ASB Standard 076, First Edition
2025

Standard for Training and Certification of Canine Detection of Human Remains: Human Remains on Land

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ASB Approved Xxxxx 2025

ANSI Approved Xxxxx 2025

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Foreword

This document serves as a baseline for the general protocols for training human remains detection on land. This standard promotes consistency across organizations utilizing canines for the detection of human remains on land and relieves the judicial system of conflicting protocols. This Standard represents the current ASB Dogs and Sensors consensus body's consensus between veterinarians, scientists, and practitioners regarding available relevant scientific understanding and practical experience.

This standard is intended to be applied prospectively, and not retroactively.

The training programs described in this standard have not been validated because there are no validated training programs. Given the lack of validation studies in this area, the standard assembled selected professional expert opinions about best practices into a training document so that the training and accreditation of canine teams across this discipline of canine detection is standardized. Although validated training standards are the goal, this is a consensus-based training document that, when followed correctly, will increase standardization. Standardization is a form of quality control that seeks to increase consistency in canine detection results, independent from validation. The result of this will be increased repeatability and reproducibility within the discipline while the necessary research develops [48].

To understand the value of standardization in canine detection disciplines, this standard needs to be assessed with the role of forensic canine detection in mind. Detection canine teams serve as an investigative tool. The results of detection may be used to establish “probable cause,” develop leads that investigators can pursue, or to assist emergency professionals. Detection teams, like many forensic techniques, cannot confirm someone’s involvement in a crime, confirm the nature of any materials at a crime scene, or determine details or timelines associated with crime events. Confirmatory analyses that serve this purpose require additional investigation, laboratory testing, and (ideally) many pieces of corroborating evidence. Confirmatory testing might occur *because of* the work done by a canine team, and confirmatory techniques also have limitations and error rates—some known, some not. A result from a canine detection team alone is insufficient as a basis for closing investigations or be used alone as a basis for charging someone.

While the proposed standard has not been validated, there is research that provides evidence that standardized training and testing increases consistency and reliability [48]. Standardization can advance our ability to research specific aspects of training in combination with specific detection purposes. It is expected as the research continues that this standard will evolve and additional specific citations to research to support or alter specific aspects of the training standards are expected as a result of this standard.

Standardized training protocols and certification criteria produce several benefits. First, any canine detection teams that meet the criteria set forth in this training and certification standard have passed a predetermined minimum level of the performance and have been required to follow a specific set of rules and guidelines to achieve that. The goal of this standard is to encourage all canine teams to perform at least as well as this training/certification protocol requires and to minimize individual discretion on the part of handlers and examiners/assessors. Standardization also leads to general improvements in reproducibility between canine teams or across time for a particular canine team. Even though these protocols have not been validated, having a detailed protocol like the ones described in this standard is expected to increase the likelihood that different canine teams trained under this regimen react the same to the same evidence or materials. Finally,

the required documentation allows appropriately trained individuals to assess and review the canine team's performance. Thus, standardization is a form of quality control and a way to increase consistency in canine detection results, independent from validation.

The American Academy of Forensic Sciences established the Academy Standards Board (ASB) in 2015 with a vision of safeguarding Justice, Integrity and Fairness through Consensus Based American National Standards. To that end, the ASB develops consensus based forensic standards within a framework accredited by the American National Standards Institute (ANSI), and provides training to support those standards. ASB values integrity, scientific rigor, openness, due process, collaboration, excellence, diversity and inclusion. ASB is dedicated to developing and making freely accessible the highest quality documentary forensic science consensus Standards, Guidelines, Best Practices, and Technical Reports in a wide range of forensic science disciplines as a service to forensic practitioners and the legal system.

This document was revised, prepared, and finalized as a standard by the Dogs and Sensors Consensus Body of the AAFS Standards Board. The draft of this standard was developed Dogs and Sensors Subcommittee of the Organization of Scientific Area Committees (OSAC) for Forensic Science. This document is based on the scientific working group on dog and orthogonal guidelines (SWGDOG) Approved SWGDOG SC8 Human Remains Detection guidelines.

Questions, comments, and suggestions for the improvement of this document can be sent to AAFS-ASB Secretariat, asb@aafs.org or 410 N 21st Street, Colorado Springs, CO 80904.

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

ASB procedures are publicly available, free of cost, at www.aafs.org/academy-standards-board.

Keywords: *human remains detection, cadaver, canine team assessments, canine certification, maintenance training, record keeping, document management.*

Table of Contents *(to be finalized upon publication)*

Standard for Training and Certification of Canine Detection of Human Remains: Human Remains on Land

1 Scope

This document provides the requirements for the training, certification, and documentation pertaining to canine teams trained to search for human remains on land. This document does not cover mass disaster victim location canine activities, which are covered under separate standards.

2 Normative References

There are no normative reference documents. Annex A, Bibliography, contains informative references.

3 Terms and Definitions

For purposes of this document, the following discipline specific definitions apply. Please refer to ASB Technical Report 025, *Crime Scene/Death Investigation – Dogs and Sensors – Terms and Definitions*, First Edition, 2017 for a comprehensive listing of detailed general canine detection definitions.

3.1
adipocere
(grave wax)
Is a waxy or greasy decomposition product formed by hydrolysis and hydrogenation of tissue fats formed in a moist or anaerobic conditions.

3.2
alert
A characteristic change in ongoing behavior in response to a trained odor, as interpreted by the canine handler. The components of the alert may include: change of behavior (COB), interest, and final response or indication.

3.3
alternative training aid
Any type of training material that does not use unadulterated target material; commonly used in the cases where the target material is hazardous, limited availability, or controlled access; subclassifications include, Sorption, Mimic, Dilution, and Vigilance Aids.

3.4
area search
The act of using a canine to search a designated area for a target odor.

3.5
assessments
An evaluation during training and/or certification process; a tool to assess canine team ability.

3.6
assessor
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.

3.7
behavior
Any measurable, physical response of a canine. Can be voluntary (goal directed) or involuntary (reflexive).

3.8
blank search
A training or certification exercise in which the target odor is not present.

3.9
blood
The fluid consisting of plasma, blood cells, and platelets that is circulated by the heart through the vertebrate vascular system, carrying oxygen and nutrients to and waste materials away from all body tissues.

NOTE Fresh blood removed from the body is defined as blood that is less than 24 hours old, old or aged blood is defined as blood that is greater than 24 hours old [41].

3.10
burned remains
Human remains which have been exposed to fire, flame, or high heat.

3.11
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.

3.12
canine team
A human and working canine that train and work together as an operational unit.

3.13
certification
A process that attests to the successful completion of an examination of relevant skills for the canine team.

NOTE Certifications are comprised of operational assessments (see **3.55 operational assessments**)

3.14
certifying authority
The organization authorizing the certification of a canine team.

3.15
certifying official
A person who has been delegated the authority to conduct a 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.

3.16
Change of Behavior
COB
A characteristic pattern of behaviors, as recognized by the canine handler, that occurs when the canine detects a trained odor. This differs from other olfactory interest that otherwise is exhibited by the canine in response to the daily environment. The canine's initial change of behavior typically leads to following the odor to its source/target. The pattern of behavior may be unique to each canine.

3.17
competent canine trainer
A person having the skills, knowledge, and experience to train canines and canine handlers, who has demonstrated, through education, training, and operational experience, extensive skills 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.

3.18
concealed
Refers to the location of the training aid which is hidden from sight.

3.19
concentration (chemical)
The amount of a constituent expressed as a mass or volume divided by the total amount of material expressed as a mass or volume.

3.20
confirmed operational outcome
Verification of search results following a deployment of a canine team(s).

3.21
contamination
When an odor is inadvertently introduced. Contamination can include the following: contamination of a search area with a target odor or contamination of a training aid with competing odor.

3.22
containment systems
Any means of restricting target odor to prevent cross-contamination, odor dispersion, or odor transfer or any means of limiting access to training aid sources during training or certification to prevent consumption, movement, or relocation.

