## Geospatial Technology Associates v. United States
United States Court of Federal Claims
April 8, 2021

1    LYDIA KAY GRIGGSBY, Judge.

2                          **I. INTRODUCTION**

3    In this patent and copyright infringement action, Geospatial Technology Associates, LLC ("GTA") alleges that the United States has infringed upon one or more of the claims of U.S. Patent No. 8,897,489 (the "'489 Patent") and upon GTA's registered copyright rights in certain software code (the "NINJA.pro Copyright"). The government has filed a brief on patent invalidity and the parties have filed cross-motions for summary judgment on the priority and conception dates for the '489 Patent and patent invalidity issues, pursuant to *Rule 56 of the Rules of the United States Court of Federal Claims* ("RCFC"). For the reasons set forth below, the Court **DENIES** GTA's motion for summary judgment and **GRANTS-IN-PART** the government's cross-motion for summary judgment.

4               **II. FACTUAL AND PROCEDURAL BACKGROUND**

5    **A. Factual Background…**

7    **1. The '489 Patent**

8    As background, the '489 Patent patents technology involving automated image processing and target detection. This patent was filed on January 28, 2011, and GTA maintains that it relates back to provisional application No. 61/337,065, which was filed on January 29, 2010 (the "'065 Provisional Application").

9    The '065 Provisional Application is entitled "Methods for Object-Based Sorting and Ranking of Target Detections and Devices Thereof." The '065 Provisional Application states, in relevant part, that:

10       [T]his Object-Based Sorting and Ranking of Target Detections (OBSR) technology is a new method for sorting and ranking target detection scores in mulit [sic]-band spectral imagery. . . . The list of detections can contain metadata, such as time, latitude, longitude, nearby detected materials, and can be searched and cataloged as a database.

11       Given a collection of one or more images, a statistical target detection filter is applied using one or more signatures from a library. The set of detection scores on pixels in a single image for a single target is called a detection plane. Each pixel is ranked by the number of standard deviations from the mean for the detection plane to give a statistical score for every pixel in the image collection. This score can be used to compare the strength of detections across images and targets.

12       A second, spatial, process is applied to turn the per-pixel statistical scores into an object-based score. The highest scoring pixel in the image collection is identified (call it x) and

a local region around this pixel is chosen. Endmembers . . . are chosen from this local region after the top statistical detection scores for the given target are masked out. The convex hull of these endmembers is a geometric model of the background for the detected pixel. The pixel is then "unmixed" by finding abundances . . . that give the best approximation of the pixel spectra as a linear combination of the background endmembers and the target . . . .

13   In November 2008, the inventor of the '489 Patent, Dr. William Basener, and his wife prepared an unsolicited draft proposal, entitled "Mathematically-Optimized Target Detection in Spectral Imagery" The Unsolicited Draft Proposal states, in relevant part, that:

14   We propose to conduct basic research into the mathematical foundations of target detection in hyper/mulit [sic]-spectral imaging to achieve two objectives:

15   1. Develop a Spectral Discrimination Prediction (SPD) [sic] algorithm, including software, that 1) can predict the relative performance of a given algorithm detecting a given spectra at multiple fill fractions in a given image, 2) predict the confuser materials for a given spectra in an image, and 3) predict the top performing detection algorithm for a given spectra and image.

16   2. Develop a suite of algorithms that use SDP to optimize target detection performance beyond the NGA 5 year goal.

17   On November 25, 2014, the United States Patent and Trademark Office ("USPTO") issued the '489 Patent to the Rochester Institute of Technology ("RIT"). Thereafter, RIT and GTA entered into an exclusive license agreement, whereby RIT transferred all substantial rights in the '489 Patent, including copyright rights in the NINJA.pro software, to GTA on November 12, 2015.

18   The invention, as described in the '489 Patent abstract, is as follows:

19   A method, non-transitory computer readable medium, and apparatus that provides object-based identification, sorting and ranking of target detections includes determining a target detection score for each pixel in each of one or more images for each of one or more targets. A region around one or more of the pixels with the determined detection scores which are higher than the determined detection scores for the remaining pixels in each of the one or more of images is identified. An object based score for each of the identified regions in each of the one or more images is determined. The one or more identified regions with the determined object based score for each region is provided.

