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STATEMENT OF

WALTON H. SHELEY, DEPUTY DIRECTOR

PROCUREMENT AND SYSTEMS ACQUISITION DIVISION

before the

Subcommittee on Investigations

House Committee on Armed Services 501

on

[Matters Relating to the XM I Tank]

Mr. Chairman and Members of the Subcommittee:

We are pleased to be here today to provide you with our findings relating to the XM 1 tank and our assessment of its current status.

In our last report to the Congress on the XM1, issued on January 29, 1980, we recommended that production proceed at a low rate in view of continuing reliability and durability problems, particularly with the turbine engine. We also recommended, at that time, the start of a back-up diesel engine program should a blue ribbon panel, which had been evaluating the tank's power train for the Secretary of Defense, continue to have reservations about the turbine engine's performance.

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The panel, in February of this year, issued a report on its assessment. We have received a number of inquiries from members of the Congress asking whether, in the light of the panel's report, our views had changed, particularly on the desirability of starting a back-up diesel engine program. Having studied the panel's report, and interviewed seven of its nine members as well as other individuals with extensive turbine engine experience, our position remains essentially the same as it was when we issued our report last January.

We understand the urgency of fielding the new tank as quickly as possible. However, we have been troubled for some time about the rush to produce the tank before an adequate demonstration that it will meet the requirements established by the Army. In a letter to the Secretary of Defense about one year ago, just prior to the initial production decision, we stated that it would be preferable to defer that decision until the tank's reliability had been demonstrated in further testing. Our position was based on the Army's own operational and development test results which revealed that the tank's performance was considerably short of its reliability requirements. At that stage of the development process the Army's objective was for the XM1 to be able to travel 272 mean miles between failures. In the tests the tank attained only 145 mean miles between failures.

There were a number of engine failures caused by excessive ingestion of dirt and there were also problems with the fuel system. In addition, track was frequently thrown, and a problem with shifting gears developed in the transmission.

Nevertheless, the Secretary of Defense, with Congressional concurrence, decided to authorize initial production. He did, however, limit the first year's procurement to 110 tanks and conditioned his approval of the second year's procurement of 352 tanks on the XM1's achieving certain reliability objectives in further tests. The Secretary directed that these take place under conditions similar to those prevailing during the operational tests which had been held at Fort Bliss, Texas. The Secretary also assembled a panel of experts to evaluate the tank's power train in view of its poor showing. The panel, at that time, identified several deficiencies and urged continued testing, particularly of the turbine engine.

The Army selected Fort Knox as the site for the reliability and durability tests. Three tanks were tested, each one modified to correct problems disclosed in the previous tests. Some of the problems experienced at Fort Bliss, such as track throwing and dust ingestion, did not recur with enough frequency to cause concerns. The transmission performed reliably. These improvements were the major reasons for the more favorable test scores at Fort Knox. On the basis of the tank's performance the Army computed the mean miles between failures at 299. However, the 299 mean mile reliability level may not be a true indicator of the tank's current reliability.

Although the Army considers the type of testing conducted at Fort Knox to have been as challenging as the operational tests at Fort Bliss there were some important differences. The cross-country courses at Fort Bliss were selected at random so that obstacles and ruts were less anticipated by drivers than the impediments at Fort Knox where the same courses were used consistently. The more frequent firing at Fort Bliss placed a greater stress on the vehicle. The tanks at Fort Knox did not fire on the move as did the tanks at Fort Bliss. There were more quick turns and cross-country maneuvering at Fort Bliss.

The modifications to the XM1 have obviously improved the tank's capacity to retain its track and withstand severe dirt and dust conditions. Improved transmission performance was also evident in the Fort Knox tests. We believe, however, that until the tank is put through its paces in further operational tests this year its reliability in combat will not have been sufficiently determined. In particular, further specific modifications are needed, according to the blue ribbon panel, to make the turbine engine more reliable and durable.

In its report the blue ribbon panel concluded that, based on the Fort Knox test results, the XM1 had demonstrated a reliability of 306 mean miles between failures. The panel further concluded that considerable progress had been made towards achieving the power train's long term durability goal. However, the panel also noted several deficiencies, and proposed that an improvement program begin immediately in those areas and that the fixes be validated in further testing. It suggested continued performance evaluation through the next series of operational and development tests scheduled to begin shortly, and the completion of environmental testing, that is, testing in extreme temperatures.

A few observations about the panel's evaluation are in order.

1. The panel made its assessment of the tank's reliability based on the Fort Knox test data. The panel did not consider the differences in the types of testing occurring at Fort Knox and Fort Bliss. Using the same data that the Army scorers of the Fort Knox tests used it computed a reliability statistic of 306 mean miles between failures which more or less confirmed the Army scorers' statistic of 299 mean miles between failures. Actually, failures during the tests occurred with much greater frequency than these scores would indicate. However, many were judged to have no effect on the tank's ability to complete its mission. The statistics represent projections based on the scorers' perceptions of the seriousness of the failures and the

likelihood that they would recur pending further corrective modifications. Both statistics, we believe, should be qualified as possibly not being truly indicative of the tank's reliability in an operational environment.

