

ASB Standard 026, First Edition  
2020

**Crime Scene/Death Investigation - Dogs and Sensors  
Pre-Scented Canines - Aged Trail Search**

DRAFT



## Crime Scene/Death Investigation - Dogs and Sensors Pre-Scented Canines - Aged Trail Search

ASB Approved Xxxxx 2020

ANSI Approved Xxxxx 2020



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## Foreword

Canines not trained specifically for Pre-Scented Aged Trail Search and detection may result in inaccurate and inconsistent results. Since there are no consensus standards for canine teams (canine and handler), this document is specifically dedicated to specialized protocols for trailing canines, to be used when trails are 24 hours or older.

This document provides recommended guidelines for training, certification and documentation pertaining to Pre-Scented Canines – Aged Trail Search within the detector dog community. This document serves as the progression of that effort. Prior to the start of the search, the canine is “scented” on an object (scent article) containing the target’s scent. The canine works from an article to either a person or a location associated with that person. The goal is for the canine to detect and use a specific person’s scent on a scent article to either search for and follow a matching scent trail to this specific person or a location associated with this person while discriminating from all non-matching scent trails, or to correctly demonstrate the absence of a matching scent trail. Canines used in this discipline are typically deployed in search and rescue and forensic investigative functions, and typically not in immediate apprehension functions.

This standard was revised, prepared, and finalized by the Dogs and Sensors Consensus Body of the AAFCO ASB. The Dogs and Sensors Subcommittee of the Organization of Scientific Area Committee (OSAC) determined that initial training, certification, and documentation standards should be established for Pre-Scented Canine - Aged Trail Search as no industry standards currently exist. This document is based on the Scientific Working Group on Dog and Orthogonal detector Guidelines (SWGDOG) approved SWGDOG SC 9 – Human Scent Dogs Pre-Scented Canine - Aged Trail Search<sup>1</sup>.

All hyperlinks and web addresses shown in this document are current as the publication date of this standard.

**Key Words:** *initial training, canine team assessments, canine certification, maintenance training, mantrailing, record keeping and document management, terms and definitions, references, cases and legal references, alert, change of behavior, disclosure, certifying official, scent article, olfactory.*

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<sup>1</sup> [https://www.nist.gov/sites/default/files/documents/2018/04/25/swgdog\\_human\\_scent\\_dogs\\_-\\_pre-scented\\_canine\\_-\\_aged\\_trail\\_search.pdf](https://www.nist.gov/sites/default/files/documents/2018/04/25/swgdog_human_scent_dogs_-_pre-scented_canine_-_aged_trail_search.pdf)

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# Crime Scene/Death Investigation - Dogs and Sensors

## Pre-Scented Canines - Aged Trail Search

### 1 Scope

This document provides the requirements for training, certification and documentation pertaining to pre-scented canine-aged track/trail search. Pre-scented canine aged trail searches use a canine team (canine and handler) to search for and follow aged trails of a specific person's (target) scent over different surface types. An aged track/trail is a human scent pathway that has been present for some period of time, typically expressed with a time frame associated with the track/trail (e.g., a 24 hour or older track/trail).

### 2 Normative References

The document contains no normative references. See Annex B, Bibliography for other references.

### 3 Terms and Definitions

#### 3.1

##### **accreditation**

The process by which an organization (or, in some cases, an individual or canine team) is formally recognized by an accreditation body as competent and able to plan, manage and operationally conduct their actions safely, effectively and efficiently. This is an ongoing process that must be renewed within the accreditation body's compliance timeframe. (See [3.2 accreditation body](#).)

#### 3.2

##### **accreditation body**

An organization responsible for management and implementation of the system to set standards or guidelines within the relevant field.

#### 3.3

##### **accredited**

The designation given to those who are able to demonstrate they meet or exceed the standards or guidelines set by the appropriate accreditation body.

#### 3.4

##### **active alert**

A type of response that the canine displays/indicates in a manner that may disturb the environment and or forensic evidence (i.e., dig, bark, scratch, paw, jump, and bite after the detector canine has detected a trained odor/scent).

#### 3.5

##### **aged scent**

Specific human scent that has been present for a period longer than 24 hours.

#### 3.6

##### **aged trail**

A specific human scent pathway that has been present for a period longer than 24 hours.

**3.7  
alert**

A characteristic change in ongoing behavior in response to a trained odor/scent, as interpreted by the canine handler. The components of the alert may include: change of behavior (COB), interest, and final response or indication. (See **3.48 final response**, **3.56 indication**.)

**3.8  
article**

(1) A particular item or object, typically one of a specified type used to present to the canine for scent discrimination.

(2) Scented objects left on the track or in a search area at various intervals to which the canine is expected to indicate.

**3.9  
assessments**

An evaluation during training and/or certification process; a tool to assess canine team ability.

**3.10  
behavior**

Any measurable, physical response of a canine. Can be voluntary (goal directed) or involuntary (reflexive).

**3.11  
behavior modification**

The application of a behavioral technique (e.g., positive reinforcement) to change a behavior.

**3.12  
best practices**

A system of processes, checks and testing that may deliver an outcome that has fewer problems and fewer unforeseen complications, and that may combine the attributes of the most efficient and most effective ways of accomplishing a task based on proven and provable methods, while maintaining overall operational integrity and remaining within the bounds of legally accepted practices.

**3.13  
blank search**

A training or certification exercise in which the target odor/scent is not present.

**3.14  
blind experiments**

The person(s) obtaining the measurements does not know the treatments.

**3.15  
canine**

A dog, *Canis familiaris*, more commonly used to denote a working dog and sometimes abbreviated as K-9.

**3.16****canine handler**

A person who has successfully completed a recognized course of canine handling in a specific discipline and maintains those abilities through field applications, maintenance training, certification, recertification and agency or program required continuing canine education.

**3.17****canine handler error**

Any action or cue by the handler that causes the canine team to perform incorrectly.

**3.18****canine team assessment record**

The documentation of an evaluation conducted during training.

**3.19****canine trainer**

A person providing training/instruction who has demonstrated, through education, training and operational experience, extensive skill and knowledge in the subject field or discipline. This person would normally perform the maintenance training and proficiency training in the field and may train canines in preparation for a formal course of instruction. (See **3.58 instructor**.)

**3.20****certification**

A process that attests to the successful completion of an examination of relevant skills for the canine team.

**3.21****certification component**

An element of the canine team odor/scent recognition or operational assessment.

**3.22****certifying authority**

The organization authorizing the certification of a canine team.

**3.23****certifying official  
assessor**

A person who has been delegated the authority to conduct an evaluation (assessment and/or certification) and/or sign certificates on behalf of an organization or entity, that recognizes a canine team has been trained to a particular standard within the organization.

**3.24****Change of Behavior****COB**

A characteristic pattern of behaviors, as interpreted by the canine handler that occurs when the canine detects a trained odor/scent. This differs from other olfactory interest that otherwise are exhibited by the canine in response to the daily environment. The initial change of behavior typically leads to following the odor/scent to its source/target. The pattern of behavior may be unique to each canine. (See **3.59 interest**.)

**3.25**

**cognitive bias**

A set of influences that may affect the reliability and validity of one's observations and conclusions.

**3.26**

**competent canine trainer**

A person having suitable or sufficient skill, knowledge, experience to train canines and canine handlers.

**3.27**

**confirmed alert**

An alert for which the presence of a trained odor/scent can be verified or corroborated. Also referred to as a "hit", "find" and/or "positive response".

**3.28**

**confirmed operational outcome**

Verification of search results following a deployment of a canine team(s).

**3.29**

**consistency**

Consistent measures are those where repeated measurements of the same thing produce the same results. (See [3.93 reliability](#).)

**3.30**

**contaminating odor/scent**

Of target: any odor/scent not ordinarily part of a target odor/scent signature. Of area: any odor/scent not normally part of the context of that area.

**3.31**

**controlled search**

An experiment/training/testing exercise in which any defined variable(s) is consistent within specific parameters.

**3.32**

**correction**

The application of an aversive stimulus intended to prompt the canine to cease undesired behavior using verbal reprimand, choke collar (slip)/check chain, prong collar, remote trainer, etc.

