

## Unconfirmed Canine Accelerant Detection: A Reliability Issue in Court

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**ABSTRACT:** Canines trained to alert to traces of flammable liquids at a fire scene are useful to identify locations to collect samples for laboratory analysis. In some instances, no samples are collected or laboratory testing of samples collected following a canine scent alert fails to identify a residual flammable liquid and potential accelerant. In these, an attempt may be made, through testimony of the dog's handler, to introduce at trial, information regarding the canine alert to indicate the presence of an ignitable liquid at the scene. Canine handlers contend that the dog has greater sensitivity to typical accelerants than laboratory techniques but scientists counter that, while sensitive, the specificity of canine detection is unknown. Unverified canine indications have been used in a number of cases and challenges to several of these have reached the appellate level. Examination of court decisions on admissibility of canine alerts shows that they have been as varied as the arguments pro and con.

**KEYWORDS:** forensic science, accelerant detection, arson, canine, jurisprudence, reliability

That trained accelerant detection canines searching a fire scene have the potential to improve evidence selection and enhance arson detection hardly seems debatable. At a fire scene, identification of potential evidence to be collected for further examination has always posed a challenge to the investigator. Now investigators may be assisted by canines, frequently Labrador retrievers, properly trained to recognize the scent of common flammable liquids frequently used as accelerants. Ideally, at the same time, the dog will reject odors arising from pyrolysis of materials common at fire scenes. As the canine works the scene, the handler observes and notes the dog's movements and reactions. Areas of interest are identified where the dog "alerts" by sitting, scratching, etc. depending upon the animal's training. Samples of debris from these areas may be collected and packaged for laboratory analysis. In a significant number of instances, the laboratory is able to confirm the presence of a residual flammable liquid which may have served as an accelerant. In other situations, however, highly sensitive analytical methods in the forensic laboratory provide no definitive identification of a flammable liquid in the submitted samples. This, of course, raises the question: "Who knows best, the laboratory or the Labrador?"

When the laboratory detects and identifies a flammable liquid in samples from the fire scene, at trial, the chemist testifies as an

expert witness to his/her findings. In an arson case, the finding of a flammable liquid in an area where none should exist can make an important contribution in establishing the corpus delicti. Such testimony significantly augments a contention by the fire investigator that the fire was incendiary.

Absent the finding of a flammable liquid, other indicators of a set fire must be relied upon such as burn patterns, depth of char, spalling, etc. Unfortunately for the investigator, research in the past few years has shown many of these indicators to be less reliable than previously believed (1–4). In addition, attorneys for the opposing party are more aware of the limitations of classic indicators and are less hesitant to challenge evidence of an incendiary fire.

### Canines in Court

In what may have been the first appellate case involving an accelerant detecting canine, *State v. York* (5), the role of the canine in detecting possible accelerants and identifying suitable material for collection at the scene is described by the court. "Hiles' dog (trained to smell accelerants) 'alerted' at what had been a bathroom; samples from the area were collected which carried a strong smell of gasoline." Although the warrantless search of the burned out apartment building was an issue on appeal, no specific challenge to the use of the canine in the search was made. It was noted in the opinion that "Several containers buried in the debris . . . . were found which had been used to hold gasoline" but no mention of laboratory testing of any of the collected samples appears.

Similarly, in *State v. Setzer* (6), "Through the use of a police dog trained in the detection of accelerants such as gasoline, the search resulted in the seizure of the rubber floor mat from (defendant) Horn's car as well as shoes and a pair of bluejeans which belonged to Horn." The reported decision provides no information as to the types of tests, if any, conducted on the seized items or the results of such tests but neither the canine search nor testing of the seized samples was raised as an issue on appeal.

