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4 Attorneys for Defendant

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6 IN THE SUPERIOR COURT OF THE COUNTY OF CONTRA COSTA, MARTINEZ

STATE OF CALIFORNIA

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1. THE PEOPLE OF THE STATE OF CALIFORNIA ) No. 5-170990-6

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1. ) NOTICE OF MOTION AND
2. Plaintiff, ) MOTION TO REQUEST

) SARGON/KELLY HEARING

1. ) AND TO EXCLUDE

) EVIDENCE DERIVED FROM

1. ) SHOTSPOTTER; POINTS

) AND AUTHORITIES IN

1. ) SUPPORT THEREOF

MR. DEFENDENT, )

1. ) DATE:
2. ) TIME:

Defendant. ) DEPT:

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TO: DIANA BECTON, DISTRICT ATTORNEY, CONTRA COSTA COUNTY,

18 MARTINEZ, CALIFORNIA; AND TO THE CLERK OF THE ABOVE-ENTITLED COURT:

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PLEASE TAKE NOTICE that on the above date and time, or as soon thereafter as counsel

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may be heard, the defendant, through counsel, will request the Court conduct a hearing pursuant to

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1. the California Supreme Court cases of *Sargon Enterprises, Inc. v. Univ. of S. Cal.* (2012) 55 Cal.4th
2. 747 and *People v. Kelly* (1976) 17. Cal.3d 24 to exclude all testimony and evidence produced by or
3. derived from the ShotSpotter system.
   1. Said Motion is based upon this notice, the accompanying memorandum of points and
   2. authorities, and any evidence, oral or documentary, to be adduced at the hearing.

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4 Dated: April 10, 2018 Respectfully Submitted,

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1. Attorney for Defendant
2. Attorney for Defendant

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1. **MEMORANDUM OF POINTS AND AUTHORITIES**
2. **ARGUMENT**
3. **I. INTRODUCTION**
4. On September 5, 2016, Ilaysia McCoy, the victim in this matter, was fatally shot in front of

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1707 17th Street, in San Pablo, California. Ms. McCoy was pregnant at the time, and her unborn

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fetus did not survive the gunshot.

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Witnesses told police that the source of the gunfire was an occupant of a dark colored

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1. vehicle – driven by Mr. Defendent – parked a short distance from Ms. McCoy, near the intersection
2. of 17th and Post Streets.
3. ShotSpotter, a private company employed by the City of San Pablo, and one which utilizes
4. microphones installed in multiple locations throughout the city, recorded the sound of purported
5. gunfire – 6 shots – at the time that Ms. McCoy was shot and determined the source of the these 6
6. alleged gun shots to be within an area of a 25 meter radius which would have encompassed Mr.
7. Defendent’s car.

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The Defense anticipates that the Prosecution will attempt to admit evidence of the

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ShotSpotter technology.

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ShotSpotter is an acoustical detection system that purports to be capable of accurately

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1. detecting gunshots and determining their location. The ShotSpotter system relies on a network of
2. acoustic sensors, each equipped with microphones, GPS technology and a converter that converts
3. analog sound waves into digital code for transmission to computers and review by human
4. operators.
5. When an impulsive sound is identified by a sensor as having characteristics similar to a
6. gunshot, the sensor transmits a recorded soundwave of that sound to a server operated by
7. ShotSpotter. In order for the ShotSpotter system to identify a sound as a gunshot and estimate the
8. sound’s location of origin, at least three sensors must detect the impulsive sound. Relying on the
9. location of each sensor that has identified a potential gunshot and the precise time at which each
10. sensor received the sounds, ShotSpotter claims to be able to locate the sound’s source. The

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geography and structures in a given area, particularly multistory buildings or hills, as well as

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environmental factors, such as weather, or the type of gun fired, may distort or interfere with the

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sensors’ capacity to accurately capture and record a soundwave created by an impulsive sound.

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9 Because ShotSpotter’s computer software is incapable of *accurately* distinguishing a

1. gunshot from a similar impulsive sound, such as a firecracker, truck or helicopter, each audio
2. recording of a potential gunshot transmitted to the server must be reviewed by a human operator.
3. ShotSpotter personnel, as well as police personnel, listen to audio recordings of each potential
4. gunshot and form an opinion, using only the human ear and visual representation of the soundwave,
5. as to whether the sounds on the digital audio recording are consistent with sounds typically made by
6. a gun being discharged.

