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

GEODYNAMICS, INC., *Plaintiff,* v. DYNAENERGETICS US, INC., *Defendant.*	§ § § § § § § § § § § §	Case No. 2:17-CV-00371-RSP

MEMORANDUM OPINION AND ORDER ON CLAIM CONSTRUCTION

On April 2, 2018, the Court held a hearing to determine the proper construction of the disputed claim terms in United States Patent No. 8,220,394 ("the '394 Patent"). The Court has considered the arguments made by the parties at the hearing and in their claim construction briefs. Dkt. Nos. 54, 60, 64, & 67.[1] 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 Memorandum and Order on Claim Construction in light of these considerations.

[1] Citations to the parties' filings are to the filing's number in the docket (Dkt. No.) and pin cites are to the page numbers assigned through ECF.

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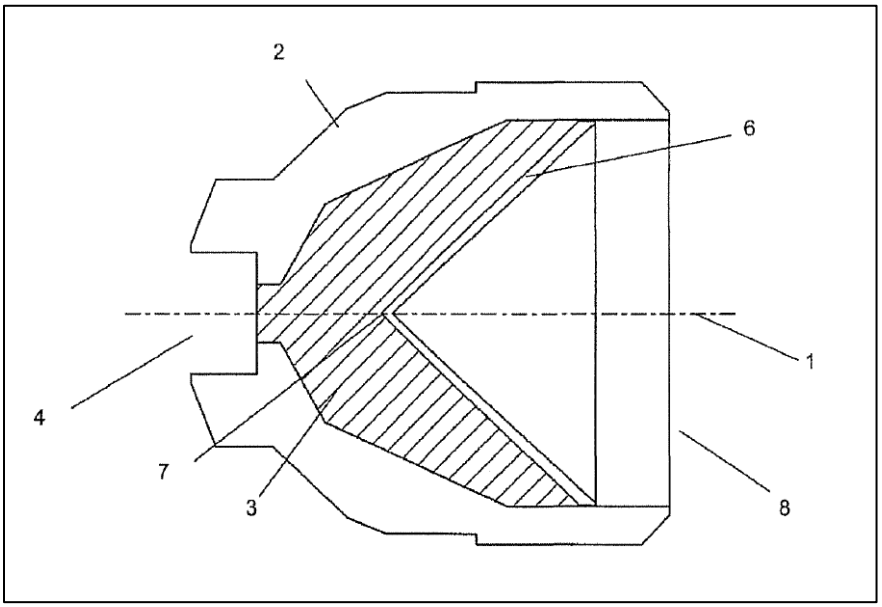
I. BACKGROUND

The ’394 Patent is titled “Oil Well Perforators.” The PCT application was filed on October 8, 2004, entered the national stage on April 7, 2006, and the ’394 Patent issued on July 17, 2012. The ’394 Patent is generally directed to “a reactive shaped charge liner for a perforator for use in perforating and fracturing well completions.” ’394 Patent at 1:5–7. Figure 1 illustrates a cross section view of a shaped charge device. *Id.* at 7:7–8



The specification states that liner 6 fits closely in the open end 8 of the cylindrical housing 2. *Id.* at 7:14–15. The specification adds that “[h]igh explosive material 3 is located within the volume enclosed between the housing and the liner.” *Id.* at 7:15–16. The specification further states that “[t]he high explosive material 3 is initiated at the closed end of the device, proximate to the apex 7 of the liner, typically by a detonator or detonation transfer cord which is located in recess 4.” *Id.* at 7:16–20.

Regarding the liner 6, the specification states that it “comprises a composition capable of an exothermic reaction upon activation of the shaped charge liner.” *Id.* at 2:58–60. The specification further states that “[i]n order to achieve this exothermic output the liner composition

preferably comprises at least two components which, when supplied with sufficient energy (i.e. an amount of energy in excess of the activation energy of the exothermic reaction) will react to produce a large amount of energy typically in the form of heat." *Id.* at 2:61–66. The specification further clarifies that "typically the reaction will involve only two metals, however intermetallic reactions involving more than two metals are known." *Id.* at 3:3–5. The specification continues that "[t]he liners give particularly effective results when the two metals are provided in respective proportions calculated to give an electron concentration of 1.5, that is a ratio of 3 valency electrons to 2 atoms such as NiAl or PdAl." *Id.* at 3:52–56

Claim 1 of the '394 Patent is an exemplary claim and recites the following elements (disputed term in italics):

> 1. A reactive, oil and gas well shaped charge perforator comprising a liner and an associated shaped charge, whereby the liner is *a green compacted particulate* composition formed from a powder mixture comprising at least two metal elements, and whereby the liner is reactive such that the at least two metal elements will undergo an *intermetallic alloying reaction* to give an exothermic reaction upon activation of the associated shaped charge, and in which the *at least two metal elements are provided in respective proportions calculated to give an electron* concentration of 1.5, and wherein the composition further comprises *at least one further inert metal, wherein the at least one further inert metal is not capable of an exothermic reaction with the at least two metal elements upon activation of the shaped charge liner*.

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. Conceptronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996)); *Teleflex, Inc. v. Ficosa 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. Definiteness Under 35 U.S.C. § 112, ¶ 2 (pre-AIA) / § 112(b) (AIA)

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, 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).

I. LEVEL OF ORDINARY SKILL IN THE ART

It is well established that patents are interpreted from the perspective of one of ordinary skill in the art. *See Phillips*, 415 F.3d at 1313 ("[T]he ordinary and customary meaning of a claim term is the meaning that the term would have to a person of ordinary skill in the art in question at the time of the invention, i.e., as of the effective filing date of the patent application."). The Federal Circuit has advised that the "[f]actors that may be considered in determining the level of skill in the art include: (1) the educational level of the inventors; (2) the type of problems encountered in the art; (3) prior art solutions to those problems; (4) the rapidity with which innovations are made; (5) sophistication of the technology; and (6) education level of active workers in the field." *Env'tl Designs, Ltd. v. Union Oil Co. of California*, 713 F.2d 693, 696 (Fed. Cir. 1983). "These factors are not exhaustive but are merely a guide to determining the level of ordinary skill in the art." *Daiichi Sankyo Co. Ltd. v. Apotex, Inc.*, 501 F.3d 1254, 1256 (Fed. Cir. 2007).

Plaintiff's expert, Mr. Larry Behrmann, opined that "a person of ordinary skill in the art

during the 2003 timeframe would have had a Bachelor of Science in an engineering or science discipline, and five years of experience working in the oil and gas industry with respect to perforation design and fabrication and well completion activities including perforation." (Dkt. No. 59-4 at ¶ 9). Defendant's expert, Dr. William Walters, opined that a person of ordinary skill in the art would possess an "advanced" degree and "three to five" years of experience in shaped charge design. (Dkt. No. 59-8 at 32:16–33:5).

Defendant states that it "largely agrees with [Plaintiff's] proposed level of ordinary skill, and for purposes of this claim construction process will apply that level of skill in construing the claim language." (Dkt. No. 60 at 12). Having considered the parties' proposals, and the factors that may be considered in determining the level of skill in the art, the Court finds that a person of ordinary skill in the art would have a Bachelor of Science in an engineering or science discipline, and five years of experience working in the oil and gas industry with respect to perforation design and fabrication and well completion activities including perforation.

II. CONSTRUCTION OF AGREED TERMS

The parties agreed to the construction of the following phrase:

Claim Term/Phrase	Agreed Construction
"exothermic reaction" (Claims 1, 28)	"a chemical reaction resulting in the release of heat"

Dkt. No. 47 at 1. In view of the parties' agreement on the proper construction of the identified terms, the Court **ADOPTS** the parties' agreed construction.

III. CONSTRUCTION OF DISPUTED TERMS

The parties' dispute focuses on the meaning and scope of six terms/phrases in the '394 Patent.

A. "a green compacted particulate"

Disputed Term	Plaintiff's Proposal	Defendant's Proposal
"a green compacted particulate"	"a pressed powder that has not been further strengthened as by sintering"	Plain and ordinary meaning.

1. The Parties' Positions

The parties dispute whether the term "a green compacted particulate" requires construction. Plaintiff argues that the term would likely be unfamiliar to a jury, and that a construction is necessary to avoid confusion. (Dkt. No. 54 at 6). Plaintiff contends that a "green compacted particulate" refers to a liner formed as a pressed powder. *Id.* at 7. Plaintiff also contends that the file history supports its construction. *Id.* at 7-8 (citing Dkt. No. 54-3). Plaintiff further argues that its construction is particularly relevant to claim 28's reactive liner comprising nickel and aluminum. *Id.* at 8 (citing '394 Patent at 4:39–41). According to Plaintiff, it would be "obvious" to a person of skill in the art that exposing a liner comprising nickel and aluminum to thermal energy (*e.g.*, sintering) during the formation process may prematurely cause "an unwanted exothermic reaction." (Dkt. No. 54 at 8) (citing '394 Patent at 4:41–45).

Defendant responds that Plaintiff does not dispute that "green compacted particulate" is well-known in the field of shaped charge design, and would be well-understood by a person of ordinary skill in the art. (Dkt. No. 60 at 12-13) (citing Dkt. No. 59-8 at 47:18–48:7; Dkt. No. 59-10 at 39:24–40:3). Defendant argues that a construction is not required because there is no dispute that "green compacted particulate" would be abundantly clear to a person of ordinary skill in the art. (Dkt. No. 60 at 13).

Plaintiff replies that Defendant's expert agrees that Plaintiff's construction is appropriate. (Dkt. No. 64 at 2) (citing Dkt. No. 64-3 at 48:8–12). Plaintiff argues that in view of the experts' agreement on the meaning of the term, there is no reason for Defendant to oppose a construction

that is both accurate and accessible to jurors. (Dkt. No. 64 at 3) (citing *Funai Elec. Co., Ltd. v. Daewoo Elecs. Corp.*, 616 F.3d 1357, 1366 (Fed. Cir. 2010)).

