

States (“the government”) through the Department of Defense (“DOD”), has infringed upon its patent, United States Patent No. 7,748,325 (“’325 patent”), entitled “Firearms Projectile.”

Since the mid-1990s, the DOD has been seeking a lethal, lead-free bullet to take the place of the former 5.56 x 45mm (.223 caliber) standard-issue NATO round, the M855. In 2010, the United States Department of the Army (“the Army”) began replacing the M855 with a new lead-free bullet, the M855A1 Enhanced Performing Round (“EPR”). The Army is seeking to also replace another bullet, the M80, with a similar lead-free design, designated as the M80A1 EPR.² During the development of this ammunition, an individual now associated with Liberty, PJ Marx, the inventor of the projectile covered by the ’325 patent, contacted individuals at the DOD to share his design for a new, lead-free projectile. Liberty further alleges that through these conversations with Mr. Marx, the Army copied its design and violated the terms of three non-disclosure agreements (“NDAs”) by disclosing confidential information within the Army to unauthorized recipients, including some who worked with vendors of ammunition to the Army. The government denies both of Liberty’s claims and asserts that the ’325 patent is invalid. An eleven-day trial was held in Washington, DC, commencing on June 23, 2014, and ending on July 8, 2014. Following post-trial briefing, a closing argument was held on October 24, 2014. The case is now ready for disposition.

FACTS³

A. Army’s Standard Ammunition

During the Vietnam War, the Army discontinued its use of its earlier standard projectile in favor of a .22 caliber bullet, the M855.⁴ See Pl.’s Pretrial Mem. at 1, ECF No. 56; see also Tr. 443:19-20 (Test. of George Joseph Phillips, Liberty’s CEO).⁵ The M855 was developed by

²The M80 is a 7.62 x 51mm rifle cartridge that previously served as the standard small-arms round among North Atlantic Treaty Organization (“NATO”) countries. It remains standard for light machine guns. The round is roughly equivalent to a .308 caliber or the original 30-06 cartridge.

³This recitation of facts constitutes the court’s principal findings of fact in accord with Rule 52(a) of the Rules of the Court of Federal Claims. Other findings of fact and rulings on questions of mixed fact and law are set out in the analysis.

⁴A round, also known as a loaded cartridge, constitutes one unit of ammunition containing: (1) a bullet, which is a solid projectile propelled from the ammunition upon firing; (2) a propellant, which is explosive gun powder; (3) a primer, which ignites the propellant; (4) a case, which holds the pieces of ammunition together; and (5) sometimes, a rim, found at the tail end of the ammunition and which holds the round in the barrel of the firearm. Caliber denotes the diameter of a bullet.

⁵Citations to the trial transcript are to “Tr. ___.” Citations to plaintiff’s exhibits are identified as “PX ___,” defendant’s exhibits are denoted as “DX ___,” and joint exhibits are referred to as “JX ___.” Plaintiff’s demonstrative exhibits are cited as “PDX ___.”

Belgium, Tr. 1554:23, 1557:9 (Test. of Dr. James Frederick Newill, Weapons and Materials Research Directorate's Force Application Capability Research Area Manager), and incorporates a hardened steel penetrator; a lead slug; and a forward-drawn copper jacket, JX 11 at 1 (M855 Design), JX 83 at 4 (M855 Technical Drawing).⁶ The M855 features a 5.56mm (.223 in) cartridge, JX 83 at 1, 4, and has a weight of 62 grains, JX 11 at 1. In 1983, the M855 became the standard NATO ammunition in its caliber and has been used in infantry deployments overseas. See Pl.'s Pre-Trial Mem. at 1; see also Tr. 306:7-8 (Test. of PJ Marx, '325 Patent Inventor). A similar, but larger and heavier lead projectile, the M80, is also used by the Army. See *supra*, at 2 n.2. The M80 weighs 147.5 grains, Tr. 2223:12 (Test. of Clarence Wesley Kitchens, Jr., defendant's technical expert) and is the standard NATO 7.62 mm (.30 in) cartridge, see Tr. 1699:20-21 (Newill).

In the 1990's, post-combat reports and surveys revealed discrepancies surrounding the lethality of the standard ammunition. Tr. 1523:23 to 1524:6 (Newill); see also JX 25 at 3 ("M855 Enhanced Performance Round (EPR) Media Day" (May 4, 2011)). Some soldiers were reporting instances of through-and-through hits on enemy combatants who would return fire despite being struck by the standard ammunition, while other infantry units were experiencing no issues with the projectiles' performance. Tr. 183:21 to 184:6 (Test. of Tyler Ehlers, a Mechanical Engineer with the Army Research Laboratories ("ARL")); see also JX 20 at 6 ("Improved Performance 5.56mm Desired Characteristics") ("We had a[n] enemy that had been hit 14 times in the fatal zone and was still returning fire on us. . . . [A]fterwards when we checked his body most of the shots went clean through him with minimal damage."). These inconsistencies were a result of the M855 and M80 being yaw-dependent. Tr. 53:4-5 (Test. of Lt. Col. Glenn A. Dean, III, U.S. Army); see also Tr. 181:5-13 (Test. of Lee Smith Magness, Jr., ARL).⁷ At a high angle of yaw, the projectile typically strikes a soft target without exiting the body. In doing so, the bullet transfers all of its energy within that target, which increases the severity of tissue damage and therefore, the likelihood of incapacitation. Conversely, at a low angle of yaw, the bullet may pass through a soft target. If it does not puncture a vital area, such as an organ, the through-and-through hit will only cause minimal damage because the projectile traverses the body without expending significant energy. Tr. 99:8-10 (Lt. Col. Dean); see Tr. 183:21 to 184:19 (Ehlers); see also Tr. 181:5-10 (Magness). Therefore, proficient marksmanship

⁶In the M855, the penetrator is at the front of the bullet, the slug consisting of a lead core is at the tail, and the jacket completely encompasses the penetrator and slug. See JX 11 at 1. The jacket of the M855 is forward-drawn, *i.e.*, the jacket "is formed, point first, the steel penetrator is inserted into the jacket, with the lead core behind, and then the projectile is crimped shut." JX 15 at 6 ("In Search of Lethality: Green Ammo and the Development of the M855A1 Enhanced Performance Round" (May 9, 2011)).

⁷Yaw is the rotation of a bullet along its longitudinal axis while in flight and yaw angle is the degree to which the bullet deviates from its line of flight. See Tr. 233:2-13 (Test. of Dr. Dipak Kamdar, Engineering Fellow with Alliant Techsystems ("ATK")). The amount of yaw depends on the environment; both the distance to the target and velocity of the projectile affect yaw. See Tr. 99:1-18 (Lt. Col. Dean). In a yaw-dependent bullet, such as the M855 and M80, tumbling, *i.e.*, high yaw, will affect lethality. See *id.*; see also Tr. 232:23 to 233:1 (Kamdar).

becomes a necessary factor for engendering incapacitation and preventing an enemy combatant from returning fire. *See* Tr. 51:11-15 (Lt. Col. Dean) (“The issue is . . . unless that through-and-through passes through a critical organ like the brain, you don’t incapacitate the target.”); *see also* Tr. 181:11-13 (Magness).

B. President Clinton’s Executive Order

In addition to the soft-target lethality issues in the standard ammunition, there were mounting concerns that lead from lead slugs at small-caliber firing ranges was penetrating soil and polluting ground water. *See* JX 32 at 1 (“Green Ammunition Phase II Program” (Apr. 7, 2005)); *see also* JX 125 at 3 (Small Business Innovative Research (“SBIR”) Program Proposal (Jan. 13, 2006)) (“The lead can leach through the soil and contaminate ground water, leading to exposure of the surrounding population.”). Given this concern, President Clinton signed Executive Order 12856 in 1993 which “mandated the elimination of 50 percent of the hazardous materials [in projectiles] by [1999].” Tr. 1952:15-18 (Test. of John R. Middleton, an Engineer with the U.S. Army Armament Research, Development, and Engineering Center); *see also* Tr. 2428:11-21 (Kitchens).

Recognizing the need to mitigate the negative environmental externalities associated with lead slugs and to enhance performance of its standard ammunition, the army initiated the Green Ammunition Program (“the Program”) in 1995. *See* JX 32 at 1. Participating in the Program were various Army departments and small-arms developers, including Project-Manager - Maneuver Ammunition Systems (“PM-MAS”), ARL, the United States Army Infantry Center (“USAIC”), and ATK. *See* JX 21 at 1 (“Green Ammunition Phase II Kick-off” (July 26, 2005)); *see also* JX 15 at 1. The Program’s goal was to develop a non-lead and yaw-independent bullet as an alternative to the Army’s standard .22 cartridge, the M855. Tr. 2424:11 to 2425:19 (Kitchens); JX 31 at 4, 11 (Briefing to Congressman Sherwood (Mar. 7, 2005)).

In the late 1990’s, the Army produced the M855 Lead-Free Slug (“M855 LFS”), which contained tungsten bound with tin or nylon in place of the lead core used in the M855. Tr. 1954:3-6 (Middleton); JX 83 at 9. The Army selected a tungsten core as a substitute for lead because the two metals have approximately the same density. Tr. 1954:18-22, 1960:2-5 (Middleton); *see also* JX 83 at 4. By 2003, the Army’s Lake City Army Ammunition Plant (“LCAAP”) was producing significant quantities of the M855 LFS. *See* Tr. 2002:8-9 (Test. of Frank Joseph Hanzl, U.S. Army Maneuver Ammunitions Systems Office’s Project Manager); *see also* Tr. 1956:4-5 (Middleton) (“[W]e had produced 88 million rounds [of the M855 LFS].”). However, the scale-up in production resulted in irregularities in the slugs. Specifically, anomalies created erratic and unstable flight trajectories. Tr. 1835:11-25 (Test. of Daniel J. Mansfield, ATK’s Design Engineer) (“There were failure rates [in the 855 LFS] that were approaching 50 percent, depending on the circumstances.”); *see also* Tr. 1516:14-19 (Newill) (“[The M855 LFS bullets] were getting keyholes, which means the round goes and hits the target sideways . . . indicating . . . at least sporadic performance problems with the [tungsten].”).

Consequently, in 2003, the Army initiated Phase I of the Green Ammunition Program to identify the manufacturing problem that was causing erratic flight in the M855 LFS and to find alternative slug materials that could replace the tungsten core. Tr. 1957:6-10 (Middleton); Tr.

230:23-25 (Kamdar). At the commencement of Phase I, PM-MAS directed scientists at ARL to begin searching for new slug materials and drafting other projectile designs. Tr. 1511:2-13, 1518:7-14 (Newill). Additionally, ATK, the contract operator for the LCAAP, began investigating potential causes of the erratic flight paths. Tr. 1833:25 to 1834:16 (Middleton). By summer 2004, ATK had determined that an error in the manufacturing process at LCAAP was creating unstable flight trajectories,⁸ and had found various tungsten-based materials that were acceptable replacements for the M855 LFS slugs. Tr. 1839:1 to 1840:6 (Mansfield). By this time, Dr. Newill and other scientists at ARL had also developed four redesigns of the projectile with slugs comprised of tungsten-derived materials. On July 27, 2004, ARL presented its conceptual designs to the Army. Tr. 1533:7-11 (Newill); JX 79 at 5-15 (“New Concepts for M855 5.56mm Ball Ammunition” (July 27, 2004)).

Despite identifying the source of erratic flight in the M855 and designing slug replacements, the Army was unsuccessful in its efforts to develop a non-lead and yaw-independent bullet during Phase I. Tungsten as a substitute for lead was no longer a viable solution for the Army because prices for the metal had rapidly increased, JX 32 at 1, *see also* JX 31 at 4 (finding that production of the M855 LFS was 50 percent more costly than that of a leaded bullet), and alternative slug materials proposed by ammunition developers proved equally ineffective because they were also derived from tungsten, JX 32 at 1. Furthermore, tungsten alloys presented environmental concerns. JX 33 at 6 (“5.56mm Green Ammo Program Strategy” (Apr. 14, 2005)).

C. Marx’s Experimental Work

Mr. Marx, a business owner living in Florida, was aware of the Army’s unsuccessful endeavors to develop a replacement projectile for the standard ammunition. *See* Tr. 288:2 to 293:10 (Marx).⁹ Despite having little experience in ammunition design, Mr. Marx set out to

⁸The consolidation process, in which the slug became consolidated in the jacket, was imperfect, leaving a small gap between these two components. During flight, this gap prevented the M855 LFS from “spinning fast enough to be gyroscopically stable.” Tr. 1519:16 to 1520:18 (Newill). The consolidation steps needed to be adjusted to account for the stiffness of tungsten powder when inserted into the jacket. Tr. 1839:22 to 1840:2 (Mansfield).

⁹Mr. Marx at the age of thirteen and with funds provided to him from his father became a minority partner in a retail music store. Tr. 280:10-16 (Marx). In this capacity he attended trade shows involving the music industry. *See* Tr. 281:8 to 282:23 (Marx). After finishing high school, Mr. Marx formed and became president of Lady Amplification USA (“Lady”), a music distribution company. Tr. 283:1-6 (Marx). While president of Lady, Mr. Marx created a product line of vacuum tube amplifiers and electromagnetic transducers for the domestic market. Tr. 283:3 to 284:19 (Marx). He later formed PJ Marx Pickups and Electronics, which focused on transducers and guitar assembly work. *See* Tr. 286:5 to 287:3 (Marx). Mr. Marx received two United States patents for his guitar assembly designs. Tr. 285:12-15 (Marx). He currently is the inventor of ten United States patents. The majority of these patents involve Mr. Marx’s music-related endeavors. Tr. 285:7-15 (Marx). In the late 1990’s Mr. Marx moved from Nashville,

design a lethal, lead-free 5.56mm NATO round. Tr. 360:20 (Marx). His interest stemmed from the 9/11 attacks. Specifically, Mr. Marx felt obligated to “to try to make a contribution to the war effort.” Tr. 289:7-12 (Marx). After the 9/11 tragedy, Mr. Marx sold his business, and in 2003 he began meeting with members of the firearms industry to explore solutions to the M855. Tr. 289:7-12, 290:2 to 293:6 (Marx). During summer 2004, parallel in time to the Army’s Phase I presentations, *see supra*, at 5, Mr. Marx conceived of the Enhanced Performance Incapacitative Composite (“EPIC”) round, JX 122 at Attach. (EPIC Brochure). Comparable to the M855, the EPIC ammunition featured a 5.56mm bullet, but had a greater mass (approximately 100 grains) and fragmented upon striking a soft target. Tr. 297:17 to 300:25 (Marx); JX 122 at Attach.¹⁰ According to Mr. Marx, the EPIC prototype projectile displayed “a much higher ballistic coefficient,¹¹ better penetration[,] and excellent terminal effects against soft targets,” JX 122 at Attach., which could improve “the performance of [the Army] personnel’s existing weapons,” JX 4 (Letter from Marx to Lt. Col. Dean (Nov. 16, 2004)).

In the fall of 2004, Mr. Marx contacted Lt. Col. Dean, then Chief of Small Arms for the U.S. Army Infantry Directorate of Combat Development at Ft. Benning, to discuss the possibility of commercializing his invention with the Army. JX 4; Tr. 47:22 to 48:1 (Lt. Col. Dean). “[L]ooking at multiple opportunities to bring forth technology to the Army,” Tr. 350:15-16 (Marx), Mr. Marx also spoke with Paul Riggs, then Director of the Green Ammunition Program, to arrange a meeting, which took place at Picatinny Arsenal on February 16, 2005, *see* Tr. 352:9-19 (Marx). At this meeting, Mr. Marx presented a 5.56mm EPIC prototype, but did not leave any rounds with Mr. Riggs or engage in technical discussions. Tr. 351:6-20 (Marx); Tr. 2100:23 to 2101:6 (Test. of Paul Riggs, Office of PM-MAS).¹²

The next day, on February 17, 2005, Mr. Marx met with Lt. Col. Dean and his civilian aide, John Amick, at Ft. Benning. Tr. 321:7-12 (Marx). To protect the proprietary projectile design, Mr. Marx had previously requested that Lt. Col. Dean and Mr. Amick sign a NDA on behalf of the government, which provided that the countersigning party would keep secret all confidential information disclosed by Mr. Marx. JX 3 (the “Dean NDA”); Tr. 319:9 to 320:10

where he had been touring with musical groups and playing guitar, to Florida. Tr. 287:14 to 288:5 (Marx).

¹⁰Once a bullet fragments, or breaks apart, the detached pieces traverse the body in distinct “wound channels,” which compound the degree of injury. Tr. 381:5-7, 418:16 (Marx); Tr. 575:4-7 (Test. of Randall Michael German, plaintiff’s Technical Expert).