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ShotSpotter claims its technology accurately triangulates the location of the sound source to

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within 25 meters of its origin. ShotSpotter also claims that its technology captures at least 80

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percent of all audible, outdoor gunfire in coverage zones.

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# II. MR. DEFENDENT IS ENTITLED TO A SARGON/KELLY HEARING TO

1. **DETERMINE WHETHER EXPERT TESTIMONY REGARDING SHOTSPOTTER TECHNOLOGY IS ADMISSIBLE.**

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# *Sargon* Requires the Court Exercise Its Role as “Gatekeeper” and Conduct a

1. **Hearing to Determine the Reliability of ShotSpotter Technology.**
2. Under *Sargon*, a trial court has a duty under Evidence Code section 801 to act as
3. “gatekeeper to exclude speculative or irrelevant expert opinion.” *Sargon Enterprises, Inc. v.*
4. *Univ. of S. Cal.* (2012) 55 Cal.4th 747, 770 [hereafter “*Sargon*”].) As the California Supreme
5. Court reaffirmed in *Sargon*, “[T]he expert's opinion may not be based ‘on assumptions of fact
6. without evidentiary support [citation], or on speculative or conjectural factors [¶] Exclusion of
7. expert opinions that rest on guess, surmise or conjecture [citation] is an inherent corollary to the

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foundational predicate for admission of the expert testimony: will the testimony assist the trier of

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fact to evaluate the issues it must decide?’ (Citation.)” (*Sargon, supra,* 55 Cal.4th at 770.)

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In addition, Evidence Code section 802 gives the court discretion to “require that a

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1. witness before testifying in the form of an opinion be first examined concerning the matter upon
2. which his opinion is based.” (*Id.* at 771 [quoting Evid. Code section 802.) In *Sargon*, the court
3. explained that trial courts have a duty under sections 801(b) and 802 to act as a “gatekeeper” and
4. exclude expert opinion testimony that is 1) based on matter of a type on which an expert may not
5. reasonably rely, 2) based on reasons unsupported by the material on which the expert relies, 3)
6. speculative, or 4) barred by other provisions of law. (*Id.* at 771-772.)
7. Accordingly, Mr. Defendent requests this Court conduct a hearing pursuant to *Sargon* and

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exercise its duty as a “gatekeeper” to exclude any expert testimony derived from ShotSpotter

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technology that is unreliable, unsupported by the material on which the expert relies, speculative

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or barred by other provisions of law.

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# B. *Kelly* Requires the Court Conduct a Hearing to Determine if ShotSpotter

**Is a New Scientific Technology Generally Accepted By the Relevant Scientific**

1. **Community.**
2. Not all expert opinion testimony must be subjected to analysis under *People v. Kelly*

23 (1976) 17 Cal.3d 24, 30. (See *People v. McDonald* (1984) 37 Cal.3d 351, 372-373; *People v.*

1. *Stoll* (1988) 49 Cal.3d 1136, 1157.) If, however, the proposed testimony is based on a “new
2. scientific technique,” admissibility of evidence produced by the technique requires a “showing of
3. the technique’s general acceptance in the relevant scientific community.” (*People v. Venegas*
4. (1998) 18 Cal.4th 47, 53.) Under the first prong of the *Kelly* analysis, as under *Sargon*, the court
5. is charged with determining the “reliability” of the new scientific technique. (*Kelly, supra*, 17
6. Cal.3d at 30.) The second prong of the *Kelly* analysis requires the witness furnishing testimony

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on reliability to be properly qualified as an expert to give an opinion on the subject. (*Ibid*.)

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Finally, only if the scientific technique is determined reliable, the proponent of the evidence must

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also demonstrate that correct scientific procedures were used in the particular case. (*Ibid*.) The

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1. burden is on the proponent of evidence based on a new scientific technique to establish the
2. reliability of that evidence before it is admitted under *Kelly*. (*Kelly, supra*, 17 Cal.3d at 31.)
3. In applying the first prong of the *Kelly* analysis, the court must assess reliability by
4. determining whether a scientific technique is “generally accepted” in the relevant scientific
5. community. In order to find a new scientific technique “generally accepted,” a court must be
6. “reasonably certain that the pertinent scientific community no longer views [it] as experimental
7. or of dubious validity. (Citation.)” (*People v. Leahy* (1994) 8 Cal.4th 587, 602 [quoting *Stoll,*

