Beyond the Crime Laboratory:  
The Admissibility of Unconfirmed Forensic Evidence in Arson Cases

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I. THE RELIABILITY OF FORENSIC EVIDENCE

In June 2009, the Supreme Court decided Melendez-Diaz v. Massachusetts.¹ Writing for the majority in a 5-4 decision, Justice Antonin Scalia held that three “certificates of analysis” issued by a Massachusetts state crime laboratory, reporting the results of the analysis of nineteen small plastic bags allegedly containing cocaine, were within the “core class of testimonial statements” covered by the Confrontation Clause of the Sixth Amendment.² As such, the certificates were functionally identical to live, in-court testimony.³ Thus, Justice Scalia concluded that the forensic analysts who prepared the certificates were “witnesses” for purposes of the Sixth Amendment and that the prosecution had an obligation to make the analysts available so that the defendant could confront and cross-examine them at trial.⁴ Although the defendant in Melendez-Diaz was charged with


2. Id. at 2530-32. The Confrontation Clause of the Sixth Amendment states that “in all criminal prosecutions, the accused shall enjoy the right . . . to be confronted with the witnesses against him.” U.S. CONST. amend. VI.


4. Id. Four days after issuing its decision in Melendez-Diaz, the Supreme Court granted certiorari in Briscoe v. Virginia. Briscoe v. Virginia, 130 S.Ct. 1316 (2010). Briscoe gave the Court an opportunity to decide whether a State has fulfilled its obligation under the Confrontation Clause if a prosecutor introduces a certificate of laboratory analysis without presenting the analyst who prepared it if the defense is provided the right to call the analyst as its own witness. Id. However, the Supreme Court did not decide that issue and remanded the case for further proceedings not inconsistent with Melendez-Diaz. Id. In Briscoe, which is known as Magruder v. Commonwealth, 275 Va. 283, 288-307 (Va. 2008), at the state level, the Virginia courts found no error in the admission of the laboratory certificate alone

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possession of drugs, the decision will have broader implications because the results of crime laboratory analysis are required whenever evidence such as a breath, hair, fiber, ballistic, soil, glass, paint, chemical, fingerprint, blood, DNA, or semen is crucial to support the prosecution’s case.5

Although the focus of the Supreme Court’s decision in Melendez-Diaz was on whether the prosecution’s evidence was “testimonial” for purposes of the Confrontation Clause, a broader underlying concern of the Clause centers on the reliability of evidence in criminal cases when the defendant has not been afforded an opportunity to cross-examine the person presenting it. Writing for the Court in its 2004 decision in Crawford v. Washington, Justice Scalia stated that “[t]o be sure, the Clause’s ultimate goal is to ensure reliability of evidence.”6 However, Justice Scalia went on to write that since reliability is a procedural rather than a substantive guarantee, the Clause “commands, not that evidence be reliable, but that reliability be assessed in a particular manner: by testing in the crucible of cross-examination. The Clause thus reflects a judgment, not only about the desirability of reliable evidence... but about how reliability can best be determined.”7

Improving the reliability of forensic evidence in criminal cases has been the topic of considerable analysis in recent years.8 At least one case

on the grounds that the state’s “notice and demand” statutes (in effect at the time but since having been repealed) adequately protected a criminal defendant’s rights under the Confrontation Clause because they permitted the defendant to call the laboratory analyst as its own witness. Magruder, 275 Va. at 288-307 (Va. 2008); cert., 129 S. Ct. 2858 (2009).

5. In Grant v. Commonwealth, 682 S.E.2d 84 (Va. Ct. App. 2009), the Virginia Court of Appeals became the first state appellate court to apply Melendez-Diaz. In Grant, the defendant was charged with driving while intoxicated. Id. at 85-86. When the Commonwealth stated that it would introduce a certificate of the defendant’s breath-test analysis, the defense notified the prosecutor that it wanted the Commonwealth to call the analyst who prepared the certificate for cross examination at the Commonwealth’s expense. Id. at 85, 87. The analyst was not called and did not testify. Id. at 86. The defense objected to the admission of the certificate. The trial judge admitted the certificate and the defendant was convicted. Id. On appeal, the Virginia Court of Appeals held that a certificate of breath-test analysis is testimonial and that the facts establishing the validity and admissibility of a breath-test result must be proved by live, in-court testimony. Id. The appellate court reversed the defendant’s conviction and remanded the case for further proceedings. Id. at 92. For an analysis of a number of specific areas of forensic sciences where laboratory analysis is crucial, see generally Terrence F. Kiely, Forensic Evidence: Science and the Criminal Law (2d ed. 2006).


7. Id.

8. See generally Committee on Identifying the Needs of the Forensic Sciences Community, Strengthening Forensic Science in the United States: A Path Forward (2009) [hereinafter A Path Forward].
revealed that the State fabricated scientific evidence in a criminal trial.9 However, concern for the reliability of forensic evidence goes beyond prosecutorial misconduct. In February 2009, a report released by a committee of the National Academy of Sciences concluded that the "forensic science system . . . has serious problems that can only be addressed by a national commitment to overhaul the current structure that supports the forensic science community in this country."10 Among the challenges facing the forensic science community, the report listed the disparities among forensic science in state, local, and federal jurisdictions; the lack of mandatory standardization, certification, and accreditation; problems relating to the interpretation of forensic evidence, and the need for research to establish limits and measures of performance.11 In order to meet the challenges, the reports sets out thirteen recommendations, including the establishment of a federal agency to finance research and training and promote universal standards in forensic science as well as mandatory certification and accreditation of forensic scientists.12

In most criminal cases, if the evidence presented by the prosecution in support of its allegations is confirmed by laboratory analysis, the defendant may challenge the reliability of the conclusion by questioning the qualifications and training of the analyst or the accuracy of the methods the analyst used to arrive at his or her conclusions.13 In Melendez-Diaz, the certificates of analysis reported the weight of the plastic bags and stated that an examination showed they contained cocaine.14 This supported the


11. A PATH FORWARD, supra note 8, at 4-14.

12. Id. at 19-33.


prosecution's charge that the defendants were in possession of illegal drugs. Presumably, if the laboratory analysis of the bags had not confirmed the presence of cocaine, the certificates and the analyst would not have been an issue in the case since the prosecution would have either charged the defendant with an offense other than possession of cocaine or dropped the charges against him.