As canines have become an integral part of the fire investigation team in many areas, investigators and dog handlers have gained increased confidence in the ability of the canine to reliably detect low levels of accelerants in materials from the scene. When laboratory confirmation of accelerant identification is unavailable, to bolster the testimony of the investigator, an attempt may be made to introduce the canine as an "expert in detection of accelerants" through the testimony of the handler. The handler will testify to the training and past performance of the dog to demonstrate his/her reliability and then interpret for the jury the observed behavior of the dog during the processing of the scene. In a Nassau County, Massachusetts case, *Commonwealth v. Mistler* (7), Sgt. Hulk, a

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black Labrador trained by the Connecticut State Police and Bureau of Alcohol, Tobacco and Firearms (BATF) was brought to the scene of a fire in a house owned by the defendants. He alerted to pieces of the first floor stairway and a pair of tennis shoes belonging to the husband. The collected evidence was submitted for testing by a laboratory working under contract with the state police. An initial report indicated the presence of gasoline on the shoes but a subsequent test by the same analyst was negative. At trial, the chemist was unavailable to either authenticate the reports or explain the discrepancy. To get the information on the canine alerts before the jury, the prosecution sought to introduce the handler's testimony describing the dog's actions at the scene. According to the handler, State Police Officer Michael Cherven, in about 20 prior prosecutions, Sgt. Hulk's alerts had always been received by stipulation. In this instance, however, the defense demanded an admissibility hearing based on the guidelines laid down in *U.S. v. Frye* (8). This hearing was to review the dog's training and establish his reliability [perhaps closer to the more recent guidelines from *Daubert v. Merrill Dow* (9) than to those in *Frye*]. An extensive hearing included discussion of the relative sensitivity of the dog versus the gas chromatograph, the dog having been trained only on gasoline and that the laboratory had identified lacquer thinner on one of the five samples and no accelerant on another. The court declined to admit the testimony of the dog's alerts and suppressed part of the proffered evidence. The defendants were later acquitted by the jury.

The first reported decision directly addressing the admissibility of accelerant canine detection alerts, *State v. Reisch* (10), involved a 1991 Middletown, Delaware fire. In a slip opinion, the court noted that following an investigation which eliminated accidental causes and identified a "pour pattern" at the origin; an accelerant detection dog "indicated that a sample taken from the 'pour pattern' contained a fire accelerant. At the fire scene, the dog indicated that the area of the pour pattern, as well as two chairs which had been located over the pattern contained accelerants. No laboratory tests were performed to verify this identification." There is no indication in the opinion that laboratory tests were conducted on the sample to which the dog had alerted. At trial, testimony to the canine's reactions was admitted to corroborate the testimony of two deputy state fire marshals that the burn pattern indicated the use of a small amount of chemical accelerant. The defendant objected that, without laboratory confirmation, the dog's evidence was unreliable and should not be admitted. The defense argued that the dog's prior identifications had been confirmed by scientific tests only 17 of 80 times and that he had been characterized by his trainer as only slightly better than average. The court considered the three criteria enumerated in *Cook v. State* (11), the only Delaware case discussing the admissibility of evidence obtained from dogs. Under the guidelines in *Cook*, admissibility would require proof of: 1) The experience and qualifications of the dog's handler, 2) The dog's experience, skill, training and reputation as a tracker and; 3) The circumstances pertaining to the trailing itself. The *Reisch* court noted that although the *Cook* case addressed the use of evidence obtained from tracking dogs, the criteria are analogous to this case even though the dog here was used for accelerant detection and not tracking. "In both cases, there is no requirement of scientific testing to support evidence obtained by a dog if these requirements are met (10)." This reasoning by the court merits our examination.