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*supra*, 49 Cal.3d at 1156].) “General Acceptance” means “consensus drawn from a typical cross-

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section of the relevant, qualified scientific community.” (*Leahy, supra*, 8 Cal.4th at 612.) The

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relevant scientific community must be construed to include not just practitioners of a technique,

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1. but “those most qualified to assess the general validity of a scientific method.” (*Jones v. United*
2. *States* (D.C. 1988) 548 A.2d 35, 39 [quotations and citation omitted].) Thus, long-standing use
3. by police officers is “less significant a factor than repeated use, study, testing and confirmation
4. by scientists or trained technicians.” (*Leahy, supra*, 8 Cal.4th at 605.)
5. California courts have consistently held that experts furnishing testimony regarding the
6. view of the scientific community must have sufficient academic and professional credentials to
7. understand both the scientific principals involved and any difference of view concerning their
8. reliability. (*Kelly, supra*, 17 Cal.3d at 37-40; *People v. Brown* (1985) 40 Cal.3d 512 [overruled
9. on other grounds in *California v. Brown* (1987) 479 U.S. 538].) Moreover, the testifying expert
10. should not have a personal or professional stake in the acceptance of the technique, as such

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individuals “may be too closely identified with the endorsement [of the technique] to assess fairly

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and impartially the nature and extent of any opposing scientific views.” (*Kelly, supra*, 17 Cal.3d

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at 38; see also, *People v. Pizarro* (1992) 10 Cal.App.4th 57, 79-80 [being a leading proponent of

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1. a scientific technique, having a long association with its development or promotion, or having a
2. vested career interest in its acceptance show a lack of impartiality by an expert].)
3. In the present matter, the relevant scientific community is not composed of ShotSpotter
4. technicians whose job it is to analyze recorded audio and form an opinion about its source, nor is
5. it composed of ShotSpotter employees who design or manage the company’s technology. Rather,
6. the relevant scientific community must include independent scientists or scholars capable of
7. evaluating whether the *methods and technology used* by ShotSpotter technicians to form opinions

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are reliable.

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*Kelly* permits the court to consider writings, such as “scientific and legal articles,” in

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evaluating the reliability of new scientific methodology. (*Kelly, supra*, 17 Cal.3d at 35; see also

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1. *People v. Shirley* (1982) 31 Cal.3d 18, 56 [scientists have long been permitted to speak to the
2. courts through their published writings in scholarly treatises and journals for the purposes of
3. establishing reliability under *Kelly*].) A trial court “may safely conclude *from the literature alone*
4. that there is no generally accepted scientific consensus about the reliability of the new technique
5. at that time. (*Leahy, supra*, 8 Cal.4th at 611.)” (*In re Jordan R*. (2012) 205 Cal. App. 4th 111,

25 128.)

* 1. In the present matter, the defense is aware of only one peer-reviewed study or article
  2. published by members of a relevant scientific community discussing the reliability of ShotSpotter
  3. or analogous gunfire detection technology. (See Aguilar, Juan R., *Gunshot Detection Systems in*
  4. *Civilian Law Enforcement*, 63 Journal of the Audio Engineering Society 4 at 287 (April 2015).)

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Given that the technology the prosecution seeks to present evidence of in this matter has only

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been addressed in a single article, the Court should conclude on this basis alone that there is no

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generally accepted scientific consensus about the technology’s reliability. (See *In re Jordan R*.,

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1. *supra*, 205 Cal.App.4th at 128.) Moreover, the above-referenced article casts serious doubts on
2. ShotSpotter’s reliability, noting that studies funded by ShotSpotter have found that only 67% of
3. ShotSpotter activations, on average, are produced by actual gunfire and concluding that
4. “[i]mprovements need to be made in gunshot detection algorithms in order to minimize system
5. sensitivity to false positive activations.” (Aguilar, Juan R., *Gunshot Detection Systems in*
6. *Civilian Law Enforcement*, 63 Journal of the Audio Engineering Society 4 at 287 (April 2015) at

15 p. 287, 288.)