For the following reasons, the Court finds that the term **"a green compacted particulate"** should be construed to mean **"a pressed powder that has not been further strengthened as by sintering."**

2. Analysis

The term "a green compacted particulate" appears in asserted claims 1 and 28 of the '394 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 intrinsic evidence indicates that a person of ordinary skill in the art would understand "a green compacted particulate" to mean "a pressed powder that has not been further strengthened as by sintering." The specification describes that "one method of manufacture" of the liners is "by pressing a measure of intimately mixed and blended powders in a die set to produce the finished liner as *a green compact*." '394 Patent at 7:50–52 (emphasis added); *see also*, *id.* at 4:39–41 ("In the case of AlNi, the reaction will only occur if liner is formed from a mixture of powders that are *green compacted*.") (emphasis added).

The specification describes "other circumstances" where "different, intimately mixed powders may be employed in exactly the same way as described above, but the *green compacted product* is a near net shape allowing some form of sintering or infiltration process to take place." '394 Patent at 7:50–57 (emphasis added). Thus, the specification indicates that a green compacted product has not been further strengthened by further processing (*e.g.*, sintering). Consistent with this statement, the patentee distinguished the prior art by arguing that the prior art liners "have already undergone an exothermic reaction during their formation and are, therefore, incapable of

undergoing an exothermic reaction upon activation of the associated shaped charge." (Dkt. No. 54-3 at 6).

The extrinsic evidence is consistent with the intrinsic evidence. The text *Manufacturing Processes* states that "[t]he ejected part, known as *a green compact*, resembles the finished part, but has only the little structural strength derived from the interlocking of the powder particles obtained by compression. Final strength is obtained by sintering." (Dkt. No. 54-4 at 9, Myron L. Begeman & B.H. Amstead, *Manufacturing Processes*, (6th ed. 1969)) (emphasis in original). Likewise, Defendant's expert, Dr. William Walters, agreed that this is the understanding of a person of ordinary skill in the art. (Dkt. No. 64-3 at 48:8–12) ("Q. So is it your opinion that plaintiff's proposed definition, which is 'a pressed powder that has not been further strengthened, as by sintering' is appropriate? A. Yes.").

Defendant argues that there is no need to construe this term because there is no dispute that "green compacted particulate" would be "abundantly clear to a person of ordinary skill in the art." (Dkt. No. 60 at 13). Defendant suggests that any claim that would be clear to a person of skill in the art requires no construction, even if the claim is a technical term that would be foreign to a jury. The term "a green compacted particulate" is "a technical term, and '[t]he Court believes that some construction of the disputed claim language will assist the jury to understand the claims." *Rockwell Automation, Inc. v. 3-S Smart Software Solutions, GmbH*, 2016 U.S. Dist. LEXIS 138209, *27-28 (E.D. Tex. Oct. 5, 2016) (Payne, M.J.) (internal citation omitted). 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.

3. Court's Construction

The Court construes the term **"a green compacted particulate"** to mean **"a pressed**

powder that has not been further strengthened as by sintering."

B. "intermetallic alloying reaction"

Disputed Term	Plaintiff's Proposal	Defendant's Proposal
"intermetallic alloying reaction"	Plain and ordinary meaning.	"a reaction between at least two metal elements that forms an intermetallic compound"

1. The Parties' Positions

The parties dispute whether the term "intermetallic alloying reaction" requires construction. Plaintiff argues that this term is easily understood and requires no construction when read in the context of the claim. (Dkt. No. 54 at 8). Plaintiff contends that Defendant's construction obscures the meaning of the claim by introducing redundant and confusing language. *Id.* According to Plaintiff, claim 28 already explains that the "intermetallic alloying reaction" is a reaction between two metals that forms an intermetallic compound. *Id.* at 9. Plaintiff argues that under Defendant's construction, the claim twice references "two metal elements" and twice references the formation of an "intermetallic compound." *Id.* Plaintiff further argues that claim 28 does not disclose a reaction "between at least two metal elements," it discloses a reaction between nickel and aluminum. *Id.*

Defendant responds that this term must be construed because the limitation contains terms of art with specific and complex meanings. (Dkt. No. 60 at 13). According to Defendant, the concepts of "alloying" and "reacting" are distinct from a chemical and metallurgical standpoint. *Id.* (citing Dkt. No. 59-11 at 11:25–13:15). Defendant further argues that the parties agree that the "intermetallic alloying reaction" requires the formation of an intermetallic compound. (Dkt. No. 60 at 14) (citing Dkt. No. 59-1 at ¶ 12; Dkt. No. 59-11 at 89:21–91:14; Dkt. No. 59-10 at 47:21–48:6). Defendant also contends that its construction is not redundant, but instead specifies that the claimed reaction must form an "intermetallic compound." (Dkt. No. 60 at 15).

Plaintiff replies that the term "intermetallic alloying reaction" should be given its plain and ordinary meaning, because the surrounding claim language provides clarity. (Dkt. No. 64 at 3-4). Plaintiff also argues that Defendant's construction renders portions of claim 28 superfluous. (*Id.* at 4). Plaintiff further contends that claim 28 unambiguously states that the reaction occurs, "thereby forming the intermetallic compound NiAl." *Id.* Plaintiff also argues that Defendant's expert, Dr. Lograsso, concedes that the specification uses the terms alloy and compound interchangeably. *Id.* (citing Dkt. No. 64-2 at 90:20–25).

For the following reasons, the Court finds that the phrase **"intermetallic alloying reaction"** should be construed to mean **"a reaction between the at least two metal elements that forms an intermetallic compound"** in claim 1, and should be construed to mean **"a reaction between the two metal elements that forms an intermetallic compound"** in claim 28.

2. Analysis

The term "intermetallic alloying reaction" appears in asserted claims 1 and 28 of the '394 Patent. The Court finds that the term is used consistently in the claims and is intended to have the same general meaning in each claim. The parties agree that the recited "intermetallic alloying reaction" is "a reaction between the at least two metal elements that forms an intermetallic compound." (Dkt. No. 59-1 at ¶ 12; Dkt. No. 59-11 at 89:21 – 91:14). The parties also agree that in the context of the '394 Patent, the terms "compound" and "alloy" are used interchangeably. Plaintiff's expert, Mr. Behrmann, testified that "[i]n the context of the – of the '394 patent, yes, we can call that intermetallic reaction creating an alloy or creating a compound.· Those compound and alloy, in reference to the '394, there's no difference." (Dkt. No. 59-10 at 48:2-6). The parties also confirmed at the hearing that in the context of the intrinsic record, "compound and alloy" are used interchangeably.

Plaintiff does not contend that Defendant's construction is contrary to the '394 Patent specification. Instead, Plaintiff contends that Defendant's construction introduces redundant and confusing language into the claims. Although, the construction is redundant of language in claim 28, it is not redundant of language in claim 1. Furthermore, it does not confuse the claim language in either claim, but instead provides additional clarity for the jury. As with the previous term, the Court finds that the term "intermetallic alloying reaction" is "a technical term, and '[t]he Court believes that some construction of the disputed claim language will assist the jury to understand the claims." *Rockwell Automation, Inc. v. 3-S Smart Software Solutions, GmbH*, 2016 U.S. Dist. LEXIS 138209, *27-28 (E.D. Tex. Oct. 5, 2016) (Payne, M.J.) (internal citation omitted). 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.

3. Court's Construction

The Court construes the term **"intermetallic alloying reaction"** to mean **"a reaction between the at least two metal elements that forms an intermetallic compound"** in claim 1, and to mean **"a reaction between the two metal elements that forms an intermetallic compound"** in claim 28.

C. "at least two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5"

Disputed Term	Plaintiff's Proposal	Defendant's Proposal
"at least two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5"	Only the term "an electron concentration of 1.5" needs to be construed The proper construction of "an electron concentration of 1.5" is "a ratio of valence electrons to atoms of 1.5" The remaining terms should be given their plain and ordinary meaning	Indefinite under 35 U.S.C. § 112

1. The Parties' Positions

The parties dispute whether the phrase "at least two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5" is indefinite. Defendant contends that the claim is indefinite for two reasons: (1) a person of skill in the art would not know how to determine the number of valence electrons in order to calculate an electron concentration of 1.5; and (2) a person of skill in the art would not be able to determine with reasonable certainty the scope of the "respective proportions" limitation. (Dkt. No. 60 at 20, 22).

Plaintiff argues that the only portion of the disputed claim term that needs construction is "electron concentration." (Dkt. No. 54 at 10). Plaintiff contends that the electron concentration of a chemical compound is a straightforward calculation that requires adding the total number of valence electrons and dividing that sum by the total number of atoms in the given compound. *Id.* Plaintiff argues that this equation finds ample intrinsic support. *Id.* (citing '394 Patent at 3:52–56, 7:28–32). Plaintiff further contends that the relevant extrinsic evidence further corroborates its construction. (Dkt. No. 54 at 11) (citing Dkt. No. 54-5; Dkt. No. 54-6). Plaintiff also argues that the parties' experts agree that the term "electron concentration" means a ratio of valence electrons to atoms. (Dkt. No. 54 at 11) (citing Dkt. No. 54-7 at 38:24-39:8; Dkt. No. 54-1 at ¶¶ 5-6). Plaintiff contends that Defendant ignores the Supreme Court's directive to read the claims "in light of the

specification delineating the patent, and the prosecution history" and disregards the concrete language of the claims. (Dkt. No. 54 at 12) (citing *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014)).

