

DOD'S SOPHISTICATED MUNITIONS

L/ank

HEARING
BEFORE A
SUBCOMMITTEE OF THE
COMMITTEE ON
GOVERNMENT OPERATIONS
HOUSE OF REPRESENTATIVES
NINETY-EIGHTH CONGRESS
SECOND SESSION

SEPTEMBER 18, 1984

Printed for the use of the Committee on Government Operations



U.S. GOVERNMENT PRINTING OFFICE
WASHINGTON : 1985

42-382 O

COMMITTEE ON GOVERNMENT OPERATIONS

JACK BROOKS, Texas, *Chairman*

DON FUQUA, Florida	FRANK HORTON, New York
JOHN CONYERS, Jr., Michigan	JOHN N. ERLBORN, Illinois
CARDISS COLLINS, Illinois	THOMAS N. KINDNESS, Ohio
GLENN ENGLISH, Oklahoma	ROBERT S. WALKER, Pennsylvania
ELLIOTT H. LEVITAS, Georgia	LYLE WILLIAMS, Ohio
HENRY A. WAXMAN, California	WILLIAM F. CLINGER, Jr., Pennsylvania
TED WEISS, New York	RAYMOND J. McGRATH, New York
MIKE SYNAR, Oklahoma	JUDD GREGG, New Hampshire
STEPHEN L. NEAL, North Carolina	DAN BURTON, Indiana
DOUG BARNARD, Jr., Georgia	JOHN R. MCKERNAN, Jr., Maine
BARNEY FRANK, Massachusetts	TOM LEWIS, Florida
TOM LANTOS, California	ALFRED A. (AL) McCANDLESS, California
RONALD D. COLEMAN, Texas	LARRY E. CRAIG, Idaho
ROBERT E. WISE, Jr., West Virginia	DAN SCHAEFER, Colorado
BARBARA BOXER, California	
SANDER M. LEVIN, Michigan	
MEL LEVINE, California	
MAJOR R. OWENS, New York	
EDOLPHUS TOWNS, New York	
JOHN M. SPRATT, Jr., South Carolina	
JOE KOLTER, Pennsylvania	
BEN ERDREICH, Alabama	
GERALD D. KLECZKA, Wisconsin	
GEORGE (BUDDY) DARDEN, Georgia	

WILLIAM M. JONES, *General Counsel*

JOHN E. MOORE, *Staff Administrator*

JAMES E. LEWIN, *Chief Investigator*

STEPHEN M. DANIELS, *Minority Staff Director and Counsel*

LEGISLATION AND NATIONAL SECURITY SUBCOMMITTEE

JACK BROOKS, Texas, *Chairman*

DON FUQUA, Florida	FRANK HORTON, New York
ELLIOTT H. LEVITAS, Georgia	JOHN N. ERLBORN, Illinois
HENRY A. WAXMAN, California	WILLIAM F. CLINGER, Jr., Pennsylvania
STEPHEN L. NEAL, North Carolina	DAN BURTON, Indiana
TOM LANTOS, California	
RONALD D. COLEMAN, Texas	

RICHARD C. BARNES, *Staff Director*

LESLIE L. MEGYERI, *Professional Staff Member*

CONTENTS

	Page
Hearing held on September 18, 1984.....	1
Statement of—	
Brooks, Hon. Jack, a Representative in Congress from the State of Texas, and chairman, Legislation and National Security Subcommittee: Open- ing statement	1
Conahan, Frank C., Director, National Security and International Affairs Division, U.S. General Accounting Office, accompanied by Terry A. Kremer, group director, and Reginald L. Furr, Jr., evaluator in charge.....	2
Korb, Dr. Lawrence J., Assistant Secretary of Defense for Manpower, Installations and Logistics, Department of Defense	20
Letters, statements, etc., submitted for the record by—	
Brooks, Hon. Jack, a Representative in Congress from the State of Texas, and chairman, Legislation and National Security Subcommittee:	
August 21, 1984, Department of the Air Force notice of progress payments suspensions on all Maverick, Phoenix, and TOW con- tracts	29
August 24, 1984, article from the New York Times entitled "3 Mili- tary Services Suspend Payments for Missiles"	27
September 12, 1984, article from the New York Times entitled "Im- proper Microchip Testing May Bring Criminal Inquiry"	31
September 1984 article from the Armed Forces Journal International entitled "US Army Rolands for USAFE in Norway?"	33
Conahan, Frank C., Director, National Security and International Affairs Division, U.S. General Accounting Office:	
Listing of missiles allocated for training	16
Number of TOW missiles allocated and fired for training by the Army in Europe	14
Replacement cost for 10,155 missiles	7
Submissions to Congressman Horton's additional questions	11-12
Horton, Hon. Frank, a Representative in Congress from the State of New York: September 17, 1984, article from Aviation Week & Space Tech- nology entitled "Microchip Test Problem Halts Weapon Deliveries"	36-37
Korb, Dr. Lawrence J., Assistant Secretary of Defense for Manpower, Installations and Logistics, Department of Defense: Submissions to Con- gressman Horton's additional questions	41-44
APPENDIX	
Material submitted for the hearing record.....	47

DOD'S SOPHISTICATED MUNITIONS

TUESDAY, SEPTEMBER 18, 1984

**HOUSE OF REPRESENTATIVES,
LEGISLATION AND NATIONAL SECURITY SUBCOMMITTEE
OF THE COMMITTEE ON GOVERNMENT OPERATIONS,
*Washington, DC.***

The subcommittee met, pursuant to notice, at 10:15 a.m., in room 2154, Rayburn House Office Building, Hon. Jack Brooks (chairman of the subcommittee) presiding.

Present: Representatives Jack Brooks, Elliott H. Levitas, Ronald D. Coleman, Frank Horton, John N. Erlenborn, and William F. Clinger, Jr.

Subcommittee staff present: Richard C. Barnes, staff director; Leslie L. Megyeri and Robert Moreno, professional staff members; Mary V. Heuer, clerk; and Mary Alice Oliver, secretary; full committee staff: William M. Jones, general counsel; Robert S. Richard, professional staff member; Stephen M. Daniels, minority staff director and counsel; and Douglas D. Mitchell, minority professional staff, Committee on Government Operations.

OPENING STATEMENT OF CHAIRMAN BROOKS

Mr. Brooks. The subcommittee will come to order.

Today the subcommittee continues its oversight of the operations of the Department of Defense. As the debate continues over just how many billions of dollars need to be committed to defense, this subcommittee has a responsibility to do everything possible to assure that the Department of Defense is, in fact, well managed, and that the dollars allocated to defense are used to maximum advantage and are not squandered.

The focus of this hearing is on the military services' requirements for sophisticated missiles and how their use during training and weapon system evaluations affects the readiness and sustainability of our forces. The missiles we will be discussing are very expensive. For example, the Maverick, an air-to-ground missile, costs about \$90,000 each. The Air Force expects to spend \$5 billion on this program. The Navy's long-range air-to-air missile Phoenix costs about \$1 million each. Their total program is expected to be in the range of \$4 billion.

Because of the dollar amounts involved and the importance of missiles to our national defense, it is imperative that our missile programs be managed effectively. We are, therefore, concerned over reports that these expensive missiles are being fired in training programs where there is little evidence that the practice increases the combat readiness of the services.

We are also concerned over recent reports of quality control problems in some missile production programs.

We will hear testimony today from the General Accounting Office on the results of a review they recently completed on the use of these missiles for training and weapon system evaluations. We will also hear from the Defense Department on what its current policies are regarding the use of these missiles.

Mr. Horton.

Mr. HORTON. Thank you, Mr. Chairman.

I would like to join you in welcoming again Dr. Korb and Mr. Conahan as witnesses before our subcommittee.

The purpose of this morning's hearing, as you have already indicated, is to review the policies and training objectives that set the requirements for live fire practice with tactical missiles. The high cost of precision guided munitions and the availability of increasingly effective training devices are developments that should be recognized in all the services' training programs along with their unique combat training objectives. Expenditures of live munitions without a clear rationale is something we clearly cannot afford. Recurring breakdowns in quality assurance, most notably involving some of the missiles under discussion this morning, point up another need for live firing: that is, weapons evaluation.

While training and weapons evaluation both should contribute to the readiness posture of our military forces, there is a clear trade-off in this area against requirements for sustainability, especially in view of the shortfalls in war reserve stocks that our committee has deplored in the past. Accordingly, I am very interested, as you are, in hearing the views of our distinguished witnesses on how to ensure economy and efficiency in DOD's management of sophisticated munitions for purposes of training and evaluation.

Thank you, Mr. Chairman.

Mr. BROOKS. Thank you, Mr. Horton.

