



# Non-Detonable Training Aids for Explosives Detection Canines

## Market Survey Report

February 2024



Science and  
Technology





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The “Non-Detonable Training Aids for Explosives Detection Canines Market Survey Report” was prepared by the National Urban Security Technology Laboratory – in conjunction with Johns Hopkins Applied Physics Laboratory– for the U.S. Department of Homeland Security, Science and Technology Directorate pursuant to Contract No. 70RSAT19CB0000002 from the U.S. Department of Homeland Security, Science and Technology Directorate.

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## FOREWORD

The National Urban Security Technology Laboratory (NUSTL) is a federal laboratory within the U.S. Department of Homeland Security (DHS) Science and Technology Directorate (S&T). Located in New York City, NUSTL is the only national laboratory focused exclusively on supporting the capabilities of federal, state, local, tribal, and territorial responders to address the homeland security mission. The laboratory assists responders with the use of technology to prevent, protect against, mitigate, respond to, and recover from homeland security threats and incidents. NUSTL provides expertise on a wide range of subject areas, including chemical, biological, radiological, nuclear, and explosive detection, personal protective equipment, and tools for emergency response and recovery.

NUSTL manages the System Assessment and Validation for Emergency Responders (SAVER) program, which provides information on commercially available equipment to assist response organizations in equipment selection and procurement. SAVER knowledge products provide information on equipment that falls under the categories listed in the DHS Authorized Equipment List (AEL), focusing primarily on two main questions for the responder community: “What equipment is available?” and “How does it perform?” The SAVER program works with responders to conduct objective, practitioner-relevant, operationally-oriented assessments and validations of commercially available emergency response equipment. Having the right tools provides a safer work environment for responders and a safer community for those they serve.

NUSTL is responsible for all SAVER activities, including selecting and prioritizing program topics, developing SAVER knowledge products, and coordinating with other organizations to leverage appropriate subject matter expertise. In conjunction with the Johns Hopkins Applied Physics Laboratory (APL), NUSTL conducted a market survey of commercially available non-detonable canine training aids. This technology aligns with the Federal Emergency Management Agency (FEMA) Authorized Equipment List (AEL) number, 07ED-01-DOGS titled “Canines, Explosive Detecting.”

SAVER reports are available at [www.dhs.gov/science-and-technology/saver-documents-library](http://www.dhs.gov/science-and-technology/saver-documents-library).

Visit the NUSTL website at [www.dhs.gov/science-and-technology/national-urban-security-technology-laboratory](http://www.dhs.gov/science-and-technology/national-urban-security-technology-laboratory) or contact the lab at [NUSTL@hq.dhs.gov](mailto:NUSTL@hq.dhs.gov).

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## EXECUTIVE SUMMARY

Emergency responders use canines for explosives detection. Explosive training aids (TAs) are materials specifically designed for training explosives detection canines (EDCs) to detect explosives or explosives-related substances. These TAs emulate the scent of explosives, allowing canines to learn and recognize the specific odor associated with different types of explosives. Non-detonable TAs for canines are safe and effective tools trainers and handlers can use for training EDCs in authentic scenarios while eliminating the inherent risks associated with traditional, live explosives.

Between August 2023 and October 2023, the U.S. Department of Homeland Security (DHS) Science and Technology Directorate's (S&T's) National Urban Security Technology Laboratory (NUSTL) System Assessment and Validation for Emergency Responders (SAVER) program, in conjunction with the Johns Hopkins Applied Physics Laboratory (APL), conducted a market survey of commercially available non-detonable TAs that offer safe and effective methods to improve the explosive detection abilities of canines. The survey identified 12 non-detonable TA products ranging in price from \$15 to \$550. This market survey report is based on information gathered from manufacturer and vendor websites, internet research, industry publications, and a government-issued request for information that was posted on the [System of Award Management website](#). Performance of these products and information included in this report has not been independently verified by the SAVER program.

Featured TAs are notable for their inherent non-detonable characteristics. These TAs have been specifically designed to eliminate risks of explosion or detonation, ensuring their safety and suitability for training purposes. Each manufacturer offers one or more products, each distinctive in terms of explosive odor selection, form factor, packaging, shelf life, work time, storage conditions, price, and blank TA availability.

The purpose of this market survey is to provide emergency responders with information that will guide emergency response agencies in making operational and procurement decisions. Emergency responder agencies should consider overall capabilities, technical specifications, and limitations of non-detonable TAs for canines in relation to their agency's operational needs when making equipment selections.



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## 1.0 INTRODUCTION

Emergency responders use explosive training aids (TAs) for training explosives detection canines (EDCs). The employment of canines for detecting conventional explosives is widely accepted and acknowledged as an exceptionally effective detection and countermeasure system. Canine trainers and handlers have the option to utilize non-detonable TAs to enhance and hone the detection skills of EDCs. This is achieved by establishing a secure training environment for practical exercises in realistic scenarios using TAs that remove the hazards linked to conventional explosive training materials.

Between August 2023 and October 2023, the U.S. Department of Homeland Security (DHS) Science and Technology Directorate's (S&T's) National Urban Security Technology Laboratory (NUSTL) System Assessment and Validation for Emergency Responders (SAVER) program, in conjunction with the Johns Hopkins Applied Physics Laboratory (APL), conducted a market survey of non-detonable TAs that provide a safe and effective way for trainers and handlers to enhance the explosive detection capabilities of their EDCs, while eliminating the inherent risks associated with actual explosive materials. This market survey report is based on information gathered from manufacturer and vendor websites, internet research, industry publications, and a government-issued request for information that was posted on the [System of Award Management website](#). The DHS S&T Technology Scouting Group also contributed to the market research used in the development of this report. Due diligence was performed to develop a report that is representative of products in the marketplace.

TAs play a pivotal role in the process of equipping canines to identify explosives and/or substances related to explosives. They are essential for instructing canines, enhancing their olfactory senses, and enabling them to identify potential explosive threats. By employing non-detonable TAs, professionals who work with canines can efficiently educate them to distinguish and alert to the unique scents associated with explosive materials.

This market survey identified 12 non-detonable TA products for canines ranging in price from \$15 to \$550. In order to be included in this report, products had to:

- Be commercially available for purchase in the United States
- Align with federal and/or state regulations in the fields of transportation and waste management
- Emulate the scent characteristics of actual explosives
- Guarantee safety for both canines and handlers (i.e., eliminate any risk of accidental detonation or harm)
- Maintain a consistent scent profile over an extended period and have a reasonable duration of shelf stability
- Have a design that enables trainers and/or handlers to easily manage, store, and distribute during training exercises
- Remain resilient through repeated or multiple uses during training sessions
- Be applicable in various training situations, including both indoor and outdoor settings



## 2.0 EXPLOSIVES TRAINING AIDS OVERVIEW

An explosive TA is an explosive substance or formulation that is used as a tool to train canines to detect explosives or explosive-related substances. These aids are crucial for security and law enforcement agencies, as well as military organizations, where EDCs play a vital role in ensuring safety. Explosive TAs are used to teach canines to recognize and alert their handlers to the presence of explosives, including various types of explosives and explosive-related materials. This training is essential for security and anti-terrorism efforts. In essence, canine TAs are indispensable instruments that contribute to the success and proficiency of working canines across various fields.