20   Figure 2 of the '489 Patent provides an exemplary example of the method for target detection as shown below:
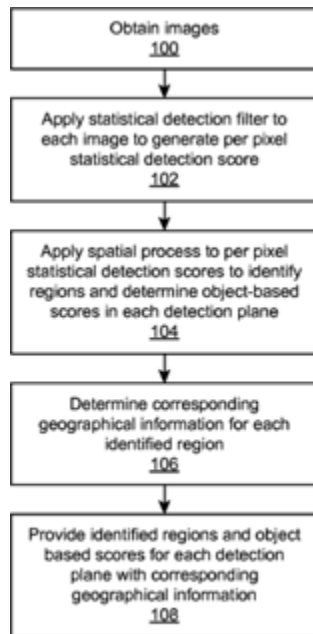
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┌─────────────────────────┐
│     Obtain images       │
│          100            │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Apply statistical       │
│ detection filter to     │
│ each image to generate  │
│ per pixel statistical   │
│ detection score         │
│          102            │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Apply spatial process   │
│ to per pixel statistical│
│ detection scores to     │
│ identify regions and    │
│ determine object-based  │
│ scores in each          │
│ detection plane         │
│          104            │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Determine corresponding │
│ geographical information│
│ for each identified     │
│ region                  │
│          106            │
└─────────────────────────┘
            │
            ▼
┌─────────────────────────┐
│ Provide identified      │
│ regions and object      │
│ based scores for each   │
│ detection plane with    │
│ corresponding           │
│ geographical information│
│          108            │
└─────────────────────────┘
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FIG. 2

22   The '489 Patent provides that the method for target detection involves five steps. First, obtaining the images. Second, applying a target detection algorithm to determine a target detection score for each pixel. Third, determining an object-based score for identified regions from the determined target detection scores (although other types of scores for other identification aspects could be determined). Fourth, obtaining geographic location information associated with each of the images at capture. And, lastly, the fifth step involves providing one or more identified regions with the determined object-based score for each region.

23   The '489 Patent also provides that each step of the process described above is performed using the exemplary example of the target detection processing apparatus contained in the '489 Patent as shown below:
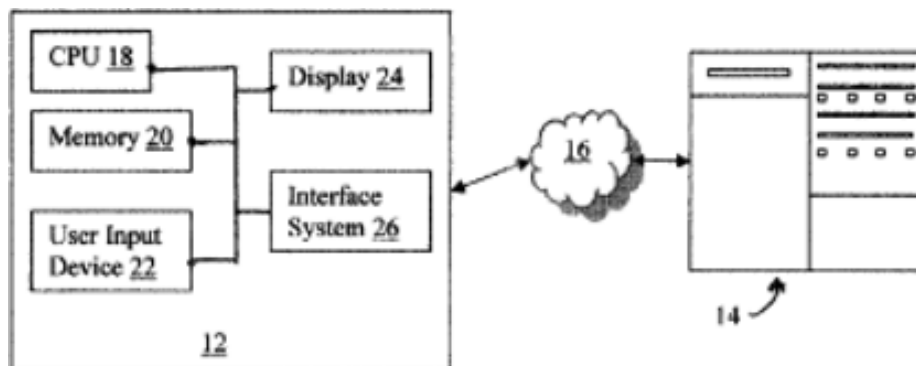


FIG. 1

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**2. Claims Of The '489 Patent**

The '489 Patent consists of 33 claims, 30 of which are the subject of this action. Specifically, the '489 Patent consists of 12 independent claims and 21 dependent claims.

Claim 1 is the first independent claim, and this claim provides:

> A method for identification, sorting and ranking detections of one or more targets, the method comprising: determining with a target detection processing apparatus a target detection score for each pixel of a spectral image for one or more targets by obtaining with the target detection processing apparatus a signature for one or more of the targets for the image, and applying with the target detection processing apparatus the statistical target detection filter using the one or more obtained signatures to rank each of the pixels by its statistical score; identifying with the target detection processing apparatus a region around one or more of the pixels with the determined detection scores which are higher than a first score in said image; determining with the target detection processing apparatus an object-based spectral identification score for each of the identified regions in said image; and providing with the target detection processing apparatus the one or more identified regions with the determined object-based score for each region….

**3. The Court's Construction Of The Terms "Object-Based Spectral Identification Score" And "Object-Based Score"**

On March 7, 2019, the Court issued a Memorandum Opinion and Order on Claim Construction that defined, among other things, the claim term or phrase "object-based spectral identification score," found in Claims 1, 10 and 19, and the claim term or phrase "object-based score," found in Claims 3, 4, 5, 12, 13, 14, 21, 22 and 23. The Court construed these terms to mean "any metric that is computed from the pixels in an identified region using a process that provides better understanding of the material or object in the region."

