

**IN THE UNITED STATES DISTRICT COURT
FOR THE WESTERN DISTRICT OF VIRGINIA
CHARLOTTESVILLE DIVISION**

UNIVERSITY OF VIRGINIA
PATENT FOUNDATION,

Plaintiff,

v.

GENERAL ELECTRIC COMPANY
d/b/a/ GE HEALTHCARE,

Defendant.

CIVIL No. 3:08-cv-00025

MEMORANDUM OPINION

JUDGE NORMAN K. MOON

In this action, Plaintiff alleges that Defendant infringed and continues to infringe its patent, which discloses a technique for three-dimensional magnetic resonance imaging (“MRI”) of the human body. Two matters are presented for the Court’s decision. First, Plaintiff and Defendant submitted a Joint Claim Construction and Prehearing Statement (docket no. 99), setting forth the constructions of claim terms and phrases in the patent on which they agree, and proposing constructions of the terms and phrases on which they disagree. After full briefing, the Court held a claim construction hearing. The Court’s construction of the disputed terms is explained herein.

Second, Defendant moved for partial summary judgment seeking an order that Defendant is not liable for any activities infringing the patent that occurred prior to the issuance of the reexamination certificate for the patent (docket no. 100). After full briefing, the Court heard arguments on Defendant’s motion. For the following reasons, the Court will grant Defendant’s motion for partial summary judgment.

I. BACKGROUND

Plaintiff University of Virginia Patent Foundation (“Patent Foundation”), a not-for-profit Virginia corporation, is the assignee of United States Patent No. 5,245,282 (“‘282 Patent”) for an invention entitled “Three-Dimensional Magnetic Resonance Imaging.” (Complaint ¶¶ 1, 8.) The Patent Foundation brought an action for infringement of the ‘282 Patent against Defendant General Electric Company d/b/a G.E. Healthcare (“GE”), a New York corporation, on May 20, 2008 (docket no. 1).¹ The Patent Foundation alleged that GE infringed the ‘282 Patent by “practicing the methods of the ‘282 Patent and by making, using, selling, offering for sale, and/or importing in or into the United States, without authority, MRI scanners that practice the methods of the ‘282 Patent.” (Complaint ¶ 11.)

MRI is a medical diagnostic imaging process that can produce high-contrast images of the interior soft-tissue structures of the human body without the use of ionizing radiation, which can potentially be harmful to human organs.² The subject in an MRI examination is placed in a very strong static magnetic field, and the information necessary to create the images is generated using a series of magnetic field gradient pulses and radiofrequency (or “RF”) pulses. The precise manner in which the gradient pulses and radiofrequency pulses are applied to the body is generally referred to as a pulse sequence. Pulse sequences are usually repeated many times

¹ In the same action, the Patent Foundation also sued Philips Electronics North America Corp. d/b/a Philips Healthcare (“Philips”). The claims against Philips were later voluntarily dismissed with prejudice pursuant to Federal Rule of Civil Procedure 41(a)(1)(A)(i) (docket no. 51).

² The background on MRI is drawn from information provided in the ‘282 Patent and the parties’ technology presentations, as well as from several other sources. *See* CLINICAL MAGNETIC RESONANCE IMAGING 1168 (Robert R. Edelman & John R. Hesselink eds.) (1990); E. MARK HAACKET AL., MAGNETIC RESONANCE IMAGING: PHYSICAL PRINCIPLES AND SEQUENCE DESIGN 821 (1999); Archie Alexander, *Functional Magnetic Resonance Imaging Lie Detection: Is a “Brainstorm” Heading Toward the “Gatekeeper”?*, 7 HOUS. J. HEALTH L. & POL’Y 1 (2006); ELENA PRESTINI, THE EVOLUTION OF APPLIED HARMONIC ANALYSIS: MODELS OF THE REAL WORLD (2004); HOW DOES MRI WORK? (Dominik Weishaupt, et al. eds., 2d ed. 2006); Owen D. Jones, et al., *Brain Imaging for Legal Thinkers: A Guide for the Perplexed*, 2009 STAN. TECH. L. REV. 5 (2009).

during a scan in order to obtain enough information about a region of interest in the body to construct an image of it.

MRI imaging techniques take advantage of the fact that nuclei of some atoms, including hydrogen atoms, have “spin” and act like tiny bar magnets. When exposed to an external magnetic field, they align with it in much the same manner as a compass needle aligns with the earth’s magnetic field. At this stage, the nuclei are in their steady state and said to be aligned with the external magnetic field, which is represented by a vector projecting into the z-plane. If aligned nuclei are excited by applied pulses of electromagnetic energy of the resonant frequency, however, they jump to a higher energy state and their axes move out of alignment with the external magnetic field. The magnetization of tissues while their nuclei are being excited is usually represented by their projections into a three-dimensional plane. Their projections have two components: one in the direction of the external magnetic field (i.e., the extension into the vertical z-plane), called the longitudinal component, and the other perpendicular to the external magnetic field (i.e., the extension into the horizontal (x, y)-plane), called the transverse component.

Excited nuclei in a sample generate a resonance signal that can be detected. Tissues can be distinguished based upon characteristics of the resonance signal, especially the manner in which the resonance signal fades over time, or “relaxes.” In the process called “relaxation,” when the applied high frequency energy is removed, the nuclei release their absorbed energy and realign with the external magnetic field, while the signal decays. T1, or “spin-lattice relaxation time,” and T2, or “spin-spin relaxation time,” are values arbitrarily selected to measure the time it takes the nuclei to return to their original alignment in the external magnetic field, before they were disturbed. The spin-lattice relaxation process concerns the restoration of the longitudinal

component of the magnetization (i.e., the extension of the excited nuclei into the vertical z-plane) to its initial value. It is measured by the time constant T1, which is the time required for the longitudinal component of the magnetization to return to sixty-three percent of its original magnitude following an excitation pulse. Strictly speaking, the longitudinal component approaches but never fully reaches its steady-state value; it would require an infinite amount of time to fully reach equilibrium. The spin-spin relaxation process concerns the decay of the transverse component of the magnetization (i.e., the extension of the excited nuclei into the horizontal (x, y)-plane) toward its steady-state value of zero at equilibrium. It is measured by the time constant T2, which is the time required for the transverse component of the magnetization to return to thirty-seven percent of its thermal equilibrium value of zero. Transverse relaxation occurs more quickly than longitudinal relaxation, so T1 will always be greater than T2.

Different tissues recover at different rates, so the amount of time represented by T1 and T2 varies according to the type of tissue being excited by the electromagnetic pulse. In other words, the amount of time it takes for the longitudinal component of excited Tissue A to return to sixty-three percent of its original magnitude may be different than the amount of time it would take in Tissue B. Differences between recovery rates of tissues are used to distinguish between types of tissues in an MRI scan; these differences in magnetization of the tissues at the time their resonance signal is measured create “contrast.” For example, at the time at which the magnetization of the tissues is measured, the difference in the amount of relaxation that has occurred in a healthy tissue and in a tissue with a tumor can be used to distinguish the two tissues. To create an image, the measured magnetization properties of the tissue are used to determine the brightness of the pixels of that region.

The '282 Patent describes an invention of "a rapid process for producing three-dimensional magnetic resonance imaging" through a pulse sequence which is referred to as 3D MP-RAGE. '282 Patent, col. 1, ll. 8-9; *id.* col. 4, ll. 23-26. Claim 1, its only independent claim, provides:

In a method for producing a set of magnetic resonance three-dimensional image data, a preparation-acquisition-recovery pulse sequence cycle comprising the steps of:

a—a magnetization preparation period in which a series of at least one of RF pulses, gradient field pulses, and time delays are applied to encode the desired contrast properties in the form of longitudinal magnetization,

b—a data acquisition period, said data acquisition period including at least two repetitions of a gradient echo sequence to acquire data for a fraction of k-space,

c—a magnetization recovery period which allows T1 and T2 relaxation before the start of the next sequence cycle, and

d—repeating steps a, b and c until a predetermined k-space volume is sampled.

The patent application was granted by the United States Patent and Trademark Office ("PTO") in 1993 with no objections because "[n]o prior art has been found to meet the limitations of claims 1-44 calling for a method of producing three dimensional image data." PTO, Notice of Allowability and Reasons for Allowance, at 2 (Aug. 6, 1992).³

In May 2008, the Patent Foundation brought the present action against GE for past and continuing infringement of the '282 Patent. Subsequently, GE filed a request with the PTO for *ex parte* reexamination of the '282 Patent, arguing that the body of published art anticipates and renders obvious claims 1-13, 15-19, 22, 26-39, 41, 42, and 44 of the '282 Patent. Request for *Ex Parte* Reexamination (Mar. 13, 2009). The PTO granted the request, finding that the request had

³ The patent application was filed on June 28, 1991, and the patent was issued by the PTO on September 14, 1993. '282 Patent, page 1.

raised eight substantial new questions of patentability based upon certain prior art. PTO, Order Granting Reexamination of U.S. Patent 5,245,282 (May 6, 2009).

Upon reexamination, the PTO rejected all of the claims in question. PTO, Reexamination of U.S. Patent 5,245,282 (Oct. 1, 2009). Pursuant to 35 U.S.C. § 102(b),⁴ the PTO rejected Claims 1-12, 18, 19, 22, 26, 27, 29, 30, 37, 39, 41, and 42 in the '282 Patent as being anticipated by United States Patent No. 4,707,658 by Frahm, et al. (“‘658 Patent”), and rejected Claim 1 as being anticipated by United States Patent No. 4,724,301 by van der Meulen et al. (“‘301 Patent”). Furthermore, pursuant to 35 U.S.C. § 103(a),⁵ the PTO rejected Claims 1, 4, 13, 15-17, 26-28, 31-36, and 44 as being unpatentable because such claims were rendered obvious in light of certain prior publications. After the claims were rejected, the Court granted a stay of the present action. (Order Adopting Stipulation to Stay Case (Nov. 9, 2009) (docket no. 90).)

In response to the PTO’s action, the Patent Foundation filed an Amendment under 37 C.F.R. § 1.111 and § 1.550 canceling dependent Claim 4 of the patent, which had recited “[t]he method of claim 1, wherein said magnetization recovery period has a time of zero.” The Patent Foundation explained that it canceled the claim “because it does not properly depend from claim 1 because a ‘magnetization recovery period [that] has a time of zero’ does not ‘allow[s] [sic] T1 and T2 relaxation before the start of the next sequence cycle,’ as required by the magnetization recovery period of claim 1. Stated simply, a finite period of time must occur for T1 and T2 relaxation to occur, and thus a magnetization recovery period that has a time of zero is inconsistent with claim 1” Pl.’s Amendment Under 37 C.F.R. § 1.111 and § 1.550 and

⁴ This provision states, in pertinent part, that “[a] person shall be entitled to a patent unless . . . the invention was patented or described in a printed publication in this or a foreign country of in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.” 35 U.S.C. § 102(b).