Regarding the term "electron concentration of 1.5," Plaintiff argues that Defendant's expert, Dr. Lograsso, testified that there are three "common ways" of determining electron concentration. (Dkt. No. 54 at 12) (citing Dkt. No. 54-7 at 36:10–37:5). Plaintiff concedes that the claims do not explicitly state which of these three methods should be used to determine electron valency. (Dkt. No. 54 at 13). Plaintiff argues that a claim limitation that is subject to more than one interpretation is not sufficient to render the claim indefinite. *Id.* Plaintiff contends that the prosecution history makes clear that the '394 Patent invokes the Hume-Rothery method of determining electron valency. *Id.* (citing Dkt. No. 54-8 at ¶ 6).

Plaintiff argues that there is no meaningful intrinsic support for either of the other two competing methods suggested by Mr. Lograsso. *Id.* Plaintiff notes that a reference on the face of the '394 Patent provides a table identifying the Hume-Rothery valencies for 21 metals. *Id.* (citing Dkt. No. 54-9). Plaintiff further contends that a person of skill in the art could look beyond the specification and the publications to other publically available references that describe the Hume-Rothery method of calculating electron concentration of intermetallic compounds. (Dkt. No. 54 at 15) (citing Dkt. No. 54-10).

Regarding the term "respective proportions," Plaintiff argues the patent supplies the "standard for measuring the scope of the term." (Dkt. No. 54 at 17) (citing *Datamize, LLC v. Plumtree Software, Inc.*, 417 F.3d 1342, 1351 (Fed. Cir. 2005)). Plaintiff contends that the standard against which the "respective proportions" limitation is measured is "an electron concentration of 1.5." *Id.* According to Plaintiff, as long as the reactive materials of a liner are provided in

respective proportions calculated to yield an intermetallic compound with an electron concentration of 1.5, then this limitation is satisfied. *Id.* Plaintiff argues that Defendant's expert, Dr. Lograsso, agrees with this characterization of the scope of the claim. (Dkt. No. 54 at 17) (citing Dkt. No. 54-7 at 70:22-71:3). Plaintiff contends that a person skilled in the art could calculate the respective proportions (stoichiometric or otherwise) that will yield an intermetallic compound with an electron concentration of 1.5. (Dkt. No. 54 at 18) (citing Dkt. No. 54-1 at ¶ 11). Plaintiff also argues that those skilled in the art could run standard tests on reactive liners with varying ratios of reactive metals to determine if they yield an intermetallic compound with an electron concentration of 1.5. (Dkt. No. 54 at 18) (citing Dkt. No. 54-7 at 81:22-25, 84:3-20; Dkt. No. 54-1 at ¶ 11). According to Plaintiff, those skilled in the art could readily determine whether a particular ratio of metal elements yields an intermetallic compound with an electron concentration of 1.5 by viewing the compound under an SEM. (Dkt. No. 54 at 19).

Defendant responds that "electron concentration" is not a term or concept that would have been familiar to a person of ordinary skill in the art at the time of the patent filing. (Dkt. No. 60 at 16) (citing Dkt. No. 59-1 at ¶ 14). According to Defendant, shaped charge designers would not use this language to describe liner formulations. (Dkt. No. 60 at 16). Defendant further argues that there are multiple methods for determining the number of valence electrons for metal elements. *Id.* Defendant contends that neither the claims nor the specification specify which method to use to assign valencies. *Id.* Defendant argues that the specification describes the use of "customary valencies," without identifying which method is "customary." *Id.* (citing Dkt. No. 59-1 at ¶ 14; Dkt. No. 59-2 at ¶¶ 8-9; '394 Patent at 3:55, 7:29–38).

Defendant further argues that "Hume-Rothery" does not appear in the specification, and a person of ordinary skill in the art would have to "scour the prosecution history" to find the

mentions of Hume-Rothery compounds. (Dkt. No. 60 at 17). Defendant also argues that shaped charge designers were not familiar with Hume-Rothery. *Id.* (citing Dkt. No. 59-8 at 48:18–49:24; Dkt. No. 59-10 at 59:22–60:6). Defendant contends that the Hume-Rothery scheme of assigning valencies is not "customary." (Dkt. No. 60 at 17). Defendant argues that shaped charge designers would consult a periodic table to determine the valency of a given element. *Id.* at 17-18 (citing Dkt. No. 59-10 at 73:1–21, 74:5–8; Dkt. No. 59-1 at ¶ 14).

Defendant further contends that the "customary" valency of nickel is 2 or 3 according to the periodic table. (Dkt. No. 60 at 18) (citing Dkt. No. 59-10 at 79:16-21; Dkt. No. 59-2 at ¶¶ 9-10). Defendant argues that Plaintiff contends that the "customary valency" for nickel is zero. (Dkt. No. 60 at 18). Defendant also argues that the European Patent Office found the term "electron concentration of 1.5" to lack clarity and required its deletion from the claims. *Id.* (Dkt. No. 59-12 at 2). Defendant contends that one of ordinary skill in the art would not have understood which measure to use to assign valencies, and therefore to calculate the "electron concentration." (Dkt. No. 60 at 20). According to Defendant, calculating the electron concentration using the "customary valencies" of the periodic table would not result in "an electron concentration of 1.5" for NiAl. *Id.*

Defendant next argues that the Hume-Rothery's "rules" are arbitrary, unsettled, disputed, and scientifically untenable. *Id.* Defendant contends that the Massalski reference notes that "it [is] possible to hold rather divergent views about the so-called 'Hume-Rothery rules,'" and that the Hume-Rothery rules are "unsettled." *Id.* (citing Dkt. 54-9 at 153). Defendant further contends that the Pauling reference states that there is "an element of arbitrariness" to Hume-Rothery's rules of assigning zero valence electrons to certain transitional elements. (Dkt. No. 60 at 20) (citing Dkt. 54-10 at 113). According to Defendant, Pauling created a new model to improve upon the Hume-Rothery rules, and ultimately assigned nickel a valence count of 0.61. (Dkt. No. 60 at 21) (citing

Dkt. 54-10 at 115).

Defendant further argues that the Church declaration submitted in prosecution provided a number of examples of what he deemed "Hume-Rothery 3/2 compounds." (Dkt. No. 60 at 21). Based on these examples, Defendant contends that molybdenum (Mo) would have a valence count of either -1.5 or 3, and Nickel (Ni) would have a valence count of 4.5 or 0. *Id.* at 21-22 (citing Dkt. No. 59-2 at ¶ 11; Dkt. No. 59-11 at 113:23–115:17). Defendant argues that this shows that one skilled in the art would be unable to determine the bounds of the claimed invention, because of the inherent inconsistencies of the proposed scheme. (Dkt. No. 60 at 22).

Regarding the term "respective proportions," Defendant argues that the only way to preserve the claims from indefiniteness is to require stoichiometric mixtures of the "at least two metal elements." *Id.* (citing Dkt. No. 59-1 at ¶ 15; Dkt. No. 59-2 at ¶ 12). Defendant further argues that the patent specification, the Church declaration, and later technical papers and descriptions, all describe the invention as being directed to stoichiometric combinations of reactive metals, primarily nickel and aluminum. Dkt. No. 60 at 22 (citing '394 Patent at 2:66–3:3; Dkt. No. 59-13; Dkt. No. 60-2). Defendant contends that the specification provides no description, metric, or process for determining how far beyond stoichiometric quantities the term "portions calculated" extends. (Dkt. No. 60 at 22-23) (citing '394 Patent at 3:46–52; Dkt. No. 59-1 at ¶ 15; Dkt. No. 59-2 at ¶ 12). According to Defendant, once one moves away from a stoichiometric combination of reactive metal elements, the resulting electron concentration will change. (Dkt. No. 60 at 23) (citing Dkt. No. 59-2 at ¶ 12).

Defendant further argues that Plaintiff's two methods for determining the scope of this limitation are inconsistent and conflict with the intrinsic evidence. (Dkt. No. 60 at 23). Defendant contends that Plaintiff appears to suggest that any proportions of reactive metals, for example

nickel and aluminum, provided in the liner would practice the claimed invention. *Id.* (citing Dkt. No. 59-10 at 93:13–94:18; Dkt. No. 54 at 14). Defendant also contends that Plaintiff would like to allege infringement based on a hypothetical and transient existence of an intermetallic compound. (Dkt. No. 60 at 24). Defendant argues that this completely reads the "respective proportions" language out of the claims. *Id.* at 25. Defendant contends that the '394 Patent disavows a number of reactive metal combinations, including Ni_2Al. *Id.* (citing '394 Patent at 7:36–40). Defendant further argues that Plaintiff's suggestion of inspecting the resulting compounds using a scanning electron microscope ("SEM") is complex, time-consuming, expensive, and not contemplated anywhere in the specification. (Dkt. No. 60 at 26).

Plaintiff replies that the inventor defined the term "electron concentration" as the ratio of valence electrons to atoms. (Dkt. No. 64 at 6) (citing '394 Patent at 3:52–56; 7:28–32). Plaintiff argues that Dr. Walters' lack of understanding of a term defined in the specification does not suggest that the claim term is indefinite. (Dkt. No. 64 at 6). Plaintiff further argues that the existence of multiple methods of calculation is not sufficient to render the claim indefinite if the intrinsic record explains which method is appropriate. *Id.* Plaintiff contends that the intrinsic record identifies only Hume-Rothery as the method, with no other competing method disclosed. *Id.* at 6-7.