**4. The ARCHER System**

Also relevant to the parties' cross-motions for summary judgment on patent invalidity issues is the ARCHER system. The Civil Air Patrol ARCHER Hyperspectral Sensor System (the "ARCHER system") is an airborne real-time cueing hyperspectral enhanced reconnaissance system procured by the Air Force to increase its search and rescue mission capability. The ARCHER system incorporates an onboard data processing system to perform numerous real-time processing functions, including "data acquisition and recording, raw data correction, target detection, cueing and chipping, precision image geo-registration, and display and dissemination of image products and target cue information." In addition, the ARCHER system contains, among other things, an advanced hyperspectral imaging system and high-resolution camera. The system also contains an on-board real-time processor for data calibration, geo-rectification, target detection, display and recording. Figure 1 below shows the ARCHER system's imaging geometry.
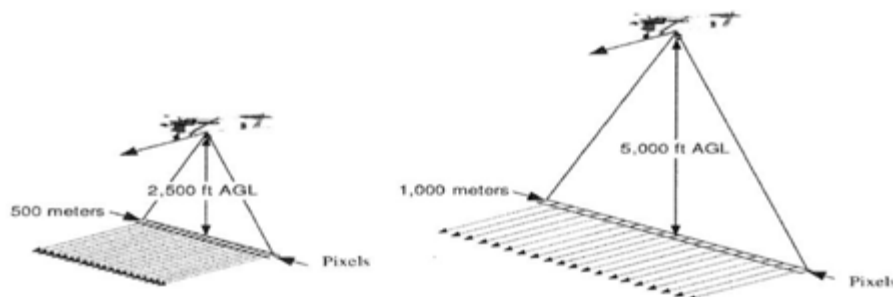
Figure 1. CAP ARCHER imaging geometry.

33 The Civil Air Patrol ARCHER Hyperspectral Sensor System reference states that "[u]pon detection of a possible ground target by one of the ARCHER spectral algorithms, the processor extracts a subregion of image data surrounding that point from each sensor." The reference also states that:

34 Each of these images is geo-registered and cropped to create a 256 x 256 pixel chip of the target area. Finally, the two chips are precisely aligned via a scene-based correlation shift measurement, and then fused, by combining the three-color information of the HSI chip with the higher spatial resolution of the HRI. All three chips—HSI, HRI and Fused—are sent to the Chip Viewer window (Figure 4) for operator review. The fused chip is also overlaid onto the GeoPaint window at the exact location of the detected target . . . .

35 The Air Force developed the ARCHER system in 2004 and deployed the system in 2005. …

36                                    **III. LEGAL STANDARDS**

37 **A. Patent Infringement Claims Against The Government**

38 Title *28, United States Code, section 1498(a)* waives the government's sovereign immunity and provides a remedy "[w]henever 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." In this regard, *Section 1498(a)* provides that:

39 [T]he owner's remedy shall be by action against the United States in the United States Court of Federal Claims for the recovery of his reasonable and entire compensation for such use and manufacture.

40 **B. RCFC 56**

41 Pursuant to *RCFC 56*, a party is entitled to summary judgment when there is "no genuine dispute as to any material fact and the movant is entitled to judgment as a matter of law." ...

42 **C. Patent Invalidity And Section 102**

43 An invalid patent cannot be infringed. And so, the Court need not reach the issue of patent infringement if the claims of the patent are found to be invalid, based upon clear and convincing evidence.

43 An issued patent is presumed valid—novel, nonobvious, useful, and containing patentable subject matter—because the "[US]PTO [is] presumed to do its job." *35 U.S.C. § 282*. To rebut this presumption, an accused infringer must prove its affirmative defense of invalidity by clear and convincing evidence. In this regard, the Federal Circuit has held that a person cannot obtain a patent unless the invention is new. The pre-AIA version of *Section 102* provides, in relevant part, that:

44 A person shall be entitled to a patent unless —

45 (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

46 (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States[.]

47 *35 U.S.C. § 102(a)-(b) (2006)*. And so, a patent claim is invalid for a lack of novelty, or anticipation, under *35 U.S.C. § 102*, if each and every element set forth in the claim is found, either expressly or inherently, in a single reference. *Atlas Powder Co. v. Ireco, Inc., 190 F.3d 1342, 1346 (Fed. Cir. 1999)*.

48 Although anticipation normally requires that a prior art reference disclose each and every limitation of a claim, the Federal Circuit has recognized that "a prior art reference may anticipate when the claim limitation or limitations not expressly found in that reference are nonetheless inherent in it." *Id. at 1347*. Given this, "[u]nder the principles of inherency, if the prior art necessarily functions in accordance with, or includes, the claimed limitations, it anticipates." *Id.* And so, "if granting patent protection on the disputed claim would allow the patentee to exclude the public from practicing the prior art, then that claim is anticipated, regardless of whether it also covers subject matter not in the prior art." *Id. at 1346* (citing *Titanium Metals Corp., 778 F.2d at 781*).