⁵ This provision states, in pertinent part, that “[a] patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.” 35 U.S.C. § 103(a).

Written Statement of Examiner Interview Under 37 CFR § 1.560(b), at 12-13 (Nov. 30, 2009) [hereinafter “Pl.’s Amendment”] (alterations in original).

Based on the Patent Foundation’s amendment, the PTO withdrew all of its objections to the claims except for those pertaining to Claim 4, which was canceled, and issued the reexamination certificate on May 4, 2010. In its statement of reasons for patentability, the PTO declared that “the claimed ‘magnetization recovery period’ is interpreted to correspond to a finite period of time (i.e., greater than zero) that allows substantially complete T1 and T2 relaxation to occur—i.e., relaxation to thermal equilibrium of both the longitudinal component and the transverse component—as opposed to partial or substantially incomplete relaxation.” PTO, Notice of Intent to Issue *Ex Parte* Reexamination Certificate and Statement of Reasons for Patentability and/or Confirmation, at 3 (Jan. 28, 2010) [hereinafter “Statement of Reasons for Patentability”]. The Patent Foundation submitted comments on the PTO’s statement of reasons in order to clarify that it was the Patent Foundation’s position that the magnetization recovery period in Claim 1 need only allow “partial T1 and T2 relaxation to occur.” Pl.’s Comments on Statement of Reasons for Patentability and/or Confirmation, at 2 (Mar. 1, 2010).

After the reexamination proceedings concluded, the stay of the present suit was lifted, and the parties requested that a claim construction hearing be held to resolve the meaning of disputed terms in the claims of the ‘282 Patent and filed a Joint Claim Construction and Prehearing Statement with the Court (docket no. 99). GE moved for partial summary judgment, requesting a finding of no liability for any infringement that occurred prior to the issuance of the reexamination certificate. The claim construction issues and GE’s motion were both fully briefed and heard before this Court.

II. CLAIM CONSTRUCTION

A. Applicable Law

Patent claim construction is a “question of law, to be determined by the court.” *Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 384 (1996); *Markman v. Westview Instruments, Inc.*, 52 F.3d 967, 997 (Fed. Cir. 1995). The patentee may exercise the right to exclude granted by its patent, and “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). The patentee must “define precisely what his invention is,” because it would be “unjust to the public, as well as an evasion of the law, to construe [the patent] in a manner different from the plain import of its terms.” *Id.* (quoting *White v. Dunbar*, 119 U.S. 47, 52 (1886)). A court need only construe, however, claims “that are in controversy, and only to the extent necessary to resolve the controversy.” *Vivid Techs., Inc. v. Am. Sci. & Eng'g, Inc.*, 200 F.3d 795, 803 (Fed. Cir. 1999).

The Court begins its claim construction analysis with the words of the claim. *Vitronics Corp. v. Conceptoronic, Inc.*, 90 F.3d 1576, 1582 (Fed. Cir. 1996). The words of a claim are given their ordinary and customary meaning, which “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. *Nystrom v. TREX Co., Inc.*, 424 F.3d 1136, 1142 (Fed. Cir. 2005) (citing *Phillips*, 415 F.3d at 1313). A person of ordinary skill in the art is not deemed to read the disputed claim term in isolation, but instead “views the claim term in light of the entire intrinsic record,” *id.*, i.e., “in the context of the entire patent, including the specification.” *Conoco, Inc. v. Energy & Env'tl. Int'l, L.C.*, 460 F.3d 1349, 1357 (Fed. Cir. 2006) (quoting *Phillips*, 415 F.3d at 1313).

To ascertain the meaning of claims, the Court must first consider the intrinsic record, which consists of three sources: the claims, the specification, and the prosecution history. *Markman*, 52 F.3d at 979. The first and most important step in the Court’s inquiry is to examine the words used in the claims themselves, both asserted and unasserted claims. *Vitronics*, 90 F.3d at 1582; *accord Phillips*, 415 F.3d at 1314 (“[T]he claims themselves provide substantial guidance as to the meaning of the particular claim terms.”); *Digital Biometrics, Inc. v. Identix, Inc.*, 149 F.3d 1335, 1344 (Fed. Cir. 1998) (“The actual words of the claim are the controlling focus.”). Because claim terms are often used “consistently throughout the patent, the usage of a term in one claim can often illuminate the meaning of the same term in other claims.” *Phillips*, 415 F.3d at 1314.

The next source to be considered is the specification. The specification is required to provide a written description of the invention in “full, clear, concise, and exact terms,” 35 U.S.C. § 112, and the patentee may satisfy this requirement by using “such descriptive means as words, structures, figures, diagrams, formulas, etc., that set forth the claimed invention.” *Regents of the Univ. of Cal. v. Eli Lilly & Co.*, 119 F.3d 1559, 1566 (Fed. Cir. 1997). On questions of claim construction, “[u]sually, [the specification] is dispositive; it is the single best guide to the meaning of a disputed term.” *Phillips*, 415 F.3d at 1315 (citing *Vitronics*, 90 F.3d at 1582). Where the specification “reveal[s] a special definition given to a claim term by the patentee that differs from the meaning it would otherwise possess,” it is “the inventor’s lexicography” that governs. *Id.* at 1316. Similarly, where the specification “reveal[s] an intentional disclaimer, or disavowal, of claim scope by the inventor,” again, “the inventor’s intention, as expressed in the specification, is regarded as dispositive.” *Id.*

The Federal Circuit has cited as a “well-established” principle that a “court may not import limitations from the written description into the claims.” *Laitram Corp. v. NEC Corp.*, 163 F.3d 1342, 1347 (Fed. Cir. 1998). The disclosure of a particular embodiment of the claimed invention in the specification does not function to narrow the patent claims. *See id.* at 1347-48. It is also the case, however, that a proposed claim interpretation that would exclude a preferred embodiment would rarely, if ever, be correct. *See SanDisk Corp. v. Memorex Prods., Inc.*, 415 F.3d 1278, 1285 (Fed. Cir. 2005) (quoting *Vitronics*, 90 F.3d at 1583). “It is therefore entirely appropriate for a court, when conducting claim construction, to rely heavily on the written description for guidance as to the meaning of the claims.” *Phillips*, 415 F.3d at 1317.

Next, the patent’s prosecution history, as part of the “intrinsic record,” should be considered by the Court when construing a claim. *See Markman*, 52 F.3d at 980. The prosecution history consists of the complete record of proceedings before the PTO, including reexamination proceedings. *Phillips*, 415 F.3d at 1317; *CIAS, Inc. v. Alliance Gaming Corp.*, 504 F.3d 1356, 1362-63 (Fed. Cir. 2007); *CVI/Beta Ventures, Inc. v. Tura LP*, 112 F.3d 1146, 1155-56 (Fed. Cir. 1997). Prior art cited in the patent examination or reexamination is also part of the prosecution history. *Phillips*, 415 F.3d at 1317. The patent prosecution history “often lacks the clarity of the specification and thus is less useful for claim construction purposes,” *id.*, however, it is still “often of critical significance in determining the meaning of the claims.” *Vitronics*, 90 F.3d at 1582.

The purpose of consulting the prosecution history is to determine “how the inventor understood the invention and whether the inventor limited the invention in the course of prosecution, making the claim scope narrower than it otherwise would be.” *Phillips*, 415 F.3d at 1317 (citing *Vitronics*, 90 F.3d at 1582-83). The Court consults the prosecution history in order

to “exclude any interpretation that was disclaimed during prosecution.” *Chimie v. PPG Indus., Inc.*, 402 F.3d 1371, 1384 (Fed. Cir. 2005). District courts therefore have broad power to look at the prosecution history to determine “the true meaning of language used in the patent claims,” since this history may demonstrate the patentee’s understanding and use of the relevant terms at the time of the application. *See Markman*, 52 F.3d at 980. Importantly, however, the prosecution history may not be used to “enlarge, diminish, or vary the limitations in the claims.” *Id.* Moreover, a patentee may not construe a claim term one way during prosecution in order to obtain allowance of the patent and then in a different way during litigation in order to obtain a finding of infringement. *See Chimie*, 402 F.3d at 1384; *Omega Eng'g, Inc. v. Raytek Corp.*, 334 F.3d 1314, 1323-26 (Fed. Cir. 2003); *Southwall Techs., Inc. v. Cardinal IG Co.*, 54 F.3d 1570, 1576 (Fed. Cir. 1995). In order for the patentee to disclaim an interpretation, the alleged disavowing statements in the prosecution history must be “clear and unmistakable.” *Omega Eng'g*, 334 F.3d at 1325-26 (“[W]e . . . have consistently rejected prosecution statements too vague or ambiguous to qualify as a disavowal of claim scope . . .”).

Generally, the Court will be able to resolve any ambiguity in a disputed claim term by considering the intrinsic record, in which case, “it is improper to rely upon extrinsic evidence.” *Vitronics*, 90 F.3d at 1583. Expert testimony, dictionaries, treatises, and other types of extrinsic evidence, while considered to be “less reliable than the patent and its prosecution history in determining how to read claim terms,” *Phillips*, 415 F.3d at 1318, are still “an available resource” and are “often useful” to claim construction, *Vanguard Prods. Corp. v. Parker Hannifin Corp.*, 234 F.3d 1370, 1372 (Fed. Cir. 2000). In any event, trial courts may always consult extrinsic evidence in aid of understanding the general technology involved in the patent claims at issue, but not to vary or contradict the patent claims. *See Phillips*, 415 F.3d at 1319-24;

Vitronics, 90 F.3d at 1584 n. 6. Ultimately, “[t]he construction that stays true to the claim language and most naturally aligns with the patent’s description of the invention will be, in the end, the correct construction.” *Phillips*, 415 F.3d at 1316.

B. Construction of “magnetization recovery period”

Claim 1, limitation (c) reads, “a *magnetization recovery period* which allows T1 and T2 relaxation before the start of the next sequence cycle”. (emphasis added) The parties dispute the meaning of the term “magnetization recovery period,” and disagree over whether the reexamination proceedings changed its meaning. The resolution of this term’s meaning is both important to the Court’s construction of Claim 1 and crucial to the Court’s decision on GE’s motion for partial summary judgment, which is discussed in Section III. below. First, I will determine the meaning of the “magnetization recovery period” limitation in Claim 1 as of the filing date of the application for the patent in suit and prior to reexamination. Then I will address the parties’ arguments in the claim construction briefing and hearing over whether the meaning of the term was altered by the reexamination proceedings. I reserve for Section III. discussion of the scope of the change in the meaning of the term.