Our first witness this morning is Frank C. Conahan, Director of the National Security and International Affairs Division of the U.S. General Accounting Office. In his present position, he is responsible for planning and executing all of GAO's work relating to defense and international affairs. This is a tremendous responsibility and a tremendous challenge.

He is accompanied by Terry A. Kremer, group director; and Reginald L. Furr, Jr., the evaluator in charge.

Gentlemen, we welcome you here today and look forward to your testimony.

You may proceed, Mr. Conahan.

STATEMENT OF FRANK C. CONAHAN, DIRECTOR, NATIONAL SECURITY AND INTERNATIONAL AFFAIRS DIVISION, U.S. GENERAL ACCOUNTING OFFICE, ACCOMPANIED BY TERRY A. KREMER, GROUP DIRECTOR, AND REGINALD L. FURR, JR., EVALUATOR IN CHARGE

Mr. CONAHAN. Thank you, Mr. Chairman and other members of the subcommittee. We appreciate the opportunity to participate in this hearing today.

I will limit my comments to a short summary of our principal findings. Some of the information underlying our findings is classified and can be discussed with the committee at some other time in some other form. But I think we can deal with the principal findings of our work in a nonclassified format today.

The services have generally held that the firing of missiles in peacetime is necessary to train pilots and gunners by building their self-confidence and morale and to evaluate weapons systems. Their position on training seems to be eroding somewhat. Nonetheless, in fiscal year 1984, the services plan to fire about 7,900 missiles for training and evaluation purposes. These missiles have a replacement value of \$437 million. Based on our work, we believe the Department of Defense needs to develop better criteria as to how many missiles the services need to fire to achieve these goals.

Minimizing the numbers of missiles used for these purposes is important because the services do not have enough missiles to meet their wartime inventory requirements. This shortfall will persist for some time, even though a significant number of missile deliveries are scheduled in fiscal years 1984 and 1985 and thereafter.

Most missiles are fired annually for training, except for Air Force air-to-air missiles, which are fired to evaluate the weapon system—that is, to test missiles, aircraft, and crews as integrated units. A secondary benefit from the weapon system evaluation missile firings is training.

The Office of the Secretary of Defense has not issued policy guidance for the peacetime consumption of missiles. Therefore, the services have each developed their own criteria. As a result, there is variation within and between the services for firing missiles.

An example of this variation is seen in the Marine Corps and Army guidance concerning the TOW missile. The Marine Corps guidance requires each of the two Cobra helicopter crewmembers and each ground TOW gunner to fire a missile annually to ensure proficiency.

In contrast, the Army guidance requires only its Cobra pilots to fire TOW missiles annually, although it has been providing additional missiles for firing by some of its ground TOW gunners. During fiscal year 1984, the Army allocated about 3,700 TOW missiles for training more than 16,000 pilots and gunners.

Another example of this variation is seen between the Navy/Marine Corps and Air Force for firing air-to-air missiles. The Navy and Marine Corps pilot training manuals require pilots to fire air-to-air missiles as part of their training to be combat ready.

On the other hand, the Air Force does not have any requirements in its training manual for pilots to fire air-to-air missiles to be rated combat ready. However, as stated earlier, they do fire air-to-air missiles in the Weapons System Evaluation Program. According to Air Force officials, the critical skill in employing air-to-air missiles is maneuvering the aircraft into the proper missile launch parameters. This skill can be developed and practiced by using instrumented training ranges, simulators, and other nonfiring training methods.

Our analysis of service missile firing results showed that firing missiles may not be necessary to achieve proficiency. The analysis indicates that most target misses are the result of missile or other

system malfunctions rather than pilot or gunner error. Our analysis also shows that Army and Marine Corps pilots and gunners firing TOW missiles for the first time scored just about as well as those who had fired more than one TOW; that is, multiple missile firings did not increase gunner accuracy. In this connection, the Army director of training has questioned the need for repeated TOW firings as well. He told us that, in his opinion, based on TOW missile training devices and firing results, each pilot and gunner may need to fire only one TOW missile during his career.

Our discussions with other service officials also raised doubt concerning the need for pilots and gunners to fire missiles. Training officials and unit commanders in the Army, Air Force, and Navy told us that combat-qualified pilots and gunners can be trained without firing missiles because other training devices, such as simulators, tracking devices, and instrumented training ranges can be used.

Notwithstanding the Navy and Marine Corps annual missile firing requirement, they reduced fiscal 1984 firings for training by about 50 percent in order to increase missile inventories. In addition, the Navy is studying the use of simulators and other training devices to see if it can further reduce missile firings. The 1983 DOD IG report which prompted the Navy actions questioned the need to fire missiles for training because: One, missile skills can be developed up to the point of firing the missiles through the use of simulators and other training devices; and two, missile inventories were less than their wartime requirements.

The Army and Marine Corps plan to use simulators to train their gunners rather than firing the new Stinger missile because of its high cost of \$76,000 each. Moreover, an Army study has shown that simulators and tracking devices are highly effective in developing the target-tracking skills of Cobra TOW missile gunners.

In our view, developing proficiency through live firings is constrained because current missile firings take place under artificial conditions, imposed by safety and range restrictions. Specifically, some missile targets do not realistically simulate the threat; some missile shots are at nonmaneuvering targets; and pilots usually know the direction, altitude, and speed of the target in advance.

For example, Army ground TOW missiles are fired at stationary targets under ideal conditions, bearing little relation to actual combat conditions. The Marine Corps also fires at stationary targets, although it does use more realistic combat techniques. Air Force pilots in Europe and Korea make Maverick missile training shots using techniques that are not combat realistic and by shooting at plainly marked stationary targets.

In summary, Mr. Chairman, we believe that there is a need for criteria to justify the number of missiles fired for training and evaluation. OSD should work with the services to develop firing criteria. This criteria should be developed for each type of missile through studies and analyses and should address the extent to which pilots' and gunners' use of available training devices could replace the actual firing.

That concludes my statement, Mr. Chairman. We will be happy to take any questions you have.

Mr. BROOKS. Thank you, Mr. Conahan, for a balanced presentation and for a careful evaluation of the documents that are now classified secret, particularly those that have to do with the matters you discussed in this report.

Do missile firings influence unit readiness ratings?

Mr. CONAHAN. To the extent that missile firings result in confidence building and improved morale, I should think that there would be some impact on overall readiness.

However, missile firings in and of themselves do not impact on readiness ratings because they are simply a small part of the total training effort, and their occurrence or nonoccurrence does not have a heavy weight in the development of the overall readiness rating. In fact, pilots can be rated combat ready without ever having fired a missile.

Mr. BROOKS. Through the use of what, simulators?

Mr. CONAHAN. Through the use of simulators and other training devices, yes, sir.

Mr. BROOKS. Do the services have a sufficient number of missiles on hand to meet the sustainability objectives of our forces?

Mr. CONAHAN. That has been a problem for some time, and it continues to be a problem. Concerning the 10 missiles that we looked at in our review, the services had between 13 percent and 83 percent of their inventory objectives at the beginning of fiscal year 1984.

Another factor, as was mentioned in your opening statement, is that some of these missiles are in an unserviceable condition. They are unserviceable because of routine maintenance, and they are unserviceable because of defects found in testing.

For example, at the beginning of fiscal year 1984, the Navy reported that one-third of its Sparrows and one-quarter of its Sidewinders were unserviceable.

Mr. BROOKS. Doesn't that signify a major quality control problem when a third and a quarter of two types of missiles are unserviceable?

Mr. CONAHAN. I can't comment precisely on why these two missiles were at that unserviceable level. Certainly there was some routine maintenance involved. There were certainly some instances where missiles were being taken from carriers and put in depots and back and forth. Also, some of these missiles had defects, and it seems to me to be a fairly high level, yes, sir.

Mr. BROOKS. Does the Marine Corps have any problems with any of their missiles?

Mr. CONAHAN. The Marine Corps noted that it has a safety problem with some of its TOW missiles. It seems that the motor may not ignite as it should in flight, thereby resulting in the missile actually dropping to the ground. It could sometimes restart and, depending upon the direction in which it's pointed, it could, in fact, come back to the gunner. They are fixing that problem. They are fixing it with respect to the TOW's that they need for training purposes. I understand that the Army had a similar problem, and that they are fixing them.

Mr. BROOKS. Isn't there a plan for DOD to transfer these missiles to the Army National Guard?

Mr. CONAHAN. I can't comment on that. I don't have that information, sir.

Mr. BROOKS. In February 1984, fixed TOW missiles were sent to the Team Spirit exercises in Korea. Is it not true that when those missiles were fired, there was a recurrence of the problem?

Mr. CONAHAN. I believe so, yes, sir. Yes, that is correct.

Mr. BROOKS. Mr. Furr, doesn't that indicate then that DOD did not fix the TOW missiles?