Plaintiff further argues that Defendant's characterization of Hume-Rothery as "old," "arbitrary," and "disputed" is unsupported. *Id.* at 8. Plaintiff contends that the specification lists five preferred compounds with an electron concentration of 1.5 that can be implemented in the patented reactive liner: NiAl, PdAl, CuZn, Cu_3Al, and Cu_5Sn. *Id.* at 10 (citing '394 Patent at 7:32–38). Plaintiff argues that all five embodiments will have an electron concentration of 1.5 if the Hume-Rothery method is used. (Dkt. No. 64 at 10). Plaintiff contends that if some other method

is used to assign electron valency, the preferred embodiments would not have an electron concentration of 1.5. *Id.* (citing Dkt. No. 47-3 at ¶ 9).

Regarding the two compounds (CoAl and MoNi) listed in the Church declaration, Plaintiff argues that Mr. Church erroneously states that MoNi is a Hume-Rothery 3/2 compound. (Dkt. No. 64 at 11). Plaintiff agrees that MoNi is not a Hume-Rothery 3/2 compound, does not have an electron concentration of 1.5, and falls outside the scope of the asserted claims. *Id.* Plaintiff argues that this error does not bear on the patentability of the challenged claims. *Id.*

Regarding the term "respective proportions," Plaintiff replies that the claim limitation is met when the resulting intermetallic compound has an electron concentration of 1.5. (Dkt. No. 64 at 12). Plaintiff argues that Defendant's criticisms of binary-phase diagrams and post-detonation testing are belied by their own reliance on these very same methods in the copending German litigation. *Id.* at 12-13 (citing Dkt. No. 64-1 at ¶ 3). Plaintiff contends that Defendant's expert, Dr. Lograsso, has submitted an expert report in the German proceeding detailing his findings from SEM analysis, which Defendant now argues is too complex to be practicable. (Dkt. No. 64 at 13) (citing Dkt. No. 64-1 at ¶ 4; Dkt. No. 64-2 at 84:3–20). Finally, Plaintiff argues that the claim limitation is certain because if an intermetallic compound with an electron concentration of 1.5 is formed, it necessarily has respective proportions necessary to yield such a reaction. (Dkt. No. 64 at 14).

Defendant responds that Plaintiff ignores the specification's direction to use "customary valencies." (Dkt. No. 67 at 3). According to Defendant, Dr. Walters and Mr. Behrmann had not heard of Hume-Rothery in 2003, and the periodic table would have been the "customary" source for determining valencies. *Id.* Defendant further argues that all references for applying Hume-Rothery come from the Church Declaration, a third-party statement submitted eight years after the

patent's effective filing date. *Id.* at 4. Defendant contends that Plaintiff now asserts that there is an "error" in the Church declaration. *Id.* Defendant argues that Plaintiff has failed to explain why a person of ordinary skill would consider Church's statement to be an error rather than proof that the Hume-Rothery scheme is fatally inconsistent and fraught with ambiguity. *Id.* According to Defendant, every mention of "Hume-Rothery" in the prosecution history is with respect to molybdenum being in such a compound (either with Ni or Al). *Id.* (citing Dkt. No. 67-1).

Regarding the term "respective proportions," Defendant argues that binary phase diagrams are not mentioned anywhere in the patent or in the prosecution history. (Dkt. No. 67 at 5). Defendant further argues that the German litigation involves a patent with claims that are limited to the intermetallic compound NiAl and do not include any limitations involving "electron concentrations." *Id.* Defendant contends that Plaintiff's construction reads the "calculation" limitation out of the patent, and adopts an approach nowhere mentioned in the intrinsic record. *Id.* Defendant also contends that Plaintiff's expert testified that any combination of Ni and Al will satisfy the limitation. *Id.* According to Defendant, this broad construction is impermissible because it eliminates an indefinite claim term. *Id.* at 6.

For the following reasons, the Court finds that the term **"electron concentration"** should be construed to mean **"a ratio of valence electrons to atoms."** The Court further finds that the phrase **"at least two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5"** should be construed to mean **"at least two metal elements are provided in respective proportions calculated to produce an intermetallic product with an electron concentration of 1.5, as determined by the Hume-Rothery method."** The Court finds that the term **"respective proportions"** should be given its **plain and ordinary meaning**.

2. Analysis

The phrase "at least two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5" appears in asserted claim 1 of the '394 Patent. Defendant contends that claim one is indefinite. In order to meet the "exacting standard" to prove indefiniteness, an accused infringer must demonstrate by clear and convincing evidence that the claims, read in light of the specification and the prosecution history, fail to inform, with reasonable certainty, those skilled in the art about the scope of the invention. *Nautilus,* 134 S. Ct. at 2124. For the following reasons, the Court finds that Defendant has failed to prove by clear and convincing evidence that the phrase is indefinite. The parties present the dispute in the context of the terms "electron concentration of 1.5" and "respective proportions." The Court will address each term.

a) "electron concentration of 1.5"

Defendant contends that claim1 is indefinite because a person of skill in the art would not know how to determine the number of valence electrons in order to calculate an electron concentration of 1.5. The Court disagrees. The intrinsic evidence indicates that "electron concentration" means a ratio of valence electrons to atoms. The specification states that "[t]he liners give particularly effective results when the two metals are provided in respective proportions calculated to give *an electron concentration* of 1.5, *that is a ratio of 3 valency electrons to 2 atoms such as NiAl or PdAl as noted above.*" '394 Patent at 3:52–26 (emphasis added). Similarly, the specification states that "the NiAl compound described above is one example of a compound which, when assigned the customary valencies, corresponds *to a ratio of three valence electrons to two atoms: that is, an electron concentration of 3/2 = 1.5.*" *Id.* at 7:28–32 (emphasis added). Thus, the specification indicates that "electron concentration" means a ratio of valence electrons to atoms.

The extrinsic evidence is consistent with the intrinsic evidence. For instance, a textbook

authored by William Hume-Rothery states that "[t]he number of valency electrons per atom is often called the *electron concentration*," and that "[b]y electron concentration is meant the ratio of valency electrons to atoms." (Dkt. No. 54-5 at 7, 9) (emphasis added). Likewise, the parties' experts appear to agree that the term "electron concentration" means a ratio of valence electrons to atoms. Defendant's expert, Dr. Thomas Lograsso, testified as follows:

> Q. How does the number of electrons available for bonding relate to the term electron concentration?
>
> A. So the number of electrons that are available for bonding are called the valence electrons and electron concentration is the ratio of valence electrons to the number of atoms that are in a crystal—in the unit cell of a crystal structure.

Dkt. No. 54-7 at 38:24–39:8. Likewise, Plaintiff's expert stated that "electron concentration of 1.5" means "a ratio of valence electrons to atoms of 1.5." Dkt. No. 54-1 at ¶ 6. Accordingly, the evidence indicates that "electron concentration" means "a ratio of valence electrons to atoms."

Defendant contends that claim 1 is indefinite because a person of skill in the art would not know how to determine the number of valence electrons in order to calculate an electron concentration of 1.5. The parties agree that there are multiple methods for determining the number of valence electrons for metal elements.[2] (Dkt. No. 60 at 16). Plaintiff argues that this fact alone does not render the claims indefinite. (Dkt. No. 54 at 16). Defendant responds that "neither the claims nor the specification specify which method to use to assign valencies," and only describes "the use of 'customary valencies,' without identifying which method is 'customary.'" (Dkt. No. 60 at 16). Plaintiff responds that the "prosecution history makes clear that the '394 Patent invokes the Hume-Rothery method of determining electron valency." (Dkt. No. 54 at 13). The Court agrees

[2] Defendant's expert Dr. Lograsso testified that the "three most common ways" of determining electron concentration are (1) "Hume-Rothery's way of basically looking at unfilled or filled electron shells," (2) "looking at electrons and how they behave magnetically and whether or not they're available for bonding," and (3) looking "at the oxidation state and electron sharing between elements as a third way." Dkt. No. 54-7 at 36:10-37:5. Plaintiff's expert, Larry Berhmann, agrees that "there are multiple methods of assigning valencies to elements." Dkt. No. 54-1 at ¶ 7.

with Plaintiff, and finds that Defendant fails to read the claims "in light of the specification delineating the patent, *and the prosecution history*" and disregards the language of the claims at issue. *Nautilus, Inc. v. Biosig Instruments, Inc.*, 134 S. Ct. 2120, 2124 (2014) (emphasis added).

In reply to an Office Action, the patentees provided the Declaration of Phillip Duncan Church, which describes various tests Mr. Church conducted to support his assertion that the claimed reactive liners are "highly advantageous" as compared to non-reactive liners. Dkt. No. 54-8 at ¶ 8. Mr. Church testifies that the claimed compounds are "known as Hume-Rothery 3/2 compounds." *Id.* at ¶ 6. Mr. Church then defines liners having Hume-Rothery 3/2 powder mixtures as "liners wherein the two reactive metal elements are provided in respective proportions calculated to give an electron concentration of 1.5." *Id.* He then explains that the five chemical intermetallic compounds listed in the specification (NiAl, PdAl, CuZn, Cu_3Al, and Cu_5Sn) are "examples of Hume-Rothery 3/2 compounds." *Id.*

Defendant does not dispute that for each of these compounds, the total number of valence electrons (determined under Hume-Rothery) divided by the total number of atoms yields an electron concentration of 1.5. For example, in the case of Cu_3Al, Hume-Rothery assigns copper one valence electron and aluminum three valence electrons, which yields an electron concentration of 1.5. The Court agrees that there is no meaningful intrinsic support for either of the other two competing methods suggested by Mr. Lograsso. Indeed, a reference on the face of the '394 Patent provides a table identifying the Hume-Rothery valencies for 21 metals:

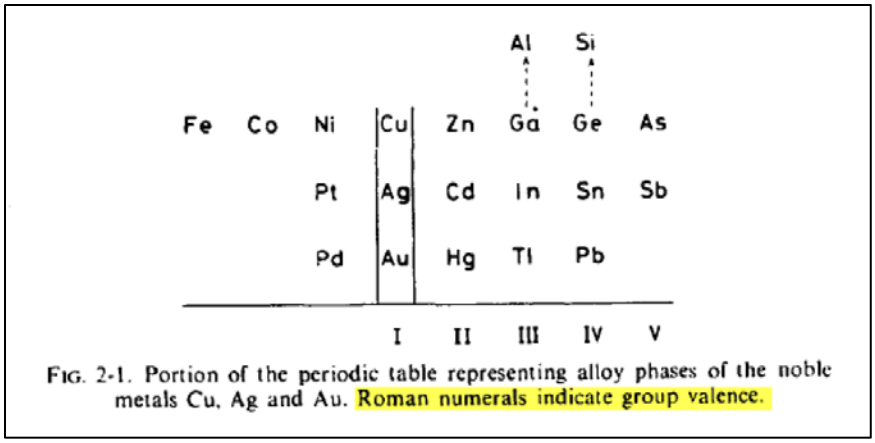


FIG. 2-1. Portion of the periodic table representing alloy phases of the noble metals Cu, Ag and Au. Roman numerals indicate group valence.