1. Construction of “magnetization recovery period” as of Filing Date of Patent Application⁶

The parties dispute whether, from the time the application was filed and prior to reexamination, the “magnetization recovery period” limitation, properly construed, was broad enough to encompass a process wherein duration of the period was zero, i.e., where no magnetization recovery period was provided.

⁶ The claim construction standards set forth in Section II.A, *supra*, apply to this determination. See *Anderson v. Int’l Eng’g & Mfg., Inc.*, 160 F.3d 1345, 1349 (Fed. Cir. 1998) (“The question of claim scope before and after reexamination is a matter of claim construction.”) (citing *Cybor Corp. v. FAS Tech., Inc.*, 138 F.3d 1448, 1454-56 (Fed. Cir. 1988)).

GE contends that prior to the reexamination, limitation (c) encompassed a magnetization recovery period of zero duration. (Def.'s Mem. in Support of Mot. Partial Summ. J. 8.)⁷ GE points to several portions of the specification, Figure 5, and Claim 4 for support. First, it is stated in the "Summary of the Invention" section of the specification that "[a] magnetization recovery period is provided which allows T1 and T2 relaxation before the start of the next sequence cycle. *The magnetization recovery period can have a time of zero.*" '282 Patent, col. 2, ll. 20-26 (emphasis added). Second, it is stated in the "Description of the Preferred Embodiments" section of the specification that "[t]he two limiting cases for the magnetization recovery period *are zero duration* and a duration which is relatively long compared to the T1s of interest." '282 Patent, col. 15, ll. 18-20 (emphasis added). Third, Example III describes and Figure 5 illustrates a preferred embodiment of the invention having a magnetization recovery period of "none." '282 Patent, col. 18, ll. 5-13. Fourth, dependent Claim 4 recites "[t]he method of claim 1, wherein said magnetization recovery period has a time of zero." As GE correctly concludes, because dependent Claim 4 covers the specific case where the recovery period has time zero, its independent Claim 1 must cover that specific case as well. (Def.'s Mem. Supp. Mot. Partial Summ. J. 8-9 (citing *EMI Group N. Am., Inc. v. Cypress Semiconductor Corp.*, 68 F. Supp. 2d 421, 430 (D. Del. 1999), *aff'd in relevant part*, 268 F.3d 1342 (Fed. Cir. 2001)).)

The Patent Foundation argues that Claim 1 cannot encompass the possibility of a duration of time zero because Claim 1 plainly states that the magnetization recovery period allows for T1 and T2 relaxation, and no such relaxation would occur if the recovery period had a time period of zero. (Pl.'s Resp. Br. Opp'n Mot. Partial Summ. J. 3-4, 12-13.)

⁷ Arguments over the meaning of "magnetization recovery period" as of the date of the patent application's filing and prior to the reexamination are made by the parties in their briefing on GE's motion for partial summary judgment. The constructions of "magnetization recovery period" proposed by the parties in their claim construction briefs pertain to the meaning of "magnetization recovery period" *after* the reexamination, and will be dealt with in Section II.B.2 below.

After consideration of the parties' contentions and in accordance with the principles of claim construction, I hold that from the time the application for the patent was filed and until the issuance of the reexamination certificate, the "magnetization recovery period" in Claim 1 encompassed within its scope a time period of zero. In reaching this conclusion, I ascribe to the claim's term the meaning that would have been accorded it by a person of ordinary skill in the art, who would have read the claim in light of the entire intrinsic record, including the specification. *See Nystrom*, 424 F.3d at 1142; *Conoco*, 460 F.3d at 1357 (quoting *Phillips*, 415 F.3d at 1313).

Here, the person of ordinary skill in the art would see that the patentee expressly and unambiguously states in two places in the patent specification that one possible time period for the magnetization recovery period is zero duration. *See* '282 Patent, col. 2, ll. 20-26; *id.* col. 15, ll. 18-20. In addition, the person of ordinary skill in the art would review the embodiments the patentee labeled as "preferred," one of which (Example III) has no magnetization recovery period. *See id.*, col. 18, ll. 5-14. The Patent Foundation's proposed claim interpretation would exclude that "preferred" embodiment; such an interpretation is rarely, if ever, the right one. *See SanDisk Corp.*, 415 F.3d at 1285. The specification "is the single best guide to the meaning of a disputed term," and here it makes abundantly clear that a magnetization recovery period of zero duration is within the intended scope of Claim 1. *See Phillips*, 415 F.3d at 1315 ("Usually, [the specification] is dispositive . . .").

Dependent Claim 4, in specifically reciting "[t]he method of claim 1, wherein said magnetization recovery period has a time of zero," supports this conclusion. In light of the requirement that an independent claim be broad enough to encompass a limitation added by a

claim dependent therefrom, dependent Claim 4 necessarily implies that Claim 1 is sufficiently broad in scope to include a period of time zero.⁸

In consideration of this overwhelming evidence, I hold that prior to the reexamination, a person of ordinary skill in the art would have understood the term “magnetization recovery period” in Claim 1 to include the case of a time of zero duration. The Patent Foundation’s argument that limitation (c) must allow for T1 and T2 relaxation to occur and that no such relaxation would occur if the magnetization recovery period had a time period of zero would only be persuasive if limitation (c) were read in isolation, i.e., without giving due consideration to the specification and to Claim 4. But such a reading of the claim terminology in isolation would be contrary to Federal Circuit precedent. *See, e.g., Conoco*, 460 F.3d at 1357; *Phillips*, 415 F.3d at 1313.

2. Construction of “magnetization recovery period” After Reexamination

I turn now to determine the meaning of the “magnetization recovery period” limitation as of the close of the reexamination proceedings. The Patent Foundation proposes construing the term as “a distinct period following data acquisition which allows T1 and T2 relaxation and provides for additional control over the image contrast.”⁹ GE offers the definition “a distinct time period, greater than 150 [milliseconds], for recovery of magnetization in the tissues of interest.”

⁸ The Patent Foundation represented in the reexamination and argued in the hearing that a drafting error had been committed in writing Claim 4. *See* Pl.’s Amendment at 12-13 (“Upon further review of claim 4, the Patent Owner has canceled this claim because it does not properly depend from claim 1 Stated simply, a finite period of time must occur for T1 and T2 relaxation to occur, and thus a magnetization recovery period that has a time of zero is inconsistent with claim 2, and does not further limit claim 1”); Tr. 36-38. While the possibility of a drafting error cannot be totally discounted, Claim 4’s plain terms are perfectly consistent with the statements in the specification that the recovery period can have a time of zero. Thus, I find it more persuasive that Claim 4 was intended to properly depend from Claim 1—that Claim 1 was meant to include a range of values for the length of the recovery period, including the option of having no recovery period at all, and that Claim 4 was meant to embody a limitation to the broad range of time values for the recovery period.

⁹ The Patent Foundation first contends that the meaning of the term is clear and no construction is necessary. I reject this contention. There is no question that the meaning of the term is in dispute and that claim construction by the Court is required.

For the reasons stated below, the Court adopts the following construction of “magnetization recovery period”: “a distinct period following data acquisition which allows T1 and T2 relaxation and provides for additional control over the image contrast.”

Both parties proposed adding the term “distinct” to describe the duration of time of the recovery period, although “distinct” is not used in the patent’s glossary definition for “magnetization recovery period.” The addition of “distinct” is intended to clarify that the recovery period must have a positive value and cannot be of duration zero. The parties appear to agree that as of the Patent Foundation’s filing of the amendment canceling Claim 4 and the accompanying remarks, the magnetization recovery period cannot be a time of zero, though they disagree about the reasons for that construction. The Patent Foundation argues that the term always precluded a value of zero, whereas GE argues that the original patent included the option of a value of zero but the Patent Foundation disclaimed that option during the reexamination proceedings. Indeed, the Patent Foundation’s Amendment expressly stated to the PTO that the magnetization recovery period “precludes an embodiment wherein the magnetization recovery period is zero or none.” Pl.’s Amendment at 14. Having already decided that the magnetization recovery period included the possibility of a value of zero prior to the issuance of the reexamination certificate, I concur with GE that the statements made by the Patent Foundation in the reexamination proceedings disclaimed the possibility of time zero. Accordingly, I interpret the meaning of “magnetization recovery period” following reexamination to include the limitation that the period be “distinct.”

The Patent Foundation proposes that the phrase “and provides for additional control over the image contrast” be added to the construction. Although this phrase is not found in the patent’s glossary definition of magnetization recovery period, a variation of it is stated at least

twice in the specification. *See* '282 Patent, col. 4, ll. 21-23 (“Additional control over the image contrast is provided by varying the duration of the magnetization recovery period.”); *id.*, col. 15, ll. 10-18 (“The recovery period provides an additional degree of freedom for controlling the image contrast by providing additional time for T1 and T2 relaxation before the start of the next sequence cycle. The duration of the recovery period is determined by the desired contrast properties of the image, the T1 relaxation properties of the tissues, and the state of the longitudinal magnetization at the end of the gradient-echo acquisition.”). GE contends that the proffered phrase is merely one description of the preferred embodiment and was not designed to define the claim term. GE adds that there is no justification for defining the term in this way, that the language is redundant because allowing T1 and T2 relaxation is itself the method for controlling the image contrast, and that the language is vague.

I find it appropriate to include the phrase “and provides for additional control over the image contrast” in the construction of “magnetization recovery period.” On questions of claim construction, the specification “is the single best guide to the meaning of a disputed term.” *Phillips*, 415 F.3d at 1315 (citing *Vitronics*, 90 F.3d at 1582). Here, the patentee provided in two separate places in the specification an explicit statement of the relationship between the duration of the magnetization recovery period and the resulting image contrast. An ordinary person skilled in the art, after reviewing the statements in the specification that explicitly discuss image contrast, would recognize that the magnetization recovery period plays a key role in enabling control of image contrast. The magnetization recovery period’s function in affecting image contrast appears to be the principal, if not sole, benefit of having a recovery step in the imaging process. Nothing in the claims or the patent’s glossary definition contradicts or undermines this view.

