Detection Canine Program

November 15, 2022
Fiscal Year 2022 Report to Congress

Homeland Security

Science and Technology Directorate

Message from the Under Secretary

November 15, 2022

I am pleased to present the following report, "Detection Canine Program," which has been prepared by the Science and Technology Directorate (S&T).

This document responds to direction in the Joint Explanatory Statement accompanying the Fiscal Year 2022 Department of Homeland Security (DHS) Appropriations Act (P.L. 117-103).

Pursuant to congressional requirements, this report is being provided to the following Members of Congress:
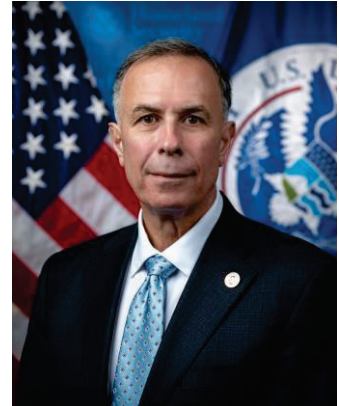
The Honorable Lucille Roybal-Allard
Chairwoman, House Appropriations Subcommittee on Homeland Security

The Honorable Chuck Fleischmann
Ranking Member, House Appropriations Subcommittee on Homeland Security

The Honorable Chris Murphy
Chair, Senate Appropriations Subcommittee on Homeland Security

The Honorable Shelley Moore Capito
Ranking Member, Senate Appropriations Subcommittee on Homeland Security

Inquiries about this report may be directed to the Office of Legislative Affairs at 202-447-5890.

Sincerely,

Dimitri Kusnezov
Under Secretary for Science and Technology

Executive Summary

S&T delivers this report in response to the Committee's request for an update on the spend plan of the Detection Canine Program. The S&T Detection Canine Program focuses on providing DHS operational components and the larger Homeland Security Enterprise with the tools, techniques, and knowledge to understand, train, and utilize detection canines better. The program has three specific focus areas:

- Development and testing of canine training aids that can be used to improve and test canine ability to detect new threats,
- Independent operational test and evaluation capability for detection canines, and
- Research and development focused on basic understanding of canine olfaction, cognition, genetics, genomics, and breeding, and behavior to improve operational efficiencies and training methods.

While much of this research can be applied to a variety of odor detection dog fields (narcotics, urban search and rescue, currency, etc.), the program's primary customer and focus is on traditional (stationary) and person-borne (mobile) explosives detection. Examples of recent successes include: evaluation of more than 400 explosives detection canine teams representing more than 200 state, tribal, and local law enforcement agencies; distribution of a novel person-borne explosives training guideline; delivery of a software tool that greatly simplifies training design and logging results for detection canines; and published research regarding canine acclimatization and canine vigilance.

Detection Canine Program

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I.   Legislative Language

This report responds to direction in the Joint Explanatory Statement accompanying the Fiscal Year (FY) 2022 Department of Homeland Security (DHS) Appropriations Act (P.L. 117-103), which states:

> *Detection Canine Program.*—Within 90 days of the date of enactment of this Act, S&T shall provide a spend plan for the Detection Canine Program and shall brief the Committees semiannually thereafter on the program's status.

II. Background

The Science and Technology Directorate (S&T) is the primary research and development (R&D) arm of DHS. It provides federal, state, and local officials with the technology and capabilities to protect the homeland. S&T's Detection Canine Program, established in 2010, conducts research to inform and improve operational proficiency of the domestic detection canine. The program's scope spans the entirety of the Homeland Security Enterprise (HSE), including DHS Components, and state, local, tribal, and territorial agencies that utilize detection canines across all threats.

Nationwide, DHS and the HSE have more than 16,000 detection canine teams. These teams previously lacked a specific federal program focused on providing critical tools, techniques, and knowledge to improve operational proficiency and to understand, train, and utilize detection canine teams better. Detection canines often are called upon to respond to new and emerging threats, be it intelligence-driven explosive materials or a global human pandemic such as Coronavirus Disease 2019 (COVID-19). The decentralized employment of this resource requires a federal core capability to inform the community and decisionmakers on canine capabilities and concepts of operations for this biological detector.

Additionally, over the last 20 years, the demand for elite detection canines has increased while domestic supply has not kept pace. This has resulted in an increased reliance on foreign sourcing of detection canines and a subsequent reduction in the quality of the canines available for such service in the United States. In response to a congressional call "to expand and establish a domestic supply for explosive detection canines," the program began the Domestic Breeding Consortium—a pilot to establish a community committed to improving both the quality and quantity of explosives detection dogs. This pilot aims to improve selection and breeding, thereby minimizing lost opportunity costs, decreasing dropout and repurpose rates, and increasing operational lifespan. Much of the advanced research backing this effort is the discovery and pairing of canine genomic markers to specific behaviors and capabilities found in elite detection dogs.

