

# Joint Chemical Agent Detector (JCAD)

## Executive Summary

- Combined developmental testing/operational testing (DT/OT), completed in FY06, indicates that the Joint Chemical Agent Detector (JCAD) has adequate detection capabilities and acceptable false alarm rates for ground operations. The device's false alarm rate in shipboard operations is not acceptable. Alternate detection schemes for the shipboard environment are being explored.
- The JCAD's DT/OT performance will form much of the basis for the Milestone C low-rate initial production (LRIP) decision in March 2007. The JCAD's Multi-Service Operational Test and Evaluation (MOT&E), also scheduled during FY07, will help determine whether the device is ready for full-rate production.

## System

- JCAD is a device that automatically detects, identifies, and warns warfighters of the presence of nerve, blister, and blood chemical agents.
- The Increment 1 is a commercially available, hand-held device that will operate as a stand-alone detector.
- The Increment 2 device is designed to detect extremely low levels of chemical agents and will have a networking capability.
- The total quantity of Increment 1 systems is 60,000 detectors, with 6,000 low-rate initial production. The Joint Acquisition Objective for JCAD is 274,887 detectors.

## Mission

- The warfighter equipped with JCAD will be alerted to the presence of chemical agent vapor hazards so that the operator



and his chain of command can take protective measures to operate in a chemically-contaminated environment.

- JCAD will be issued to:
  - Army squads
  - Marine platoons
  - Air Force aircraft, base reconnaissance, and ground-service personnel
  - Navy shore installations
- JCAD will be employed in a wide variety of tasks including personal detector, survey instrument, aircraft interior detector, and fixed installation monitor.

## Activity

- The program was rebaselined in 2003. The Single Acquisition Management Plan was approved in September 2005. DOT&E approved the Test and Evaluation Master Plan (TEMP) for the rebaselined system during FY06.
- A JCAD operational assessment was conducted during FY06.
- The following DT/OT completed during FY06:
  - Simulant and Agent Relationship: Compared JCAD's response to both actual chemical agents and agent simulants that will be used in field testing of the device
  - Field Simulant Test: Determined JCAD's probability of detection of chemical simulants in an ambient environment and investigates JCAD's integration in selected representative combat vehicles
- The following DT/OT was partially completed during FY06:
  - Gate 2 Chemical Agent Surety Testing: Demonstrated JCAD's ability to detect and identify several concentrations of chemical agents in a series of representative environments of temperature and humidity
  - Weapons Grade Agent: Verified JCAD's ability to detect and identify exposures of explosively-disseminated weapons-grade agents
  - Nuclear, Biological, and Chemical (NBC) Contamination Survivability: Assessed JCAD's capability to withstand the effects of NBC agents, as well as decontamination solutions and processes

# DOD PROGRAMS

- Standalone Interferents: Determined JCAD's susceptibility to false alarming in the presence of several potential interferents
- Preliminary preparations were made for the following DT/OT:
  - Chemical Agent Surety with Interferents: Determines JCAD's ability to discriminate, detect, and identify chemical agents in the presence of several potential interferents
  - Fielded Detector Comparison: Compares the performance of various fielded detectors with the JCAD; these detectors are the Automatic Chemical Agent Detector Alarm (ACADA), Shipboard-ACADA, and Improved Chemical Agent Monitor (ICAM)
  - Post Field Detection: Determines whether the detection and identification capabilities of JCADs previously used for DT and OT events have been degraded

## Assessment

- DT/OT to date indicates that the JCAD has a probability of detecting four chemical agents greater than 90 percent of the time and a probability of detecting another agent 85 percent of the time. In general, average detection response times meet or exceed requirements. Detection response times for very low levels of agent contamination need to be improved.
- JCAD false alarm rates appear to be acceptably low for ground operations, but unsuitably high for afloat operations. They are still to be determined for rotary-wing and fixed-wing air operations.
- During the operational assessment, the warfighters found the JCAD easy to operate, troubleshoot, and maintain. They also

liked JCAD's light weight and small size. They reported the following drawbacks:

- The JCAD's sampling interval is too long for monitoring equipment and personnel for contamination, and was not well suited for on-the-move vehicle operations
- Vehicle mounting locations need to be selected to provide crewmembers easy visual and hand access to the JCAD
- JCAD needs both adjustable display illumination and alarm volume controls for use in operations requiring light and noise discipline
- Battlefield smoke and insect repellent caused the JCAD to false alarm
- JCAD's confidence checkers leaked in hot and humid field conditions
- During developmental testing, JCAD appears to have displayed acceptable performance in a wide variety of extreme environmental conditions, with the exception of:
  - Salt Fog Testing
  - Full Immersion Testing
  - Low Temperature Operations
- The Program Office is working corrections to address these deficiencies.

## Recommendations

- Status of Previous Recommendations. The Program Manager accepted our FY05 recommendations.
- FY06 Recommendations. None.