49 **D. Patent Priority Date**

50 Lastly, to ascertain the effective filing date for a patent, the Court must determine a patent's priority with respect to earlier patent applications. *35 U.S.C. § 120 (2006)*. Generally, the effective filing date of a patent is presumed to be the filing date apparent on the face of the patent, unless the patent examiner found otherwise during prosecution. But, a patent owner can rebut this presumption by "com[ing] forward with evidence to prove entitlement to claim priority to an earlier filing date," such that the patent-in-suit should be deemed as filed on the filing date of its earlier related patents.

51 "[T]he test for conception is whether the inventor had an idea that was definite and permanent enough that one skilled in the art could understand the invention." *Burroughs Wellcome Co. v. Barr Lab'ys, Inc., 40 F.3d 1223, 1228 (Fed. Cir. 1994)*. The Federal Circuit has defined a "definite and permanent" idea as an idea that is a "specific, settled idea, a particular solution to the problem at hand, not just a general goal or research plan." *Id.*; *see also Coleman v. Dines,*

*754 F.2d 353, 359 (Fed. Cir. 1985)* ("[i]t is settled that in establishing conception a party must show possession of every feature recited in the count, and that every limitation of the count must have been known to the inventor at the time of the alleged conception.") (citation omitted).

## IV. LEGAL ANALYSIS

53 The government has filed a brief on patent invalidity and the parties have filed cross-motions for summary judgment on the priority and conception dates for the '489 Patent and several issues related to the validity of the '489 Patent. Specifically, the parties present the following issues for resolution by the Court: (1) whether GTA has established a conception date for the invention claimed in the '489 Patent of November 22, 2008; (2) whether GTA has established a priority date of January 29, 2010, for the invention claimed in the '489 Patent; (3) whether the claims of the '489 Patent are anticipated by the ARCHER system; (4) whether the '489 Patent is invalid due to obviousness; and (5) whether the '489 Patent is invalid due to indefiniteness. …

54 **A. GTA Has Not Established A Conception Date Of November 22, 2008**

55 As an initial matter, GTA has not established a conception date of November 22, 2008, for the '489 Patent. The Federal Circuit has held that "[t]he test for conception is whether the inventor had an idea that was definite and permanent enough that one skilled in the art could understand the invention." *Burroughs Wellcome Co. v. Barr Lab'ys, Inc., 40 F.3d 1223, 1228 (Fed. Cir. 1994)*. And so, to establish a conception date for the invention claimed in the '489 Patent, GTA must show that Dr. Basener had an idea that was definite and permanent enough that one skilled in the art could understand the invention claimed in the '489 Patent on November 22, 2008. GTA has not made such a showing in this case.

56 To support its argument that the conception date for the invention claimed in the '489 Patent is November 22, 2008, GTA relies upon an Unsolicited Draft Proposal, last revised on November 22, 2008, to show that Dr. Basener had conceived of the invention at issue by that date. But, a careful review of the Unsolicited Draft Proposal makes clear that this document is a plan for research that does not describe the invention claimed in the '489 patent.

57 Notably, the Unsolicited Draft Proposal states that it is a "proposal" to conduct basic research into the mathematical foundations of target detection. Def. Br. Ex. D at 2 ("We propose to conduct basic research into the mathematical foundations of target detection . . . ."). The Unsolicited Draft Proposal presents a problem—the need to improve target detection algorithms and methodology. *Id.* at 12-14 (discussing the "challenges in the current state-of-the-art target detection"). But, a review of this document shows that the draft proposal does not provide the specific solution claimed in the '489 patent. In fact, the specific invention claimed in the '489 Patent is not described anywhere in the Unsolicited Draft Proposal. Given this, the Unsolicited Draft Proposal does not establish that Dr. Basener had an idea that was definite and permanent enough for a POSITA to understand the invention claimed in the '489 Patent. And so, the Court **DENIES** GTA's motion for summary judgment and **GRANTS** the government's cross-motion for summary judgment on this issue.

58 **B. GTA Has Not Established A Priority Date Of January 29, 2010**

59  GTA also has not established a January 29, 2010, priority date for '489 Patent. The Court presumes that the priority date for the '489 Patent is the filing date for the patent—January 25, 2011. *PowerOasis, Inc. v. T-Mobile USA, Inc., 522 F.3d 1299, 1305-06 (Fed. Cir. 2008)*. But, GTA can rebut this presumption by "com[ing] forward with evidence to prove entitlement to claim priority to an earlier filing date," such that the patent-in-suit should be deemed as filed on the filing date of its earlier related patents. Again, GTA has not made such a showing here.