Mr. FURR. Those were a couple of firings—a couple of the missiles that they sent there malfunctioned, sir. It would seem that, for those particular missiles, the fix didn't work.

Mr. BROOKS. How much did the Navy save by reducing the number of missiles used in training?

Mr. CONAHAN. They reduced the number by close to 750 missiles, and an estimated savings of \$240 million, sir.

Mr. BROOKS. What is the Army doing to reduce its expenditures for munitions used in training?

Mr. CONAHAN. They have established a commission to establish standards for weapons training. The draft standard recommended an increase in the number of TOW missiles to be expended for training. Now the director of training for the Army has instructed the commission to go back and reassess its position and to rejustify the number of missiles that they had proposed. It is his view, as I pointed out in my statement, that TOW missile gunners and pilots may need to fire only one missile in their career and that, through the use of simulators and other training devices, we just simply don't need to expend as many missiles for training as we are now expending.

Mr. BROOKS. Do I understand that the GAO is suggesting that uniform criteria be established for firing missiles for training and evaluation? I mean, rather than having each service determine its own criteria?

Mr. CONAHAN. It would seem to me that we should see much more uniformity than there is right now. I think that OSD should work with the services to develop criteria. You have two or more services using the same weapon, and you find tremendous variations in the number of firings that each does during the course of a year.

Now certainly, the criteria should take into account such things as the launch vehicle and service mission and doctrine, and that might result in some differences between the services in terms of criteria. But I would expect to find much more uniformity than there is now, sir.

Mr. BROOKS. As I understand it, this study was directed to the sophisticated munitions that the services use.

Mr. CONAHAN. That is correct, sir.

Mr. BROOKS. Not torpedoes.

Mr. CONAHAN. I can just list them very quickly. It was the Sparrow and the Sidewinder, which are air-to-air; the air-to-surface missiles were the Shrike, the Maverick, and the Cobra TOW; surface-to-air; the Navy's standard missiles, the Stinger, the Redeye, and the Hawk; and surface-to-surface were the TOW, the Army and Marine Corps TOW, and the Navy Harpoon.

Mr. BROOKS. Thank you very much.

I would suggest that one of our members, Mr. Horton, has had some earlier experience in the Navy, but also some experience recently, with one of the more conventional systems. I wish he would just mention that. It just shows that the problem of expending ammunition and of availability of ammunition for the weapons we already have in production is a serious problem across the board in the Defense Department, in all of the services. Mr. Horton.

Mr. HORTON. Thank you, Mr. Chairman.

I was going to comment on that. About a year ago, I had the opportunity to visit one of the submarines that was at that point in Norfolk, and one of the points that was made during the course of that tour was that the submarines have only enough torpedoes to make one trip, and that when they fire torpedoes they have no replacements. So, if they find themselves in a combat situation, they can literally run out of torpedoes unless they go back and take them from another submarine. If we keep a sufficient reserve for this purpose, though, quantities on the submarines would go down still more. This illustrates some serious problems with regard to availability of ammunition, in this case torpedoes.

They are very expensive. There is no question about it. But on the other hand, they don't have enough training rounds either. So that, in my judgment, is a very serious problem that the Navy in particular and the Department of Defense have with regard to arming those submarines.

In your review of training with sophisticated munitions, did you find that the amount of live firings among the services was on the increase?

Mr. CONAHAN. Over a time horizon, going back several years, there has been a tendency toward an increase. Indeed, in 1984, as I mentioned earlier, the services planned to fire 7,900 missiles. They plan in fiscal year 1985 to fire 10,155 missiles.

Mr. HORTON. Have you got costs on those?

Mr. CONAHAN. In 1984, it would be 7,900, a cost of \$437 million. That is the replacement cost now. And in fiscal year 1985, they plan to fire 10,155. I don't have a number on that, Mr. Horton. I will provide it for you.

Mr. HORTON. You will provide us that?

Mr. CONAHAN. Yes, sir.

[The information follows:]

The replacement cost for the 10,155 missiles is \$502.6 million.

Mr. HORTON. What accounts for this increase?

Mr. CONAHAN. There are slight increases in the number planned to be fired for all of the missiles that we looked at, the 10 that I mentioned before. The bulk of the increase is in the TOW missile by both the Army and the Marine Corps.

As I mentioned earlier, the Army director of training did instruct the commission that the Army established to go back and take a look at their proposals for firing the TOW and to come up with a better justification for the number that they plan to fire, so there could possibly be some change in that.

As I mentioned earlier, in early 1984, the Navy cut back by 50 percent across the board. The number that I gave you does take into account the Navy cutback.

Mr. HORTON. What appears to be the principal training benefit from live firing?

Mr. CONAHAN. I think that the consensus on that is that it builds self confidence and morale of the pilots and gunners.

Mr. HORTON. But your view expressed earlier was that there really isn't any basis of justification for that; is that correct basically?

Mr. CONAHAN. Well, I think that is a military judgment. As I said, I think it is eroding. I think that, at one time, you would find very little deviation from that position. But during the course of our review, we found a fair level of thought that we didn't need to live fire to the extent that people heretofore thought that we had to live fire.

Now, of course, one has to take into account the fact that these missiles are terribly expensive, that we don't have our wartime inventory requirements, and perhaps those sorts of things tend to contribute to the kind of conclusions that we are hearing from some of these folks today.

Mr. HORTON. Did you do some studies of the alternatives to live firing? You mentioned some just a moment ago.

Mr. CONAHAN. Yes, we did take a look at some of the simulators that are used as an alternative to live firing, and some are really very, very excellent. They do everything that the launcher and the missile does in a live situation.

Mr. HORTON. Some of these are air launched. Do they do that in a simulator?

Mr. CONAHAN. Yes, sir.

Mr. HORTON. Or is that in an airplane with a simulator aboard?

Mr. CONAHAN. There is a new simulator called the weapons tactic trainer, and it is used primarily for the FA-18. It is a full simulator.

Mr. HORTON. As a matter of fact, I visited one of those installations at Griffiss Air Force Base. You can actually fly an airplane there. It is very interesting.

You did note that the Navy and Marine Corps, unlike the Air Force, require their pilots to fire air-to-air missiles annually so that they will be combat ready. Is it sufficient for this purpose merely to launch a missile in a combat exercise, or is successfully striking the target part of the training objective?

Mr. CONAHAN. The objective is a successful shot. If the shot is successful and there was a live warhead on the missile, it would be a kill.

However, our work shows that the launch need not be successful or, indeed, the gunner need not hit the target in order to get a combat ready rating. As I mentioned earlier, the live firing doesn't impact that greatly on the combat readiness ratings of pilots—that is so long as they do sufficient other training events.

Mr. HORTON. Live weapons firings are conducted for purposes of weapons evaluation as well as training, as you have already noted. Did you find that the services are fairly consistent in the number of live firings that they feel are necessary for weapons evaluation purposes?

Mr. CONAHAN. As you point out, Mr. Horton, most of the firings are done in the first instance for training purposes with weapons

evaluation as a secondary purpose. There we found rather significant variances. Now, as you do point out, the Air Force does fire the Sparrow and the Sidewinder primary for evaluation purposes.

If you take a look at 1984, after the Navy had cut the number of firings, the Air Force and the Navy were fairly consistent in the number of Sparrow missiles that they planned to fire. However, after the cut begins in 1984, the Air Force plans to fire twice as many Sidewinders as does the Navy, and I have no reason for those kinds of differences.

Mr. HORTON. Is that justifiable, in your judgment?

Mr. CONAHAN. I can't comment on that. I don't find a basis other than a military judgment for these kinds of numbers. Now what the Navy did, as I said, for budgetary purposes is simply cut back 50 percent across the board. When you take into account the training ranges that are available, the aircraft that are available, and match that up with your budgetary resources, you come out with the kind of allocations that the Navy does. The Air Force, as I say, they do it for evaluation purposes, and the formula for getting there is somewhat different.

But I think that your question goes to our principal concern here, that there is not criteria developed at the moment by OSD and the services for determining the number of weapons that need to be fired.

Mr. HORTON. Well, when we are dealing with something as critical as inventories of missiles that are so expensive, and we are dealing also with the tremendous deficits that we have—and recognizing that it is important that personnel have the occasion to fire these missiles to be adequately trained and to be combat ready—it does seem to me that there is a need for some sort of standardization by the Secretary of Defense, rather than leaving it up to the individual services. I would think that the services could make their cases, as it were, to the Department of Defense; but some sort of standardization seems necessary if we are going to be combat ready and get a maximum benefit from the sophisticated munitions that we are talking about.

Is that generally what you are saying?

Mr. CONAHAN. Yes, sir.

Permit me to give an example of what can and, in fact, has occurred as a result of the absence of the criteria that we are talking about.