I decline to adopt GE's proposed construction, which would require the magnetization recovery period to last for at least 150 milliseconds. A 150 millisecond period is not described anywhere in the patent. GE argues that in the reexamination proceedings, the Patent Foundation disclaimed a magnetization recovery period of less than 150 milliseconds in order to distinguish its patent claims from prior art U.S. Patent No. 4,707,658. (Def.'s Opening Claim Constr. Br. 16-17.) In support, GE cites to sections of the amendment and comments that the Patent Foundation submitted to the PTO in the reexamination proceedings,¹⁰ and to the Patent Examiner's Statement of Reasons for Patentability.¹¹

It is only the Patent Examiner's statement that suggests that a magnetization recovery period of less than 150 milliseconds would be anticipated by the '658 Patent. *See* Statement of Reasons for Patentability at 6 (“[F]or cases in which T1 and T2 are smaller than 150 ms, unintentional T1 and T2 relaxation occurs, and [the '659 Patent] would inherently anticipate the claimed magnetization recovery period.”). But to disclaim an interpretation, the Patent Foundation's disavowing statements must be “clear and unmistakable,” *see Omega Eng'g*, 334 F.3d at 1325-26, and here the Patent Foundation never disavowed a magnetization recovery period of less than 150 milliseconds.¹² A unilateral statement by a patent examiner without a disavowal of claim scope by the patentee is not sufficient to constitute a disclaimer. *Salazar v. Procter & Gamble Co.*, 414 F.3d 1342, 1344-48 (Fed. Cir. 2005) (holding that a unilateral statement by a patent examiner in stating his reasons for allowance did not disavow claim scope because “*the applicant has disavowed nothing*”) (emphasis added); *cf. Phillips*, 415 F.3d at 1317

¹⁰ *See* Pl.'s Amendment at 12-14, 22-30.

¹¹ *See* Statement of Reasons for Patentability at 4-6.

¹² Indeed, after the Examiner issued its statement and before the reexamination certificate was issued, the Patent Foundation supplied comments to the PTO on the Examiner's statement that made clear that it did not view the prior art as requiring the magnetization recovery period to allow “substantially complete” T1 and T2 relaxation to occur, but only “partial” relaxation. Pl.'s Comment on Statement of Reasons for Patentability and/or Confirmation at 2. Presumably, in many if not all cases, “partial” relaxation occurs in a period of less than 150 milliseconds.

(describing the purpose of consulting prosecution history as a means to determine “how *the inventor* understood the invention and whether *the inventor* limited the invention in the course of prosecution”) (emphasis added).¹³

C. Construction of “T1 and T2 Relaxation”

The next term to construe is “T1 and T2 relaxation,” which is found in Claim 1, limitation (c), reciting “a magnetization recovery period which allows *T1 and T2 relaxation* before the start of the next sequence cycle”. (emphasis added) The Patent Foundation proposes that “T1 relaxation” be defined as “the process by which the longitudinal component of the magnetization vector relaxes to its thermal equilibrium value aligned with the main magnetic field” and “T2 relaxation” be defined as “the process by which the transverse component of the magnetization vector relaxes to its thermal equilibrium value of zero.”¹⁴ In contrast, GE proposes that “T1 relaxation” be defined as “the amount of longitudinal relaxation that takes place in longitudinal relaxation time T1; each tissue has a characteristic time constant T1,” and “T2 relaxation” be defined as “the amount of transverse relaxation that takes place in transverse relaxation time T2; each tissue has a characteristic time constant T2.”

Neither “T1 relaxation” nor “T2 relaxation” is defined in the patent, however, “T1” is defined in the patent’s glossary as “[t]he spin-lattice or longitudinal relaxation time. See longitudinal relaxation.” ‘282 Patent, col. 21, ll. 42-43. Similarly, “T2” is defined in the glossary as “[t]he spin-spin or transverse relaxation time. See transverse relaxation.” ‘282 Patent, col. 21,

¹³ In any case, the Examiner did not rely on a requirement that the magnetization recovery period last for at least 150 milliseconds in order to approve the claims. Instead, the Examiner withdrew his objection based on the ‘658 Patent because the prior art disclosure of an 150 millisecond recovery period would result in substantially complete T1 and T2 relaxation only occasionally. Statement of Reasons for Patentability at 6. It did not inherently induce T1 and T2 relaxation at a frequency sufficient to anticipate the magnetization recovery period in the ‘282 Patent. *Id.* Therefore, there is no basis for limiting the meaning of magnetization recovery period to a period of at least 150 milliseconds.

¹⁴ The Patent Foundation first contends that the meaning of the phrase is plain and no construction is necessary. I reject this contention. There is no question that the meaning of these terms is in dispute and that claim construction by the Court is required.

ll. 47-48. In turn, “longitudinal relaxation,” which is referenced in the definition of “T1,” is defined in the glossary as “[t]he process by which the longitudinal component of the magnetization vector relaxes to its thermal equilibrium value aligned with the main magnetic field. The relaxation takes place with a characteristic time constant T1.” ‘282 Patent, col. 19, ll. 60-64. “Transverse relaxation,” which is referenced in the definition of “T2,” is defined in the glossary as “[t]he process by which the transverse component of the magnetization vector relaxes to its thermal equilibrium value of zero. The relaxation takes place with a characteristic time constant T2.” ‘282 Patent, col. 21, ll. 62-65.

The Patent Foundation’s proposed constructions are exactly the same as the first sentences of the definitions for longitudinal relaxation and transverse relaxation. The second sentences, which describe the characteristic time constant, are excluded from the Patent Foundation’s construction. This reflects, argues the Patent Foundation, that T1 and T2 relaxation would be understood by a person with ordinary skill in the art in question reviewing the ‘282 patent as *processes* rather than fixed amounts of time because the other limitations of Claim 1 refer to processes. In contrast, GE argues that T1 and T2 relaxation are the *fixed amounts* of relaxation that occur within the time it takes a particular tissue to relax within time constant T1 or T2. Under this construction, the amount of T1 or T2 relaxation will depend on the type of tissue being imaged because each tissue has a particular T1 time and T2 time associated with it. GE reaches its construction by taking T1 and T2, which the glossary defines as an amount of time, and pairing that understanding of T1 and T2 with relaxation, which is a process as shown by the glossary definitions of longitudinal relaxation and transverse relaxation. When placed together, the phrase T1 relaxation (or T2 relaxation) “is understood to be the amount of that

process that occurs in T1.” (Def.’s Opening Claim Constr. Br. 22.) GE’s construction would place a clear time constraint on the duration of the magnetization recovery period.

I conclude that the Patent Foundation’s proposed constructions reflect the terms’ ordinary and customary meaning and are best supported by the intrinsic evidence. Although the patent glossary defines T1 and T2 as fixed amounts of time, and longitudinal relaxation and transverse relaxation as processes of relaxation, it never defines T1 relaxation or T2 relaxation. To best approximate the meaning of those terms, GE combines the definition of T1 and part of the definition of longitudinal relaxation, and the definition of T2 and part of the definition of transverse relaxation. This method, though somewhat logical, does not produce an accurate interpretation of the terms at issue. In fact, GE’s construction would prove quite unworkable in practice. An MRI scan involves at least two tissues, and sometimes more. The hydrogen atoms in each tissue take a different amount of time to relax, and so the atoms in the tissues have different T1 and T2 values associated with them. Because GE’s proposed construction does not specify to which tissue type its construction is applicable, it would be unclear in any given scan which tissue’s atom’s T1 or T2 values should be used to determine the length of the magnetization recovery period.

GE’s construction would also render the reference in Claim 1 to T2 relaxation superfluous because T1 relaxation is always a greater value than T2 relaxation. Accordingly, a magnetization recovery period would always have to last long enough to allow T1 relaxation, but never more since T2 relaxation would have already occurred. Moreover, an ordinary person skilled in the art would think it highly unlikely that the patentee intended to limit the claimed invention to the precise values of T1 and T2 for a given tissue being imaged without describing

that limitation and the reason for it in any detail in any part of the patent.¹⁵ Such a major restriction on the scope of the patent claims appears unlikely to have been intended to be included in the terms T1 relaxation and T2 relaxation, which are commonly understood by experts in the field to be interchangeable with the processes of longitudinal relaxation and transverse relaxation.¹⁶

The construction proposed by the Patent Foundation is supported by the intrinsic evidence. First, it draws from the definitions provided in the patent's glossary of longitudinal relaxation and transverse relaxation, which are referenced in the definitions of T1 and T2. Second, it provides a basis of interpretation of the claimed magnetization recovery period stage that is compatible with the clear import of the previous two stages and the process of the claimed invention. It appropriately characterizes the recovery period as a process. Claim 1 sets forth a "cycle" for producing image data that is divided into four "steps," with each step representing a process or "period." '282 Patent, col. 22, ll. 7-25. The "magnetization preparation period" referred to in step (a) and the "data acquisition period" referred to in step (b) clearly, by their terms, describe a process or series of events that occur at each of those steps. Likewise, the "magnetization recovery period" in step (c) refers to the process of T1 and T2 relaxation, not the amount of time for a specific amount of such relaxation to occur.

Although the intrinsic evidence by itself adequately supports the constructions of T1 relaxation and T2 relaxation adopted by the Court, the extrinsic evidence is consistent with this meaning. The parties provided expert testimony that, on the whole, indicated that T1 relaxation and longitudinal relaxation are viewed by persons of ordinary skill in the art as different ways to

¹⁵ GE has not suggested any reasonable explanation for why an ordinary person skilled in the art would believe this particular limitation on the magnetization recovery period step has been adopted, and none appears on the face of the patent.

¹⁶ See discussion of extrinsic evidence, *infra*.

describe the same process of relaxation. (*See* Haacke Dep. 106:6-20, June 22, 2010 (Pl.’s expert) (testifying that T1 relaxation and longitudinal relaxation are always used synonymously); Gore Dep. 62:6-15, June 14, 2010 (Def.’s expert) (testifying that outside this particular patent, “many people” of ordinary skill in the art would use the terms T1 relaxation and longitudinal relaxation “interchangeably”); *contra* Gore Decl. ¶¶ 66-67, June 24, 2010.) As demonstrated in oral argument,¹⁷ GE’s own online medical encyclopedia defines T2 relaxation as “one of two principle contrast determining *processes* of the NMR phenomenon (the other being spin-lattice, *longitudinal or T1 relaxation*), also known under the names of *transverse relaxation* and spin-spin relaxation.” (emphasis added). GE’s encyclopedia defines T1 relaxation as the “*process* by which the longitudinal magnetization M_z attains its equilibrium value M_z^0 ” and under “longitudinal relaxation” it says “see T1 relaxation.” (emphasis added) Thus, the weight of the extrinsic evidence aligns with the meaning of the terms adopted by the Court.

D. Construction of “repeating steps a, b and c” and of “wherein said time period employed for magnetization recovery is also employed for magnetization preparation”

Claim 1, limitation (d) states “repeating steps a, b and c until a predetermined k-space volume is sampled.” ‘282 Patent, col. 22, ll. 24-25. Dependent Claim 44 adds the following limitation: “The method of claim 1, wherein said time period employed for magnetization recovery is also employed for magnetization preparation.” ‘282 Patent, col. 24, ll. 49-51. At the center of the parties’ dispute over these phrases is a disagreement about whether each step in Claim 1 of the patent must be distinct from both the prior step and the successive step, or whether overlap is permitted between step (c) and the following step (a).

