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Report to the Chairman, Committee on Foreign Affairs, House of Representatives

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BIGEYE BOMB

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Program Evaluation and
Methodology Division

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May 20, 1988

The Honorable Dante Fascell
Chairman, Committee on Foreign Affairs
House of Representatives

Dear Mr. Chairman:

This report responds to your staff's request that we provide preliminary findings on our work involving the developmental and operational testing of the Bigeye bomb. We have continued to actively monitor and evaluate the Bigeye program since we sent you our June 4, 1987, analysis of the Bigeye operational test plan. As you know, several GAO reports and letters of correspondence have been issued over the past five years in the area of chemical warfare and the Bigeye bomb. We will provide more detailed reports on operational and developmental testing in the near future.

Objectives, Scope, and Methodology

We have concentrated our attention on three key areas of quality: that of the operational testing program for Bigeye; that of the developmental (laboratory) testing of the weapon, involving lethal agent; and that of DOD's evaluation of the Bigeye's operational capabilities in a mission context. This report discusses our findings, which are based on the data we have received from DOD to date. We employed multiple data gathering methods to produce our findings. We obtained documents such as briefing papers, status reports, manuals, memos, test plans and test results and analyses. We reviewed and analyzed these documents to assess the status of the program and to identify information gaps related to testing issues. We interviewed officials from the Office of the Secretary of Defense, the Naval Air Systems Command Program Office, the Army's Chemical Research, Development and Engineering Center, the Director of Operational Test and Evaluation, the Navy's Operational Test and Evaluation Force, and we also interviewed operational testers from the Air Force and Navy and private sector experts to verify results and to assure the completeness of our evidence.

We discussed the issues in our report with these officials and have included their comments where appropriate. However, in accordance with your wishes, we did not obtain written comments on a draft of this report.

Operational Testing

At the time of our June 1987 analysis, the Bigeye operational testing (OT) program had been suspended and the bomb decertified, due to numerous failures during the testing of the first ten bombs. That testing resumed in late August 1987, and 48 additional bombs were dropped by the end of December 1987. The Defense Department expected to issue a report on the OT results by March 15, but no report has yet been issued. Our comments therefore must be based on the data we have received, and on our interviews with DOD officials, rather than on a completed DOD report.

Our June 1987 analysis cited four major concerns with the OT program—unrealistic mission profiles, the absence of a data analysis plan, an excessive number of independent variables, and 10 limitations to achieving operational realism. Although DOD did not resume testing for nearly three months after we raised these issues, no changes were made in the test plan to address them. Indeed, DOD rejected most of our observations as unfounded in a lengthy letter sent to the House Armed Services Committee at the end of July, which we did not see until early September. We did not, in fact, receive a direct reply to our comments until March 8 of this year—almost nine months after our report was issued.

The results of the August to December 1987 tests confirm the validity of the issues we raised in our June analysis. Although we have the test data from Dugway, it is virtually impossible to determine why some test runs were successful and why some failed, due to the large number of independent variables present in every run (a problem we highlighted in our June 1987 analysis). For example, we cannot determine why a test run with three bombs covered less area than a test run with one bomb. The variables include: wind, drop height, fuze setting, number of weapons, release mode, aircrew experience, type of aircraft, and so on. Even for purposes of determining accuracy, for which all 58 weapons will be used, there are only 18 weapons that are countable, given DOD's criteria.

The Bigeye program office states that the overall reliability of Bigeye now stands at 0.79 at the 80 percent lower confidence level. However, this reliability figure is based in part on DOD's assumption that the bomb will generate lethal agent every time its mixing system functions. Using data from the DOD laboratory tests, however, we determined that at the DOD-required level of lethality, VX was generated much less often than the level assumed by DOD. Including these actual test results from the

laboratory in calculating reliability, the weapon system reliability figure falls considerably lower than 0.79.

Other problems complicating analysis of Bigeye tests involve changing and loose definitions of success being used by DOD. A criterion contained in the Test and Evaluation Master Plan was changed during the course of testing, which lowered the reliability requirement. Furthermore, criteria for accuracy and deposition are either so vague or so broad that deposition of virtually any simulant over a very large area is considered evidence of a successful run. Such criteria are of questionable utility in evaluating the weapon.

Despite these problems with the test program, President Reagan certified the Bigeye as "in the national interest" in January 1988, thereby releasing $90 million in funds previously allocated for Bigeye production "facilitization."

According to the Bigeye program office, the Bigeye program has now entered low-rate-initial production (LRIP), which calls for the production of hundreds of bombs. Of these, 20 bombs will be subjected to article acceptance tests in the fall of 1989, and 80 will be used for additional operational testing scheduled for early 1990.