After the Navy found it necessary to cut back—or indeed made the decision to cut back—they reduced requirements for the Sparrow and the Sidewinder. The new requirements were five missiles per fighter squadron, except that they allocated two per FA-18 squadron in the Pacific. Now, the fleet requirements are as follows. In both the Atlantic and Pacific, they require a live fire for an initial combat capability rating.

However, because of the insufficiency of missiles, the follow-on firings are handled different in the Atlantic than in the Pacific. The Atlantic continued the requirement for a follow-on live firing to requalify every 11 months; but the Pacific Fleet Commander, being much more realistic since he didn't have the missiles to begin with, changed the requirement that they fire once per tour,

which is normally every 36 months. So, for the same purposes, you have got each fleet handling it differently.

Mr. HORTON. I don't know just how to ask this question, but have you made a recommendation with regard to standardization and, if so, have you put any figure on what could be saved if that step is taken?

Mr. CONAHAN. We have not attempted to quantify what the savings might be. Our recommendation is that the Office of the Secretary of Defense work with the services to develop appropriate criteria for firing of these missiles for both training and evaluation, and we list a number of factors that should be taken into account. But insofar as attempting to determine what that level should be, we have not done that.

Mr. HORTON. If that step were taken, and if that recommendation were followed, is it your view that there would be savings and, if so, how would you classify them—minor, substantial?

Mr. CONAHAN. These missiles have a very substantial cost associated with them. They are getting much more expensive. As the old missile drops out of the inventory, it is replaced by a missile which is tremendously more expensive in most cases. So I think that, indeed, there would be significant cost benefit to doing this.

It seems to me that if one service has concluded that it can meet its training requirements and that it can meet its readiness requirements by a certain level of live fires, and another service is as much as twice that, there is a question in my mind as to whether the latter is necessary.

Mr. HORTON. I have some other questions which I will submit to you, and then perhaps you could in due course submit the written answers for the record.

Thank you, Mr. Chairman.

Mr. BROOKS. Without objection.

[Mr. Conahan's submissions to additional questions of Mr. Horton follow:]

ADDITIONAL QUESTIONS OF MR. HORTON
FOR MR. CONAHAN

1. QUESTION: Are there examples from your study in which the proficiency levels demonstrated in simulations constitute an input to readiness ratings?

ANSWER: Our review did not cover individual unit readiness ratings. However, simulators are one of the methods used to train personnel to an acceptable level of readiness. Personnel readiness ratings are ultimately reflected in unit readiness ratings.

2. QUESTION: Of the 7,900 tactical missiles to be fired in the course of 1984, are many consumed for purposes unrelated to training or evaluation? How many are consumed exclusively for evaluation purposes? Do you find that variances in policies and practices among the services with respect to live-firings is attributable solely to inconsistencies in training objectives, or do you find inconsistencies in evaluation objectives that may also contribute to these variances? Given the large number of weapons fired for combined purposes, how are you able to make attribution to one or the other?

ANSWER: We are not aware of any missiles having been fired for purposes other than training and evaluation.

We do not have information on how many of the missiles may have been consumed exclusively for either training or evaluation in FY 1984. However, 7,900 missiles were authorized and allocated for training with some evaluation as a secondary benefit. The Air Force allocated about 900 air-to-air missiles for their Weapon System Evaluation program and has told us that training was a secondary benefit.

I would have to say that both are contributors to the variances we found and would add that, as I concluded in my testimony, a need exists for criteria to justify the number of missiles fired for training and evaluation.

The services authorize and allocate missiles to be fired either primarily for training or evaluation. Therefore, we relied on the services' determination as to the reasons the missiles were fired.

3. QUESTION: You testified that 10,155 tactical missiles were programmed for live-firing in FY 1985, compared with 7,900 in 1984. Much of the increase, you said, was due to TOW live-firings, with 6,700 planned for 1985. How many will have been fired in 1984? What is the value of all the 1985 firings that correlates with the 1984 replacement value of \$437 million?

ANSWER: About 4,800 (3,700 Army and 900 Marine Corps) were allocated for firing in fiscal year 1984.

The replacement value of all planned FY 1985 firings is about \$502.6 million.

4. QUESTION: Could all training objectives for TOW (in aggregate) be met within the number of live-firings thought necessary for evaluation purposes? If not, could all the evaluation objectives for TOW (in aggregate) be met within the number of live-firings thought necessary for training purposes? What factors in the real, disaggregated world prevent the Army and the USMC from achieving such a standard of efficiency?

ANSWER: TOW missiles are authorized, allocated, and fired for the primary purpose of training--not evaluation. As to achieving a greater standard of efficiency, we recommended that the Office of the Secretary of Defense work with the services to develop appropriate criteria for the firing of missiles for training (as in this case) and evaluation (as in the case of certain Air Force missiles).

5. QUESTION: Are there appreciable economies available from still further integration of the training and weapons-evaluation aspects of live-firing programs? Do the WSEP and PGMAT programs of the USAF represent such integration? With a more integrated program, can older, more expendable munitions be used in the numbers needed to consume those that would otherwise have to be disposed of?

ANSWER: I believe that the development of the criteria we are recommending would result in economies.

The WSEP and PMAT programs of the USAF are evaluation programs with secondary training benefits. We have not made a study of what could be accomplished through a more integrated program. It is the services' policy to fire older missiles first. However, we found that some TOW missiles received in the inventory in 1982 were being fired while older missiles remained in the inventory.

6. QUESTION: Please summarize the findings on TOW malfunctions to which you referred in your testimony.

ANSWER: We found that some TOW missiles experienced a problem with the flight motor not igniting properly. The problem was that the motor failed to ignite causing the missile to fall toward or to the ground. The motor then ignited and the missile flew in the direction it was pointing. This creates a safety hazard since the missile would fly in a random direction, which could be back toward the launcher.

A safety switch has been put on all of the missiles used for training which prevents the flight motor from reigniting if it fails to properly ignite. All affected missiles will have the safety switch installed.

7. QUESTION: Please summarize the findings on incomplete reporting of live-fire events to which you referred in your testimony.

ANSWER: We found that the Army was not reporting all TOW missiles firings to the Missile Command. Over the last several years, only about 50% of the missiles fired were reported; and in fiscal year 1983, only 28% were reported.

Mr. BROOKS. May I mention to my distinguished friend, Mr. Horton from New York, you will recall that about 3 years ago we did a study on conventional ammunition and found inventory problems. The Army didn't know how much ammunition it stored, where it was all stored, and whether it would work. It was a horror story.

Mr. CONAHAN. Yes, sir.

Mr. BROOKS. We will try to update that study to see if DOD has done any better. There is probably the same ammunition still rusting, and fuses messed up.

Mr. Levitas, distinguished Member from Georgia.

Mr. LEVITAS. Thank you very much, Mr. Chairman.

As I understand the thrust of your audit and your report, there appears to be three major questions which are addressed, and they are interrelated, and there are several subquestions under each of those.

The first relates to the firing of these missiles for training to achieve proficiency in their use, and what is necessary in order to do that. I think we would all agree that we want to be assured that people who are firing these missiles know what it is like and are trained in real-life circumstances to have that experience. The question is, what is needed to do that, and does that vary from service to service or missile to missile?

The second question relates to the impact of excessive use of these missiles for training purposes to the extent that it brings about a shortage of wartime inventory requirements.

The third question, of course, related to the other two, is the cost factor.

Let me start with the first for just a minute. Other than the Army director of training, quoted in your statement on page 3, saying that perhaps only one TOW missile firing during a person's career, do you have any other information from the services as to what they consider to be necessary in order to fire for proficiency?

Mr. CONAHAN. It is mixed, as I said earlier. Their requirements do vary.

But let me talk about the TOW. Though there is a requirement that the TOW be fired annually, there is also a requirement that all TOW gunners need to qualify on the TOW simulator. It is an M-70. They have got to qualify on that as well as a missile.

The Stinger missile, which is going to be a very expensive missile, will not be live fired at all. They are developing a launch simulator for the Stinger. Also pilots use simulators, as I think I might have mentioned. The FA-18 has a simulator which simulates the totality of the mission of an FA-18.

So I think that what we are seeing is, with the increases in technology and the ability to simulate things that we haven't been able to do before, there is much more consideration of the use of simulators and other training devices than there had been before because, in fact, they can simulate battle conditions oftentimes better than the training range can simulate battle conditions.

Mr. LEVITAS. Let's leave the Stinger aside for a moment, because I think that poses a different type of question. In the system that is utilized, and in the circumstances which a simulator can replicate, as opposed to the TOW which, on a range, if you are in a Bradley

vehicle on rough terrain and are running around the countryside, you may not be able to simulate that quite in the same way as you can on the platform that a Stinger might be fired from. So I want to focus on the TOW, if you don't mind.

