbalance condition of the wellbore to an underbalanced condition after the step of positioning**

<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>
“without changing the pressure condition of the wellbore to a more underbalanced condition after the step of positioning”	ordinary meaning	Claim is indefinite under 35 U.S.C. § 112.
“without changing the balance or overbalance condition of the wellbore to an underbalanced condition after the step of positioning”	ordinary meaning	Claim is indefinite under 35 U.S.C. § 112.

**a) The Parties’ Positions**

The parties dispute whether the phrase “without changing the pressure condition of the wellbore to a more underbalanced condition after the step of positioning,” and the phrase “without changing the balance or overbalance condition of the wellbore to an underbalanced condition after the step of positioning” are indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112 ¶ 2. Plaintiff argues

that the phrases do not need construction because they would be easily understood by the jury. (Dkt. No. 62 at 12) (citing '431 Patent at 5:13–21). Plaintiff further argues that the complete text of claim 1(c) teaches that the relevant timeframe for the step of “without changing the pressure condition of the wellbore to a more underbalanced condition . . .” is at a time related to the perforation operation, *i.e.* after the step of positioning the perforation gun, and detonating the shaped charges in the gun. (Dkt. No. 62 at 12-13). According to Plaintiff, there is no concurrent or subsequent “underbalancing” step that would have been used to “clean” the tunnels in prior art perforation methods. (*Id.* at 13).

Plaintiff further argues that the specification of the '431 Patent makes clear that the timing relevant to claim element 1(c) is the firing of the perforation gun during performance of the perforation. (*Id.* at 13) (citing '431 Patent at 2:54–59, 3:46–51). Plaintiff contends that there is no evidence that the phrases fail to define the pressure condition after the step of positioning with the “reasonable certainty” required by *Nautilus*. (Dkt. No. 62 at 13). Plaintiff further contends that resorting to extrinsic evidence is improper because the Court may make the indefiniteness determination as a matter of law based on the intrinsic evidence. (*Id.* at 14) (citing *Eidos Display, LLC v. AU Optronics Corp.*, 779 F.3d 1360 (Fed. Cir. 2015)).

Plaintiff also argues that the language of step claim 1(c) itself teaches to one of ordinary skill the meaning of the phrase. (Dkt. No. 62 at 15). Plaintiff contends that the intrinsic evidence is clear that the pressure condition is not changed to a more underbalanced condition when the perforation gun is fired. (*Id.*). According to Plaintiff, the Court should disregard conflicting expert testimony when it is in conflict with a clear intrinsic record. (*Id.*).

Defendants respond that claim 1 originally recited “detonating the shaped charge without the deliberate application of a pressure differential between the wellbore and reservoir to create



and first and second explosive event.” (Dkt. No. 66 at 16) (citing Dkt. No. 66-8 at 28). Defendants argue that the examiner rejected all claims in the application under 35 U.S.C. § 112, second paragraph, on the basis that the term “deliberate application” was indefinite. (Dkt. No. 66 at 16) (citing Dkt. No. 66-9 at 5-6). Defendants further argue that after the patentee unsuccessfully argued that the term was sufficiently definite, the patentee amended the claims to recite “without changing the pressure condition of the wellbore.” (Dkt. No. 66 at 16) (citing Dkt. No. 66-10 at 7). According to Defendants, the prosecution history exhibits the ambiguous drafting and prosecution conduct the Supreme Court has cautioned against. (Dkt. No. 66 at 16) (citing *Nautilus*, 134 S. Ct. at 2129).

Defendants also argue that their expert has opined that the phrase “without changing the pressure condition of the wellbore to a more underbalanced condition after the step of positioning” does not have a well-defined meaning to a person of ordinary skill in the art. (Dkt. No. 66 at 18) (citing Dkt. No. 66-1 at ¶ 24). Defendants contend that it is not clear whether “after the step of positioning” limits the temporal scope of the claim to immediately after or rather to any time after the step of positioning. (Dkt. No. 66 at 18). According to Defendants, it is well-known in the perforating industry that the pressure condition of a wellbore can change frequently for a number of reasons and based on a number of variables. (*Id.*) (citing Dkt. No. 66-1 at ¶ 25). Defendants contend that it is unclear whether these inevitable changes and fluctuations in the pressure condition are permissible under the asserted claims. (Dkt. No. 66 at 18).

Defendants also contend that the claims appear to encompass any time after the step of positioning. (*Id.*). Defendants also argue that when the perforation gun is fired, an immediate pressure change results. (*Id.*) (citing Dkt. No. 66-1 at ¶ 25, 26). Defendants contend this renders the claim language unintelligible to a person of ordinary skill in the art. (Dkt. No. 66 at 19).