3.23
control
A sample used as a quality control measure to demonstrate that the system is working to an optimum level and/or that the integrity of the analytical process is maintained. Material of established origin that is used to evaluate the performance of a test or comparison. A test with an expected positive or negative result often used to confirm the reliability of the method being used.

3.24
controlled search
1) An experiment/training/testing exercise in which any defined variable(s) is consistent within specific parameters.
2) Handler maintains control of the canine during a test/assessment/training/search to ensure safety or adequate coverage using on or off leash verbal or visual commands.

3.25
debris
Scattered material in a search area, i.e., soil and sediment, vegetation (trees, shrubs), municipal solid waste (household garbage, personal belongings), demolition debris or disaster debris i.e., explosion, mudslide, landslide, tornado, hurricane, or fire.

3.26
decomposition fluids
Fluids associated with the human body decay process that produces a distinctive odor.

3.27
deployment
Assignment of a canine team in an operational environment.

3.28
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.

3.29
detector/detection canine
detector dog
A canine trained to detect and give a trained final response to the presence of certain scents or odors for which it has been trained.

NOTE May be referred to as a law enforcement or search and recovery working canine, which is not to be confused with canines covered by the Americans with Disabilities Act (ADA).

3.30
distractor
Non-target stimuli placed or naturally occurring within a search area. These can include: humans, toys, food, animal odor, etc.

3.31
double-blind assessment/double-blind testing
In the evaluation of a canine team, neither the assessor nor the canine handler knows the location of the target odor or whether target odor is present (i.e., a blank/null search) or the assessor is not in a position to influence the outcome (i.e., two-way glass, video monitoring, physical barriers, great distance).

3.32
dry bone
Bone that no longer retains its visco-elastic properties (it could still be associated with tissue, but that tissue would likely be mummified).

3.33
false final response
In a controlled environment, the canine responds as if a target odor was present when it is known that it is not.

3.34
false hole
Depression, void, or disturbed earth that is intentionally created in a search environment by the assessor/ evaluator/ handler/certifying official that does not contain and has not contained the odor of human remains. This is a distractor depression or void.

3.35
fresh stage
A recently deceased human, aged no longer than 24 hours old, for example fresh blood [41].

3.36
handler error
Any action or cue made by the handler that causes the canine to perform incorrectly.

3.37
HRD
Human Remains Detection

3.38
human decomposition
The postmortem process in which tissues and macro molecules in human bodies breakdown into simple organic matter over time.

3.39
human remains
Whole of a deceased person, or parts of a human body.

3.40
human tissue
An aggregation of similarly specialized human cells (skin, muscle, fat, organ, and bone) united in the performance of a particular function.

3.41
initial training
The fundamental training associated with detector canine training which consists of, but not limited to: bonding/relationship building, obedience, basic odor/scent recognition and discrimination, and basic search techniques.

3.42
interest
Any reaction to an odor, 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.
(2) Pattern of behavior following the canine's initial reaction to a trained odor when the canine displays motivation to remain at or trace the trained odor to its source.

3.43
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.

3.44
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.

3.45
mummification
The desiccation of human tissues under conditions of high temperature and low humidity.

3.46
natural distractors
Distractor odor(s) that are naturally occurring in the search environment that are not placed by assessors, evaluators, certifying officials, observers, or participants. Examples may include animal remains that were not placed by someone, holes that were dug by wild animals, feces from other animals, etc.

3.47
non-productive response
A change of behavior of the canine followed by a positive indication which cannot be confirmed.

NOTE 1 This may be the result of residual odor that the canine can detect but which cannot be confirmed by technology or direct observation.

NOTE 2 A non-productive response may also be an error—a false final response—but these outcomes cannot be distinguished in an operational environment.

3.48
obedience training
The training of an animal, especially a canine, to obey certain commands.

3.49
odor
Volatile chemicals emitted from a substance that are able to be perceived by olfaction.

NOTE "Odor" has traditionally referred to canine detection of a substance; "scent" has traditionally referred to canine detection of humans.

3.50
odor dispersion
The movement of odor in an environment, which is affected by environmental conditions/factors/influences.

3.51
odor recognition
Demonstration of the canine's ability to alert to a target odor(s).

3.52
odor recognition assessment
A test of the canine's olfactory ability to discriminate and perform its trained final response to target odor(s) in a controlled environment.

3.53
off-lead
Any work or interactions with the canine where the canine is not attached to a lead.

3.54
organization
An organized body with a particular purpose.

NOTE In this document, an organization can consist of a single canine team or any other organization, department, agency, or entity.

3.55
operational assessment
An evaluation conducted (single-blind or double-blind) in an operational environment in which the canine team will be deployed or utilized.

3.56
operational proficiency
A measure of the canine team's capability to perform desired tasks on operational search missions.

NOTE Ways of demonstrating such proficiency include certification, engaging in regular maintenance training, etc.

3.57
proficiency assessment/testing
An evaluation during training; a tool to assess team ability.

3.58
random/randomized
When the choice of something or the placement of something is random, the source placed is equally likely to be in any location.

3.59
record
Documentation of the use of the canine and canine team for the working life of the canine kept in writing or some other permanent form, i.e., electronic format.

NOTE Including veterinary, training, certification, assessment, maintenance, deployment, etc.

3.60
reliability
The extent to which (1) an experiment, test, or measuring procedure yields the same results on repeated trials; (2) there is a low probability of alerting to anything other than a target odor and a high probability of alerting to a target odor; (3) evidence establishes a fair probability that a target odor is present; (4) a measurement is repeatable and consistent and free from random errors.

3.61
residual odor
Odor that originated from any target source/subject that lingers and may not be physically recoverable or detectable by other means.

3.62
routine training
Canine training conducted with regularity that maintains the canine's operational capabilities.

3.63
set time
The length of time between the target placement and when the canine is deployed to detect the target odor.

3.64
single-blind assessment/testing
An evaluation of the canine team's ability to complete an exercise where the assessor/evaluator/certifying official knows the outcome and the canine team does not.

3.65
smear
A small amount of training aid that is placed in the search environment via touching the target source with object, gauze, a gloved hand, etc., and pressing or wiping target odor onto a surface.

3.66
surface deposition
The placement of human remains on the surface of the ground.

3.67
systematic search
A technique that employs a specific search pattern to increase accuracy and minimize omissions, while maximizing coverage.

3.68
trace
A minimal amount of target odor that is recognizable by the canine. This amount can be in the form of a smear, touch transfers or dried stains originating from physical material.

3.69
trained final response
A behavior that a canine has been trained to exhibit in the presence of a trained odor. This behavior may be either passive (sit, stare, down, point, etc.) or active (bite, bark, scratch, jump, etc.).

NOTE This term has traditionally been referred to as "final response". See ASB Technical Report 025 for definition of "final response".

3.70
training aid
Target odor sources used for training, assessments, certification, maintenance training, and proficiency testing.

3.71
urban search
To locate target odor(s) in a city type of environment.

3.72
voice inflection
Use of tonal changes and volume to effectively communicate with the canine.

3.73
wet bone
Bone that still retains its visco-elastic properties, typically due to retention of soft tissue and associated fluids.

4 Canine Team Requirements

4.1 Initial Training of Canine Handler

4.1.1 The canine handler training shall be conducted by a competent canine trainer in human remains detection from a canine team's department, agency, entity, or organization, herein referred to as organization (see 3.54), that utilizes a structured curriculum with specific training and learning objectives.

NOTE In this document, an organization can consist of a single canine team or any other organization, department, agency, or entity.

