Aerosol Vapor Chemical Agent Detector (AVCAD)

In June 2023, DOT&E approved the Aerosol Vapor Chemical Agent Detector (AVCAD) Milestone C (MS C) TEMP, which required additional developmental and operational testing on low-rate initial production systems to address deficiencies discussed in DOT&E's April 2023 operational assessment report. Laboratory testing with chemical warfare agents (CWAs) is scheduled to finish by 1QFY25. The multi-Service operational test and evaluation (MOT&E) began in FY24, and DOT&E intends to publish an MOT&E report in 2QFY25, to support the Army's full-rate production (FRP) decision later that quarter.

SYSTEM DESCRIPTION

The AVCAD is an aerosol and vapor CWA and non-traditional agent detector. The AVCAD will provide warfighters with the new capability to detect CWA aerosols as well as additional persistent V-Series and A-Series CWAs. The Joint Services, without the Air Force, plan to employ AVCAD as a man portable detector; a fixed-site monitoring device; and on manned vehicles, ships, and aircraft to detect and alert personnel to the presence of chemical warfare agents and support force-protection decisions. The AVCAD is designed for operation using shore power, battery, or the power provided by the integrated platform itself.

The Army is the only Service intending to use the AVCAD in a perimeter defense mission. The AVCAD is designed as a networked detector with the ability to be controlled and send alerts over a network using the Army's Integrated Sensor Architecture. Receiving units will need to provide necessary hardware not fielded with the system in order to add AVCAD to any network.

MISSION

Joint warfighters equipped with the AVCAD will employ the system to detect CWAs and non-traditional agents in aerosol and vapor physical states; alert personnel in the event of a chemical attack; and support post-attack reconnaissance, surveillance, and decontamination missions across the full range of military operations. The Army has a perimeter defense mission where detectors are placed in an array and alarms are remotely monitored over a radio network. The radios are not fielded as part of the system.

PROGRAM

AVCAD is a joint Acquisition Category III program and was authorized in May 2023 to enter the production and deployment phase. DOT&E approved the MS C TEMP to support the low-rate initial production decision in June 2023.

In April 2023, DOT&E published an operational assessment, which identified a number of challenges. The program office worked with the vendor to address the recommendations. The vendor updated software algorithms with intentions to improve detection performance and false alarm rates. The program office added a cleaning tool and updated preventative maintenance checks and services (PMCS) procedures to address reliability and system-to-system variability concerns. The program office updated the technical manual with the PMCS procedures. The program office also updated hardware components to improve performance in electromagnetic environments.

The production and deployment phase of testing began in January 2024, with a FRP decision targeted for March 2025. The program conducted an MOT&E in August 2024 in accordance with the DOT&E-approved test plan. DOT&E observed the testing and will publish a classified MOT&E report in 2QFY25 prior to the FRP decision.

» MAJOR CONTRACTOR

- Smiths Detection, Inc. – Edgewood, Maryland

TEST ADEQUACY

In accordance with the DOT&E-approved TEMP, the AVCAD program office is conducting a series of laboratory chamber tests to demonstrate performance against vapor and aerosol disseminations of chemical warfare agents. Due to deficiencies identified during the engineering and manufacturing development phase, the MS C TEMP directed additional developmental and operational testing on the low-rate initial production items. The program office conducted a number of false alarm and reliability tests at a variety of locations to confirm fixes emplaced after engineering and manufacturing development was completed in FY23.

In FY24, the program began the MOT&E, in accordance with the DOT&E-approved test plans:

- In April 2024, the program conducted cyber survivability testing with a cooperative vulnerability and penetration assessment, which was followed by an adversarial assessment in August 2024.

- In August, the program conducted the land portion of the MOT&E with the Army and Marine Corps.
- In October 2024, the Navy conducted a maritime operational test.

DOT&E observed each of the MOT&E events, which cumulatively were adequate to assess operational effectiveness, suitability, and cyber and electromagnetic survivability. DOT&E will publish a classified MOT&E report when data analyses are complete in 2QFY25.

PERFORMANCE

» EFFECTIVENESS

DOT&E will provide an evaluation of the operational effectiveness, following the scheduled completion of laboratory testing in December 2024, in the classified MOT&E report in 2QFY25.

» SUITABILITY

DOT&E will provide an evaluation of the operational suitability, following the completion of all testing outlined in the DOT&E-approved TEMP, to include evaluating the efficacy of the updated training and technical manuals, in the classified MOT&E report in 2QFY25.

» SURVIVABILITY

DOT&E will assess cyber and electromagnetic survivability in the classified MOT&E report in 2QFY25. The report will also assess if the updates to AVCAD mitigated the identified cyber deficiencies discussed in the classified annex to the DOT&E AVCAD operational assessment report, dated April 2023.

RECOMMENDATIONS

The Joint Product Manager for Chemical, Biological, Radiological, and Nuclear Sensors should:

1. Review the recommendations in the DOT&E MOT&E report released in 2QFY25.

The Army should:

1. Purchase equipment needed for the perimeter defense mission.