In the vast majority of criminal cases, any challenge to the reliability of the forensic evidence comes from the defendant. However, suppose the laboratory analysis in Melendez-Diaz had found that the plastic bags did not contain cocaine. Instead of dismissing the charges, could the prosecution have challenged the laboratory analysis and called—as expert witnesses—the police officers who arrested the defendant and presented their testimony that, in their opinion, the packets contained cocaine? It may seem strange that the prosecution would attempt to introduce testimony at trial that not only has not been confirmed by its forensic laboratory analysis, but has been contradicted by such analysis. However, that is exactly what the state attempts to do in some arson prosecutions.

Arson prosecutions often depend on the state showing the presence of a chemical accelerant at the scene of the fire. In the course of their investigation, police or fire department investigators frequently take samples from the scene of the fire and send them to a forensic laboratory for analysis. While some of these samples are obtained as a result of the use of mechanical detection devices, many fire and police departments now rely on specially trained canines to “alert” their investigators to the presence of accelerants.

If the canine alerts for an accelerant, a sample is taken from the site and is usually sent to a forensic laboratory for analysis. In situations in which the laboratory analysis does not confirm the presence of accelerants, the prosecution may seek to present the testimony not of the analyst who conducted the laboratory tests but of the canine's handler or trainer. If admitted, the handler then testifies that, despite the negative laboratory analysis, the canine’s alert should be treated as evidence of the presence of a chemical accelerant because the canine's highly developed sense of smell makes it more accurate than the laboratory tests.

The admissibility of the handler’s testimony raises questions of the reliability of the canine’s alert when the laboratory analysis does not confirm that testimony.

15. State of Conn. Dep’t of Pub. Safety, Forensic Science Laboratory, http://www.ct.gov/dps/cwp/view.asp?a=2155&q=31496 (last visited Aug. 12, 2010). The Connecticut State Forensic Laboratory, for example, analyzes between 150 and 200 suspicious fires each year. Id. These submissions come from state and local fire marshals, and fire and police departments. Id.
Of the more than a dozen state and federal court opinions that have considered the question of the reliability of unconfirmed canine alerts in arson cases, all but three have admitted the testimony of the handler. However, those decisions have not resolved questions of the reliability and admissibility of such testimony. Several courts have admitted the testimony (usually offered in the form of expert testimony), or indicated that they would admit it, if the proper foundation were established. However, the courts in many of those cases did not give detailed reasons for their decisions. They stated only that the trial judges did not abuse their discretion in admitting the testimony, that the state independently presented sufficient evidence of arson (and thus the evidence of the unconfirmed alert was not prejudicial), or that it was up to the jury to determine the weight to be given to the evidence.

Those courts that have given detailed reasons for admitting the unconfirmed testimony examined three broad factors: (1) the training of the canine and its trainer; (2) the canine’s experience and accuracy in detecting
accelerants; and (3) the procedures followed in conducting the particular search.  

Three states have held that testimony concerning uncorroborated canine alerts are either unreliable or do not meet the evidentiary test of "general acceptance" for admissibility.  

Although these courts are in the minority on the issue, their view that such evidence is not admissible at trial is shared by some forensic scientists and by organizations such as the National Fire Protection Association (NFPA).  

The differences between the courts, forensic scientists, and professional organizations raise continuing questions of the reliability and admissibility of evidence that has not been confirmed by laboratory analysis. Part II of this article discusses the importance of the investigative stage in an arson case, the role that canines have come to play in detecting chemical accelerants, and studies of the accuracy of their alerts to accelerants. Part III and Part IV examine state and federal decisions accepting or rejecting testimony concerning unconfirmed canine alerts. While laboratory analysis of canine alerts provides a useful second opinion as to the validity of a canine alert, it is the conclusion of this article that a careful application of the factors used by the courts that permit testimony concerning unconfirmed canine alerts to the presence of accelerants can provide the degree both of certainty and reliability that justifies the admissibility of the evidence in arson cases.  

II. ARSON INVESTIGATION  

A. The Challenge of Arson Investigation  

The most important part of any arson case is the investigation by the fire and/or police department into the cause and origin of the fire.  


investigation determines whether the fire is classified as an "accident" or as "incendiary" in origin. If "incendiary," the fire is treated as "arson." The investigation also produces the physical, biological, and documentary evidence that the prosecutor must present in court and that the defense will attempt to refute. The importance of the investigation, collection, and analysis of evidence is illustrated by the petitions submitted to state commissions on behalf of a number of persons who allege to have been wrongly convicted of arson, some of whom face the death penalty as a result of these convictions.

The investigation stage is also the most difficult part of any arson case. Although a fire creates its own evidence, much of the evidence investigators need to reconstruct the scene and to make their cause-and-origin determination has been damaged, destroyed, or covered up by the fire. In addition, the process of fighting a fire alters or destroys evidence. Firefighters force open doors, break windows, and introduce hose streams onto the fire and the property; they overhaul ceilings and walls looking for indications that an extinguished blaze could rekindle; they pick up what may be evidence and move it, hand it to others, or place it in

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23. NFPA, supra note 21 § 3.3.3, at p. 11 (defining an accident as: “An unplanned event that interrupts an activity and sometimes causes injury or damage or a chance occurrence arising from unknown causes; an unexpected happening due to carelessness, ignorance, and the like.”).

24. NFPA, supra note 21 § 3.3.99, at p. 14 (defining an incendiary fire cause as: “A fire that is intentionally ignited under circumstances in which the person knows that the fire should not be ignited.”).

25. NFPA, supra note 21, § 3.3.11, at p. 11 (defining arson as: “The crime of maliciously and intentionally, or recklessly, starting a fire or causing an explosion.”).


27. United States v. Markum, 4 F.3d 891, 894 (10th Cir. 1993) (explaining that firefighters used 1100 gallons of water to extinguish a fire in home).

containers for later analysis;\textsuperscript{29} and, frequently, they remove the remaining contents of a building fire to the sidewalk or yard.