Plaintiff replies that these claim elements were focused on by the examiner during prosecution. (Dkt. No. 68 at 8). Plaintiff contends that the terms themselves do not appear ambiguous and that their meaning from the intrinsic evidence is clear. (*Id.*). Plaintiff argues that the examiner added the language “to a more underbalanced condition” in claim 1 as a condition of allowance in an “Examiner’s Amendment.” (*Id.* at 9) (citing Dkt. No. 68-5). Plaintiff contends that the temporal scope was clear to the examiner, and it is clear in the intrinsic record. (Dkt. No. 68 at 9). According to Plaintiff, “after” means “after” (the step of positioning) in the course of the perforation operation as explained throughout the specification of the ’431 Patent. (*Id.*) (citing ’431 Patent at 3:45–65, 5:13–36, Figure 4).

Plaintiff further argues that Defendants seek to define the term to mean “immediately after” versus “any time.” (Dkt. No. 68 at 9). According to Plaintiff, Defendants impermissibly vary the ordinary meaning of “after” to result in a tortured understanding of the specification. (*Id.*). Plaintiff contends that the specification describes the general timeframe at issue using the term “after.” (*Id.*) (citing ’431 Patent at 3:12–13, 3:46–51). Plaintiff argues that there is no ambiguity or discrepancy in the timing of the steps of the methods of the ’431 Patent. (Dkt. No. 68 at 9). Finally, Plaintiff contends that the summary of the interview between the examiner and patentee indicates that definiteness was discussed. (*Id.* at 10) (citing Dkt. No. 68-6).

For the following reasons, the Court finds that the phrase **“without changing the pressure condition of the wellbore to a more underbalanced condition after the step of positioning”** should be construed to mean **“without changing the pressure condition of the wellbore to a more underbalanced condition after the step of positioning during perforation.”** The Court finds that the phrase **“without changing the balance or overbalance condition of the wellbore to an underbalanced condition after the step of positioning”**

should be construed to mean **“without changing the balance or overbalance condition of the wellbore to an underbalanced condition after the step of positioning during perforation.”**

**b) Analysis**

The phrase “without changing the pressure condition of the wellbore to a more underbalanced condition after the step of positioning” appears in asserted claim 1 of the ’431 Patent. The phrase “without changing the balance or overbalance condition of the wellbore to an underbalanced condition after the step of positioning” appears in asserted claim 9 of the ’431 Patent. The Court finds that the phrases are not indefinite, because they inform, with reasonable certainty, those skilled in the art about the scope of the invention.

The prosecution history indicates that claim 1 of the original application recited “detonating the shaped charge without the deliberate application of a pressure differential between the wellbore and reservoir to create and first and second explosive event.” (Dkt. No. 66-8 at 28). The patentee amended the claim by replacing the above phrase with the phrase “without changing the pressure condition of the wellbore.” (Dkt. No. 66-10 at 4). In an “Examiner’s Amendment,” the examiner added the language “to a more underbalanced condition” as a condition of allowance. (Dkt. No. 66-11 at 8).

Contrary to Defendants’ contention, the intrinsic record indicates that “after” means “after” the step of positioning and during perforation. Indeed, the specification discusses the advantages of not changing the pressure condition during perforation, stating that “[t]he method of the present application provides an improved method for the perforation of a wellbore, which eliminates the crushed zone and fractures the end (referred to also as one or more tip fractures) of a perforation tunnel, resulting in improved perforation efficiency and effective tunnel cleanout, *without having to perforate in an underbalanced pressure condition*. In other words,

*without having to control or reduce the pressure within a wellbore*, as commonly necessary in currently known methods, as discussed above.” ’431 Patent at 5:13–21 (emphasis added).

In addition, the claim language itself recites the relevant timeframe for step (c) of the claims as the time during the perforation operation. In other words, there is no subsequent “underbalancing” step used to “clean” the tunnels once the perforation gun is positioned and the shaped charges are detonated. Likewise, the specification describes the prior art as requiring a separate “cleaning” step using underbalance after the creation of the perforation tunnels. ’431 Patent at 2:54–56 (“Currently, common procedures to clear debris from tunnels rely on flow induced by a relatively large pressure differential between the formation and the wellbore.”).

Moreover, the specification describes the general timeframe at issue using the term “after.” Specifically, the specification states that “[a]fter perforation, fluid flows from the formation through the tunnels.” ’431 Patent at 3:12–13. Similarly, the specification states that there is improved production that results from activating a perforating gun, and recites that “[i]t has been found that by activating a perforating gun having reactive shaped charges which produce a second, local reaction following the creation of perforation tunnels, superior inflow and/or outflow performance is delivered compared to that achieved with conventional shaped charges, without establishing a pressure differential.” ’431 Patent at 3:46-51.