Other than the statement from the Army director of training, do you have any other information from the Army or the Marines with respect to what is needed in terms of live firing in order to obtain proficiency in their judgment?

Mr. CONAHAN. A couple of things, sir. In the first instance, we noted that the results achieved by TOW gunners as between first firings and multiple firings are essentially unchanged. That is to say that the people who were firing the TOW missile for the first time, a live fire for the first time, were achieving essentially the same score as were people who had fired it before.

A number of folks in both the Army and the Marine Corps complained to us about the range restrictions in the use of the TOW. They just simply don't have enough room to simulate combat conditions, and they felt that there were severe constraints on what they could do.

Mr. LEVITAS. OK.

That brings me to my next question. Where are these ranges that are being utilized? Are they being utilized in the field in Europe, as well as in the United States?

Mr. CONAHAN. Yes, sir, as well as in the Far East.

Mr. LEVITAS. OK.

But I am focusing on Europe for the moment now, because that is where I am concerned about the shortage that might exist in the wartime inventory requirement. Do these test firings, do they occur at Grafenwohr or one of these places in Germany?

Mr. CONAHAN. Yes; at both Grafenwohr and Vilseck.

Mr. LEVITAS. OK.

During the period for which your audit covered, how many TOW missiles were fired in the field for training purposes in the European theater?

Mr. CONAHAN. In the European theater?

Mr. LEVITAS. Yes.

Mr. CONAHAN. I don't have the breakdown. The only thing I have are the overall figures.

Mr. LEVITAS. If you could, I would appreciate your submitting that to me for the record.

Mr. CONAHAN. Yes, sir.

[The information follows:]

The number of TOW missiles allocated and fired for training by the Army in Europe were:

Fiscal year:	Missiles allocated	Missiles fired
1982.....	1,324	1,324
1983.....	1,330	1,184
1984.....	1,316	1,053

¹ Fired as of June 30, 1984.

Mr. LEVITAS. Also, there is some other information which may be classified and, if so, I would request that you submit it for the record under the appropriate circumstances—a breakdown with respect to the number of each of the missiles involved by category and by service during the period covered.

Mr. CONAHAN. Yes, sir.
[The information follows:]

Listing of Missiles Allocated for Training

<u>Missile Type</u>	<u>Service</u>	<u>Training Allocation</u>			
		<u>Fiscal Year 1982</u>	<u>Fiscal Year 1983</u>	<u>Fiscal Year 1984</u>	<u>Fiscal Year 1985</u> ^{1/}
<u>Air-to-Air</u>					
SPARROW (AIM-7)	Navy/Marine Corps	312	313	194	214
	Air Force ^{2/}	318	374	349	422
SIDEWINDER (AIM-9)	Navy/Marine Corps	346	348	192	199
	Air Force ^{2/}	578	575	588	644
<u>Air-to-Surface</u>					
SHRIKE (AGM-45)	Navy/Marine Corps	84	208	72	75
	Air Force	75	75	66	57
MAVERICK (AGM-65)	Navy/Marine Corps	0	0	4	4
	Air Force	314	419	464	479
COBRA-TOW (BGM-71)	Marine Corps Army ^{3/}	266	234	120	120
<u>Surface-to-Air</u>					
STANDARD (RIM-66)	Navy	408	320	108	112
STANDARD (RIM-67)	Navy	40	186	56	59
<u>Surface-to-Air</u>					
STINGER (FIM-92)	Army	60	20	-0-	-0-
	Marine Corps	0	14	20	20
REDEYE (FIM-43)	Army	288	347	443	568
	Marine Corps	437	483	500	500
HAWK (MIM-23)	Army	56	50	37	24
	Marine Corps	22	23	24	24
<u>Surface-to-Surface</u>					
TOW (BGM-71)	Army	3,387	3,558	3,721	5,500
	Marine Corps	465	711	925	1,129
HARPOON (RGM-84)	Navy	9	15	6	8

^{1/} These are planning estimates.

^{2/} Air Force allocations are for weapons system evaluation.

^{3/} Army does not separate the COBRA TOW missile allocation from the GROUND TOW. The major commands determine the numbers of missiles to allocate to COBRA TOW units. See the GROUND TOW allocation for total missiles allocated for training.

Mr. LEVITAS. That will give me at least a better feel for whether we are having a substantial impact on the reduction of the inventories, the required inventories.

One of the points that the Secretary of Defense and the witness who will follow you makes, as I understand it, is that in many instances, the older missiles, the older versions which are being phased out and will soon be replaced in any event, are the ones being fired. So this really doesn't have an impact on the ready wartime inventory requirement. How would you respond to that?

Mr. CONAHAN. I would say that that certainly occurs. But then missiles of the newer variety are also being fired.

Mr. LEVITAS. Is that in connection with evaluation testing, or is it in connection with training, or with dual purpose?

Mr. CONAHAN. It is both.

Mr. LEVITAS. Do you have an estimate of the total cost of the missiles which have been fired for training purposes during the audit period?

Mr. CONAHAN. The number for fiscal year 1984 is \$437 million. That is in replacement costs for the missiles fired in 1984.

Mr. LEVITAS. The Secretary of Defense will be testifying that the amount that is actually used—for example, the Navy fires about 1 percent of its wartime requirement, the Air Force 2½ percent—the suggestion being that these really are not significant, and, I suppose, where they are fired and what inventory it comes from might have some relationship. If they are all being fired out of one theater or in the front operational theaters, it would be to me more serious than if it were coming from the continental United States inventories. Could you comment on those two points, sir?

Mr. CONAHAN. I would not make a qualitative conclusion on whether there are adequate or inadequate firings of any of these missiles in the absence of the criteria that I think needs to be developed.

I would point to the fact that, overall, as of the beginning of 1984, the Department of Defense had 52 percent of its inventory objective for the TOW missile; and in 1984, they will have fired something on the order of 4,600 of those; and in fiscal year 1985, they will have fired something on the order of 6,700. We are talking about an individual cost there of \$18,000 per missile. So I think that is another way to look at it.

Mr. LEVITAS. I thank you for your testimony and the report. It is troublesome, and I want to hear from Secretary Korb to get that view as well. But even more troublesome to me is the implications that come from this specific controversy, because it doesn't seem as if there are any considered criteria based on what is necessary to make sure that our fighting people are as well trained as they must be. It seems more of a random catch-as-catch-can. We will shoot them off when we have them around, and nothing else to do; rather than saying this is what we need in order to be the most proficient we can be to achieve our purposes and, whatever cost is attached to that, I think the taxpayers would happily pay. It is just the random, unstructured, lack of thought-through criteria which apparently is the case—at least it appears to be—in response to the questions I raised here.

Mr. CONAHAN. There is no overall OSD criteria. Each of the services determines by itself what it feels its requirements are. And even within the services, you will find variations on how these missiles are used. So I think the evidence suggests that there is a need for analysis and study in order to develop the kind of criteria you are talking about.

Mr. LEVITAS. I think that Mr. Korb will confess to that in just a few minutes when he says they want to think it through again to see whether they need to fire more missiles than they are presently firing. So if they don't know whether they are firing enough or not, or firing too many—that would indicate to me that they don't know, period. And that seems to be the problem that your testimony points up.

Thank you very much, Mr. Chairman.

Mr. BROOKS. Mr. Clinger.

Mr. CLINGER. Thank you very much, Mr. Chairman.

Mr. Conahan, you have indicated that, in some cases, the test firing is really not very effective because of the artificial combat conditions that are involved in the firing, the limitation on the ranges, et cetera. Is it possible that, in some cases, the need for a controlled test environment would also account for the artificiality of the combat conditions that they were attempting to simulate?

Mr. CONAHAN. Certainly one cannot rule that out in all instances. However, I think that we will find that the dominant reasons for this have to do with the range restrictions, with the fact that they use nonmaneuverable targets, and that safety restrictions impose constraints on what they can do.

Mr. CLINGER. So those factors, rather than—

Mr. CONAHAN. Yes, sir.

Mr. CLINGER. I think you indicated that the dual purpose testing was rather limited, in other words, that it was primarily done for training rather than for weapons evaluation.

Mr. CONAHAN. It is done primarily for training for the most part. However, test results are accumulated by all of the services and used for weapons evaluation purposes. So even where there is a dominant reason for doing it, they are getting the secondary benefit.

Mr. CLINGER. If we were to have a live firing program that more closely integrated both the training and weapons evaluation purposes, would this help reduce the missile consumptions for achieving the two objectives? In other words, if we had more of an emphasis on dual purpose live firings, could we reduce the missile consumption?

Mr. CONAHAN. I think the answer to that has to be yes, provided that both objectives are met. I would suggest to the Department of Defense that that matter be explicitly addressed in the study and analysis that we are recommending leading to the development of criteria.

