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GAO

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General Accounting Office
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National Security and
International Affairs Division

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June 15, 1992

The Honorable John Glenn
Chairman, Committee on
Governmental Affairs
United States Senate

Dear Mr. Chairman:

As you requested, we are reviewing the Department of Defense's chemical and biological detection program, for which the Army is the lead service. This program includes the production of the chemical agent monitor (CAM), a hand-held device used to monitor contamination levels after a chemical agent attack.

On May 19, 1992, we briefed your staff on the status of our review, and this letter summarizes our work on the CAM procurement. Our work shows that

-- the U.S. contractor has experienced difficulty producing acceptable CAMs,

-- testing of production units disclosed significant defects, and

-- the Army's fiscal year 1993 budget request for the CAM may be premature.

BACKGROUND

The Army Training and Doctrine Command (TRADOC) is responsible for determining materiel needs. In September 1984, it identified an urgent need for a portable, hand-held, automatic contamination monitoring system that could quickly detect mustard and nerve agent vapors and provide a relative measure of the amount of contamination present. TRADOC determined that the available chemical agent detectors were unacceptable to meet this need because of their slow response time. In response to the need, the Army selected the CAM, which was originally produced in the United Kingdom for the Ministry of Defense by Graseby Dynamics, Ltd. (currently Graseby Ionics), London, England.

The Army awarded a limited production contract for 1,261 CAMs to Graseby Ionics in 1986. Subsequent licensing for the CAM was obtained by an American contractor, Bendix Environmental Systems, Baltimore, Maryland, a division of Allied Signal, Inc. Allied Signal later sold the division to several investors, and it became the Environmental Technologies Group, Inc. (ETGI). Table 1 summarizes the Army's procurement of the CAM.

Table 1: Army's Procurement of Chemical Agent Monitors

	Contract			Quantity
Contractor	Date	Quantity	Amount	delivered
Graseby	Jan. 1986	1,261	$ 8,198,308	1,261
ETGI	Sept. 1987	3,739	24,884,798	2,385
Graseby	Jan. 1991	495	3,793,680	495
ETGI	Feb. 1991	6,400	40,096,000	0
Total		11,895	$76,972,786	4,141

The CAM gives one to eight bar readouts to indicate the relative presence of either nerve or blister chemical agent vapors. The bar readings do not indicate the actual concentration of chemical agent present. Rather, they provide a relative indication of the level of chemical agent present; the higher the bar reading, the greater the level of contamination.

U.S. CONTRACTOR HAS EXPERIENCED DIFFICULTY PRODUCING ACCEPTABLE CAMS

According to the Army, the January 1991 procurement from Graseby was necessary because of urgent requirements associated with Operation Desert Storm and because ETGI had not yet produced acceptable CAMs under its September 1987 contract. The final delivery of CAMs from ETGI under this contract was originally scheduled to occur in March 1990, 31 months after the contract award date. However, the delivery schedule slipped because ETGI's CAM could not pass first

article testing.[1] Further, the contractor had various production problems that continue today. Final delivery is currently scheduled for November 1992.

ETGI's CAM has yet to pass first article testing primarily because the monitor's bar readout lens tends to crack during testing in cold temperatures. Following completion of the CAM's third unsuccessful first article test in January 1991, the Army granted ETGI conditional first article test approval under the provision that the first 400 CAMs produced would be tested to demonstrate that the problem with the cracked lens had been resolved. However, after delivery of over 2,300 CAMs this situation continues, and the Army has continued to require cold testing prior to accepting CAMs. The lens problem and numerous other problems, such as pump leaks, have caused ETGI to rework its rejected CAMs in order to produce sufficient acceptable CAMs to meet the revised delivery schedule.

TESTING OF PRODUCTION UNITS DISCLOSED SIGNIFICANT DEFECTS

To determine the acceptability of ETGI's CAM production units, the Chemical Research, Development and Engineering Command (CRDEC), the materiel developer[2], requested TECOM to test a number of the initial production units using live chemical agents. TECOM began this testing in December 1989 and completed it in February 1992.

A TECOM test official told us that the draft report indicates that the CAM failed the test. As a result, TECOM will recommend against fielding the ETGI CAMs until they pass this test. This official further stated that the ETGI CAM failed initial production testing for two reasons. First, the technology may be at its limit and is unable to provide consistent bar readings that can be relied upon to determine when it is safe to unmask and take off protective clothing. Second, the poor quality of the ETGI CAM has also contributed to its test failure. TECOM's draft report disclosed the following results:

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[1]First article testing is conducted to ensure that the contractor can furnish a product that conforms to all contract requirements for acceptance.