**3.33**

**corrective action plan**

A training course of action to remediate performance deficiencies with a canine team.

**3.34**

**deployment**

Assignment of a canine team in an operational environment.

**3.35  
deployment record or utilization record**

A record of the deployment and/or utilization of a trained canine team, maintained separately from other records, i.e., training, assessments or certifications. A record documenting the deployment and/or utilization of the canine team, especially an account of an act or occurrence kept in writing or some other permanent form, i.e., electronic format, which is discoverable. (See **3.91 record**.)

**3.36  
discoverable**

Documentation that pertains to an investigation that can be requested and must be produced by the prosecution or the defense for trial purposes. For example, notes, records, certifications, photographs or digital media.

**3.37  
discrimination**

The ability to recognize differences between two or more stimuli. Operational usage: The ability to recognize differences between two or more odors/scents.

**3.38  
discriminative stimulus**

A stimulus that signals when a particular response produces specific consequences. For example, sitting in the presence of a particular odor/scent leads to a reward. The odor/scent in this case is the discriminative stimulus.

**3.39  
distractibility**

The tendency to be easily diverted from task.

**3.40  
distractor**

Non-target stimuli placed within a search area. These can include: humans, toys, food, animal odor, etc.

**3.41  
distractor odors/scents**

Non-target stimuli placed within a search area. These can include: humans, toys, food, animal odors or other blank-target odors/scents.

**3.42  
dog handler**

The trained person who works the canine. (See **3.16 canine handler**.)

**3.43  
double-blind assessment/double-blind testing**

Scientific usage: This condition occurs when neither the experimenter/canine handler, nor the observer/evaluator, knows which treatments/manipulations are given to which subjects.

Operational usage: In the evaluation of a canine neither the assessor nor the canine handler knows the location of the target odor/scent or whether target odor/scent is present (i.e., a blank/null search).

**3.44  
drive**

The propensity of a canine to exhibit instinctual behaviors when faced with particular stimuli. Drives are triggered by these particular stimuli (e.g., food or retrieve) and expressed in a typical and predictable way that is associated with the particular stimulus. Drives can be enhanced or diminished through experience (e.g., training, environment, etc.), but they cannot be created or eliminated. Traditionally defined in the working canine literature as an exaggerated, instinctual response to certain stimuli and situations. Drive is most narrowly and clearly defined as a willingness, vigor, or enthusiasm to engage in certain behavior, contexts, or situations.

**3.45  
environmental training/testing**

Instruction and evaluation procedures used to teach a canine to work, and determine whether a canine can work, in a variety of operational environments with increasing biological and physical complexity, which may distract or inhibit the canine from work. The training and testing, respectively, are designed to teach the canine to work, and assure that the canine can work, in a variety of operational environments, some of which may be extreme.

**3.46  
evaluator**

An individual with relevant training and experience in the discipline being evaluated, who assesses the performance of canine, canine handler, or canine team while showing no bias or partiality. (See [3.23 certifying official/assessor](#).)

**3.47  
false alert**

An indication/trained final response demonstrated by the canine in the absence of the target odor/scent; a situation in which the canine exhibits the trained final response in the absence of the odor/scent on which he/she was trained to find.

**3.48  
final response**

A behavior that a canine has been trained to exhibit in the presence of a target odor/scent source. This behavior may be either passive (sit, stare, down, point, etc.) or active (bite, bark, scratch, jump, etc.). Also known as a trained final response. (See [3.7 alert](#), [3.56 indication](#).)

**3.49  
handler**

(See [3.16 canine handler](#).)

**3.50  
handler error**

Any action or cue made by the handler that causes the canine to perform incorrectly. (See [3.17 canine handler error](#).)

**3.51  
human distractor**

Non-target person placed within a search area.

**3.52****human scent behavior**

The way in which human scent moves or reacts in a given environment. Factors that influence the dispersion of scent may include wind, temperature, air currents, and topography. An example would be a plume of scent that a canine has been trained to follow to its target.

**3.53****human scent evidence**

A particular person's scent collected for use for investigative purposes.

**3.54****human scent evidence canine**

A canine trained to locate and indicate items in question by means of detecting human scent.

**3.55****human target**

Individual that laid a track/trail for a canine to follow to the exclusion of all other trails.

**3.56****indication**

The canine's response to the odor/scent in the manner in which it has been trained, independently and without distraction. (See [3.7 alert](#), [3.48 final response](#).)

**3.57****initial training**

The fundamental training associated with detector canine training which consists of, but not limited to: bonding/relationship building, obedience, basic odor/scent discrimination, and basic search techniques.

**3.58****instructor**

(See [3.19 canine trainer](#).)

**3.59****interest**

Any reaction to an odor/scent, which may include:

- (1) A noticeable, readable, physical change in behavior in a detector canine during the search when the canine reacts to (i.e., is interested in) an odor/scent.
- (2) Pattern of behavior following the canine's initial reaction to a trained odor/scent when the canine displays motivation to remain at or trace the trained odor/scent to its source. (See [3.24 change of behavior](#).)

**3.60****maintenance training**

Continuing training conducted beyond the initial training of a discipline, designed to maintain a level of proficiency by ensuring the canine team's capability to perform desired tasks.

**3.61****matching scent trail**

A pathway laid by a human subject whose scent matches the scent on the article presented to the canine.

**3.62****matching-to-sample****MTS**

A procedure where upon presentation of a comparison stimulus, an animal chooses the same stimulus amongst an array of stimuli. For example, a canine is presented with scent of Person X and then identifies the scent contributor amongst an array of persons.

**3.63****minimum standard**

Written documents established to define the least level of performance considered acceptable

**3.64****mission requirement**

Performance demanded of a person or canine team in accordance with certain fixed regulations, needs of the department or agency. Compulsory pre-requisites needed before deployment.

**3.65****National Institute of Standards and Technology****NIST**

A non-regulatory federal agency within the U.S. Department of Commerce. NIST's mission is to promote U.S. innovation and industrial competitiveness by advancing measurement science, standards, and technology in ways that enhance economic security and improve quality of life. The Dogs and Sensors Subcommittee of the Organization of Scientific Area Committees (managed by NIST) focuses on standards and guidelines related to performance of deployed canines, canine handlers and canine teams, and optimization of their integration with electronic detection devices.

**3.66****negative control**

A known odor/scent sample that is used to assess the canine's proficiency in a non-matching odor/scent scenario. The canine is expected to give a negative response.

**3.67****negative response**

An alert/indication given by a canine showing no match to odor/scent, i.e., no matching trail, no substance present, etc.

**3.68****non-matching scent trail**

A pathway laid by a human subject whose scent does not match the scent on the article presented to the canine, or the absence of a matching scent pathway.

**3.69****non-productive response**

A change of behavior of the canine followed by a positive indication which cannot be confirmed by the canine handler. This may be the result of residual odor/scent that the canine can detect but which cannot be confirmed by technology or direct observation. A non-productive response may also be an error—a false positive—but these outcomes cannot be distinguished in an operational environment.

**3.70****objective-oriented training**

Training to enhance a canine team's proficiency using specific goals established prior to the initiation of the training.

**3.71****odor**

Volatile chemicals emitted from a substance that are able to be perceived by olfaction. "Odor" has traditionally referred to canine detection of a substance. "Scent" has traditionally referred to canine detection of humans. (See [3.97 scent](#).)

**3.72****odor dispersion**

Environmental conditions/factors/influences affecting the movement of odor. (See [3.73 odor plume](#).)

**3.73****odor plume**

Dispersion of odor in a given environment. (See [3.72 odor dispersion](#).)

**3.74****odor recognition**

Demonstration of the canine's olfactory ability to alert to a target odor(s).

**3.75****odor recognition assessment**

A test of the canine's olfactory ability to alert to target odor(s) in a controlled environment.

**3.76****odor/scent pool**

Area of concentrated target odor/scent.

**3.77****odor signature**

The chemical profile of an odor produced by a substance.

**3.78****olfaction****olfactory**

Of, relating to, or connected with the sense of smell.

**3.79****operational assessment**

A test conducted (single- or double-blind) in an operational environment in which the canine team will be deployed or utilized.

**3.80****operational certification**

A process that attests to the successful completion of an examination of relevant skills for the canine team to be deployed on operations.