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The absence of any published California cases deciding ShotSpotter’s admissibility

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further necessitates the Court conduct a hearing. An “important corollary” to *Kelly’s* requirement

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that proposed expert testimony based on a new scientific technique be shown to be reliable “is

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1. that if a published appellate decision in a prior case has already upheld the admission of evidence
2. based on such a showing, that decision becomes precedent for subsequent trials in the absence of
3. evidence that the prevailing scientific opinion has materially changed.” (*Venegas*, *supra*, 18
4. Cal.4th at 73 [quoting (*Kelly, supra*, 17 Cal.3d at 32].) The defense is aware of no such
5. decisions. While other jurisdictions have approved or denied the admissibility of evidence
6. derived from ShotSpotter technology, under *Kelly*, “these cases do not establish, as a matter of
7. law, the reliability of the [] technique.” (*Kelly, supra*, 17 Cal.3d at 35.) The absence of applicable
8. authority warrants a hearing. Furthermore, even assuming arguendo such authority exists, Mr.
9. Defendent is entitled to a *Kelly* hearing to determine whether the “prevailing scientific opinion
10. has materially changed.” (*Venegas*, *supra*, 18 Cal.4th at 53; *People v. Doolin* (2009) 45 Cal.4th

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390, 447.)

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The Court need look no further than the facts and analysis of the *Kelly* opinion itself in

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determining the necessity of conducting a hearing on the admissibility of ShotSpotter technology.

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1. Indeed, the “scientific technique” assessed by the court in *Kelly* provides a strikingly apt
2. comparison to the technique at issue in this case. In *Kelly*, a purported expert claimed he could
3. develop voiceprints of individual human voices that could identify whether a given individual
4. had spoken the words in a relevant recording. (*Kelly, supra*, 17 Cal.3d at 29.) In the first part of
5. the voiceprint technique, a machine created a spectrogram of a human voice by plotting on paper
6. a series of lines or bars representing the acoustical signal. (*Id*. at 29.) The technique then
7. involved an “examiner” visually examining spectrogram data recorded from both a known voice

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and an unknown voice, listening to the two voices, and based upon his or her visual and aural

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comparisons between the voices, stating an opinion regarding whether the two voices are the

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same. (*Ibid*.) In finding the voiceprint technique unreliable, the *Kelly* court noted that “[s]ince the

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1. identification process is essentially an exercise in pattern matching, the examiner's opinion is to a
2. large extent a subjective one based upon the relative aural similarity or dissimilarity of the two
3. voices and visual comparison of their spectrograms.” (*Id*. at 29-30.) The court further noted that
4. “[i]n some instances, the examiner is unable to declare positively either that there is a match or
5. nonmatch of the sample tests.” (*Id. at 30*.)

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* 1. ShotSpotter similarly claims to be capable of identifying recorded sounds using a novel
  2. combination of human and non-human processes. Specifically, ShotSpotter claims to be capable
  3. of distinguishing between gunshots and other similarly loud, percussive sounds, such as
  4. fireworks or a vehicle backfiring, and determining the geographic location of any such recorded

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sounds. ShotSpotter’s gunshot identification process can be distilled into two stages. In the first

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stage, a sensor equipped with microphones, GPS technology and audio convertors relies on

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proprietary algorithms to identify an impulsive sound as a potential gunshot. Once “triggered” by

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1. the impulsive sound, the sensor transmits a recording of the sound that has been converted from an
2. analog soundwave to a digital file to a ShotSpotter server. Relying on the location of each sensor
3. that identified and recorded the potential gunshot and the precise time at which each sensor
4. received the sound, ShotSpotter claims to be able to locate the sound’s source.
5. In the second stage of the process, ShotSpotter employees and/or police review the audio
6. recordings captured and transmitted by multiple sensors to form an opinion regarding whether a
7. recorded sound is a gunshot or a false positive. This second stage, as in *Kelly*, involves an

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examiner listening to an audio recording and analyzing graphical representations of that

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recording to make subjective, idiosyncratic conclusions about the source of a sound. Thus, the

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specific concern the court identified in *Kelly* is also present here: that the ShotSpotter

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1. “examiner's opinion is to a large extent a subjective one based upon the relative aural similarity
2. or dissimilarity” of, in this case, a percussive sound that occurred in an urban environment and
3. the sound of a typical gunshot. (*Kelly, supra*, 17 Cal.3d at 29-30.)
4. The Court must assess each distinct procedure in the ShotSpotter process under the lens
5. of the three-prong *Kelly* analysis. (*People v. Pizzaro* (2003) 110 Cal.App.4th 530, 616.) In
6. addition to the two stages of the ShotSpotter process described above, the court must also subject
7. the statistical data and analysis derived from ShotSpotter’s processes to a *Kelly* analysis. As the
8. court of appeal stated in *People v. Barney* (1992) 8 Cal.App.4th 798, 818 in deciding that
9. statistical analysis in DNA cases must pass its own *Kelly* test:
10. “The evidence produced by DNA analysis is not merely the raw data of matching bands
11. on autoradiographs but encompasses the ultimate expression of the statistical significance of a match, in the same way that polygraph evidence is not merely the raw data produced
12. by a polygraph machine but encompasses the operator's ultimate expression of opinion whether the subject is telling the truth.”