The training process involves introducing canines to the explosive TA in a gradual, systematic manner to help them associate the scent with the desired behavior or response. Within the canine community, this process is often referred to as “imprinting.” Training is conducted in controlled environments to ensure the safety of both the canines and handlers. As canines become more proficient, they are exposed to increasingly complex scenarios (e.g., person-borne explosive detection) to enhance their detection capabilities. Safety is paramount when using traditional explosive TAs, particularly in high-risk training scenarios, therefore rigorous handling, storage, and disposal practices are necessary. Explosive TAs for canines can be categorized based on the extent of the true material’s contribution in their manufacture. “True material” is simply the actual target explosive substance or formulation, whether solid or liquid.

Alternatives to explosive TAs for canines include non-detonable TAs, pseudo-odor TAs, and TA devices. These alternative TAs provide various avenues for training and maintaining the detection capabilities of EDCs, while safeguarding the well-being of both the canine and their handler. Non-detonable TAs are materials used for training purposes that incorporate the true material into their design or construction in a way that ensures safety. These aids are not considered “pseudo” because they do not depend on synthetic or artificial scents to produce the odor of the target material. Pseudo-odor TAs do not contain true material, but instead are formulated to closely match the vapor components of the true material. Unlike non-detonable TAs, pseudo-odor TAs (i.e., “mimic TAs”) consist solely of explosives-related scents without the true material being present. These TAs may contain non-explosive odors associated with the scent profile of the true material or a completely unrelated scent that is intended to replicate the odor signature of the true material.

In addition to the TAs described above, a range of other commercially available products and devices exist to facilitate training EDCs to recognize and respond to specific odors safely and effectively without exposing the canines to the inherent dangers associated with explosive substances. These products serve various essential functions including physically retaining explosive materials and releasing their vapors, providing control over the quantity of emitted odor, or encapsulating explosive odors to minimize their potential hazards during release. Products of this nature, however, are beyond the scope of this market survey.

## 2.1 Non-Detonable Canine Training Aids

What sets non-detonable TAs apart from traditional explosive TAs is their inherent safety. Live explosives are intrinsically risky to handle, even in a controlled training environment. Non-detonable TAs, on the other hand, are designed to facilitate the scent and characteristics of actual explosive material without possessing explosive properties. Non-detonable TAs are also attractive because their lack of explosive properties means they can be transported without restrictions. These products eliminate the danger associated with handling traditional explosives during training, while ensuring EDCs develop accurate and reliable detection abilities. Meanwhile, blank TAs that hold no true material are valuable for training canines to disregard extraneous odors associated with the non-detonable TAs (e.g., odors associated with the inert element).

Many non-detonable TAs achieve their non-explosive nature by blending the true material with an inert filler (i.e., “dilution TAs”). Others may capture the vapor from the explosive material and non-explosive components (i.e., “vapor soak TAs” or “sorption TAs”). An additional approach entails encapsulating the true material within a polymer, silica, or petroleum medium (i.e., “encapsulation TAs”). Regardless of the method chosen of rendering the true material non-detonable, it is essential to carefully assess a TA’s production process when making decisions about which products to select. How a non-detonable TA is produced can have a substantial influence on its potential for introducing extraneous odors, which could interfere with the training process.

## 2.2 Key Components

The key components of TAs include the explosive odors available, the physical form and design (“form factor”), its necessary storage conditions, the duration of usability (“shelf life”), the window of effective use (“work time”), and the availability of blank TAs. Explosives odors available can vary widely between TA products. Form factor plays a critical role in TA design, as it has the capacity to exert a significant influence over aesthetics, usability, and functionality. TA storage conditions refers to the specific environment necessary for proper storage. Adequate storage in accordance with the manufacturer-intended conditions helps prevent degradation and extends the shelf life and/or work time of the TA. Shelf life denotes the duration a TA can be stored while maintaining suitability for use without significant deterioration in quality, safety, and effectiveness. Shelf life can vary considerably depending on product type, its components, and storage conditions; therefore, adhering to proper practices, regularly monitoring shelf life, and remaining mindful of work time become imperative to sustain TA effectiveness. TA shelf life can fluctuate based on factors like form factor and storage conditions, underscoring the importance of monitoring expiration dates and routinely evaluating TA potency for consistent and dependable training outcomes.

The availability of blank TAs holds equal importance, as they are manufactured in the same manner as target odor TAs. These TAs typically share identical inert elements and packaging but omit the active odor components of the target odor TA. Their significance lies in their utility for “extinction training,” that is training EDCs to disregard any extraneous odors the TA might contain.

## 2.3 Benefits of Canine Training Aids

Canine TAs are indispensable tools for training detection canines to identify explosives accurately. They are carefully designed and maintained to create a controlled and safe environment for training, with a focus on safety, effectiveness, and consistency in preparing canines for their crucial roles in security and public safety. Explosive and non-detonable TAs offer a multitude of invaluable benefits in the realm of security and law enforcement.

Foremost among these advantages is the precise and reliable detection they enable in canines, empowering them to identify even minute traces of explosive materials swiftly and accurately. This accuracy is instrumental in enhancing public safety and security measures. Equally crucial is the aspect of safety during training activities. By utilizing non-detonable TAs rather than conventional explosives, the inherent risks of accidents are significantly reduced, safeguarding both the canine handlers and the canines themselves. Moreover, non-detonable TAs prove to be cost-effective alternatives to true materials, as they can be reused and expenses associated with procuring, storing, and disposing of hazardous materials is eliminated.

The controlled training environment facilitated by TAs ensures that canines learn and refine their detection skills systematically, fostering confidence and proficiency. Consistency in scent profiles is maintained, which reinforces the ability of the canine to recognize and respond to target odors consistently. The ability to customize TAs to include various explosive types further enhances a canine's versatility and preparedness for realistic threat scenarios.

## **2.4 Limitations of Canine Training Aids**

Canine TAs, while highly effective, possess inherent limitations for consideration in the training and deployment of EDCs. Explosive TAs for canines typically focus on specific explosive compounds or mixtures; however, explosive materials can vary widely in composition and form. Canines trained on specific TAs may not recognize unfamiliar explosive variants, which can limit their effectiveness in detecting novel threats.