**3.81****operational proficiency**

Training conducted beyond the initial training of a discipline, designed to maintain a high level of competence or skill by ensuring the canine team's capability to perform desired tasks.

**3.82****operational requirement**

(See [3.64 mission requirements](#).)

**3.83****operational search**

(See [3.34 deployment](#).)

**3.84****passive alert**

A trained final response given by the canine that requires an inactive behavior such as sitting, staring or lying down. These types of behaviors are typically trained so as not to disturb the environment and/or forensic evidence. (See [3.85 passive response](#), [3.94 response](#).)

**3.85****passive response**

A type of response that the canine displays/indicates in a manner that does not disturb the environment (i.e., sit, stand, lie quietly, or focus/stare after the detector canine has detected a trained odor). (See [3.84 passive alert](#).)

**3.86****positive alert**

A trained detection alert in the presence of the target odor/scent.

**3.87****positive reinforcement**

A reward given after a response or as the response occurs that increases the probability of that response recurring. For example, if a canine is rewarded for sitting by being given a treat the canine is more likely to sit again.

**3.88****pre-scenting**

A sample target scent that is presented to the canine prior to deployment. The canine's objective is to match the scent article to the target scent. This is commonly used in tracking/trailing/location checks and/or scent discrimination line ups.

**3.89****pre-scenting canines**

A type of canine that smells a sample target odor pad (scent article) prior to deployment. The canine's objective is to match the pre-scented pad to the target scent. This is commonly used in tracking/trailing and/or scent discrimination line ups.

**3.90****proficiency assessment/testing**

An evaluation during training; a tool to assess a canine team's ability.

**3.91****record****record/utilization log**

A record/log in the use of a trained canine team in an operational environment, as opposed to training records. A log constituting a piece of evidence about the past, especially an account of an act or occurrence kept in writing or some other permanent form, i.e., electronic format. (See **3.35 deployment record or utilization record.**)

**3.92****reliability**

The extent to which an experiment, test or measuring procedure yields the same results on repeated trials. Low probability of alerting to anything other than a target odor/scent and a high probability of alerting to a target odor/scent. Evidence that establishes a fair probability that a target odor/scent is present. The extent to which a measurement is repeatable and consistent and free from random errors. (See **3.29 consistency.**)

**3.93****residual odor/scent:**

Odor/scent that originated from any substance/subject that may or may not be physically recoverable or detectable by other means. The odor/scent that originated from a target substance/subject and lingers after the target substance/subject has been removed or has totally decomposed (as in the case of human remains).

**3.94****response**

A behavior that a canine has been trained to exhibit upon locating the source of a target odor/scent. This behavior may be either passive (sit, stare, down, point) or active (bite, bark, scratch, jump, etc.). (See **3.56 indication.**)

**3.95****reward**

The presentation of an article, toy, food, or praise given to the canine once the detector canine has alerted and responded to the odor(s)/scent(s) for which the canine is trained to detect/locate.

**3.96****routine training**

Canine training conducted with regularity that maintains the canine's operational capabilities.

**3.97****scent**

Volatile chemicals emitted from a live human that are perceived by the canine through olfaction. “Scent” has traditionally referred to canine detection of humans. “Odor” has traditionally referred to canine detection of a substance. (See [3.71 odor](#).)

**3.98****scent article**

An item that has been exposed to the target scent source that is used to put the canine on task.

**3.99****scent association**

When a canine learns to identify a trained scent with a specific reward.

**3.100****scent cone**

A funnel-shaped scent pathway, which extends down-wind from the target, becoming wider the farther away from the target. The canine is able to locate the target by moving upwind.

**3.102****scent discrimination**

The ability of the canine to use olfactory capabilities to differentiate one scent from another.

**3.103****scent dispersion**

Environmental conditions/factors/influences affecting the movement of scent from a fixed scent source. Movement of the source creates a separate scent cone at the new location.

**3.104****scent match**

(See [3.62 matching-to-sample](#).)

**3.105****scent/odor association**

When a canine learns to identify a trained odor/scent with a specific reward.

**3.106****scent/odor picture**

The combination of odors/scents that are present when a detector canine responds to a trained odor/scent.

**3.107****scent pad**

A material used to collect target scent from a person, object, or location for subsequent presentation to the canine.

**3.108**

**scent plume**

Dispersion of scent in a given environment. (See **3.100 scent cone/scent dispersion**.)

**3.109**

**scent recognition**

Demonstration of the canine's olfactory ability to alert on a target scent(s).

**3.110**

**scent recognition assessment**

A test of the canine's olfactory ability to alert to target scent(s) in a controlled environment.

**3.111**

**scent trail**

Scent pathway left by a person.

**3.112**

**set time**

The length of time between the target placement and when the canine is deployed to detect the target odor/scent.

**3.113**

**single-blind assessment/testing**

An evaluation of the canine team's ability to complete an exercise where the evaluator knows the outcome and the handler does not.

**3.114**

**single split trail/turn**

Refers to a training exercise in which two subjects walk a straight line and then split into two different directions. When the canine is presented with a scent article from one of the subjects, the canine commences to trail and match the correct person to the scent article. Despite the contamination of scent from the other person on the trail the canine is still able to discriminate between scents and identify the correct subject.

**3.115**

**standard**

An established or widely recognized model of authority or excellence as a reference point against which other things can be evaluated or the ideal in terms of which something can be judged.

**3.116**

**target**

The odor/scent for which the canine is trained to respond.

**3.117**

**target trail**

A pathway that was laid by a target subject that matches the scent article presented to the canine. (See **3.61 matching scent trail**.)

**3.118****track/trail**

The scent pathway left by an individual moving. (**see scent trail**)

**3.119****trailing**

The propensity or learned ability of a canine to methodically follow the target scent. The canine may follow a scent plume which could be either air borne or settled on the ground/vegetation. The canine will use whichever technique will get them to the target the most efficiently. Canines are typically pre-scented on an object.

**3.120****trainer/instructor**

Any member of a specific discipline who is in a situation of instructing any part of the canine team using established methods and validated training guidelines.

**3.121****training**

Goal oriented task designed to teach, correct, expand, improve, and maintain detection capabilities. (See [Error! Reference source not found.](#) **reinforcement.**)

**3.122****training log****training record**

A record used to document the training of a canine, canine handler or canine team, maintained separately from other records, i.e., assessments, certifications or discipline-related deployment records. A record documenting the performance of the canine team, especially an account of an act or occurrence kept in writing or some other permanent form, i.e. electronic format which is discoverable.

**3.123****unconfirmed alert**

An alert for which the presence of a trained odor/scent cannot be confirmed. This may be the result of residual or lingering odor/scent that the canine can detect but which has not been confirmed by technology or direct observation. (See [3.69 non-productive response.](#))

**3.124****unconfirmed operational outcome**

Lack of verification of search results following a deployment of a canine team(s).

**4 Canine Team Requirements****4.1 Initial Training of the Canine Handler**

**4.1.1** Canine handler training shall be conducted by a competent trainer from an entity that utilizes a structured curriculum with specific training and learning objectives.

**4.1.2** Canine handler training shall include, but not limited to the following:

- a) the ability to “read the canine” (interpreting the canine’s change of behavior to particular stimuli);
- b) the acquisition and processing of scent by the canine;
- c) education on the various environmental conditions affecting scent dispersion;
- d) canine handling techniques (e.g. voice inflection and lead handling);
- e) rewarding the canine;
- f) education on the aspects of cognitive bias;
- g) first aid for canine and handler;
- h) fitness for canine and handler, and
- i) relevant legal aspects to include:
  - effect of odor/scent dispersion;
  - relevant case law (See Annex C);
  - preparation of legal documentation; and
  - preparation for courtroom testimony.

**4.1.3** The training shall be structured to meet the typical mission requirements of the canine team’s department, agency or organization, herein referred to as organization.

**4.1.4** The canine team’s training shall continue to maintain a level of operational proficiency and obtain certification (see Sections 5, 6, and 7).

**4.1.5** Canine handler training may include techniques for collecting, handling, storing and disposing of articles and human scent evidence as required by the canine handler’s organization.