(Dkt. No. 54-9 at 6, Massalski, et al., *Electronic Structures of Hume-Rothery Phases*, Progress in Materials Science, Vol. 22, pp. 155 (1978)) (highlight added). Using this reference, a person of skill in the art could confirm that all five of the exemplary compounds (NiAl, PdAl, CuZn, Cu_3Al, and Cu_5Sn) are Hume-Rothery 3/2 compounds with an electron concentration of 1.5. '394 Patent at 7:27–39. The table provided by Plaintiff illustrates this point.

Compound	First Element Valency Under H-R	Second Element Valency Under H-R	Total Atoms	Electron Concentration (ratio of valence electrons to atoms)
NiAl	Nickel: 0	Aluminum: 3	2	$\frac{0+3}{2} = 1.5$
PdAl	Palladium: 0	Aluminum: 3	2	$\frac{0+3}{2} = 1.5$
CuZn	Copper: 1	Zinc: 2	2	$\frac{1+2}{2} = 1.5$
Cu_3Al	Copper: 1	Aluminum: 3	4	$\frac{(3\ x\ 1)+3}{4} = 1.5$
Cu_5Sn	Copper: 1	Tin: 4	6	$\frac{(5\ x\ 1)+4}{6} = 1.5$

Dkt. No. 64 at 10. A person of skill in the art could also use the Massalski reference to determine the electron concentration of other compounds not specifically identified in the specification.

Defendant argues that this reference was not provided until December 13, 2010, almost six years after the PCT was filed. (Dkt. No. 76-1 at 3). Defendant's timing argument is misguided and unpersuasive. The timing of the filing does not discount the importance of this reference, which becomes intrinsic evidence once it is included in the prosecution history. *V-Formation, Inc. v.*

Benetton Group SpA, 401 F.3d 1307, 1311 (Fed. Cir. 2005) (This court has established that 'prior art cited in a patent or cited in the prosecution history of the patent constitutes intrinsic evidence.'") (quoting *Kumar v. Ovonic Battery Co.*, 351 F.3d 1364, 1368 (Fed. Cir. 2003).

Moreover, as discussed above, the reference is consistent with the five exemplary compounds (NiAl, PdAl, CuZn, Cu_3Al, and Cu_5Sn) included in the specification. *Arthur A. Collins, Inc. v. Northern Telecom Ltd.*, 216 F.3d 1045 (Fed. Cir. 2000) ("[W]hen prior art that sheds light on the meaning of a term is cited by the patentee, it can have particular value as a guide to the proper construction of the term, because it may indicate not only the meaning of the term to persons skilled in the art, but also that the patentee intended to adopt that meaning."). Defendant has not shown that this intrinsic evidence is inconsistent with the specification.

The Court also finds that the other extrinsic source provided by Plaintiff is consistent with the intrinsic record, and describes the Hume-Rothery method of calculating electron concentration of intermetallic compounds. *Wellman, Inc. v. Eastman Chem. Co.*, 642 F.3d 1355, 1368 (Fed. Cir. 2011) ("[A] patent applicant need not include in the specification that which is already known to and available to a person of ordinary skill in the art."). Specifically, it explains that "Hume-Rothery valences . . . have the values of zero for manganese, iron, cobalt, and nickel, one for copper, two for zinc, three for gallium etc." (Dkt. No. 54-10 at 4-5, Pauling, et al., *The Ratio of Valence Electrons to Atoms in Metals and Intermetallic Compounds*, Reviews of Modern Physics, Vol. 20, No. 1, pp. 114-15 (Jan. 1948)). This reference also includes a table calculating the Hume-Rothery electron concentration for a number of intermetallic compounds:

TABLE I. Hume-Rothery phase.

Phase	β	β-Mn	γ	ϵ
Type in Strukturbericht	$B2$ and $L20$	$A13$	$D81$, 82, 83, 84	
Character	body-centered cubic	complex cubic	complex cubic	hexagonal close packed $c/a < (8/3)^{\frac{1}{2}}$
Atoms per unit cell (minimum)	2	20	52	2

	Compounds	H-R ratio	Compounds	H-R ratio	Compounds	H-R ratio	Compounds	H-R ratio
Compounds formed, with Hume-Rothery ratio electrons: atoms	CuZn	3/2	β-Manganese	0	Cu_5Zn_8	21/13	$CuZn_2$	7/4
	AgZn	3/2			Cu_5Cd_8	21/13	$CuBe_2$	7/4
	AgCd	3/2	Ag_3Al	3/2	Ag_5Zn_8	21/13	$CuCd_3$	7/4
	AuZn	3/2	Au_3Al	3/2	Ag_5Cd_8	21/13	$AgZn_3$	7/4
	AuCd	3/2	Cu_3Si	3/2	Au_5Zn_8	21/13	$AgCd_3$	7/4
	Cu_3Ga	3/2	$CoZn_3$	3/2	Au_5Cd_8	21/13	$AuZn_3$	7/4
	Cu_3Sn	3/2			Au_5Hg_8	21/13	Cu_3Sn	7/4
	BeCu	3/2			Cu_9Al_4	21/13	Cu_3Ge	7/4
	MgAg	3/2			Cu_9Ga_4	21/13	Ag_3Sn	7/4
	AlFe	3/2			Cu_9In_4	21/13	Au_3Sn	7/4
	AlCo	3/2			Ag_9Al_4	21/13	Au_5Al_3	7/4
	AlNi	3/2			$Cu_{31}Sn_8$	21/13	$FeZn_7$	7/4
	$AlCu_3$	3/2			$Ag_{31}Sn_8$	21/13		
	LiHg	3/2			Fe_5Zn_{21}	21/13		
	LiAg	1.0			Co_5Zn_{21}	21/13		
	LiTl	2.0			Ni_5Zn_{21}	21/13		
	BeCo	1.0			Rh_5Zn_{21}	21/13		
	BePd	1.0			Pd_5Zn_{21}	21/13		
	MgHg	2.0			Pt_5Zn_{21}	21/13		
	MgTl	2.5			Ni_5Cd_{21}	21/13		
	CaTl	2.5			$Cu_7Zn_4Al_2$	21/13		
	SrTl	2.5			$Li_{10}Pb_3$	22/13		
	AlNd	3.0			$Li_{10}Ag_3$	13/13		
	PdCu	0.5						
	TlSb	4.0						
	TlBi	4.0						

Dkt. No. 54-10 at 4. Accordingly, the Court finds that the claims, viewed in light of the intrinsic evidence, inform those skilled in the art about the scope of the invention with reasonable certainty.

Defendant first argues that "electron concentration" is not a term or concept that would have been familiar to a person of ordinary skill in the art at the time of the alleged invention. (Dkt. No. 60 at 16). Defendant contends that one of its experts, Dr. William Walters, testified that he did not understand what the term "electron concentration" meant or referred to. The Court is not persuaded by this testimony. As the Federal Circuit has repeatedly explained, the meaning of claim terms must be considered in light of the written description, as "a patentee is free to be his own lexicographer." *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 980 (Fed. Cir. 1995). As discussed above, the specification indicates that the patentee defined this term as the ratio of valence electrons to atoms. '394 Patent at 3:52–56; 7:28–32. Moreover, one of Defendant's experts, Dr. Lograsso, testified that the term "electron concentration" is a "common term." Dkt.

No. 64-2 at 26:23–27:5.

Defendant further argues that a person of ordinary skill in the art should not be required to "scour the prosecution history" to find these Hume-Rothery references. (Dkt. No. 60 at 16-17). The Court disagrees with Defendant's characterization of the review required to locate the Church declaration. More importantly, it is well established that the claims must be "read in light of the specification delineating the patent, and the prosecution history." *Nautilus*, 134 S. Ct. at 2124.