The remains of a fire may contain traces of a hydrocarbon-based accelerant, such as gasoline, diesel fuel, kerosene, lighter fluid, turpentine, or butane, which may indicate arson. However, these accelerants undergo changes as a result of the intense heat of a fire and only a small amount of the accelerant may remain after a fire, making accelerant detection, identification, and analysis serious problems for investigators.\textsuperscript{30} To assist with these difficulties, investigators have a number of resources, including hydrocarbon gas detectors (known as “sniffers”) that can detect low levels of an accelerant on material. These permit the investigator to take samples at the scene of the fire that then are sent to a laboratory for detailed analysis. In addition to these mechanical detection devices, a number of state and local police and fire departments use specially trained accelerant detection canines to assist them in their work.\textsuperscript{31}

B. Arson Detection Canines

Since the early 1980s, an important addition to the tools for the physical investigation of fire scenes has been accelerant-detection canines, particularly Labradors and German shepherds.\textsuperscript{32} These dogs usually work

\textsuperscript{29} See Young v. Fire Ins. Exch., 182 P.3d 911, 915 (Utah Ct. App. 2008) (stating the mattress where the fire could have started was removed from the room before the canine searched the room).

\textsuperscript{30} See, e.g., Gaona v. State, No. 13-08-364-CR, 2009 WL 2568578, at *4 (Tex. App. Mar. 26, 2009) (quoting the Texas state fire marshal analyst with the arson laboratory, where she offered four reasons for failing to detect any ignitable liquid residue: “(1) ‘the fire suppression activities [could have] washed it away’; (2) ‘[i]t could have been burned up’; (3) ‘[i]t also could have evaporated before it was collected’; and (4) ‘there were [no accelerants] to begin with’”); Maier v. Allstate Ins. Co., 838 N.Y.S.2d 715, 716-17 (N.Y. App. Div. 2007) (explaining that laboratory results were negative for an accelerant on a burned-out mattress, fire investigator testified this was because the accelerant was completely consumed by the fire or washed away during the effort to extinguish the fire).


\textsuperscript{32} See BUREAU OF ALCOHOL, TOBACCO AND FIREARMS, CANINE ACCELERANT DETECTION PROGRAM (1997), http://oregon.gov/OSP/AES/ATF.shtml. For a discussion of the canine arson detection program used by one local agency, the Santa Clara County (California) fire department, see http://www.sccfd.org/fire_investigation.html. Because of their heightened sense of smell, canines have been used in other aspects of police work. See People v. Bartelt, 894 N.E.2d 482 (Ill. App. Ct. 2008), appeal granted, 900 N.E.2d 1120 (2008) (canine alerted to the smell of drugs in a car); Brooks v. People, 975 P.2d 1105 (Colo. 1999) (permitting testimony regarding the use of scent-tracking canine to identify the defendant if the proper foundation is laid and there is corroborating independent evidence);
exclusively with the same handler in a partnership that enables them to read each other's reactions. As a result of training, a canine may give a "primary alert" at a particular spot. This is an indication that the canine has located an odor (i.e., gasoline, kerosene, diesel fuel, etc.) that it has been trained to locate. A canine also may give a "secondary alert" during an investigation. This is a reaction that indicates some odor is present but the amount is insufficient or the canine does not have the ability to locate its exact source.

An example of how a canine may give an alert occurred in State v. Foy where the canine was trained to sit when she first detected the presence of hydrocarbons. On the command of "show me," the canine placed her nose at the point of the source of the smell. An investigator who works consistently with one canine will know the dog's style of detection, as well as be able to evaluate the dog's performance on any given day. Investigators also devise systems of rewards, in the form of food or toys, when a canine alerts to an accelerant. The close partnership of an investigator and a canine gives the canine stability and enables the dog to learn exactly what the investigator expects.

Because of the nature of their work and their close relationship with the dogs, arson investigators are the most ardent supporters of the use of canines in their work. Jim Butterworth, a fire investigator with the Connecticut Office of State Fire Marshall, and one of the original handlers and trainers of the first accelerant detection canine, provides five advantages canines have over mechanical detection devices. First, mechanical detectors do not distinguish between petroleum-based products (i.e., polyurethane foam chair cushions and certain types of carpeting) that


35. Id. at *24 n.7.

36. 662 A.2d 238 (Me. 1995).

37. Id. at 240 n.1.

38. For example, in Foy, the training of the canine was based on a food reward technique. Id. In addition, the canine underwent blind testing at least once a year, the most recent test having been several weeks prior to the defendant's arrest. Id. The canine had never failed a blind test. Id.

burn normally at fire scenes and items that may contain a flammable liquid. In contrast, a properly trained accelerant detection canine will ignore the normal products and focus on finding combustible liquids. Second, it may take hours to search a large area with a mechanical detection device, while a properly trained canine may take only a few minutes.

A canine also may be able to detect accelerants beneath several feet of debris at a fire site. Third, the use of a canine may reduce the number of samples that have to be sent to a laboratory for analysis. Since fire investigators are limited in the number of samples they can submit to a laboratory for analysis, the role of a canine is to “alert” to spots where ignitable liquids have survived. Fourth, a canine may be able to detect an accelerant on substances where the fire damage is so severe that there are no visible pour patterns. Finally, in some situations, there may not be enough oxygen to ignite a flammable liquid. A canine may be able to alert to an accelerant in those areas where there is no visible sign of fire damage. Thus, Jim Butterworth and many other arson investigators feel that properly trained canines’ sensitivity to odors makes them a valuable resource in locating low levels of accelerants, in some cases at levels that escape mechanical detection devices.

C. Reliability of Canine Accelerant Detection

Despite their wide use by police and fire departments as well as the recognized advantages of accelerant-detection canines over mechanical detection devices by most forensic scientists, the use of canine alerts as evidence at trial remains an issue of contention. The NFPA, for example, takes the position that, because canines are so sensitive in detecting petroleum products, they are not selective in distinguishing between the residues present in normal household products that may be present at the

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40. See generally State v. Foy, 662 A.2d 238 (Me. 1995). The primary indication by the canine of the presence of an accelerant at the site of the burned building was “[c]onfirmed by a chemical analysis of samples taken from the building.” Id. at 240.

scene of a fire and those used as accelerants. Most of the studies that have been done on canines have focused on attempts to determine the lower limits at which they can detect potential accelerants and their sensitivity in comparison to laboratory techniques for fire analysis. The most comprehensive study of canine accelerant alerts was published in the Journal of Forensic Science in 1995. The study evaluated forty-two accelerant detection canine teams for accuracy in four areas: (1) distinguishing "between accelerants and other common pyrolysis products"; (2) detecting common accelerants at low concentrations; (3) locating accelerants precisely; and (4) detecting different classes of accelerants. In the test concerning the detection of accelerants, as distinguished from other products such as wood and plastic that were set on fire, 60% of the canine teams performed the test without error and, overall, averaged a 96.7% accuracy rate for alerting only to the sample that contained gasoline. When tested for the precise location of an accelerant, the canine teams averaged 61.5% accuracy in detecting areas with three microliter drops of gasoline.