**4.1.6** In order to maximize search efficiency, canine handler training shall include search techniques.

**4.2 Initial Training of the Canine**

**4.2.1** Canine training shall be conducted by a competent canine trainer from an entity that utilizes a structured curriculum with specific training and learning objectives. The training shall include, but not be restricted to the following.

**4.2.1.1** Initial training shall include sufficient obedience training to ensure the canine will operate safely and effectively based on mission requirements. Obedience training should include on- and/or off-lead control and responsiveness to verbal commands.

- 4.2.1.2 The canine shall be trained to perform a pre-determined specific final response (active or passive alert) upon locating the target (positive alert).
- 4.2.1.3 The canine shall be trained to perform a pre-determined specific final response (active or passive alert) upon locating the trained scent (positive alert).
- 4.2.1.4 The canine shall be trained to perform a pre-determined specific final negative response when no trained scent(s) are located.
- 4.2.1.5 Initial training of the canine shall include exposing the canine team to a variety of locations, expected situations, and searches.
- 4.2.1.6 Training shall progressively include scent articles, aged scent, trail distances, locations and environmental conditions typically expected in an operational search.
- 4.2.1.7 The canine shall be exposed to varying concentration/amounts of available scent.
- 4.2.1.8 Training shall include exposing the canine to a variety of different noise, visual, and odor/scent distractors.
- 4.2.1.9 The canine shall be trained to perform a safe, effective, and controlled search.
- 4.2.1.10 The training shall be structured to meet the typical mission requirements of the canine team's organization.
- 4.2.1.11 The canine team's initial training shall be continued until the required level of operational proficiency is achieved and the canine team is certified. (See Sections 5, 6, and 7)

## 5 Canine Team Assessments

- 5.1 Assessments are part of certification, maintenance training, and proficiency testing.
- 5.2 Each assessment is the evaluation of a search.
- 5.3 The canine handler shall articulate the canine's final response prior to the start of the assessment. The canine may not be able to make a final response due to the components and parameters of the assessment. Reasonable consideration by the assessor shall be given in these instances (e.g., the target is inaccessible for the canine to make a final response).
- 5.4 Each trail should be used by only one canine team.
- 5.5 Each non-matching trail should be used by only one canine team.
- 5.6 The canine team shall be assessed in the following ways.
  - 5.6.1 The assessments in this section are intended for *single-blind assessments*.
    - 5.6.1.1 *Scent recognition assessments* shall test the following.
      - 5.6.1.1.1 The ability of the canine to detect and use a specific person's scent on a scent article to follow the matching scent trail while discriminating from non-matching scent trails.

**5.6.1.1.2** The ability of the canine to demonstrate the absence of a matching scent trail.

**5.6.1.1.3** The canine handler's interpretation of the canine's behavior while searching.

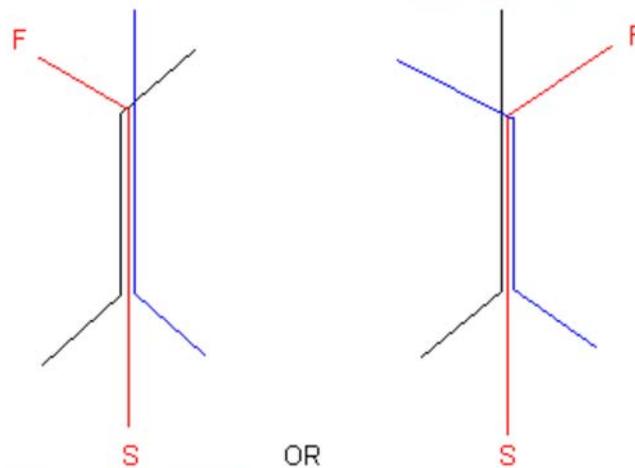
**5.6.1.1.4** The canine's final response.

**5.6.1.1.5** The canine handler's interpretation of the canine's final response.

**5.6.1.1.6** The scent recognition assessment shall consist of four individual assessments with the following components and parameters.

**5.6.1.1.6.1** For each scent recognition assessment, one human target and two human distractors are utilized to lay human scent trails in an environment similar to where the canine usually works (e.g., urban, suburban, or rural environment). Both target and human distractors shall not be visible.

**5.6.1.1.6.2** Each scent recognition assessment shall be between 90 m – 183 m (≈100 – 200 yds.) in length with a single split turn involving one human target and two human distractors (see Figure 1).



S is starting point human target, F is finishing point

FIGURE NOTE The target trail is indicated by the red, the distractor trails are indicated by the blue and black.

**Figure 1—Diagram Single Split Turn**

**5.6.1.1.6.3** Target trails shall be laid on a minimum of two surfaces (dirt, grass, concrete, asphalt, etc.).

**5.6.1.1.6.4** The target trail and one human distractor trail shall be aged a minimum of 30 minutes, and one distractor trail shall be aged a maximum of 15 minutes.

**5.6.1.1.6.5** At least half, but not all of the scent recognition assessments shall be conducted with non-matching scents to demonstrate the absence of a matching scent trail (see Figure 2). The order of the matching and non-matching scent recognition assessments shall be randomized.

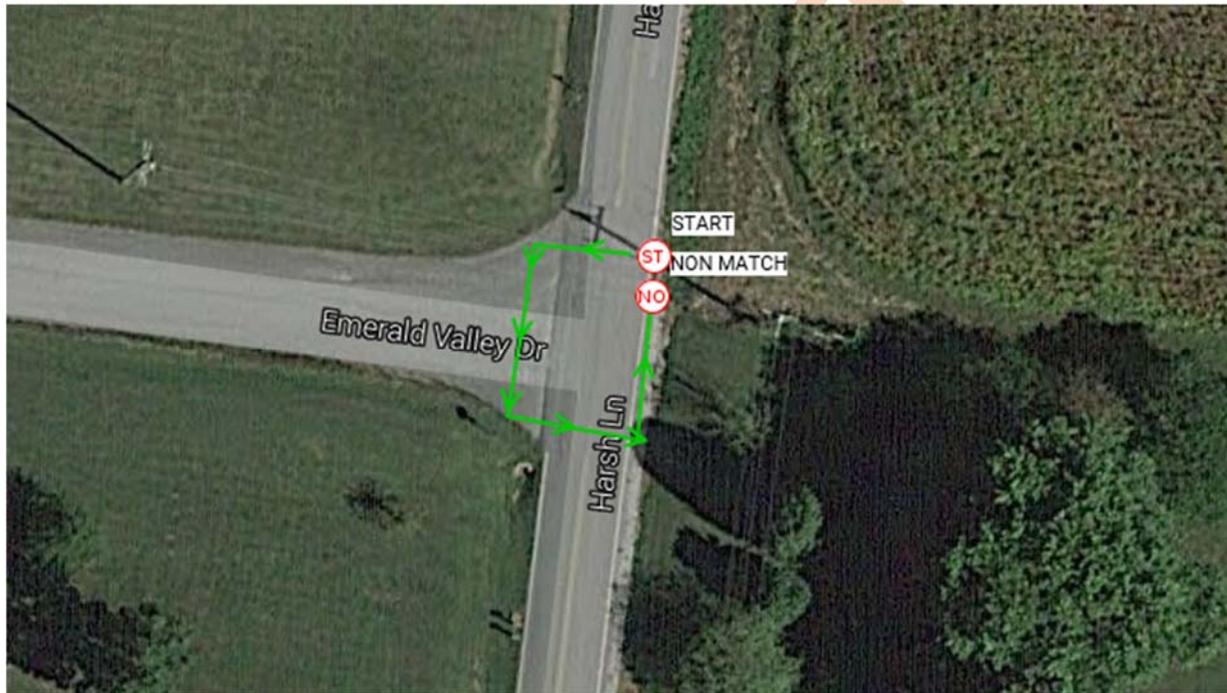
**5.6.1.1.6.6** Prior to the assessment, the start of the scent trail shall be marked by the assessing agency.

**5.6.1.1.6.7** The canine handler shall be directed to the start marker, but not given the target's direction of travel.

**5.6.1.1.6.8** The canine handler shall be provided a scent article from the target or a nonmatching scent article as a negative control.