The aging of TAs can diminish their scent potency over time, requiring the periodic replacement or refreshing of TAs. The limited shelf life of TAs necessitates ongoing monitoring and replacement, adding to the maintenance requirements. Environmental factors such as weather conditions and air currents can also challenge the effectiveness of detection, as canines may struggle in adverse environments. Furthermore, the possibility of false positives poses a concern, as canines trained with these aids may occasionally produce alerts due to residual scents or environmental contamination. Training bias can also influence detection outcomes, with canines potentially favoring specific TAs or techniques.

Despite these limitations, canine TAs remain a cornerstone of security measures, requiring a nuanced approach to training, handling, and deployment to maximize their effectiveness in safeguarding against explosive threats.

## **2.5 Emerging Technologies**

Emerging technologies are advancing TA design and manufacturing. These innovations encompass 3D printing and the incorporation of odor-capturing materials within inert matrices like activated charcoal, diverse polymers, and cotton gauze pads.

Additive manufacturing uses data computer-aided-design (CAD) software or 3D object scanners to direct hardware to deposit material, layer upon layer, in precise geometric shapes [1]. The use of additive manufacturing for the production of a non-detonable TA has been investigated by Lawrence Livermore National Laboratory (LLNL). The TA consists of an explosive embedded within an inert matrix. The inert matrix can be made from various materials, such as plastic, clay, ceramic, or polydimethylsiloxane (PDMS).

TAs for triacetone triperoxide (TATP) and hexamethylene triperoxide diamine (HMTD) are being developed by Fraunhofer Institute for Chemical Technology (Pfinztal, Germany) in conjunction with the German Federal Police (Lübeck, Germany) [2]. These TAs are prepared by coprecipitating TATP or HMTD with activated charcoal. Activated charcoal is used in the TA as an inert matrix due to its odorless properties.

A Polymer Odor Capture and Release (POCR) TA is currently under development by the Federal Bureau of Investigation (FBI) Laboratory Division [3]. POCRs for TATP have been created by introducing the vapor of pure TATP to PDMS in an enclosed container.

The Controlled Odor Mimic Permeation System (COMPS), developed by Florida International University, consists of a cotton gauze pad infused with a target odor. This combination is enclosed within a permeable polymer bag, facilitating odor release over a specific duration. While its formal utilization as a training tool hasn't been established, various research studies have investigated the potential applications of this technology [4].

## **2.6 Standards/Certification Programs**

Specific widely acknowledged standards or certification programs tailored exclusively to non-detonable TAs for canines are currently limited. Nevertheless, such TAs usually adhere to universal safety and quality standards applicable to canine training equipment and materials. This includes conducting sensitivity testing, often in accordance with the United Nations (UN) test series for the classification of explosives to ascertain hazard classification. The UN Manual of Tests and Criteria contains guidelines and criteria for the classification of dangerous goods, including tests and procedures for assessing their properties [5]. Pertinent tests and procedures may encompass, but are not limited to, those described within Test Series 1 or Test Series 3. In the context of Test Series 1, substances are assessed for their explosive properties, while Test Series 3 evaluates sensitivity to factors such as impact, friction, heat, and flame. Both Test Series 1 and Test Series 3 are essential resources for ensuring the safe transportation and handling of dangerous goods, including explosives, in accordance with international regulations and standards.

While there may not be widely recognized standards or certification programs dedicated to canine TAs, the Dogs and Sensors Subcommittee, operating within the National Institute of Standards and Technology's (NIST) Organization of Scientific Area Committees for Forensic Science (OSAC), has directed its focus towards defining standards and guidelines [6].



## 3.0 NON-DETONABLE TRAINING AIDS

This section provides information on 12 commercially available non-detonable training aids. All products described emulate genuine explosives odors; eliminate detonation risks; maintain a consistent odor profile for a specified duration; have a reasonable work/shelf life; endure repeated use in training sessions; are easily handled, stored, and distributed for training exercises; comply with federal and/or state regulations for transportation and waste management; and are versatile for various training purposes.

Product information presented in this section was obtained directly from manufacturers, vendors, and their websites. In each table, products are listed alphabetically by manufacturer. Table 3-1 provides general characteristics and specifications of the products. Table 3-2 details individual explosive odors available for each TA type while Table 3-3 indicates what formulated explosive odors available. Table 3-4 shows each product's availability from its manufacturer and/or domestic vendors. The information in section 3.0 has not been independently verified by the SAVER program.

Below are definitions of the product information in Table 3-1, Table 3-2, and Table 3-3.

**Number of Explosives Odors** refers to the number of explosives TAs available in that product line.

**Form Factor** refers to the physical form of a product, which plays a crucial role in product design, influencing aesthetics, usability, and functionality.

**Storage Conditions** refers to the environment that the product should be stored in, including the temperature range where explicitly provided.

**Shelf Life** refers to the length of time a product can be stored and remain suitable for use without significant deterioration in quality, safety, or effectiveness. Shelf life can vary widely depending on the product type, its components, and storage conditions.

**Work Time** refers to the duration of time available for a product to fulfill its intended function.

**Blank TA** refers to a TA that does not contain target components; these aids are crafted in the same manner as a target odor TA, containing the same inert components and packaging, but do not replicate the active odor components. The tables address the availability of blank versions of a product.

**TA Price:** The list price of the product rounded to the nearest U.S. dollar, as provided by the manufacturer or listed on the vendor website. TA price may be given as a range to account for differences relating to explosive odor type within the product line.

**Primary Explosives** refers to highly sensitive and unstable explosive compounds that can be easily initiated by heat, shock, or other forms of mechanical energy; often used as initiators or detonators in blasting caps to trigger an explosion.

**Secondary Explosives** refers to explosive materials that requires a primary explosive or detonator to initiate an explosion. Unlike primary explosives, secondary explosives are more stable and typically require a more substantial shock or heat source to trigger an explosion.

**Oxidizers** refers to substances that provide oxygen or other oxidizing agents to support combustion; they can enhance the burning of other materials by providing the necessary oxygen for the chemical reaction that releases energy to occur.



**High Explosives** refers to a type of explosive material that undergoes a rapid and violent chemical reaction when initiated. High explosives detonate, releasing a tremendous amount of energy in a very short period of time with a supersonic shockwave.

**Low Explosives** refers to a type of explosive material that undergoes a combustion or deflagration—rather than detonation—process when ignited. Unlike high explosives, low explosives burn relatively slowly at subsonic speeds.

**Homemade Explosive (HME)** refers to explosive materials that can be readily synthesized or manufactured using improvised materials, equipment, methods, and commercially available materials or chemicals.

**Improvised Explosive Device (IED)** refers to device placed or fabricated in an improvised manner that incorporates destructive, lethal, noxious, pyrotechnic, or incendiary chemicals and is designed to destroy, incapacitate, harass, or distract.