¹¹The higher the ballistic coefficient, the longer a projectile will travel. Tr. 963:16-17 (Test. of Thomas “Tucker” Champion, a contractor with United States Special Operations Command (“SOCOM”)).

¹²Mr. Marx testified that at the February meeting, Mr. Riggs “refused to sign [a NDA], claiming that he didn’t have the authority.” Tr. 351:1-3 (Marx). Mr. Riggs did not recall any such conversation with Mr. Marx. Tr. 2100:11-20 (Riggs).

(Marx).¹³ Upon executing the Dean NDA, Mr. Marx supplied Lt. Col. Dean and Mr. Amick with fifty rounds of the 5.56mm EPIC ammunition along with performance test results. Tr. 361:8-14 (Marx); Tr. 491:12 to 492:18 (Amick). Following the meeting, and without going “into too many details” so as to “respect [Mr. Marx’s] concerns about confidentiality,” Lt. Col. Dean contacted various small-arms developers at the Army and at SOCOM to highlight the projectile’s “very promising technology that line[d] up well with [the Army’s] lethality improvement efforts” and to illustrate the potential uses and alternative applications surrounding the design. JX 8 (E-mail from Lt. Col. Dean to Vernon Shisler, *et al.* (Feb. 17, 2005)). Lt. Col. Dean also suggested that the EPIC round be considered “as an alternative” ammunition within the Green Ammunition Program, recognizing the need for further evaluations by the Army. *Id.* Subsequently, in March 2005, Mr. Amick sent Mr. Riggs and the United States Army Marksmanship Unit a subset of the fifty EPIC rounds for testing. *See* JX 37 (E-mail from Amick to Marx (Mar. 15, 2005)).

D. Transitional Events

On May 11, 2005, Mr. Marx attended an Industry Day conference, co-hosted by Mr. Riggs, to further his connections in the small arms community and to learn more about the Green Ammunition Program. Tr. 367:23 to 368:2 (Marx); JX 36 at 3 (“Welcome to Green Ammo Industry Day” (May 11, 2005)). Program participants expected to hear about “the status of the [P]rogram, and [who] would be potential suppliers of a concept in Phase II,” and were disappointed when they discovered that Phase II of the Program would primarily be a “joint government/ATK [re]design effort” and that the Army would no longer be considering slug replacement designs from the industry. Tr. 2110:9 to 2113:22, 2118:17 to 2119:1 (Riggs); JX 36 at 18-19. Consequently, Mr. Riggs suggested to Mr. Marx that he might pursue commercializing the EPIC technology with a boutique customer, such as SOCOM. Tr. 2112:21 to 2113:12 (Riggs).

On June 23, 2005, Mr. Marx met with Thomas Champion, a contractor at SOCOM, to discuss the EPIC round. Tr. 961:6-12 (Champion). Mr. Champion was interested in submitting a SBIR proposal¹⁴ involving ammunition with enhanced ballistics and was aware that Mr. Marx had designed a heavier projectile with a large ballistic coefficient. *See* Tr. 963:11 to 965:16 (Champion). After signing a second NDA (the “Champion NDA”), Mr. Marx provided Mr. Champion samples of the 5.56mm EPIC round and disclosed information about the proprietary design. JX 124 (Champion NDA); JX 48 (E-mail from Champion to Shawn Spickert-Fulton (Aug. 5, 2005)). Mr. Champion subsequently e-mailed technical and performance data, such as “gel shots” and a descriptive brochure about EPIC, to members of the Army, with the disclaimer that

¹³The Dean NDA “imposes an affirmative duty to hold [disclosed] information in confidence and protect it from dissemination to and use by an unauthorized person. In the absence of the Disclosing Party’s prior written consent, the Receiving Party shall not reproduce nor disclose the Confidential Information to any third party.” JX 3 § 2.1 (Dean NDA).

¹⁴The SBIR program awards research and development grants to eligible small businesses looking to commercialize a product. *See* Tr. 964:15-19 (Champion).

they “[t]reat th[e] [information] as proprietary.” JX 122 (E-mail from Campion to Charles Marsh, *et al.* (Aug. 18, 2005)).¹⁵

By this time, Phase II of the Green Ammunition Program had commenced with a redirected purpose to design a cost effective lead-free 5.56mm projectile that would also be more lethal than its predecessor, the M855. JX 21 at 4. Several prototypes were designed and tested. *See* JX 11 at 3-25. ATK had previously submitted ammunition redesigns to the Army, DX 584 at 10 (“Preliminary Program Review” (Feb. 22-24, 2005)), Tr. 1849:6 to 1850:1 (Mansfield), and it provided the initial two concepts. Concept A comprised a modified M855 projectile with a full metal jacket and a copper slug. JX 11 at 3. Concept B, later designated as B1, featured a three-component projectile having a reverse jacket,¹⁶ exposed penetrator, and copper slug. *See* DX 214 at Attach. (E-mail from Mansfield to Kamdar & Dr. Joseph South (Aug. 19, 2005)); *see also* DX 122 at 1, 5 (South Lab Notebook (Aug. 2, 2005)).¹⁷ During July and August 2005, ATK made final design modifications for Concept B and carried out computer-based simulations to determine its lethality and large-scale manufacturing capability. *See* Tr. 1649:23 to 1653:13 (Newill); *see also* JX 11 at 4-6. The tests were completed in October 2005 with mixed results; although Concept B was yaw-independent, it received low performance ratings. Tr. 1677:5-23 (Newill).

E. Marx’s Patent Application

On October 21, 2005, Mr. Marx filed a patent application for the EPIC projectile, which in due course led to issuance of the ’325 patent on July 6, 2010. PX 1 at 2 (the ’325 patent). After applying for the patent, Mr. Marx assigned the rights to his invention to Liberty, a business he formed in 2005. JX 132 (Assignment of Rights in Patent Application (Apr. 5, 2010)); Tr. 416:19 to 417:3 (Marx).¹⁸ The patent describes a three-component projectile, one embodiment

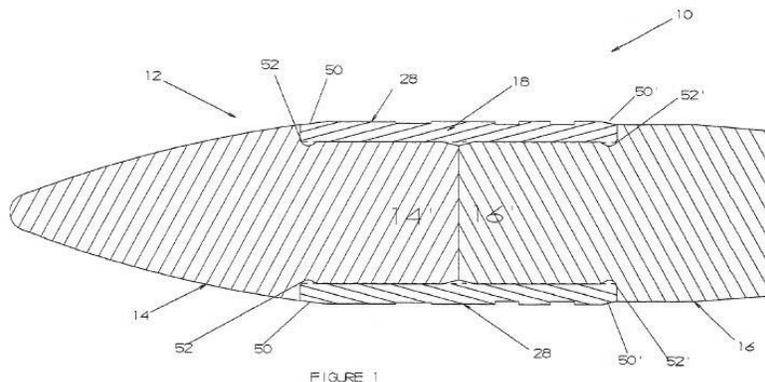
¹⁵“Gel shots” are either photographs or videos of projectiles fired into translucent blocks of gelatin, or the actual gelatin blocks after being hit by the fired projectiles. *See, e.g.*, Tr. 221:10-16 (Magness).

¹⁶In a bullet having a reverse-jacketed design, the jacket is drawn last. Specifically, “the slug is first inserted [into a cup,] and then the penetrator is inserted, and then the jacket [cup] is deformed around the rear portion of the penetrator.” Tr. 218:9-12 (Ehlers); Tr. 1815:12-13 (Newill). This “method of construction . . . results in a [uniform tapered base] and more consistent dispersion performance.” JX 15 at 6.

¹⁷Concept A and Concept B originated as Concept 1 and Concept 2, respectively. Tr. 1602:23 to 1604:5 (Newill).

¹⁸Mr. Marx is “an Officer and Chief of Research and Development of Liberty.” Mem. of Law of Pl. in Opp’n to Def.’s 12(b)(1) Mot. to Dismiss Counts II and III of the First Amended Complaint for Lack of Subject Matter Jurisdiction, Ex. 2, at ¶ 2 (Aff. of PJ Marx (Aug. 27, 2011)), ECF No. 14. After starting Liberty as a sole proprietorship, the business became “Liberty Ammunition Inc., a Florida corporation, Liberty Ammunition LLC, a Delaware Limited Liability Company – [and ultimately took] its current form[,] Liberty Ammunition Inc., a

of which has an exposed steel nose (penetrator), an exposed copper tail (slug), and a copper interface (in place of a jacket) interconnecting the head and tail portions together during discharge and flight. *See generally* '325 patent. The interface portion is engineered to create a reduced area of contact between the projectile and the rifle barrel, thereby decreasing barrel friction and increasing the life of the gun barrel. '325 patent, col. 2, lines 39-49. These components of this embodiment are represented in Figure 1 of the patent:



Id. at 3.

This tripartite lead-free design “overcome[s] the disadvantages and problems associated with conventional firearm projectiles.” '325 patent, col. 2, lines 35-37. The bullet of the invention is capable of penetrating a hard target, but engages in controlled fragmentation upon hitting a soft target, *id.*, col. 2, line 62 to col. 3, line 11. Controlled fragmentation is “facilitated by one of both of the nose and tail portions being removably attached or connected to the interface.” *Id.*, col. 2, lines 62-67. An additional benefit of the patented invention is that it “may be produced on a mass scale using materials and manufacturing equipment currently available and known in the projectile production industry.” *Id.*, col. 3, lines 36-38.

The '325 patent contains two independent claims (Claims 1 and 32) and forty dependent claims. Claim 1 reads as follows:

A projectile structured to be discharged from a firearm, said projectile comprising:

a body including a nose portion and a tail portion,

said body further including an interface portion disposed in interconnecting relation to said nose and tail portions, said interface portion structured to provide controlled rupturing of said interface portion responsive to said projectile striking a predetermined target,

Delaware corporation by conversion of the LLC pursuant to § 265 of the Delaware Corporation Law.” *Id.* ¶ 10.

said interface portion disposed and dimensioned to define a reduced area of contact of said body with the rifling of the firearm,

said interface portion maintaining the nose portion and tail portion in synchronized rotation while being fixedly secured to one another by said interface portion whereby upon said projectile striking said predetermined target said interface portion ruptures thereby separating said nose and tail portions of said projectile.

'325 patent, col. 7, line 57 to col. 8, line 5.

Claim 32 recites:

A projectile structured to be discharged from a firearm, said projectile comprising:

a body including a nose portion and tail portion,

said body further including an interface portion disposed intermediate opposite ends of said body in interconnecting relation to said nose and tail portions, said interface portion structured to provide controlled rupturing of said interface portion responsive to said projectile striking a predetermined target, said interface portion maintaining said nose portion and tail portion in synchronized rotation while being fixedly secured to one another by said interface portion whereby upon said projectile striking said predetermined target said interface portion ruptures thereby separating said nose and tail portions of the projectile; and

said exterior surface of said interface portion disposed and structured to define a primary area of contact of said body with an interior barrel surface of said firearm.

Id., col. 9, line 55 to col. 10, line 16.

Additionally, a series of claims dependent upon Claim 1 describe embodiments in which the interface encloses at least one of the nose or tail. These dependent claims derive either directly or indirectly from Claim 8, which provides:

A projectile as recited in claim 1 wherein said interface comprises an at least partially hollow interior dimensional and configured to receive at least one of said nose or tail positions therein.

'325 patent, col. 8, lines 27-30. As a result, either a forward-drawn or reverse-jacketed design is contemplated by Claim 1 and Claim 8.

F. Marx's SBIRs with SOCOM

At the time the patent application was filed, the Army Marksmanship Unit was evaluating the performance of the EPIC rounds previously provided by Mr. Marx. On November 1, 2005, the Army Marksmanship Unit tested ten out of the fifty rounds and found weaknesses in the bullet's muzzle velocity, precision, and target penetration capability. *See* Tr. 539:17 to 545:18 (Amick); *see also* DX 212 (E-mail from Troy Lawton to Amick (Nov. 1, 2005)).¹⁹ Mr. Marx was "surprised by th[ose] data," because they were "inconsistent" with his own test results, Tr. 374:7-10 (Marx), and he was also "uncomfortable with the fact that [his ammunition] was tested in a weapon . . . that didn't appear to be a part of the weapons that were being utilized by the U.S. Army," Tr. 375:17-25 (Marx). Mr. Marx subsequently requested that the Army return the remaining EPIC rounds to him. Tr. 376:1-4 (Marx); *see also* DX 63 (E-mail from Marx to Amick (Jan. 3, 2006)).²⁰

Mr. Marx then focused his efforts on a SBIR contract with SOCOM, collaborating with Mr. Champion to complete a Phase I SBIR proposal. *See* Tr. 375:24-25 (Marx) ("I felt that . . . my time was better spent working with SOCOM"). Shortly thereafter, on January 1, 2006, Mr. Marx entered into a third NDA with Charles Marsh (the "Marsh NDA"), a Navy employee at the Crane Naval Surface Warfare Center. JX 131 (Marsh NDA).²¹ Mr. Champion had requested that Mr. Marx execute a NDA with Mr. Marsh because Mr. Marsh worked closely with SOCOM and had experience with SOCOM weapon systems. Tr. 340:7-19 (Marx).²²

The SBIR Phase I proposal, with an objective to evaluate the performance of the EPIC ammunition and to make necessary modifications, was submitted on January 13, 2006. JX 125 at 1, 13. It recited that "Liberty . . . ha[d] developed green 5.56mm projectiles with range from 98-126 grains," plus a "62 grain, green copper alloy 5.56mm projectile." JX 125 at 3-4, 9-11; *see also* Tr. 379:4-24 (Marx). The proposal featured a three-component projectile capable of controlled fragmentation and comprising the same interface with exposed copper slug and steel penetrator as found in an embodiment of the application that resulted in the '325 patent. JX 125 at 7, 9-11. Dr. Newill and two additional evaluators reviewed Liberty's SBIR proposal for its

¹⁹"The lower the velocity . . . the more time that mother nature has the ability to move the round or affect the round as it [is] going down range. Also, the lower the velocity, the lower the . . . [hard and soft] target [penetration] potential associated with ammunition." Tr. 541:24 to 542:6 (Amick).

²⁰Although ten out of the fifty rounds were tested, Mr. Marx testified that the Army only returned "26 or so samples" of the EPIC ammunition. Tr. 377:7-17 (Marx).

²¹Except for the name of the countersigning party, the Marsh NDA is identical to the Champion NDA. *Compare* JX 124 (Champion NDA), *with* JX 131 (Marsh NDA).

²²Mr. Champion testified that he was "pretty sure" that Marx sent a subset of the 5.56 EPIC ammunition to Mr. Marsh. Tr. 985:2-4 (Champion); *see also* JX 48 at 2 (E-mail from Champion to Mark Minisi (Aug. 4, 2008)). According to Mr. Marx, he did not provide Mr. Marsh with any EPIC rounds, Tr. 659:9-12 (Marx), and there is no evidence in the record showing that Mr. Marsh received samples of the EPIC ammunition.

technical merit and documented their findings in a written report. Tr. 1749:10-22 (Newill). Although Dr. Newill did not retain a copy of this report, Tr. 1750:3-5 (Newill), computer records from SOCOM reveal that he accessed the proposal on July 31, 2006. JX 89 at 1 (SOCOM Computer Records).²³

G. Army's Completion of Development

Given the problematic results for Concept B, *see supra*, at 8, ATK revisited an earlier prototype that it had developed, Concept L, in October 2006. JX 24 at 25 (“Green Ammo Status” (Oct. 10, 2006)). Concept L was similar in structure to Concept B; both featured a reverse jacket, copper slug, and steel penetrator. *See* Tr. 1677:12-23 (Newill); *compare* JX 24 at 16 (Concept B design), *with* JX 14 at 25 (Concept L design). In spring 2007, two versions of Concept L, L2 and L3, were designed to replace the M855. While both had an optimal weight of approximately 64 grains,²⁴ displayed fragmentation behavior when striking a soft target, and featured a reverse jacket and steel penetrator, Concept L2 employed a bismuth-tin slug, while Concept L3 used a copper slug. Tr. 1686:13 to 1687:4 (Newill); JX 11 at 24-25. The Army first produced the L2 concept in May 2007, *see* Tr. 1687:16 to 1688:1 (Newill), but later replaced the bismuth-tin slug with a copper slug, featured in L3, after qualification testing revealed that bismuth-tin slugs lost their shape under high temperatures, Tr. 1695:9-14 (Newill).