With a detection dog, such as one trained to detect drugs or explosives or to locate missing persons, there is usually an opportunity to promptly verify the validity of the alert, e.g., the opened

trunk of the vehicle reveals marijuana; the suitcase does not contain an explosive device or the missing person is found under the debris in the collapsed building. When no contraband is found or person located, the canine alert normally becomes moot, although the results do not necessarily preclude drugs or explosives having been present at a prior time. With an accelerant detecting canine, unless samples are collected and analyzed by a competent laboratory, there is no opportunity to verify the reliability of the canine's alert. When using a tracking dog, the objective is to locate a particular individual based entirely on his/her unique scent and, in so doing, to discriminate against other individuals who may have been in the same area and who may possess many of the same scent characteristics as the targeted individual. In a tracking situation, there is no scientific methodology to verify an individual identification as the one whom the canine has been trailing, unless other factors suffice to demonstrate that the dog has reliably completed his task. Perhaps a better analogy to the accelerant detection dog is a situation in which a dog is given an item recovered at the crime scene, e.g., a glove or shoe, and from the scent, promptly picks an individual from a lineup. Here, there is virtually no opportunity for verification of the identification and confidence in its validity must rest primarily on the canine's prior performance record. A similar situation exists in a post-fire search. At the scene there will be a number of materials produced by pyrolysis of common products originally present. These pyrolysis products may contain a few or many of the same chemical compounds present in common flammable liquid accelerants. The canine must be able to discriminate, with a high degree of accuracy, between pyrolysis products and typical accelerant liquids. The reliability with which the canine discriminates targeted scents and extraneous ones is crucial to the identification of individuals by a tracking dog or residual flammable liquids at a fire scene.

In the *Reisch* case, the court examined the reported 17 confirmations of 80 canine positive alerts and observed that there was no evidence of incorrect identifications by the dog (how incorrect identifications, particularly in samples on which no laboratory testing was conducted, would have been identified is not elucidated) and that at 20 sites where the dog did not alert, no evidence of an accelerant was found (10). The court also noted that some of the 80 samples remained untested and for others, no laboratory testing was requested. From this information, the court was apparently satisfied that when the dog alerted, it would have only been to the presence of an accelerant. The court concluded that the record did not support the contention that the dog was so unreliable as to make the evidence inadmissible. On review, appellant's conviction was affirmed with no published opinion (12).

A year later, in *State v. Buller* (13), an appeal from an arson conviction raised only one issue; the admission at trial of a description of the actions of a canine during the search of the appellant's fire damaged apartment. Buller asserted the lack of a proper foundation for testimony indicating that the dog had detected the scent of a fire accelerant. In his appeal brief, Buller noted the existence of two types of cases involving dog searches. The first involves a search for hidden drugs or explosives to establish probable cause for a search and seizure but which does not address the issue of guilt or innocence. The second type of cases involves tracking and the reliability of the dog to identify a suspect. Although the Iowa court was unaware of the holding in the unpublished *Reisch* opinion, noting that "accelerant detection by dogs seems not to have been addressed by any state appellate court. . . ." (13), interestingly, they adopted the same reasoning regarding accelerant detection being more like tracking than drug or explosive searches.

They examined 32 state decisions admitting trailing by dogs to prove identity providing a proper foundation is laid. They also examined rulings from five states, including *State v. Grba* (14) which had rejected such dog evidence as being unreliable and dangerous. The court rejected *Grba* as controlling, noting that it "was decided more than 70 years ago when courts were considerably less friendly to expert testimony than they are today. Testimony of experts is now governed by Iowa rule of evidence 702 . . . (13)." In overruling *Grba*, the court observed that a foundation is still required for admissibility. To establish this foundation, the handler's qualifications as a fire investigator were first enumerated. Because the handler, Hiles, himself had trained the dog to detect accelerants, this was considered in detail. The court noted that "According to the record there is no place he could have received training on the subject of training and using a dog to detect fire accelerants. The evidence indicates it is a specialty that Hiles developed himself with his own dog, Ty." "In the summer of 1986 Hiles began training Ty to detect and respond to the odor of gasoline . . . Over the next few years Hiles trained Ty to respond to the odor of other flammable liquids, including diesel fuel, kerosene, charcoal lighter fluid, and alcohol. He continued to train . . . (13)." In the matter of information on the record of available training and development of the specialty by the handler, the trial court was either ill informed or misled. If Hiles had begun his training of Ty in the summer of 1986 and continued it over the next few years, it is surprising he was unaware that, the BATF had begun a pilot program to train an accelerant detection canine in 1983. The preliminary results of this program were reported at the American Academy of Forensic Sciences meeting in February, 1984. In the Spring of 1986, the Connecticut State Police and BATF began a joint program to train accelerant detection canines (15–16). It is even more surprising that Hiles was unaware of a seminar in August 1988 which included recommended guidelines for training and evaluation of the performance of accelerant detection dogs (17).