**5.6.1.1.6.9** The assessor shall know the correct outcome of each assessment.

**5.6.1.1.6.10** The canine handler shall not know the correct outcome of any assessment.



Scent or a scent trail present, but the human scent traces on the pre-scenting article does not match the scent trail.

**Figure 2—Non-matching Scent Trail**

**5.6.1.1.6.11** The assessor shall observe the canine team. At the conclusion of the assessment, the assessor shall compare the search results with the parameters of the search. This comparison may be done immediately after the handler determines the canine has made its final response, or at the conclusion of the entire assessment.

**5.6.1.1.6.12** The assessing agency may take into consideration the environmental influences on the scent in determining whether or not the canine team has successfully completed the scent recognition assessment.

**5.6.1.1.6.13** A successful completion of the scent recognition assessment shall be the ability to find the correct direction of travel and follow the scent trail and correctly demonstrate a final response at the target or demonstrate the absence of a matching scent trail.

**5.6.1.1.6.14** The canine team shall properly scent discriminate in at least 75 % of the assessments.

**5.6.1.1.6.15** The assessor can fail the canine handler team if it is determined that the canine is no longer actively searching.

**5.6.1.1.7** *Operational assessments* shall test the following.

**5.6.1.1.7.1** The ability of the canine team to follow a scent trail on different surfaces and identify the specific target at the conclusion of the scent trail as required by the organization.

**5.6.1.1.7.2** Demonstration of the canine's ability to perform a systematic search.

**5.6.1.1.7.3** Demonstration of the canine handler's control of the canine during the execution of a systematic search.

**5.6.1.1.7.4** The canine's final response.

**5.6.1.1.7.5** The canine handler's interpretation of the canine's behavior while searching and including the canine's final response.

**5.6.1.1.7.6** Operational assessments shall consist of the following components and parameters.

**5.6.1.1.7.6.1** A mission-oriented assessment environment shall be used.

**5.6.1.1.7.6.2** In an operational assessment, the canine handler team is running only one trail. Each target trail shall be approximately 1.6 km ( $\approx$  1 mile) in length in an environment similar to where the canine usually works.

**5.6.1.1.7.6.3** Each target trail shall be aged in accordance with mission requirements for a minimum of 24 hours.

**5.6.1.1.7.6.4** Each target trail shall contain a minimum of ten turns.

**5.6.1.1.7.6.5** Multiple human distractors, either placed or regularly occurring in the assessment area shall be present along the distance of the target trail (see Figure 3).

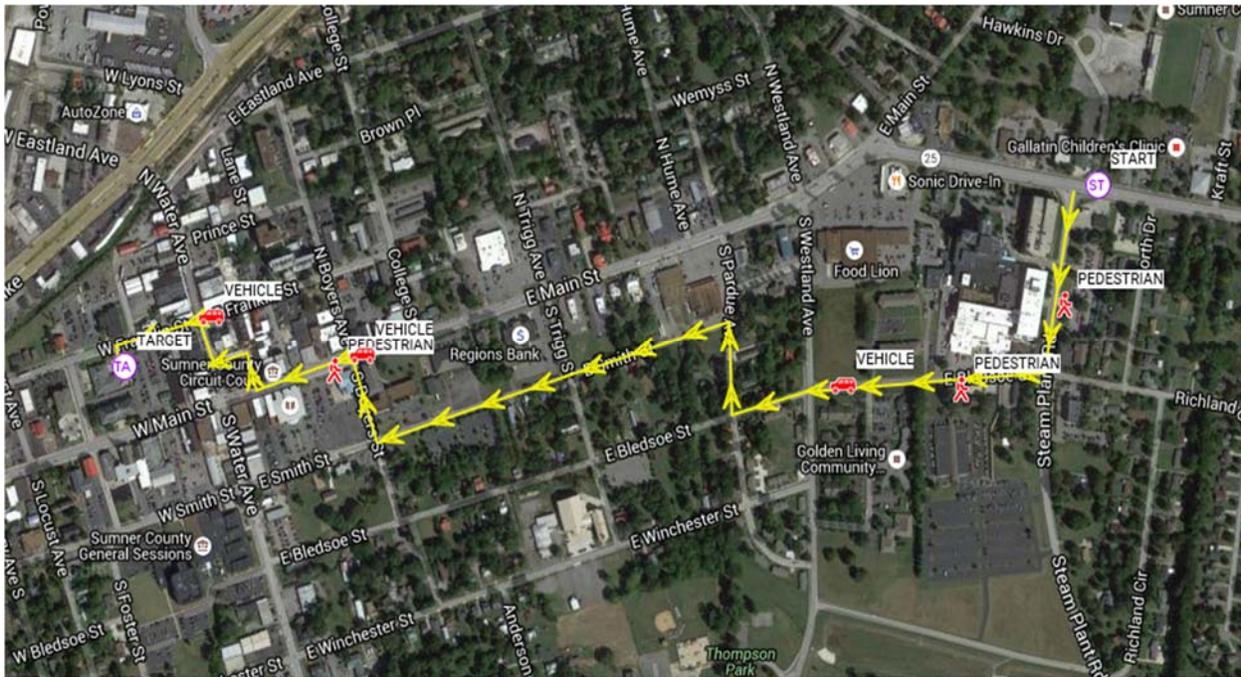
**5.6.1.1.7.6.6** The assessment location shall be unfamiliar to the canine handler.

**5.6.1.1.7.6.7** The targets and distractors shall not be ones normally utilized in the training of the canine team.

**5.6.1.1.7.6.8** The canine handler shall be informed of the start location area.

**5.6.1.1.7.6.9** The canine handler shall be provided a scent sample from the target.

**5.6.1.1.7.6.10** The assessment should be completed in less than 60 minutes.



Matching scent article to scent trail with multiple human distractors present along the distance of the target/scent trail demonstrating presence of matching scent trail.

**Figure 3—Example Aged Scent Trail**

- 5.6.1.1.7.6.11 The assessing agency shall know the correct target trail of each assessment.
- 5.6.1.1.7.6.12 The canine handler shall not know the correct target trail of the assessment.
- 5.6.1.1.7.6.13 The canine handler must be able to discern the canine’s final response and communicate this to the assessing agency.
- 5.6.1.1.7.6.14 The conclusion of the assessment shall be defined by the assessing agency.
- 5.6.1.1.7.6.15 Any canine team that is determined by the assessing agency to correctly follow the target trail and correctly come to a final response at the correct target, within 60 minutes has passed the assessment.
- 5.6.1.1.7.6.16 Failure of the assessment includes the following.
  - 5.6.1.1.7.6.16.1 Any canine team that is determined by the assessing agency to be more than 46 m (~50yd) off the target’s trail may be failed. However, the assessing agency may take into consideration environmental influences on the scent in determining whether or not a canine team is still on trail.
  - 5.6.1.1.7.6.16.2 Identifying a human distractor shall be considered a failure.
  - 5.6.1.1.7.6.16.3 A canine team taking longer than 60 minutes to complete the assessment shall be considered a failure.
  - 5.6.1.1.7.6.16.4 Following a distracter scent/odor track/trail will be considered a failure.

**5.6.1.1.7.6.16.5** The assessor can fail the canine handler team if it is determined that the canine is no longer actively searching.

**5.6.1.1.7.6.16.6** If the canine fails to come to a final response, that constitutes a failure of the canine team in the assessment.

**5.6.2** The assessments in this section are intended for *double-blind assessments*. When a double-blind assessment is conducted, it shall be conducted with considerations for safety.

**5.6.2.1** Scent recognition assessments can be conducted double-blind following the components and parameters described in Section 5.6.1.

**5.6.2.2** Unlike the assessments described in Section 5.6.1, neither the canine handler, nor the assessor, nor any individual present with the canine team shall know the correct outcome of any portion of the assessment, including whether there is a scent match.

**5.6.2.3** The canine team shall be required to successfully complete the assessment as defined by the assessing agency.

**5.6.2.4** The assessor shall observe the canine team. At the conclusion of the assessment, the assessor shall compare the search results with the parameters of the search. This comparison may be done immediately after the handler determines the canine has made its final response, or at the conclusion of the entire assessment.

**5.6.2.5** The canine team shall be required to complete a double-blind assessment every six months unless there is a double-blind assessment as a component of the certification.