At the time of the L3 production by the Army and ATK, Liberty was awarded a SBIR Phase I contract for \$90,000. Liberty and SOCOM completed the ballistics tests outlined in the SBIR Phase I proposal and presented the results in a Phase I report on August 30, 2007. Tr. 387:4-13 (Marx); JX 126 (Liberty SBIR Phase I Report). In 2010, for the SBIR Phase II contract, SOCOM requested that Liberty “scale down [its] lead-free exposed-tip, [three]-piece 5.56mm Enhanced Performance Round, [which] had demonstrated both superior penetration of hard targets and terminal effects in soft issue in [the] Phase I SBIR.” DX 270 at 9 (Liberty SBIR Phase II Report). Specifically, Liberty was asked to create a 4.6mm prototype projectile that would “exhibit enhanced internal, external[,] and terminal ballistics performance, as well as defeat intermediate barriers such as auto glass and doors, when fired.” *Id.* at 9. In March 2013, Liberty submitted a Phase II test report summarizing its progress. *See id.*

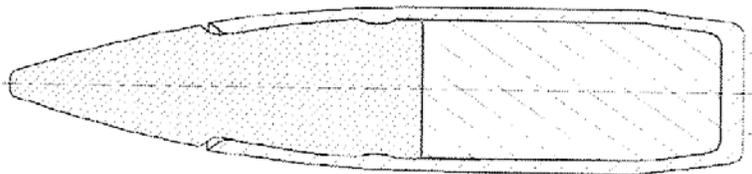
The projectile design found in L3 became what is now designated as the M855A1 Enhanced Performance Round and achieves several enhancements not found in M855.²⁵ These

²³Although all of the information contained in the SBIR proposal was considered confidential under SBIR regulations, *see* Tr. 1766:10 to 1767:5 (Newill); *see also* JX 125, the EPIC projectile disclosed in the ’325 patent became public knowledge after the patent application was published on April 26, 2007. *See* ’325 patent at 1.

²⁴ARL had previously determined that the weight of the original M855, 62 grains, was optimal for a 5.56mm projectile. DX 156 at 13-14 (“Projectile Mass Study”).

²⁵“On May 7, 2010, the Army submitted Patent Application No. 61332631 for its bullet, but this application apparently has been abandoned.” *Liberty Ammunition, LLC v. United States* (“*Liberty Ammunition II*”), 111 Fed. Cl. 365, 370 n.6 (2013).

include superior hard target performance, greater soft target lethality, higher velocity, and reduced muzzle flash. *See* JX 15 at 5-9.²⁶ The design of the M855A1, reproduced below, exhibits a tripartite construct comprising: a steel nose ogive with an exposed tip,²⁷ a tail portion containing a copper slug, and a surrounding thin jacket that connects the nose and tail. Moreover, the jacket of the M855A1 is designed to rupture upon soft target impact, regardless of the yaw angle. *See* Tr. 2366:16-21 (Kitchens); *see also* JX 25 at 5-7. These enhancements are also achieved by Liberty's EPIC projectile and are highlighted in the '325 patent. *See supra*, at 9-10. Indeed, after examining the exterior surfaces of the EPIC and M855A1 EPR projectiles, a senior contractor for the SOCOM "thought there was a fairly direct similarity between [the two designs]." Tr. 778:25 to 779:6 (Test. of John D. Bennett, SOCOM's Acquisition Logistician).



JX 54 at 2 (M855A1 Technical Drawing).

H. Army's Adoption and Fielding of the M855A1

The M855A1 EPR was fielded in Afghanistan in 2010 and has since replaced the M855 round. *See* Tr. 1694:17-25 (Newill); *see also* JX 15 at 11. The developers of the M855A1 have been awarded DOD's highest acquisition award for their exemplary contribution to small arms ammunition. JX 80 ("PEO Ammunition Team wins DOD's highest award" (Oct. 5, 2012)) ("The result is the most effective and technically advanced small caliber cartridge ever developed, designed to equip our troops with improved ammunition quickly, while also supporting the Army's requirement for an environmentally friendly projectile" (quoting Col. Paul Hill, PM-MAS)). As of 2013, LCAAP had produced over one billion rounds of the M855A1, *see* Tr. 892:4 (Test. of Kimberly Mary McCleerey, PM-MAS Acquisition Manager), *see also* Tr. 2041:8-9 (Hanzl), which is now the Army's .22 caliber standard issue ammunition, Tr. 306:9-10 (Marx).

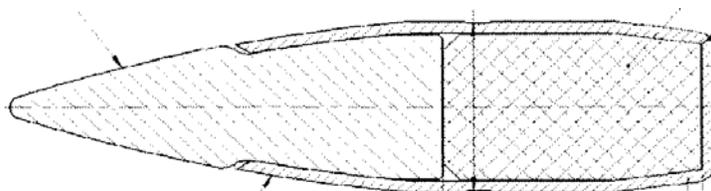
I. Adoption of the M80A1

"As soon as [the Army] knew [they] were very likely to be successful with the M855A1," Tr. 1698:15-16 (Newill), they began exploring how to "integrate to the M80 projectile the same types of performance gains achieved in the M855A1 while removing the lead from the projectile

²⁶Muzzle flash refers to the flare of light created by the combustion of propellant in the cartridge upon firing. *See* JX 15 at 8.

²⁷In architectural terms, an ogive is a curved, pointed arch, often represented in Gothic windows or fan vaulting. *See Merriam-Webster Online Dictionary*, ogive, available at www.merriam-webster.com/dictionary/ogive. For projectiles, an ogive can appear as a streamlined, elliptical, rounded nose.

due to environmental reasons.” DX 175 at 7 (Defendant’s Responses to Plaintiff’s Third Set of Interrogatories); Tr.189:12-18 (Ehlers). The 7.62mm M80A1, reproduced below, is the Army’s most recent prototype round. Similar to the M855A1, the projectile of the M80A1 EPR employs a steel penetrator, copper slug, and reverse copper jacket that ruptures upon striking a soft target. However, the M80A1 features different dimensions and detailed features from those of the M855A1. DX 175 at 7-9; *see* Tr. 1443:24 to 1445:6 (Middleton). As of the date of the trial, qualification and performance evaluations were still being performed on the M80A1. *See* Tr. 1699:10-11 (Newill).



JX 144 at 2 (M80A1 Technical Drawing)

PROCEDURAL HISTORY

Liberty filed suit in this court on February 8, 2011 alleging that the Army’s “Green Bullet” technology found in the M855A1 and the M80A1 infringed upon its ’325 patent, and that Army breached its contractual obligations set forth in three NDAs by disclosing confidential information to potential vendors. *See* Compl. at 2-3. After the government moved to dismiss the breach-of-contract count, Liberty amended its complaint and included a pendent claim for unfair competition under the Lanham Act and state law. *See* First Am. Compl., ECF 9. At that point, the parties stipulated to a denial of the government’s motion to dismiss, *see* Joint Stipulation Regarding Pl.’s First Am. Compl. (July 18, 2011), ECF No. 11, and the government filed its second motion to dismiss on July 28, 2011 seeking to dismiss Liberty’s breach-of-contract and unfair competition claims, *see* Def.’s Mot. to Dismiss Counts II & III of the First Am. Compl., ECF No. 13. Following briefing and a hearing, the court held that the Anti-Assignment Act did not bar its subject matter jurisdiction over Liberty’s breach-of-contract claim, but dismissed Liberty’s pendent Lanham Act and unfair-competition claim for lack of jurisdiction. *Liberty Ammunition, Inc. v. United States* (“*Liberty Ammunition I*”), 101 Fed. Cl. 581, 586-92 (2011).

The parties then proceeded to submit briefs on claim construction and to present oral arguments at a *Markman* hearing held on March 22, 2013. The court issued an order on June 13, 2013, construing fifteen terms of the patent. *Liberty Ammunition II*, 111 Fed. Cl. at 368-81.²⁸

²⁸Most importantly for this post-trial decision, the court adopted a construction of “reduced area of contact,” as meaning that the area of contact between the interface and the rifling of the firearm is less than that of a traditional jacketed lead bullet of calibers .17 through .50 BMG,” and held that “intermediate opposite ends” means that the interface is positioned between or in the middle of the opposite ends of the forward end of the nose portion and the trailing end of the tail portion.” *Liberty Ammunition II*, 111 Fed. Cl. at 375, 380. For the additional thirteen claims construed by the court, *see id.* at 371-80.

After the parties completed discovery, an eleven-day trial began on June 23, 2014. In aid of trial, the parties filed pre-trial briefs addressing the issues of patent infringement, breach-of-contract, and damages. Following post-trial briefing and closing argument, the case is ready for disposition.

STANDARDS FOR DECISION

A. Patent Infringement

Section 1498(a) of Title 28 serves as a congressional waiver of the United States's sovereign immunity and vests in the United States Court of Federal Claims the exclusive authority to adjudicate patent infringement claims against the federal government “[w]henver an invention described in and covered by a patent of the United States is used or manufactured by or for the United States without license of the owner thereof or lawful right to use or manufacture the same.” 28 U.S.C. § 1498(a); *see Martin v. United States*, 99 Fed. Cl. 627, 632-33 (2011) (recognizing that Section 1498, rather than the Tucker Act, 28 U.S.C. § 1491(a), grants the court jurisdiction over a claim for patent infringement). The statute further states, in pertinent part, that “the use or manufacture of an invention described in and covered by a patent of the United States by a contractor, a subcontractor, or any person, firm, or corporation for the Government and with the authorization or consent of the Government, shall be construed as use or manufacture for the United States.” 28 U.S.C. § 1498(a).

1. Taking of a non-exclusive and compulsory license.

Pursuant to 28 U.S.C. § 1498, the government is authorized to “take” a non-exclusive and compulsory license to any United States patent based on the theory of eminent domain. *See Motorola, Inc. v. United States*, 729 F.2d 765, 768 (Fed. Cir. 1984) (recognizing that the taking of a license equates to an eminent domain taking of property under the Fifth Amendment of the United States Constitution). “The [g]overnment takes a license to use or to manufacture a patented invention as of the instant the invention is first used or manufactured by the [g]overnment.” *Decca Ltd. v. United States*, 640 F.2d 1156, 1166 (Ct. Cl. 1980). Because the government has consented to being sued only for the compulsory taking of a non-exclusive

patent license, the basis for recovery against the government under 28 U.S.C. § 1498 diverges from that in patent litigation between private parties under 35 U.S.C. § 271:

Expressed differently, section 1498 is a waiver of sovereign immunity only with respect to a *direct governmental infringement* of a patent. Activities of the Government which fall short of direct infringement do not give rise to governmental liability because the Government has not waived its sovereign immunity with respect to such activities. Hence, the Government is not liable for its inducing infringement by others, for its conduct contributory to infringement of others, or for what, but for section 1498, would be contributory (rather than direct) infringement of its suppliers.

Although these activities have a tortious ring, the Government has not agreed to assume liability for them.

Decca, 640 F.2d at 1167 (emphasis added); *see, e.g., Martin*, 99 Fed. Cl. at 632 (recognizing that injunctive relief is not available under 28 U.S.C. § 1498).

As it pertains to an action under Section 1498, direct infringement of a patent occurs when the government directly uses or manufactures the patented invention without a license, *Decca*, 640 F.2d at 1167 n.15, or when, through a procurement contract or otherwise, the government consents to the use or the manufacture of the patented invention for its benefit without first obtaining a license, *id.* at 1166-67; *Hughes Aircraft Co. v. United States*, 534 F.2d 889, 897 (Ct. Cl. 1976); *Parker Beach Restoration, Inc. v. United States*, 58 Fed. Cl. 126, 131 (2003). The court determines whether the government has engaged in direct infringement using a two-step process that parallels the analysis for infringement litigation between private parties. *See Lemelson v. United States*, 752 F.2d 1538, 1548 (Fed. Cir. 1985); *see also Casler v. United States*, 15 Cl. Ct. 717, 731 (1988), *aff'd*, 883 F.2d 1026 (Fed. Cir. 1989). The court initially construes the claims of the patent and then compares the construed claims to that of the accused infringing product or process. *See JW Enterprises, Inc. v. Interact Accessories, Inc.*, 424 F.3d 1324, 1329 (Fed. Cir. 2005). When comparing the claims to the accused device or process, “the plaintiff must show the presence of every element [for literal infringement] or its substantial equivalent [for infringement under the doctrine of equivalents] in the accused device.” *Boeing Co. v. United States*, 69 Fed. Cl. 397, 426 (2006) (alteration in original) (quoting *Lemelson*, 752 F.2d at 1551); *see also Pratt & Whitney Canada, Inc. v. United States*, 17 Cl. Ct. 777, 781-84 (1989), *aff'd*, 897 F.2d 539 (Fed. Cir. 1990). The first step in this analysis, *i.e.*, claim construction, is a question of law to be determined by the court; the second step, *i.e.*, infringement, either literal or under the doctrine of equivalents, involves questions of fact. *See Markman v. Westview Instruments, Inc.*, 517 U.S. 370, 388-90 (1996). The plaintiff has the burden of proving direct infringement, whether by literal infringement or under doctrine of equivalents, by a preponderance of the evidence. *Lemelson*, 752 F.2d at 1547; *Hughes Aircraft Co. v. United States*, 717 F.2d 1351, 1361 (Fed. Cir. 1983).

2. Relief available under 28 U.S.C. § 1498(a).

The relief provided by 28 U.S.C. § 1498(a) for direct infringement is the “reasonable and entire compensation” for the compulsory non-exclusive patent license. 28 U.S.C. § 1498(a); *see Decca*, 640 F.2d at 1167; *see also Honeywell Int’l Inc. v. United States*, 107 Fed. Cl. 659, 679 (2012) (“Because [S]ection 1498(a) entails an eminent domain remedy, the Government must pay ‘just compensation[.]’” (citations omitted)). “Generally, the preferred manner [for computing reasonable and entire compensation] is to require the government to pay a reasonable royalty for its license as well as damages for its delay in paying the royalty.” *Standard Mfg. Co. v. United States*, 42 Fed. Cl. 748, 758 (1999), *abrogated in other respects by Uniloc USA, Inc. v. Microsoft Corp.*, 632 F.3d 1292 (Fed. Cir. 2011); *see also Wright v. United States*, 53 Fed. Cl. 466, 469 (2002). When determining the amount of royalty required to adequately compensate the plaintiff, the court must consider the “supposed result of hypothetical negotiations between the plaintiff and defendant.” *Rite-Hite Corp. v. Kelley Co.*, 56 F.3d 1538, 1544 (Fed. Cir. 1995) (en banc) (citing *Hanson v. Alpine Valley Ski Area, Inc.*, 718 F.2d 1075, 1078 (Fed. Cir. 1983)).

“The hypothetical negotiation requires the court to envision the terms of a licensing agreement reached as the result of a supposed meeting between the patentee and the infringer at the time infringement began,” *id.*, which is the date of first use or manufacture, *Brunswick Corp. v. United States*, 36 Fed. Cl. 204, 210 (1996), *aff’d*, 152 F.3d 946 (Fed. Cir. 1998). To aid in its calculation of a reasonable royalty arising from a hypothetical negotiation, the court may rely on a comprehensive list of factors elucidated in *Georgia-Pacific Corp. v. U.S. Plywood Corp.*, 318 F. Supp. 1116, 1120 (S.D.N.Y. 1970), *modified and aff’d*, 446 F.2d 295 (2d Cir. 1971). *See Maxwell v. J. Baker, Inc.*, 86 F.3d 1098, 1109-10 (Fed. Cir. 1996). The factors recognized by the court in *Georgia-Pacific* are:

(1) current, established royalty rates under the patent at issue; (2) royalty rates for comparable technology; (3) scope, exclusivity, and restrictiveness of a retroactive license; (4) the patent holder’s established licensing and marketing practices; (5) commercial/competitive relationship of licensor and licensee; (6) derivative/convoys sales of unpatented, accompanying materials by patentee and competitors; (7) duration of patent and license terms; (8) profitability and commercial success of invention; (9) utility and advantages of invention over prior art; (10) nature, character, and benefits of use; (11) extent and value of infringing use; (12) allocation of a portion of profits or sales for use of invention; (13) portion of realizable profits creditable to the invention alone; (14) expert testimony on royalty rates; and (15) the totality of other intangibles impacting a hypothetical negotiation between a willing licensor and licensee.

Georgia-Pacific Corp., 318 F. Supp. at 1120. Nonetheless, the court “is neither constrained by [the factors] nor required to consider each one where they are inapposite or inconclusive.” *Brunswick*, 36 Fed. Cl. at 211-12. The determination of a reasonable royalty “requires a highly case-specific and fact-specific analysis, relying upon mixed considerations of logic, common sense, justice, policy and precedent.” *Boeing Co. v. United States*, 86 Fed. Cl. 303, 311 (2009) (internal citations omitted) (quotation marks omitted).