Defendants contend that the phrases are ambiguous because there will be an immediate pressure change when the perforation gun is fired. (Dkt. No. 66 at 18). The Court agrees that the intrinsic evidence indicates that there will be an immediate pressure change when the perforation gun is fired. However, the specification explicitly states that the pressure change resulting from the firing of the perforation gun is not considered in the recited “pressure condition” of the wellbore. Specifically, the specification states that “[t]he term ‘pressure differential’ is meant to

apply to difference between the pressures within the wellbore and within the reservoir, *independent of any other reaction or perforation, and independent of any pressure change caused by or during any reaction or perforation.*” ’431 Patent at 5:61–67 (emphasis added). Accordingly, the Court rejects Defendants’ argument that this “renders the claim language unintelligible to a person of ordinary skill in the art.” (Dkt. No. 66 at 19). In sum, the Court finds that Defendants have failed to provide clear and convincing evidence that the phrases fail to particularly point out and distinctly claim the subject matter regarded as the invention.

Defendants also argue that it is not clear whether “after the step of positioning” limits the temporal scope of the claim to immediately after or rather to any time after the step of positioning. (Dkt. No. 66 at 18). As indicated by the Court’s construction, the temporal scope of the claim is limited to “after the step of positioning during perforation.” Indeed, during the claim construction hearing, Defendants acknowledged that the Court’s construction goes a long way to cure the alleged temporal issue. To the extent that Plaintiff argues that “after” means “any time” after the step of positioning, and not “after the step of positioning during perforation,” the Court rejects this argument. Finally, in reaching its conclusion, the Court has considered the extrinsic evidence submitted by the parties, and given it its proper weight in light of the intrinsic evidence.

#### c) Court’s Construction

The Court construes the phrase “**without changing the pressure condition of the wellbore to a more underbalanced condition after the step of positioning**” to mean “**without changing the pressure condition of the wellbore to a more underbalanced condition after the step of positioning during perforation.**” The Court construes the phrase “**without changing the balance or overbalance condition of the wellbore to an underbalanced condition after the step of positioning**” to mean “**without changing the balance or**

**overbalance condition of the wellbore to an underbalanced condition after the step of positioning during perforation.”**

**3. “explosive event”**

<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>
“explosive event”	ordinary meaning	“rapid event during which gases created from the reacting materials cause an increase in the local pressure or volume, whereby the shock front propagates faster than or near the speed of sound”

**a) The Parties’ Positions**

The parties dispute whether the phrase “explosive event” requires construction. Plaintiff argues that the phrase does not require construction because it is one that would be easily understood by the jury. (Dkt. No. 62 at 16). Plaintiff contends that Defendants’ construction is not found in the intrinsic evidence related to the ’431 Patent. (*Id.*). Plaintiff also argues that the terms “shock front” and “propagate” do not appear anywhere in the specification or claims. (*Id.*). According to Plaintiff, Defendants’ construction will create additional confusion because these technical terms will require additional explanation to the jury. (*Id.*). Plaintiff further argues that resorting to extrinsic evidence to interpret the phrase is inappropriate since the phrase is not ambiguous. (*Id.*).

Defendants respond that the term “explosive event” relates to specific chemical reactions between specified components. (Dkt. No. 66 at 19). Defendants argue that a person of ordinary skill in the art would understand that the term “explosive event” connotes a rapid reaction accompanied by an extreme spike in pressure or volume. (*Id.*) (citing Dkt. No. 66-1 at ¶ 29). Defendants contend that a person of ordinary skill would understand the term to mean a detonation, wherein the resulting shock wave (or shock front) travels faster than the speed of sound. (Dkt. No. 66 at 19) (citing Dkt. No. 66-1 at ¶ 30).

Defendants further contend that certain reactions that result in slightly less rapid shock waves are within the ambit of “explosive events.” (Dkt. No. 66 at 20). Defendants argue that these reactions are known as deflagrations. (*Id.*). According to Defendants, in a deflagration the shock front travels at a rate near the speed of sound. (*Id.*). Defendants also contend that one of ordinary skill in the art would understand that explosions or “explosive events” result in the creation of gases, which impact the local pressure or volume. (*Id.*) (citing Dkt. No. 66-1 at ¶ 31). Defendants further argue that one of ordinary skill in the art working in the perforating industry would associate an explosive event with explosives and not reacting metals. (Dkt. No. 66 at 20) (Dkt. No. 66-1 at ¶ 31).