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*Sargon* and *Kelly* are complementary expressions of the critical responsibility the trial

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1. court shoulders to assess, and exclude, expert testimony regarding a scientific technique that is
2. not reliable. In order to be admissible, expert testimony based on ShotSpotter must pass muster
3. under both *Kelly* and *Sargon*. The Court’s “gatekeeping” duty under sections 801 and 802
4. requires an assessment of ShotSpotter’s reliability, both generally and as applied in this case.
5. Because no California appellate court has decided the admissibility of ShotSpotter technology
6. and no consensus has been produced by the relevant scientific community as to the technology’s
7. reliability, the Court must conduct a hearing to determine the question of admissibility.

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# III. SHOTSPOTTER’S INABILITY TO RELIABLY DISCERN GUNFIRE FROM

17 **NON-GUNFIRE RENDERS ITS DATA INAPPROPRIATE FOR USE IN CRIMINAL TRIALS.**

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A study of the efficacy of the ShotSpotter system funded by ShotSpotter found that a

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1. range of non-gunfire noises, including dumpsters, trucks, motorcycles, helicopters, fireworks,
2. construction, trash pickup, high winds, and even church bells triggered false positive activations
3. of ShotSpotter’s automated gunfire detection system. (See CSG Analysis, ShotSpotter Gunshot
4. Location System Efficacy Study (2011) (“CSG Study”) p. 42, available at
5. <http://richmondconfidential.org/wp-content/uploads/2011/10/ShotSpotterefficacystudy.pdf>(last
6. accessed Feb. 14, 2018).) The CSG Study found that approximately 67% of ShotSpotter
7. activations were caused by actual gunfire.1 (*Ibid*; see also Aguilar, Juan R., *Gunshot Detection*
8. *Systems in Civilian Law Enforcement*, 63 Journal of the Audio Engineering Society 4 at 287
9. (April 2015) (citing the CSG Study).) Because the ShotSpotter software and algorithms are not
10. capable of accurately determining whether an impulsive sound is a gunshot, the ShotSpotter

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system relies on human operators to make a determination in every instance where the

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ShotSpotter system is automatically activated by an impulsive sound. (See SST, ShotSpotter

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Whitepaper (Sept. 2, 2014) p. 10, available at <http://www.shotspotter.com/system/content->

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1. uploads/Gunshot%20detection%20WP.pdf (last accessed Feb. 14, 2018).) The reliability and
2. accuracy of the ShotSpotter technology varies greatly based on the skill and experience of the
3. operator, the specific factual information the operator receives regarding the triggering event, and
4. environmental and geographic factors.

# A. ShotSpotter’s Human Operators Are Not Able to Consistently or Accurately

1. **Discern Recorded Gunfire Sounds.**
2. The ShotSpotter technology relies on a “reclassification” method, whereby a ShotSpotter
3. operator, who has been trained to identify false positives, can reclassify a recorded sound after
4. reviewing the acoustical data. (Reporter’s Transcript of *People v. Durham* at 44:5-16, attached as
5. Exhibit A (hereinafter “Durham Tr.”).) However, police officers can *also* reclassify a sound after
6. reviewing the acoustical data themselves. (*Durham* Tr. at 94:8-17.) The CSG Study concluded
7. that “few” of the dispatchers surveyed in the study had the necessary experience or training to

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discern recorded gunshots. (CSG Study at p.26) The CSG Study further found that “none had

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experience with audio waveform analysis, and three of the seven dispatchers had never heard a

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1. 1 The CSG Study’s authors omitted the data reported regarding ShotSpotter’s efficacy in East Palo Alto, California. The dispatcher from East Palo Alto reported a 95% false positive rate. Had that estimate been included, the
2. perceived true gunshot reporting rate would have been 58%. The authors cited the dispatcher’s comments that he