In assessing the reliability of Ty's alerts, the court notes that about 75% of these were later confirmed by gas chromatographic analysis in the laboratory and that the remaining 25% is explained by error in sample collection or evaporation of the flammable liquid prior to laboratory analysis. No mention is made of alerts on pyrolysis products as representing a potential contributor to the unconfirmed results. In the *Buller* case, the laboratory test results were inconclusive but "the state offered evidence strongly indicating that the laboratory analysis was considerably *less reliable in detecting fire accelerants* (emphasis by the authors) than trained dogs (13)."

The nature, source and validity of this information is not indicated in the reported decision. The court should have been made aware that, as a number of studies have shown, there is a significant difference between the ability to detect hydrocarbons and related compounds which may arise from pyrolysis of common materials at a fire scene as compared to identification of refined petroleum-type products used as accelerants. The identification/elimination of potential accelerant materials in heavily pyrolysis product contaminated samples has proven a difficult task for the laboratory even using sophisticated analytical techniques such as gas chromatography/mass spectrometry with an advanced data analysis system (18–20). That accelerant detection canines will alert on such pyrolysis products is well documented (15,21–25).

There is nothing in the record to indicate that Ty received training to scent discriminate between pyrolysis products and common

accelerants, nor is there any indication that he was regularly independently tested to verify the reliability of his alerts. Nevertheless, the court found that adequate foundation for the expert testimony to the dog's unverified indications of the presence of accelerants had been established and that there was no error in the admission of such testimony. In view of the challenge to the canine-handler team, it is of interest that no mention was made of the earlier *York* case, discussed above, also from Iowa and involving the same handler.

The most recent case to address the issue of canine accelerant detection is *People v. Acri* (26). Two days after a fire at the defendants home, a canine alerted on carpet along three walls and an area of "spalling" in the center of a screened-in porch. No samples were collected from the areas where the dog had alerted, however, some samples had been taken previously. Laboratory testing of these did not detect a flammable liquid but it is unknown if they were from the area where the dog alerted. Prior to trial, the defendant filed a motion in limine to exclude testimony to the dog's alerts at the scene and evidence that canines were capable of scent detection of accelerants at levels below those detectable by laboratory testing. *Acri* contended that this kind of evidence had not gained general acceptance in the field of fire investigation. At the hearing on the motion, the state called the handler, William Glover, who testified to the training of the canine, Watson, and to his ability to detect accelerants at fire scenes. Glover described Watson's performance in a published study, of which he was a co-author (22), in which accelerants were detected by the canine in samples in which they were undetectable by the laboratory. He described an actual case in which the laboratory was unable to verify Watson's alerts but where they were confirmed by the confession of the arsonist.

Glover indicated that he was a member of the International Association of Arson Investigators (IAAI) and was aware of a position paper published by the Forensic Science Committee of the IAAI (27). This paper supports the use of trained canines to assist in sample collection at fire scenes. It recommends records showing continual training and annual recertification of the dog and effective recordkeeping for identification of samples collected with canine assistance. These records will aid in determining the rate of confirmation of the animal's alerts by laboratory testing. The IAAI position paper notes that the lower detection limit for accelerant detection canines is undefined but may be below that of current laboratory techniques. They also observe that the mechanism by which a canine identifies a particular compound or mixture is not well understood nor is its ability to distinguish mixtures containing many of the same compounds, such as those in pyrolysis products produced at fires. As a result, even though he has excellent sensitivity, selectivity of the dog for similar compounds at low levels may be less than generally believed.