Defendants also argue that the patent claims and specification do not specify any characteristics that signify that the patentee intended to impart a special or different meaning to the term “explosive event.” (Dkt. No. 66 at 20) (citing Dkt. No. 66-1 at ¶ 32). Defendants contend that technical publications in the industry fully support their construction and are consistent with the ’431 Patent. (Dkt. No. 66 at 20) (citing Dkt. Nos. 66-12, 66-13, 66-14).

Plaintiff replies that Defendants seek to add terms to the definition of “explosive” that do not appear in the specification. (Dkt. No. 68 at 12) (referring to the terms “shock front” and “speed of sound”). Plaintiff also argues that Defendants’ use of extrinsic evidence to vary the commonly understood meaning of “explosive” should be disregarded. (*Id.* at 13).

For the following reasons, the Court finds that the phrase “**explosive event**” should be given its plain and ordinary meaning.

#### **b) Analysis**

The phrase “explosive event” appears in asserted claims 1 and 9 of the ’431 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same

meaning in each claim. The Court further finds that the phrase does not require construction, because the phrase is unambiguous, and is easily understandable by a jury, and should be given its plain and ordinary meaning. The parties do not dispute that the claims require a “first explosive event” and a “second explosive event.” Instead, the parties dispute whether the “second explosive event” must be a “violent event,” or if it can be a slower event (*e.g.*, burning).

The Court finds that the intrinsic evidence indicates that the recited “explosive event” must be a violent and sudden event. The specification states that “[p]erforation using shaped explosive charges is inevitably a *violent event*, resulting in plastic deformation 28 of the penetrated rock, grain fracturing, and the compaction 26 of particulate debris (casing material, cement, rock fragments, shaped charge fragments) into the pore throats of rock surrounding the tunnel (as best shown in FIG. 2B).” ’431 Patent at 1:56–61. This is consistent with the extrinsic evidence that defines “explosion” as “a violent release of energy resulting from a rapid chemical or nuclear reaction, especially one that produces a shock wave, loud noise, heat, and light.” (Dkt. No. 66-13 at 2) (Collins, <http://www.collinsdictionary.com/dictionary/english/explosion>).

Similarly, the American Heritage Dictionary defines “explosion” as “a release of mechanical, chemical, or nuclear energy in a sudden and often violent manner with the generation of high temperature and usually with the release of gases.” (Dkt. No. 66-14 at 3). Thus, the intrinsic and extrinsic evidence indicates that the recited “explosive event” is a sudden and violent event. To the extent that Plaintiff argues that the recited “explosive event” does not have to be a violent and sudden event, the Court rejects this argument.

Turning to Defendants’ construction, the Court finds that it is not based on the intrinsic record and introduces technical terms that could unnecessarily confuse the jury. For example, the terms “shock front” and “speed of sound” do not appear in the specification or claims of the ’431



Patent. Defining an unambiguous and is easily understandable phrase with technical terms unnecessarily creates additional complexity. The specification also does not explicitly state the rate at which the “shock front” propagates. Thus, Defendants have not provided any intrinsic support for the proposed “whereby the shock front propagates faster than or near the speed of sound.” Instead, as discussed above, the intrinsic evidence indicates that the recited “explosive event” is a sudden and violent event. The Court finds that this is captured by the plain and ordinary meaning of “explosive.” Finally, in reaching its conclusion, the Court has considered the extrinsic evidence submitted by the parties, and given it its proper weight in light of the intrinsic evidence.

**c) Court’s Construction**

The term “**explosive event**” will be given its plain and ordinary meaning.

**4. “eliminating a substantial portion of said/the crushed zone**

<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>
“eliminating a substantial portion of said/the crushed zone”	ordinary meaning	Indefinite under 35 U.S.C. § 112, Alternatively: “completely removing substantially all of said zone of disturbed sandstone having reduced permeability around the perforation tunnel”

**a) The Parties’ Positions**

The parties dispute whether the phrase “eliminating a substantial portion of said/the crushed zone” is indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112 ¶ 2. Plaintiff argues that the phrase does not need construction because it will be easily understood by the jury. (Dkt. No. 62 at 17). Plaintiff also contends that the term “completely removing” does not appear anywhere in the specification or claims. (*Id.*). Plaintiff further argues that resorting to extrinsic evidence to interpret the phrase is inappropriate because the phrase is not ambiguous. (*Id.*).

Plaintiff also contends that there is no evidence that the phrase fails to define the degree of removal of debris from the tunnel formed by the first explosive event. (*Id.*). Plaintiff argues that resorting to extrinsic evidence is improper because the Court may make the indefiniteness determination as a matter of law based on the intrinsic evidence. (*Id.* at 18). Plaintiff also argues that the term “substantial” is known as a term of degree. (*Id.*) (citing Manual of Patent Examining Procedure §2173.05(b)). According to Plaintiff, determining whether the perforation operation results in a tunnel that has had the crushed zone “substantially” eliminated and the debris cleared will present no difficulty to one of ordinary skill in the art. (*Id.*).