60  GTA relies upon the '065 Provisional Application to show that the '489 Patent is entitled to a January 29, 2010, priority date. But, a careful review of the '065 Provisional Application shows that the '065 Provisional Application does not enable a POSITA to practice the invention claimed in the '489 Patent, which includes target identification as well as target detection. For example, the title of the '065 Provisional Application refers only to target detection and differs from the title of the '489 Patent, which includes target identification. Indeed, as GTA acknowledges, target identification is not mentioned in any of the claims of the '065 Provisional Application.

61  In addition, the field, background and detailed description sections of the '065 Provisional Application also make clear that the '065 Provisional Application pertains only to target detection. Pl. Ex. C at 12 (the field section states that "[t]his technology relates to methods for object-based sorting and *target detections* and devices thereof") (emphasis supplied); *id.* (the background section states that "*[t]arget detection* in spectral digital imagery is the identification of known material with a given target spectrum") (emphasis supplied); *id.* at 14-15 (the detailed description section states that "this Object-Based Sorting and Ranking of Target Detections . . . technology is a new method for sorting and ranking *target detection* scores in multi-band spectral imagery."). Given this, GTA has not shown that the '489 Patent is entitled to an earlier priority date based upon the '065 Provisional Application. And so, the Court **DENIES** GTA's motion for summary judgment and **GRANTS** the government's cross-motion for summary judgment on this issue.

62  **C. The Claims Of The '489 Patent Are Anticipated**

63  Turning to the merits of the parties' arguments on patent invalidity, the government has shown by clear and convincing evidence that each and every claim of the '489 Patent is anticipated by the ARCHER system. And so, for the reasons discussed below, the Court concludes that the '489 Patent is invalid for a lack of novelty. *35 U.S.C. § 102(a)*.

64  It is well-established that an invalid patent cannot be infringed. And so, if the government can show that the '489 Patent is invalid, based upon clear and convincing evidence, the Court need not reach the issue of patent infringement in this case.

65  With regards to the first ground upon which the government argues that the '489 Patent is invalid—lack of novelty, or anticipation—the Federal Circuit has held that a person cannot obtain a patent unless the invention is new. The pre-AIA version of *Section 102*, which applies to this case, also provides that:

66      A person shall be entitled to a patent unless—

67      (a) the invention was known or used by others in this country, or patented or described in

a printed publication in this or a foreign country, before the invention thereof by the applicant for patent, or

68         (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of the application for patent in the United States[.]

69 And so, the '489 Patent is invalid for a lack of novelty, or anticipation under *Section 102*, if the government can show by clear and convincing evidence that each and every element set forth in the claims of the patent is found, either expressly or inherently, in a single reference. *Atlas Powder Co. v. Ireco, Inc., 190 F.3d 1342, 1346 (Fed. Cir. 1999)*.

70 In this regard, the Federal Circuit has recognized that "a prior art reference may anticipate when the claim limitation or limitations not expressly found in that reference are nonetheless inherent in it." And so, "if granting patent protection on the disputed claim would allow the patentee to exclude the public from practicing the prior art, then that claim is anticipated, **[*50]** regardless of whether it also covers subject matter not in the prior art."

71 In this case, the government argues that the Civil Air Patrol ARCHER Hyperspectral Sensor System—or the ARCHER system—is such a single reference. Specifically, the government argues that the ARCHER system anticipates each of the five "top-level" elements found in the '489 Patent—obtain images, apply statistical detection filtering, identify regions and determine object-based scores, determine geographical information for identified regions and provide identified regions and object-based scores with geographical information. In this regard, the government contends that the ARCHER system "performed 'numerous real-time processing function[s] including data acquisition and recording, raw data correction, target detection, cueing and chipping, precision image geo-registration, and display and dissemination of images productions and target cue information.'" And so, the government further contends that the '489 Patent is invalid due to a lack of novelty, because the ARCHER system anticipates the use of methods for detailed post-detection analysis of detected objects based upon spatial and spectral information. For the reasons set forth below, the Court agrees.