The Patent Foundation proposes interpreting the term “repeating steps, a, b and c” as meaning “repeating steps a, b, and c, in that order, until a predetermined k-space volume is

¹⁷ The following quotations are drawn from the slides presented by the Patent Foundation during the hearing.

sampled.”¹⁸ The Patent Foundation’s position is that each of the steps need not be distinct from one another, but only need be sequential, which does not preclude overlapping. It points to dependent Claim 44, which includes an embodiment of the sequence wherein the time period employed for magnetization recovery in step (c) can also be used for magnetization preparation in step (a) of the following sequence. The Patent Foundation argues that this potential secondary use of the magnetization recovery period was highlighted as one of five “[a]dvantages of the 3D MP RAGE technique” when compared to prior three-dimensional imaging techniques. ‘282 Patent, col. 15, ll. 60-65. In fact, this portion of the specification states that “[t]he dead times in the magnetization preparation and/or recovery periods can be used for secondary magnetization preparations such as spatial or chemical presaturation.” ‘282 Patent, col. 16, ll. 12-15. Finally, the Patent Foundation calls the Court’s attention to Figure 1 of the patent, in which “secondary preparations” is listed as an aspect of the magnetization recovery period. ‘282 Patent, Figure 1, page 2.

In contrast, GE proposes construing step (d) to mean “repeating distinct steps a, b and c, in that order until a predetermined k-space volume is sampled.” GE argues that “distinct” is an appropriate interpretation because language in the specification provides that the magnetization preparation period must be distinct from the data acquisition period,¹⁹ and the Patent Foundation itself described the magnetization recovery period as distinct in the reexamination proceedings.²⁰ Following from the conclusion that the steps must be distinct, GE takes the position that Claim

¹⁸ The Patent Foundation first argues that these terms are sufficiently clear and need not be construed by the Court. I reject this contention. There is no question that the meaning of these terms is in dispute and that claim construction by the Court is required.

¹⁹ See ‘282 Patent, col. 4, ll. 17-19 (“By employing a distinct magnetization preparation period, the determination of the image contrast can be largely separated from the data acquisition.”); *id.* col. 9, ll. 62-65 (“The use of a distinct magnetization preparation period largely separates the generation of the image contrast from the acquisition of the 318 [sic] image data.”).

²⁰ See Pl.’s Amendment at 33 (“[S]tep (c) of claim one provides a distinct magnetization recovery period . . . after the data acquisition period and before the start of the next preparation-acquisition-recovery pulse sequence cycle.”), 36 (same).

44 is indefinite because it contradicts the requirement that the steps be distinct, precluding a person of ordinary skill in the art from determining the scope of the claim. (Def.'s Opp'n Claim Constr. Br. 24 (citing *Competitive Techs. v. Fujitsu Ltd.*, 286 F. Supp. 2d 1161, 1175 (N.D. Cal. 2003))).

The words of the claim are “generally given [the] ordinary and customary meaning” that the terms would have “to a person of ordinary skill in the art in question.” *Phillips*, 415 F.3d at 1312-13. With that guiding principle in mind, the Court observes that on its face, Claim 1, step (d) does not require that steps (a), (b), or (c) be distinct. The language of step (c) does not exclude the possibility that magnetization preparation could be conducted during magnetization recovery. The passages from the specification cited by GE that use the term “distinct” merely indicate that step (a) and step (b) are separate; no comparable language in the specification supports the proposition that step (c) is distinct from the step (a) in the following sequence cycle. Rather, the specification explicitly contemplates the possibility of some overlap between the magnetization recovery period and the subsequent magnetization preparation period, stating in two places the possibility of conducting secondary magnetization preparations during the recovery period. *See* ‘282 Patent, Figure 1, page 2; *id.* col. 16, ll. 12-15.

It is also important to note that when construing one claim term, “[o]ther claims of the patent in question, both asserted and unasserted, can also be valuable sources of enlightenment as to the meaning of a claim term.” *Phillips*, 415 F.3d at 1314. The fact that Claim 44 provides for magnetization recovery to occur at the same time as magnetization preparation activities strongly suggests that step (c) allows overlap with the subsequent step (a). The Patent Foundation’s proposed constructions of Claim 1, limitation (d) and Claim 44 are consistent with, and mutually support, each other. In contrast, GE’s interpretation of Claim 1, limitation (d) would, according

to GE, create a contradiction between Claim 1 and Claim 44, and require the Court to find Claim 44 invalid for indefiniteness. Courts are especially reluctant to invalidate a claim where a narrowing definition is available. *See Datamize, LLC. v. Plumtree Software, Inc.*, 417 F.3d 1342, 1347-48 (Fed. Cir. 2005).

The Court must also consider whether the prosecution history sheds light on the meaning of the claims, or whether the patentee disclaimed the possibility of overlap between the steps. The Patent Foundation used the adjective “distinct” to describe step (c) several times in its comments accompanying the amendment during the reexamination proceedings. *See, e.g.*, Pl.’s Amendment at 30 (“step (c) provides a *distinct* magnetization recovery period which allows T1 and T2 relaxation to occur before the start of the next preparation-acquisition-recovery pulse sequence cycle, and which occurs outside of the repetitions of the gradient-echo pulse sequence”) (emphasis added). GE claims that the Patent Foundation’s statements were made to maintain the validity of the patent in light of prior art. But these statements do not disavow, in a “clear and unmistakable” manner, the possibility that secondary preparations can be conducted during the recovery period, *see Omega Eng’g*, 334 F.3d at 1325-26, or otherwise indicate that the patentee intended the terminology to preclude overlap. In several instances, “distinct” is explicitly used by the Patent Foundation to merely distinguish the magnetization recovery period from the data acquisition period, which does not address the issue of whether the recovery period must be separate from the next preparation period. *See* Pl.’s Amendment at 30, 34, 42. The statements that do address the relationship between step (c) and step (a) were made in the context of distinguishing prior art that contained relaxation time intervals during or between radiofrequency pulses. In essence, those statements were made in the context of arguing that the magnetization recovery period is actually a third step, rather than an interval of relaxation within

step (a) or step (b). Those statements did not address, nor did the prior art raise, whether the T1 and T2 relaxation in step (c) was distinct from any type of magnetization preparation activity, such as the chemical or spatial presaturation activities described in the specification. Thus, those statements are also irrelevant to determining whether the possibility of overlap between the steps was disclaimed. Notably, the relevant parts of the specification and Claim 44 were not addressed in the reexamination proceedings. Therefore, I conclude that the evidence is not clear and unmistakable that the Patent Foundation disclaimed the option of having some overlap between step (c) and step (a).

I adopt the construction of Claim 1, limitation (d) proposed by the Patent Foundation, “repeating steps a, b and c, in that order, until a predetermined k-space volume is sampled,” which is best supported by the intrinsic evidence, as I describe above. Having found that step (c) and the subsequent step (a) need not be distinct, there is no logical contradiction between Claim 1 and Claim 44 that could render Claim 44 indefinite. Claim 44 merely encompasses an embodiment in which magnetization preparation is conducted during the magnetization recovery period, which is consistent with the descriptions in the specification of secondary preparation activities occurring during recovery. ‘282 Patent, Figure 1, page 2; *id.* col. 16, ll. 12-15. The Federal Circuit has set a high bar for finding a claim term indefinite, which is not met here because the claim terms are amenable to the constructions adopted herein. *See Praxair, Inc. v. ATMI, Inc.*, 543 F.3d 1306, 1319 (Fed. Cir. 2008) (“A claim will be found indefinite only if it is insolubly ambiguous and no narrowing construction can properly be adopted.”); *Datamize*, 417 F.3d at 1347-48 (“By finding claims indefinite only if reasonable efforts at claim construction prove futile, we accord respect to the statutory presumption of validity and we protect the inventive contribution of patentees, even when the drafting of their patents has been less than

ideal. In this way we also follow the requirement that clear and convincing evidence be shown to invalidate a patent.”).

E. Construction of “gradient echo sequence”

Claim 1, limitation (b) of the ‘282 Patent recites “a data acquisition period, said data acquisition period including at least two repetitions of a *gradient echo sequence* to acquire data for a fraction of k-space”. (emphasis added) The parties dispute the meaning of the term “gradient echo sequence.” Although the patent does not define “gradient echo sequence,” it defines “gradient echo” as follows:

A refocusing of phase coherence among spin isochromats at different positions along the magnetic field gradient resulting from (1) balanced negative and positive gradient pulses, or (2) balanced gradient pulses of the same sign on opposite sides of an RF pulse. A gradient echo does not refocus phase shifts due to static field inhomogeneities, susceptibility differences or chemical shift.

‘282 Patent, col. 19, ll. 25-33.

The Patent Foundation proposes defining the term as “a pulse sequence that includes just one RF pulse before reading out a line or multiple lines of data.”²¹ The Patent Foundation’s proposed construction is drawn from an identical definition of “gradient echo” provided in a textbook on the subject. *See* E. MARK HAACKE ET AL., *MAGNETIC RESONANCE IMAGING: PHYSICAL PRINCIPLES AND SEQUENCE DESIGN* 821 (1999). The Patent Foundation argues that the patent’s glossary definition of “gradient echo” should not be used to define “gradient echo sequence” because a gradient echo is a phenomenon that can be produced by a spin echo sequence as well as by a gradient echo sequence. According to this argument, the definition of

²¹ The Patent Foundation first argues that no construction is required. I reject this contention. There is no question that the meaning of these terms is in dispute and that claim construction by the Court is required.

“gradient echo” would not accurately capture the defining characteristics of a gradient echo sequence.

In contrast, GE proposes defining the term as “a sequence of pulses for creating and refocusing phase coherence among spin isochromats at different positions along the magnetic field gradient resulting from (1) balanced negative and positive gradient pulses, or (2) balanced gradient pulses of the same sign on opposite sides of an RF pulse.” GE reaches its construction by taking the first sentence of the patent glossary’s definition of “gradient echo” and modifying it to mean a “sequence of pulses . . . ,” not an echo. GE argues that by defining “gradient echo” in the glossary, the patentee acted as its own lexicographer, and gradient echo sequence should be defined by incorporating the patentee’s own choice of definition.

The Court begins its claim construction inquiry with the intrinsic evidence. On its face, the glossary definition describes a “refocusing of phase coherence” that results from balanced negative and positive gradient pulses or from balanced gradient pulses and a radiofrequency pulse. The glossary definition describes the *effect* of pulses on phase coherence; it does not describe a *sequence* of pulses.²² Thus, it does not appear from the language of the glossary definition alone that the meaning of gradient echo is interchangeable with that of gradient echo sequence. Because the patent’s glossary only defines gradient echo and not gradient echo sequence, and there appears to be a difference between the two, it is not controlling, though it remains relevant in light of the similarity of the terms employed.