Defendants respond that the ’431 Patent provides no standard of measuring the “substantial portion” limitation. (Dkt. No. 66 at 21). Defendants argue that it could be read as requiring anywhere from more than a minimal amount all the way up to the entire crushed zone. (*Id.*) (citing Dkt. No. 66-1 at ¶¶ 35, 36). Defendants contend that the only other quantitative description of how much of the crushed zone is eliminated is when the specification provides that the crushed zone is “substantially eliminated.” (Dkt. No. 66 at 22) (citing ’431 Patent at Abstract, 7:1–4). Thus, in the alternative, Defendants propose to construe the phrase as “completely removing substantially all of said zone of disturbed sandstone having reduced permeability around the perforation tunnel.” (Dkt. No. 66 at 22) (citing Dkt. No. 66-1 at ¶ 36).

Regarding the term “crushed zone,” Defendants argue that the patent applicant provided a definition for “crushed zone” in the patent itself. (Dkt. No. 66 at 22) (citing ’431 Patent at 1:66–2:2). Defendants further argue that the ’431 Patent is directed to applications of shaped charge perforation in sandstone targets. (Dkt. No. 66 at 22) (citing ’431 Patent at 8:5–11, 8:50–51, 9:31–33). According to Defendants, a person of ordinary skill in the art would understand that the “crushed zone” is the area of disturbed sandstone having reduced permeability around the

perforation tunnel. (Dkt. No. 66 at 22) (citing Dkt. No. 66-1 at ¶ 37).

Plaintiff replies that neither the claims nor specification limit the recited “crush zone” to “sandstone” formations. (Dkt. No. 68 at 10). Plaintiff further argues that federal case law and the USPTO indicate that terms of degree such as “substantial” are permissible. (*Id.*) (citing Manual of Patent Examining Procedure §2173.05(b)). Plaintiff also contends that determining whether the perforation operation results in a tunnel that has had a “substantial portion” of the crushed zone eliminated will present no difficulty to one of ordinary skill in the art. (Dkt. No. 68 at 11). Plaintiff argues that the crushed zone can be easily measured in the lab. (*Id.*) (citing Dkt. No. 68-3 at 7, 9, 10). Plaintiff further argues that Table 2 in the specification gives examples of the improvement in “Clear Tunnel Depth,” and provides experimental measurements to gauge removal of a “substantial portion” of the crushed zone. (Dkt. No. 68 at 11). According to Plaintiff, this is more than enough disclosure to provide reasonable certainty for one of ordinary skill to understand “eliminating a substantial portion of said/the crushed zone.” (*Id.*).

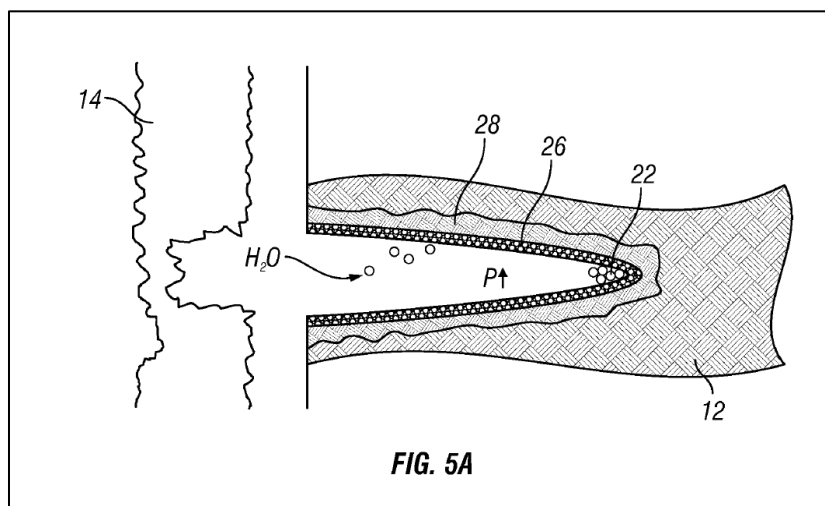
For the following reasons, the Court finds that the phrase **“eliminating a substantial portion of said/the crushed zone”** should be construed to mean **“substantially eliminates the zone of reduced permeability (disturbed rock) around the perforation tunnel.”**