[2]The materiel developer is the organization responsible for the research and development work required to produce a required item of equipment.

-- Tested with 5 different chemical agents and 19 agent concentration combinations at ambient temperatures (77 degrees), the CAMs failed to respond properly (mainly bar responses outside the criteria values) in 39 of 356 attempts (11 percent). In addition, CAMs were tested under 12 conditions to determine whether they could be cleared for reuse within the required 60 seconds. The CAMs showed clearance times in excess of the allowable 60-second period in 182 out of 356 attempts (51 percent).

-- In tests with 4 agents and 13 agent concentrations in hot and cold conditions, the CAMs failed to provide an accurate bar readout under 11 of 13 conditions during the hot trials and 12 of 13 conditions during cold trials. The CAMs failed to meet the 60-second clearance requirement in 10 of the 13 hot trials and in all 13 of the cold trials.

-- The monitor's handle clearance was too small to be used with the arctic mitten, as required to meet military standards (MIL-STD-1472D).

-- The CAM did not meet all of the nuclear/biological/chemical survivability criteria. Specifically, it did not meet the hardness criteria necessary for biological decontamination.[3] The necessary decontamination measures may damage the CAMs, making it necessary to repair or replace them after use.

Referring to the results of the initial production testing, TECOM test officials told us that "the only thing consistent about the CAM's bar readings is its inconsistency." Further, these officials stated that if the bar readout problems were left unresolved, serious difficulties would occur for the users of the CAM. They explained that TRADOC and proponents of collective protection shelters[4] have established guidelines that require commanders in the field to take certain actions based upon the response of the CAM

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[3]The CAM must be capable of withstanding the material damaging effects of nuclear/biological/chemical contamination and the procedures and agents required for decontamination.

[4]A collective protective shelter provides protection against chemical/biological agents for personnel without the use of individual protection garments and masks.

to chemical agent contamination. If the CAM cannot provide the user with a reliable response, its utility is questionable. A commander, for example, would not be able to rely on it to make a decision such as when it was safe to take a wounded soldier into a collective protection shelter for treatment.

A TECOM official explained that TECOM performed some limited testing on the initial Graseby CAMs; however, the Army generally relied on limited Graseby test results. This official further explained that the technology issue should be resolved when TECOM tests the ETGI CAMs produced under the 1991 contract, and a new version of the CAM, the improved CAM (ICAM), which is currently being developed by Graseby. The ICAM is designed for easier maintenance than the current model but is based on the same technology and therefore will probably have the same reliability problems. Initial TECOM testing of the ICAM's design changes showed that it may not work as well as the current CAM model.

Army Chemical School[5] officials were aware of the CAM's inaccurate bar reading problem; however, they were unaware of the actual TECOM test results. A Chemical School official responsible for the CAM advised us that in order for the CAM to have utility for judging the severity of chemical agent contamination after an attack, it must have consistent bar readings. This official advised us that until the Chemical School receives official notification from CRDEC that the CAM failed its initial production test, the Chemical School cannot judge the usefulness of the CAM.

PART OF THE ARMY'S FISCAL YEAR 1993 BUDGET REQUEST MAY BE PREMATURE

The Army's fiscal year 1993 budget request for nuclear/biological/chemical defense systems totals $22.7 million. Of this amount, $9.5 million is for the proposed procurement of the ICAM. Since there are concerns that the CAM, because of technology limits, may never pass initial production testing or fulfill mission requirements, the planned $9.5 million procurement for ICAMs could be deferred until the Army fully analyzes the initial production test results and determines the actual utility of the CAM.

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[5]The Army Chemical School, a component of TRADOC, is responsible for establishing the requirements for needed chemical equipment.

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To determine the quality of the ETGI-produced CAMs, we obtained the required first article test results and discussed them with an official of CRDEC's Product Assurance Directorate. We also discussed the quality of the monitors with the Defense Contract Management Quality Assurance Representative at ETGI's production facility in Towson, Maryland.

To ascertain whether the CAM has defects that degrade its usefulness, we obtained and reviewed TECOM's draft initial production test report on live agent testing conducted at the Dugway Proving Ground, Utah. We discussed this report with TECOM, TRADOC, and Chemical School officials to determine their views on the utility of the CAM.

Within CRDEC, we obtained CAM contract information from the Procurement Directorate and CAM financial information from the Office of the Project Manager for Nuclear/Biological/ Chemical Defense Systems.

If you or your staff have any questions about the information presented in this letter, please call me at (202) 275-4141.

Sincerely yours,

Richard Davis

Richard Davis
Director, Army Issues

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