Mr. CLINGER. And if we were to have such an integrated program, live fire program, which would tend to serve both purposes, could we then use older, more expendable munitions instead of the more expensive, modern, sophisticated munitions?

Mr. CONAHAN. The services gather information on weapons for different reasons. For example, they test out older weapons to test

out their condition in the inventory; they test out newer weapons in order to develop new methodologies for training examples. So I think that you have to test out both the old and the new to serve the multiple objectives or the multiple requirements the Department of Defense has.

Mr. CLINGER. So that then if we are using both, the cost advantage of this would be reduced, presumably?

Mr. CONAHAN. It would be reduced, but there would be a significant cost advantage.

I think that we see it now in the Air Force firing of the air-to-air missiles. They do it primarily for evaluation purposes, but they certainly are getting the concomitant training benefits out of it.

Mr. CLINGER. Thank you very much.

Mr. BROOKS. Mr. Coleman.

Mr. COLEMAN. Thank you, Mr. Chairman.

It seems to me the only thing that I am not understanding in the final analysis of what you want, the set policy and guidelines coming down from the Department of Defense, the Secretary—but isn't that inherent—that it is there inherently based upon the funds that are available for those purposes? Or are you suggesting that each of the services just has carte blanche with respect to those missile firings?

Mr. CONAHAN. Budgetary considerations certainly have to be taken into account.

However, I think that the departments are in a position to make certain tradeoffs, and budgetary considerations, in my view, should not be the sole determinant of what is required. Certainly there is a requirement for training and there is a requirement for evaluation. I think that the services, together with OSD, should have a better idea as to precisely what that is, or a better idea than they have right now.

Mr. COLEMAN. I don't think anybody would object that the services ought to maybe say so or delineate that as an issue themselves. But I am also reluctant to suggest—I would be—that the Secretary of Defense be the sole determinant of that decision. I would rather have the Secretary, of each of the services at least, be sure that they are heard on the issue. In other words, I don't view the mission of each of the services, and particularly the mission indeed of each of the missile systems, to be the same. So I have a little problem with the suggestion that there has to be one criterion, if that is the suggestion. Maybe I am misunderstanding it.

Mr. CONAHAN. The suggestion, sir, is that the Office of the Secretary of Defense work with the services to develop the criteria. I am suggesting that, inasmuch as these weapons are, if not the same in two or more services, they certainly are very, very similar, and they are launched from very, very similar platforms, and I would expect to find more uniformity than exists now.

I certainly think that we need to take into account each service's doctrine and tactics and mission and all that would get factored in. It might very well be we would find differences. I suspect that we would not find the kind of differences that we are finding now.

Mr. COLEMAN. Thank you, Mr. Chairman.

Mr. BROOKS. Mr. Erlenborn.

Mr. ERLENBORN. I have no questions, Mr. Chairman.

Mr. Brooks. A distinguished member soon to go to private practice.

I want to thank you very much, gentlemen, for your assiduous study and your attention to this. Thank you very much.

Our next witness is Dr. Lawrence J. Korb, Assistant Secretary of Defense for Manpower, Installations and Logistics.

Prior to his present position, he was the resident director of defense policy studies at the American Enterprise Institute for Public Policy Research. He has an M.A. from St. Johns and a Ph.D. from the State University of New York at Albany.

Dr. Korb, we are delighted to have you back again. We would appreciate your comments.

STATEMENT OF DR. LAWRENCE J. KORB, ASSISTANT SECRETARY OF DEFENSE FOR MANPOWER, INSTALLATIONS AND LOGISTICS, DEPARTMENT OF DEFENSE

Dr. KORB. Mr. Chairman, as always, it is a pleasure to be with you to discuss today the Department of Defense's current policy and practices regarding the live firing of tactical missiles in peacetime and the impact of those live firings on our sustainability posture. The GAO briefed to my staff last month and to this committee today; the brief that they gave raises issues about those firings. As the Department of Defense principal with responsibility to oversee training and other contributors to readiness, and our combat sustainability posture, I help shape the relevant policies and review the programs and practices that flow from them.

The Department of Defense policy on training, transmitted to the services in the defense guidance, is as follows:

Services should establish training requirements that will achieve a level of force readiness commensurate with plans for force employment, and provide those resources needed to satisfy the requirements.

Applying this guidance, we would expect the services to do a number of things: first, limit the number of missiles fired for training to the number required to achieve the level of readiness associated with force employment plans; second, make appropriate use of simulators, training devices, and less expensive training munitions in order to achieve training objectives at lowest cost; third, restrict live firings of missiles exclusively for training purposes to the number required to meet training objectives; and finally, to the maximum extent feasible, use the results of missile firing for training to meet requirements for missiles testing, certification, and lot surveillance. Conversely, missiles used for hardware testing, certification, and lot surveillance should serve legitimate training requirements when feasible.

The establishment of specific numeric requirements for missile firings for training, as well as for war reserve stocks, is—within broad OSD policy guidelines—a service prerogative. I support that philosophy. The Department reviews service programs each summer and service budgets each fall. When service practices are not consistent with the guidance, the Secretary of Defense, on my advice, may adjust service programs and budgets to bring them in line with the guidance.

The General Accounting Office has pointed out that there may be some cases where services have reached different decisions as to the level of live firing as an alternative to other types of training. There could be several reasons why this might occur, not the least of which is competing priorities for available funds. Obviously, if cost were no object—which, of course, in the real world it is—we would prefer to train our crews with live firings. However, the cost of modern tactical missiles forces us to be very judicious in selecting when the benefits justify those costs.

As to the effect of the live firing on our sustainability posture, I would say that it is minimal. The total number of missiles fired in peacetime is very small compared to the war reserve requirement. For example, in 1 year the Army fires about one-half of 1 day of wartime supply of TOW, while the Marine Corps fires about 1 day of supply. In air-to-air missiles, the Navy fires about 1 percent of its wartime requirement, while the Air Force fires only 2.5 percent. Air Force training expenditures of Maverick amount to only about one-fourth of 1 day of supply.

Please keep in mind that many of the missiles that are being fired in peacetime are required for systems testing, lot certification, and surveillance. Those that are fired exclusively for training are, almost without exception, the older versions of these systems that are nearing the end of their shelf-life. It would take several of these older missiles to provide the same expectation of killing a target as provided by one of the most modern versions that we are buying to fill the war reserve requirement.

The missile maintenance program varies with the type of missile and the service involved. In general, only a visual inspection is performed at organizational level, consistent with the philosophy of sending complete, all-up rounds to the field, minimizing the handling of the missile and enhancing its reliability. Missiles are returned to intermediate level periodically or whenever failures are detected during operations. A comprehensive test is performed at intermediate level, located at a weapons station, unit, or wing; those that pass are returned to operation, while those that fail are disassembled and sent to the depot. The depot facility may be either organic or contractor operated.

When the GAO analysis is completed and the information gathered during the survey is made available to me, I will direct my staff to work with the services to review: first, whether there is any evidence to suggest that readiness might be impaired by not conducting more live firings of missiles in peacetime; second, the extent to which the Department might become more efficient without adversely affecting readiness by reducing live firing, substituting perhaps more use of simulators or other training devices; and finally, the need for any additional guidance to ensure the Department's live firing of tactical missiles for training is appropriate and cost effective.

Thank you very much, Mr. Chairman. I welcome your questions.

Mr. Brooks. I would suggest that there is a serious problem as reflected even by your own testimony. In the Miami Herald, August 5, 1984, it states:

Assistant Secretary of Defense, Larry Korb, agreed when he said earlier this year he was not satisfied that an ideal balance has been reached between weapons pro-

curement on the one hand, and ammunition and war reserve items essential to sustainability on the other hand.

I agree that that is a serious problem.

Dr. KORB. That is correct, Mr. Chairman. That is why, for example, in this particular area of tactical missiles, the amount of money that we have asked for from 1982 to 1985 is twice as much as that which was asked for in the preceding 4 years. So we do know we have a problem, and we are making some inroads into it, but we have more to go.

Remember that that statement—which I might add was taken out of context—was talking about a situation which had not yet been affected by the budgets of this particular administration, because it takes quite a period of time from when Congress passes the budget until we actually see those weapons come into the inventory.

Mr. BROOKS. Yes; we understand the problem.

Would you explain the lack of specific departmental guidance for the live firing of missiles for training?

Dr. KORB. Well, again, I think that this is a question, and I think that the whole hearing hinges on that, as to how specific the guidance should be to the services. As I mentioned in my statement, we have services that have different missions, different doctrines, different deployment schedules.

Mr. BROOKS. Doctor, we understand the differences in the services. What I want to point out is that there is no standard policy from the Office of the Secretary of Defense. Some services have different standards for the same missiles. It leaves a large gap as to what is required. That is the issue that the Defense Department, I think, should be applying themselves to, and that is what you have not done.