Defendant also argues that the Federal Circuit has recently found similar claim terms invalid for indefiniteness.[3] (Dkt. No. 60 at 19). In *Teva*, the parties agreed that there were three different measures of molecular weight (Mp, Mn, and Mw). *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335, 1341 (Fed. Cir. 2015). The parties also agreed that each of these measures is calculated in a different way and would typically yield a different result for a given polymer sample. *Id.* The plaintiff's expert testified that Mp "is the only type of average molecular weight that can be directly obtained from a chromatogram and calibration curve obtained by the analytical method described in Example 1" *Id.* at 1338. Thus, the plaintiff's expert opined that this example implied the use of Mp. *Id.* This testimony, however, was at odds with the applicants' representation to the examiner in the prosecution history of a continuation of the asserted patent.[4]

Specifically, the applicants successfully argued that the term "molecular weight" was not indefinite because "[o]ne of ordinary skill in the art could understand that kilodalton units implies [Mw]." *Id*. at 1343. In other words, the applicants argued to the Patent Office that Mw applied, while plaintiff's expert argued to the district court that Mp applied. Unlike *Teva*, both the

[3] Defendant cites to *Teva Pharms. USA, Inc. v. Sandoz, Inc.*, 789 F.3d 1335, 1341 (Fed. Cir. 2015), and *Dow Chem. Co. v. Nova Chems. Corp. (Canada)*, 803 F.3d 620, 633 (Fed. Cir. 2015).
[4] The Court found that the asserted patent and continuation "share a nearly identical specification, and all three patents identically include Example 1 and Figure 1, discussed above." *Teva*, 789 F.3d at 1343.

prosecution history and Plaintiff's expert identify Hume-Rothery as the appropriate method of assigning electron valencies. *See* Dkt. No. 54-1 ¶ 7 ("The intrinsic record makes clear that the '394 patent employs the Hume-Rothery method for assigning electron valencies when calculating 'an electron concentration of 1.5.'"); Dkt. No. 54-3 at 5 ("There are a number of compounds that are known to exist in the form of Hume-Rothery 3/2 compounds (i.e. metal combinations capable of an intermetallic alloying reaction that are combined in proportions calculated to given electron concentration of 1.5 . . . .").

Similar to *Teva*, the court in *Dow* found that three methods existed for determining the "maximum slope" of strain hardening. The court further determined that plaintiff's expert developed "yet another method-of his own invention," which he presented at trial. *Dow Chem. Co. v. Nova Chems. Corp. (Canada),* 803 F.3d 620, 633 (Fed. Cir. 2015). The court found "that each of these four methods may produce different results, i.e., a different slope," *Id.* at 633. The Court concluded that "[n]either the patent claims nor the specification here discusses the four methods or provides any guidance as to which method should be used or even whether the possible universe of methods is limited to these four methods." *Id.* at 634. Ultimately, the court held that the claims were indefinite because the "required guidance is not provided by the claims, specification, and prosecution history." *Id.* Unlike the present case, the parties in *Dow* did not argue that the prosecution history provided guidance in resolving the indefiniteness issue. *Id*. at 634. Thus, the present case is only similar in that there are multiple ways to calculate electron valencies. However, unlike *Dow*, the prosecution history identifies Hume-Rothery as the method for calculating electron concentration.

Defendant further argues that "even a cursory review of [the submitted references] reveals the frailty and arbitrariness of the Hume-Rothery system." (Dkt. No. 60 at 20). Defendant criticizes

Hume-Rothery as "old," "arbitrary," and "disputed." *Id*. Contrary to Defendant's contention, the references indicate that Hume-Rothery, like other scientific approaches, simplifies and categorizes complex concepts into a method of understanding that trades some level of precision for accessibility. Indeed, one reference states that "[i]n spite of this element of arbitrariness *the Hume-Rothery rule has served to organize and to simplify a large amount of data* relative to alloy systems." (Dkt. No. 54-10 at 3) (emphasis added). Moreover, the particular aspect of the Hume-Rothery rules that is relevant to the specific issue (*i.e.*, electron valency assignments) is not disputed. As indicated above, Hume-Rothery assigns electron valence to certain metal elements: Ni=0, Al=3, Cu=1, etc. These assignments are sufficiently certain for a skilled artisan to use in calculating electron concentration as required by the claim.

Finally, Defendant argues that the Church declaration submitted during prosecution provides "a clear example of why the Hume-Rothery 'rules' are inconsistent, disputed, and ultimately break down mathematically." (Dkt. No. 60 at 21). Defendant contends that Mr. Church identified MoNi and Mo_2Al as a Hume-Rothery 3/2 compounds. *Id.* (citing Dkt. No. 54-8 at ¶ 6). Plaintiff agrees that MoNi and Mo_2Al do not have an electron concentration of 1.5, and would fall outside the scope of the claims. (Dkt. No. 64 at 11). The Court finds that a person of ordinary skill would view this as an obvious error in the Church declaration. *Biotec Biologische Naturverpackungen GmbH v. Biocorp, Inc.*, 249 F.3d 1341, 1348 (Fed. Cir. 2001) ("An error in the prosecution record must be viewed as are errors in documents in general; that is, would it have been apparent to the interested reader that an error was made, such that it would be unfair to enforce the error."). Accordingly, the Court does not agree that this clearly shows that the Hume-Rothery rules are "inconsistent, disputed, and ultimately break down mathematically." Instead, it only indicates that Mr. Church incorrectly identified MoNi and Mo_2Al as Hume-Rothery 3/2

compounds. This incorrect statement does not bring into question the electron valence assigned to certain metals under Hume-Rothery.

a) "respective proportions"

Defendant argues that claim 1 is also indefinite because a person of skill in the art would not be able to determine with reasonable certainty the scope of the "respective proportions" limitation. (Dkt. No. 60 at 22). In the alternative, Defendant contends that the only way to preserve the claims from indefiniteness is to require "respective proportions" to mean stoichiometric mixtures of the "at least two metal elements." *Id.*

The Court finds that Defendant's alternative suggestion is unwarranted because the specification explicitly states that the invention is not limited to stoichiometric mixtures. '394 Patent at 3:48–52 ("It will be readily appreciated by those skilled in the art that ratios other than a stoichiometric ratio may also afford an exothermic reaction and as such the invention is not limited to stoichiometric mixtures."). Moreover, the patentees demonstrated their ability to claim stoichiometric mixtures, as shown by dependent claim 25. Dependent claim 25 recites "[a] liner according to claim 1 wherein the composition of at least two metals is a stoichiometric composition of two metals." *See Karlin Tech. Inc. v. Surgical Dynamics, Inc.*, 177 F.3d 968, 971-72 (Fed. Cir. 1999) (explaining that the doctrine of claim differentiation is based on "the common sense notion that different words or phrases used in separate claims are presumed to indicate that the claims have different meanings and scope").

The prosecution history also indicates that a "stoichiometric quantities" limitation should not be read into the claims.[5] Claim 1, as originally filed, recited "[a] reactive shaped charge

[5] The original claims filed on April 7, 2006 (the "Original Claims") and the Preliminary Amendment filed on January 16, 2009 (the "Preliminary Amendment") were not included by the parties in the record before the Court. The Original Claims and the Preliminary Amendment can

liner·comprising a *stoichiometric* composition of two metals . . . and in which the two metals are provided in respective proportions calculated to give an electron concentration of 1.5." Original Claims (emphasis added). In the Preliminary Amendment filed on January 16, 2009, "stoichiometric" was removed from claim 1, and dependent claim 29 was added. Dependent claim 29 recited "[a] liner according to claim 1 wherein the composition is a stoichiometric composition of two metals." Preliminary Amendment. This further confirms that the patentees understood how to claim stoichiometric mixtures.

Defendant argues that the patent provides no guidance as to what additional ratios and mixtures may qualify beyond stoichiometric quantities. (Dkt. No. 60 at 23). The Court finds that additional guidance is not required given the context of the claim. If a reactive shaped charge liner is activated, and an intermetallic product with an electron concentration of 1.5 is formed, it will necessarily have the respective proportions necessary to yield such a reaction. That said, the Court rejects the argument that any combination of Ni and Al will satisfy the limitation, as Plaintiff's expert suggests. (Dkt. No. 59-10 at 94:14–18) ("Q.· ·And that's my point.· So under your reading, your interpretation of this patent, every combination of nickel and aluminum is covered? . . . A.· ·Yes.). This interpretation would render the "respective proportions" term meaningless because it would cover any proportions and any electron concentration. Indeed, the '394 Patent unambiguously disavows a number of reactive metal combinations, including Ni_2Al, as not covered by the claimed invention. '394 Patent at 7:36–40.

In sum, claim 1 explicitly requires an "electron concentration of 1.5," and the Court's construction further requires that the "at least two metal elements are provided in respective

be found at https://portal.uspto.gov/pair/PublicPair, and is entered with this Order as Court Exhibit A.

proportions calculated to produce an intermetallic product with an electron concentration of 1.5." *See, e.g.*, '394 Patent at 3:1–3 ("The exothermic reaction of the liner can be achieved by using a typically stoichiometric (molar) mixture of at least two metals which are capable upon activation of the shaped charge liner *to produce an intermetallic product* and heat.") (emphasis added). Accordingly, the Court finds that the claim language, "viewed in light of the specification and the prosecution history, inform those skilled in the art about the scope of the invention with reasonable certainty." *Nautilus*, 134 S. Ct. at 2129.

3. Court's Construction

The Court construes the term **"electron concentration"** to mean **"a ratio of valence electrons to atoms."** The Court construes the phrase **"at least two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5"** to mean **"at least two metal elements are provided in respective proportions calculated to produce an intermetallic product with an electron concentration of 1.5, as determined by the Hume-Rothery method."** The term **"respective proportions"** will be given its **plain and ordinary meaning**.

D. "the two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5, thereby forming intermetallic compound NiAl"

Disputed Term	Plaintiff's Proposal	Defendant's Proposal
"the two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5, thereby forming intermetallic compound NiAl"	Only the term "an electron concentration of 1.5" needs to be construed The proper construction of "an electron concentration of 1.5" is "a ratio of valence electrons to atoms of 1.5" The remaining terms should be given their plain and ordinary meaning	Indefinite under 35 U.S.C. § 112 Alternatively: "the two metal elements nickel and aluminum are provided in respective proportions calculated to produce NiAl and not another compound following the activation of the associated shaped charge."