**Individual Explosive Odors** refers to a pure chemical that is used as an explosive by itself or is used as a component of a formulated explosive. This includes but is not limited to:

**TATP:** Triacetone triperoxide, unstable primary explosive

**HMTD:** Hexamethylene triperoxide diamine, unstable primary explosive

**NG:** Nitroglycerine, unstable primary explosive

**TNT:** 2,4,6-Trinitrotoluene, secondary explosive

**Tetryl:** 2,4,6-Trinitrophenylmethylnitramine, secondary explosive

**RDX:** 1,3,5-Trinitro-1,3,5-triazinane, secondary explosive

**HMX:** 1,3,5,7-Tetranitro-1,3,5,7-tetrazoctane, secondary explosive

**PETN:** Pentaerythritol tetranitrate, secondary explosive

**ETN:** Erythritol tetranitrate, secondary explosive

**EGDN:** Ethylene glycol dinitrate, secondary explosive

**NC:** Nitrocellulose, nitrated cellulose, or guncotton is highly flammable and can be a low or high explosive under certain conditions

**AN:** Ammonium nitrate; oxidizer

**KNO<sub>3</sub>:** Potassium nitrate; oxidizer

**UN:** Urea nitrate; high explosive, oxidizer

**PC:** Potassium chlorate, KClO<sub>3</sub>; oxidizer

**NaClO<sub>3</sub>:** Sodium chlorate; oxidizer

**Formulated Explosive Odors** refers to an explosive product created by combining various explosive materials or substances.

**Comp-B:** Composition B, a castable mixture of RDX and TNT

**C-4:** Composition C-4, a plastic explosive containing RDX and a taggant<sup>1</sup>, DMNB (2,3-dimethyl-2,3-dinitrobutane)

**Semtex:** plastic explosive containing PETN, RDX, and a taggant, DMNB; variants include Semtex-1A, Semtex-H, and Semtex-10

**PETN Sheet:** rubberized sheet explosive containing PETN and a taggant, DMNB (e.g., Primasheet-1000)

**Single-Base Smokeless Powder:** Propellant that contains NC

**Double-Base Smokeless Powder:** Propellant that contains NC and NG

**Black Powder:** Low explosive that typically contains potassium nitrate, charcoal, and sulfur

**Dynamite, NG-based:** Explosive that contains NG, stabilizers, and may also contain AN

**Dynamite, TNT-based:** Dynamite substitute that contains TNT, also referred to as “military dynamite;” does not contain NG

**ANFO:** Ammonium nitrate/fuel oil is a fuel oxidizer mixture containing AN and fuel oil

**Emulsion:** Packaged emulsion explosives are dynamite substitutes that contain AN or other nitrate salts

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<sup>1</sup> A taggant is an additive that may be incorporated into an explosive material for the purpose of identification or detection.

Table 3-1 Non-Detonable TA Product Comparison Matrix

Manufacturer	Product	# of Explosive Odors	Form Factor	Storage Conditions	Shelf Life	Work Time	Blank TA	TA Price
Gallant Tech	SPOT	2	Powder in tin or glass vial	Room	12 months	8 hours; Single use	Included with purchase	\$175-\$429
Polymath Interscience	ScentLogix Explosives	22	--	Cool, dark	2 years	16 hours	\$70-\$100	\$145-\$550
Precision Explosives	Odor Print Mini	15	Substrate between two aluminum discs	Cool	1 year	2000 hours	\$59	\$59
	Odor Print	15		Cool	1 year	2000 hours	\$69	\$69-\$94
	Odor Print XL	12		Cool	1 year	2000 hours	\$99	\$99
	Getxent Tubes (Explosive)	12	Polymer odor capture and release tubes	--	1 year	--	--	\$15
Signature Science	TrueScent	10	Material in breather bag	Room/Fridge or Freezer	6-12 months	--*	\$25	\$25-\$159
SOKKS K9 International	SOKKS-MPTS Explosives	16 <sup>†</sup>	Polypropylene tube	Cool, dark, >0°C	3 years	Up to 10 uses	None	\$490
Tripwire Operations Group	TOID Conventional	11	Filter between two stainless steel discs	--	--	90-120 days	None	\$65
	TOID HME	3		--	--	30 days	None	\$75
XM	K9 NESTT Silica	5	Powder in tin, cloth bag, or quart can	--	Limitless	2 weeks	\$12-\$62	\$30/16 g tin \$120/cloth bag \$293/qt. can
	K9 NESTT Petrolatum	5	Petrolatum in metal tube	65-90°F	--	Single-use or 2 weeks	\$25	\$55-\$60

-- indicates no data is available.

\* Manufacturer's internal study determined several TAs remained stable without significant degradation after simulated use for 108 hours over 12 weeks.

† SOKKS-MPTS Explosives claims to train for any explosive and lists several explosives they claim that canines trained on SOKKS have detected, but SOKKS does not disclose the actual substances contained in their SOKKS-MPTS Explosives TA.

Table 3-2 Non-Detonable TA Product Comparison Matrix by Individual Explosive Odors

Manufacturer	Product	Peroxides		High Explosives									Nitrate Salts			Chlorate Salts	
		TATP	HMTD	NG	TNT	Tetryl	RDX	HMX	PETN	ETN	EGDN	NC	AN	KNO <sub>3</sub>	UN	PC	NaClO <sub>3</sub>
Gallant Tech	SPOT	Y	Y	–	–	–	–	–	–	–	–	–	–	–	–	–	–
Polymath Interscience	ScentLogix Explosives	Y	Y	Y	Y*	Y*	Y	–	Y*	Y*	Y	Y	Y*	Y	Y*	Y	Y
Precision Explosives	Odor Print Mini	Y	Y	–	Y	Y	Y	–	Y	–	–	–	Y	Y	Y	Y	–
	Odor Print	Y	Y	–	Y	Y	Y	–	Y	–	–	–	Y	Y	Y	Y	–
	Odor Print XL	–	–	–	Y	Y	Y	–	Y	–	–	–	Y	Y	Y	Y	–
	Getxent Tubes (Explosives)	Y	Y	–	Y	–	Y	–	Y	–	–	–	Y	Y	–	Y	–
Signature Science	TrueScent	Y	Y	–	Y	Y	Y	–	Y	Y	–	–	Y	–	Y	Y	–
SOKKS K9 International	SOKKS-MPTS Explosives	Y*	Y*	Y*	Y*	–	Y*	Y*	Y*	–	–	Y*	Y*	Y*	–	Y*	Y*
Tripwire Operations Group	TOID Conventional	–	–	–	Y	Y	Y	Y	–	–	–	–	–	–	–	–	–
	TOID HME	Y	Y	–	–	–	–	–	–	–	–	–	–	–	Y	–	–
XM	K-9 NESTT Silica	–	–	–	Y	–	Y	–	Y	–	–	–	–	Y	–	Y	–
	K-9 NESTT Petrolatum	–	–	–	Y	–	Y	–	Y	–	–	–	–	Y	–	Y	–

Y indicates explosive odor available in product line  
 – indicates explosive odor is not listed for that product  
 \* indicates one product has multiple explosive odors listed under the same TA product name