III. Expenditure Plan

Detection Canine Program		
Project/Expense	**Activities**	**FY 2022 Enacted Funding ($)**
Develop and Analyze Canine Training Tools and Techniques	Training tools/odor generalization studies, training aids/emerging threats/concealment, and training aid characterization	**$3,110,000**
Improve Canine Operational Proficiency	Regional Explosives Detection Dog Initiative, general effectiveness, airflow studies, odor concealment, canine handler assessments, and improving operational proficiency	**$2,930,000**
Olfaction & Cognition: Canine Structure and Function	Domestic Breeding Consortium, cognition testing, and canine phenotype/genotype research	**$2,400,000**
Shared Service Costs	Costs to ensure that detection canine activities are fully compliant with U.S. Government policy and regulations, including those pertinent to acquisitions, privacy, and compliance; includes allocation to Small Business Innovation Research (SBIR), per Section 9f of the Small Business Act, 15 United States Code 638	**$920,000**
Grand Total		**$9,360,000**

S&T is working with Auburn University College of Veterinary Medicine (AUCVM) and other performers to execute directed efforts under the program's projects and activities to satisfy DHS Component customer requirements and capability gaps. Detailed efforts include a broad range of research spanning the program's investments:

Develop and Analyze Canine Training Tools and Techniques: Employs state-of-the-art laboratory technology to inform development of nonhazardous canine training aids for emerging and conventional explosive threats and to perform independent assessment and quality assurance assessments of commercially available products for HSE, as well as for odor generalization analysis studies, providing a valuable resource for all detection canine disciplines. This activity includes development of other training tools needed to meet component customer requirements in areas such as training records, data management and assessment, test design, and parameter management.

Improve Canine Operational Proficiency: Provides scientifically rigorous independent test and evaluation of canine teams in their operational environment to validate training

methodologies and to assess strengths and weaknesses of canine deployment techniques. This includes validation testing to understand strengths and weaknesses of the Transportation Security Administration Passenger Screening Canine program, thereby improving concept of operations and training, and the Person-borne Improvised Explosive Device program for mass transit and soft target/large crowd events.

Olfaction & Cognition: Canine Structure and Function: A basic research effort to explore the genetics, phenomics, breeding, olfaction, behavior, training, and physiology of successful detection canines to improve training methods and operational proficiency of the HSE's detection canine teams, including olfaction and cognition, behavioral and genetics research, domestic sourcing, breeding standards, and early learning strategies.

Recent expansion of the Detection Canine Program's performer portfolio includes the addition of AUCVM. AUCVM received a $24 million competitive contract award over 5 years through S&T's successful Long-Range Broad Agency Announcement program. This benchmark award is the largest in the Detection Canine Program's history and is a complementary addition to S&T's portfolio of world-renowned research institutions performing critical research to close the gaps in canine R&D.

Auburn University's Canine Performance Science Center has been a stalwart in academic detection canine R&D for decades, and S&T has benefited from several smaller individual engagements leading up to this comprehensive award. The scope of this contract spans all three focus areas of the Detection Canine Program, with a particular emphasis on the functional aspects of detection canines including genetics, phenotypical traits, olfaction, cognition, longevity, and breeding.

This 5-year award is structured into a base year and four separate option years and is compliant with all Federal Acquisition Regulation and DHS contracting standards. The base award began in January of 2022. The resourcing of this contract through FY 2024 is:

Fiscal Year	Amount ($ in millions)	Type
FY 2022	$3.85	Base Award
FY 2023	$5.15	Option Year 1
FY 2024	$5.00	Option Year 2

Shared Service Costs: Ensures that program activities—including acquisition, policy, compliance, and information technology—adhere to U.S. Government policy and regulations. These funds also include the SBIR requirement where federal agencies with R&D budgets that exceed $100 million are required to allocate 3.2 percent of their R&D budget to the SBIR programs.

IV. Analysis/Discussion

Funding included in the FY 2022 budget for this research project will be used to execute ongoing research efforts into the development of training tools that will ensure effective and efficient training of detection canine teams. These tools include, but are not limited to, nonhazardous explosive training aids and training aids reflecting concealed devices. Ongoing research also includes conducting odor generalization studies to reduce training burdens, performing field assessments to validate operational strengths and limits of the mobile canine sensing platform, and continuing a pilot breeding consortium effort to improve the supply of domestic working dogs.

The Detection Canine Program serves as a trusted federal focal point to: provide expertise and knowledge sharing; address customer requirements by understanding emerging threat detection performance; analyze how threat concealment affects detection; and provide scientifically rigorous, statistically significant R&D, and test and evaluation. The COVID-19 pandemic forged new partnerships with the Countering Weapons of Mass Destruction Office to identify key markers that could lead to the use of canines (and other detectors such as nanosensors) to identify asymptomatic individuals infected with COVID-19. The program partnered with DHS and industry stakeholders to bring focus to the domestic detection canine supply challenge through FY 2022. The program established a breeding roadmap, which was endorsed by DHS Components and was validated by a Breeding Working Group pilot to integrate the best scientific practices in genetics, genomics, breeding, olfaction, behavior, training, and physiology and metrology to improve the mobile canine sensing platform. The program has established core capabilities including odor chemistry expertise, breakthrough laboratory analysis capabilities, specialized testing and evaluation experts, and canine operations and training expertise to improve operational proficiency of DHS Component and state, local, tribal, and territorial canine teams throughout the HSE.

V. Conclusion/DHS Action Plan

The Nation relies on the performance of detection canine teams every day, and this program enables them to do their job more efficiently and effectively, thereby improving mission performance. The creation of this dedicated R&D office has supported the expansion of domestic detection canine supply and improving efficiency of production, which will reduce dependence on foreign sources substantially over time. The program establishes a domestic research, development, testing, and evaluation focal point for detection canines that otherwise would not exist. Ultimately, this provides DHS and the HSE with a resource to fill critical gaps in canine training and mission performance, in addition to improving the efficiency and effectiveness of the detection canine to train and perform in operational environments, to respond to emerging threats, and to address the growing threats and operational concerns regarding soft target and crowded spaces security.

Appendix: Abbreviations

Abbreviation	Definition
AUCVM	Auburn University College of Veterinary Medicine
COVID-19	Coronavirus Disease 2019
DHS	Department of Homeland Security
FY	Fiscal Year
HSE	Homeland Security Enterprise
R&D	Research and Development
S&T	Science and Technology Directorate
SBIR	Small Business Innovation Research