72 **1. The ARCHER System Discloses An "Object-Based Spectral Identification Score" And "Object-Based Score"**

73 As an initial matter, the government has shown that the ARCHER system discloses an "object-based spectral identification score" and "object-based score," as described in Claims 1, 4, 5, 10, 13, 14, 19, 21, 22 and 23 of the '489 Patent. Several claims of the '489 Patent contain the limitations "determining with the target detection processing apparatus an object-based spectral identification score for each," "determining . . . an object-based score for each of the identified regions" and "providing with the target detection processing apparatus the one or more identified regions with the determined object-based score for each region." Given this, GTA's primary rebuttal to the government's anticipation defense is that the ARCHER system does not disclose an "object-based spectral identification score," or an "object-based score," as described in these two limitations. GTA's argument is belied by the undisputed material facts regarding the ARCHER system.

74   First, the undisputed material facts show that the ARCHER system's approach to target detection includes determining an "object-based spectral identification score" and an "object-based score," as the Court has defined those terms. The Court previously issued a Claim Construction Memorandum Opinion and Order on March 7, 2019, that defined the terms "object-based spectral identification score" and "object-based score" to mean "*any metric that is computed from the pixels in an identified region using a process that provides better understanding of the material or object in the region.*"

75   It is undisputed that the Air Force developed the ARCHER system in 2004, and that this system is an airborne real-time cueing hyperspectral enhanced reconnaissance system that incorporates an onboard data processing system to perform numerous real-time processing functions, including target detection, cueing and chipping, precision image geo-registration and display, and dissemination of image products and target cue information. *See* B. Stevenson et al., *The Civil Air Patrol ARCHER Hyperspectral Sensor System*, 5787 Proc. SPIE 17 (2005). It is also undisputed that the ARCHER system contains an advanced hyperspectral imaging system, high-resolution camera and an on-board real-time processor, for target detection, display and recording.

76   The Civil Air Patrol ARCHER Hyperspectral Sensor System reference and the Strategies for Hyperspectral Target Detection in Complex Background Environments reference also make clear that the ARCHER system's approach to target detection includes determining an "object-based spectral identification score." Specifically, these references explain that the ARCHER system determines a "detection statistic" and "target cues" that provide a better understanding of the material or object detected in a region, by "eliminat[ing] detected pixel groups that do not conform to the expected size range of the [targets]." For example, the Civil Air Patrol ARCHER Hyperspectral Sensor System reference explains that the ARCHER system's target detection capabilities include "[a]nomaly detection, to find unusual objects with unknown spectra in real-time" and "[m]atched detection, to find targets with known spectral signatures in real-time." Strategies for Hyperspectral Target Detection in Complex Background Environments further explains that the ARCHER system: (1) performs target detection by exploiting the difference in the spectral characteristics of the target of interest relative to the background materials; (2) reports this difference in terms of a "detection statistic" that is "computed on a pixel-by-pixel basis;" and (3) then generates "target cues," by "thresholding the detection statistic image and performing simple . . . filtering to eliminate detected pixel groups that do not conform to the expected size range of the [targets]."

77   Because these references show that the ARCHER system's approach to target detection includes determining a "detection statistic" and "target cues" that provide a better understanding of the material or object in a region, by "eliminat[ing] detected pixel groups that do not conform to the expected size range of the [targets]," the Court agrees with the government that the ARCHER system determines an "object-based identification score," as that term has been defined by the Court. And so, the Court concludes that the ARCHER system anticipates the "determining . . . an object-based spectral identification score for each of the identified regions in said image" limitation found in Claims 1, 10 and 19, and the "determining . . . an object-based score for each region" limitation found in Claims 4, 5, 12, 13, 14, 21, 22 and 23 of the '489 Patent.

78    The government has also shown that the ARCHER system anticipates the "providing . . . [the] identified regions with the determined object-based score" limitation found in Claims 1, 4, 5, 10, 13, 14, 19, 21, 22 and 23 of the '489 Patent. In this regard, the undisputed material facts show that the ARCHER system's chip viewer window provides the determined detection statistics and target cue information to the ARCHER system operator.

79    As the government persuasively argued during the oral arguments on the parties' cross-motions, the ARCHER system "does the providing step [of the '489 Patent] because it provides the chip viewer that contains the additional spectral and spatial information" derived from ARCHER's target detection algorithms. Specifically, the Civil Air Patrol ARCHER Hyperspectral Sensor System reference explains that, once the ARCHER system detects a possible ground target, the system geo-registers and crops each image "to create a 256 x 256 pixel chip of the target area," which is then "sent to the Chip Viewer window . . . for operator review." Def. Br. Ex. I at US_003220. An example of the chip viewer window is provided in the Civil Air Patrol ARCHER Hyperspectral Sensor System reference and is reproduced below:



80    As shown in the figure above, the ARCHER system's chip viewer window provides the ARCHER system operator with target cue information, including scores and geolocations for each detected target.