**5.6.2.6** Any double-blind assessment may be used for proficiency testing.

## **6 Canine Team Certification**

**6.1** Certification for the named canine team shall be valid for up to one year (365 days or 366 days in a leap year).

**6.2** The canine team shall perform regular maintenance training, periodic proficiency assessments, double-blind assessments, and follow other recommended local, state and/or federal guidelines. Certification does not remove the requirement for continued training.

**6.3** The certifying official(s) shall not be routinely involved in the day to day training of the canine team being evaluated.

**6.4** The certifying authority may fail the canine team due to handler errors and breaches of safety, which may include, but are not limited to, the following.

- a) Not maintaining positive control of the canine, which may lead to safety issues.
- b) Allowing canine outside of search area.
- c) Not following directions of the assessor.

**6.5** Deliberate compromise of an evaluation will not be tolerated. Any communication concerning specifics of the evaluation will constitute a compromise and will lead to termination of the canine team's certification.

**6.6** A mission-oriented test environment shall be used.

**6.7** The certification shall be comprised of a scent recognition assessment together with an operational assessment (single- and/or double-blind assessment, or a combination of both Certification parameters are outlined in Section 5, Canine Team Assessments.

**6.8** Targets used in the certification process shall not have been used in the day-to-day training activities of the canine team being certified.

**6.9** The canine team shall properly scent discriminate in at least 75% of the scent recognition assessments and pass the operational assessment for successful certification.

**6.10** A canine team that fails the certification process shall complete a documented corrective action plan before making another attempt to certify.

**6.11** Certifying official(s) should identify the performance deficiency to the canine handler so that the trainer can determine a minimum amount of time for that deficiency to be remediated before another certification attempt.

**6.11.1** During this time frame, documentation should be provided by the canine trainer/handler to demonstrate that efforts have been enacted to correct the deficiency.

**6.12** Organization(s) may enhance the recommended guidelines in order to make the requirements more stringent.

## **7 Canine Team Maintenance Training**

**7.1** The canine team shall conduct regular objective-oriented training sufficient to maintain and enhance operational proficiency that includes:

- a) enhancing the proficiency level of the canine team;
- b) correcting identified deficiencies or weak areas;
- c) a variety of search locations, environmental conditions, weather conditions, and search area sizes;
- d) a varied duration of search times at a variety of times of day or night;
- e) a variety of blank search areas;
- f) a variety of search areas that contain non-matching scent trails;
- g) a variety of odor/scent distractions and/or odor/scent distractors in the search area;
- h) a variety of set times;

- i) a variety of targets;
- j) a variety of articles used for pre-scenting the canine;
- k) a variety of degrees of concealment (behind a tree, behind a door, in a trunk of a car, above ground, in a tree, etc.); and
- l) a variety of noise distractors (traffic, sirens, children playing, verbiage over a PA system, etc.).

**7.2** Routine training conducted solely by the canine handler to maintain the canine's proficiency is acceptable, but not a best practice, and shall be combined with supervised training on a regular basis.

Supervised training by a competent trainer is required in order to improve performance, identify and correct training deficiencies, and perform proficiency assessments.

**7.3** A canine team shall conduct a minimum of 16 hours of training per month to maintain and improve the proficiency level of the canine team.

**7.4** Training is meant to sustain, enhance, and promote the performance of the canine team.

**7.5** The canine team shall perform periodic proficiency assessments throughout the certification period as outlined in Section 5 - Canine Team Assessments, including a variety of scent recognition assessments, operational assessments, and single- and double - blind assessments.

**7.6** Canine teams shall be challenged during the regular maintenance training sessions within the operational environments for which the canine team may be deployed.

## **8 Scent Article Material Storage and Handling**

**8.1** Handling and storage of scent article materials shall be conducted in a manner that prevents odor/scent contamination.

**8.2** Scent article materials shall be stored in separate, individual, and labeled containers.

**8.3** Scent article materials shall be stored individually and separately from non-target and masking odor/scent.

**8.4** Scent article materials shall be appropriately disposed of and replenished as required and necessary due to odor/scent contamination and/or the perishable nature of the material.

**8.5** Scent article materials shall be maintained in a manner to avoid loss or destruction.

**8.6** Scent article materials should be signed in and out.

**8.7** Scent article materials should be inventoried monthly.

**8.8** Documented training should take place on the acquisition, handling, storing and disposing of target scent.

## 9 Canine Team Records and Document Management

**9.1** The canine handler/ organization shall document training, certification, canine team assessments, and discipline-related deployment data as relevant.

**9.2** Proficiency assessments and training records may be combined or separate documents.

**9.3** Discipline-related deployment records shall be separated from training, proficiency assessment, and certification documentation.

**9.4** Training and discipline-related records should be standardized within the organization.

**9.5** Training records shall include, but are not limited to the following data.

- a) Name of canine handler and canine.
- b) Name(s) of individual(s) conducting or assisting with training.
- c) Time and date of training.
- d) Location, environment, and weather conditions of training (i.e., urban, rural, wilderness, etc.).
- e) Training design (non-blind, single-blind, or double-blind).
- f) Target descriptors (e.g. gender, age, ethnicity, stature, etc.).
- g) Location of target.
- h) Concealment of the target (if applicable).
- i) Set time.
- j) Type of scent article/source (if applicable).
- k) Length of scent trail.
- l) Length of training session.
- m) Canine team search results.
- n) Deficiencies and corrective measures implemented during training regimen.
- o) Other information required by organization.

**9.6** Certification records shall be maintained by the certifying authority and the handler, and shall include, but are not limited to, the following data.

- a) Name of canine and canine handler.
- b) Name(s) of individual(s) conducting, assisting, or awarding certification.

- c) Date and time canine team certified.
- d) Location, environment, and weather conditions during certification (i.e., urban, rural, wilderness, etc.).
- e) Certification assessment design (non-blind, single-blind, or double-blind).
- f) Target descriptor(s) (e.g. gender, age, ethnicity, stature, etc.).
- g) Location of target(s).
- h) The concealment of the target(s) (if applicable).
- i) Set time.
- j) Length of scent trail.
- k) Type of scent article/source, i.e., leather, plastic, metal, textile (if applicable).
- l) Time taken to complete certification assessment.
- m) Canine team certification results.
- n) Deficiencies and corrective measures noted for future training.
- o) Other information required by canine team's organization.
- p) Certification authority (i.e., agency, professional organization, and/or individual(s)).
- q) The standard or guideline to which the canine team is certified.

**9.7** Canine team assessment records maintained by the canine handler/organization should include, but are not limited to, the following data.

- a) Name of canine and canine handler.
- b) Name(s) of individual(s) conducting, assisting, or awarding assessment.
- c) Date and time of canine team assessment.
- d) Location, environment, and weather conditions during assessment (i.e., urban, rural, wilderness, etc.).
- e) Assessment design (non-blind, single-blind, or double-blind).
- f) Target descriptor(s) (e.g. gender, age, ethnicity, stature, etc.).
- g) Location of target(s).
- h) The concealment of the target(s).

- i) Set time.
- j) Type of scent article/source, i.e., leather, plastic, metal, textile, etc. (if applicable).
- k) Time taken to complete assessment.
- l) Location address (GPS coordinates optional) included in assessment.
- m) Canine team assessment results.
- n) Deficiencies and corrective measures noted for future training.
- o) Other information required by canine team's organization.
- p) The standard or guideline to which the canine team is assessed.

**9.8** Deployment/utilization records maintained by the canine handler/organization shall document the specifics of the deployment to include, but are not limited to, the following data.

- a) Name of canine and canine handler.
- b) Name(s) of organization(s) conducting search.
- c) Date and time of deployment.
- d) Requestor of deployment.
- e) Location address (GPS coordinates) of deployment.
- f) Environmental conditions at deployment.
- g) Search area type (i.e. urban, rural, wilderness, etc.).
- h) Point last seen (PLS) (date, time, environmental conditions).
- i) Name of target/suspect (if available).
- j) Description of target/suspect (e.g. gender, age, ethnicity, height, weight, dress, etc.) (if available).
- k) Medical conditions/medications.
- l) Type of search (i.e. missing person, criminal, run away, armed, etc.).
- m) Type of scent article/source (i.e., leather, plastic, metal, textile, etc.) (if applicable).
- n) Back-up names.
- o) Search results.
- p) Information regarding search and final response(s).

q) Other information required by the canine team's organization.