Table 3-3 Non-Detonable TA Product Comparison Matrix by Formulated Explosive Odors

Manufacturer	Product	Comp-B	C-4	Semtex	PETN sheet	Single-Base Smokeless Powder	Double-Base Smokeless Powder	Black Powder	Dynamite, NG-based	Dynamite, TNT-based	ANFO	Emulsion
Gallant Tech	SPOT	–	–	–	–	–	–	–	–	–	–	–
Polymath Interscience	ScentLogix Explosives	–	Y*	Y	–	Y*	Y*	Y	Y*	Y*	Y*	–
Precision Explosives	Odor Print Mini	–	Y	–	–	–	Y	Y	Y	–	–	Y
	Odor Print	–	Y	–	Y	–	Y	–	Y	–	–	Y
	Odor Print XL	–	Y	–	–	–	Y	–	Y	–	–	Y
	Getxent Tubes (Explosives)	–	Y	–	–	–	Y	Y	Y	–	–	–
Signature Science	TrueScent	–	–	–	–	–	–	–	–	–	–	–
SOKKS K9 International	SOKKS-MPTS Explosives	–	–	–	–	Y*	Y*	Y*	Y*	Y*	–	–
Tripwire Operations Group	TOID Conventional	Y	Y	Y	Y	–	–	–	Y	–	Y	Y
	TOID HME	–	–	–	–	–	–	–	–	–	–	–
XM	K-9 NESTT Silica	–	–	–	–	–	–	–	–	–	–	–
	K-9 NESTT Petrolatum	–	–	–	–	–	–	–	–	–	–	–

– indicates explosive odor is not listed for that product  
 Y indicates explosive odor available in product line  
 \* indicates one product has multiple explosive odors listed under the same TA product name



**Table 3-4 Non-Detonable TA Product Availability by Manufacturer or Domestic Vendor**

Manufacturer	Product	Available from Manufacturer	Vendors		
			Elite K-9	Ray Allen Manufacturing	CRE-8 LLC
Gallant Tech	SPOT	(Y)	—	—	—
Polymath Interscience	ScentLogix Explosives	Y	Y*	Y*	Y
Precision Explosives	Odor Print (Mini, Standard, XL)	Y	Y*	Y*	—
	Getxent Tubes (Explosives)	(Y)	—	—	—
Signature Science	TrueScent	Y	Y*	Y*	—
SOKKS K9 International	SOKKS-MPTS Explosives	—	Y	Y	—
Tripwire Operations Group	TOID Conventional	(Y)	—	—	—
	TOID HME	(Y)	—	—	—
XM	K-9 NESTT Silica	Y	Y	Y	—
	K-9 NESTT Petrolatum	Y	Y*	Y	—
(Y) indicates sold exclusively from the manufacturer — indicates product is not available or sold * indicates not all explosive odors or product type available					

### 3.1 Gallant Tech, SPOT

The Gallant Tech SPOT product line offers the TA-SPOT (TATP-based) and HM-SPOT (HM-TD-based). TA-SPOT and HM-SPOT TAs both consist of pure explosive material enclosed within an inert matrix composed of diatomaceous earth (DE) and are produced without the use of solvents. Two types of TAs are listed for each version of SPOT product line: TA-SPOT-Imprint/TA-SPOT-Train and HM-SPOT-Imprint/HM-SPOT-Train. The TA-SPOT-Imprint TAs are packaged in a glass vial with a screw cap, while the TA-SPOT-Train aids are supplied in a metal slider tin. Both form factors of TA-SPOT aids come foil-wrapped and contained within a vapor barrier bag. Both the Imprint and Train HM-SPOT TAs are packaged in a circular metal container with a mesh cover and enclosed in a re-sealable bag designed with a punched-out hole to enable outgassing. Blank TAs are available for each type of SPOT TA.

The shelf life of the TAs is 12 months; Gallant Tech assures that the products will have at least six months of shelf life upon delivery. Each SPOT TA is single-use and has a work time of eight hours. TA-SPOT TAs cost \$175–\$350 depending on TA type and HM-SPOT TAs cost \$215–\$429 depending on TA type, each includes 1 TA, 1 Blank TA, and a pair of gloves. For larger purchases, one blank TA is included per 10 SPOT TAs. Certificates of analysis (COAs) may be provided upon request. TA pricing is not explicitly stated on the manufacturer’s website without account creation. Discounts are available for quantity, government, and subscriptions.

### 3.2 Polymath Interscience, ScentLogix Explosives

ScentLogix has 22 training aids, representing individual target odors and improvised explosive device (IED) mixtures in their explosives product line. Refer to Table 3-5 for their full explosives product list. ScentLogix TAs consist of material in a cotton bag, stored in a vapor barrier bag. ScentLogix has three different type of TAs, which include: “de-energized,” “composite,” and “surrogate.” The de-energized explosive ScentKits use a patented technique, which yields explosive odors without their energetic qualities. The composite odor ScentKits consists of TAs that emit the odor components of an explosive material's scent profile. The surrogate odor ScentKits are comprised of TAs that the company claims give off scents indistinguishable from the volatile components of a true explosive material, as perceived by the canine. Zero Component (blank) TAs are available for extinction training.



Figure 3-1 The HM-SPOT (left), TA-SPOT-Train (top right) and TA-SPOT-Imprint (bottom right)

Image Credit: Gallant Tech



Figure 3-2 ScentLogix TAs and Accessories

Image Credit: Polymath Interscience

The shelf life for ScentLogix TAs is six years if unopened and up to two years once opened. Scentlogix recommends storing TAs in a cool, dark place, preferably refrigerated. Work time is considered 16 hours of use. The 1-Aid ScentKits (1-Aid Handler-Practitioner ScentKits), which range from \$209–\$550 depending on the explosive odor (as shown in Table 3-5), include one TA and the following accessories in a clear zipper-sealed pouch: a protective outer Velcro bag for TA, a “scentable” training towel, a perforated below-ground scent pipe, and either an above-ground magnetic scent pipe or an above-ground scent cage with hook (Figure 3-2). Double-Aid ScentKits (i.e., 2-Aid Trainer-Practitioner ScentKits), which range from \$370–\$1,070, contain two TAs with all the same accessories as the 1-Aid ScentKits in a plastic air-tight container. Replacement aids are slightly discounted, as they only contain the TA and no accessories, and range from \$185–\$525. Zero Component (blank) TAs cost \$100 for a ScentKit and \$70 for a replacement aid.