Dr. KORB. I would like—

Mr. BROOKS. You are telling me about all the differences. I know there are differences among the Marine Corps, the Navy, the Army, and the Air Force.

Dr. KORB. I would like to comment on that. I think that, first of all, it is hard to issue much more specific guidance, and I will get into that. The other is, I don't think the differences are as great as this committee has been led to believe.

For example, if you take a look at the differences between the Navy and the Air Force in terms of firing the AIM-7 and AIM-9 air-to-air missiles, the Air Force goal is for each pilot to fire one every 3 years, and the Navy is to have one per pilot for a 3-year tour in a fleet squadron. Until recently, the Navy wanted to do one per pilot per year, but they have changed. So right now they are pretty similar to the Air Force.

If you take a look at the TOW missile, which we have heard a lot of discussion about today—

Mr. BROOKS. Be careful firing them.

Dr. KORB. Pardon me?

Mr. BROOKS. You don't want to go out and fire some of those, do you?

Dr. KORB. Well, I know of the problem that was alleged, and that problem was discovered a year ago and, to the best of my knowledge, that problem has been fixed.

Mr. BROOKS. They all work perfectly?

Dr. KORB. As best as we can find out—during the exercise Proud Spirit that you referred to in your colloquy with Mr. Conahan, there were none of these problems that were alleged here today.

Mr. BROOKS. So you think the GAO was wrong, none of them had any problem?

Dr. KORB. With the TOW missile, we have about a 90-percent effectiveness rate.

Mr. BROOKS. And 10 percent of them are faulty?

Dr. KORB. No. I would say that 90 percent work as advertised, and you have 10 percent that you have problems with.

Mr. BROOKS. What benefits are derived from firing the TOW and the air-to-ground missile such as a Maverick at targets which do not simulate battlefield conditions?

Dr. KORB. Obviously, you try to get as close as you can to battlefield conditions. You can never completely replicate battlefield conditions, but I would argue that, by and large, we do come pretty close.

For example, the Army uses stationary and moving targets for TOW gunnery that are constructed so they closely resemble actual armored vehicles of threat nations. The targets are camouflaged, and the trainees fire from typical field firing positions. The Marine Corps has procured these same type of targets and will install them shortly.

If you take a look at the Navy and the Air Force and their air-to-air missiles, they use drones as targets, and these drones range from full-scale aircraft to subscale drones which are augmented by infrared devices. So I would say that, by and large, when it comes to live firing which has the primary emphasis of training, we are pretty good.

Now keep in mind that a lot of the firings, as has been pointed out here today, are done for other reasons; for example, test and evaluation. Then they are done under more controlled conditions. So I would say that, in this area, we have a very good record.

Mr. BROOKS. I thought you would say that.

The Maverick missile training shots by Air Force pilots in Europe and Korea were accomplished by using nontactical maneuvers at plainly marked stationary targets. So you have some areas in there where you are using pretty controlled situations.

Dr. KORB. That is correct.

Mr. BROOKS. Your words, "overall" and "generally," and so forth—you say that very well. But that is really not adequate for defense. DOD needs to be up to snuff, not just 60 or 70 percent.

Dr. KORB. Mr. Chairman, as I mentioned, we are trying to satisfy a number of goals. We are trying to hold down the live firings to the extent that we can. We are trying to get dual purpose usage to the maximum extent possible. We want to not only give the pilot the feeling of the live firing—because, as was pointed out here today, it builds confidence and morale—we are trying to then achieve some testing result. So there are lots of things we are trying to accomplish here with the minimum expenditures of taxpayers' money.

Mr. BROOKS. Why are the improved Phoenix missile and the Army's Patriot missile being deployed without complete testing by aerial targets?

Dr. KORB. Here, again, I think that—

Mr. BROOKS. What I am saying is I think you test before you buy.

Dr. KORB. No, sir. If you take a look at the AIM-54C Phoenix missile, which has just completed operational evaluation, that includes live firings against aerial targets. As a result of this evaluation, the commander of the operational test and evaluation force concluded that it was operationally effective, and recommended the AIM-54C for limited production. The evaluation, as with all evaluations, included a matrix of missile firings which were all tailored to simulate expected operational requirements and conditions as closely as possible.

I would argue that, if you take a look at the Patriot, the situation is similar. The Patriot air defense system has been developed in a test environment that uses simulation and aerial targets to validate performance. The system engaged 23 subscale targets, 47 full-scale targets, 1 helicopter, and 3 Nike Hercules missiles. So I would say that that was a pretty complete evaluation.

Mr. BROOKS. The GAO found very clearly that the improved Phoenix and the Patriot were not fully tested because existing aerial targets cannot adequately test the systems' capabilities. I quote:

An urgent need exists for targets that can realistically duplicate the high-altitude, high-speed threat aircraft and antiship Cruise missiles, the low-altitude, high-speed, antiship Cruise missiles. The Air Force planned Firebolt target may eventually satisfy the high-speed, high-altitude requirements with limitations in other areas. Its small size, its nonrealistic radar and infrared signatures, and its lack of electronic counter-measures capability will significantly reduce its usefulness.

Now that Firebolt may be an adequate target to test the capabilities of these weapons. It is scheduled to enter production in 1985, long after the testing of several major weapons systems has been completed.

Dr. KORB. Mr. Chairman, as you—

Mr. BROOKS. How do you test the weapon when you don't even have a target that can simulate what it is supposed to do? That is very difficult.

Dr. KORB. Mr. Chairman, let me say two things. No. 1, we have not had a chance to comment on this GAO report.

Mr. BROOKS. Do you agree or disagree?

Dr. KORB. I would disagree.

Mr. BROOKS. When is the Firebolt going to be ready, and will it do the job?

Dr. KORB. I would say so, because if you take a look at the Phoenix, as I mentioned—and it did include live firings against aerial targets—and the Patriot—I went through all of the targets that it went against, and this was done in both a subsonic and supersonic environment, with ECM, without ECM—and the results of these live firings validated both the system performance and the computer models. So I would say we have done what needs to be done to the best extent possible here.

Mr. BROOKS. You know, of course, that this report that I read from on better planning and management of threat simulators and

aerial targets crucial to effective weapons systems' performance was issued in 1983, and you have had about a year to evaluate that.

Dr. KORB. I understand that, Mr. Chairman. I was talking about the findings here today.

Mr. BROOKS. Why isn't the Army complying with its own regulations, which require that TOW missile firings be reported to the Army Missile Command?

Dr. KORB. Well, the Army, to the best of my knowledge, has reports for over 14,000 TOW missile firings. That is pretty good. I can't verify that every single firing has been reported, but they do have over 14,000.

Mr. BROOKS. The GAO found that only 50 percent of the firings for the last several years have been reported, that in fiscal year 1983 only 28 percent were reported. That indicates some laxity in keeping up with that, doesn't it?

Dr. KORB. We will check that out. But as I said, when I checked with the Army on this, they told us they had reports for over 14,000 firings.

Mr. BROOKS. That doesn't have anything to do with whether or not they reported them all. They just gave you the total of what they did report.

Dr. KORB. That is correct. But if you take a look at the number, for example, last year—

Mr. BROOKS. Is your glass half full or half empty? They say it is half full every time.

Dr. KORB. I would say it is more than half full, sir.

Mr. BROOKS. More than half?

Dr. KORB. Yes.

Mr. BROOKS. Why are a significant number of Navy and Marine Corps Sparrow and Sidewinder missiles unserviceable?

Dr. KORB. Well, Mr. Chairman, there are a couple of points on that—I know that was brought up before. The word unserviceable, I believe, refers to missiles that are scheduled for normal maintenance or renovation because of shelf-life or operational usage. Missiles that are in that category at the present time comprise about 20 percent of on-hand assets. The Navy's target is to have no more than 15 percent in the maintenance pipeline.

Now we do have a temporary backlog of 380 Sidewinder missiles awaiting renovation at Raytheon and Ford Aerospace, and that is the problem with the current deficiency, which is a little above normal. This backlog was created by initial contracting delays pursuant to mandatory compliance with Public Law 97-72, which requires additional competitive initiatives. All the contracts are now in place, and we expect to have the recovery by next spring.

Mr. BROOKS. The Sidewinder has had some problems with its fin. According to the Navy, there are indications of collusion between the Government quality control inspectors and the contractor. Since 1977, Genii has delivered about 35,000 fins for Sidewinder missiles. The Army had earlier warned the Navy about problems with that corporation while they were making firing bolts for the .45 caliber handgun. The Navy has yet to take any contractual action against Genii. Are you looking into that?

Dr. KORB. Mr. Chairman, that does not come under my direct responsibility; that is the Under Secretary for Research——

Mr. BROOKS. It is not on your watch.