Aside from the patent’s glossary, the specification provides other clues that are relevant to how a person of ordinary skill in the art would interpret the claim. The patentee specified that a gradient echo sequence “may be any one of the standard gradient-echo techniques such as

²² The extrinsic evidence shows that a “phase” in this context is the relative position of peaks and troughs of a signal. Phase coherence occurs where the peaks of one signal occur simultaneously with the peaks of another signal. CLINICAL MAGNETIC RESONANCE IMAGING, *supra*, at 1167.

FLASH, FFE, GRASS, FAST, or FISP, or some variant of these sequences as described below.” ‘282 Patent, col. 13, ll. 55-59; *see also id.*, col. 8, ll. 17-22 (“The 3D short-TR gradient-echo sequences can be divided into two general categories, those which employ a steady state of only the longitudinal component of the magnetization vector (e.g., FLASH, FFE) and those which employ a steady state of the complete magnetization vector (e.g., GRASS, FAST, FISP).”). Thus, the construction of gradient echo sequence must be broad enough to include “any one of the standard gradient-echo techniques” within its scope. Both parties maintain that their constructions would encompass these standard categories of pulse sequences. Another piece of evidence is found in Figure 2 of the patent, which depicts a FLASH gradient echo sequence as consisting of a single radiofrequency pulse and negative and positive gradient pulses. ‘282 Patent, Figure 2, page 3; *id.* col. 3, ll. 45-48. The negative and positive gradient pulses depicted are consistent with the patent’s glossary definition of gradient echo, which states that the echo may result from “balanced negative and positive gradient pulses.”²³

Because the intrinsic record does not resolve the ambiguity in the meaning of gradient echo sequence, the Court proceeds to examine the extrinsic evidence while recognizing that such evidence is considered less reliable than evidence from the patent itself. *See Phillips*, 415 F.3d at 1318. Both parties have submitted extrinsic evidence to assist the Court with determining the meaning of the disputed term. The glossary of definitions provided in the CLINICAL MAGNETIC RESONANCE IMAGING text is particularly helpful because it places a gradient echo sequence in the context of other pulse sequences and explains the relationship between a gradient echo and a pulse sequence. *See CLINICAL MAGNETIC RESONANCE IMAGING* 1168 (Robert R. Edelman & John R. Hesselink eds.) (1990). This source defines “pulse sequence” as a “[s]eries of radiofrequency and gradient pulses used to excite the spins and measure the MR [i.e., magnetic

²³ The Court does not find the prosecution history helpful in construing the claim term.

resonance] signal.” *Id.* Then, under the general heading of pulse sequence, the text provides the definitions for “gradient-echo sequence” and “spin-echo sequence.” *Id.* It defines a gradient echo sequence as a “[p]ulse sequence having a single radiofrequency (alpha) pulse. The echo is produced by reversal of the magnetic field gradients.” *Id.* The text also makes clear that a spin echo sequence involves *two* radiofrequency pulses rather than one and produces *both* a spin echo and a gradient echo. *Id.*

The definitions provided in the CLINICAL MAGNETIC RESONANCE IMAGING text are consistent, on balance, with the remainder of the extrinsic evidence submitted for this Court’s review. Both that text and the text authored by the Patent Foundation’s expert state that a gradient echo sequence uses a single radiofrequency pulse. *See HAACKE ET AL., supra*, at 821 (defining “gradient echo” as “[a] method which uses just one rf pulse before reading out a line or multiple lines of data”). The parties’ experts appear to agree that within a data acquisition period, a gradient echo sequence contains only one radiofrequency pulse, though additional radiofrequency pulses may be used in preparation or ancillary to the data acquisition period. (*See* Tr. 179:5-10, 180:10-17, 184:8-16; Haacke Dep. 168:19-23.) The patent proposes using a gradient echo sequence only within the data acquisition period. *See* ‘282 Patent, col. 22, ll. 16-20. The expert testimony also confirms that a gradient echo sequence produces a gradient echo, and a spin echo sequence produces both a spin echo and a gradient echo. (*See* Gore Dep. 136:19-21; Haacke Dep. 170:2-8.) Further, the CLINICAL MAGNETIC RESONANCE IMAGING text’s description of a gradient echo sequence as a type of pulse sequence is supported by other extrinsic evidence. *See* DAVID D. STARK & WILLIAM G. BRADLEY, JR., MAGNETIC RESONANCE IMAGING 1464 (1988); Haacke Dep. 168:17-23. Finally, the expert testimony indicates that the

phrase “(1) balanced negative and positive gradient pulses” describes the features of a gradient echo sequence. (*See* Tr. 183:9-14.)

Therefore, the extrinsic evidence demonstrates that a gradient echo sequence is not merely a sequence of pulses that create a gradient echo—such a sequence would also describe a spin echo sequence, which is a different type of sequence under the broader category of pulse sequences. Based on this insight, GE’s proposed construction is not entirely accurate because it fails to distinguish between a gradient echo sequence and a spin echo sequence. The key differences, according to the expert literature and testimony, are that a gradient echo sequence uses only one radiofrequency pulse before reading out a line of data and produces only a gradient echo, whereas the spin echo sequence uses at least two radiofrequency pulses before reading out a line of data and produces both a gradient echo and a spin echo. In order to remain faithful to the language chosen by the patentee in its glossary definition, I adopt the patent’s glossary definition but modify it to show that a gradient echo sequence is a type of pulse sequence, not an echo, and a gradient echo sequence involves only a single radiofrequency pulse, as compared to a spin echo sequence, which involves two.

These changes result in the following construction of gradient echo sequence: “a pulse sequence that includes just a single RF pulse for refocusing phase coherence among spin isochromats at different positions along the magnetic field gradient resulting from (1) balanced negative and positive gradient pulses, or (2) balanced gradient pulses of the same sign on opposite sides of an RF pulse.” It remains as faithful to the language used in the patent as one can while accurately describing a gradient echo sequence. This definition encompasses the various standard types of gradient echo sequences mentioned in the specification. *See* ‘282 Patent, col. 13, ll. 55-59; *id.*, col. 8, ll. 17-22.

I decline to adopt the Patent Foundation’s proposed construction because it does not incorporate any of the language actually used in the patent. Instead, it is drawn entirely from one extrinsic source. Further, that source only defines gradient echo, not gradient echo sequence. Because gradient echo is already defined in the patent, the Court will not substitute a different formulation from a specialized textbook for the one provided in the patent.

F. Construction of “desired contrast properties”

Claim 1, limitation (a) provides for “a magnetization preparation period in which a series of at least one of RF pulses, gradient field pulses, and time delays are applied to encode the *desired contrast properties* in the form of longitudinal magnetization”. (emphasis added) The parties dispute the meaning of the phrase “desired contrast properties.” The patent’s glossary defines “contrast” as “[t]he difference in signal intensity from two tissues, sometimes scaled to a reference intensity value.” ‘282 Patent, col. 18, ll. 33-34. The Patent Foundation argues that no construction for “desired” is required and proposes construing “contrast properties” to mean “properties causing signal intensity differences among tissues.” GE argues that “desired” should be construed to mean “known in advance and intended,” and “contrast properties” are “properties causing a difference in signal intensity from two issues.”

The Federal Circuit has provided guidance on a district court’s authority to decline to construe claim terms. It stated:

The *Markman* decisions do not hold that the trial judge must repeat or restate every claim term in order to comply with the ruling that claim construction is for the court. Claim construction is a matter of resolution of disputed meanings and technical scope, to clarify and when necessary to explain what the patentee covered by the claims, for use in the determination of infringement. It is not an obligatory exercise in redundancy.

U.S. Surgical Corp. v. Ethicon, Inc., 103 F.3d 1554, 1568 (Fed. Cir. 1997). In *U.S. Surgical*, however, the meaning of the claim terms was not disputed by the parties—the terms were understood to have their plain meaning. *Id.*; see also *Sulzer Textil A.G. v. Picanol N.V.*, 358 F.3d 1356, 1366-67 (Fed. Cir. 2004) (distinguishing *U.S. Surgical*).

More recently, the Federal Circuit has specified that a determination that a claim term needs no construction or has the plain and ordinary meaning “may be inadequate when a term has more than one ‘ordinary’ meaning or when reliance on a term’s ‘ordinary’ meaning does not resolve the parties’ dispute.” *O2 Micro Int’l Ltd. v. Beyond Innovation Tech. Co.*, 521 F.3d 1351, 1361 (Fed. Cir. 2008); see also *Attic Tent, Inc. v. Copeland*, 627 F. Supp. 2d 635, 640 (W.D. Va. 2008) (construing claim terms that might have commonly understood meanings because the parties disagreed about their meaning and technical scope); *Netscape Commc’ns Corp. v. ValueClick, Inc.*, 684 F. Supp. 2d 678 (E.D. Va. 2009) (construing the term “file” despite party’s argument that construction was unnecessary). In *O2 Micro*, the Federal Circuit held that the district court’s decision not to construe “only if” because it had a well-understood definition capable of application by the jury or the court was error. 521 F.3d at 1361. Even though the term might have had a common meaning, the parties still disputed the scope that should be encompassed by the claim language. *Id.* The Federal Circuit cautioned, however, that the dispute over the scope of the claim term must be “fundamental.” *Id.* at 1362.

With those principles in mind, I first consider whether it is necessary to construe “desired.” The Patent Foundation contends that the term “desired” is an ordinary term that is commonly understood and so it does not require further clarification by the Court. GE counters that “desired” has a specialized meaning in the context of a patent method claim that is contrary to the plain meaning. GE’s proposed construction would limit the scope of the patent claim to

instances where the contrast properties were known in advance and intended. Because there appears to be a dispute over the scope of the claim, this Court will ascertain the meaning of “desired” to the extent necessary to resolve the controversy.

The patent itself does not provide any special definition for the term “desired,” nor does it indicate that the term has taken on a specialized meaning.²⁴ This claim term is so simple that the ordinary meaning of the claim language as understood by a person of skill in the art is readily apparent. *See Sunbeam Prods., Inc. v. Hamilton Beach Brands, Inc.*, No. 3:09-cv-791, 2010 U.S. Dist. LEXIS 85281, at *4 (E.D. Va. Aug. 19, 2010). A property that is desired is one that is hoped for or wished for. *See* MERRIAM WEBSTER’S THIRD NEW INTERNATIONAL DICTIONARY 612 (2002) (defining “desired” as “1: that is longed or hoped for”); *id.* (defining “desire” as “1: to long or hope for: wish for earnestly: exhibit or feel desire for: covet”).²⁵ The patentee’s use of the term “desired” in this context does not by necessity require that the specific contrast properties be both known in advance and intended, as GE argues. No further consideration of this simple and non-technical term is deemed necessary.