**Table 3-5 ScentLogix Product Price List<sup>2</sup>**

ScentLogix TA	1-Aid ScentKit	2-Aid ScentKit	Replacement Aid
TATP	\$550	\$1,070	\$525
HMTD	\$550	\$1,070	\$525
“Dirty Diana” (TATP + Nitrate IED)	\$350	\$660	\$325
“Dirty Harry” (HMTD + Chlorate IED)	\$350	\$660	\$325
All Base Smokeless Powder	\$209	\$370	\$185
ICAO-Mandated Explosive Taggants	\$209	\$370	\$185
RDX (Tagged)	\$209	\$370	\$185
RDX (Untagged)	\$209	\$370	\$185
Semtex (A + H)	\$209	\$370	\$185
TNT/Tetryl	\$209	\$370	\$185
Ammonium Nitrate/Urea Nitrate/ANFO	\$209	\$370	\$185
Black Powder	\$209	\$370	\$145
IED/HME	\$209	\$370	\$185
Potassium Chlorate	\$209	\$370	\$185
Potassium Nitrate	\$209	\$370	\$185
Sodium Chlorate	\$209	\$370	\$185
Dynamite	\$209	\$370	\$185

<sup>2</sup> TA price indicated in table reflects manufacturer pricing; vendor/distributor pricing may vary.

ScentLogix TA	1-Aid ScentKit	2-Aid ScentKit	Replacement Aid
Ethylene Glycol Dinitrate	\$209	\$370	\$185
ETN/PETN	\$209	\$370	\$185
Nitrocellulose	\$209	\$370	\$185
Nitroglycerin	\$209	\$370	\$185
Nitromethane	\$209	\$370	\$185
Zero Component (Blank)	\$100	--	\$70

### 3.3 Precision Explosives

#### 3.3.1 Odor Print

Precision Explosives offer 16 odors in their Odor Print TAs Explosives product line: including TATP, HMTD, TNT, Tetryl, RDX, C-4, PETN, PETN Sheet, Double Base Smokeless Powder, NG Dynamite, Ammonium nitrate, Emulsion, Potassium nitrate, Potassium chlorate, Urea nitrate, and Black Powder; however, each odor is not available in every size. Sizes vary from “mini” to the standard size to “XL.” An Odor Print TA consists of the explosive impregnated in a substrate (i.e., laboratory grade filter) and sealed between two aluminum discs that are riveted together. The top disc is engraved with an odor code and has paw print cutouts to increase odor availability.

Explosive loading for each TA type is a maximum 8% by weight. Precision Explosives says their proprietary process does not involve any solvents or adhesives that would require proofing canines off extraneous odors. The TAs are packaged in Mylar bags and have a one-year shelf life. No special storage conditions are required; however, it is recommended that Odor Prints remain in their original packaging between uses. While refrigeration is not required, the manufacturer recommends storage at a cooler temperature and out of direct sunlight. The manufacturer states a confirmed working time of 2000 hours. A safety data sheet (SDS) is included with each TA purchase. Returning TAs to the manufacturer for recycling is encouraged.

##### 3.3.1.1 Odor Print Mini

Odor Print Mini is available with 15 odors, specifically TATP, HMTD, TNT, Tetryl, RDX, C-4, PETN, Double Base Smokeless Powder, NG Dynamite, Ammonium nitrate, Emulsion, Potassium nitrate, Potassium chlorate, Urea nitrate, and Black Powder. Odor Print Mini comes as a disc with diameter of 1.75 inches and is designed to fit within the cans used in the Bureau of Alcohol, Tobacco, Firearms, and Explosives National Odor Recognition Test. An Odor Print Mini TA costs \$59.



**Figure 3-3 Odor Print Mini**

*Image Credit: Precision Explosives*



### 3.3.1.2 Odor Print (Standard)

The standard Odor Print TA is available in 15 odors, specifically TATP, HMTD, TNT, Tetryl, RDX, C-4, PETN, PETN sheet, Double Base Smokeless Powder, NG Dynamite, Ammonium nitrate, Emulsion, Potassium nitrate, Potassium chlorate, and Urea nitrate. The standard Odor Print has a diameter of 3-inches. It costs \$69 for all odors except TATP and HMTD, which cost \$94.

### 3.3.1.3 Odor Print XL

Odor Print XL TAs are available in 12 odors, specifically TNT, Tetryl, RDX, C-4, PETN, Double Base Smokeless Powder, NG Dynamite, Ammonium nitrate, Emulsion, Potassium nitrate, Potassium chlorate, and Urea nitrate. Odor Print XL is shaped like a bone and is advertised by the manufacturer to replicate the odor of 5 lbs. of explosives. An Odor Print XL TA costs \$99.

### 3.3.2 Getxent Tubes (Explosives TA)

Precision Explosives also sells pre-impregnated Getxent polymer odor capture and release tube TAs for \$15/tube. These cover 12 explosives odors: AN, BP, C-4, HMTD, NG Dynamite, PETN, Potassium chlorate, RDX, Potassium nitrate, TATP, TNT, and DBSP. The tube TAs come stored in Mylar bags and, when stored appropriately, should be usable for up to one year. Empty Getxent tubes, which are considered odor-neutral, are also available for purchase from Precision Explosives at \$10/tube. The manufacturer does not recommend the empty tubes be used as blank TAs.

For additional information on both pre-impregnated and empty Getxent tubes, refer to Appendix A.

### 3.4 Signature Science, TrueScent

TrueScent offers 10 explosives odors in their product line, specifically TATP, HMTD, Urea nitrate, ETN, RDX, TNT, PETN, Tetryl, Ammonium nitrate, and Potassium chlorate. TrueScent TAs are produced by desensitizing real explosives with an odorless filler material, which renders them non-explosive. The TAs are enclosed within “breather” bags that allow the scent to be released during training sessions. To ensure safe transport and storage, the breather bag is enclosed in a non-permeable, anti-contamination pouch that also preserves the training aid's shelf life.



Figure 3-4 Odor Print

Image Credit: Precision Explosives



Figure 3-5 Odor Print XL

Image Credit: Precision Explosives

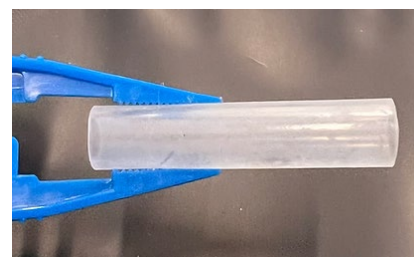


Figure 3-6 Getxent Tubes (Explosives)

Image Source: Precision Explosives



Figure 3-7 TrueScent TAs

Image Credit: Signature Science



Included with each TrueScent TA is a blank “Distractor,” a specialized TA containing unscented material. The distractor comes individually packaged in a sealed “breather” bag, safeguarded within an outer anti-contamination pouch. The Distractor’s primary purpose is to support effective training techniques, as it can be employed for proofing and odor extinction training sessions. The manufacturer recommends replacing the blank “Distractor” after 12 months of use.