In general, for a particular detection system, increased sensitivity is obtained with an attendant loss of selectivity (28). The IAAI Committee takes the position that canine alerts unconfirmed by laboratory testing do not present the trier of fact with accurate data and that "evidence" of such unconfirmed positives should not be used in an actual trial.

Glover indicated that he did not agree with the position of the IAAI and that the Canine Accelerant Detection Association (CADA), a sizeable organization of dog handlers also disagreed. He further stated that a number of people in the arson investigation field had written letters to the IAAI opposing the Forensic Science Committee's position. Similar testimony was offered by Mike Hiles of the Iowa State Fire Marshal's Office, the same handler who

testified in the York and Buller cases. In his opinion, the authors of the IAAI paper were not dog handlers and unfamiliar with the ability of the dog to detect accelerants at levels too low to register in laboratory tests (26).

The State Police forensic chemist who had analyzed the samples from the defendant's home agreed with the IAAI position that unconfirmed alerts should not be used and indicated that most of the other arson examiners in the state would agree (26). We assume that by using the term arson examiners as opposed to arson investigators, the chemist was referring to laboratory analysts who routinely conduct fire debris analyses. Enthusiasm for the IAAI position may be less among arson investigators and particularly so among canine handlers, i.e., the "electronic nose" of the gas chromatograph versus the "real sniffer" of the dog. The trial court had granted, in part, the defendant's motion and declined to admit testimony of Watson's alerts at the defendant's home. The State argued on appeal that the trial court had abused its discretion in barring the unconfirmed canine alerts. Without mention of Daubert (9) or the changes in the Federal Rules of Evidence, the appellate court said "The admission of scientific evidence in Illinois is governed by the test set forth in *Frye v. U.S.* (cite omitted)" Citing a 1914 (29) and a 1994 (30) case, the court noted that Illinois has been very cautious in its approach to the admission of evidence derived from the use of dogs. They reviewed the controversy between the chemists and other professionals responsible for the IAAI position and the dog handler group led by CADA who contend that an alert without confirmation still has probative value. The court concludes that the trial court was correct in barring the testimony because there is no "general acceptance" of the reliability of uncorroborated alerts in the field of arson investigation. The justices note that, as the CADA points out, this conflict may be no more than each faction's attempt to preserve its own sphere of influence. In the authors' view, while perhaps true to a degree, the attention by scientists in recent years to the field of arson investigation must be considered. As noted previously, scientific studies of phenomena observed at a fire scene and considered as indicators of an accelerated fire have shown a number of them to be of limited value and, in some instances, potentially misleading. In a situation involving unconfirmed detection of "accelerants" by a canine, the training and experience of scientists causes them to distrust that which cannot be demonstrated in a controlled and reproducible experiment. Dog handlers, by contrast, based on their experience with working detector dogs, tend to accept that which is not completely understood or readily demonstrable.

Despite the dissemination of the IAAI position paper, agencies continue to introduce unconfirmed alerts as evidence at trial. A recent report describes a November, 1995 fire in a vacant building (31). Two days later, Gentry, a canine of the Philadelphia Fire Department worked the scene and alerted to four areas. Samples were sent to the Philadelphia Police Crime Laboratory which verified two of the four alerts as positive for gasoline. At trial, following a review of case law, the judge allowed testimony to all four alerts into evidence. The police chemist testified about Gentry's four alerts and two confirmations. It is not indicated in the article whether or not the chemist was at the scene to observe the dog's behavior but if not, much of his testimony would appear to be hearsay. It seems reasonable that where two of the four alerts are confirmed by laboratory testing that the two unconfirmed alerts are, and should be, moot. What useful purpose is served by their introduction? With the documented occurrence of alerts to pyrolysis products, why is a potentially unreliable bit of information introduced when independently verified information is also being

introduced to show the same thing. Traditionally, one of the indicators relied upon to indicate an incendiary fire is the observation of multiple unrelated fires. If testimony is offered that the canine alerted in three different areas, even though none were confirmed by laboratory analysis, does this provide even stronger evidence of a set fire? In the instant case, the chemist further explained that, through testing, he had determined that Gentry's nose is more sensitive than the machine he uses to test for vapors (31). While perhaps true, this information is of limited value in the absence of peer reviewed data and selectivity considerations. The article concludes with the observation that the case "is significant because this was the first time evidence obtained through the use of an arson detection dog has been ruled into evidence by a sitting judge (31)." As we have seen, on several counts, this information is simply not correct.