The canines' ability to detect such small amounts of accelerant means that the handler must be very careful in collecting a sample from the precise location. With regards to the canines' ability to alert to various classes of accelerants, most of the canines had been trained primarily on

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42. NFPA, supra note 21, § 16.5.4.7.3 at p. 138; cf. Land v. State, 802 N.E.2d 45, 46, 48 (Ind. Ct. App. 2004) (detailing an instance in which a canine trained to recognize petroleum-based accelerants alerted on the defendant's shoes. However, when the fire investigator tested the defendant's shoes with an electronic hydrocarbon detector the results were negative. Further testing revealed that the soles of the defendant's shoes were manufactured using a type of solvent that was flammable and detectable by the canine but not sufficient to be detected by the electronic detector. The Indiana appellate court affirmed the defendant's conviction for arson despite the failure of the state to preserve one of his shoes since the shoes were not the sole basis of the defendant's defense.).


44. See M. Nowlan et al., Use of Solid Absorbent and an Accelerant Detection Canine for the Detection of Ignitable Liquids Burned in a Structure Fire, 52 J. FORENSIC SCI. 643 (2007); Andrew Armstrong et al., The Evaluation of the Extent of Transporting or "Tracking" an Identifiable Ignitable Liquid (Gasoline) Throughout Fire Scenes During the Investigative Process, 49 J. FORENSIC SCI. 741 (2004).


46. Id.

47. Id. at 562 tbl.1, 563.

48. Id. at 563 tbl.3.
gasoline, although some were trained on a variety of additional accelerants.\textsuperscript{49} Eighty-one percent of the canines alerted to a medium petroleum product, and 94\% alerted to the heavy petroleum product.\textsuperscript{50} Seventy-one percent of the canines trained primarily on gasoline were able to identify accelerants from all of the classes tested as compared with 66\% of canines trained on a variety of accelerants.\textsuperscript{51} The authors noted that this alone did not seem to indicate which training method (gasoline alone or multiple types of accelerants) is more effective.\textsuperscript{52} Based on these results, the authors concluded that accuracy, dependability, and effectiveness of the canines depended on their training and maintenance.\textsuperscript{53} They made no universal endorsement or condemnation of accelerant-detection canines. Instead, the authors supported their use as a valuable tool in locating accelerants for submission for laboratory analysis.\textsuperscript{54}

Although a number of studies have shown that properly trained canines have a higher sensitivity to accelerants than do some laboratory techniques for analysis and are very reliable in detecting accelerant residue, they are not perfect.\textsuperscript{55} In keeping with the conclusions of the 1995 study, NFPA 921 states that the objective of “canine/handler teams is to assist with the selection of samples that have a higher probability of laboratory confirmation” and that canine detection should be used in conjunction with, and not in place of, the other fire investigation and analysis methods described in this guide.\textsuperscript{56} Thus, NFPA 921\textsuperscript{57} and some forensic scientists\textsuperscript{58} take the position that a canine alert that is not

\begin{enumerate}
\item \textit{Id.} at 563.
\item \textit{Id.}
\item \textit{Id.}
\item \textit{Id.}
\item \textit{Id. at} 564.
\item \textit{Id.}
\item See also Andrew Armstrong et al., \textit{The Evaluation of the Extent of Transporting or “Tracking” an Identifiable Ignitable Liquid (Gasoline) Throughout Fire Scenes During the Investigative Process}, 49 J. FORENSIC SCI. 741 (2004).
\item NFPA, \textit{supra} note 21, § 16.5.4.7.5 at 138.
\item NFPA, \textit{supra} note 21, § 16.5.4.7.1 at 137-38 (“In order for the presence or absence of an ignitable liquid to be scientifically confirmed in a sample, that sample should be analyzed in a laboratory . . . . Any canine alert not confirmed by laboratory analysis should not be considered validated.”).
\item See, e.g., DEHAAN, \textit{supra} note 20, at 543:

The canine cannot discriminate between the residues of carpet glue used to repair a section of carpet from the residues of isoparaffinic solvent used as an accelerant. Despite the advice of the IAAI Forensic Science Committee and the NFPA Technical Committee on Fire Investigations (NFPA 921), a number of courts have
confirmed by laboratory analysis should not be considered valid. In some
cases, however, samples taken from a fire scene are not submitted to a
laboratory for analysis or, if they are submitted, the laboratory tests fail to
identify an accelerant on the samples. Typically, the test results from a
laboratory that confirm the presence of an accelerant on a sample usually
will not encounter admissibility problems. However, the admission of
an unconfirmed alert will vary by jurisdiction and depend on the factors
that a court uses to determine the reliability of evidence under that state’s
rules of evidence as well as on the method employed by the prosecution
to present the testimony.

The Federal Rules of Evidence includes provisions for the admission
and exclusion of “relevant evidence” as well as for the admission of the
testimony of experts. Forty states have modeled their state evidence rules
on the Federal Rules of Evidence, and all but one have admitted evidence
of unconfirmed canine accelerant alerts. One of the three states that have
rejected evidence of unconfirmed alerts also bases its rules of evidence on

admitted evidence of canine alerts as indications of the presence of ignitable liquid
accelerants in the absence of laboratory identifications. Studies have shown that
even the best-trained canine teams cannot discriminate all possible pyrolysis
products and background contaminants from accelerant and will alert to a
percentage of targets that really do not contain ignitable liquid accelerants.
Without a specific verifiable identification of just what is present [by a lab], the
investigator cannot decide the significance of such positive alerts.

Ct. App. Apr. 21, 2001) (samples taken as a result of a canine’s alerts later were tested along
with other samples taken from a vehicle fire scene and the results of those tests were
admitted at trial); see also Perez v. Hill, No. 06-1805-HU, 2009 U.S. Dist. LEXIS 79051, *3
30, 1999) (laboratory analysis also confirmed the presence of accelerants).