**9.9** Confirmed operational outcomes can be used as a factor in determining canine team's capability.

**9.10** Unconfirmed operational outcomes shall not be used as a factor in determining a canine team's proficiency. Unconfirmed operational outcomes, including a non-productive response, may be relevant for investigative/testimony purposes because:

**9.10.1** Target scent or residual scent may be present below the measurable level of detection for laboratory instrumentation.

**9.10.2** There may be an environmental inability or external factors which prevent locating the scent source.

**9.11** Supervisory review of all records is recommended.

**9.12** Digitally formatted records (with appropriate back up), versus handwritten are recommended to facilitate compiling and analyzing data.

**9.13** All documented training, assessments, certification, and deployments shall be documented to include final response, any false positives, and any false negatives.

**9.14** Records may be discoverable in court proceedings and may become evidence of the canine team's reliability. Record retention policy shall be determined by the canine team's organization guidelines.

**9.15** Training records are necessary to illustrate the type and amount of training that the canine team has experienced before and after certification.

**9.16** Scent article materials records.

**9.16.1** Scent article materials shall be clearly labeled in a manner to support accountability.

**9.16.2** Appropriate records shall be maintained by the canine handler/ organization in accordance with federal/state/local requirements.

**9.17** Veterinary Records.

**9.17.1** Veterinary records shall be maintained in a manner such as they are accessible to the handler/ organization.

**9.17.2** Vaccinations required by state or local law should be documented in the veterinary record of the canine.

## **Annex A** **(informative)**

### **Foundational Principles**

Prior to the start of the search, the canine is “scented” on an object (scent article) containing the target’s scent. The canine works from an article to either a person or a location associated with that person. The goal is for the canine to detect and use a specific person’s scent on a scent article to either search for and follow a matching scent trail to this specific person or a location associated with this person while discriminating from all non-matching scent trails, or to correctly demonstrate the absence of a matching scent trail. Canines used in this discipline are typically deployed in search and rescue and forensic investigative functions, and typically not in immediate apprehension functions.

This standard provides the critical foundation needed for the development and quality assurance for deployment of the use of the canine’s functioning within this discipline.

Many agencies, departments and canine organizations have established internal standards and standard operating procedures. The intent of this document is to provide a minimum standard which may be exceeded and provide consistency in training, assessments, documentation and terms and definitions

## Annex B (informative)

### Bibliography

This is not meant to be an all-inclusive list as the group recognizes other publications on this subject may exist. At the time this standard was drafted, these were the publications available for reference. Additionally, any mention of a particular software tool or vendor as part of this bibliography is purely incidental, and any inclusion does not imply endorsement.

- 1] Academy Standards Board. *ASB Technical Report 025, Crime Scene/Death Investigation - Dogs And Sensors - Terms And Definitions*, First Edition, 2017<sup>2</sup>.
- 2] Bernier, U.R., D.L. Kline, D. R. Barnard, C.E. Schreck,, and R. Yost. "Analysis of Human Skin Emantations by Chromotography/Mass Spectrometry." *Analytical Chemistry*. 2000. 72, 747-756.
- 3] Bowling, T. "How reliable is your dog?" *Police K-9 Tracking*, 2006, Spring. 24-34.
- 4] Brisbin, I.L, S. Austad, S.K. Jacobson. "Canine Detectives: The Nose Knows-Or Does It?" *Science*, 2000. 290 (5494), 1093.
- 5] Brisbin, I.L. Jr., and S.N. Austad. "The use of trained dogs to discriminate human scent: a reply." *Animal Behavior*, 1993. 46, 191-192.
- 6] Brisbin, I.L., and S.N. Austad. "Testing the individual odour theory of canine olfaction." *Animal Behavior*, 1991. 42, 63-69.
- 7] Browne, C., K. Stafford, and R. Fordham. "The use of scent-detection dogs." *Irish Veterinary Journal*, 2006. 59 (2), 97-104.
- 8] Curran, Allison M., Paola A. Prada, and Kenneth G. Furton. "Canine human scent identifications with post-blast debris collected from improvised explosive devices." *Forensic science international*, 2010. 199.1: 103-108.
- 9] Curran, A., PhD., P. Prada, PhD., and K. Furton, PhD. "The Differentiation of the Volatile Organic Signatures of Individuals Through SPME-GC/MS of Characteristic Human Scent Compounds." *Journal of Forensic Sciences*, 2010. 55(1), 50-57.
- 10] Curran, A., C. Ramirez, A. Schoon, and K. Furton. "The frequency of occurrence and discriminatory power of compounds found in human scent across a population determined by SPME-GC/MS." *Journal of Chromotography*, 2006. B 846, 86-97.
- 11] Curran, A., S. Rabin, and K. Furton. "Analysis of the Uniqueness and Persistence of Human." *Forensic Science Communications*, 2005. 7 (2), 1-15.

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<sup>2</sup> <http://www.asbstandardsboard.org/published-documents/dogs-and-sensors-published-documents/>

- 12] Curran, A., S. Rabin, P. Prada, and K. Furton. "Comparison of the Volatile Organic Compounds Present in Human Odor Using SPME-GC/MS." *Journal of Chemical Ecology*, 2005. 31(7), 1607-1619.
- 13] Curran, A., S. Rabin, P. Prada, and K. Furton. "Comparison of the Volatile Organic Compounds Present in Human Scent from Males and Females Using SPME-GC/MS." *International Forensic Research Institute*, 2004. 1-17.
- 14] Eckenrode, Brian A., et al. "Performance Evaluation of the Scent Transfer Unit™(STU-100) for Organic Compound Collection and Release." *Journal of forensic sciences*, 2006. 51.4: 780-789.
- 15] Ensminger, John J. "*Police and Military Dogs: Criminal Detection, Forensic Evidence and Judicial Admissibility*", CRC Press, 2012.
- 16] Gallagher, M., C. Wysocki, J. Leyden, A. Spielman, X. Sun, and G. Preti, "Analyses of volatile organic compounds from human skin." *British Journal of Dermatology*, 2008. 159, 780-791.
- 17] Harper, R., A. Curran, J. Almirall, PhD., K. Furton, PhD. "Developing the Science Behind Canine Olfaction of Forensic Specimens." 2004. International Forensic Research Institute.
- 18] Harvey, Lisa M., et al. "The use of bloodhounds in determining the impact of genetics and the environment on the expression of human odor type." *Journal of forensic sciences*, 2006. 51.5: 1109-1114.
- 19] Harvey, L.M., Ph.D., and J.W. Harvey. "Reliability of Bloodhounds in Criminal Investigations." *Journal of Forensic Science*, 2003. 48 (4), 811-816.
- 20] Helton W.S. "*Canine Ergonomics The Science of Working Dogs*". CRC Press, 2009.
- 21] Hepper, P. and D. Wells, "How Many Footsteps Do Dogs Need to Determine the Direction of an Odour Trail?" *Chemical Senses*, 2005. 30(4), 291-298.
- 22] Hepper, P.G., "The Discrimination of Human Odour by the Dog." *Perception*, 1988. 17(4), 549-554.
- 23] Hudson-Holness, T. Davia, and K. Furton. "Comparison between human scent compounds collected on cotton and cotton blend materials for SPME-GC/MS analysis." *Journal of Forensic Research*, 2010.
- 24] Hudson, D. Phd., A. Curran, PhD., and K. Furton, PhD. "The Stability of Collected Human Scent Under Various Environmental Conditions." *Journal of Forensic Sciences*, 2009. 54(6), 1270-1277.
- 25] Hudson, T. "Variables Affecting the Collection and Preservation of Human Scent Components Through Instrumental and Biological Evaluations." Florida International University. Dissertation. 2009.
- 26] Hunt, R. "The Benefits of Scent Evidence." *FBI Law Enforcement Bulletin*, 1999. 68(11), 15-18.
- 27] Jezierski T, Ensminger J, Papet L.E. "*Canine olfaction science and law*", CRC Press, 2016.