“look[s] at the waveform” in determining whether something is not a gunshot and his statement that he is “only

1. confident if I hear it” in determining the data set an “outlier” that warranted exclusion from the study.
2. live gunshot. Four had, though on the shooting range, where presumably they wore hearing
3. protection which muffles the sound of the gunshot.” (*Ibid*.) According to the CSG Study, other
4. than “just listening to it,” there is no “cogent procedure to better differentiate between actual
5. gunshots and other sounds” used by dispatchers analyzing ShotSpotter alerts. (*Ibid*.) The highly

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subjective and ambiguous nature of ShotSpotter’s human review component is underscored by

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the fact that even trained and experienced ShotSpotter personnel have arrived at conflicting

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conclusions regarding the number of gunshots fired in an incident after reviewing the exact same

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1. data. (See, e.g., Durham Tr. at 68:21-69:8.) The inexperience and lack of training among
2. operators, the absence of standardized, science-based procedures or protocols for identifying
3. gunfire, and the inability of ShotSpotter’s own trained personnel to consistently identify gunfire
4. caste serious doubts on the technology’s reliability.

# B. The Potential for Cognitive Bias Among ShotSpotter’s Human Operators

1. **Undermines the Reliability of their Conclusions.**
2. The reliability of the ShotSpotter technology is inherently compromised by the potential
3. for cognitive bias to improperly influence the judgment of ShotSpotter’s human reviewers.
4. According to a 2016 report by the President’s Council of Advisors on Science and Technology:
5. Cognitive bias refers to ways in which human perceptions and judgments can be shaped by factors other than those relevant to the decision at hand. It includes
6. “contextual bias,” where individuals are influenced by irrelevant background
7. information . . . [and] “confirmation bias,” where individuals interpret information, or look for new evidence, in a way that conforms to their pre-existing
8. beliefs or assumptions. . . .
9. (President’s Council of Advisors on Science and Technology, *Report to the President: Forensic*
10. *Science in Criminal Courts: Ensuring Scientific Validity of Feature-Comparison Methods* at 31
11. (September 2016) (“PCAST Report”).) The PCAST Report further described cognitive bias as a
12. “serious issue in forensic science.” (*Ibid*.) The problem of cognitive bias is well-established in
13. the scientific community and “[a] wealth of evidence indicating that an observer’s expectations
14. can impact visual and auditory perception.” (Kassin, Saul M. et al., *The Forensic Confirmation*
15. *Bias: Problems, Perspectives and Proposed Solutions*, 2 J. of Applied Research in Memory &
16. Cognition 42, 44 (2013).) It is also well-established that “given the genuine dangers of cognitive

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bias, the better practice is to protect examiners from inadvertent bias by shielding them from

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information that is clearly unnecessary and not relevant to their assessment.” (Taylor, Melissa K.

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et al., Expert Working Group on Human Factors in Latent Print Analysis, Nat’l Institute of

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1. Standards and Technology, *Latent Print Examination and Human Factors: Improving the*
2. *Practice through a Systems Approach* (2012), available at
3. [https://www.nist.gov/publications/latent-print-examination-and-human-factors-improving-](http://www.nist.gov/publications/latent-print-examination-and-human-factors-improving-)
4. practice-through-systems-approach (last accessed February 2, 2018); *see also* National
5. Commission on Forensic Science*, Ensuring That Forensic Analysis Is Based Upon Task-*
6. *Relevant Information,* available at [https://www.justice.gov/ncfs/file/795286/download](http://www.justice.gov/ncfs/file/795286/download) (last
7. accessed February 2, 2018) (examiners “should rely solely on task-relevant information when

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performing forensic analyses”); Peterson, Peter E. et al., FBI, *Latent Prints: A Perspective on the*

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*State of the Science*, 11 Forensic Science Communications 14 (October 2009) (discussing

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problem of cognitive bias and efforts to mitigate its influence).)

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1. The ShotSpotter technology is rife with the potential for cognitive bias to improperly
2. influence the judgement of human operators. In deciding whether a recorded sound is gunfire,
3. ShotSpotter and/or police personnel may review, edit, and change their conclusions about a
4. recorded audio file after having learned factual details regarding the incident. Specifically,
5. ShotSpotter personnel may change their conclusions about how many gunshots are represented in
6. an audio recording based on conversations with police about the incident. Similarly, police may
7. classify or reclassify a recorded sound as gunfire or a false positive based on factual information
8. they receive regarding the incident. It is also possible that ShotSpotter personnel do not begin to
9. review an activation until after they have been contacted by police regarding the incident. Thus,
10. there are many possible scenarios in which a ShotSpotter reviewer’s conclusions may be

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influenced by the biases or opinions of police or other parties involved in the incident, as well as

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by factual information they are given by police regarding the underlying incident. The defense is

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unaware of any standardized policies or procedures employed by ShotSpotter to minimize the

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9 risks of cognitive bias.