1. The Parties' Positions

The parties dispute whether the phrase "the two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5, thereby forming intermetallic compound NiAl" is indefinite. Alternatively, Defendant argues that the phrase should be construed to exclude all compounds except NiAl. Plaintiff argues that the only portion of this phrase that needs construction is "electron concentration of 1.5." (Dkt. No. 54 at 20). Plaintiff contends that Defendant's construction improperly imposes a negative limitation into the claim. *Id.* Plaintiff further contends that the scope of claim 28 is narrower than that of claim 1, by requiring that the powder mixture comprises nickel and aluminum. *Id.* at 21. Plaintiff argues that a person of skill in the art would understand that the '394 Patent invokes the Hume-Rothery method of assigning valencies in light of the intrinsic evidence. *Id.* (citing Dkt. No. 54-7 at 49:13–16, 22–35).

Regarding the term "respective proportions, Plaintiff argues that those skilled in the art would be aware of at least two ways of ascertaining the scope of claim 28. (Dkt. No. 54 at 21). Plaintiff contends that a binary phase diagram for nickel and aluminum is a well-known resource for determining which ratios of nickel and aluminum are likely to yield NiAl upon an exothermic reaction. *Id.* at 21–22. Plaintiff also argues that this limitation is satisfied by combining nickel and aluminum in proportions that yield NiAl (an intermetallic compound with an electron

concentration of 1.5). *Id.*

Defendant argues this phrase is indefinite for the same reasons discussed above with the previous phrase. (Dkt. No. 60 at 26). In the alternative, Defendant contends that the phrase is not indefinite if it is construed to cover a 1:1 stoichiometric blend of nickel and aluminum, and no other "respective proportions" of nickel and aluminum. *Id.* Defendant argues that there must be respective proportions of nickel and aluminum that a person of ordinary skill in the art could provide in the shaped charge liner that are calculated to produce Ni_2Al, which would not be covered by the claims. *Id.* (citing Dkt. No. 59-10 at 93:19–22). According to Defendant, any starting composition outside of a 1:1 stoichiometric blend of nickel and aluminum will result in mixtures or compounds that will not have an electron concentration of 1.5. (Dkt. No. 60 at 26) (citing Dkt. No. 59-11 at 61:25–64:12; Dkt. No. 59-2 at ¶ 12). Defendant argues that claim 28 can only be construed to mean that nickel and aluminum are provided in stoichiometric proportions, which is the only ratio "calculated to give" NiAl, and not other intermetallic compounds. (Dkt. No. 60 at 27) (citing Dkt. No. 59-1 at ¶¶ 18-19).

Plaintiff responds that Defendant misapprehends the claim, because any exothermic reaction that yields Ni_2Al and no NiAl does not infringe claim 28. (Dkt. No. 64 at 15). Plaintiff argues that Defendant's construction imports a negative limitation into claim 28 that is at odds with the specification. *Id.* Specifically, Plaintiff contends that the specification states that "the invention is not limited to stoichiometric mixtures," and the claim uses the open-ended "comprising" language. *Id.* ('394 Patent at 3:46–52). Plaintiff further argues that claim 25 demonstrates the patentee's ability to claim stoichiometric mixtures. (Dkt. No. 64 at 15).

For the following reasons, the Court finds the term **"electron concentration"** should be construed to mean **"a ratio of valence electrons to atoms."** The Court finds that the phrase **"the**

two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5, thereby forming intermetallic compound NiAl" should be construed to mean **"at least two metal elements are provided in respective proportions calculated to produce an intermetallic product with an electron concentration of 1.5, as determined by the Hume-Rothery method, thereby forming intermetallic compound NiAl."** The Court further finds that the term **"respective proportions"** should be given its **plain and ordinary meaning**.

2. Analysis

The phrase "the two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5, thereby forming intermetallic compound NiAl" appears in asserted claim 28 of the '394 Patent. The phrase is very similar to the previous phrase "at least two metal elements are provided in respective proportions calculated to give an electron concentration of 1.5." The key difference is that claim 28 includes the additional limitation of "thereby forming intermetallic compound NiAl." Given the similarities between the two phrases, the Court finds that Defendant has failed to prove by clear and convincing evidence that the phrase is indefinite for the same reasons discussed above.

In the alternative, Defendant proposes that the phrase should be construed as "the two metal elements nickel and aluminum are provided in respective proportions calculated to produce NiAl and not another compound following the activation of the associated shaped charge." Defendant's construction includes the negative limitation of "not another compound," which requires the production of only NiAl. Defendant argues that the '394 Patent explicitly excludes Ni_2Al from the compounds intended to be covered by the claimed invention. (Dkt. No. 60 at 26) (citing '394 Patent at 7:36–40). According to Defendant, "there must be respective proportions of nickel and aluminum that a person of ordinary skill in the art could provide in the shaped charge liner that are

calculated to produce Ni_2Al, and which therefore would not be covered by the '394 patent claims." (Dkt. No. 60 at 26). Plaintiff responds that "[a]ny exothermic reaction that yields Ni_2Al and no NiAl does not infringe claim 28." (Dkt. No. 64 at 15).

The disputed phrase explicitly recites "an electron concentration of 1.5." Defendant's construction drops this disputed claim language, and replaces it with an unwarranted negative limitation. It is for reason that the Court rejects Defendant's construction. Defendant argues that "any starting composition outside of a 1:1 stoichiometric blend of nickel and aluminum will result in mixtures or compounds that *will not have an electron concentration of 1.5*." (Dkt. No. 60 at 26) (emphasis added). The Court agrees that the claim requires an "electron concentration of 1.5," which might require a 1:1 stoichiometric ratio depending on which two metals are used. However, Defendant's construction improperly drops the critical "electron concentration" claim language. A person of ordinary skill in the art would understand that if an exothermic reaction fails to yield a NiAl product having an electron concentration of 1.5, then it would not fall within the scope of claim 28. Likewise, if an exothermic reaction yields Ni_2Al with an electron concentration that is not 1.5, then it would not fall within the scope of claim 28. Indeed, the specification identifies Ni_2Al as not having "a ratio of three valence electrons to two atoms" (*i.e.*, not having an electron concentration of 1.5). '394 Patent at 7:38–39. This is consistent with the claim as drafted and does not warrant adding Defendant's negative limitation. 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.

3. Court's Construction

The Court construes the term **"electron concentration"** to mean **"a ratio of valence electrons to atoms."** The Court construes the phrase **"the two metal elements are provided in**

respective proportions calculated to give an electron concentration of 1.5, thereby forming intermetallic compound NiAl" to mean **"at least two metal elements are provided in respective proportions calculated to produce an intermetallic product with an electron concentration of 1.5, as determined by the Hume-Rothery method, thereby forming intermetallic compound NiAl."** The term **"respective proportions"** will be given its **plain and ordinary meaning**.

E. "at least one further inert metal, wherein the at least one further inert metal is not capable of an exothermic reaction with the at least two metal elements upon activation of the shaped charge liner" and "at least one further inert metal is not capable of an exothermic reaction with the two metal elements upon activation of the shaped charge line"

Disputed Term	Plaintiff's Proposal	Defendant's Proposal
"at least one further inert metal, wherein the at least one further inert metal is not capable of an exothermic reaction with the at least two metal elements upon activation of the shaped charge liner"	Plain and ordinary meaning.	Indefinite under 35 U.S.C. § 112 Alternatively: "at least one further inert metal that does not participate in an exothermic reaction with any of the at least two metal elements upon activation of the shaped charge liner"
"at least one further inert metal is not capable of an exothermic reaction with the two metal elements upon activation of the shaped charge line"	Plain and ordinary meaning.	Indefinite under 35 U.S.C. § 112 Alternatively: "at least one further inert metal that does not participate in an exothermic reaction with any of the two metal elements upon activation of the shaped charge liner"

1. The Parties' Positions

The parties dispute whether the phrase "at least one further inert metal, wherein the at least one further inert metal is not capable of an exothermic reaction with the at least two metal elements upon activation of the shaped charge liner" is indefinite. Alternatively, Defendant argues that the

phrase should be construed to exclude the inert metal from participating in an exothermic reaction with any of the metal. Plaintiff argues that Defendant's construction rephrases the plain language and impermissibly imports a new limitation in the claim language through the addition of "any." (Dkt. No. 54 at 22). Plaintiff contends that a metal is inert so long as it does not undergo an intermetallic alloying reaction with the at least two reactive metals. *Id.* According to Plaintiff, the specification emphasizes that inert metals must not "participate in the exothermic reaction," and the exothermic reaction is the reaction between the at least two reactive metals. *Id.* at 23 (citing '394 Patent at 5:43–55). Plaintiff also argues that Defendant's construction is inconsistent with statements made by the patentee during prosecution concerning the inert metal limitation. (Dkt. No. 54 at 22) (citing Dkt. No. 54-3). Plaintiff further argues that the claim itself is self-defining, and if a metal does not participate in the reaction between the at least two reactive metals, that metal is inert. (Dkt. No. 54 at 23-24)

Defendant responds that the specification describes the "further inert metal" only in functional terms without any criteria for determining whether a metal will react with other metals upon the detonation of an explosive. (Dkt. No. 60 at 28) (citing '394 Patent at 5:43–46). Defendant argues that the specification merely makes conclusory statements that "at least one further metal" should be incorporated, and that the at least one further metal is not capable of an exothermic reaction and is thus "inert." *Id.* According to Defendant, the '394 Patent provides no mechanism for determining whether a metal is a "further inert metal" other than trial and error involving explosives and laboratory testing. (Dkt. No. 60 at 28).