3. Available defenses.

Under Section 1498(a), “[i]n the absence of a statutory restriction, any defense available to a private party is equally available to the United States.” *Motorola*, 729 F.2d at 769 (alterations in original) (quoting 28 U.S.C. § 1498 Revisor’s Notes). Accordingly, the government may avail itself of the invalidity defenses set forth in 35 U.S.C. § 282(b). *See, e.g., Messerschmidt v. United States*, 29 Fed. Cl. 1, 18-40, *aff’d*, 14 F.3d 613 (Fed. Cir. 1993) (holding that patent was invalid for lack of novelty and for obviousness, addressing an infringement claim brought under Section 1498(a)). The government has the burden of proving invalidity by clear and convincing evidence, as opposed to merely the preponderance of the evidence. *Microsoft Corp. v. i4i Ltd. P’ship*, ___ U.S. ___, ___, 131 S.Ct. 2238, 2242 (2011)); *Allergan, Inc. v. Sandoz Inc.*, 726 F.3d 1286, 1291 (Fed. Cir. 2013); *Twin Disc, Inc. v. United States*, 10 Cl. Ct. 713, 727 (1986) (quoting *SSIH Equipment, S.A. v. International Trade Comm’n*, 718 F.2d 365, 375 (Fed. Cir. 1983)). This burden of persuasion remains on the party asserting invalidity throughout the pendency of the action. *Stratoflex, Inc. v. Aeroquip Corp.*, 713 F.2d 1530, 1534 (Fed. Cir. 1983); *see also In re Cyclobenzaprine Hydrochloride Extended-*

Release Capsule Patent Litig., 676 F.3d 1063, 1080 (Fed. Cir. 2012) (holding that the trial court must “consider[] the objective evidence in its entirety before making an obviousness finding, and consider[] that evidence in light of the actual burden imposed on a patentee and a patent challenger”).

To invalidate a patent for lack of novelty pursuant to Section 102(a) of Title 35, the asserted claim in the patent-in-suit must be anticipated. *See* 35 U.S.C. § 102(a) (2006) (“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, before the invention thereof by the applicant for patent.”).²⁹ Although validity is a legal issue, anticipation is a question of fact. *Atofina v. Great Lakes Chem. Corp.*, 441 F.3d 991, 995 (Fed. Cir. 2006). “A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described, in a single prior art reference.” *Verdegaal Bros. v. Union Oil Co. of Cal.*, 814 F.2d 628, 631 (Fed. Cir. 1987). If there is not strict equivalence between the prior art reference and each and every element set forth in the claim, “the proper inquiry is obviousness, not [anticipation].” *Messerschmidt*, 29 Fed. Cl. at 21; *see Beckson Marine, Inc. v. NFM, Inc.*, 292 F.3d 718, 726 (Fed. Cir. 2002) (“Indeed the obviousness inquiry weighs the differences between the claimed invention and non-anticipating prior art references to determine whether one of skill in the art would have considered the invention obvious at the time of invention.”); *see also Connell v. Sears, Roebuck & Co.*, 722 F.2d 1542, 1548 (Fed. Cir. 1983) (“A prior art disclosure that ‘almost’ meets th[e anticipation] standard may render the claim invalid under § 103; it does not ‘anticipate.’”).

A patent is invalid for obviousness when “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.” 35 U.S.C. § 103 (2006).³⁰ “The determination of obviousness under 35 U.S.C. § 103 is a legal conclusion based on underlying facts.” *Allergan*, 726 F.3d at 1290. These factual underpinnings include: (1) the scope of content of the prior art; (2) the difference between the prior art and asserted claims; (3) the level of ordinary skill in the relevant art; and (4) the objective evidence of non-obviousness. *Graham v. John Deere Co. of Kansas City*, 383 U.S. 1, 17-18 (1966); *see also KSR Int’l Co. v. Teleflex Inc.*, 550 U.S. 398, 399-01 (2007). “A party asserting that a patent is obvious must demonstrate by clear and convincing evidence that a skilled artisan would have had reason to combine the teaching of the

²⁹Section 102 was amended by Section 3 of the Leahy-Smith America Invents Act (“AIA”), Pub. L. No. 112-29, 125 Stat. 284, and AIA Paragraph 3(n)(1) makes that change applicable to any patent application filed 18 months after September 16, 2011, *i.e.*, on March 16, 2013. Because the application for the ’325 patent was filed well before that date, the court will reply on the pre-AIA version of § 102. *See SD3, LLC v. Dudas*, 952 F. Supp. 2d 97, 103 nn.4-5 (D.D.C. 2013).

³⁰Section 103 also was amended by Section 3 of the AIA. For reasons stated *supra*, at n.29, the pre-AIA version of § 103 applies in this case. *See Alcon Research Ltd. v. Barr Labs., Inc.*, 745 F.3d 1180, 1183 n.1 (Fed. Cir. 2014); *see also I.E.E. Int’l Electronics & Eng’g, S.A. v. TK Holdings Inc.*, No. 10-13487, 2014 WL 5371038, at *40 n.4 (E.D. Mich. Oct. 23, 2014).

prior art reference to achieve the claimed invention, and that the skilled artisan would have had a reasonable expectation of success from doing so.” *PAR Pharm., Inc. v. TWI Pharms., Inc.*, ___ F.3d ___, ___, 2014 WL 6782649 (Fed. Cir. Dec. 3, 2014) (internal quotation marks omitted) (quoting *In re Cyclobenzaprine Hydrochloride*, 676 F.3d at 1068-69 (in turn quoting *Proctor & Gamble Co. v. Teva Pharm. USA, Inc.*, 566 F.3d 989, 994 (Fed. Cir. 2009))).

B. Breach of Contract

The Tucker Act grants the Court of Federal Claims subject matter jurisdiction to hear claims “against the United States founded either upon the Constitution, or any Act of Congress or any regulation of an executive department, or upon any express or implied contract with the United States, or for liquidated or unliquidated damages in cases not sounding in tort.” 28 U.S.C. § 1491(a)(1). Although the Tucker Act waives sovereign immunity, it does not create a substantive right to relief against the United States. *United States v. Testan*, 424 U.S. 392, 398, (1976); *Martinez v. United States*, 333 F.3d 1295, 1302-03 (Fed. Cir. 2003) (en banc). Rather, the “substantive right must be found in some other source of law” that mandates payment from the United States for the injury suffered. *United States v. Mitchell*, 463 U.S. 206, 216 (1983). A damages claim arising from a breach-of-contract with the United States fits squarely within the ambit of this requirement. *Speed v. United States*, 97 Fed. Cl. 58, 64 (2011), *aff’d*, 550 Fed. Appx. 885 (Fed. Cir. 2014) (“Allegations of a contract with the government and breach of that contract can suffice for this purpose, so long as monetary relief is sought.” (citing *Ransom v. United States*, 900 F.2d 242, 244 (Fed. Cir. 1990) (“To maintain a cause of action pursuant to the Tucker Act that is based on a contract, the contract must be between the plaintiff and the government and entitle the plaintiff to money damages in the event of the government’s breach of that contract.”))).

To prevail on a breach-of-contract claim, the plaintiff bears the burden of proving: (1) the existence of a valid contract between the parties; (2) a duty arising from the contract; (3) a breach in duty; and (4) damages caused by the breach. *San Carlos Irr. & Drainage Dist. v. United States*, 877 F.2d 957, 959 (Fed. Cir. 1989). A valid contract with the United States may be express, *Trauma Serv. Grp. v. United States*, 104 F.3d 1321, 1325 (Fed. Cir. 1997), or may be implied-in-fact, “founded upon a meeting of minds, which, although not embodied in an express contract, is inferred, as a fact, from conduct of the parties showing, in the light of the surrounding circumstances, their tacit understanding,” *Baltimore & O.R. Co. v. United States*, 261 U.S. 592, 597 (1923). For either type of contract, *see Hanlin v. United States*, 316 F.3d 1325, 1328 (Fed. Cir. 2003) (“[T]he requirements for an implied-in-fact contract are the same as for an express contract; only the nature of the evidence differs.”), the plaintiff must demonstrate: (1) mutuality of intent; (2) consideration; (3) an unambiguous offer and acceptance; and (4) the existence of actual authority, express or implied, on part of the government signatory to bind the government to the contract. *Massie v. United States*, 166 F.3d 1184, 1188 (Fed. Cir. 1999); *see also H. Landau & Co. v. United States*, 886 F.2d 322, 324 (Fed. Cir. 1989) (recognizing that “implied actual authority, like expressed actual authority, will suffice” for the fourth requirement). The remedy for breach-of-contract is to award “damages sufficient to place the injured party in as good a position as it would have been had the breaching party fully performed.” *Indiana Michigan Power Co. v. United States*, 422 F.3d 1369, 1373 (Fed. Cir. 2005). The injured party, however, may only recover if: (1) the damages were reasonably

foreseeable; (2) there is a causal connection between damages and the breach; and (3) the amount of recovery is not speculative. *Id.*

ANALYSIS

I. PATENT INFRINGEMENT

Liberty filed suit against the government under 28 U.S.C. 1498(a), alleging that the M855A1 and the M80A1 (“A1 projectiles”) directly infringe, by literal infringement and under the doctrine of equivalents, the ’325 patent. Specifically, Liberty charges the government with infringement of independent Claims 1 and 32, as well as dependent Claims 2-3, 7-11, 18-20, 22, 25, 28-32, and 38-41. Pl.’s Post-Trial Br. at 5-6, ECF No. 99. The government maintains that the A1 projectiles do not directly infringe independent Claims 1 or 32 or their dependent claims, Def.’s Post-Trial Br. at 40-46, ECF No. 103, and contests the validity of “each and every claim of the ’325 patent,” *id.* at 47. Before addressing the government’s invalidity contentions, the court will make a factual determination regarding whether the A1 projectiles directly infringe the foregoing claims in the ’325 patent.

A. *Literal Infringement*

1. *Claim 32.*

Liberty avers that the A1 projectiles literally infringe independent Claim 32, as well as the associated dependent Claims 38-41. To prove literal infringement, Liberty has the burden of demonstrating that the A1 projectiles embody each and every element in Claim 32. *ZMI Corp. v. Cardiac Resuscitator Corp.*, 844 F.2d 1576, 1578 (Fed. Cir. 1988); *Judin v. United States*, 27 Fed. Cl. 759, 784 (1993). If the language set forth in Claim 32 reads directly on the A1 projectiles, “the court may disregard additional components or elements of the [A1 projectiles] if those additions do not produce a radically different result.” *Judin*, 27 Fed. Cl. at 784; *see also Becton Dickinson & Co. v. C.R. Bard, Inc.*, 922 F.2d 792, 797 (Fed. Cir. 1990).

The government concedes that the A1 projectiles infringe each and every element of Claim 32 in the ’325 patent except the claim limitation “intermediate opposite ends.” *See supra*, at 10, 15 n.28; Tr. 2375:16 to 2376:9 (Kitchens); Def.’s Post-Trial Br. at 45-46. In its claim construction order, the court construed “intermediate opposite ends” to mean “that the interface is positioned between or in the middle of the opposite ends of the forward end of the nose portion and the trailing end of the tail portion.” *Liberty Ammunition II*, 111 Fed. Cl. at 379-80. The court further acknowledged that “‘intermediate opposite ends’ indicates by its plain meaning an embodiment where the interface is positioned between the tail and nose, though *not necessarily enclosing the tail or nose.*” *Id.* at 379 (emphasis added).

The government now interprets that construction as precluding the interface from “enclos[ing] an end of the projectile.” Def.’s Post-Trial Br. at 46; Tr. 2343:24 to 2344:9 (Kitchens). The government’s attempt to interpose this limitation into Claim 32 restates an unsuccessful argument that it previously raised during claim construction. Then, the government urged the court to adopt an additional limitation, “that the interface cannot extend to the front or

to the end of the projectile,” because no figures found in the ’325 patent depict an interface that extends to the nose or tail portions. *Liberty Ammunition II*, 111 Fed. Cl. at 379. Given that “the sampling of embodiments provided by the figures does not comprise the entirety of all embodiments enabled by the patent,” the court declined to adopt the government’s proffered limitation. *Id.* at 379-80 (citing *Phillips v. AWH Corp.*, 415 F.3d 1303, 1323 (Fed. Cir. 2005) (“[W]e have repeatedly warned against confining the claims to those embodiments . . . [and] expressly rejected the contention that if a patent describes only a single embodiment, the claims of the patent must be construed as being limited to that embodiment.”)).

The government further argues that an embodiment in which the interface encloses an end portion contradicts the meaning of “intermediate opposite ends” because that interface no longer is “positioned between or in the middle of the opposite ends [of the projectile].” *See* DX 203 at 34 (Dr. Kitchens’s Responsive Expert Report Regarding Infringement); *see also* Def.’s Post-Trial Br. at 46. This supposition mischaracterizes the claim language. The claim term “intermediate opposite ends” is preceded by the open transition term “including.” It is axiomatic in patent law that the terms “including” and “comprising” have the same meaning, “namely that the listed elements . . . are essential but other elements may be added.” *Lucent Technologies, Inc. v. Gateway, Inc.*, 525 F.3d 1200, 1214 (Fed. Cir. 2008). Therefore, as Liberty correctly has recognized, “intermediate opposite ends” means that the interface must “cover[] at least the ‘middle’ portion of the round, but *is not limited* to covering only that middle portion.” Pl.’s Post-Trial Br. at 9 (alteration in original); *see* Tr. 668:7-24 (German) (testifying that the court’s construction of “intermediate opposite ends” permits, but does not require, the interface to extend to the front or to the end of the projectile).³¹ The government’s attempt to limit this claim term falls short.

Under the proper reading of “intermediate opposite ends,” the A1 projectiles literally infringe Claim 32. A trial, Liberty demonstrated by a preponderance of evidence that the reverse-drawn jackets of the M855A1 and M80A1 are disposed at “intermediate opposite ends” because the jackets cover at least the middle portion of the round. *See* PDX 66-67 (“Disposed Intermediate Opposite Ends” of the A1 Projectiles); *see also* Tr. 669:10-19 (German). Moreover, the government’s expert, Dr. Kitchens, conceded that under the court’s construction, the A1 projectiles are indeed “disposed at intermediate opposite ends.” Tr. 2344:20-22, 2395:24 to 2396:10 (Kitchens). Given that the jackets of the A1 projectiles fall within the scope of “intermediate opposite ends,” each and every element in Claim 32 reads on the A1 projectiles.

Based on the foregoing, the M855A1 and the M80A1 literally infringe independent Claim 32. It is self-evident that dependent Claims 38-41, which incorporate by reference all of the limitations of Claim 32, are also infringed by the A1 projectiles. *See Wahpeton Canvas Co.*

³¹The government’s expert, Dr. Clarence W. Kitchens, in his report had suggested that Liberty’s interpretation of the claim term “is essentially identical to the limitation provided by the language in [C]laim 32 that the interface be ‘dis[posed] . . . in interconnecting relation to said nose and tail and portion.’” DX 203 at 34. This juxtapositioning of claim terms is not warranted. The terms “intermediate opposite ends” and dis[posed] . . . in interconnecting relation to” serve different purposes in delineating the claim.

v. *Frontier, Inc.*, 870 F.2d 1546, 1553 (Fed. Cir. 1989); *see also* Tr. 2376:6-9 (Kitchens).

2. Claim 1.

Liberty further contends that the A1 projectiles literally infringe, or alternatively infringe under the doctrine of the equivalents, independent Claim 1 and the associated dependent Claims 1-3, 7-11, 18-20, 22, 25, and 28-31. Pl.'s Post-Trial Br. at 5. Unlike Claim 32, Claim 1 describes a projectile having a "reduced area of contact" with the "interior barrel surface of said firearm." *See supra*, at 9-10. There are "no clues within [Claim 1] itself as to what the area of contact has been reduced *from*," *Liberty Ammunition II*, 111 Fed. Cl. at 375 (alteration in original), but the specification recites "a reduced contact area as compared to conventional projectiles," '325 patent, col. 1, lines 65-66. During claim construction, Liberty argued that the claimed reduction was "self-referential, defined by a comparison between the interface and part of the interface." *Liberty Ammunition II*, 111 Fed. Cl. at 375. In contrast, the government maintained that an accurate comparator was that of a "traditional jacketed projectile, which includes the M855." *Id.* The court found that neither referent adequately addressed the missing antecedent and looked to the entire patent to select the following appropriate referent: the area of contact is reduced to that of a "traditional jacketed lead bullet of calibers .17 through .50 BMG." ³² *Id.* (recognizing that "'conventional projectiles' referred to in the specification must logically be limited to those projectiles comparable to the ones enabled by the '325 patent, which is to say 'all calibers generally ranging from .17 through [.]50 BMG.'" (citing '325 patent, col. 2, line 28)). Accordingly, the court construed "reduced area of contact" to mean "the area of contact between the interface and the rifling of the firearm is less than that of a traditional jacketed lead bullet of calibers .17 through .50 BMG." *Id.*

Similar to Claim 32, the government only contests the infringement of one element found in Claim 1: the "reduced area of contact" limitation. Tr. 2375:16 to 2376:8 (Kitchens). The crux of the contention centers on the parties' diverging selection of referent projectiles in accordance with the court's claim construction order. For each A1 projectile, Liberty and the government selected jacketed lead comparators with the same caliber, but Dr. Kitchens further limited the government's comparison to projectiles with approximately the same mass. Dr. Kitchens testified that the referent must have a similar weight as the accused projectile because a bullet's mass is positively correlated to its length and its area of contact. *See* Tr. 2192:2 to 2193:4 (Kitchens). According to Dr. Kitchens, "if heavier and larger bullets are considered proper comparative projectiles, then every bullet could conceivably have a reduced area of contact, as long as a heavier bullet was used as a comparator." DX 203 at 17.³³

³²"BMG" specifically refers to the Browning Machine Gun and thus ".50 BMG" refers to the cartridge developed for that machine gun (used for some time with the military-standard M2 heavy machine gun)." *Liberty Ammunition II*, 111 Fed. Cl. at 375 n.8.