#### **b) Analysis**

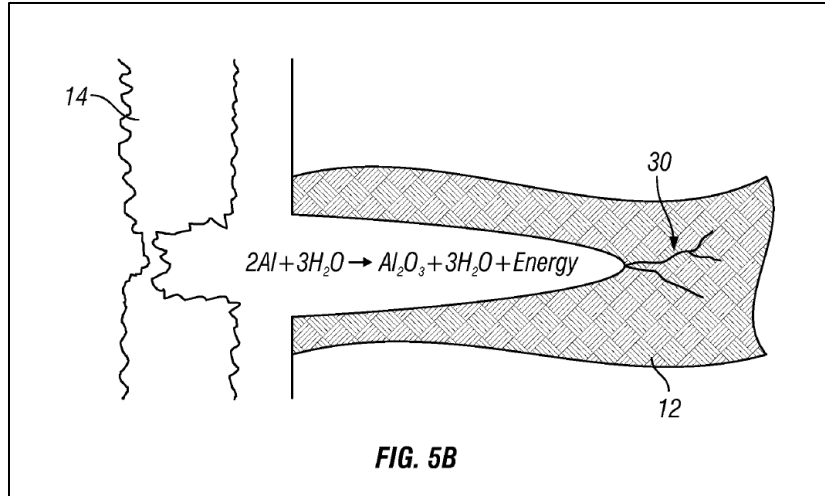
The phrase “eliminating a substantial portion of said/the crushed zone” appears in asserted claims 1 and 9 of the ’431 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same meaning in each claim. The Court further finds that the phrase is not indefinite. “Claim language employing terms of degree has long been found definite where it provided enough certainty to one of skill in the art when read in the context of the invention.” *Interval Licensing LLC v. AOL, Inc.*, 766 F.3d 1364, 1370 (Fed. Cir. 2014); *see*,

e.g., *Eibel Process Co. v. Minnesota & Ontario Paper Co.*, 261 U.S. 45, 65-66 (1923) (finding “substantial pitch” sufficiently definite because one skilled in the art “had no difficulty . . . in determining what was the substantial pitch needed” to practice the invention). Here, the intrinsic evidence informs, with reasonable certainty, those skilled in the art on the scope of the invention.

The specification states that “FIGS. 5a-5b depict the theoretical process that occurs within the hydrocarbon-bearing formation 12 as a reactive charge comprising an aluminum liner is activated.” ’431 Patent at 6:57–60. The specification adds that “[a]s shown in FIG. 5a, the activated charge carrier 14 has fired the reactive charge into the formation 12 and has formed a tunnel surrounded by the crushed zone 26.” *Id.* at 6:60–63.



The specification further states that “[a]s shown in FIG. 5b, following the secondary explosion, the crushed zone 26 is *substantially eliminated* and a fracture 30 is formed at the end (or tip) of the tunnel. The elimination of the crushed zone 26 provides for an increase in, or widening of, the cross-sectional diameter of the perforation tunnel, by at least a quarter inch around the tunnel, and elimination of the barrier to inflow or outflow of fluids caused by skin effects.” *Id.* at 7:1–8 (emphasis added).



Accordingly, the Court finds that a person of ordinary skill in the art would understand that “eliminating a substantial portion of the crushed” means that the crushed zone is “substantially eliminated.” Table 2 in the specification of the ’431 Patent (col. 9) gives examples of the improvement in “Clear Tunnel Depth” available through use of the claimed invention.

TABLE 2

Examples of Performance Comparison Test Programs between  
Reactive Charges and Best-in-Class Conventional Deep Penetrating Charges

Charge Tested	UCS (psi)	Effective Stress (psi)	Average Porosity (%)	Under-balance (psi)	Clear Tunnel Depth Improvement with Reactive Perforator	Lab Productivity Improvement with Reactive Perforator
23 g Reactive	11,000	4,000	11.7	1,500	216%	N/A
39 g Reactive	11,000	5,000	10.6	0	82%	N/A
25 g Reactive	5,500	3,000	21.6	0	235%	25%
25 g Reactive	7,000	4,000	19.0	500	80%	28%
6 g Reactive	10,000	4,000	12.0	0	35%	N/A

Regarding the term “crushed zone,” the Court finds that providing a construction for this term would be helpful to the jury. The specification states that “the compaction of particulate debris into the surrounding pore throats results in a zone of reduced permeability (disturbed rock) around the perforation commonly known as the ‘crushed zone.’” *Id.* at 1:66–2:2.

Accordingly, the Court construes “crushed zone” to mean “the zone of reduced permeability (disturbed rock) around the perforation tunnel.”