60. See Table of State and Military Adaptations of Federal Rules of Evidence, in
2007).

61. FED. R. EvID. 402-403.

62. Id. at 702.

63. Massachusetts is an exception because it does not have a codified set of evidence
rules. However, in November 2008, the Massachusetts Supreme Judicial Court issued a
press release stating: “The Supreme Judicial Court and its Advisory Committee on
Massachusetts Evidence Law today announce the release of the Massachusetts Guide to
Evidence. The Supreme Judicial Court recommends the use of this Guide.” Press Release,
the Federal Rules.\textsuperscript{64} In addition, many courts have looked to the tests developed by the Supreme Court in \textit{Daubert v. Merrell Dow Pharmaceuticals}\textsuperscript{65} or the Court of Appeals for the District of Columbia in \textit{Frye v. United States}\textsuperscript{66} when deciding whether to admit evidence of confirmed alerts through expert testimony.

III. JUDICIAL ADMISSIBILITY OF UNCONFIRMED CANINE ALERTS

A. The Probative Value of Evidence of Unconfirmed Canine Alerts

The first appellate court decision to consider the admissibility of an uncorroborated canine alert was \textit{Reisch v. State}, in which a dog trained to detect fire accelerants indicated that a particular area of the fire scene contained accelerants.\textsuperscript{67} No laboratory tests were performed to verify the canine’s alert. On appeal of the conviction, the Delaware Supreme Court looked to Delaware Rule of Evidence 403 and affirmed the trial court’s decision to admit testimony concerning the dog’s reaction to the burn patterns.\textsuperscript{68} According to Rule 403, “[a]lthough relevant, evidence may be excluded if its probative value is substantially outweighed by the danger of unfair prejudice, confusion of the issues or misleading the jury, or by considerations of undue delay, waste of time or needless presentation of cumulative evidence.”\textsuperscript{69} In order to determine whether the testimony had the “probative value” required by Rule 403, the Supreme Court applied a three-part test that it had developed sixteen years earlier to determine the reliability of evidence obtained from tracking dogs. Under that test, admissibility of a canine alert requires proof of: (1) the experience and qualifications of the canine’s handler; (2) the canine’s experience, skill, training, and reputation for detecting accelerants; and (3) the circumstances pertaining to the alert.\textsuperscript{70} According to the court in \textit{Reisch}, “there is no

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\textsuperscript{64} New Jersey and Georgia model their rules of evidence after the Federal Rules. Illinois does not.


\textsuperscript{66} 293 F. 1013, 1014 (D.C. Cir. 1923).


\textsuperscript{68} Id. at *6.

\textsuperscript{69} DEL. R. EVID. 403.

\textsuperscript{70} Reisch, 1993 Del. LEXIS 229 at *4 (citing to Cook v. State, 374 A.2d 264, 270 (Del. 1977)).
requirement of scientific testing to support evidence obtained by a dog if these requirements are met. The court concluded that the evidence presented as to the particular canine’s alert to accelerants met all three prongs of the test based on testimony from the handler of the dog’s reliability, certification, and overall effectiveness. Although subsequent cases have not cited Reisch explicitly, many courts have used its factors to decide whether to admit evidence of unconfirmed canine alerts of accelerants.

B. Evidence of an Unconfirmed Canine Alert Offered as Expert Testimony

Most jurors and judges have no basis for determining the cause and origin of a fire. Thus, the evidence obtained from a fire scene means little or nothing to them without the help of expert testimony. Although there are no federal or state rules that explicitly require expert testimony, courts have stated that such testimony is required to assist the trier of fact when the issue “cannot be determined by common knowledge and experience.” Thus, expert testimony is necessary when the subject matter of an inquiry, such as the cause and origin of a fire, is such that only a person with particular skills or experience in the area is capable of forming an opinion. The test for the competency of an expert witness is whether the witness has knowledge of the subject sufficient to entitle his or her opinion to go to a jury. The advantage of presenting a witness as an expert is that the person may testify “in the form of an opinion or otherwise” and may have more credibility with a jury.

In most cases, the prosecution seeks to have a canine’s handler testify as an expert witness. Federal Rule of Evidence 702, which is the basis for

71. Id. at *5.
72. Id. at *5-6. In Commonwealth v. Taylor, 687 N.E.2d 631 (Mass. 1997), the canine’s handler died before trial and was unable to testify about the use of the dog. Id. at 637. However, the court admitted the testimony of other state troopers who were present during the canine’s search for, and detection of, the accelerant. Id. The defendant’s attorney had the opportunity to cross-examine those troopers to test the foundation and reliability of the evidence that also was confirmed by laboratory analysis. Id.
75. See People v. Enis, 564 N.E.2d 1155, 164 (Ill. 1990).
77. Fed. R. Evid. 702.
most state rules of evidence governing expert testimony, provides in part that “[i]f scientific, technical, or other specialized knowledge will assist the trier of fact to understand the evidence or to determine a fact in issue, a witness qualified as an expert by knowledge, skill, experience, training, or education, may testify thereto in the form of an opinion or otherwise.”

Since most courts in states that follow the Federal Rules also require that expert testimony concerning the use of canines in a fire investigation be subject to Rule 702, it is the job of the trial judge to determine whether the proffered evidence will help the jury “understand the evidence.” As with Rule 403, the admissibility of expert testimony depends upon its reliability and relevance. Without citing Reisch, courts in two states have used the factors set out in that case to aid in their decision to admit evidence regarding unconfirmed canine alerts through expert testimony under Rule 702 of their state rules of evidence.

Following the Supreme Court’s decision in Daubert, trial judges in a number of states look to an expanded number of factors when deciding whether to admit expert testimony. An example of a court’s use of these factors to determine the reliability of a canine’s unconfirmed accelerant alert under Rule 702 is the Texas Court of Appeals’ decision in Fitts v. State. In that case, two canines alerted to accelerants in several different areas of the defendant’s home. Samples were collected and sent to a laboratory for testing but only one of the samples came back positive for gasoline. Prior to trial, the defendant moved to suppress any evidence of

78. Id.
82. In Daubert v. Merrell Dow Pharm. Inc., 509 U.S. 579 (1993), the Supreme Court held that federal courts should decide the admissibility of expert testimony by using five factors: (1) whether the expert's theory has been or can be tested for validity; (2) whether the theory has been subject to peer review and publication; (3) the known or potential rate of error when the theory is applied; (4) the existence and maintenance of standards of control; and (5) the degree to which the theory is accepted in the scientific community. Id. at 593-95. In E. I. du Pont de Nemours v. Robinson, 923 S.W.2d 549 (Tex. 1995), the Texas Supreme Court made two additions to the list: (1) the extent to which the technique relies upon the subjective interpretation of the expert; and (2) the non-judicial uses that have been made of the theory or technique. Id. at 557. For a discussion of the use of the Daubert factors by state court judges, see generally David Bernstein & Jeffrey D. Jackson, The Daubert Trilogy in the States, 44 JURIMETRICS J. 351 (2004).
83. 982 S.W.2d 175, 182 (Tex. Crim. App. 1998).
canine alerts and the trial judge held a hearing on the motion.\textsuperscript{84}