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

a) proper use of Personal Protection Equipment (PPE);

b) education on human remains as biohazardous materials, to include safety storage, disposal, transportation, and handling;

c) completion with a passing score of National Incident Management System (NIMS) (ICS 100, ICS 200, IS-700, and IS-800.b) courses[a];

d) completion with a passing score of a blood-borne pathogen course;

e) proof of completion of Hazard Materials (HazMat) awareness course;

f) the ability to "read the canine" (recognize the canine's change of behavior to particular stimuli);

g) the acquisition and processing of odor/scent by the canine;

h) education on the various environmental (e.g., weather and settings) conditions affecting odor/scent dispersion;

i) canine handling techniques (e.g., voice inflection and lead handling);

j) rewarding the canine (e.g., type of reward, timing, reward schedules).

k) education on cognitive bias and the effects of handler influence [31,57];

l) first aid for canine and handler;

m) fitness for canine and handler [18,22];

n) preparation of training logs;

o) education on crime scene preservation;

p) preparation of search reports;

q) debriefing of a search;

r) land navigation; (e.g., maps, compass);

s) use of global positioning systems (GPS) and tools;

t) orthogonal detectors (see Table A.2 in Annex A); and

u) relevant legal aspects to include:

- articulate the effect of odor/scent dispersion [27,35],
- relevant case law,
- documentation, and
- preparation for courtroom testimony.

[a] Available from: https://training.fema.gov/is/crslist.aspx?lang=en

4.1.3 The canine handler shall be familiarized with the process of human decomposition. Decompositional changes develop over time and with great variability, depending on the host and environmental factors. The body may be found in various states of decomposition (early, moderate, advanced) which may include:

a) fresh tissue (there is no visible putrefaction);

b) putrefaction (focal green skin discoloration, skin slippage, marbling, bloating, diffuse green skin discoloration, foul odor, purged fluid from orifices and other cavities, softening/liquefaction of internal organs);

c) mummification (affects the face and distal extremities first; body parts/ tissues are desiccated/ dried out; skin takes on a brown-black parchment-like and leathery quality and the internal organs may appear black/brown and putty-like);

d) adipocere formation (body takes on a firm, grayish white to brown wax-like quality);

e) skeletonization (occurs at the advanced state of decomposition when most or all soft tissue is absent).

NOTE Human sweat, saliva, vomit, urine, feces, and semen are not considered human decomposition fluid as they are produced outside of the decay process.

4.1.4 The handler shall understand the range of human decomposition training aids to include:

a) fresh (no visible putrefaction)/early putrefaction:

1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

2) blood,

3) tissue;

b) advanced putrefaction:

1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

2) blood,

3) tissue,

4) adipocere,

5) putrefactive fluid;

NOTE Human sweat, saliva, vomit, urine, feces, semen, finger/toe nail trimmings, and hair trimmings are not considered human decomposition fluid as they are produced outside of the decay process.

c) mummified remains:

1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

2) tissue;

d) burned remains[41]:

1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

2) tissue;

e) bone:

1) wet untreated,

2) dry untreated,

3) burned,

f) teeth:

1) untreated post removal,

2) burned.

4.1.5 The handler shall understand how the training aids are used, to include:

a) varying quantities or thresholds of training aid(s) as produced from a range of large whole body to small amounts;

b) varying containment systems; and

c) varying lengths of placement time.

4.1.6 The handler shall understand the application of search techniques to maximize search efficiency and the canine's opportunity to encounter target odor(s).

4.2 Initial Training of the Canine

4.2.1 Canine training shall be conducted by a competent canine trainer from an organization that utilizes a structured curriculum with specific training and learning objectives. The initial training shall include, but not be limited to 4.2.1.1 through 4.2.1.8.

4.2.1.1 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 and visual commands.

4.2.1.2 Sufficient control training to ensure the canine will operate safely and effectively based on mission requirements. Control training should include on- and/or off-lead control and responsiveness to verbal and visual commands.

4.2.1.3 Not engaging in any of the following:

a) defecating or urinating within 6 ft (~ 2 m) of the training aid;

b) consume a training aid; and

c) aggression towards humans and/or canines.

4.2.1.4 Training to perform a predetermined specific trained final response (active or passive) upon locating the odor of human remains.

4.2.1.5 Training shall include exposing the canine to a variety of different types of searches, locations, and environments including the following variables:

a) a variety of training aid amounts to include:

1) trace [in the form or smears, touch transfers or dried blood (one to two drops of blood)] to whole body,

2) varying concentration/amounts of available odor;

b) a variety of depths, containment systems, and distraction odors/scents;

c) a variety of types of search environments (building, burned structures, debris piles, vehicles, wilderness, etc.);

d) a variety of weather conditions;

e) a varying duration of search times;

f) a variety of training aid set times;

g) a variety of search area sizes; and;

h) a variety of blank searches in different environments.

4.2.1.6 Training shall include exposing the canine to a variety of different noise, visual and odor/scent distractors.

4.2.1.7 The canine shall be exposed to the complete spectrum of human decomposition, including a variety of training aid amounts to include low threshold odor of human remains to whole body. Examples of training aids include the following:

a) fresh (no visible putrefaction)/early putrefaction:

1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

2) blood,

3) tissue;

b) advanced putrefaction:

1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

2) blood,

3) tissue,

4) adipocere,

5) putrefactive fluid;

NOTE Human sweat, saliva, vomit, urine, feces, semen, finger/toe nail trimmings, and hair trimmings are not considered human decomposition fluid as they are produced outside of the decay process.

c) mummified remains

1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

2) tissue;

d) burned remains [41]:

1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

2) tissue;

e) bone:

1) wet untreated,

2) dry untreated,

3) burned,

f) teeth:

1) untreated post removal,

2) burned.

4.2.1.8 The training shall be structured to meet the typical mission requirements of the canine team's organization.

4.3 Initial Training of the Canine Team

4.3.1 The canine team's training shall be structured to meet the typical mission requirements of the canine team's organization.

4.3.2 The bond between the handler and canine shall be developed through training, social interaction, and husbandry.

4.3.3 The canine team shall be trained to perform a safe, effective, and controlled search.

4.3.4 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 shall be part of certification, maintenance training, and proficiency testing.

5.2 Each assessment shall be the evaluation of a search.

5.3 The canine handler shall articulate the canine's trained final response prior to the start of the assessment. The canine may not be able to make a trained 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 training aid is inaccessible for the canine to make a trained final response).

5.4 The desired outcome of the search is the correct identification of the number and location of the training aid(s) by the canine team.

5.5 Training aid(s) used for assessments shall be representative of the complete spectrum of human decomposition.

5.5.1 Training aid(s) shall be selected from the following examples.

a) fresh (no visible putrefaction)/early putrefaction:

    1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

    2) blood,

    3) tissue;

b) advanced putrefaction:

    1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

    2) blood,

    3) tissue,

    4) adipocere,

    5) putrefactive fluid;

    NOTE Human sweat, saliva, vomit, urine, feces, semen, finger/toe nail trimmings, and hair trimmings are not considered human decomposition fluid as they are produced outside of the decay process.

c) mummified remains

    1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

    2) tissue;

d) burned remains [41]:

    1) tissue and bone (e.g., extremity cross section, full body, full/partial extremity),

2) tissue;

e) bone:

1) wet untreated,

2) dry untreated,

3) burned,

f) teeth:

1) untreated post removal,

2) burned.

5.5.2 Only training aids that have been properly maintained, stored, and are in good condition shall be used. The parameters of the training aids are as follows.

a) Containers shall be as permeable as possible to maximize surface area for highest odor threshold while completely containing the training aid (suet cage, vented jar, bag, etc.).

b) Containers shall be of a size that will prohibit or restrict a canine's ability to swallow the training aid(s).

c) Human remains mixtures with non-human odors such as soil introduce non-human odors to the canine's generalized odor picture and should not be used in training. If mixtures with non-human odors such as soil are used, they should be used sparingly. Pure training aid(s) should be prominently used [16,35].

5.6 A minimum of 0.5 lb (227 g) of training aid(s) shall be used for buried operational assessments. A minimum of 0.03 lb (15 g) of training aid(s) shall be used for all other assessments.

5.7 When possible, prior to the first canine team entering the assessment area; a separate, nonparticipating canine team should be walked through the assessment area.

NOTE This step randomizes canine odor if multiple canines are to be assessed in the same area.