I next consider the meaning of “contrast properties.” Upon review of the parties’ submissions, I gather that the disagreement pertains to whether the properties being encoded during the magnetization period are limited to properties that cause contrast between *only two tissues*, as GE argues, or that cause contrast between *two or more tissues*, as the Patent Foundation argues. If it were limited to properties that cause contrast between only two tissues, then in effect the patent’s scope would not cover any MRI scans of more than two tissues. At the

²⁴ GE has failed to show that a practitioner skilled in the art in question at the time the patent was filed would understand the use of the term “desired” in this context to mean “known in advance and intended.” The Federal Circuit’s interpretation of the term “desired” in *Datamize* was based on a completely different patent and context and does not resolve the dispute here. *See* 417 F.3d at 1356. As the Patent Foundation demonstrates, requiring a user to have both foreknowledge and intent of the contrast properties would be inconsistent with the use of the patented invention. (Haacke Dep. 204:18-205:5, 208:24-209:21.)

²⁵ Although it is the meaning of the term as of the date of the filing of the patent application that is relevant, there is no question that “desired” did not have a different meaning in 1993 than it did in 2002.

outset, GE's proposed limitation seems unlikely given that many MRI scans are of more than two tissues, and GE provides no rationale for why one of ordinary skill in the art would interpret the claims as being limited to contrasting only two tissues.

GE's argument goes to the scope of the claims, not the meaning of "contrast." Here, the patentee explicitly defined "contrast" as the difference in signal intensity "from two tissues." Where the patentee acts as his own lexicographer, he can vary the ordinary and customary meaning of the terms. In this case, the definition of contrast set forth in the patent comports with the common understanding of the term in the field. *See* STARK & BRADLEY, *supra*, at 1455 ("the difference in signal intensity between two tissues"); CLINICAL MAGNETIC RESONANCE IMAGING, *supra*, at 1160 ("difference in signal intensities of two objects"); *cf.* FONAR, MRI GLOSSARY (2003) (Ex. Q to Def.'s Opening Claim Constr. Br.) ("the relative difference of signal intensities in two adjacent regions of an image"); AMERICAN COLLEGE OF RADIOLOGY, GLOSSARY OF NMR TERMS (1984) (Ex. R to Def.'s Opening Claim Constr. Br.) ("the relative difference of the signal intensities in two adjacent regions"). Although contrast is generated by comparing two signals, the contrast *properties* relevant to an MRI scan need not be limited to those that show contrasts only between two tissues. The intrinsic evidence bears this observation out. At least two of the embodiments disclosed in the patent involve scans of more than two tissues. The preferred embodiment labeled Example I discloses a whole-body scan that involves imaging of at least five tissue types: stomach, bowel, cardiac, liver and fat tissues, and blood. '282 Patent, col. 17, ll. 34-41. The preferred embodiment labeled Example II discloses a head scan that involves imaging of at least three tissue types. '282 Patent, col. 17, ll. 64-66 ("the images do not show any significant susceptibility artifacts at air/soft tissue and bone/soft tissue interfaces"). If the claims were construed to cover only scans of two tissues, they would not cover those embodiments described

by the patentee. A proposed claim interpretation that excludes preferred embodiments is rarely, if ever, correct. *See SanDisk Corp*, 415 F.3d at 1285. I conclude that Claim 1, limitation (a) includes within its scope the encoding of contrast properties between two or more tissues. This construction most naturally aligns with the patent’s description of the invention. *See Phillips*, 415 F.3d at 1316.

G. Construction of “the magnetization system”

Claim 6 provides “[t]he method of Claim 1, wherein at least some of said RF pulses and/or gradient pulses applied during at least one of steps (a), (b), and (c) stabilize the magnetization system.” ‘282 Patent, col. 22, ll. 37-41. According to GE, the phrase “the magnetization system” is indefinite because 1) it does not have an antecedent, rendering its meaning unclear, and 2) it did not have a definite meaning when the patent was filed and no explanation of the meaning is provided in the patent. The Patent Foundation defends that the phrase is used in the specification and its meaning can be ascertained through intrinsic and extrinsic evidence.

The claim must be “insolubly ambiguous” and not amenable to a narrowing construction for the Court to find it indefinite. *Praxair*, 543 F.3d at 1319; *accord Datamize*, 417 F.3d at 1347-48. That high bar is not met here. The term “the magnetization system” is not found for the first time in dependent Claim 6. Although the term is not used in the other claims, its use in the specification provides a basis for its introduction in dependent Claim 6. The requirement of antecedent basis is a rule of patent drafting. The Manual of Patent Examining Procedure states that “obviously, however, the failure to provide explicit antecedent basis for terms does not always render a claim indefinite.” MPEP § 2173.05(e) (8th ed. Rev. 2, May 2004). As long as the term “has a reasonably ascertainable meaning” in context, it is not indefinite on the ground of

lack of antecedent basis. *Energizer Holdings v. Int'l Trade Comm'n*, 435 F.3d 1366, 1370 (Fed. Cir. 2006).

The meaning of “the magnetization system” can be ascertained through its use in the specification, which states:

Some or all of the RF pulses and/or gradient pulses applied during any of the steps can serve the purpose of stabilizing responses of the apparatus (such as eddy currents). In addition, or instead of the foregoing, some or all of the RF pulses and/or gradient pulses can be for the purpose of stabilizing the magnetization system, e.g., oscillations in signal strength.

‘282 Patent, col. 2, ll. 34-41. Sufficient information can be gathered from this passage for one of ordinary skill in the art to comprehend the meaning of the term. First, it is clear from the juxtaposition of the first and second sentences above that the magnetization system is not the same as the physical MRI apparatus, which is described in the first sentence. Second, the example provided of oscillations in signal strength indicates that the term “system” refers to the magnetization of the tissues in the region whose signals are being measured, not to a mechanical system that produces magnetization, like an MRI scanner. While the term does not appear to have been widely used at the time the patent application was filed, the Patent Foundation’s expert was able to understand the term upon reviewing the passage above. (*See Haacke Dep.* 204:16-205:19.)

GE only asks that the Court find the claim to be indefinite, and for the foregoing reasons, I decline to do so. Neither party requests the Court to define the term, so no claim interpretation dispute is presented. *See O2 Micro Int'l*, 521 F.3d at 1361; *Vivid Techs.*, 200 F.3d at 803.

H. Construction of “fixed” and “varies”

Claim 35 provides “[t]he method of claim 1, wherein the temporal order of k-space data collection is fixed.” Claim 36 provides “[t]he method of claim 1, wherein the temporal order of k-space data collection varies from sequence cycle to cycle.” The term “fixed” is also used in Claim 37, and the terms “varies,” “vary,” or “varying” are also used in Claims 11, 19, 26, and 27. GE requests that “fixed” be construed as “identical across all pulse sequence cycles” and “varies” (or its alternate forms) be construed as “changes from each one to the next.” The Patent Foundation argues that the Court should refuse to construe these terms because their plain meaning is clear to the trier of fact.

After reviewing each place in the patent where these terms are employed, I conclude that nothing in the patent or the remainder of the intrinsic record indicates that these terms should have anything other than their plain meaning. GE does not argue, and no evidence shows, that in the context of an MRI imaging technique these terms acquire a different meaning than their plain meaning. In addition, the terms in question do not have more than one ordinary meaning that could apply here. According to their ordinary dictionary definitions, “fixed” means not subject to change, and “varying” means changing. *See* MERRIAM WEBSTER’S COLLEGIATE DICTIONARY 441 (10th ed. 1994) (defining “fixed” as “1 . . . c (1): not subject to change or fluctuation”); *id.* at 1307 (defining “vary” as “1 a: to make a partial change in: make different in some attribute or characteristic”). The constructions proposed by GE would unduly limit the scope of the claims and have no basis in the specification or in the dictionary. Therefore, I hold that the meaning of “fixed” is not limited to “identical across all pulse sequence cycles,” and “varies” (or its equivalent form) is not limited to “changes from each one to the next.”

III. GE'S MOTION FOR PARTIAL SUMMARY JUDGMENT

GE moves for partial summary judgment, asking the Court to find that GE is not liable as a matter of law for any alleged infringement of the '282 Patent prior to the issuance of the reexamination certificate because accused infringers are shielded where an amendment to a patent substantively changes the patent. The Patent Foundation opposes the motion on several grounds. For the following reasons, I find that the patent's scope was substantively changed during reexamination, and accordingly grant GE's motion for partial summary judgment.

A. Standard of Review

The Court should grant summary judgment "if the pleadings, the discovery and disclosure materials on file, and any affidavits show that there is no genuine issue as to any material fact and that the movant is entitled to judgment as a matter of law." Fed. R. Civ. P. 56(c). "As to materiality . . . [o]nly disputes over facts that might affect the outcome of the suit under the governing law will properly preclude the entry of summary judgment." *Anderson v. Liberty Lobby, Inc.*, 477 U.S. 242, 248 (1986). In order to preclude summary judgment, the dispute about a material fact must be "'genuine,' that is, if the evidence is such that a reasonable jury could return a verdict for the nonmoving party." *Id.*; see also *JKC Holding Co. v. Wash. Sports Ventures, Inc.*, 264 F.3d 459, 465 (4th Cir. 2001). However, if the evidence of a genuine issue of material fact "is merely colorable or is not significantly probative, summary judgment may be granted." *Anderson*, 477 U.S. at 250.

B. Substantive Change

1. Applicable Law

35 U.S.C. § 307(b) governs the effect of a reexamined patent on alleged infringers during the period prior to issuance of the reexamination certificate. It states:

Any proposed amended or new claim determined to be patentable and incorporated into a patent following a reexamination proceeding will have the same effect as that specified in section 252 of this title for reissued patents on the right of any person who made, purchased, or used within the United States, or imported into the United States, anything patented by such proposed amended or new claim, or who made substantial preparation for the same, prior to issuance of a certificate under the provisions of subsection (a) of this section.

35 U.S.C. § 307(b). Thus, § 307(b) provides that the rules established in 35 U.S.C. § 252 for reissued patents apply to reexamined patents. *See Bloom Eng'g Co. v. N. Am. Mfg. Co.*, 129 F.3d 1247, 1249 (Fed. Cir. 1997).