³³According to Liberty's expert, Dr. Randall M. German, a bullet does not necessarily become longer as it becomes heavier. By "chang[ing] the material of construction," the bullet's mass can increase without a corresponding expansion in length. Tr. 691:16-23 (German).

Dr. Kitchens determined that the M80 and the M855 “are the best comparators” because they are “the same weight as [their successors], and they are both general-purpose Army rounds that will be used in the same weapon.” Def.’s Post-Trial Br. at 42; *see* DX 203 at 15-16. Recognizing that the specific predecessor rounds may be “excluded as a standard of comparison,” *see* DX 203 at 17, Dr. Kitchens selected additional .22 caliber bullets with weights between 40 and 70 grains as comparators for the M855A1, *id.* at 21. He also picked the M80 and other .30 caliber projectiles with weights of 110 to 168 grains as referents for the M80A1. *Id.* at 27. Based on these comparators, Dr. Kitchens concluded that the “M855A1 has a larger area of contact³⁴ than the M855 it has replaced, as well as a larger area of contact than twenty other representative 5.56mm (0.22 cal[iber]) traditional lead bullets,” *id.* at 22-23, and that “the M80A1 has a larger area of contact than the M80 . . . , as well as a larger area of contact than nine other 7.62mm (.30 cal[iber]) traditional jacketed lead bullets,” *id.* at 28. He then concluded that neither the M855A1 nor the M80A1 “literally meet (or infringe) the ‘reduced area of contact limitation.’” *Id.* at 24, 29.

The court finds that the M855 and M80 are not the sole comparators for the claim term because the ’325 patent is silent as to this additional limitation. The specification simply recites that the area of contact is reduced as compared to “conventional projectiles,” ’325 patent, col. 1, lines 65 to 66, which are projectiles of “all calibers generally ranging from .17 through [.50 BMG,” *id.* at col. 2, line 28. *See Liberty Ammunition II*, 111 Fed. Cl. at 375 (declining to adopt the M855 as a referent when construing the claim term “reduced area of contact”). Comparing the accused rounds by weight is equally problematic for three reasons. First, the standard of comparison enunciated by the court is that of “traditional jacketed lead bullet of calibers .17 through .50 BMG.” *Id.* Notably absent from the court’s construction is any limitation on the weight of the referent. *See* Tr. 604:22-24 (German). Accordingly, selecting referent rounds by weight impermissibly limits the “reduced area of contact” claim term. Second, many of the referents cited by Dr. Kitchens are not traditional jacketed lead bullets. Rather, a number of those comparators are either partially- or non-jacketed bullets, non-military standard ammunition, or civilian .22 caliber ammunition designated as .22 “shorts” or “longs” that are not comparable in any meaningful way to ammunition used by the military. *See* DX 203 at 21, 27; *see also* Pl.’s Post-Trial Br. at 10 n.5 (“While Dr. Kitchens purports to list a number of rounds

³⁴Dr. Kitchens’s methodology for calculating the contacting area was similar to that employed by Dr. German. *Compare* DX 203 at 14 (“[Area of Contact] = πDL , where D is the nominal outer diameter of the non-tapered cylindrical portion of the bullet, L is the bullet bearing surface length.”), *with* PX 12 at 16 (Dr. German’s Expert Report Regarding Infringement) (“[Surface Area] = $2\pi rh$, where r is the radius of the largest diameter non-tapered outer section of the jacket and h is the length of that non-tapered outer section.”). The only difference between the two approaches is that Dr. Kitchens included the “length of any knurled cannellure” for the value of L in bullets that featured a cannellure. *See* Tr. 2186:14-16 (Kitchens); *see also* DX 203 at 14. Accordingly, Dr. Kitchens calculated the contacting area of the M855A1 and M80A1 to be .2648 square inches and to be .3653 square inches, respectively. DX 203 at 23, 25. In contrast, Dr. German’s calculations were .2365 square inches for the M855A1 and .3260 square inches for the M80A1. PX 12 at 17, 19. The difference in area value for projectiles counting the cannellure is not dispositive. Both proffered values for the A1 projectiles are less than a number of “traditional jacketed lead bullet of calibers .17 through .50 BMG.” *See infra*, at 24-25.

with a lesser contacting surface area than the M855A1, many of these rounds are .22 ‘shorts[,]’ a rimfire munition that may or may not be characterized as a ‘traditional’ jacketed lead round.”). Third, traditional jacketed lead bullets are intentionally manufactured to be different weights to account for their intended shooting application, *e.g.*, target practice versus hunting versus combat. Tr. 604:11-21 (German) (recognizing that “the ammunition has a variety of applications, and a variety of masses” because the bullets are “used in many different applications”). In sum, Dr. Kitchen’s identification regarding comparable projectiles is fatally flawed.³⁵

The court accepts the findings of Liberty’s expert, Dr. German, because he assessed the surface area values of the M855A1 and the M80A1 with those of traditional jacketed lead rounds of the same caliber. Specifically, Dr. German compared the contacting surface area of the M855A1 to the area values of traditional jacketed .22 caliber bullets. PX 12 at 17-18 (comparing the M855A1 EPR to the “MK262 Sierra,” the “Sierra Black Hills 100,” the “Berger .22 caliber 77grain OTM Tactical,” the “Berger .22 caliber 80 grain VLD,” the “Berger .22 caliber 82 grain Long Range,” the “Berger .22 caliber 90 grain VLD,” and the “ATK 86 Grain”). Likewise, he examined the contacting surface areas of the M80 and traditional jacketed .308 caliber projectiles. PDX 3 (comparing the M80 to the “Berger .30 caliber 155 grain VLD hunting,” the “Sierra Pro Hunter,” and the “Barnes TSX”).³⁶ Dr. German determined that the contacting surface area for the M855A1 is “less than the contacting surface area of a number of traditional jacketed .22 caliber projectiles (and, obviously, all 7.62 and .50 cal[iber] projectiles),” PX 12 at 18, and that the contacting surface area of the M80A1 is also “less than the contacting surface area of a number of traditional jacketed [.308] caliber projectiles,” *id.* at 20.

Given that the M855A1 and the M80A1 have reduced areas of contact compared to traditional jacketed lead bullets, the court finds that Liberty has proven by a preponderance of the evidence that the A1 projectiles accused in this suit contain the “reduced area of contact” limitation found in Claim 1, and therefore, the M855A1 and the M80A1 literally infringe independent Claim 1. As such, claims 1-3, 7-11, 18-20, 22, 25, 28-31, which depend from

³⁵Dr. Kitchen testified that he did not know how many of the chosen comparators were .22 shorts or .22 longs, partially- or non-jacketed projectiles, or other non-military ammunition. *See* Tr. 2201:23 to 2202:7 (Kitchens). Upon examining the referents chosen by Dr. Kitchens, it appears that at least the first eight of his referent projectiles for the M855A1 are .22 shorts, *see, e.g.*, the “Sierra .22 caliber (.224) 40 grain Hornet.” DX 203 at 21. The remainder referents for both A1 projectiles feature partially-jacketed bullets, *see, e.g.*, the “Sierra .30 caliber/7.62mm (.308) 110 grain Round Nose,” *id.* at 27, or are advertised as non-military standard ammunition, *see, e.g.*, the “Sierra .22 caliber (.224) High Velocity 55 grain FMJBT” and the “Berger .22 cal. 52 gr. Match FB Varmint,” *id.*

³⁶Dr. German’s expert report included the M80 as a referent. He testified that he “made a mathematical error in [his] calculation for [the M80],” but did not recalculate the contacting surface area value for trial because he was told it was not important since the expert report had been filed. Tr. 706:15 to 707:8 (German). Consequently, Dr. German’s testimony at trial excluded the M80 as a comparator. *See* PDX 3.

independent Claim 1, are also directly infringed by the A1 projectiles. *See* Tr. 2376:2-5 (Kitchens); *see also Wahpeton Canvas*, 870 F.2d at 1553.³⁷

B. Anticipation

The government claims invalidity of the '325 patent based on a lack of novelty. *See* 35 U.S.C. § 102(a)(1) (2006). For the court to invalidate the '325 patent for lack of novelty, a single prior art reference must anticipate each and every limitation of the claimed invention. *See Verdegaal Bros.*, 814 F.2d at 631. A prior art reference may anticipate without expressly disclosing a limitation of the claimed invention if the absent limitation is inherent, or necessarily present, in the prior art reference. *See id.* To prove anticipation, the government points to three prior art references: the Leussler '416 patent (U.S. Patent No. 1,967,416), the Nosler '420 patent (U.S. Patent No. 3,003,420), and the M855/M855 LFS rounds. The government maintains that Claim 32 and the claims that depend from Claim 32 are anticipated by both above-mentioned patents and that Claim 1 and those claims that depend on Claim 1 are anticipated by the Nosler '420 patent and are inherently anticipated by the M855/M855 LFS. Liberty argues that these prior art references are not anticipatory of any claim in the '325 patent because the references lack the element of "controlled rupturing," found in both independent Claim 32 and independent Claim 1. *See* Pl.'s Post-Trial Reply Br. at 15-16, 19, ECF No. 106.

1. Leussler '416 patent.

The Leussler '416 patent describes a projectile with an exposed nose ogive and an interface portion that encloses the tail end of the projectile. DX 281 at 1 (Leussler '416 patent). Liberty avers that the Leussler '416 projectile is not anticipatory because the interface portion expands, or mushrooms,³⁸ upon impact, and therefore, is not "structured to provide controlled rupturing." Pl.'s Post-Trial Reply Br. at 15-16.³⁹ Liberty points to disclosures in the prior art to show that "[t]he Leussler '416 round mushrooms on contact to increase its lethality, but not to the point of separating the component parts." *See id.* at 15. Indeed, the Leussler '416 patent highlights a "projectile having *one part* . . . which is *readily deformed*, [or] flattened . . . , but continues to *advance as a unit*, thereby insuring deep and effective penetration." Leussler '416 patent, col. 1, lines 30-35 (emphasis added). The government sets forth the perfunctory argument that the Leussler patent nonetheless discloses a fragmenting projectile because a limitation found in Claim 6 of the '416 patent recites that "the sections are separated on impact of said projectile against a target." Leussler '416 patent, col. 4, lines 114-15; *see* Def.'s Post-

³⁷Because Claim 1 is literally infringed under 28 U.S.C. 1498(a), it is not necessary for the court to determine infringement under the alternative test, *i.e.*, the doctrine of equivalents.

³⁸A mushrooming projectile "fold[s] back on a thickened base at target impact[,] increasing its lateral cross-section." Pl.'s Post-Trial Reply Br. at 12.

³⁹In its claim construction order, the court construed "structured to provide controlled rupturing" to mean "that the interface portion is structured to rupture (*i.e.*, break) upon striking a target or object, separating two or more of the components of the projectile." *Liberty Ammunition II*, 111 Fed. Cl. at 374.

Trial Br. at 51. The court finds this argument unpersuasive. A mushrooming bullet “[is] a very different style of lethal mechanism . . . compared to [a fragmenting bullet],” Tr. 1475:1-16 (Newill), and the Leussler patent unambiguously discloses a projectile with a deformable point section (nose portion) “that mushrooms upon impact.” Leussler ’416 patent, col. 3, lines 38-45. The objective of the Leussler ’416 projectile is not to rupture upon impact, and accordingly, it does not anticipate each and every element of Claim 32 or its dependent claims.

2. *Nosler ’420 patent.*

The Nosler ’420 patent describes a projectile with an exposed nose portion, a tail portion, a jacket, and a relief band in the middle portion of the projectile, which serves to reduce friction between the projectile and a rifle barrel. *See* DX 279 (Nosler ’420 patent), col. 2, lines 4-71. Similar to the Leussler ’416 bullet, the Nosler ’420 projectile mushrooms upon impact. *Id.*, col. 1, lines 57-79 (reciting that the forward portion of the jacket in the Nosler ’420 projectile will split and fold back in petal-like fashion to increase the shocking power of the bullets.”); *see also id.* at Fig. 4. Again, Liberty makes the argument that the “controlled rupturing” limitation in the ’325 patent is not anticipated by this prior art reference, as the Nosler projectile is not structured to fragment. The government agrees that “Nosler [’420] projectile is designed to deform upon impact,” but insists that the jacket and head portion nonetheless fragment upon striking a soft target. Def.’s Post-Trial Br. at 49. For reasons similar to those stated regarding the Leussler ’416 patent, this argument related to the Nosler ’420 patent falls short. As Liberty correctly recognizes, “the lethality mechanism that the Nosler ’420 [projectile] is designed to use is an expanding/mushrooming [nose portion,] reinforced and enhanced by an intact expanding jacket,” and modifying the Nosler ’420 projectile to induce fragmentation would “alter [its] express operating principle . . . – the creation of larger wound channels (and shocking power) through the mechanism of an expanding projectile diameter upon impact.” Pl.’s Post-Trial Reply Br. at 14 (referring to the Nosler ’420 patent); *see* Nosler ’420 patent, col. 1, lines 33-58, col. 3, lines 3-27. Given that the lethality mechanism provided for in the Nosler ’420 patent is that of deformation and expansion, rather than fragmentation, it does not anticipate each and every element of Claim 32, Claim 1, or the attendant dependent claims.

3. *M855/M855 LFS.*

The M855 and the M855 LFS rounds feature a three-component projectile. *See supra*, at 3 n.6, 5. In arguing inherent anticipation of Claim 1, the government avers that the M855 and M855 LFS rounds are inherently structured to rupture upon soft target contact, causing fragmentation. Def.’s Post-Trial Br. at 51-52. The government maintains that controlled rupturing is inherent, or “necessarily present,” in the predecessor rounds because ballistics tests conducted by Dr. Kitchens confirm that the rounds fragment shortly after impacting a soft target. *Id.*; *see* DX 290-92 (Dr. Kitchens’s Test Report and Results).⁴⁰ The record does not support this

⁴⁰The government places substantial reliance on these test results, but their probative value is limited. Contrary to the 10 percent gelatin standard for Army tests, Dr. Kitchens ran ballistics tests with a 20 percent gel block. Tr. 2782:1-20 (German). Dr. Kitchens also modified the propellant without documenting the modification, which prevents replicating the experiment. Tr. 2889:3-7 (German). Finally, “[t]he results [of his tests] demonstrated a highly unlikely

factual postulate. To the contrary, “the through[-]and[-]through rounds complained of by U.S. warfighters [were] [from] a M855 projectile that did not rupture/break upon hitting the enemy combatant.” *See supra*, at 3, *see also* Tr. 2425:11-21 (Kitchens) (testifying that there were instances of through-and-through hits). Moreover, the Army acknowledged this lethality issue, *see supra*, at 3, *see also* Pl.’s Post-Trial Reply Br. at 19 (“The M855’s inconsistency and ineffectiveness in combat was one of the principal shortcomings to be addressed by the Defendant’s Green Ammo [and] Lethality program.”), and the lethality mechanism of fragmentation featured in the M855A1 was the chosen solution to this problem, *see supra*, at 13, *see also* JX 25 at 4-6 (recognizing that the M855A1 is designed to rupture upon soft target impact, irrespective of the yaw angle). This evidence establishes that the claim element of “controlled rupturing” is neither present nor inherent in the M855 or the M855 LFS. These predecessor rounds do not anticipate each and every element of Claim 1 or its dependent claims.

The ’325 patent is not invalid for lack of novelty, as it was not anticipated by any of the three prior art references cited by the government.