81    Mr. Stocker explains in his expert report that the ARCHER system chip viewer window allows the system operator to rank the cued targets "by their respective detector scores simply by clicking on the displayed column header for those scores (similar to the way one sorts entries in a spreadsheet column)." Given this, the undisputed material facts show that the ARCHER system's chip viewer window provides a "metric that is computed from the pixels in an identified region using a process that provides better understanding of the material or object in the region." Because the Civil Air Patrol ARCHER Hyperspectral Sensor System reference makes clear that the ARCHER system provides a detection score and other target cue information that provides a better understanding of the material or object for the ARCHER system operator to view in the chip viewer window, the Court agrees with the government that the ARCHER system also

anticipates the "providing . . . [the] identified regions with the determined object-based score" limitation found in Claims 1, 4, 5, 10, 13, 14, 19, 21, 22 and 23 of the '489 Patent.

82    **2. The ARCHER System Discloses Inherent "Masking Out" And "Unmixing" Capabilities**

83    The government has also shown by clear and convincing evidence that the ARCHER system anticipates the "masking out" limitations found in Claims 4, 13, 22, 28, 30 and 32 of the '489 Patent and the "unmixing" limitations found in Claims 5, 14, 23, 29, 31 and 33 of the '489 Patent. As shown in the '489 Patent, these limitations involve: "masking out from each of the regions with the target detection processing apparatus the one or more of the pixels in each of the one or more images which have the highest determined statistical detection scores in each of the one or more images," "masking out from each of the regions the one or more of the pixels in each of the one or more images which have the highest determined statistical detection scores in each of the one or more images," "unmixing with the target detection processing apparatus the pixel with highest determined statistical detection score in each of the identified regions by finding one or more abundances to determine pixel spectra" and "unmixing the pixel with highest determined statistical detection score in each of the identified regions by finding one or more abundances to determine pixel spectra."

84    The undisputed material facts show that the ARCHER system's target detection algorithms include an inherent "masking out" step as part of the system's "chipping" function. Mr. Stocker explains in his expert report that "masking out" involves removing high-scoring pixels to characterize background contributions, to provide a representative ensemble for estimating suitable background statistics or endmembers while minimizing contamination from potential targets (i.e. the high-scoring pixels). Stocker Report at ¶ 58 ("We often seek to remove any target-like features from the estimate. This can be attempted by not including (masking) the pixel under test (or a region around the pixel under test) in the covariance matrix estimate." (citation omitted)). As discussed above, the Civil Air Patrol ARCHER Hyperspectral Sensor System reference explains that the ARCHER system includes two target detection algorithms—an anomaly detection algorithm and a matched detection algorithm. Mr. Stocker explains in his expert report that the ARCHER system uses these target detection algorithms to define local image regions surrounding pixels or contiguous clusters of pixels that exceed a detection threshold. Mr. Stocker further explains that "[t]hese regions [are] referred to as 'chips' and [are] automatically resolution-enhanced, recorded and displayed in color to the . . . operator to indicate the location of a detected target and its local scene context."

85    Because it is undisputed that the ARCHER system's "chipping" function includes defining image regions and indicates to the ARCHER system operator the location and local image context surrounding identified chips, the Court concludes that the "masking out" step described in the '489 Patent is inherent within the ARCHER system's ability to eliminate pixel groups that do not conform to the detection threshold. And so, the Court concludes that the ARCHER system anticipates the 'masking out" step of Claims 4, 13, 22, 28, 30 and 32 of the '489 Patent.

86    The undisputed material facts regarding the ARCHER system similarly show that this system anticipates the "unmixing" limitations found in Claims 5, 14, 23, 29, 31 and 33 of the '489 Patent. Spectral unmixing refers to the "procedure by which the measured spectrum of a mixed pixel is decomposed into a collection of constituent spectra, or endmembers, and a set of corresponding

fractions, or abundances, that indicate the proportion of each endmember present in the pixel," and was well-known in the art prior to 2011. *See* N. Keshava & J.F. Mustard, *Spectral Unmixing*, 1053-5888 IEE Signal Processing Magazine 44, 44 (Jan. 2002); Stocker Report at ¶ 60. The government conceded during oral arguments that the version of the ARCHER system described in the Civil Air Patrol ARCHER Hyperspectral Sensor System reference does not include an unmixing algorithm. But, the government also persuasively argued that the ARCHER system can, nonetheless, support such an unmixing algorithm, because unmixing is inherent within the ARCHER system's capabilities.