5.8 The canine team assessments are outlined in 5.8.1 through 5.8.2.

5.8.1 The assessments in this section are intended for *single-blind assessments*.

5.8.1.1 Components and parameters of the odor recognition assessments are in 5.8.1.1.1 through 5.8.1.1.2.

5.8.1.1.1 Odor recognition assessments shall test the following.

a) The ability of the canine to detect the trained odor while discriminating from non-trained odor.

b) Demonstration of the canine's ability to perform a systematic search.

c) Demonstration of the canine handler's control of the canine during the execution of a systematic search.

d) The canine handler's recognition of the canine's behavior while searching.

e) The canine's trained final response.

f) The canine handler's recognition of the canine's trained final response.

5.8.1.1.2 The odor recognition assessment consists of the following components and parameters.

NOTE Successful completion of this assessment does not indicate proficiency in operational environments.

a) The canine handler shall be advised of the parameters of the assessment.

b) The canine handler shall not know the total number or placement of training aids for the totality of the exercise(s).

c) The assessor shall know the correct outcome of the assessment.

d) The canine handler shall not know the correct outcome of the assessment.

e) 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 trained final response, or at the conclusion of the entire assessment.

f) A minimum of six sample containers shall be used.

1) The sample containers shall be placed in a location that minimizes environmental influences that may affect the odor.

2) The sample containers shall be spaced a minimum of 3 ft (~1 m) apart and arranged to minimize contamination of containers and training aids.

3) Each test sample (training aid or distractor) shall be placed in a clean, unused container (boxes, plastic tubs, paint cans, etc.). All containers shall be identical. Containers should not be sealed or have lids and allow for odor to be readily available. All containers shall be absent of visual cues and external markings of the contents of the container.

4) A minimum of one training aid shall be placed randomly among the sample containers. The number of training aids may increase as long as there are a minimum of six physically stable total containers per training aids used (e.g., if three training aids are placed, then a minimum of 18 containers would be needed).

5) A minimum of four different distractor odors, uncontaminated by human remains, shall be placed randomly among the sample containers (dog food, gloves, human food, animal remains, a handler's scented article, etc.).

g) The assessor shall select the overall arrangement of the sample containers (e.g., individual lines of containers or circular configurations of containers).

h) The training aid(s) shall be placed a minimum of 5 minutes before the assessment begins.

i) The canine team shall be allowed to search each sample container twice.

j) Successful completion of the odor recognition assessment requires the canine team to locate the training aid with no false final responses.

k) Failure of the odor recognition assessment includes:

1) the canine team fails to locate the training aid;

2) the canine team fails to complete the assessment searching each sample container twice;

3) the canine team exceeds the maximum amount of false or nonproductive responses;

4) biting, scratching, and/or aggressively disturbing a placed training aid; and/or

5) the assessor can fail the canine team if it is determined that the canine is no longer actively searching.

5.8.1.2 Components and parameters of the operational assessments are in 5.9.1.2.1 through 5.9.1.2.12.

5.8.1.2.1 Operational assessments shall test the following.

a) The ability of the canine to detect the trained odor while discriminating from non-trained odor/scent.

NOTE There is no prohibition to adding additional distractors [e.g., commonly associated materials that are uncontaminated with human remains (e.g., cotton scent bags, plastic bags, plastic containers, glass jars; metal pipes; handling gloves; barriers)] beyond the naturally occurring distractors in each operational assessment. Routine incorporation of intentional distractors ensures the canine is locating human remains, rather than unintended commonly associated materials.

b) Demonstration of the canine's ability to perform a systematic search.

c) Demonstration of the canine handler's control of the canine during the execution of a systematic search.

d) The canine handler's recognition of the canine's behavior while searching.

e) The canine's trained final response.

f) The canine handler's recognition of the canine's trained final response.

5.8.1.2.2 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. The assessor may advise the handler of the comparison results immediately after the handler determines the canine has made its trained final response, or at the conclusion of the entire assessment.

5.8.1.2.3 The canine handler shall be advised of the parameters of the assessment, yet shall not know the desired outcome.

5.8.1.2.4 The canine handler shall not know the number or placement of the training aid(s).

5.8.1.2.5 If training aid has to be moved to a new location, the previously used area shall be removed as a testing site.

5.8.1.2.6 The assessor shall know the desired outcome of the assessment.

5.8.1.2.7 Natural distractors are normally present and vary depending on the assessment area. If not already present, animal remains should be placed out as a distractor (ground level, buried, etc.). Placement of distractors in the assessment area is required when no natural distractors are present. Care shall be taken not to place artificial distractions in a manner that causes contamination with the training aid.

5.8.1.2.8 The training aid(s) shall be concealed sufficiently to avoid visual cues indicating the location of the training aid to the canine and/or handler.

5.8.1.2.9 Successful completion of the operational assessment requires the canine team to achieve at least a 90% positive trained final response rate combined with a false final response rate not to exceed 10% as defined and calculated in ANSI/ASB Std 088 and within the specified search time.

NOTE In ANSI/ASB Std 088, the term “alert” was used in place of “final response” in some instances.

5.8.1.2.10 Failure of the operational assessment includes the following.

a) The canine team fails to achieve a 90% positive final response rate.

b) The canine team fails to complete the assessment within the specified search time.

c) The canine team exceeds a 10% false or non-productive response rate.

NOTE Organizations can set the threshold below 10% false or non-productive response rates.

d) Defecating or urinating within 6 ft (~ 2 m) of the training aid; consuming a training aid; and aggression towards humans and/or canines; disruption of a placed training aid(s) (destructive contact, bite, and/or dig).

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

NOTE The assessor may suspend the search if the canine handler team experiences a medical emergency (e.g., heat exhaustion, injury, frostbite).

5.8.1.2.11 The operational assessments shall be representative of the canine’s expected operational environment.

5.8.1.2.12 Operational assessments to include, but are not limited to the testing parameters in 5.8.1.2.12.1 through 5.8.1.2.12.6.

5.8.1.2.12.1 The wilderness operational assessments are designed to evaluate the canine team's ability to locate human remains within a natural environment. The wilderness operational assessment consists of the following components and parameters.

a) The assessment shall include a minimum of three individual search areas.

b) The individual search areas shall be a minimum of one (1) acre or 43,560 ft^2 (4,047 m^2) and maximum of two (2) acres or 87,120 ft^2 (8,094 m^2). For a minimum total assessment search area of three (3) acres or 130,680 ft^2 (12,141 m^2).

c) Each individual search area shall not share boundaries with one another to minimize overlap of the training aid odors between individual search areas.

d) Flags, printed maps, or Global Positioning System (GPS) coordinates shall be utilized to mark the boundaries for the individual search areas.

e) A minimum of one individual search area shall be blank.

f) A minimum of one individual search area shall contain one (1) or two (2) training aid(s).

g) The remaining individual search areas shall have zero (0), one (1), or two (2) training aid(s) per each individual search area.

h) The number of training aid(s) per individual search area shall be determined by a random number generator or the assessor's discretion based individual search area's constraints.

i) If the individual search area contains two (2) training aids then each training aid shall be separated by a minimum of ≈ 33 ft (10 m) or shall be placed in such a manner to mitigate the possibility of target odors being encountered at the same time.

j) The training aid(s) shall be placed anywhere from ground level to 6 ft (~2 m) high.

k) The training aid(s) shall be placed a minimum of 30 minutes before the assessment begins.

l) The assessment should take no more than 30 minutes per individual search area. Based on the topography and the complexity of the individual search area(s), additional time per individual search area(s) may be allowed. The assessor shall notify the canine team(s) of the maximum search time prior to beginning the assessment. The time allotment may also be increased by the assessor if an unplanned event or circumstance impacts a specific team during the assessment [e.g., animal(s) that may introduce a safety issue in the search area, weather hazard, or other safety issues].