C. Obviousness

The government’s second asserted ground for patent invalidity is that a combination of prior art references renders the ’325 patent obvious under 35 U.S.C. § 103. In particular, to invalidate the ’325 patent based on obviousness, the government must show that “a skilled artisan would have had reason to combine the teaching of the prior art references to achieve the claimed invention.” *PAR Pharm.*, ___ F.3d at ___, ___, 2014 WL 6782649, at *5 (quoting *In re Cyclobenzaprine Hydrochloride*, 676 F.3d at 1068 (in turn quoting *Procter & Gamble*, 566 F.3d at 994)); *see also ActiveVideo Networks, Inc. v. Verizon Commc’ns, Inc.*, 694 F.3d 1312, 1327 (Fed. Cir. 2012). When undertaking such an inquiry into obviousness, the court “must step backward in time and into the shoes worn by [the skilled artisan] when the invention was unknown and just before it was made . . . [and] then determine whether the patent challenger has convincingly established . . . that the claimed invention as a whole would have been obvious at *that time to that person.*” *Panduit Corp. v. Dennison Mfg. Co.*, 810 F.2d 1561, 1566 (Fed. Cir. 1987) (alteration in original) (citations omitted); *see also Graham*, 383 U.S. at 3. Hindsight may not be considered when making this determination. *Innogenetics, N.V. v. Abbott Labs.*, 512 F.3d 1363, 1374 n.3 (Fed. Cir. 2008) (recognizing that courts must “be careful not to allow hindsight reconstruction of references to reach the claimed invention without any explanation as to how or why the references would be combined to produce the claimed invention.”). The court must also consider secondary evidence of non-obviousness, such as “commercial success, long[-]felt but unsolved needs, [and] failure of others,” before concluding that a patent is invalid as obvious. *Graham*, 383 U.S. at 17-18.

1. Motivation to combine.

To demonstrate obviousness, the government points to ten prior art references: (1) the Leussler ’416 patent; (2) the Nosler ’420 patent; (3) the M855; (4) the M855 LFS; (5) the

statistical discrepancy between tested round velocity and round lot referenced velocities.” Pl.’s Post-Trial Reply Br. at 18; *see* Tr. 2786:12 to 2787:2 (German).

Katzmann '172 patent (U.S. Patent No. 4,753,172); (6) the Frey '016 patent (U.S. Patent No. 3,154,016); (7) the Kruze '508 patent (U.S. Patent No. 4,884,508); (8) DX 284, George E. Frost, *Ammunition Making* (1990) ("*Frost on Ammunition*"); (9) the McElroy '879 patent (U.S. Patent No. 6,973,879); and (10) the Auxier '287 patent (U.S. Patent No. 2,958,287). DX 202 at 12, 57 (Dr. Kitchens's Expert Report Regarding Validity). Liberty avers that Dr. Kitchens failed to explain the motivation that would have led a skilled artisan to combine those references at the time the invention was made and that he used impermissible hindsight to conclude that the claimed invention in the '325 patent is obvious. Pl.'s Post-Trial Br. at 15-19. The opinion by Dr. Kitchens regarding the motivation to combine the ten prior art references states:

[The] asserted claims of the '325 patent require little more than a three-piece projectile that, based on its structure, is capable of staying intact and in synchronized rotation until reaching a target and breaking apart on impact. Given the long history of small-arms ammunition, the asserted claims represent general types of projectile (often designed for soft targets) that were known and being built by those of ordinary skill in the art decades before the filing of the '325 patent in 2005. . . . The *general motivation to combine these references emanates from the desire for three known and desirable performance characteristics*: stable and accurate bullet flight; reduced barrel friction and wear; and proper lethality characteristics on impact.

DX 202 at 7-8 (emphasis added).

This reasoning "fails to explain why a person of ordinary skill in the art would have combined elements from specific references *in the way the claimed invention does.*" *ActiveVideo Networks*, 694 F.3d at 1328 (emphasis in original) (citing *KSR*, 550 U.S. at 418 ("[I]t can be important to identify a reason that would have prompted a person of ordinary skill in the relevant field to combine the elements in the way the claimed new invention does . . . because inventions in most, if not all, instances rely upon building blocks long since uncovered, and claimed discoveries almost of necessity will be combinations of what, in some sense, is already known.")); *see also PAR Pharm.*, ___ F.3d at ___, ___, 2014 WL 6782649, at *5-8. The government has only established that there was a motivation to increase performance in small-arms ammunition, which is "entirely different from [a] motivation to combine particular references." *Innogenetics*, 512 F.3d at 1373 ("[K]nowledge of a problem and motivation to solve it are entirely different from motivation to combine particular references."); *see also In re Kahn*, 441 F.3d 977, 988 (Fed. Cir. 2006) ("[The test for obviousness] asks . . . whether a person of ordinary skill in the art, possessed with the understandings and knowledge reflected in the prior art, and motivated by the general problem facing the inventor, *would have been led to make the combination recited in the claims.*" (emphasis added)). As Liberty correctly notes, "[u]nless one knew that combining separate elements from ten disparate references would yield improved lethality, consistency, accuracy, and be environmentally friendly, there would be no reason to combine the prior art to arrive at the claimed device." Pl.'s Post-Trial Br. at 19.

2. Impermissible hindsight.

Additionally, Dr. Kitchen's testimony at trial illustrates the use of improper hindsight in the selection of the prior art references. Dr. Kitchens acknowledged that he divided the '325 patent into claim elements and then searched for a prior art reference that would correspond to each element. *See* Tr. 2422:1-15, 2423:6-20 (Kitchens). For example, for the "reduced area of contact" limitation, *see* DX 202 at 12, Dr. Kitchens surveyed the prior art and found a carrier for a cluster munition, which carrier featured annular grooves in two driving bands around the shell, *id.* at 23, *see also* DX 286 (Kruse '508 patent), col. 3, lines 6-65. That patent is entitled "Spin Stabilized Carrier Projectile Equipped with a Driving Band." Kruse '508 patent, col. 1, lines 1-2. The cluster shell was fired from a gun, the barrel of which was rifled to induce stabilizing spin during flight.⁴¹ Dr. Kitchens argued that the driving bands in the claimed invention corresponded to an interface and that the grooves equated to a reduction in the area of contact between the interface and firearm. DX 202 at 23. By this mode of reasoning, Dr. Kitchens was ignoring the "as a whole" requirement of 35 U.S.C. § 103 and was engaging in a part-by-part analysis that relied on hindsight. As the Federal Circuit explained in *Princeton Biochemicals, Inc. v. Beckman Coulter, Inc.*, 411 F.3d 1332, 1337 (Fed. Cir. 2005):

In making the assessment of differences between the prior art and the claimed subject matter, [S]ection 103 specifically requires consideration of the claimed invention "as a whole." Inventions typically are new combinations of existing principles or features. The "*as a whole*" instruction in title 35 prevents evaluation of the invention part by part. Without this important requirement, an obviousness assessment might successfully break an invention into its component parts, then find a prior art reference corresponding to each component. This line of reasoning would import hindsight into the obviousness determination by using the invention as a roadmap to find its prior art components.

Id. (internal citations omitted) (emphasis added); *see also Monarch Knitting Mach. Corp. v. Sulzar Morat GmbH*, 139 F.3d 877, 881 (Fed. Cir. 1998) ("Defining the problem in terms of its solution reveals improper hindsight in the selection of the prior art relevant to obviousness.").⁴²

⁴¹The driving bands had a diameter that was sufficiently large to engage the rifling, sealing the gas generated by firing the propellant, as well as imparting spin. Kruse '508 patent, col. 1, lines 11-16.

⁴²The Nosler '420 and Leussler '416 patents teach mushrooming bullets that provide through-and-through hits, intended for use in hunting large game animals. *See* DX 284 ("*Frost on Ammunition*") 115 (referring to a bullet with "desirable expansion characteristics"). The Auxier '287 patent teaches a mushrooming bullet for "use in game hunting rifles which will offer correct penetration and expanding characteristics." DX 283 (Auxier '287 patent), col. 2, lines 10-13. Mushrooming bullets are prohibited for military use by international treaties on the laws of war. Pl.'s Post-Trial Reply Br. at 13 n.9. It would be non-obvious for a person of ordinary skill in the art seeking to develop military ammunition to combine elements from projectiles that breach the laws of war with features of the M855, M855 LFS, and other references that are

The government's argument for obviousness fails to provide a motivation to combine the ten prior art references and is predicated on an improper, part-by-part, retrospective reconstruction of the claimed invention.

3. *Secondary considerations.*

Secondary considerations, “can be the most probative evidence of non-obviousness in the record, and enable[] the . . . court to avert the trap of hindsight.” *Crocs, Inc. v. Int’l Trade Comm’n*, 598 F.3d 1294, 1310 (Fed. Cir. 2010) (alteration in original) (quoting *Custom Accessories, Inc. v. Jeffrey-Allan Indus., Inc.*, 807 F.2d 955, 960 (Fed. Cir. 1986)). Secondary considerations are deserving of significant weight in this case. As Judge Learned Hand aptly said in *Safety Car Heating & Lighting Co. v. General Elec. Co.*, 155 F.2d 937, 939 (2d Cir. 1946),

In appraising an inventor's contribution to the art, as we have often said, the most reliable test is to look at the situation before and after it appears. Substantially all inventions are for the combination of old elements . . . [courts] had best appraise the originality involved by the circumstances which preceded, attended and succeeded the appearance of the invention. Among these will figure the length of time the art, though needing the invention, went without it: the number of those who sought to meet the need, and the period over which their efforts were spread: how many, if any, came upon it at about the same time, whether before or after:

compliant with such international laws. *See* PX 24 at 72 (German's Reply Expert Report on Validity).

Additionally, a skilled artisan would not have been motivated to combine the Katzmann '172 patent, DX 282 (Katzmann '172 patent), and the Kruse '508 patent, DX 286 (Kruse '508 patent), with a mushrooming projectile. The lethality mechanisms of the Katzmann '172 patent (a sabot projectile) and the Kruse '508 patent (a carrier projectile) are diametrically opposed to the mushrooming mechanism taught by the Nosler '420 patent, the Leussler '416 patent, the Auxier '287 patent, and *Frost on Ammunition*. *See* Katzmann '172 patent, col. 1, lines 23-26, col. 2, lines 24-26, 45-56 (teaching a large caliber munition intended to combat airborne targets by fragmenting on a time delay after entering the target); *see also* Kruse '508 patent, col. 2, lines 56-65, col. 4, lines 4-17 (teaching a carrier projectile capable of exploding while in flight). Correspondingly, it would have been unexpected to combine the McElroy '879 patent, DX 287 (McElroy '879 patent), with the Katzmann '172 and Kruse '508 patents, promoting fragmentation because the McElroy '879 patent teaches a uniform projectile that remains intact when striking a soft target. McElroy '879 patent, col. 7, lines 31-34; *see also Frost on Ammunition* at 115 (teaching away from a fragmentation mechanism by noting that a preferred projectile is one where the “core and jacket . . . stay together”); *see also* Auxier '287 patent, col. 1, lines 63-65 (teaching against fragmentation and promoting a projectile construction that will not “permit a separation of the jacket and core upon impact”). Finally, the Frey '016 patent, DX 285 (Frey '016 patent), teaches a method of using annular flanges to reduce contact area, which is not employed in the '325 patent. Frey '016 patent, col 1, line 35 to col. 2, line 39.

and—perhaps most important of all—the extent to which it superseded what had gone before. We have repeatedly declared that in our judgment this approach is more reliable th[a]n prior conclusions drawn from vaporous, and almost inevitably self-dependent, general propositions.

Id.

Liberty has presented evidence of secondary considerations of non-obviousness, including: (1) a long-felt need since 1993 for a lethal, lead-free replacement projectile for the standard ammunition, (2) the combat-proven success of the M855A1, and (3) the acclaim and recognition for the development of the A1 technology.⁴³ The government does not challenge the existence of this evidence, but opines that there is not a “*nexus* with the *claimed* invention and the secondary consideration[s].” Def.’s Post-Trial Br. at 54 (emphasis added).

“The term ‘nexus’ is often used, in this context, to designate a legally and factually sufficient connection between the proven success [or other secondary considerations] and the patented invention, such that the objective evidence should be considered in the determination of non[-]obviousness.” *Demaco Corp. v. F. Von Langsdorff Licensing Ltd.*, 851 F.2d 1387, 1392 (Fed. Cir. 1988); *see also Muniauction, Inc. v. Thomson Corp.*, 532 F.3d 1318, 1328 (Fed. Cir. 2008). The plaintiff has the burden of presenting evidence sufficient to establish a *prima facie* case of nexus. *Demaco*, 851 F.2d at 1392 (citing *Cable Elec. Prods., Inc. v. Genmark, Inc.*, 770 F.2d 1015, 1027 (Fed. Cir. 1985), *overruled on other grounds by Midwest Indus. Inc. v. Karavan Trailors, Inc.*, 175 F.3d 1356 (Fed. Cir. 1999)). “However, if the marketed product embodies the claimed features, and is coextensive with them, then a nexus is presumed and the burden shifts to the party asserting obviousness to present evidence to rebut the presumed nexus.” *Brown & Williamson Tobacco Corp. v. Philip Morris Inc.*, 229 F.3d 1120, 1130 (Fed. Cir. 2000); *see also Ormco Corp. v. Align Tech., Inc.*, 463 F.3d 1299, 1312 (Fed. Cir. 2006).

In this instance, a nexus is presumed because the A1 projectiles are coextensive with and embody the features claimed in the ’325 patent. *See J.T. Eaton & Co. v. Atlantic Paste & Glue Co.*, 106 F.3d 1563, 1571 (Fed. Cir. 1997) (“When a patentee can demonstrate commercial success, usually shown by significant sales in a relevant market, and that the successful product is the invention disclosed and claimed in the patent, it is presumed that the commercial success is due to the patented invention.”) (citations omitted)). Accordingly, the government must adduce evidence to negate the connection between the evidence of secondary considerations and the patented invention. *Brown & Williamson Tobacco*, 229 F.3d at 1130. The government agrees with Liberty that the M855A1 was a successful solution to the long-felt need for an

⁴³The court also takes account of the fact that copying is “strong evidence” of non-obviousness. *Pandirect Corp. v. Dennison Mfg. Co.*, 774 F.2d 1082, 1099 (Fed. Cir. 1985); *see also Diamond Rubber Co. of N.Y. v. Consolidated Rubber Tire Co.*, 220 U.S. 428 (1911). Just before the ’325 patent issued in July 2010, the Army submitted Patent Application No. 61332631, filed May 7, 2010, for a projectile that was similar in all pertinent respects to that covered by the ’325 patent. *See supra*, at 12 n.25. The Army’s application was abandoned, *id.*, but it does show the correspondence between the Army’s projectile and that of the ’325 patent.

environmentally-sound and lethal projectile. Def.'s Post-Trial Br. at 54; PX 24 at 10 (Dr. German's Reply Expert Report Regarding Validity). However, the government maintains that "both concerns have no nexus to the claimed invention(s) of the '325 patent [because] none of the patent claims require the use of non-lead materials . . . or projectiles with the yaw-independent (and in turn more lethal) behavior of the M855A1." Def.'s Post-Trial Br. at 54. This reasoning is deficient because it forces Liberty to disprove a negative in its *prima facie* case, thus contravening the basic tenet of the presumption. *See Demaco*, 851 F.2d at 1394 ("A requirement for proof of the negative of all imaginable contributing factors would be unfairly burdensome, and contrary to the ordinary rules of evidence."). Placing the burden on Liberty to prove that commercial success was *not* due primarily to the lead-free and yaw-independent design amounts to the tail wagging the dog. Further, "it is not necessary . . . that the patented invention be *solely* responsible for the commercial success, in order for this [secondary consideration] to be given weight." *Continental Can Co. USA v. Monsanto Co.*, 948 F.2d 1264, 1273 (Fed. Cir. 1991) (emphasis added). Finally, while the technology in the patent does not require a lead-free slug and a yaw-independent projectile, the claim language expressly covers these elements.⁴⁴ The government's conjecture is inadequate to rebut the presumed nexus.

The government has failed to provide clear and convincing evidence that the ten prior art references would enable a skilled artisan to achieve the claimed invention. The '325 patent is not invalid for obviousness.

D. Damages

The government's infringement of the '325 patent entitles Liberty to recover "reasonable and entire compensation" for the compulsory non-exclusive patent license. 28 U.S.C. § 1498(a). The proper measure of damages is the reasonable royalty, *see Standard Mfg.*, 42 Fed. Cl. at 758, that would have resulted from a hypothetical negotiation, *see Rite-Hite*, 56 F.3d at 1554.⁴⁵ Reasonable royalty is "calculated by determining a reasonable royalty rate and multiplying it by a reasonable compensation base." *Brunswick*, 36 Fed. Cl. at 209.

⁴⁴Notably, the claimed invention in the '325 patent contemplates the use of a non-lead materials, *see, e.g.*, '325 patent, col. 4, lines 33-53, col. 7, line 44. The claimed projectile in the '325 patent is also yaw-independent based in part on its "hardened steel exposed tip arrowhead penetrator [and] thin copper alloy interface secured opposite the penetrator skirt." Pl.'s Post-Trial Reply Br. at 20 n.12, which produces "controlled rupturing of said interface portion responsive to said projectile striking a predetermined target." '325 patent, col. 7, lines 62-64.