87  Mr. Stocker opines in his expert report that "Claim 4 [of the '489 Patent] describes a generic spectral unmixing process in which endmembers are determined from one or more selected pixels in each identified region to define a convex hull (i.e. simplex), and subsequently used to calculate abundances . . . for the endmembers to model detected pixel spectra." Stocker Report at ¶ 108. In this regard, the Strategies for Hyperspectral Target Detection in Complex Background Environments reference provides an overview of different unmixing techniques and approaches that can be implemented in the ARCHER system. For example, the Strategies for Hyperspectral Target Detection in Complex Background Environments reference discusses the N-FINDR algorithm, which "use[s] . . . the simplex maximization technique," whereby it "selects as endmembers the set of scene spectra that maximizes the volume of a simplex defined with these spectra as endmembers." The Strategies for Hyperspectral Target Detection in Complex Background Environments reference also states with regards to the ARCHER system that "[t]he matched subspace, change detection, and spatial-spectral methods overviewed in this paper provide some of the primary avenues that [Air Force Research Laboratory] is pursuing to more fully exploit the inherent detection capabilities supported by such sensor systems." Given this, the undisputed material facts regarding the ARCHER system show that the ARCHER system can support an unmixing algorithm of the kind described in the Strategies for Hyperspectral Target Detection in Complex Background Environments reference. *Atlas Powder Co., 190 F.3d at 1347* ("[A] prior art reference may anticipate when the claim limitation or limitations not expressly found in that reference are nonetheless inherent in it."). And so, the Court concludes that the ARCHER system also anticipates the unmixing step found within Claims 5, 14, 23, 29, 31 and 33 of the '489 Patent.

88  **3. The Government Has Shown That The ARCHER System Anticipates Every Claim Of The '489 Patent**

89  As a final matter, the undisputed material facts also show that the government has asserted anticipation contentions for every claim of the '489 patent. As discussed above, the government has shown by clear and convincing evidence that the ARCHER system anticipates the limitations found in Claims 1, 4, 5, 10, 13, 14, 19, 21, 22 and 23 of the '489 Patent regarding "determining . . . an object-based spectral identification score for each of the identified regions in [an] image," "determining . . . an object-based score for each of the identified regions" and "providing . . . [the] identified regions with the determined object-based score." The government has also shown by clear and convincing evidence that the ARCHER system anticipates the "masking out" limitations found in Claims 4, 13, 22, 28, 30 and 32 of the '489 Patent and the "unmixing" limitations found in Claims 5, 14, 23, 29, 31 and 33 of the '489 Patent. GTA also does not dispute that the ARCHER system anticipates the other limitations found in these claims.

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90 A careful review of the government's claims chart and Mr. Stocker's expert report also show that the government has addressed each and every element of the claims of the '489 Patent and explained why each of these claims were anticipated by the ARCHER system. *See* Stocker Report at ¶ 43 (detailing the redundancies of the claims of the '489 patent), ¶ 86 (discussing claim 4 and equivalent claim 13 and whether these claims are anticipated by ARCHER), ¶ 87 (discussing claim 5 and equivalent claim 14 and whether these claims are anticipated by ARCHER), ¶ 96 (discussing claim 28 and equivalent claims 30 and 32 and whether these claims are anticipated by ARCHER), ¶ 98 (discussing claim 29 and equivalent claim 31 and whether these claims are anticipated by ARCHER). And so, the Court is satisfied that the government has asserted anticipation contentions for each and every claim of the '489 Patent.

91 Because the undisputed material facts in this case show that: (1) the ARCHER system discloses an "object-based spectral identification score" and an "object-based score;" (2) the ARCHER system anticipates the "masking out" and "unmixing" limitations found in certain claims of the '489 Patent; and (3) the government has shown by clear and convincing evidence that the ARCHER system anticipates each and every element of Claims 1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 15, 16, 17, 18, 19, 20, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32 and 33 of the '489 Patent, the Court concludes that the '489 Patent is invalid for a lack of novelty. And so, the Court **DENIES** GTA's motion for summary judgment and **GRANTS-IN-PART** the government's cross-motion for summary judgment on the issue of patent invalidity.

92                                    **V. CONCLUSION**

93 In sum, GTA has not established a conception date of November 22, 2008, or a priority date of January 29, 2010, for the invention claimed in the '489 Patent. The government has shown, however, by clear and convincing evidence, that the ARCHER system anticipates each and every claim of the '489 patent. And so, for the foregoing reasons, the Court:

94 1. **DENIES** GTA's motion for summary judgment; and

95 2. **GRANTS-IN-PART** the government's cross-motion for summary judgment.