Regarding Defendants’ alternative construction, the words “completely removing” do not appear in the specification or claims. Defendants also contend that the “crushed zone” should be limited to “sandstone” formations. The Court disagrees. Neither the claims nor the specification require this limitation, and importing an exemplary application into the claims would be improper. Indeed, the specification states that the “effectiveness of cleanup is thus independent of the prevailing rock lithology and independent of the permeability at the point of penetration.” *Id.* at 7:21–23. Accordingly, the Court rejects Defendants’ alternative construction. Finally, in reaching its conclusion, the Court has considered the extrinsic evidence submitted by the parties, and given it its proper weight in light of the intrinsic evidence.

### c) Court’s Construction

The Court construes the phrase “**eliminating a substantial portion of said/the crushed zone**” to mean “**substantially eliminates the zone of reduced permeability (disturbed rock) around the perforation tunnel.**”

### 5. “substantially equal to the total depth of penetration/(the tunnel)”

<u>Disputed Term</u>	<u>Plaintiff’s Proposal</u>	<u>Defendants’ Proposal</u>
“substantially equal to the total depth of penetration/(the tunnel)”	ordinary meaning	Claim is indefinite under 35 U.S.C. § 112.

### a) The Parties’ Positions

The parties dispute whether the phrase “substantially equal to the total depth of penetration/(the tunnel)” is indefinite for failing to particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112 ¶ 2. Plaintiff argues that the phrase does not need construction because it is one that would be easily understood by the jury. (Dkt.

No. 62 at 21). Plaintiff also argues that this phrase is not indefinite because one of ordinary skill in the art could measure the lengths of clear tunnel depths relative to the total depth of penetration in lab experiments. (*Id.*) (citing *Andrew Corp. v. Gabriel Electronics*, 847 F.2d 819, 822 (Fed. Cir. 1988)).

Defendants respond that a patent must provide a standard of measuring terms of degree found in patent claims. (Dkt. No. 66 at 23) (citing *Biosig Instruments, Inc. v. Nautilus, Inc.*, 783 F.3d 1374, 1378 (Fed. Cir. 2015)). According to Defendants, the '431 Patent provides no standard for measuring the term “substantially equal.” (Dkt. No. 66 at 23). Defendants contend that the specification only refers to the relationship between the “tunnel depth” and the “depth of penetration” two times, and in both instances the two are said to be “equal” (not “substantially equal”). (*Id.*) (citing '431 Patent at 7:10–17, 7:23–27; Dkt. No. 66-1 at ¶¶ 40, 41). Defendants argue that one of ordinary skill in the art would not be able to determine the bounds of the claims in which this term appears with reasonable certainty. (Dkt. No. 66 at 23).

Plaintiff replies that the phrase “substantially equal to the total depth of penetration/(the tunnel)” can be inferred from the productivity measurements related to the perforation. (Dkt. No. 68 at 12). Plaintiff also argues that it can easily be measured in the lab. (*Id.*) (citing Dkt. No. 68-3 at 7, 9, 10). According to Plaintiff, the percentage improvements in “Clear Tunnel Depth” from Table 2 are the guide by which this phrase may be understood in the context of the specification. (Dkt. No. 68 at 12). Finally, Plaintiff argues that the Court may consult extrinsic evidence to educate itself about the invention and relevant technology, but it may not rely upon extrinsic evidence to reach a claim construction that is at odds with a construction mandated by the intrinsic evidence. (*Id.*) (citing *Key Pharm. v. Hercon Labs. Corp.*, 161 F.3d 709, 716 (Fed. Cir. 1998)).

For the following reasons, the Court finds that the phrase “**substantially equal to the total depth of penetration/(the tunnel)**” is indefinite because it fails to inform, with reasonable certainty, those skilled in the art about the scope of the invention.

#### **b) Analysis**

The phrase “substantially equal to the total depth of penetration/(the tunnel)” appears in asserted claims 4 and 9 of ’431 Patent. The Court finds that the phrase is used consistently in the claims and is intended to have the same meaning in each claim. The Court further finds that the phrase is indefinite, because it fails to “inform those skilled in the art about the scope of the invention with reasonable certainty.” *Nautilus*, 134 S. Ct. at 2129.

Patent claims must particularly point out and distinctly claim the subject matter regarded as the invention. 35 U.S.C. § 112(b). The Supreme Court has described this statutory provision as requiring a “delicate balance” between the “inherent limitations of language” and the need of patents to “afford clear notice of what is claimed, thereby apprising the public of what is still open to them” so as to avoid “a zone of uncertainty which enterprise and experimentation may enter only at the risk of infringement claims.” *Nautilus*, 134 S. Ct. at 2128–29. “[A]bsent a meaningful definiteness check...patent applicants face powerful incentives to inject ambiguity into their claims.” *Id.* at 2129.