⁴⁵Both parties agree that the date of the hypothetical negotiation would have taken place on July 2010, the date of issuance for the '325 patent. Def.'s Post-Trial Br. at 56 n.53; Pl.'s Post-Trial Br. at 40; *see also Applied Med. Res. Corp. v. U.S. Surgical Corp.*, 435 F.3d 1356, 1361 (Fed. Cir. 2006) ("We have held that a reasonable royalty determination for purposes of making a damages evaluation must relate to the time infringement occurred.").

1. *Reasonable compensation base.*

Liberty and the government agree that the reasonable compensation base includes the amount of infringing rounds ordered by the government. *See* Tr. 2569:7-8, 2570:1-3 (Test. of Christopher J. Bokhart, defendant's damages expert); *see also* Pl.'s Post-Trial Br. at 40. More specifically, the reasonable compensation base is the number of M855A1 and M80A1 rounds ordered from July 6, 2010, the issuance date of the '325 patent, through October 20, 2027, the expiration date of the '325 patent.⁴⁶ Thus, for the period of July 6, 2010 through April 30, 2013, the reasonable compensation base is 1,115,538,120 rounds. *See* PX 21 at 32.⁴⁷

2. *Baseline royalty rate.*

The parties acknowledge that there is no established reasonable royalty rate, *i.e.* royalty per round, in these circumstances. Def.'s Post-Trial Br. at 56. They recommend substantially different rates, drawing upon the *Georgia-Pacific* factors, quoted *supra*, at 17.⁴⁸ Liberty's expert, Creighton G. Hoffman, opined that to properly determine a reasonable royalty rate, it was necessary to calculate a starting royalty based on the government's total cost savings per round. PX 21 at 13-19; *see also* DX 527 at 25 (Mr. Bokhart's Expert Report Regarding Damages) ("As a prudent licensee, the [g]overnment would have been aware of the alternative technologies available to it, and would take the costs associated with them into consideration when negotiating a license to the patent-in-suit at the hypothetical negotiation."). According to Mr. Hoffman, the advantages of the '325 patented technology (*Georgia-Pacific* factor 9) and its benefits to users (*Georgia-Pacific* factor 10), *i.e.*, the environmentally-sound design and

⁴⁶Pursuant to 35 U.S.C. § 154(b), the patent term was extended by 729 days. *See* '325 patent at 1.

⁴⁷The number of infringing rounds for each fiscal year is as follows:

	Fiscal Year 2010 [1]	Fiscal Year 2011	Fiscal Year 2012	Fiscal Year 2013 [2]	Total
M855A1 Rounds Ordered	294,137,160	383,337,440	279,425,680	158,637,840	1,115,538,120

Notes:

[1] Assumes all units ordered in 2010 were made or used after the issuance of the '325 patent.

[2] Includes the period through April 30, 2013.

PX 21 at 32 (Mr. Hoffman's Expert Report Regarding Damages); *see also* DTX 528, tab 5, at 1, (Mr. Bokhart's calculation of rounds ordered).

⁴⁸*Georgia-Pacific* factors 1 through 6 and factor 12 are neutral and do not affect the determination of a reasonable royalty rate in this case. *See* PX 21 at 11-20; *see also* DX 527 at 30-35 (Mr. Bokhart's Expert Report Regarding Damages).

increased lethality, saved the government \$0.28 per round and \$0.23 per round, respectively. PX 21 at 19. Mr. Hoffman explained the basis for these values as follows:

The [costs savings] to the [g]overnment can be measured against the best available alternatives . . .

To achieve environmental greenness, the best alternative to the M855A1 is to incur the cost of lead remediation at firing range sites [T]he remediation effort undertaken at Fort Dix in 1999 cost approximately \$0.28 per round. . . .

To achieve comparable lethality, the best alternative to the M855A1 is the leaded [Special Operations Science and Technology (“SOST”)] round . . . In fiscal year 2012, the U.S. Navy purchased 700,000 SOST rounds at \$0.50 per round. This reflects a cost premium of approximately \$0.23 over the M855A1 average cost of \$0.265 per round in fiscal year 2013.

Thus, the total cost savings to the [g]overnment from the use of the patented technology amounts to approximately \$0.51 per round (\$0.28 + \$0.23)

*Id.*⁴⁹

⁴⁹The government’s expert on damages, Christopher J. Bokhart, did not calculate a baseline royalty per round, but posited that the existence of two alternative scenarios, by that fact itself, reduces the amount of royalty:

[T]he government would have simply continued the Green Amm[unition] Project, using the leaded M855 until an alternative lead-free round could be developed that would meet the project’s cost and performance criteria. . . . The total cost of this alternative would be \$40.1 million to \$45.8 million, or \$0.012 to \$0.017 per round over the life of the ’325 patent.

[Alternatively, the government would have] convert[ed] to the SOCOM SOST round. . . . [T]he cost of the SOST round would have been the same as, if not slightly less than, the current M855A1 cost . . . [so] there would be little, if any, risk of incurring incremental remediation costs if the government continued to use leaded rounds. Thus, the costs associated with this alternative would be less than \$0.11 per round, if any at all.

DX 527 at 25-30.

Mr. Hoffman's approach in arriving at a baseline royalty of \$0.51 per round is deficient because it overstates the remediation costs that the parties would have anticipated during a hypothetical negotiation. The Fort Dix study upon which Mr. Hoffman relied involved the use of phytoremediation, a remediation treatment using hypo-accumulating plant species to uptake toxic metals, *see* DX 495 at 59 ("Treatment and Management of Closed or Inactive Small Arms Firing Ranges" (June 2007)), *see also* DX 527 at 41, that has since "fallen out of favor as a method [of lead remediation] because . . . it depends upon the time and the amount of soil, and also . . . [is] expensive," Tr. 2605:12-21 (Bokhart). "Had the [g]overnment anticipated potential remediation at the 2010 hypothetical negotiation, it would not likely have envisioned using phytoremediation as there were other techniques that had been found to be more economical and or/more effective for lead remediation at [small arms firing ranges] by that point in time." DX 527 at 41; *see also* Tr. 2605:7 to 2607:7 (Bokhart). For example, physical separation techniques were readily available at the time of the hypothetical negotiation, which the government's expert, Mr. Bokhart, calculated to be less than \$0.02 per round. DX 527 at 41; *see also* Tr. 2592:22 to 2593:16 (Bokhart). Equally problematic is the fact that the Fort Dix data relied upon by Mr. Hoffman would not have been current at the time of the hypothetical negotiation. DX 527 at 39. This is significant because the effectiveness of lead remediation technologies has improved over time, thus decreasing remediation costs. *Id.*; *see also* Tr. 2592:4 to 2593:16 (Bokhart).

The starting royalty per round proposed by Mr. Hoffman is further flawed because it inflates the costs associated with a SOST round. It is axiomatic that manufacturing costs decrease over time as the production process becomes more efficient, yet Mr. Hoffman "compares the cost of the [g]overnment's *first* orders for the SOST round with the cost of the M855A1 EPR in [its *third* year of production]." DX 527 at 38 (emphasis added). Moreover, the SOST and the M855A1 have inherently incommensurate costs because the former is purchased in small quantities, while the latter is ordered in bulk. Given that the government receives a discount for purchasing the M855A1 in large quantities, "the unit price associated with the purchase of a relatively small quantity of the SOST round is not comparable to the unit price associated with high volume purchases of the M855A1." *Id.* at 37.

In light of the foregoing, a baseline royalty of \$0.51 per round is exorbitant and untethered from the facts in existence at the time of the hypothetical negotiation. The court finds that a proper baseline under the circumstances is \$0.05 per round.

3. *Final royalty rate.*

Mr. Hoffman ultimately arrived at a royalty rate of \$0.20 per round by adjusting the baseline figure of \$0.51 downward to account for production costs incurred at LCAAP (*Georgia-Pacific* factor 13). PX 21 at 19 ("In addition to the cash paid for each round, the government provides its contractor, ATK, with the facilities and the equipment necessary to make the rounds."⁵⁰ Mr. Bokhart responded by contending that the parties to a hypothetical negotiation

⁵⁰The government contends that a figure of 20 cents per round equates to a reasonable royalty rate of approximately 74% because the government's cost per round is roughly \$0.27. Def.'s Post-Trial Br. at 56. Liberty argues that because the government produces its own rounds, it is "entitled to a reasonable royalty on the full selling price for the infringing [round,]" which is

would have agreed to a lower royalty rate of \$0.01 per round. DX 527 at 34-35. In arriving at a reasonable royalty of \$0.01 per round, Mr. Bokhart balanced the relevant *Georgia-Pacific* factors, *see id.* at 30-35 (finding that factor 8 indicates a higher royalty, while factor 5 suggests a lower royalty), but notably left unanswered how and from what starting royalty the increment or decrement for each factor was calculated, *see* Pl.’s Post-Trial Reply Br. at 22.

Neither proffered value is justified because both experts failed to account for the state of development and commercialization (*Georgia-Pacific* factor 8) of the round covered by the ’325 patent. *Georgia-Pacific*, 318 F. Supp. at 1120 (reciting factor 8: “The established profitability of the product made under the patent; its commercial success; and its current popularity.”); *see also* 7 Donald S. Chisum, *Chisum on Patents* (“*Chisum*”) § 20.07[2][h] 20-1380 (2014) (“The state of development and commercialization affects both the estimated amount of economic benefit to the prospective licensee and the level of uncertainty as to its future realization.”). “The theory is that a willing licensee in a hypothetical negotiation at the time infringement began would have been more disposed to agree to a high royalty if the product or process was fully developed.” *Chisum* § 20.07[2][h] 20-1380 to 81; *see also Georgia-Pacific*, 318 F. Supp. at 1120 (reciting factor 15: “The amount that a licensor (such as the patentee) and a licensee (such as the infringer) would have agreed upon (at the time the infringement began) if both had been reasonably and voluntarily trying to reach an agreement.”). Correspondingly, the licensee would have been less inclined to pay a high royalty where features disclosed in the patent were “unaccompanied by technology or practical know-how necessary to design and incorporate the invention into [a commercial product].” *Hughes Aircraft Co. v. United States*, 31 Fed. Cl. 481, 489 (1994), *aff’d*, 86 F.3d 1566 (Fed. Cir. 1996), *cert. granted, judgment vacated*, 520 U.S. 1183 (1997), and *aff’d*, 140 F.3d 1470 (Fed. Cir. 1998); *see also Chisum* § 20.07[2][h] 20-1381.

In *Hughes Aircraft*, the court determined that a licensee during a hypothetical negotiation would have been willing to pay a royalty rate of only 1 percent to use an attitude control process covered by the patent because the licensor did not have a commercially proven product or the practical know-how to offer assistance to the government-licensee. 31 Fed. Cl. at 488-89. Rather, the “non-exclusive license taken by the government was a mere ‘naked’ license The user of the license was left to expend the financial resources to develop [a commercial] design necessary for implementation of the attitude control system.” *Id.* at 488. The court considered that these circumstances “have the effect of lowering rather than enhancing the level of a reasonable royalty.” *Id.*; *see also Ellipse Corp. v. Ford Motor Co.*, 461 F. Supp. 1354, 1370, 1376 (N.D. Ill. 1978), *aff’d*, 614 F.2d 775 (7th Cir. 1979) (finding a reasonable royalty of \$0.01 per product where plaintiff “did not have a commercially proven product; nor did it have any manufacturing experience or other technical assistance to offer to [the licensee].”).

In this case, the government would not have been disposed to a high royalty rate. At the time of the hypothetical negotiation, Liberty would have been offering only a bare, non-exclusive license because its patented projectile would have required substantial refinement and elaboration before a resulting projectile would have become suitable for use by the Army in combat. Instructively, Liberty’s own interactions with SOCOM in connection with the SBIR

\$1.50. Pl.’s Post-Trial Reply Br. at 23. Under the methodology employed by Liberty, a royalty of \$0.20 per round amounts to a royalty rate of 13%. *Id.*

contracts reveal that the projectile disclosed in the '325 patent was still being refined at the time of the hypothetical negotiation. For example, in its Phase I SBIR report, Liberty recognized that “potential refinements of the projectile designs included in the SOCOM SBIR proposal” were needed in light of live fire test results. JX 126 at 1. Likewise, Liberty’s Phase II SBIR proposal indicates that SOCOM operators relayed “[s]ignificant concerns about penetration of hard target and terminal effects on impact with the current ammunition,” DX 270 at 9, and had asked Liberty to “scale down [its] lead-free exposed-tip, [three]-piece 5.56mm Enhanced Performance Round,” *id.*, *see also* JX 82 at 1 (After Action Report). In these circumstances, the government would have had to spend significant time and financial resources modifying the '325 design for large-scale military use. *Cf.* Tr. 1686:13 to 1695:21 (Newill) (testifying that ATK had to make several design improvements before the final M855A1 projectile could be fielded as the standard ammunition). Given the extensive contribution required to refine and hone the '325 patented projectile, at the time of the hypothetical negotiation the government would have been able to negotiate a royalty several cents less than \$0.05 per round.

Based on the record as a whole, a reasonable royalty rate in this instance is \$0.014 per round. Applying the reasonable royalty rate of 1.4 cents per round to the reasonable compensation base of 1,115,538,120 rounds yields a reasonable royalty of \$15,617,533.7 as of April 30, 2013. This value must be adjusted to account for the accrual of interest that Liberty is owed. In addition, the government is also responsible for making periodic royalty payments in the amount of \$0.014 per round until the '325 patent expires on October 20, 2027.

4. *Delay compensation.*

Reasonable and entire compensation necessarily includes the prejudgment interest for delayed compensation of royalty “to ensure that the patent owner is placed in as good a position as he would have been in had the infringer entered into a reasonable royalty agreement.” *General Motors Corp. v. Devex Corp.*, 461 U.S. 648, 655 (1983) (citing *Waite v. United States*, 282 U.S. 508, 509 (1931) (addressing a patent infringement suit against the United States)). “An award of interest from the time that the royalty payments would have been received merely serves to make the patent owner whole, since his damages consist not only of the value of the royalty payments but also of the foregone use of the money between the time of infringement and the date of the judgment.” *Id.* “Generally, the interest rate should be fixed as of the date of infringement, with interest then being awarded from that date to the date [the judgment is actually paid.]” *Boeing*, 86 Fed. Cl. at 322.

Determining the proper rate of delay-based interest involves a factual inquiry left largely to the discretion of the court. *See Dynamics Corp. of America v. United States*, 766 F.2d 518, 520 (Fed. Cir. 1985); *see also Datascope Corp. v. SMEC, Inc.*, 879 F.2d 820, 829 (Fed. Cir. 1989). Rates used in the past include, *inter alia*, the prime rate, the prime rate plus a percentage, a U.S. Treasury bill or note rate, the tax-overpayment rate based upon 26 U.S.C. § 6621, and the Contract Disputes Act rate based upon 41 U.S.C. § 611. *See Brunswick*, 36 Fed. Cl. at 219 n.4; *see also Chisum* § 20.03[4][a][v] 20-316 to 24. Correlatively, courts frequently compound the delay-based interest, *see, e.g., Brunswick*, 36 Fed. Cl. at 219, *ITT Corp. v. United States*, 17 Cl. Ct. 199, 234-40 (1989), “reflecting, in this regard, not only the expectation of a prudent, commercially reasonable investor, but also the way that post-judgment interest is calculated

under 28 U.S.C. § 1961(c)(3),” *Boeing*, 86 Fed. Cl. at 323. In making a determination regarding the frequency of compounding, *i.e.* annually, semi-annually, quarterly, etc., courts consider how often the licensee would have made payments in accordance with the hypothetical negotiation. *See id.* (citing *Datascope*, 879 F.2d at 829); *see also Chisum* § 20.03[4] [a][v] 20-327 to 28.

Based on the facts and circumstances in this case, the court is persuaded that the proper and most prudent method of apportioning interest is the 5-year Treasury note rate.⁵¹ This rate adequately compensates Liberty because a Treasury note reflects minimal risk, the 5-year term roughly approximates the length of time from the date of infringement to the date of judgment, and there is ample precedent favoring the use of rates on Treasury securities. For infringement that occurred several years before judgment, as here where the infringement began over 4 years ago, the court would ordinarily compound the prejudgment interest. Given that the interest on a Treasury note is paid semi-annually, compounding semi-annually is appropriate in this instance.

Based on the foregoing, the court sets the interest rate for delay compensation at the 5-year Treasury note rate prevailing as of July 6, 2010. Interest on the royalties owed shall be calculated using the 5-year Treasury note rate for the period from July 6, 2010 until the date the judgment is actually paid, compounded semi-annually.