# 10 C. ShotSpotter’s Ability to Discern and Locate Gunfire Is Compromised By Environmental Factors in Urban Areas.

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There are numerous environmental factors that can cause the ShotSpotter technology to

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fail to detect gunfire or detect false positives. Per the SST Detailed Forensic Report specific to

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1. the present case and provided by the prosecution:
2. SST, Inc. does not guarantee 100% detection because real world, urban environments may contain intervening buildings, topography, foliage, periods of
3. increased traffic or construction noise, and other urban acoustic noises that may either prevent the sound of a gunshot from being detected by the sensor(s), or may
4. change or modify the audio characteristics of the sound of a gunshot so that it no longer matches the sensor(s) detection parameters.

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Even in cases where ShotSpotter sensors detect possible gunfire, environmental factors, such as

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1. multi-story buildings, hills or traffic sounds, can change or distort the soundwave recorded by the
2. sensors, thus interfering with the human reviewer’s ability to reliably classify the sound.
3. ShotSpotter is also generally unable to detect gunshots fired from inside a car, within a
4. building or home, or at extremely close range. As ShotSpotter’s CEO Ralph A. Clark
5. ackwnoledged:
6. We certainly can’t detect indoor gunfire, although we have occasionally, but that's
7. more accidental…So, if someone fires a gun indoors, there’s not enough acoustic
   1. energy to go out and reach the sensors that they can then hear the impulse noise and timestamp. And if people do execution-style shootings, there’s a possibility
   2. that we don’t catch those.
   3. (Smith, Rachel Holliday, *Here’s How the NYPD’s Expanding ShotSpotter System Works*, DNA
   4. Info (May 18, 2016), available at [https://www.dnainfo.com/new-york/20160518/crown-](http://www.dnainfo.com/new-york/20160518/crown-)

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heights/heres-how-nypds-expanding-shotspotter-system-hears-gunfire (last accessed Feb. 2,

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2018) (further admitting that “I will make the point that we are going to have missed detections

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— we call those false negatives. Those are gunshots that we should have detected [and] for some

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9 reason we did not.”).)

1. The type of gun fired also affects the ability of ShotSpotter’s sensors to detect a gunshot.
2. (See *Perez, Marin, Shots Fired: Shotspotter Gunfire Detection System Provides Leg*
3. *Up On 911,* PoliceOne (Sept. 25, 2007), available at [https://www.policeone.com/police15](http://www.policeone.com/police15)
4. products/policetechnology/articles/1357787-Shots-fired-ShotSpotter-gunfire-detection-system-
5. providesleg-up-on-911/ (last accessed Feb. 2, 2018) (“Fully-suppressed weapons” and “very low-
6. caliber weapons can also defeat the ShotSpotter system.”); see also Mazerolle, Lorraine Greene,

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*Using Gunshot Detection Technology in High-Crime Areas*, National Institute of Justice (June

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1998), available at [https://www.ncjrs.gov/pdffiles/fs000201.pdf](http://www.ncjrs.gov/pdffiles/fs000201.pdf) (last accessed Feb. 2, 2018)

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(“The type of weapon fired affected the system's ability to detect the shot: The MP-5 rounds were

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1. much more difficult for the system to detect than either the pistol or shotgun rounds”).)
2. Environmental conditions, geography, the location from where a gun is fired and the type of gun
3. fired are factors that may alter and distort a soundwave recorded by a ShotSpotter sensor,
4. undermining the ability of a human reviewers to accurately and reliably identify the source of the
5. recorded soundwave.

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# Conclusion

For the foregoing reasons Mr. Defendent requests the Court conduct a hearing to determine

the admissibility of evidence derived from or related to ShotSpotter technology and exclude all

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evidence that does not satisfy the requirements of *Kelly* and *Sargon*.

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9 Dated: April 10, 2018 Respectfully Submitted,

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1. Attorney for Defendant
2. Attorney for Defendant

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