

# Aerosol and Vapor Chemical Agent Detector (AVCAD)

At least one of the two pursued Aerosol Vapor Chemical Detector (AVCAD) systems has the potential to be operationally effective in detecting chemical vapor and aerosol threats without requiring significant design and engineering changes. At least one of the vendors needs to implement additional design and engineering changes to demonstrate the potential to meet operational suitability requirements. Both vendors have taken action to mitigate cyber-induced vulnerabilities identified during the Cooperative Vulnerability and Penetration Assessment.



## System Description

The AVCAD is an aerosol and vapor chemical warfare agent and non-traditional agent detector. The Services plan to employ AVCAD as a handheld detector, a fixed site monitoring device, and on manned vehicles, ships, and aircraft to detect and alert personnel to the presence of chemical agents and support force protection decisions. The AVCAD is designed to be powered by battery or the platform on which it is integrated.

## Program

The AVCAD program is a joint Acquisition Category III program in the engineering and manufacturing development phase of acquisition. DOT&E approved the Milestone B Test and Evaluation Master Plan (TEMP) in January 2019 and subsequent changes to this plan in October 2021. The Operational Assessment started in October 2021 and is expected to end in March 2022. The Milestone C acquisition decision is scheduled to occur in FY22.

## Major Contractors

Smiths Detection Incorporated – Edgewood, Maryland. Chemring Sensors and Electronic Systems – Charlotte, North Carolina.

## Test Adequacy

In FY21, the AVCAD Program Office, in conjunction with the Army Test and Evaluation Command, executed the following developmental test events: chemical agent detection, false alarm performance, coastal environment, reliability, and military standards compliance, as well as early user testing to identify system design and operational deficiencies. The Program Office, in conjunction with a joint Service test team, conducted integrated

developmental and operational test events to evaluate chemical warfare agent detection performance. The Program Office also executed several demonstrations to assess changes made to the systems and to the preventative maintenance and check procedures. Testing was completed in accordance with DOT&E-approved TEMP and test plans.

## Performance

### Effectiveness

The Smiths Detection AVCAD must address several shortfalls to mitigate its risk to meeting operational effectiveness requirements. The Smiths Detection AVCAD demonstrated the capability to meet some but not all detection requirements. The Smiths Detection AVCAD demonstrated acceptable false alarm rates.

The Chemring Sensors AVCAD will need to implement additional design and engineering changes to mitigate its risk to meeting operational effectiveness requirements. The Chemring Sensors AVCAD demonstrated the capability to meet some but not all detection requirements. The Chemring Sensors AVCAD was not able to demonstrate the acceptable false alarm rates.

### Suitability

The Smiths Detection AVCAD will need to implement additional design and engineering changes to mitigate its risk to meeting operational suitability requirements. The design continues to have

performance deficiencies and previous attempts to correct the problem have not proven successful. Smiths Detection is assessing other options to address the identified deficiencies.

The Chemring Sensors AVCAD may be able to meet its operational suitability requirements with the proposed design changes that need to be further verified in operational test. Chemring Sensors made changes to the initial AVCAD design to address the reliability concerns but changes negatively affected others aspect of the design. Chemring Sensors continues to assess options to address the design deficiency.

### Survivability

An initial Cooperative Vulnerability and Penetration Assessment identified cyber-induced vulnerabilities affecting system survivability in a cyber-contested environment. Both vendors modified their systems to mitigate these vulnerabilities. An Adversarial Assessment was conducted in November 2021 to identify and address vulnerabilities prior to low-rate initial production.

## Recommendation

1. The Program Office should continue to address the identified shortfalls to improve system performance prior to IOT&E and successfully demonstrate operational effectiveness, suitability, and survivability in support of the full-rate production and fielding decisions.