According to the court in \textit{Fitts}, “to be considered reliable, evidence based on a scientific theory must satisfy three criteria: (1) the underlying scientific theory must be valid; (2) the technique applying the theory must be valid; and (3) the technique must have been properly applied on the occasion in question.”\textsuperscript{85} The factors affecting a trial court’s determination of reliability include: (1) the acceptance of the underlying scientific theory and technique by the scientific community; (2) the qualifications of the expert witness; (3) the existence of supporting literature; (4) the potential rate of error; (5) the availability of other experts to perform and evaluate the technique; (6) the clarity with which the scientific theory and technique can be explained; and (7) the experience and skill of the person who actually performed the technique on the occasion in question.\textsuperscript{86} In their application, these factors are an expansion of those used in \textit{Reisch}.

At the hearing on the motion to suppress the evidence of the canine’s alert in \textit{Fitts}, the trainer and handler of the two canines used in the investigation of the house fire stated that the dogs had worked on approximately fifty fires for different law enforcement agencies. He “testified that his dogs were correct 99.9\% of the time.”\textsuperscript{87} “The dogs alerted at each of the [fifty] fires at which he assisted law enforcement.”\textsuperscript{88} In forty-nine of those fires, it was later determined, either by laboratory tests or by independent verification from witnesses or arson investigators, that an accelerant was used.\textsuperscript{89} At the hearing, an arson investigator with the Houston Fire Department testified that he had used the trainer and handler of the dogs thirty times in the previous three years and considered them 100\% accurate. According to the arson investigator, the trainer and handler and his dogs had an excellent reputation for accuracy within the arson investigation community. An arson investigator with the Harris County Fire Marshal’s office also testified that he had used the trainer and handler “four times, and that the dogs were accurate and enjoyed a reliable reputation.”\textsuperscript{90}

\begin{footnotes}
\item[84.] \textit{Id.} at 181.
\item[86.] \textit{Fitts}, 982 S.W.2d at 182.
\item[87.] \textit{Id.} at 183.
\item[88.] \textit{Id.}
\item[89.] \textit{Id.}
\item[90.] \textit{Id.}
\end{footnotes}
Based on that testimony, the Texas Court of Appeals concluded that the training theory used by the trainer and handler was valid, that the methods and techniques used to apply the theory were valid, and that his technique was applied properly to the particular investigation. As a result, the appellate court affirmed the judgment of arson entered by the trial court on the jury’s verdict.

A more detailed example of the qualifications and training that will support the admissibility of an unconfirmed canine accelerant alert is the 2007 decision of the Kentucky Supreme Court in Yell v. Commonwealth. In that case, the trial judge held a Daubert-style hearing before trial that examined in detail the qualifications of the fire investigator and the training of his dog, PJ.

At trial, Cannon testified to his own qualifications as a handler as well as PJ’s training, qualifications and testing record. Cannon established he had twenty-three years of experience as a policeman and firefighter. He explained that when PJ was assigned to the National Certified Fire Investigator Buster Cannon by the Federal Bureau of Alcohol, Tobacco and Firearms (ATF) she had already been trained and imprinted in accelerant detection. In early 2002, Cannon and PJ successfully completed a five-week course in canine accelerant-detection training with ATF, and since then both Cannon and PJ have completed annual forty-hour re-certification programs and have been subject to annual testing by the ATF. Moreover, since 2002 Cannon and PJ worked approximately 200 fire scenes together. On a more daily basis, Cannon explained that PJ trains twice a day with him, using varying levels of accelerant, and the results of these tests are submitted monthly to the ATF.

The Kentucky Supreme Court held that the testimony of the canine’s handler satisfied the state’s foundational requirements concerning his qualifications and certification as well as the testing and training record with his canine and affirmed the arson conviction.

C. Failure to Lay a Proper Foundation for the Admission of Canine Alert Evidence

Some states that follow Rule 702 have indicated a willingness to admit expert testimony about a canine alert, but did not do so in a particular case

91. Id. at 184.
92. Id. at 189.
93. 242 S.W.3d 331 (Ky. 2007).
95. Yell, 242 S.W.3d at 334.
96. Id. at 334-35.
97. Id. at 336-37.
because the prosecution failed to present proper evidence to lay a foundation for the testimony. In State v. Webber, the trial judge qualified two investigators from the Rhode Island fire marshal’s office as experts in the field of the origin of fires. The Rhode Island Supreme Court stated that it had “little doubt that testimony concerning [the canine’s] reactions to the presence of accelerants is within the ambit of Rule 702. Nevertheless, even though expert testimony may be helpful to the trier of fact, a foundation is still required for it to be admissible.” In Webber, the court held that the government had not established the proper foundation because the fire investigators exceeded their area of expertise when testifying about the activities of their arson-detecting canine. Both witnesses testified that when the canine detected the presence of a flammable accelerant it scratched the surface of the floor where the liquid was detected, sat down, and pointed to the area with its nose. They also testified that on several occasions they had witnessed the canine make positive alerts, which indicated the presence of accelerants. According to the court, that type of testimony should have come from the canine’s trainer who did not testify. Thus, the state’s failure to establish the expertise of the canine’s trainer, the canine’s background and training, and the canine’s general accuracy during investigations constituted prejudicial error and justified the reversal of the defendant’s conviction for arson.

Similarly, in Prater v. State, the Arkansas Supreme Court applied its own test for the admission of novel scientific evidence under Rule 702 of the state rules of evidence. This approach requires the trial judge to conduct a preliminary inquiry that focuses on three factors: (1) the reliability of the process used to produce the evidence; (2) the possibility that the evidence might overwhelm, confuse, or mislead the jury; and (3) the connection between the evidence and the disputed factual issues in the case.