5.8.1.2.12.2 The buried operational assessments are designed to evaluate the canine team's ability to locate human remains buried within a natural environment. The buried operational assessment consists of the following components and parameters.

a) The assessment shall include a minimum of two individual search areas.

b) The individual search areas shall be a minimum of ½ acre or 21,780 ft^2 (2023 m^2) and no larger than one (1) acre or 43,560 ft^2 (4,047 m^2) for each area. For a minimum total assessment search area of one (1) acre or 43,560 ft^2 (4,047 m^2).

c) Each individual search area shall not share boundaries with one another to minimize overlap of the target odors between individual search areas.

d) Flags, printed maps, or Global Positioning System (GPS) coordinates shall be utilized to mark the boundaries for the individual search areas.

e) A minimum of one individual search area shall contain one (1) training aid.

f) The remaining buried area(s) shall have zero (0) or one (1) training aid per each buried area.

g) The number of training aid(s) per individual search area shall be determined by a random number generator or the assessor's discretion based individual search area's constraints.

h) Training aid(s) shall be covered by a minimum of 6 in. (15.25 cm) and a maximum of 24 in. (25.4 cm) of loose soil.

i) If the individual search area contains two (2) training aids then each training aid shall be separated by a minimum of ≈ 33 ft (10 m) or shall be placed in such a manner to mitigate the possibility of target odors being encountered at the same time.

j) There shall be a minimum of three (3) false holes per individual search area. False holes shall be a minimum of 33 ft (10 m) from a training aid and shall be placed in such a manner to mitigate the collection of target odor on a false hole.

k) The training aid(s) shall be placed a minimum of six (6) hours before the assessment begins.

l) The assessment should take no more than 30 minutes per individual search area. Based on the topography and the complexity of the individual search area(s), additional time per individual search area(s) may be allowed. The assessor shall notify the canine team(s) of the maximum search time prior to beginning the assessment. The time allotment may also be increased by the assessor if an unplanned event or circumstance impacts a specific team during the assessment [e.g., animal(s) that may introduce a safety issue in the search area, weather hazard, or other safety issues].

5.8.1.2.12.3 *Urban exterior operational assessments* are designed to evaluate the canine team's ability to locate human remains within an urban environment. Potential urban exterior operational assessment areas shall be consistent with the operational requirements of the canine team (building exteriors, alley ways, sidewalks, streets, and other city environments, etc.). The urban exterior operational assessment consists of the following components and parameters.

a) The assessment shall include a minimum of one (1) search area.

b) The search area shall be a minimum ≈1000 ft^2 (93 m^2) and no larger than 2,000 ft^2 (186 m^2).

c) The number of training aid(s) is zero (0) to two (2) and shall be selected randomly for placement in the area.

d) The number of training aid(s) per individual search area shall be determined by a random number generator or the assessor's discretion based individual search area's constraints.

e) The training aid(s) shall be placed anywhere from ground level to 6 ft (~2 m) high.

f) If the individual search area contains two (2) training aids then each training aid shall be separated by a minimum of ≈ 33 ft (10 m) or shall be placed in such a manner to mitigate the possibility of target odors being encountered at the same time.

g) The training aid(s) shall be placed a minimum of 30 minutes before the assessment begins.

h) The assessment should take no more than 15 minutes per individual search area. The time allotment may also be increased by the assessor if an unplanned event or circumstance impacts a specific team during the assessment [e.g., animal(s) that may introduce a safety issue in the search area, weather hazard, or other safety issues].

5.8.1.2.12.4 *Interior building/structure* operational assessments are designed to evaluate the canine team's ability to locate human remains within an interior building/room. The interior building/structure operational assessment consists of the following components and parameters.

a) The assessment shall include a minimum of one (1) search area.

b) The search area shall be a minimum ≈1000 ft^2 (93 m^2) and no larger than 2,000 ft^2 (186 m^2) which may include multiple rooms.

c) The number of training aid(s) is zero (0) to two (2) and shall be selected randomly for placement in the area.

d) The number of training aid(s) per individual search area shall be determined by a random number generator or the assessor's discretion based on the individual search area's constraints.

e) The training aid(s) shall be placed anywhere from ground level to 6 ft (~2 m) high.

f) If the individual search area contains two (2) training aids then each training aid shall be separated by a minimum of ≈ 33 ft (10 m) or shall be placed in such a manner to mitigate the possibility of target odors being encountered at the same time.

g) The training aid(s) shall be placed a minimum of 30 minutes before the assessment begins.

h) The assessment should take no more than 15 minutes per individual search area.

5.8.1.2.12.5 *Light debris (e.g., non-disaster environment)* operational assessments are designed to evaluate the canine team's ability to locate human remains within urban and rural environments. Potential *light debris* operational assessment area(s) shall be consistent with the operational requirements of the canine team (trash piles, pallet piles, small collapsed or burned structure, etc.). The *light debris* operational assessment consists of the following components and parameters.

a) The assessment shall include a minimum of one (1) search area(s).

b) The search area shall be a minimum ≈1000 ft^2 (93 m^2) and no larger than 1,500 ft^2 (140 m^2).

c) The number of training aid(s) is zero (0) to two (2) and shall be selected randomly for placement in the area (s).

d) The number of training aid(s) per individual search area shall be determined by a random number generator or the assessor's discretion based individual search area's constraints.

e) If the individual search area contains two (2) training aids then each training aid shall be separated by a minimum of ≈ 33 ft (6 m).

f) Training aid(s) shall be concealed by a minimum of 6 in. (15.25 cm) and a maximum of 12 in. (30.5 cm) below the surface of the debris.

g) The training aid s) shall be placed a minimum of 30 minutes before the assessment begins.

h) The assessment should take no more than 15 minutes per individual search area.

5.8.1.2.12.6 The motor vehicle operational assessments are designed to evaluate the canine team's ability to locate human remains concealed in the exterior or interior of a vehicle. The vehicle operational assessment consists of the following components and parameters:

a) The assessment should include a minimum of 5 vehicles.

b) The number of training aid(s) shall be zero (0) to a maximum of one (1) training aid for every five (5) vehicles.

1) Whether the assessment includes a training aid, or not, shall be determined randomly.

2) If the assessment includes a training aid, the vehicle the training aid is placed on shall be selected randomly.

3) No more than one (1) training aid shall be placed on or in each vehicle.

4) No two (2) vehicles containing training aids shall be placed next to each other.

c) Training aid(s) shall be randomly placed within the exterior and interior of the vehicles used in the assessment. Potential training aid placement may include, but is not limited to:

1) closed engine compartment;

2) closed passenger compartment with windows rolled up and doors/hatch closed;

3) closed trunk compartment with no additional concealment beyond the training aid packaging material;

4) open passenger compartment with window(s) rolled down and/or door(s)/hatch open [i.e., console, glove box, in a parcel/luggage, under seat(s)];

5) open trunk compartment with a training aid concealed within a parcel/luggage, spare tire well, and storage compartment, etc.

6) vehicle exterior (bumper, quarter panels, wheel wells, etc.); and/or

7) undercarriage.

d) Any type or model of passenger vehicle, including pickup trucks, vans, and buses may be utilized for testing. Commercial vehicles such as 18-wheelers, police cars, ambulances, fire

engines, or vehicles that have been in scrap yards should not be used due to their potential for contamination with human remains odor.

e) The parking area shall be consistent with the number of vehicles to be searched or larger, with ample room between each vehicle to allow the canine team to move around each vehicle.

f) The training aid(s) shall be placed a minimum of 30 minutes before the assessment begins.

g) The canine team shall conduct the search in accordance with their organization's requirements (e.g., the organization's requirements is that only exteriors of the vehicle are searched with window(s)/door(s)/other opening(s) closed and/or a specified number of passes around the vehicle).

h) The assessment should take no more than two (2) minutes per vehicle. Based on the size of the vehicle and the complexity of the search, additional time per vehicle may be allowed.

5.8.2 The assessments in this section are intended for *double-blind assessments*.

5.8.2.1 Odor recognition and operational assessments can all be conducted double-blind following the components and parameters described in 5.8.1.

5.8.2.2 Unlike the assessments described in 5.8.1, 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 the search area(s) is a blank or includes a trained odor.