In *Seattle Box Co. v. Industrial Crating & Packing*, 731 F.2d 818, 826 (Fed. Cir. 1984), the court remarked that “substantially equal” is a term of degree, and that its acceptability depends on “whether one of ordinary skill in the art would understand what is claimed . . . in light of the specification,” even if experimentation may be needed. Here, a person of ordinary skill in the art would not be informed, with reasonable certainty, about the scope of the invention. The claims recite creating “a clear tunnel depth substantially equal to the total



depth of penetration/(the tunnel).” The specification does not indicate when the clear tunnel depth is no longer “substantially equal” to the total depth of the tunnel.

Instead, the patent specification only refers to the relationship between the “tunnel depth” and the “depth of penetration” two times, and in both instances the two are said to be “equal,” not “substantially equal.” ’431 Patent at 7:10–15 (“As shown in FIG. 6, the effective wellbore radius,  $r_e^*$ , as compared in dashed lines to the prior art method obtaining an effective wellbore radius,  $r_e$  (and plugged at the tip 18 with debris), is extended by the removal of the compacted fill, having a clean tunnel depth *equal* to the total depth of penetration of the jet.”) (emphasis added); *id.* at 7:23–27 (“Consequently, a very high perforation efficiency is achieved, theoretically approaching 100% of the total holes perforated, within which the clean tunnel depth will be *equal* to the total depth of penetration (since compacted fill is removed from the tunnel tip), as depicted in FIG. 6.”) (emphasis added). Thus, a person of ordinary skill in the art would not be informed, with reasonably certainty, about when the clear tunnel depth is no longer “substantially equal” to the total depth of the tunnel.

Indeed, Plaintiff does not contend that the intrinsic evidence indicates the bounds of the phrase “substantially equal.” Instead, Plaintiff argues that the phrase can be “inferred” from the productivity measurements related to the perforation. (Dkt. No. 68 at 12). According to Plaintiff, the percentage improvements in “Clear Tunnel Depth” from Table 2 are the guide by which this phrase may be understood in the context of the specification. (*Id.*). The Court finds that Table 2 does not provide further understanding, but instead introduces further ambiguity and uncertainty concerning the disputed phrase. Table 2 does not provide actual measurements for either the recited “clear tunnel depth” or the “total depth of penetration/tunnel.” Moreover, Table 2 includes a column labeled “Clear Tunnel Depth Improvement with Reactive Perforator.” The

values in this column range from 35% to 235%. This range of improvement would appear to stretch well below and beyond “substantially equal.” As such, a person of ordinary skill in the art would not know whether a 35% improvement, an 80% improvement, or a 235% improvement would be considered “substantially equal.”

Plaintiff also argues that the clear tunnel depth can easily be measured in the lab. (Dkt. No. 68 at 12). The Court appreciates that the clear tunnel depth may be measured in a lab. However, this does not resolve the ambiguity for the term “substantially equal” in the context of the intrinsic evidence. Even with a measurement for the clear tunnel depth, a person of ordinary skill in the art would not be informed, with reasonably certainty, whether the clear tunnel depth is no longer “substantially equal” to the total depth of the tunnel. *Litton Sys. v. Honeywell, Inc.*, 145 F.3d 1472, 1474 (Fed. Cir. 1998) (“Public notice of the scope of the right to exclude, as provided by the patent claims, specification and prosecution history, is a critical function of the entire scheme of patent law...because it provides competitors with the necessary information upon which they can rely to shape their behavior in the marketplace.”).

Finally, the prosecution history provides no assistance for this term, and neither party cites to any portion of the prosecution record to support their positions. In reaching its conclusion, the Court has considered the extrinsic evidence submitted by the parties, and given it its proper weight in light of the intrinsic evidence. Accordingly, the Court finds that “substantially equal to the total depth of penetration/(the tunnel)” is indefinite.

### **c) Court’s Construction**

The phrase “**substantially equal to the total depth of penetration/(the tunnel)**” is indefinite for failing to inform, with reasonable certainty, those skilled in the art about the scope of the invention.

**V. CONCLUSION**

The Court adopts the above constructions. The parties are ordered to not refer, directly or indirectly, to each other's claim construction positions in the presence of the jury. Likewise, the parties are ordered to refrain from mentioning any part of this opinion, other than the definitions adopted by the Court, in the presence of the jury. However, the parties are reminded that the testimony of any witness is bound by the Court's reasoning in this order but any reference to claim construction proceedings is limited to informing the jury of the definitions adopted by the Court.

**It is SO ORDERED.**

**SIGNED this 24th day of October, 2016.**

  
ROY S. PAYNE  
UNITED STATES MAGISTRATE JUDGE