98. In State v. Abner, No. 20661, 2006 WL 2522384 (Ohio App. 2d. Sept. 1, 2006), the trial judge admitted expert testimony concerning an unconfirmed alert. On appeal, the defendant argued that her counsel provided ineffective assistance by failing to object to the testimony of the canine’s handler. Id. at 20. The Ohio court of appeals found nothing objectionable in the testimony of the witness about the training and qualifications of his canine. Id. at 22. However, the court held that the expert provided no foundation to establish his opinion that a canine’s olfactory sensitivity is beyond what laboratory analysis can detect. Id. Since the court could not say whether the expert could have provided a foundation for the opinion if asked to do so, it found no ineffective assistance of counsel. Id.

100. Id. at 741.
101. Id.
102. Id.
103. Id.
In the case of In re Foote, the court held that expert testimony concerning a canine's superior ability to detect the presence of accelerants was not admissible because the plaintiff did not present evidence of the techniques used, the error rate, or whether the theory had been tested or subjected to peer review.

D. Evidence of an Unconfirmed Canine Alert Offered Other than Expert Opinion of Fact

Because of the difficulty of qualifying a witness as an expert, the prosecution may focus on the admissibility of the evidence itself rather than on whether or not it is in the form of an expert opinion of fact. In Commonwealth v. Crouse, a Massachusetts trial court judge admitted the testimony of a fire investigator concerning an unconfirmed canine alert because the testimony "did not purport to be an expert opinion of fact, based on a particular scientific theory or methodology ..." Instead, the prosecution offered the testimony as a direct observation by the investigator that the canine alerted to a specific area in the defendant's vehicle. The prosecution did not offer the testimony to prove the crime of arson; instead, it presented it as "circumstantial evidence that supported the [prosecution's] theory that the defendant purchased gasoline and transported it in the back of [his vehicle] in order to set the fire." In addition, the fire investigator admitted during cross-examination that a NFPA guideline suggested "that evidence of a canine alert that is not confirmed by laboratory testing should not be considered valid." The Massachusetts Supreme Judicial Court held that, since the jury was aware of the controversy over the admissibility of such testimony, it could decide for itself "what weight, if any, to give the challenged testimony."

IV. JUDICIAL DENIAL OF ADMISSIBILITY OF UNCONFIRMED CANINE ALERTS

Although twelve state and two federal courts have admitted testimony concerning uncorroborated canine alerts in arson cases, or indicated that it

105. Id.
108. Id. at 402.
109. Id.
110. Id.
111. Id.
would be admissible if the proper foundation was laid, state courts in Georgia, Illinois, and New Jersey have held that such evidence is not admissible at trial.\textsuperscript{112} These courts have based their decisions on their view that the evidence lacks general acceptance and reliability. In a 1996 decision, the Illinois Appellate Court held that, under the test for scientific evidence set out in \textit{Frye v. United States}\textsuperscript{113} and adopted by Illinois, there was no “general acceptance” of the reliability of evidence concerning unconfirmed canine alerts in arson cases.\textsuperscript{114} A year later, the Georgia Supreme Court stated that uncorroborated canine alerts had not reached a state of “verifiable certainty” to have the scientific reliability necessary to permit their use as evidence of the presence of an accelerant.\textsuperscript{115}

The most detailed analysis for rejecting unconfirmed canine alerts was provided by a New Jersey superior court in 2006 in \textit{State v. Sharp}, in which the defendant was convicted of arson of his residence.\textsuperscript{116} In a pretrial motion, the defendant sought to prevent a state deputy fire marshal from giving his expert opinion that his canine’s alert to certain locations at the fire scene was proof that an accelerant was present near the origin of the fire. Since the laboratory tests were negative for accelerants, the trial judge held that the deputy fire marshal’s opinion was not based on “a generally accepted scientific theory” and, thus, was inadmissible.\textsuperscript{117}

New Jersey’s Rules of Evidence permit an expert to testify in the form

\begin{footnotes}
\item[113] 293 F. 1013, 1014 (D.C. Cir. 1923).
\item[114] People v. Acri, 662 N.E.2d 115, 117 (Ill. App. Ct. 1996). In \textit{Acri}, the defendant pointed to two opposing viewpoints on the reliability of unconfirmed canine alerts to show that there was no “general acceptance” of them. \textit{Id.} at 116-17. On the one hand, a chemist with the Illinois State Police Forensic Science Laboratory testified at a pretrial hearing that he agreed with the position taken by a paper published by the International Association of Arson Investigators (IAAI) that stated that evidence of a canine alert should be used only when laboratory analysis supports the canine’s findings. \textit{Id.} at 116. On the other hand, a special agent with the Illinois State Fire Marshal’s Office stated that several persons in the arson investigation field opposed the IAAI position. \textit{Id.} Similarly, a dog handler with the Iowa State Fire Marshall’s office testified that, in his opinion, those who wrote the IAAI policy were not dog handlers and were unfamiliar with a dog’s ability to detect accelerants in amounts too small to register on laboratory tests. \textit{Id.} at 116-17. Faced with the disagreement among these experts, the Illinois Appellate Court agreed with the trial judge that there was no “general acceptance” as to the reliability of uncorroborated canine alerts, that they did not meet the \textit{Frye} test, and that they should be excluded from the trial. \textit{Id.} at 117.
\item[115] Carr, 482 S.E.2d at 317.
\item[117] \textit{Id.} at 168.
\end{footnotes}
of an opinion if the opinion is one that produces "reasonably reliable results." In New Jersey, an opinion is "reasonably reliable" if it meets the "general acceptance" test set out by the United States District Court for the District of Columbia in Frye v. United States, which governs the admissibility of scientific evidence. According to Frye:

> Just when a scientific principle or discovery crosses the line between the experimental and demonstrable stages is difficult to define. Somewhere in this twilight zone the evidential force of the principle must be recognized, and while courts will go a long way in admitting expert testimony deduced from a well-recognized scientific principle or discovery, the thing from which the deduction is made must be sufficiently established to have gained general acceptance in the particular field in which it belongs.

In practice, the Frye test in arson cases means that techniques of investigation that have not been peer reviewed and gained "general acceptance" within the arson investigation community are inadmissible. Only when the theory or procedures have gained such acceptance are they admissible.