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

5.8.2.4 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 trained final response, or at the conclusion of the entire assessment.

5.8.2.5 The canine team should be required to complete a double-blind assessment every six months.

5.8.2.6 A human remains detection double-blind assessment may be used for proficiency testing.

6 Canine Team Certification

6.1 Certification for the named canine team (one canine handler and one canine) shall be valid for up to one year (365 days or 366 days in a leap year). Canine handlers with more than one canine shall be required to independently certify with each canine.

6.2 The canine team shall perform regular documented maintenance training, periodic proficiency assessments, double-blind assessments, and follow other recommended Federal, state, and local guidelines. Certification does not remove the requirement for continuing proficiency training.

6.3 The certifying official(s) shall not be routinely involved in the training (maintenance training, periodic proficiency assessments, double-blind assessment, etc.) of the canine team being evaluated.

6.4 The certification shall be comprised of the assessments listed in Table 1 (single- and/or double-blind assessment, or a combination of both). In order to obtain certification, the canine team shall pass all parameters outlined in Section 5, *Canine Team Assessments*. If the canine is a dual purpose (HRD/alternate detection discipline) then the canine team shall pass all parameters outlined in Section 5, in both this document and the certification requirements in Section 5 of the corresponding detection discipline ASB standard (e.g., ANSI/ASB Std 024, ANSI/ASB Std 026, ANSI/ASB Std 027).

Table 1—Certification Assessments

Required Assessments	Optional Assessments
— Odor recognition — Wilderness — Buried	Select optional assessments based on mission needs: — Urban exterior — Interior building/structure — Light debris — Motor vehicle

6.5 A minimum of 0.5 lb (227 g) of training aid(s) shall be used for buried operational assessments. A minimum of 0.03 lb (15 g) of training aid(s) shall be used for all other assessments. Maximum weight of training aid(s) being tested shall be determined by the certifying official and based on mission requirements.

6.5.1 Table 2 contains the training aids representing the complete spectrum of human decomposition.

6.5.1.1 The required training aids listed in Table 2 shall be utilized for all certification testing.

6.5.1.2 The optional training aids listed in Table 2 should be utilized for optional mission specific testing.

Table 2—Human Remains Training Aids for Certification

Required training aids	Optional training aids based on organizational needs (mission specific testing)
Human Decomposition (fresh, early, or advanced) 1) Composite that includes: Full body or portions of a body (Leg, arm, foot, hand, etc.) 2) Component that includes a mixture of: Human tissue, adipocere, wet or dry bone, purge, decomposition fluid, teeth, etc. NOTE The required component training aids should include skin and soft tissue.	Burned remains Dry bone Blood Mummified remains

NOTE Human sweat, saliva, vomit, urine, feces, semen, finger/toe nail trimmings, and hair trimmings are not considered human decomposition fluid as they are produced outside of the decay process.

6.5.1.3 All training aids utilized for any certification testing shall be documented.

6.5.1.4 Handlers shall deploy within the scope of their certification.

6.5.2 Only training aids that have been properly maintained, stored, and are in good condition shall be used.

a) Containers shall be as permeable as possible to maximize surface area for highest odor threshold while completely containing the training aid (suet cage, vented jar, bag, etc.).

b) Containers shall be of a size that will prohibit or restrict a canine's ability to swallow the training aid(s).

c) Human remains mixtures with non-human odors such as soil introduce non-human odors to the canine's generalized odor picture and should not be used in training. If mixtures with non-human odors such as soil are used, they should be used sparingly, pure training aid(s) should be prominently used [16,35].

6.5.3 Training aid(s) shall not be placed in plain sight. The concealment should be sufficient to avoid visual cues indicating the location of the training aid to the canine and/or handler.

6.5.4 Training aid(s) used in the certification process should not have been used in the training activities (maintenance training, periodic proficiency assessments, double-blind assessment, etc.) of the team being certified.

6.5.5 Certification shall not take place in areas/locations where regular training (maintenance training, periodic proficiency assessments, double-blind assessment, etc.) takes place.

6.6 At least one certification component should be a double-blind assessment. Certification components that are not double-blind shall be single-blind assessments.

6.7 For successful certification, the canine team shall

a) first pass the odor recognition assessment;

b) locate a minimum of one buried training aid within the buried operational assessment, and;

c) complete the remaining required and selected optional assessments achieving at least an overall 90% positive alert rate and an overall false alert rate not to exceed 10%, as defined and calculated in ANSI/ASB Std 088.

The canine team should be able to locate all training aid(s) within 3 ft (~1 m) from the source without disturbing the training aid(s), barring environmental conditions deemed relevant by the certifying official(s).

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

a) Not maintaining control of the canine.

b) Allowing canine outside of the search area unless the canine is actively following target odor into the assigned search area.

c) Not following directions of the certifying official**.**

d) Defecating or urinating within 6 ft (~2 m) of the training aid; consuming a training aid; and aggression towards humans and/or canines; disruption of a placed training aid(s) (destructive contact, bite, and/or dig).

6.9 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.

6.10 A mission-oriented environment(s) shall be used.

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

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

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

6.13 Organization(s) may enhance the recommended standards in order to make the requirements more stringent.

7 Canine Team Maintenance Training

7.1 The canine team's training shall continue to maintain a level of operational proficiency and obtain and maintain organizational certification requirements (see Sections 5, and 6).

7.2 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) maintaining the necessary level of fitness of the canine team;

c) correcting identified deficiencies;

d) various types of searches (i.e., wilderness, urban, building, vehicle and debris);

e) a variety of search locations, environmental conditions (confined spaces, a variety of flooring, dark rooms, attics, modes of transportation, etc.), weather conditions, and search area sizes;

f) a varied duration of search times at different times of day or night;

g) a variety of blank searches;

h) a variety of odor/scent distractions and/or odor/scent/animal distractors in the search area;

i) a variety of set times;

j) a variety of training aids, amounts, number of targets, and different sources of targets, from the minimum amount to whole body and covering the full spectrum of decomposition;

k) the quantity and type of training aids used are dependent on the region, mission, and operational deployment needs of the canine team;

l) a variety of degrees of concealment (heights, depths, enclosures, locations, etc.); and

m) a variety of noise distractors (traffic, sirens, children playing, verbiage over a PA system, etc.).

If trace amounts are used, they should be in the form of smears, touch transfers, fresh or dried blood (i.e., a drop).

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

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

7.4 A canine team shall complete a minimum of 16 hours of training per month to maintain and improve the proficiency level of the team. The 16 hours can be comprised of various elements that maintain proficiency (odor detection, agility, obedience, direction, and control, etc.) and handler education. This can be team or individual-based training.

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 odor recognition assessments, operational assessments, and single- and double-blind assessments.

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

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

8 Training Aids

8.1 General

Training aids shall be treated as biohazardous material. The procurement, use, handling, storage, and disposal of training aids shall follow applicable organizational and other recommended Federal, state, and local guidelines (see Table 3 for additional information).

Every effort shall be made to train on actual human remains. Only when the actual human remains are not permitted is an alternative training aid acceptable.

NOTE Alternative training aids are not addressed in this standard.

8.2 Storage and Handling

8.2.1 The training aid containers shall be labeled and packaged in a manner safe for both the handler and canine. Each label shall contain, at minimum, the type of training aid, a biohazard label, and the date the training aid was acquired.

8.2.2 Each training aid shall be handled in accordance with biohazard safety procedures [see 4.1.2 a) and 4.1.2 c)] for proper handling, storage, and disposal.

8.2.3 Each training aid shall be properly stored in separate, individual, and impermeable containers such as glass or metal containers (either frozen, air dried, or refrigerated) and secured in a safe manner. There are many variables that will affect training aids' odor profile. Table 3 provides guidance on how various training aids should be stored and handled.

8.2.4 Handling of training aids shall be conducted in a manner that minimizes odor contamination.

8.2.5 Each training aid shall be maintained in a manner to avoid loss and destruction.

8.2.6 Training aids shall be appropriately disposed of and replenished as required and necessary due to odor/scent contamination and/or the perishable nature of the material.