Defendant also argues that the '394 Patent states that the same metal (copper) is an example of both a "reactive" metal and an "inert" metal. *Id.* ('394 Patent at 3:16–23, 7:35–40, 5:43–64). Defendant contends that the public cannot be on notice of what the claims cover if the '394 Patent

does not provide a consistent guide as to which metals are "inert" and which are "reactive." (Dkt. No. 60 at 29).

Defendant also refers to the *inter partes* review ("IPR") of U.S. Patent No. 8,544,563 ("the '563 Patent"). (Dkt. No. 60 at 29). Defendant argues that a key invalidity reference in the IPR was a published international patent application, known as the "Bates" reference, which formed the basis for the application that led to the '394 Patent. *Id.* at 30. Defendant contends that Plaintiff stated that Bates was limited to "relatively minor" amounts of further metal. *Id.* (citing Dkt. No. 59-20). Defendant argues that the applicant made the same argument in the prosecution history of the '563 Patent. (Dkt. No. 60 at 30) (citing Dkt. No. 59-19). Defendant contends that Plaintiff has not identified any language in Bates or the '394 Patent that would determine with reasonable certainty the quantities of "further inert metal" that are "relatively minor." (Dkt. No. 60 at 31) (citing Dkt. No. 59-21 at 91:2–20; Dkt. No. 59-10 at 91:13–92:24).

In the alternative, Defendant argues that the limitation should be construed to require that the "further inert metal" does not participate in an exothermic reaction with any of the reactive metals satisfying the "at least two metal elements" limitation. (Dkt. No. 60 at 32). Defendant contends that the '394 Patent requires the "further inert metal" to be "inert." *Id.* According to Defendant, a metal that reacts with some of the ingredients in the liner is not "inert" even if that metal does not react with all of the ingredients simultaneously. *Id.* Defendant argues that Plaintiff seeks to limit "further inert metals" only to those that are "not capable of a [simultaneous] exothermic reaction with [all of] the at least two metal elements." *Id.* Defendant contends that this conflicts with the function of the "further inert metal," which the specification describes as "provid[ing] additional mechanical strength to the liner," and not contributing to an additional intermetallic reaction. (Dkt. No. 60 at 32-33) (citing '394 Patent at 5:49–51).

Defendant also argues that the claims and specification distinguish between the reactive metal elements and the inert metals, describing the inert metals as "further" and a separate component from the "at least two metal elements" that react exothermically. (Dkt. No. 60 at 33) (citing '394 Patent at 5:43–44). According to Defendant, Plaintiff's construction effectively eliminates the distinction between reactive metal elements and further inert metals. (Dkt. No. 60 at 33). Defendant contends that its construction does not have this problem because a metal only satisfies the "further inert metal" limitation if it does not react with any of the "at least two metal elements." *Id.* at 34. Defendant argues that its construction gives full force to the requirement that the further metal be "inert." *Id.* Finally, Defendant contends that its construction maintains the distinction between the reactive "at least two metals" and the "further inert metal" by ensuring that the inert metals do not participate in exothermic reactions and vice versa. *Id.*

Plaintiff replies that the "inert metal" limitations in claims 1 and 28 are sufficiently clear. (Dkt. No. 64 at 16). According to Plaintiff, a metal that does not participate in an exothermic reaction with the "two metal elements" is inert and satisfies this limitation. *Id.* Regarding the IPR proceedings of the '563 Patent, Plaintiff argues that the '563 Patent shares no familial relationship, identity of inventors, or common specification with the '394 Patent. *Id.* Plaintiff further contends that the IPR argument is a red herring that warrants no serious consideration. *Id.*

Defendant responds that Plaintiff does not dispute that it has made contradictory statements regarding the percentage of "further inert metal" disclosed in the '394 Patent. (Dkt. No. 67 at 6). Defendant argues that (1) Plaintiff should be held to its previous statements claiming such a percentage limitation and that the "further metal limitation" is therefore indefinite, or (2) that there is no such percentage limitation, and Plaintiff's contrary assertions are therefore false. (Dkt. No. 67 at 6) (citing Dkt. No. 58 at 26-28).

For the following reasons, the Court finds that the phrase **"at least one further inert metal, wherein the at least one further inert metal is not capable of an exothermic reaction with the at least two metal elements upon activation of the shaped charge liner"** should be construed to mean **"at least one further inert metal, wherein the at least one further inert metal is not capable of an exothermic reaction with any of the at least two metal elements upon activation of the shaped charge liner."** The Court finds that the phrase **"at least one further inert metal is not capable of an exothermic reaction with the two metal elements upon activation of the shaped charge line"** should be construed to mean **"at least one further inert metal is not capable of an exothermic reaction with any of the two metal elements upon activation of the shaped charge line."**

2. Analysis

The phrase "at least one further inert metal, wherein the at least one further inert metal is not capable of an exothermic reaction with the at least two metal elements upon activation of the shaped charge liner" appears in claim 1 of the '394 Patent. The phrase "at least one further inert metal is not capable of an exothermic reaction with the two metal elements upon activation of the shaped charge line" appears in claim 28 of the '394 Patent. Starting with the claim language, claim 1 identifies two different types of metal: (1) the reactive metals and (2) the inert metal. The claims and specification clearly distinguish between the reactive metals and the inert metal. Claim 1 indicates that the reactive metals "undergo an intermetallic alloying reaction to give an exothermic reaction upon activation of the associated shaped charge." The claim further recites that the inert metal "is not capable of an exothermic reaction with the at least two metal elements upon activation of the shaped charge liner." In other words, the intrinsic evidence requires the "inert metal" to be "inert." A metal that reacts with some of the ingredients in the liner is not "inert,"

even if that metal does not react with all of the ingredients simultaneously. The specification describes the function of the "inert metal" as "provid[ing] additional mechanical strength to the liner." '394 Patent at 5:49–51. The specification does not describe the inert metal as contributing to an additional intermetallic reaction.

Plaintiff argues that the only participation excluded is the one with "*the* exothermic reaction," and not with either of the reactive metals. In other words, Plaintiff appears to argue that "inert metals" is limited to those that are "not capable of a [simultaneous] exothermic reaction with [all of] the at least two metal elements." The Court rejects Plaintiff's attempt to redraft the claim in this manner. The claim language does not refer to "the exothermic reaction," but instead recites "an exothermic reaction." Plaintiff's interpretation effectively eliminates the distinction between reactive metal elements and inert metals. The Court's construction preserves the distinction by requiring that the "inert metal is not capable of an exothermic reaction with any of the at least two metal elements."

In support of its indefiniteness argument, Defendant refers to the prosecution history and IPR of the later filed '563 Patent. A PCT application ("Bates"), which was relied on by the '394 Patent for priority, was cited as prior art to the '563 Patent. Defendant argues that "Bates formed the basis for the application that led to the '394 patent and accordingly is identical in all substantive respects to the specification of the '394 patent." (Dkt. No. 60 at 30). Defendant contends that Plaintiff argued in the prosecution history and IPR of the '563 Patent that the "further inert metal" disclosed in Bates is limited to "relatively minor" amounts. *Id.* at 30-31. Plaintiff calls this discussion a red herring, and argues that the '394 Patent shares no familial relationship with the '563 Patent.

Building on this background, Defendant argues that Plaintiff has not identified any

language in Bates or the ’394 Patent that would determine with reasonable certainty the quantities of “further inert metal” that are “relatively minor.” (Dkt. No. 60 at 31). The Court notes that the term “relatively minor” does not appear in the intrinsic evidence of the ’394 Patent. Moreover, the claims at issue do not recite or require a specific amount of “inert metal.” Instead, claim 1 only requires “at least one further inert metal, wherein the at least one further inert metal is not capable of an exothermic reaction with the at least two metal elements upon activation of the shaped charge liner.” Accordingly, the Court finds that Defendant has failed to prove by clear and convincing evidence that the term is indefinite. In the alternative, Defendant asks the Court to explicitly construe the term as not limited to “relatively minor” amounts so that it has a “ruling” that Plaintiff’s previous statements are false. The Court denies Defendant’s alternative request because it is directed to the intrinsic record of the ’563 Patent, which is not the asserted patent in this case.

Finally, Defendant proposes changing the claim language of “is not capable of” to “does not participate in.” The specification states that “[i]n an alternative arrangement it may be desirable that the liner further comprises at least one further metal, where the at least one further metal *does not participate in the exothermic reaction* when the shaped charge is activated.” ’394 at 5:43–46 (emphasis added). However, this one statement does not justify redrafting the claim. The claim language of “is not capable of” is clear and unambiguous, and Defendant has not provided a persuasive reason to replace this language with language that appears only once in the specification.

3. Court’s Construction

The Court construes the phrase **“at least one further inert metal, wherein the at least one further inert metal is not capable of an exothermic reaction with the at least two metal elements upon activation of the shaped charge liner”** to mean **“at least one further inert metal, wherein the at least one further inert metal is not capable of an exothermic reaction with any**

of the at least two metal elements upon activation of the shaped charge liner." The Court construes the phrase **"at least one further inert metal is not capable of an exothermic reaction with the two metal elements upon activation of the shaped charge line"** to mean **"at least one further inert metal is not capable of an exothermic reaction with any of the two metal elements upon activation of the shaped charge line."**

IV. CONCLUSION

The Court adopts the constructions above for the disputed and agreed terms of the Asserted Patent. Furthermore, the parties should ensure that all testimony relates to the terms addressed in this Order is constrained by the Court's reasoning. However, in the presence of the jury the parties should not expressly or implicitly refer to each other's claim construction positions and should not expressly refer to any portion of this Order that is not an actual construction adopted by the Court. The references to the claim construction process should be limited to informing the jury of the constructions adopted by the Court.

SIGNED this 8th day of May, 2018.

ROY S. PAYNE
UNITED STATES MAGISTRATE JUDGE