The shelf life for all TrueScent TAs is considered 12 months when stored under recommended conditions, with the exception of the HMTD TA, which has a six-month shelf life. TrueScent advises storing TAs inside their anti-contamination pouches and in a dry area at room temperature or below when not in use. Again, with the exception of the HMTD TA, which should be stored under average freezer conditions. TrueScent does not provide an estimate of a typical number of uses per TA. However, an internal study conducted by the manufacturer determined that various TrueScent TAs were able to withstand a simulated work time of 108 hours over 12 weeks. The TrueScent TA prices include one TA and one blank TA and range from \$25–\$159, depending on the explosives odor (see Table 3-6). An SDS, COA, and handler instructions are also included with each TA purchase.

**Table 3-6 TrueScent Product Price List**

<b>TrueScent TA</b>	<b>Price (Scent + Blank)</b>
TATP	\$159
HMTD	\$159
Urea nitrate	\$159
Tetryl	\$139
ETN	\$125
RDX	\$50
TNT	\$50
PETN	\$50
Ammonium nitrate	\$25
Potassium chlorate	\$25

### 3.5 SOKKS K9 International, SOKKS-MPTS Explosives

SOKKS K9 International offers one explosives TA, SOKKS-Micro-Particle Training Systems (SOKKS-MPTS) Explosives, that claims to contain all necessary odors for any explosive. SOKKS-MPTS TAs are not pseudo and that each tube contains nanogram to microgram amounts of each pure odor, without stating what odors are contained. The SOKKS K9 International website states the TAs have been used to detect Ammonia- Gel, Ammonia-Nitrate, RDX, Potassium Nitrate, Sodium Chlorate, Nitro-Glycerine, Nitro-Cellulose, TNT, ALL Dynamites, Water Gels, HMX, Smokeless Powder, Black Powder, Gun Powder, Chlorates, PETN, TATP, and HMTD.<sup>3</sup> The TA form factor is a flexible, polypropylene tube with pores of 10-50 microns. SOKKS does not produce blank TAs.

The SOKKS-MPTS Explosives TAs are packaged in amber glass bottles. SOKKS recommends storing the TAs in a cool, dark place; temperature should not be lower than 0 °C nor should the TAs be exposed to bright light or high temperatures for an extended period of time. When stored under recommended conditions, the TAs have a shelf life of three years. The tubes are marketed as reusable, with a recommended maximum usage of 10 times per tube. After each use, the tubes are meant to be placed back into the supplied bottle labeled “used” for future use. After approximately 10 uses or if a TA becomes excessively contaminated, the tube should be transferred to the provided bottle designated “waste.” According to the manufacturer’s website, proper disposal procedures are required for SOKKS-MPTS waste material. The company website does not provide detailed information or a specific protocol for proper disposal; however, it does mention that SOKKS containers can be returned to the company for appropriate disposal. The SOKKS-MPTS Explosives TA are available from specific vendors for \$490 which includes 50 tubes in a glass bottle labelled “original,” one empty glass bottle labelled “used,” and another empty glass bottle labeled “waste.”



**Figure 3-8 SOKKS-MPTS Explosives TAs in the “original” storage bottle (red) shown with the provided “waste” (yellow) and “used” (blue) bottles**

*Image Source: Ray Allen Manufacturing*

<sup>3</sup> SOKKS K9 International uses alternate English spellings for some compounds. The American English terms would be Ammonium gel, Ammonium nitrate, RDX, Potassium nitrate, Sodium chlorate, Nitroglycerin, Nitrocellulose, TNT, All Dynamites, Water Gels, HMX, Smokeless Powder, Black Powder, Gun Powder, Chlorates, PETN, TATP, and HMTD.

### 3.6 Tripwire Operations Group, Tripwire Odor Imprint Device

Tripwire Odor Imprint Device (TOID), from Tripwire Operations Group, offers 14 explosives odors and differentiates their product line between 11 conventional explosives odors and three homemade explosives (HME) odors. The 11 conventional odors include C-4 with taggant, sheet explosive (PETN-based), Semtex, Dynamite, Emulsion, TNT, Comp-B, HMX, Tetryl, ANFO, and RDX. The three HME odors include: TATP, HMTD, and Urea nitrate. TOID TAs are created through a proprietary method that involves embedding minute quantities of explosive material into laboratory-grade filter paper that is then sandwiched between two 4-inch-diameter stainless steel discs, which feature cutouts to allow odor release. TOIDs are reportedly active for 90-120 days for conventional odors and 30 days for HME odors; however, the manufacturer does not provide assurances regarding the estimated work time, as the longevity of the TA may be influenced by factors such as handling and storage. The Tripwire Operations Group does not provide storage recommendations nor an estimated shelf life for TOIDs. TOID TAs cost \$65 for a single conventional odor, \$75 for a single HME odor, and \$750 for a complete 15 odor set which includes a cartridge discharge residue TOID in addition to the explosives odors.



Figure 3-9 Tripwire Odor Imprint Device

Image Credit: Tripwire Operations Group

### 3.7 XM, K9 Non-hazardous Explosives for Security Training and Testing

K9 Non-hazardous Explosives for Security Training and Testing (K9 NESTT) TAs are produced by the XM division of Van Aken International. The K9 NESTT product line consists of TNT, RDX, PETN, potassium nitrate, and potassium chlorate TAs, which are available in two different form factors: silica coated and petrolatum suspension. Each K9 NESTT TA – regardless of form factor – contains 8% by weight of the pure explosive, with the exception of the PETN TA, which contains 4%. Across the XM website, “n/” is employed to distinguish a NESTT non-explosive material from the target explosive material (e.g., n/TNT refers to TNT NESTT).



Figure 3-10 K9 NESTT product line

Image Credit: Ray Allen Manufacturing

#### 3.7.1 K9 NESTT Silica

K9 NESTT Silica TAs are available in five odors: TNT, RDX, PETN, potassium nitrate, and potassium chlorate. The silica coated TAs are made by dissolving the explosive in an organic solvent and mixing with silica until the solvent has evaporated. There are three packaging/size options available for coated silica TAs: training tin (16 g), cloth bag (160 g), and quart can (907 g). The quart can option may be used as a bulk amount or to replenish the training tin. Blank silica TAs are available in the same three packaging/size options.



Figure 3-11 K9 NESTT Silica training tin

Image Credit: Ray Allen Manufacturing

XM considers the shelf life of the K9 NESTT silica TAs limitless as shipped from the factory. The work time of K9 NESTT silica TAs is two weeks. A K9 NESTT silica training tin TA costs \$30; a cloth bag TA, \$120; and a quart can TA, cost \$293. A blank silica training tin TA costs \$12 while a cloth bag TA costs \$45 and a quart can TA, \$62. Prices listed are taken from vendor websites as pricing for K9 NESTT TAs is not available on the manufacturer's website.