However, if future test plans also contain a multiplicity of independent variables and shifting and vague definitions of success, important questions about weapon performance will remain unanswered. In sum, then, we find that the quality of the operational testing program for Bigeye has not improved.

Bigeye Developmental Testing

In addition to the operational testing results, the Defense Department issued a collection of reports in September 1987 on supplemental developmental testing (DT) of the Bigeye bomb. The DT reports, based in part on laboratory tests of lethal agent and simulant by the Chemical Research Development and Engineering Center (CRDEC), were issued together as a set of seven appendices with one cover letter from DOD. They were the DOD response to legislative requirements in the FY 1987 Defense Appropriation Bill involving four major Bigeye problems cited in our June 1986 report (GAO/PEMD-86-12BR): excessive pressure buildup, generation of lethal agent, agent "flashing" (burning), and the overall reliability of the weapon.

In order to answer questions about pressure, DOD conducted just one additional test, at the CRDEC laboratories. We believe that the results of this test are not conclusive, in part because the rate of pressure buildup in the test was noticeably slower than in four of the five previous high temperature-start tests.

Similarly, with regard to lethal agent generation, we find that DOD has not fully answered the congressional question. DOD continues to assume that there is a predictable correlation between VX purity and biotoxicity, despite the fact that CRDEC officials state that this is not scientifically sound. This assumed correlation is especially significant because DOD's calculations of weapon reliability are based on the assumption that adequate VX is generated every time mixing occurs inside the weapon. If this is not true, and we believe as does CRDEC that it is not, then the reliability calculations being claimed by DOD are in doubt and the weapon does not meet DOD specifications for lethal agent generation.

We also believe that flashing, or agent burning, is an unresolved Bigeye issue, contrary to DOD conclusions. Rather than conducting any tests, DOD did a literature search on flashing, and concluded that it is no longer a concern. Yet in four of six Bigeye lethal agent generation tests with high temperature starts, the temperature generated inside the bomb actually met or exceeded the VX auto-ignition temperature. There is also empirical evidence that impure VX flashes at lower temperatures than pure VX, and Bigeye reactions often contain high levels of impurities.

Furthermore, Bigeye program officials now state that almost all the data they cited in their August 1987 report on Bigeye reliability cannot be replicated, because a former program official selectively chose the data to portray the program in a favorable way. The Bigeye program office is uncertain about which test data were used to calculate lethal agent generation reliability, and therefore no longer endorses the figures issued in the report. We commend the Bigeye program office's candor on this point, but note that the matter of Bigeye reliability is left unresolved.

We conclude that DOD has not answered the major concerns raised in the FY 1987 legislation with regard to developmental testing. The evidence cited by DOD is unconvincing—potential pressure problems are not solved by one additional test which differs from previous tests; flashing is not solved by a literature search; lethality is not solved by using a correlation rejected by CRDEC experts; and reliability is not demonstrated

by using data analyses now considered unreliable by the Bigeye program office.

Operational Capabilities

At your request, we also reviewed DOD's August 1987 study of the operational capabilities of the Bigeye bomb, which had been issued in response to a legislative requirement in the FY 1987 Defense Appropriation Bill. The legislation required DOD to report on the "military requirements for long-range standoff chemical weapons," including "the military advantages and disadvantages of such weapons and the potential of such weapons to complement the currently planned binary chemical weapon systems."

However, we found that the 11-page DOD report contained such a small amount of empirical data that it was impossible for us to do a proper full-scale analysis. The DOD study analyzed only four of many possible delivery-system alternatives for chemical weapons; provided only a cursory comparison of the military advantages and disadvantages of the alternatives; and gave no indication of the comparative cost of developing and fielding the alternatives. In effect, DOD had not prepared a report with the essential elements of an operational capability analysis. In interviews with DOD officials, they conceded that the study was at best "preliminary," and that further study of operational capability is necessary.

Under these circumstances, we decided to end our operational capability study, after consultation with your staff.

Summary

Clearly, a great deal of work remains to be done with regard to the Bigeye weapon. Questions about operational capability remain unanswered. Many of the issues we raised in our June 1986 report on development testing remain unresolved, as do the concerns about the operational testin program that we brought to your attention in June 1987. We continue to believe that a careful testing program could have answered most of our major questions. Unfortunately, the necessary changes were not made in the test plan to respond to the issues we raised.

If you have any questions concerning this report or any other aspect of our work on the Bigeye weapon system, please call me (275-1854) or Mr. Kwai Chan, Group Director (275-6161).

Sincerely,

Eleanor Chelimsky
Director

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