8.2.7 Disposal and/or destruction of the training aids shall follow organization guidelines pertaining to biohazardous materials.

8.2.8 Appropriate records shall be maintained by the canine handler/organization in accordance with Federal, state, and local requirements.

8.3 Transportation

8.3.1 Documentation, depending on the type of training aid and state or local statutes, should be available while transporting aids.

8.3.2 Transportation and vehicle storage of training aids shall follow Federal, state, and local guidelines.

8.3.3 Shipping of training aids should follow Federal, state, and local laws and regulations.

8.3.4 Training aids should be transported in such a manner that they are sequestered from the canine.

8.3.5 Training aids should be secured to prevent theft or loss.

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 Canine team assessment records maintained by the canine handler/organization shall include, but not be limited to, the following data.

a) Name of canine and canine handler.

b) Canine breed, description, age.

c) Canine team(s) organization.

d) Name of assessing organization.

e) Name(s) of individual(s) conducting, assisting, or awarding assessment.

f) Date and time of canine team assessment.

g) Type of canine trained final response stated to assessor.

h) Canine team assessment results [true positive(s), true negative(s), false positive(s), false negative(s)].

i) Operational assessment design (single-blind, or double-blind).

j) Type and size of search area [debris, wilderness, urban, vehicle(s), building(s), etc.].

k) Location, environment (i.e., urban, rural, wilderness), and weather conditions during assessment (temperature, cloud cover, humidity, wind, etc.).

l) Time taken to complete assessment.

m) Set time.

n) Target descriptor(s):

- type(s) (e.g., amount, fresh or aged: blood, bone, human tissue, decomposition);
- location of training aids(s);
- the concealment of the training aid(s) (height, depth, debris pile, etc.);
- containment of target(s) (glass jar, PVC pipe, etc.).

o) Number and type of distractor(s) (blank containers, animal remains, food, etc.)

p) The standard or guideline to which the canine team is assessed.

q) Deficiencies and corrective measures noted for future training.

r) Other information required by canine team's organization.

1000

Table 3—Storage of Training Aids

		Storage container*	Storage environment			Notes
			Ambient	Refrigerated	Frozen	
Blood	All Stages					It is not recommended to use only the handler's blood for training. Blood should be obtained from someone other than the handler. Storage containers should be opened periodically to introduce oxygen to the sample[19]. . Recent literature suggests that blood should be stored at room or ambient temperature[19].
	Fresh	Blood collection tube or other container used for initial blood collection, if not being used immediately, container should be transported in glass container with sealing lid (such as canning jar or vial).	Only storage option for fresh	N/A	N/A	Fresh blood will change categories to aged (wet or dry) after 24 hours of storage. Drawing into tubes containing an anticoagulant will delay the decomposition rate of the blood [40].
	Aged - wet	Can be stored in original blood collection container or on alternative substrate (per mission requirement) and then stored in glass container with sealing lid (such as canning jar or vial).	**Recommended storage condition.** Storing at ambient will allow blood to age at a more natural rate.	Refrigeration does have some effect on the aging and decomposition process, which could affect the odor profile. [19]	**Not recommended, unless operationally relevant.** Freezing/thawing is known to change the odor of blood. [19]	Drawing into tubes containing an anticoagulant will delay the decomposition rate of the blood [40].

	Aged - dried	Blood may be dried in open or breathable container (e.g., paper bag), but this poses a greater risk of contamination from other odors in the environment. Long term storage should use glass container with sealing lid (such as canning jar or vial).	**Recommended storage condition.** Storing in open air at ambient temperature (e.g., dried in external and/or internal environments so long as they are allowed to air dry and not dried in a sealed container) will allow blood to age at a more natural rate.	**Refrigeration is not necessary.** Refrigeration does have some effect the aging and decomposition process, which could affect the odor profile.	**Not recommended, unless operationally relevant.** Freezing/thawing is known to change the odor of blood.	Avoid drawing into tubes containing an anticoagulant. Because of the risk of cross-contamination, great care should be taken to avoid drying blood in highly odorous environments, such as a garage.
Human tissue	Wet	Store in glass container with sealing lid (such as canning jar or vial).	If stored at room temp the decomposition will continue and if sealed tight might explode.	Refrigeration will delay decomposition, but it will continue at a slower rate.	Freezing is the best method to keep the level of decomposition about the same as when it was procured.	
	Dried (mummified)	Store in paper bags or in glass containers but keep dry.	Store in paper bags at ambient temperature.	No need to refrigerate if in paper bags.	No need to freeze if kept in paper bags.	
	Burned [41]	Store in glass containers with sealing lids (such as canning jars or vials).	If stored at room temp the decomposition will continue and if sealed tight might explode.	Refrigeration will delay decomposition but will continue at a slower rate.	Freezing is the best method to keep the level of decomposition about the same as when it was procured.	

Bone	Wet	Store in glass containers with sealing lids (such as canning jars or vials) or bags made of food grade & premium quality aluminum foil and are easy sealable.	If stored at room temp the decomposition will continue and if container is sealed tight might explode.	Refrigeration will delay decomposition but will continue at a slower rate.	Freezing is the best method to keep the level of decomposition about the same as when it was procured.	
	Dry	Store in paper bags and keep dry.	Store in paper bags at ambient temperature.	No need to refrigerate if in dry paper bags.	No need to freeze if kept in dry paper bags.	
Cremated remains		Can be kept in the container that it was placed in after cremation if not metal or plastic.	Can be stored at ambient temperature.	No need to refrigerate.	No need to freeze.	It is recommended to avoid using cremated remains if an accelerant was used to create cremated remains.
Decomposition fluid		Store in glass containers with sealing lids (such as canning jars or vials).	If stored at room temp the decomposition will continue and if sealed tight might explode.	Refrigeration will delay decomposition but will continue at a slower rate.	Freezing is the best method to keep the level of decomposition about the same as when it was procured.	
Soil [35,50,54]		Store in glass containers with sealed lids once dried.	Can be stored at ambient temperature. If sample becomes damp or wet, it should be disposed.	Not recommended.	Not recommended.	Non-target odors soil samples should be obtained at the same general location for training with the target odor sample so that canines do not learn to respond to novel samples.
NOTE *best practice - do not reuse jars, use double containment, check integrity of lids.						

1001

9.6 Canine team certification records maintained by the canine handler/organization and certifying authority shall include, but not be limited to, the following data.

a) Name of canine and canine handler.

b) Canine breed, description, age.

c) Canine team(s) organization.

d) Name of certifying organization.

e) Name(s) of individual(s) conducting, assisting, or awarding certification.

f) Certification authority [i.e., agency, professional organization, and/or individual(s)].

g) Date and time canine team certified.

h) Type of canine trained final response stated to assessor.

i) Canine team certification results [true positive(s), true negative(s), false positive(s), false negative(s)].

j) Certification assessment design (single-blind, or double-blind).

k) Type and size of search area [debris, wilderness, urban, vehicle(s), building(s), rooms(s), etc.].

l) Location, environment (i.e., urban, rural, wilderness), and weather conditions during assessment (temperature, cloud cover, humidity, wind, etc.).

m) Time taken to complete certification assessment.

n) Set time.

o) Target descriptor(s):

- type(s) (e.g., amount, fresh or aged: blood, bone, human tissue, decomposition);
- location of training aids(s);
- the concealment of the training aid(s) (height, depth, debris pile, etc.);
- containment of target(s) (glass jar, PVC pipe, etc.).

p) Number and type of distractor(s) (blank containers, animal remains, food, etc.).

q) The standard or guideline to which the canine team is certified.

r) Deficiencies and corrective measures noted for future training.