In order to determine whether the deputy fire marshal's opinion about his canine's alerts was based on a generally accepted scientific theory, the trial judge in Sharp considered testimony of experts on fire causation, the scientific literature on the subject, and judicial opinions. First, the experts in the case disagreed as to the significance of an unconfirmed accelerant-detection canine alert, but agreed that the standard texts they use require laboratory confirmation. In addition, the deputy fire marshal testified that there were no spreadsheets tracking how many alerts of his canine had been confirmed by the laboratory. Thus, the experts were unable to provide the trial judge with a record by which to evaluate the reliability of the canine's alerts. Second, the court felt that there was substantial agreement in the scientific and legal literature that canine alerts are not reliable in the absence of laboratory confirmation.

121. Frye v. United States, 293 F. 1013, 1014 (D.C. Cir. 1923).
122. Sharp, 928 A.2d at 170.
123. Id.
confirmation. One of the State's experts also testified that he relied on the NFPA and John D. DeHaan, *Kirk's Fire Investigation* (6th ed. 2006) treatise. Finally, the trial court judge in *Sharp* examined the decisions of courts in other states that had considered the issue and concluded that "[m]ost courts have held that uncorroborated canine alerts are novel scientific evidence, not generally accepted in the scientific community of arson investigators."

Finally, the trial court judge considered Rule 403 of the New Jersey Rules of Evidence. Under that rule, a judge may exclude evidence "if its probative value is substantially outweighed by the risk of undue prejudice, confusion of the issues, or misleading the jury." Given what the trial court felt was the lack of reliability of unconfirmed canine alerts under the *Frye* test, the judge in *Sharp* felt that the *probative value* of the evidence of the canine's alert was minimal and carried a substantial risk of confusing the issues and misleading the jury.

A jury might infer that an accelerant was used in a particular spot, disregard the lack of laboratory confirmation, and wrongly conclude that the evidence was indicative of arson and the defendant's guilt. The judge also felt that such testimony went to the heart of the issue in the trial: whether the fire was started accidentally or intentionally. Thus, the prejudicial effect substantially outweighed the probative value of the

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124. *Id.*
125. *Id.*
127. *Id.* at 172; *N.J. R. EVID.* 403 ("Except as otherwise provided by these rules or other law, relevant evidence may be excluded if its probative value is substantially outweighed by the risk of (a) undue prejudice, confusion of issues, or misleading the jury or (b) undue delay, waste of time, or needless presentation of cumulative evidence.").
129. *Id.*
130. *Id.*
131. *Id.*
deputy fire marshal’s testimony. Since a canine’s unconfirmed alert could not form the basis of an opinion on fire causation, the trial judge held that the testimony was irrelevant and excluded it.

The decision in Sharp is in contrast with the earlier Delaware decision in Reisch where the court also looked to Rule 403. In Reisch the court felt that the probative value of the evidence could be determined by looking specifically at the experience and training of both the trainer and the canine who conducted the investigation, the canine’s reputation for detecting accelerants, and the circumstances of the alert. In Sharp, however, the New Jersey court did not consider the specific trainer and canine involved in the search but, instead, looked to the opinions of forensic scientists and professional organizations.

V. CONCLUSION

In the case of evidence that has been subject to forensic laboratory analysis, the Supreme Court in Melendez-Diaz held that the Confrontation Clause of the Sixth Amendment requires the prosecution to make the analysts who prepared the report on the evidence available so that the defendant can cross-examine them at trial. This provides an opportunity for defendants to challenge the reliability of the reports that play a crucial role in the prosecutions.

In almost all criminal cases, the prosecution has no place to turn for a “second opinion” if the laboratory analysis does not confirm its view of the evidence. The only exception is an arson case in which the state seeks to go beyond the crime laboratory analyst and to call the handler of the canine that alerted to the presence of chemical accelerants. The question faced by state and federal courts confronted with the admission of testimony concerning an uncorroborated canine alert to accelerants is whether or when the evidence is reliable enough to be of value to a jury in helping it reach its verdict. While a laboratory analysis provides a useful check on the validity of an alert, such analysis is not always possible or completed. In addition, just as a canine’s alert is not infallible, neither is a laboratory’s analysis of the sample. This has prompted courts to search for ways to determine the probative value of canine alerts on their own.

Beginning with the Delaware Supreme Court’s decision in Reisch, a number of courts have focused on those involved in the search itself: the

132. Id.
133. Id.
135. Sharp, 928 A.2d at 183-85.
canine and its trainer/handler. First, as illustrated by Yell, these courts have looked at the training and certification of the canine and its handler. When fire investigators seek to testify to matters that exceed their expertise, as in Webber, courts have refused to admit the testimony. Second, courts have examined the experience and accuracy of the canine in detecting accelerants in other fire investigations. In Fitts, for example, evidence presented in support of the testimony showed that the two canines had alerted to accelerants in each of the fifty fire investigations in which they had been involved.

In forty-nine of those fires, it later was determined by laboratory analysis or independent verification that an accelerant was used. Again, where evidence of the error rate was not presented, as in Foote, courts have not hesitated to exclude the evidence. Finally, courts have required the handlers to present evidence of the techniques used in the particular fire investigation that led to the canine’s alert.

The three state courts that have held that evidence of uncorroborated canine alerts is not admissible at trial have not focused on the canine and/or handler. Instead, two of the courts, in decisions from the late 1990s, held that the reliability of the evidence had not been the test of “general acceptance” or “verifiable certainty.” At the time, they were correct in that few courts had confronted the issue of the admissibility of the evidence. In 2006, the New Jersey court in Sharpe also looked to the “general acceptance” test of Fyre. The experts in the case disagreed as to the significance of the unconfirmed alert and some of the literature and a prominent fire protection organization stated that unconfirmed alerts should not be admitted. This led the court to conclude that such evidence not only did not have “general acceptance” but that its “probative value” was outweighed by the risk of prejudice and confusion.

These decisions point to a fundamental and continuing difference in the approach to determining the reliability of unconfirmed canine alert evidence in arson. However, the great majority of courts that have confronted the question of the “probative value” of such evidence have been willing to go beyond the laboratory and focus on the training and experience of the canine and the trainer who conducted the search itself and their procedures during the investigation that led to the alert. The testimony on these issues must come from the handler who is familiar with the canine and actually worked with it during the fire investigation that produced the “alert.” That testimony also provides the defendant with the opportunity to confront and cross-examine the handler. Since, as Justice Scalia pointed out in Crawford, the reliability of evidence is tested “in the crucible of cross-examination,”136 it then is up to the jury to

determine what weight it will give to the evidence in reaching its decision.