On the positive side, a recent article from the United States Police Canine Association is critical of a New Jersey case in which testimony of an unconfirmed canine alert was introduced (32). The position taken is that "any testimony given by canine handlers as to the presence of ignitable liquids, based on the canine alert alone without collation (sic) of samples, and the sample being confirmed by the qualified laboratory, should not be admitted into evidence at trial (32)." A similar position is also taken by one of the original trainers of accelerant detection dogs in the 1986 joint BATF/Connecticut State Police program (16). In addition, the National Fire Protection Association has drafted a Temporary Interim Amendment (TIA) for the NFPA 921 Guide to Fire Investigations regarding the proper use of canines in fire investigations (32). The TIA is largely modeled along the lines of the IAAI position paper on canine use.

## Conclusion

That the trained accelerant detection canine has an important role in fire investigation is "generally accepted" by members of the fire investigation community, be they investigators, dog handlers, or laboratory personnel. With their sensitive nose, dogs quickly locate areas with potential for collecting evidentiary samples. When these samples are tested in the laboratory and determined to contain a flammable liquid, the results are a proper subject for expert testimony. It must be recognized that, whether or not the identified liquid actually was used as an accelerant is beyond the ken of either the Labrador or the laboratory. The "bone of contention" between the dog handler and the scientist is the issue of the propriety of introduction of testimony regarding an alert by the dog which, for whatever reason, is unconfirmed by the laboratory.

While dog handlers contend that the canine's nose is more sensitive than the instruments used in the laboratory, they ignore the inherent conflict between sensitivity and selectivity. Scientists argue that the mechanism by which a dog recognizes a particular scent is not understood and that it has been demonstrated that canines sometimes alert on pyrolysis products at the fire scene. Unless confirmed by laboratory analysis, canine alerts cannot be considered sufficiently reliable for introduction in court. Inherently unreliable results cannot and should not be a proper subject for expert testimony if the role of the expert is "to aid the trier of fact." If a trial is a search for truth, there is no role for unreliable testimony in the courtroom.

Several areas need attention to enhance the validity of accelerant detection canine usage in fire investigation. At the scene, when a

clear alert occurs, samples should always be collected for laboratory examination. Careful records should be kept of these so that the laboratory results can be used to develop information on the types of materials responsible for extraneous alerts. Laboratory testing can also provide a "rate of confirmation" for a particular canine to guide future training. It has been demonstrated that with continual training, false alerts decrease and the confirmation rate can rise significantly (33). Additional research into the canine sensory mechanism is needed to provide a basis for developing even more effective training programs. Until there is additional understanding of how a dog reacts to targeted odors and the effects on this reaction by the presence of closely related odors, there will be controversies over admissibility of canine testimony. For good or ill, these will be resolved at the trial or appellate level as the courts struggle with the issue of unconfirmed accelerant canine alerts and reliability.

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Note: Subsequent to the preparation of this manuscript, a significant case from the Supreme Court of Georgia has appeared. *Carr v. State* [267 Ga. 701, 482 S.E. 314 (1997)] was a prosecution for arson and homicide. At trial, following a hearing, testimony to unconfirmed alerts by the accelerant detection canine was introduced. Following his conviction, Carr raised several issues but the one focused on by the appellate court was whether or not the canine alerts, unconfirmed by laboratory testing met the standard of "verifiable certainty" used in Georgia for determining the admissibility of expert testimony. The court decided it did not and the introduction of the testimony was error. The convictions were reversed and remanded for retrial.

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