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

9.7 Canine team training records maintained by the canine handler/organization shall include, but not be limited to, the following data.

a) Name of canine handler and canine.

b) Canine breed, description, age.

c) Canine team(s) organization.

d) Name of training organization.

e) Name(s) of individual(s) conducting or assisting with training.

f) Time and date of training.

g) Type of canine trained final response stated to trainer.

h) Canine team search results (true positive(s), true negative(s), false positive(s), false negative(s), non-productive response(s)).

i) Training design (single-blind, or double-blind).

j) Type and size of search area (debris, wilderness, urban, vehicle(s), building(s), rooms(s), etc.).

k) Location, environment (i.e., urban, rural, wilderness), and weather conditions during assessment (temperature, cloud cover, humidity, wind, etc.).

l) Length of training session.

m) Set time.

n) Target descriptor(s):

— type(s) (e.g., amount, fresh or aged: blood, bone, human tissue, decomposition);

— location of training aids(s);

— the concealment of the training aid(s) (height, depth, debris pile, etc.);

— containment of target(s) (glass jar, PVC pipe, etc.).

o) Number and type of distractor(s) (blank containers, animal remains, food, etc.).

p) Type(s) and amount(s) of target(s) used.

q) Deficiencies and corrective measures implemented during training regimen.

r) Other information required by canine team's organization.

9.8 Canine team deployment/utilization records maintained by the canine handler/organization shall include, but not be limited to, the following data.

a) Name of the canine and canine handler.

b) Canine team's organization.

c) Date of canine team's most recent certification.

d) Name(s) of organization(s) conducting search.

e) Requestor of deployment.

f) Date and time of deployment.

g) Search results.

h) Description and size of the search.

i) Date and time subject last seen and weather conditions (temperature, cloudy, humid, wind, etc.), if available.

j) Subject description (gender, age, clothing, weight, height, etc.) if available.

k) Environmental conditions at deployment (temperature, cloud cover, humidity, wind, etc.).

l) Information regarding any trained final response(s).

m) Type and size of search area (urban, rural, wilderness, urban, building, vehicles etc.).

n) Location (GPS coordinates are recommended but are optional) of deployment.

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

9.9 All documented training, assessment(s), and certification(s) shall be used to determine the canine team's proficiency.

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

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

9.11.1 Target odor or residual odor can be present below the measurable level of detection for laboratory instrumentation.

9.11.2 There may be an environmental inability or external factors which prevent locating the odor source.

9.12 Supervisory review should be conducted of all records.

9.13 Records should be digitally formatted (with appropriate back up), versus handwritten to facilitate compiling and analyzing data.

9.14 All documented training, assessments, certification, and deployments shall be documented to include trained final response, any false alerts, and any false negatives.

9.15 Records may be discoverable in court proceedings and may become evidence of the canine team's reliability. Record retention policy shall be determined by organization guidelines, at a minimum, for the life of the canine.

9.16 Training records shall illustrate the type and amount of training that the team has experienced before and after certification.

9.17 Training aid records shall be maintained by the canine handler/organization including, but are not limited to, the following data.

a) Training aids shall be clearly labeled in a manner to support accountability.

b) Appropriate records shall be maintained by the canine handler/organization in accordance with Federal, state, and local requirements.

9.18 Veterinary records shall be maintained by the canine handler/organization including, but are not limited to, the following data.

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

b) Vaccinations required by state or local law shall be documented in the veterinary record of the canine.

Annex A
(informative)

Tables

Table A.1—Assessments Summary

Type of Search Environment	Number of Areas	Individual Search Area Size	Number of Training Aid(s)	Training Aid Placement	Set Time	Training Aid Amount	Search Time
Odor Recognition	≥6	Containers ≥3 ft (~1 m) apart	**Required:** — One training aid — Four distractor odors	random	5 minutes	≥0.01 lb (≥5 g)	Each container twice
Wilderness	≥3	1 acre (4,047 m^2) - 2 acres (8,094 m^2)	**Required areas:** — one blank area — one area with 1 or 2 training aid(s) **All remaining areas:** — 0, 1, or 2 training aid(s)	ground level to 6 ft (~2 m) high	30 minutes	≥0.03 lb (≥15 g)	30 minutes/ area
Buried	≥2	½ acre (2023 m^2) - 1 acre (4,047 m^2)	**Required areas:** — one area with 1 training aid — three false holes/search area **All remaining areas:** — 0 or 1 training aid	Buried 6 in. (15.25 cm) and a maximum of 24 in. (25.4 cm) under loose soil	6 hours	≥0.5 lb (≥227 g)	30 minutes/ area
Urban Exterior	≥1	1000 ft^2 (93 m^2) - 2,000 ft^2 (186 m^2)	— 0, 1, or 2 training aid(s)	ground level to 6 ft (~2 m) high	30 minutes	≥0.03 lb (≥15 g)	15 minutes/ area
Interior Building/ Structure	≥1	1000 ft^2 (93 m^2) - 2,000 ft^2 (186 m^2)	— 0, 1, or 2 training aid(s)	ground level to 6 ft (~2 m) high	30 minutes	≥0.01 lb (≥5 g)	15 minutes/ area
Light Debris	≥1	1,000 ft^2 (93 m^2) - 1,500 ft^2 (140 m^2)	— 0, 1, or 2 training aid(s)	Concealed 6 in. (15.25 cm) – 12 in. (30.5 cm) below the surface of the debris	30 minutes	≥0.03 lb (≥15 g)	15 minutes/ area
Motor Vehicle	≥5vehicles	N/A	— ≤ 1training aid / every 5 vehicles	Interior or exterior	30 minutes	0.01 lb (5 g)	2 minutes /vehicle

1111 **Table A.2—Examples of Field Portable Orthogonal Detectors**[b]

Type of Detector	Theory of Operation	Advantages	Disadvantages
Metal detector	Can find objects that are made of metal such as bullets.	— Simple to use — Minimal training required — Inexpensive — Can find things that are metal but not bodies unless they have metal on them	— Can only find metal — Non-specific to human remains
Ground Penetrating Radar	A geophysical method that uses radar pulses to image the sub-surface.	— Non-intrusive	— Not simple to use — Requires training — Dry sandy soils or massive dry materials such as granite or limestone tend to resistive rather than conductive — Requires identifying certain areas — Cannot be effectively used in heavy vegetation or with a high-water table — Non-specific to human remains
Scent machine	Determines the structures of molecules using the molecules' characteristic absorption of infrared radiation. Detects chemicals similar to the ones detected by canines.	— Simple to use — Minimal training required — Depending on the system, may be a confirmatory test	— Requires identifying certain area to test — Very few are made — Reliability is not proven — Specificity to human remains detection is not yet proven
Dowsing rod	Type of divination employed in attempts to locate gravesites.	— not a lot of equipment needed can go anywhere	— No scientific validation to detect human remains — Non-specific to human remains
Ground Probe	Aerate soil, physical resistance variations	— Simple to use — Minimal training required	— Non-specific to human remains

[b] This list is not intended as an exhaustive list and only provides basic information on field portable detectors that can be deployed in conjunction with canine teams.

Core Sampler	Shows lack of striation in disturbed soil	— Simple to use — Minimal training required	— Non-specific to human remains
Forward Looking Infrared (FLIR) [12]	Detects temperature variance. Usually aircraft mounted.	— Non-intrusive	— Non-specific to human remains — requires training, costly equipment, costly deployment
Light Detection and Ranging (LIDAR) [55]	Using a laser, measures the time for the reflected light to return to the receiver. May operate from a fixed direction or scan. Lidar has terrestrial, airborne, and mobile applications.	— Non-intrusive	— Non-specific to human remains — requires training, costly equipment, costly deployment
Electrical Resistivity Meter [37]	Detects comparative electrical resistance between soil and human material.	— Non-intrusive	— Non-specific to human remains
Magnetometers [49]	Detects magnetic field anomalies due to reorientation of magnetic soil particles when backfilling graves.	— Non-intrusive	— Non-specific to human remains — requires training, costly equipment, costly deployment

1112

Annex B
(informative)

Bibliography

The following bibliography is not intended to be an all-inclusive list, review, or endorsement of literature on this topic. The goal of the bibliography is to provide examples of publications addressed in the standard.

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