The first paragraph of § 252 provides as follows:

The surrender of the original patent shall take effect upon the issue of the reissued patent, and every reissued patent shall have the same effect and operation in law, on the trial of actions for causes thereafter arising, as if the same had been originally granted in such amended form, but in so far as the claims of the original and reissued patents are substantially identical, such surrender shall not affect any action then pending nor abate any cause of action then existing, and the reissued patent, to the extent that its claims are substantially identical with the original patent, shall constitute a continuation thereof and shall effect continuously from the date of the original patent.

35 U.S.C. § 252.

Due to the operation of § 252, a cause of action for infringement of a patent during the period before the date of the issuance of the reexamined patent survives only if the claims of the original and reexamined patents are “substantially identical.” *Id.*; *Laitram Corp.*, 163 F.3d at

1346. Reexamined claims are substantially identical to the original claims if they are “without substantive change.” *Laitram Corp.*, 163 F.3d at 1346; *Seattle Box Co. v. Indus. Crating & Packing, Inc.*, 731 F.2d 818, 827-28 (Fed. Cir. 1984); *Bloom Eng’g*, 129 F.3d at 1249. Determining whether there has been a substantive change is a question of law for the Court to decide. *Westvaco Corp. v. Int’l Paper Co.*, 991 F.2d 735, 741 (Fed. Cir. 1993). The Court must inquire into whether the *scope* of the claims is substantially identical, not merely whether different words are used. *Laitram*, 163 F.3d at 1346; *Bloom Eng’g*, 129 F.3d at 1250 (noting that “the scope of the claims must be the same after reissue, not that the same words must be used”); *Westvaco Corp.*, 991 F.2d at 741 (“[I]t is the scope of the claim that must be identical, not that the identical words must be used.”) (quoting *Slimfold Mfg. Co., Inc. v. Kinkead Indus., Inc.*, 810 F.2d 1113, 1115 (Fed. Cir. 1987)). Claim changes that merely clarify language used in the claims are not substantive changes. *Westvaco Corp.*, 991 F.2d at 742; *Kaufman Co., Inc. v. Lantech, Inc.*, 807 F.2d 970, 977 (Fed. Cir. 1986). In determining whether there has been a substantive change, the Court analyzes “the claims of the original and the reexamined patents in light of the particular facts, including the prior art, the prosecution history, other claims, and any other pertinent information.” *Laitram*, 163 F.3d at 1347. The Federal Circuit in *Laitram* noted that “it is difficult to conceive of many situations in which the scope of a rejected claim that became allowable when amended is not substantively changed by the amendment.” *Id.* at 1348. A substantive change to an independent claim substantively changes the scope of its dependent claims. *See Fortel Corp. v. Phone-Mate, Inc.*, 825 F.2d 1577, 1581 (Fed. Cir. 1987).

2. Discussion

At the outset, I find that GE's motion is properly before the Court.²⁶ The first question I must consider is whether § 307(b), which triggers § 252, applies to the present matter. The Patent Foundation argues that on its face, § 307(b) provides that only an "amended or new claim" incorporated into a patent following a reexamination proceeding is treated the same as a reissued patent under § 252. Here, Claim 4 was canceled and Claim 41 was amended in an immaterial way, but Claim 1, which is at issue, was not explicitly amended during reexamination, and its language remains identical to before the reexamination.

The Court rejects the Patent Foundation's argument. In order to overcome the PTO's initial rejection of Claim 1 during reexamination, the Patent Foundation voluntarily canceled dependent Claim 4, the terms of which provided for a magnetization recovery period of time zero. I held above that prior to the cancellation of Claim 4, the magnetization recovery period in Claim 1 included the option of a period of time zero. After the cancellation, it is undisputed by the parties that the recovery period in Claim 1 does not include the option of a period of time zero. Thus, the amendment effected a change in meaning in Claim 1. Although no formal amendment was made to Claim 1, it was *amended in effect* when Claim 4 was canceled and the scope of Claim 1 changed.

At the time the patent application was filed, the Patent Foundation unilaterally sought and obtained a patent that included dependent Claim 4. It was only fifteen years later, when its claims were rejected by the Examiner in reexamination, that the Patent Foundation asserted that Claim 4 was not properly dependent from Claim 1. When the Patent Foundation canceled Claim 4, it was

²⁶ The Patent Foundation contends that GE's motion for protection from infringement via § 252 is an affirmative defense that must be pleaded and raised at trial, and it was not so pleaded in GE's answer. The Patent Foundation mischaracterizes GE's motion as one for intervening rights under the second paragraph of § 252. In fact, GE seeks a judgment of no liability pursuant to the first paragraph of § 252, which governs liability for infringement of the original claims of a patent prior to their amendment or reissue. That motion has been appropriately presented.

in the midst of this litigation, and had to have known that if it amended independent Claim 1 (and, perforce, all of its dependent claims) to state that the recovery period had to be finite, it risked losing the right to collect for any infringement prior to reexamination. So instead of explicitly amending Claim 1 to add that limitation, it sought to change Claim 1's meaning by canceling Claim 4. The Patent Foundation was only able to accomplish this feat because the language of Claim 1 had always been in tension with Claim 4 and with the statements in the specification that the magnetization recovery period could have a time of zero. Had Claim 1 been more carefully drafted to show that the recovery period was optional, the Patent Foundation would have had no choice but to formally amend Claim 1's wording in order to secure the validity of the patent over prior art. The Court will not permit the Patent Foundation to avoid application of § 252 through § 307(b) by taking advantage of the imperfect drafting of Claim 1 to change the meaning of Claim 1 indirectly, rather than through formal amendment.

Claim 1, then, has the same effect as a reissued patent under § 252, and the Court must consider whether the change in scope in Claim 1 was substantive. To reiterate, the magnetization recovery period originally encompassed the full range of possible time values, including zero, as I held in Section II.B.1, *supra*. After reexamination, both parties agree that the magnetization recovery period must be a finite period of time, and cannot be of zero duration.²⁷

In *Bloom Engineering*, the Federal Circuit held that the narrowing of a claim constituted a substantive change in the claim's scope. 129 F.3d at 1250-51. It found that the addition of the words "separate from the combustion air stream" limited the scope of the claims, excluding the possibility of an injected gas stream that includes combustion air. *Id.* And, as here, the patentee made the amendment in order to distinguish the patent from prior art. *Id.* at 1251; *see also*

²⁷ The Patent Foundation disclaimed the possibility of a recovery period of zero duration during reexamination. *See* Pl.'s Amendment at 14 (representing that the magnetization recovery period of Claim 1 "precludes an embodiment wherein the magnetization recovery period is zero or none").

Laitram, 163 F.3d at 1348. A change that is significant enough to differentiate the invention from prior art is likely to be substantive.

As in *Bloom Engineering*, the scope of Claim 1 has been narrowed in this case. Claim 1, the only independent claim in the patent, comprises a four-step “preparation-acquisition-recovery pulse sequence cycle” in which the fourth step is the repetition of the preparation-acquisition-recovery cycle. ‘282 Patent, col. 22, ll. 7-10, 24-25. Figures 1 and 2 clearly illustrate the preparation, acquisition, and recovery steps of the invention. Step 3, recovery, consists only of the magnetization recovery period. In the original patent, the recovery step was optional—it could have a value of zero, in which case there would be no recovery period and no T1 and T2 relaxation would occur before the start of the next preparation period. In other words, a three-step “preparation-acquisition” pulse sequence (as opposed to a four-step sequence) fell within the scope of Claim 1, as in the preferred embodiment of Example III, Figure 5, and original Claim 4. The change brought about by the amendment during reexamination renders the recovery step a required element of the claimed invention. Whereas before, one could infringe the ‘282 patent even with only a preparation-acquisition pulse sequence cycle repeated until data is collected, now such a cycle no longer would infringe the patent. The scope of the patent has been narrowed, and the possibility of not having a recovery period at all is now excluded.

One aspect of the recovery period here that was not present in *Bloom Engineering* is that a recovery period of minute length (e.g., relatively few milliseconds) will still satisfy the patent’s requirement that the recovery period be of finite duration. The difference between no recovery period and a very, very small one could be negligible in terms of the T1 and T2 relaxation that would occur in that time period. Still, a change in value or degree, even where minimal, can be a sufficiently substantive alteration in scope to surrender the original claims. For example, in

Seattle Box, the patentee amended the language of the claim during reissue proceedings, revising the original description of the height of a spacer block designed to keep pipes separated during shipping from “greater than” the pipe diameter to “substantially equal to or greater than” the diameter. 731 F.2d at 821-22. The Federal Circuit held that because the coverage of the patent broadened to include spacer blocks with a height substantially equal to the pipe diameter, which were originally excluded from the patent’s coverage, the scope of the patent changed in substance. *Id.* at 827-28. The court clarified that it is irrelevant whether the claim after amendment is “essentially identical” to the original claim. *Id.* at 828. As long as there is a change in the substance of the claim, not merely the words used, § 252 operates to bar a cause of action for infringement prior to the amendment. *See id.*

Quantum Corp. v. Rodime, PLC also supports finding that a small change in the range of possible values of an aspect of an invention is substantive. 65 F.3d 1577 (Fed. Cir. 1995). In *Quantum Corp.*, the patentee revised during reexamination the track density limitation of a hard disk from “at least 600” tracks per inch to “at least approximately 600” tracks per inch. *Id.* at 1579. The Federal Circuit held that the addition of the modifier “approximately” eliminated “the precise lower limit of that range, and, in so doing extend[ed] the scope of the range.” *Id.* at 1581. Thus, the court concluded that the change broadened the scope of the claim in violation of 35 U.S.C. § 305. *Id.*²⁸

In the present matter, the magnetization recovery period no longer encompasses a time of zero. Even though the recovery period might last for a time only slightly greater than zero, *Seattle Box* and *Quantum Corp.* teach that the difference in scope between a claim that allows a range equal to or greater than a particular value and one that only permits a range greater than

²⁸ 35 U.S.C. § 305 states, in relevant part, that “no proposed amended or new claim enlarging the scope of a claim of the patent will be permitted in a reexamination proceeding.”

that value is a substantive one. Therefore, I hold that as a result of the exclusion of the option of a recovery period of time zero, Claim 1 is not substantially identical to the original claim. Pursuant to § 252, GE cannot be held liable for any infringement of Claim 1 of the patent or its dependent claims prior to issuance of the reexamination certificate. GE's motion for partial summary judgment is granted.

IV. CONCLUSION

The claim terms shall be construed in accordance with this order. Constructions agreed upon by the parties shall be construed as agreed upon. For the reasons stated herein, GE's motion for partial summary judgment is granted. An appropriate order will follow.

The Clerk of the Court is hereby directed to send a certified copy of this Memorandum Opinion and the accompanying Order to all counsel of record.

Entered this 9th day of November, 2010.

/s/
NORMAN K. MOON
UNITED STATES DISTRICT JUDGE