### 3.7.2 K9 NESTT Petrolatum

K9 NESTT Petrolatum TAs come in five odors: TNT, RDX, PETN, potassium nitrate, and potassium chlorate. In the petrolatum suspension the explosive material is dispersed throughout United States Pharmacopeia (USP) grade Vaseline and packaged in a metal tube (75 g). NESTT Petrolatum TAs are used by applying a layer of the suspension onto a surface such as aluminum foil or into an empty training tin. A blank petrolatum TA in a metal tube (75 g) is also available.



**Figure 3-12 K9 NESTT Petrolatum**

*Image Credit: Elite K-9*

Shelf life is not specified for the petrolatum TA. XM recommends storage temperatures between 65–90° F to keep the Vaseline at an ideal consistency. Work time of a petrolatum TA is considered two weeks once applied to a training tin; if applied to foil, the TA is single use. The K9 NESTT Petrolatum TAs range from \$55–\$60. Blank petrolatum TAs cost \$25. Prices listed are taken from vendor websites as pricing for K9 NESTT TAs is not available on the manufacturer's website.

## 4.0 MANUFACTURER AND VENDOR CONTACT INFORMATION

Additional information on the products included in this market survey report can be obtained from the manufacturers or domestic vendors listed in Table 4-1.

Table 4-1 Manufacturer and Vendor Contact Information

Manufacturer/Vendor	Website	Address	Phone Number	Email Address
CRE-8 LLC	<a href="http://cre-8-llc.com">cre-8-llc.com</a>	17 Herald Drive Queensbury, NY 12804	(518) 977-9970	<a href="mailto:martin.mckay@cre-8-llc.com">martin.mckay@cre-8-llc.com</a>
Elite K-9, Inc.	<a href="http://www.elitek9.com">www.elitek9.com</a>	7660 Old US Highway 45 Boaz, Kentucky 42027	(270) 554-5515	<a href="mailto:info@elitek9.com">info@elitek9.com</a>
Gallant Tech	<a href="http://gallant.tech">gallant.tech</a>	11820 West Market Pl., Suite P Fulton, MD 20759	(240) 468-4080	<a href="mailto:info@gallant.tech">info@gallant.tech</a> <a href="mailto:sales@gallant.tech">sales@gallant.tech</a>
Polymath Interscience (ScentLogix)	<a href="http://scentlogix.com">scentlogix.com</a>	Church Circle 3, Suite 366 Annapolis, MD 21401	(410) 990-1199	<a href="mailto:info@scentlogix.com">info@scentlogix.com</a>
Precision Explosives	<a href="http://www.pre-exp.com">www.pre-exp.com</a>	7124 Dominique Dr Spotsylvania, VA 22551	(540) 388-9969	<a href="mailto:CWilber@p-exp.com">CWilber@p-exp.com</a> <a href="http://www.pre-exp.com/contact-us">www.pre-exp.com/contact-us</a>
Ray Allen Manufacturing	<a href="http://www.rayallen.com">www.rayallen.com</a>	975 Ford Street Colorado Springs, CO 80915	(800) 444-0404 (719) 380-0404	<a href="mailto:sales@rayallen.com">sales@rayallen.com</a>
Signature Science	<a href="http://www.truescentk9.com">www.truescentk9.com</a>	8329 North Mopac Expressway Austin, TX 78759	(512) 533-2040	<a href="mailto:truescent@signaturescience.com">truescent@signaturescience.com</a>
SOKKS K9 International†	<a href="http://www.soksksk9international.com">www.soksksk9international.com</a>	23 bis, rue des Bourguignons 91310 Montlhéry Essonne, France	+33 (0) 1 69 01 74 20	<a href="mailto:contact@soksksk9international.com">contact@soksksk9international.com</a>



Manufacturer/Vendor	Website	Address	Phone Number	Email Address
Tripwire Operations Group	<a href="http://tripwireops.org">tripwireops.org</a> <a href="http://tripwiresouth.com">tripwiresouth.com</a>	1685 Baltimore Pike, Gettysburg, PA 17325	(888) 330-7015 (866) 513-3133	<a href="mailto:explosive@tripwireops.org">explosive@tripwireops.org</a> <a href="mailto:staff@tripwiresouth.com">staff@tripwiresouth.com</a>
XM	<a href="http://www.xm-materials.com">www.xm-materials.com</a>	3265 Fortune Drive, North Charleston, SC 29418	Not specified	<a href="mailto:contact1@xm-materials.com">contact1@xm-materials.com</a>
† SOKKS K9 International operates as a foreign manufacturer; however, their TA product is commercially available through domestic vendors.				

## 5.0 CONCLUSIONS

Explosives detection canines are widely accepted and acknowledged as an exceptionally effective explosives detection and countermeasure system. Canine TAs play a pivotal role in the process of instructing and equipping canines to identify explosives or substances related to explosives. Non-detonable TAs for canines, which do not possess the known hazards of traditional explosive materials, are safe and effective alternatives that may be used for training purposes to reduce the risks associated with traditional explosive TAs. When procuring non-detonable TAs for canines, purchasers should be cognizant of a variety of factors including the availability of explosives odors and blank TAs, physical form and design, storage conditions, work time, and shelf life.

This market survey provides information on 12 non-detonable TA products that range from \$15 to \$550. As a number of different technologies are available, emergency responder agencies should carefully research the overall capabilities and limitations of non-detonable TAs for canines in relation to their agency's training requirements when making procurement or acquisition selections.

## Appendix A. SUPPLEMENTAL INFORMATION: GETXENT TUBE

[Getxent](#) developed polymer odor capture and release tubes for use as canine alternative TAs (Figure A-1). These tubes are known for their odor-neutral characteristics and can be saturated with explosive odors. Getxent specifies that the tubes have been used with TATP, TNT, and HMTD. The manufacturer claims that when used under proper conditions, the impregnated tube will not absorb extraneous odor(s), as the release of target odor inhibits the absorption of other odors. Getxent details that the equivalent concentration of an impregnated tube can be equal to the impregnation duration (in days) multiplied by the amount of target material (e.g., 50 g of target material soaked for two days would be equivalent to 100 g of target).



**Figure A-1 Getxent Tube**

*Image Credit: Getxent*

Shelf life is 36 months, if stored in the original sealed packaging. Getxent tubes can be stored between -80 to 55 °C under clean and dry conditions, though refrigeration is recommended. The work time of impregnated tubes depends on the impregnation conditions. The impregnated tubes can be washed with water to remove debris without affecting performance; however, the tubes cannot be re-impregnated, even with the same target. Getxent tubes cost \$10 for one tube (stored in glass vial with a metal screw cap) or \$275 for a bag of 50 tubes. The product is available for purchase as blank tubes. The blank tubes are not recommended for use as a control, though when used as such, it is recommended they are replaced every 5–10 minutes. Getxent also offers the RASCO (remote air sampling for canine olfaction) vacuum accessory for \$900.

Precision Explosives offers pre-impregnated Getxent tubes for explosive odors, as well as empty tubes that can be used to capture any odor (refer to section 3.3.2).

## 6.0 REFERENCES

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