2. To a large extent the improvement in the power train's performance was due to the improved performance of the transmission and the final drive. This is underscored by statistics reported by the panel which showed that about 80 per cent of the serious power train failures occurred in the engine. The panel also estimated the engine's demonstrated durability to be well below the design objective.

3. The panel identified what it termed "relatively few but important" areas in need of further development to realize a quantum jump in durability over existing diesel engines. It was the expected long-term growth in the turbine engine's durability that was a key factor in the Army selection of the turbine-powered tank.

--The panel cited the unsatisfactory design for retaining the first stage high pressure turbine blades. This is done by a retention wire. This is apparently the most serious of the problems. The panel estimated the wire's life to be only 200 hours. The Army is considering proposing use of a double wire but panelists we interviewed do not consider this a permanent solution.

--Bearings in several locations were loosened, had worn the housing, and resulted in oil leakage.

--The oil seals indicated considerable distress after testing causing leakage which in turn led to other problems.

--The high pressure turbine nozzle continued to show extensive cracking and erosion after some 400 to 700 hours of operation. The panel proposed programming a lower gas temperature but at the expense of some degradation in horsepower. For the long term it proposed further development to improve the high pressure turbine nozzle's durability.

The cost of these and other recommended improvements is not yet known. The Army believes it could require up to two years to make the fixes.

We interviewed seven of the nine panelists. The panel members' consensus is that while the engine is close to the point where it should be in performance and durability at this stage of its development an intensive effort is necessary to achieve its design goals. Although the panel was not asked to make any comparisons with diesel engines the panel members we spoke to unanimously prefer investing more money to improve the turbine engine's performance than to start a back-up diesel engine program.

The Department of Defense has chosen to follow a high risk acquisition policy for the XM-1 tank. That is - it has structured the program so that it relies on the successful concurrent development of a turbine engine - a type of propulsion system that has never proved itself adaptable to a tank. The failure of the engine to meet reasonable reliability and durability goals could have catastrophic results both in terms of cost and combat capability. But that decision has been made - and given the fact that production has started the issue now is how to proceed to accomplish the objective of improved combat capability, in the shortest reasonable time, at the lowest cost to the Government.

There appear to be five alternatives open to the Department of Defense and to the Congress.

A. Continue producing the tank with the turbine engine at a low production rate and simultaneously fund the development of a diesel engine to protect against the turbine engine's failing to meet reliability goals.

B. Continue producing the tank with the turbine engine but at a low production rate pending further testing but do nothing about beginning an alternative diesel engine program.

C. Authorize full production of the tank with the turbine engine in the expectation that the engine's problems will be resolved and take no action on beginning a diesel engine program.

D. Authorize full production of the tank with the turbine engine and simultaneously begin an alternative diesel engine program.

E. Stop production of the turbine engine entirely until its problems are resolved.

We believe the last three are not viable alternatives at this time.

Alternative C would create the risk of incurring substantial subsequent retrofitting cost. Alternative D would do the same and, in addition, involve a heavier investment in development cost. Alternative E would add start-up production costs to the program and delay deployment of an effective tank for an inordinate period of time.

Considering the criticality of the XM1 program and its overall cost, we favor the first alternative - continued low production rate of the tank with the turbine engine, and the start of a back-up diesel engine program at a modest initial investment-as a prudent approach that best protects against the turbine engine's proving unable to meet expectations.

When we first discussed this possibility with XM1 project office representatives they estimated the cost of a diesel development program at about $144 million. Since the diesel technology is at hand and there are, in fact, some 1500 horsepower engines already in existence, we understand there would be little new development involved. Most of the cost would be in testing the tank with the diesel.

The Army has received an $11 million proposal from a diesel engine contractor. We discussed this proposal with the contractor. The contractor proposes to adapt its diesel engine to fit the XM1 tank. The proposal includes the fabrication of two engines and a 1,000-hour laboratory test of each engine. According to the contractor no redesigning of the hull would be needed but some configuration changes of the transmission would be needed for fitting purposes.

The contractor told us that incorporating its diesel engine would result in a net reduction of 92 pounds from the XM1's current weight. A significant part of this reduction, according to the contractor, stems from the need for less fuel to operate the diesel. The contractor said that to meet the XM1's 275-mile cruising range would require 380 gallons of fuel compared to the required 531 gallons for the turbine engine.

The project office estimates it would take 2 or 3 years to complete a diesel engine program including all necessary testing. The project office estimates that the various improvements recommended by the blue ribbon panel for the turbine engine would take from 6 months to two years.

The XM1 tank is just entering the third and final phase of operational and development testing. The next 12 months of testing will be critical to any evaluation of the XM1's potential performance in combat and the resolution of its reliability and durability problems. The tests will also provide indications of its maintainability. Because of the important decisions still to be made we believe it is important that the Congress stay abreast of the tank's progress in these tests. We intend to monitor them and provide this information to the Congress.

Mr. Chairman, this concludes my prepared statement and we will be pleased to answer any questions.