II. BREACH OF CONTRACT

Liberty’s breach-of-contract claim is predicated on the government’s disclosure and use of the EPIC technology in violation of three NDAs, *see supra*, at 6-7, 11. As an initial step, the court must address whether the NDAs constitute valid contracts between Mr. Marx and the government. *Lublin Corp. v. United States*, 98 Fed. Cl. 53, 56 (2011) (“As in any claim for breach of contract, in order to recover, plaintiff must establish, *inter alia*, that a valid contract existed between it and the government.”). According to Liberty, Lt. Col. Dean, Mr. Amick, Mr. Champion, and Mr. Marsh entered into valid contracts binding on the government in which they agreed to “protect (and not misappropriate) Mr. Marx’s proprietary technology disclosed to them.” Pl.’s Post-Trial Br. at 22.⁵² The government maintains that those NDAs do not meet the requirements for a valid contract because the government signatories lacked actual authority to

⁵¹Mr. Hoffman selected a 3.25% prime rate, compounded quarterly. PX 21 at 31. The court declines to adopt this rate because a prime rate is more appropriate where “the patentee is a large, established and credit-worthy corporation.” *Boeing*, 86 Fed. Cl. at 323.

⁵²Liberty has also raised an attendant trade secret misappropriation claim. *See* Pl.’s Post-Trial Br. at 32-39. Because the misappropriation of a trade secret is a tort, *see ABB Turbo Sys. AG v. TurboUSA, Inc.*, ___ F.3d ___, ___, 2014 WL 7156709, at *1 (Fed. Cir. Dec. 17, 2014); *Radioptics, Inc. v. United States*, 621 F.2d 1113, 1130 (Ct. Cl. 1980), this court does not have jurisdiction under the Tucker Act to grant relief on such a claim, unless it is specifically derived from contractual duties; *see Demodulation, Inc. v. United States*, 103 Fed. Cl. 794, 813 (2012) (citing *Awad v. United States*, 301 F.3d 1367, 1372 (Fed. Cir. 2002)); *see also Wood v. United States*, 961 F.2d 195, 198 (Fed. Cir. 1992). As discussed *infra*, a contractual relationship does not exist between Liberty and the government, which forecloses this court’s jurisdiction over Liberty’s misappropriation claim. *See Radioptics*, 621 F.2d at 1130.

obligate the United States in contract and there is no evidence that any government superior with contracting authority ratified the NDAs. Def.'s Post-Trial Br. at 31-33.

A. Express Contracting Authority

When entering into a contract with the government, one assumes “the risk of having accurately ascertained that he who purports to act for the [g]overnment stays within the bounds of his authority,” even if the “agent himself is unaware of the limitations upon his authority.” *Federal Crop Ins. Corp. v. Merrill*, 332 U.S. 380, 384 (1947). The Supreme Court has cautioned that “[t]he scope of this authority may be explicitly defined by Congress or be limited by delegated legislation, properly exercised through the rule-making power. And this is so even though, as here, the agent himself may have been unaware of the limitations upon his authority.” *Id.*; see also *Council for Tribal Employment Rights v. United States*, 112 Fed. Cl. 231, 243 (2013), *aff'd*, 556 Fed. Appx. 965 (Fed. Cir. 2014). “Although apparent authority will not suffice to hold the government bound by the acts of its agents, implied actual authority, like expressed actual authority, will suffice.” See *H. Landau*, 886 F.2d at 324 (internal citation omitted).

A government agent has express actual authority to obligate the government in a contract “only when the Constitution, a regulation, or a statute grants such authority in an unambiguous manner.” *Roy v. United States*, 38 Fed. Cl. 184, 188 (1997); see also *Tracy v. United States*, 55 Fed. Cl. 679, 682 (2003). Liberty has failed to identify any statute, regulation, or constitutional provision conferring express contracting authority to Lt. Col. Dean, Mr. Amick, Mr. Champion, or Mr. Marsh. Thus, the government signatories lacked the requisite express actual authority to bind the government to the NDAs.

B. Implied Contracting Authority

Even where express actual authority is lacking, a government agent may have implied actual authority to contract “when such authority is considered to be an integral part of the duties assigned to a [g]overnment employee.” *H. Landau*, 886 F.2d at 324; see also *P & K Contracting, Inc. v. United States*, 108 Fed. Cl. 380, 391 (2012), *aff'd*, 534 Fed. Appx. 1000 (Fed. Cir. 2013) (quoting *Winter v. Cath-dr/Balti Joint Venture*, 497 F.3d 1339, 1346 (Fed. Cir. 2007)). “Contracting authority is integral to a government employee’s duties when the government employee could not perform his or her assigned tasks without such authority and the relevant agency regulation does not grant such authority to other agency employees.” *Flexfab, LLC v. United States*, 62 Fed. Cl. 139, 148 (2004), *aff'd*, 424 F.3d 1254 (Fed. Cir. 2005); compare *Telenor Satellite Services, Inc. v. United States*, 71 Fed. Cl. 114, 123 (2006) (holding that the Deputy Assistant Secretary for Analysis and Information Management, Department of State, had implied authority to enter into a bailment contract binding the government because, as the primary person responsible for information management programs, he could not perform his assigned tasks if he had to “obtain approval from another person before borrowing the equipment necessary to implement those programs”), and *Brunner v. United States*, 70 Fed. Cl. 623, 643 (2006) (determining that a Drug Enforcement Administration agent had implied authority to contract for expenses and salaries on behalf of the agency based on the agent’s power to spend money for such purposes), with *Leonardo v. United States*, 63 Fed. Cl. 552, 558 (2005), *aff'd*,

163 Fed. Appx. 880 (Fed. Cir. 2006) (finding that an assistant to the Cultural Affairs Officer, United States Information Services, in Brussels, Belgium, who was responsible for developing and implementing cultural programs, lacked implied contracting authority because, *inter alia*, “[n]othing in this position description implie[d] either that [he] led any [cultural] programs or that contracting authority was necessary for him to discharge his duties successfully”).

Liberty contends that Lt. Col. Dean had implied authority to contractually bind the government because that authority was integral to his duties as the Chief of Small Arms for the U.S. Army Infantry Directorate of Combat Development. Pl.’s Post-Trial Br. at 24-27. Lt. Col. Dean testified that he was responsible for evaluating new technologies and for drafting requirements for ammunition. *See* Tr. 48:5 to 49:6 (Lt. Col. Dean); *see also* Tr. 488:19-20 (Amick). In this capacity he “interacted with [members of] industry to find out what the art of the possible might be, and [] used that to generate requirements that the material developers whose responsibility it was to design, develop and procure systems would use to conduct their duties,” Tr. 48:16-20 (Lt. Col. Dean), and also signed “a few” NDAs, Tr. 65:24 to 66:3 (Lt. Col. Dean). Although Lt. Col. Dean interacted with small-arms ammunition representatives, he “was not a contracting officer during his two years as Small Arms Chief, did not have a contracting warrant, and did not interact with contracting officers insofar as his duties related to interacting with industry personnel like Mr. Marx.” Def.’s Post-Trial Br. at 31; *see also* Tr. 131:8 to 132:1 (Lt. Col. Dean). The record is also devoid of any evidence that “Lt. Col. Dean . . . had the authority to make any financial arrangements with the industry representatives that would visit [his office].” Def.’s Post-Trial Br. at 32; *see* Tr. 488:19-22 (Amick) (testifying that the Lt. Col. Dean’s office had no power to purchase ammunition); *cf. Brunner*, 70 Fed. Cl. at 643 (concluding that the “power to spend the [government’s] money implicitly includes the power to contract for the same purposes.”). Lt. Col. Dean’s job required him to write requirements and to facilitate discussions with the industry, which does not imply that it was necessary for him to execute NDAs to discharge those duties successfully. *Cf.* Tr. 132:8-9 (Lt. Col. Dean) (acknowledging that the duties of his job did not explicitly involve signing NDAs); *Telenor Satellite Services*, 71 Fed. Cl. at 123 (concluding that the Deputy Assistant Secretary for Analysis and Information Management of the Department of State had authority to select and obtain equipment). In light of the nature of Lt. Col. Dean’s position as Chief of Small Arms, the court concludes that he lacked implied actual authority to bind the government to a NDA.

Mr. Amick, Mr. Champion, and Mr. Marsh also did not possess the requisite implied actual authority to form an enforceable contract on behalf of the government. Liberty broadly avers that Mr. Amick had implied authority since he worked with Lt. Col. Dean as a civilian aid on new ammunition technologies, *see* Pl.’s Post-Trial Reply Br. at 4, and that Mr. Champion “had implied actual authority because his Project Manager responsibilities included researching, identifying, and promoting technologies for acquisition by SOCOM to satisfy its weapons needs,” Pl.’s Post-Trial Br. at 29, *see also* Tr. 956:12 to 959:16 (Champion). No such authority exists, however, because both individuals were civilian contractors, rather than government employees, and absent very explicit express authority, contractors cannot bind the government. *See Peninsula Grp. Capital Corp. v. United States*, 93 Fed. Cl. 720, 731 (2010) (holding that a government contractor’s acceptance of a proposal to the Army was not a valid acceptance

because, as “a non-government employee, [the contractor] could not bind the government to a contract.”).

Mr. Amick testified that he was working “as a contractor supporting the Small Arms Branch” at the time he signed the NDA. Tr. 475:16-17 (Amick). Likewise, Mr. Campion acknowledged that he was brought in by SOCOM to work as a contractor, Tr. 958:1-2, 959:3-13 (Campion), and “had no contracting authority at all,” Tr. 970:9-11 (Campion). While both signatories could have been given express authority to act on behalf of the government, no such authority was conferred. With regard to Mr. Marsh, Liberty makes the statement that Mr. Marsh had implied contractual authority because “integral, essential and appropriate to [his] duties to test ammunition for Mr. Campion – was the ability to execute the NDA with Mr. Marx.” Pl.’s Post-Trial Br. at 30. The court agrees with the government that this argument is untenable because “there is no testimony from Mr. Marsh or others to determine exactly what [Mr. Marsh’s] duties were (or are) or to know whether signing NDAs are integral to those duties.” Def.’s Post-Trial Br. at 33. Accordingly, Mr. Amick, Mr. Campion, and Mr. Marsh lacked implied actuality authority to enter into a contract for the government ensuring confidentiality.

C. Ratification

Because the signatories lacked actual authority to execute a NDA on behalf of the government, the resulting contracts will be found valid only if Liberty proves that they were ratified. “Individual ratification, in the government contracts context, is defined particularly as “the act of approving an unauthorized commitment by an official who has the authority to do so.” *Gary v. United States*, 67 Fed. Cl. 202, 215 (2005) (quoting 48 C.F.R. § 1.602-3(a)); see also *Schism v. United States*, 316 F.3d 1259, 1289 (Fed. Cir. 2002) (en banc) (“Ratification is ‘the affirmance by a person of a prior act which did not bind him but which was done or professedly done on his account, whereby the act, as to some or all persons, is given effect as if originally authorized by him.’” (quoting Restatement (Second) of Agency § 82 (1958)). The doctrine of individual ratification requires that “a superior must not only (1) have possessed authority to contract, but also (2) have fully known the material facts surrounding the unauthorized action of her subordinate, and (3) have knowingly confirmed, adopted, or acquiesced to the unauthorized action of her subordinate.” *Leonardo*, 63 Fed. Cl. at 560 (citing *California Sand & Gravel, Inc. v. United States*, 22 Cl. Ct. 19, 27-28 (1990), *aff’d*, 937 F.2d 624 (Fed. Cir. 1991)).

Liberty has not adduced any evidence that meets the requisite conditions for individual ratification, but contends that the contracts were nonetheless institutionally ratified. See Pl.’s Post-Trial Br. at 30. To support this contention, Liberty points to *Philadelphia Suburban Corp.*, 217 Ct. Cl. 705, 707 (1978). In *Philadelphia Suburban*, a chief petty officer of the Coast Guard directed personnel to use a private company’s flame-retardant foam to fight a ship fire, which suggested to the owners that the Coast Guard would pay for the foam. 217 Ct. Cl. at 706. The Court of Claims held that ratification exists “where the [g]overnment has or takes the benefit of another’s property” and remanded the case for trial “to determine the authority of the Coast Guard personnel, present at the fire-site . . . and also to decide whether a contract-implied-in-fact arose in the circumstances.” *Id.* at 707 (emphasis added). Since then, courts have found

institutional ratification “when the government seeks and receives the benefits from an otherwise unauthorized contract.” *Digicon Corp. v. United States*, 56 Fed. Cl. 425, 426 (2003); *see also Janowsky v. United States*, 133 F.3d 888, 891-92 (Fed. Cir. 1998). According to Liberty, the Army “obtained the ‘benefit’ of receiving Marx/Liberty’s proprietary information . . . which is more than sufficient to support a finding of ratification” for the NDA signed by Lt. Col. Dean and Mr. Amick. Pl.’s Post-Trial Br. at 30-31; *see also* Pl.’s Post-Trial Reply Br. at 5. Liberty further states that “SOCOM’s acceptance and review of the propriety information contained in Liberty’s SBIR proposal constituted an acceptance of benefits that ratified and rendered enforceable the NDAs [signed by Mr. Campion and Mr. Marsh].” Pl.’s Post-Trial Br. at 31; *see also* Pl.’s Post-Trial Reply Br. at 5.

This argument is unavailing because Liberty’s concept of institutional ratification lacks any requirement of a ratifying authority. In addition to the government’s acceptance of benefits, an *official with the power to ratify must also know of the unlawful promise*, for “such knowledge is a key element of an institutional ratification claim.” *Gary*, 67 Fed. Cl. at 216 (2005); *see Doe v. United States*, 58 Fed. Cl. 479, 486 (2003), *aff’d*, 112 Fed. Appx. 54 (Fed. Cir. 2004) (“Knowledge is the key distinguishing factor in all cases discussing institutional ratification; that is, in the absence of some indication, beyond mere assertions, that officials with ratifying authority knew of the unlawful promise, institutional ratification has not been upheld.”); *see also City of El Centro v. United States*, 922 F.2d 816, 821 (Fed. Cir. 1990) (finding no institutional ratification when there was “no express promise, by an official empowered to bind the Government to pay for the care rendered . . . [and no] individual with contracting authority exercised that authority to bind the United States in this matter”). Without such a constraint, millions of federal employees could contractually bind the United States under an institutional ratification theory by accepting benefits from a contract. *See City of El Centro*, 922 F.2d at 820. In this case, Liberty does not identify any Army or SOCOM official with ratifying authority that knew of the promises of confidentiality entered by Lt. Col. Dean, Mr. Amick, Mr. Campion, and Mr. Marsh. *See* Def.’s Post-Trial Br. at 34-35. Without this evidence, Liberty has failed to show that either the Army or SOCOM ratified the NDAs.

Because the signatories lacked actual authority to bind the government to the NDAs and no government official with the power to ratify knew of these contracts, Liberty’s contentions regarding a breach of contract are fatally flawed.⁵³

CONCLUSION

For the reasons stated, court finds that the claims in the ’325 patent are valid and directly infringed by the M855A1 and the M80A1. The court awards Liberty \$15,617,533.68 in damages, as of April 30, 2013. Liberty is entitled to interest for delayed compensation at the 5-year Treasury note rate from July 6, 2010, compounded semi-annually, until the date the

⁵³In light of the court’s holding, it is not necessary to reach a decision as to whether the NDAs are barred by the Anti-Assignment Act, 41 U.S.C. § 6305. *See* Def.’s Post-Trial Br. at 35-37.

judgment is actually paid.⁵⁴

Within 90 days of the close of each of the government's fiscal years after April 30, 2013, the government shall provide a royalty report to Liberty accounting for the number of infringing rounds ordered and delivered, and 30 days thereafter shall make a royalty payment to Liberty for those rounds at a rate of \$0.014 per round.⁵⁵ This further obligation shall terminate when the patent expires on October 20, 2027. Final judgment to this effect shall be issued under RCFC 54(b) because there is no just reason for delay. The clerk shall enter final judgment as specified.

In due course, Liberty may apply for an award of attorneys' fees and expenses under 28 U.S.C. 1498(a). Proceedings related to any such request for attorneys' fees and costs shall be deferred until after any appellate process has been concluded or, alternatively, after the time for taking an appeal has expired.

It is so ORDERED.

s/ Charles F. Lettow

Charles F. Lettow

Judge

⁵⁴The government prevails on Liberty's contractual claims.

⁵⁵As an exception, the first report, *i.e.*, that for fiscal year 2014, shall be due March 20, 2015, and the attendant royalty payment shall be made April 20, 2015. In addition, the report for the balance of fiscal year 2013 may be combined with the report for fiscal year 2014.