- 28] Kalmus, H. "The Discrimination by the Nose of the Dog of Individual Human Odours and in Particular of the Odours of Twins." *The British Journal of Animal Behaviour*. 1955. 25-31.
- 29] King, E., F. Becker, and J. Markee. "Studies on Olfactory Discrimination in Dogs: (3) Ability to Detect Human Odour Trace." *Animal Behavior*, 1964. 12(2-3), 311-315.
- 30] Krutova, V.I., and E.P. Zinkevich, "Dogs Recognize an Individual Odor in a Mixture of Odors from Many Individuals." *Doklady Biological Sciences*, 2002. 388, 56-58.
- 31] Kusano, M., M. Eladio, and K. Furton. "Comparison of the volatile organic compounds from different biological specimens for profiling potential." *Journal of forensic sciences*, 2013. 58.1:29-39.
- 32] Laing, D.G. "Identification of Single Dissimilar Odors is Achieved by Humans With a Single Sniff." *Physiology and Behavior*, 1986. 37, 163-170.
- 33] Lit, L., Schweitzer, J., A. Oberbauer, "Handler Beliefs affect scent detection dog outcomes." *Animal Cognition*, 2011. 14. 387-394.
- 34] Lorenzo, N., T. Wan, R. Harper, Y. Hsu, M. Chow, S. Rose, and K. Furton. "Laboratory and field experiments used to identify *Canis lupus var. familiaris* active odor signature chemicals from drugs, explosives, and humans." *Analytical and Bioanalytical Chemistry*, 2003. 376, 1212-1224.
- 35] Mackenzie, S.A., and J.A. Schultz. "Frequency of Back-Tracking in the Tracking Dog." *Applied Animal Behaviour Science*, 1987. 17, 353-359.
- 36] Mesloh, C., and J. Mesloh, "Trained Dogs in the Crime Scene Search." *Journal of Forensic Identification*, 2006. 56(4), 534-535.
- 37] Mesloh, C., R. Wolf, and M. Henych. "Scent as Forensic Evidence and Its Relationship to the Law Enforcement Canine." *Journal of Forensic Identification*, 2002. 52(2), 169-182.
- 38] Miklosi, A., J. Polgardi, J. Topal, and V. Csanyi. "Use of experimenter given cues in dogs." *Animal Cognition*, 1998. 1, 113-121.
- 39] Nicolaidis, N. "Skin Lipids: Their Biochemical Uniqueness." *Science*, 1974. 186, 19-26.
- 40] Penn, D., E. Oberzaucher, K. Grammer, G. Fischer, H. Soini, D. Wiesler, M. Novotny, S. Dixon, Y. Xu, and R. Brereton, "Individual and gender fingerprints in human body odour." *Journal of the Royal Society Interface*, 2007. 4, 331-340.
- 41] Pinc, Ludvík, et al. "Dogs discriminate identical twins." *PloS one* 6.6 2011. e20704. Available at, <https://journals.plos.org/plosone/article?id=10.1371/journal.pone.0020704>
- 42] Porter, Jess, et al. "Mechanisms of scent-tracking in humans." *Nature neuroscience*, 2007. 10.1 27-29.
- 43] Prada, P., A. Curran, and K. Furton. "Human scent evidence." CRC Press. 2014.
- 44] Rogowski, M. "An Attempt to Determine the Possibility of Penetration of Human Scent Through Rubber Gloves." *Problems of Forensic Sciences*, 2004. LVII, 44-50.

- 45] Segal, N.L., K.W. Brown, and T.D. Topolski. "A twin study of odor identification and olfactory sensitivity." *Acta Genet Med Gemellol*, 1992. 41, 113-121.
- 46] Sommerville, B.A., R.A. Settle, F.M.C. Darling, and D.M. Broom. "The use of trained dogs to discriminate human scent." *Animal Behavior*, 1993. 46, 189-190.
- 47] Steen, J.B., E. and Wilsson. "How do dogs determine the direction of tracks?" *Aeta Physiol Scand*, 1990. 139, 531-534.
- 48] Stockham, R. "Bloodhounds and Bombing Investigations." 2005.
- 49] Stockham, R., D. Slavin, and W. Kift. "Specialized Use of Human Scent in Criminal Investigations." *Forensic Science Communications*. 2004. 6 (3), 1-12.
- 50] Stockham, R., D. Slavin, and W. Kift. "Survivability of Human Scent." *Forensic Science Communications*, 2004. 6 (4), 1-11.
- 51] Thesen, A., J.B. Steen, and K.B. Doving. "Behaviour of Dogs During Olfactory Tracking." *J.exp Biol*, 1993. 180, 247-251.
- 52] Wallace, P. "Individual Discrimination of Humans by Odor." *Physiology and Behavior*, 1976. 19, 577-579.
- 53] Wells, D. and P.G. Hepper. "Directional Tracking in the Domestic Dog, *Canis Familiaris*." *Applied Animal Behaviour Science*, 2003. 84, 297-305.

## Annex C (informative)

### Case and Legal References

- 1] White, S. and T. Tieken. "K9's Reason for Being." 1999. 1-13.
- 2] Smith, D. "Fraudulent Use of K-9's in Law Enforcement." Unpublished paper, 2001. Michigan.
- 3] Unknown author. Press release. U.S. Department of Justice. Federal Bureau of Investigation, 2002. 1-3.
- 4] The People v. Eleazar DeSantiago et al., Los Angeles County, Superior Ct BA182395 (Second Appellate District 2003).
- 5] The People v. Jeffrey Dewayne Mitchell et al., Los Angeles County, Superior Ct. No. YA043140 (Second Appellate District 2003).
- 6] Sachs, J. "What the Cold Nose Knows." *Popular Science*, 2003, August. pp. 20-24.
- 7] Human Tissue Act of 2004, Chapter 30. 1-63, British Parliament (2004).
- 8] Burne, L. "No your Friend Cannot Do Magic: United States v. Sandra Marie Anderson and Cadaver Dogs on Trial." Special Research Project/Upper Class Writing Assignment, Connecticut School of Law, 2004. Connecticut.
- 9] Wiedel, M., *Nose News*. A Publication of the National Police Bloodhound Association. 2004, Spring. pp. 1-2.
- 10] Beasley II, J.O. "Serial Murder in America: Case Studies of Seven Offenders." *Behavioral Sciences and the Law*, 2004. 22, 395-414.
- 11] The People v. Ryan Willis, Los Angeles County, Superior Ct. No. MA 020235 (Second Appellate District, 2004).
- 12] People of the State of California v. Benigno Salcido, Los Angeles Superior Court GA052057. 2005.
- 13] Unites States of America v. Antonio Calhoun, United States Court of Appeals for the Seventh Circuit No. 02-2899. 2005.
- 14] Lammers, K. "Canine Sniffs: The Search that Isn't." *NYU Journal of Law and Liberty*. 2005. 1(2), 845-856.
- 15] VanGent, R. Document case update. (E.C.). Federal Bureau of Investigation, 2006. 1-2.
- 16] State v. Jose S. Guillen, 222 Ariz. 81, 213 P. 3d 230, App.2009.

- 17] Simpanen, M. and N. Vitala. "Sampling Places for Fire Debris Containing Ethanol Pointed by an Arson Dog at the Scene of Crime." Paper presented at the 5<sup>th</sup> Meeting of the European Academy of Forensic Science, 2009, September. Glasgow, Scotland.
- 18] Lunney, L. "Has the Fourth Amendment Gone to the Dogs?: Unreasonable Expansion of Canine Sniff Doctrine to Include Sniffs of the Home." *Oregon Law Review*, 2009. 88, 829-833.
- 19] Ensminger, J., T. Jezierski, and M. McCulloch. "Scent Identification in Criminal Investigations and Prosecutions: New Protocol Designs Improve Forensic Reliability." From the Selected Works of John Ensminger. 2010. 1-84.
- 20] Weissmann, A., E. Lammert, and C. Benoit. Letter to Richard A. McFreely. U.S. Department of Justice. 2013. 1-2.
- 21] Stam, M. "The Forensic Analysis of Wooden Stick Matches in a Southern California Arson Case and Subsequent Examinations in Two Other Arson Cases." Unpublished paper, 2013. Riverside, CA.

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