Dr. KORB. It is on my watch, but not under my responsibility. I am sure that Dr. DeLauer is aware of that and is taking the corrective action.

Mr. BROOKS. Why did it take so long to detect problems in the Phoenix, the Maverick and the TOW missiles?

Dr. KORB. Well, Mr. Chairman, Senator Grassley in the Senate has sent a letter to Secretary Weinberger asking that same question, and I can assure you that, when the Secretary answers that question, this information will be provided to your committee, too.

Mr. BROOKS. I would like to insert a New York Times comment of August 24, which states that three military services suspend progress payments for missiles, the Phoenix, the Maverick and the TOW. Without objection, I will put that in the record.

[The article follows:]

THE NEW YORK TIMES
August 24, 1984

3 Military Services Suspend Payments for Missiles

By SUSAN F. RASKY

Special to The New York Times

WASHINGTON, Aug. 22 — Air Force contracting officials announced Wednesday that the Army, Navy and Air Force had suspended payments to the Hughes Aircraft Company for work on three of the military's major missile systems.

The announcement, issued by the Air Force Contract Management Division in Albuquerque, N.M., said "systemic" quality control problems at the Hughes facility in Tucson, Ariz., had forced the suspension of progress payments for the Navy's Phoenix air-to-air missile, the Army's TOW antitank missile and the Air Force's Maverick air-to-surface missile.

\$38-Million Payment Affected

Kari Fielder, director of public affairs for the contract management division, said the decision had been made jointly by the three services and that the suspension covered a \$38 million progress payment request made by Hughes for expenses incurred in July. Mrs. Fielder said the Air Force

contract manager at the Tucson facility had informed Hughes officials of the decision by letter on Tuesday.

She said the Defense Department had given Hughes until Sept. 1 to submit a plan for corrective action and that decisions on future progress payments would be made based on that plan.

Hughes Is Prime Contractor

The payment suspension follows a series of recent efforts by the Defense Department to enforce stricter quality control on its major contractors. In late June the Navy announced it would no longer accept delivery of the Phoenix missile because of workmanship problems. On Aug. 3 the Air Force announced that it would halt acceptance of the Maverick missile and that it intended to withhold at least a portion of progress payments for the weapon.

The Phoenix program began almost 25 years ago, with Hughes chosen as the prime contractor in 1962. The newer version of the missiles, which have been under development by Hughes since the late 1970's, cost

\$950,000 each and is to be deployed on the Navy's carrier based F-14 Tomcat fighters. The radar guided missiles were designed to shoot down other aircraft before an F-14 pilot needs to see the hostile plane.

The Maverick was designed to detect heat given off by tanks and other targets. Cost of the ground-to-air missiles was estimated at more than \$100,000 each, and Congress has appropriated funds to buy at least 3,000 of them.

The TOW is a tube-launched, optically tracked, wire-guided antitank missile that costs more than \$13,000 and was designed to be fired from helicopters or from vehicles on the ground. The missile can be directed by its operator with electrical impulses that are sent through an attached wire.

28

Mr. BROOKS. I will also put in the record a document from the Department of the Air Force, a notice of progress payments suspensions for all Maverick, Phoenix, and TOW contracts to the Hughes Co.

[The information follows:]

29



DEPARTMENT OF THE AIR FORCE
DET 48, AF CONTRACT MGT DIV, AF PLANT REPRESENTATIVE OFC (AFSC)
HUGHES MISSILE SYSTEMS GROUP, P.O. BOX 11337
TUCSON, AZ 85734

AUG 21 1984

TO: TMD

SUBJECT: Notice of Progress Payments Suspensions, All Maverick, Phoenix and TOW Contracts

TO: Hughes Missile Systems Group
Attn: Mr D. K. Richardson
8433 Fallbrook Avenue
Canoga Park CA 91304

1. Reference my 16 August 1984 letter subject: Notice of Reduction of Progress Payments, Contract No. F33657-78-C-0468 and F33657-83-C-2195. As noted in paragraph 3, I reserved the right to adjust the percentage of progress payment reductions should circumstances dictate such a change.
2. The Army, Navy and Air Force have jointly made a decision to suspend progress payments 100 percent for the TOW, Phoenix and Maverick missile programs. As I am sure you are aware, the AFSC Commander has reviewed the situation at Hughes Tucson and has advised Mr Puckett of major systemic problems with MSG's quality assurance system reflected by 68 separate findings that are associated with poor workmanship, inadequate translation of engineering specifications to production planning, failure of manufacturing personnel to follow planning documentation and, most importantly, failure of management to ensure the flow-down of contractual requirements to operating levels.
3. Therefore, in accordance with DAR E-524 and FAR 32.503-6, I hereby provide you notice that I intend to suspend progress payments on all Maverick, Phoenix, and TOW contracts at Hughes Tucson until such time as a corrective action plan has been implemented. Please provide your response to my proposed suspension of progress payments within the next 24 hours.


MERRILL C. GATES
Administrative Contracting Officer

cc: AIR-21532 (Cmdr Manley)
ASD/TAMK (Frank Iozzi)
DRSMI-IZC-T (R. Cisseil)

Mr. BROOKS. I would like to point out that the Navy told us yesterday that Texas Instruments sold thousands of not fully tested chips to Hughes Aircraft Co., the manufacturer of these missiles, and these chips may have been incorporated into the Phoenix, the Maverick, and the TOW missiles.

Without objection, I would like to include an article from the New York Times of September 12, 1984, on the microchip testing. It is an interesting story.

[The article follows:]

THE NEW YORK TIMES
September 12, 1984

Improper Microchip Testing May Bring Criminal Inquiry

By DAVID E. SANGER

Defense Department officials said yesterday that they would probably investigate Texas Instruments to determine whether the company violated criminal statutes when it shipped improperly tested microchips to manufacturers of weapons systems.

Late Monday the Pentagon said it had stopped accepting military equipment from more than 80 contractors who had used the Texas Instruments chips, in some cases for more than eight years. Texas Instruments officials have said the company has recalled the suspect chips, on which complex electronic circuits are printed, and halted some shipments.

"Right now we don't know of any weapons systems which have failed because of these components," said Donald Moore, the deputy director of quality assurance at the Defense Logistics Agency, which oversees the Pentagon's weapon purchases.

Mr. Moore and other Government officials said yesterday that it was a Texas Instruments chip, similar to those under scrutiny by the Pentagon, that short-circuited and caused a delay in the launching of the space shuttle Discovery in June. The chip was part of the shuttle's computer system.

Chip Used in Warplanes

Yesterday a spokesman for the International Business Machines Corporation, which brought the improper testing to the Government's attention, said that the microchips were part of the bombing and navigation systems for such military aircraft as the B-52 and F-15 fighters.

The shuttle's computer system was put together at the same I.B.M. facility in Owego, N.Y., where the company first discovered last year that Texas Instruments had not tested the military chips according to I.B.M.'s specifications.

Defense Department officials said they thought that over the past eight years, 15 million of the chips had been shipped to I.B.M. alone, a number I.B.M. said it could not confirm.

From 1,700 to 4,700 different types of chips are involved in the investigation, and yesterday other major military contractors, including Northrup Corporation, General Dynamics, Hughes Aircraft and Lockheed Space and Missile Company, were trying to determine whether they had used the suspect chips as well.

Situation Is Confused

"We still don't have the full list of components from Texas Instruments," said Gregory Lebrache, a spokesman for Northrup, "and we're told it won't be out until the end of the week. It could be days or weeks before this thing gets worked out."

The Pentagon said in a statement, "We are looking at the entire matter to determine if an investigation, with the attendant possibility of civil or criminal action, is appropriate."

If a criminal investigation results, it would be pursued by the Justice Department, Defense officials said. In March, Justice Department prosecutors obtained a guilty plea from National Semiconductor Corporation in a similar case, and the company was fined \$1.75 million.

Texas Instruments has admitted that its revenues would probably be hurt, and on the New York Stock Exchange the company's shares fell $\frac{1}{2}$ yesterday to 135.

Conflicting reports abound about how Texas Instruments, one of the nation's largest defense contractors, allowed the chips to leave its Midland, Tex., plant without proper testing. Jim Harroun, a spokesman for I.B.M.'s Federal Systems Division, said that the company determined in a routine audit that Texas Instruments was fully documenting the tests it was performing. "The problem we had was

that the tests did not meet our specifications," which he said "somewhat exceeds" Government quality-control guidelines. "T.I. was very cooperative," he said, and "we are now getting chips that are tested to our requirements."

Mr. Moore indicated that in some cases Texas Instruments may have misled customers, deliberately or accidentally, about the thoroughness of its testing. The company, he noted, has moved its testing facilities twice since 1977, and "they may have lost control over those test procedures."

Mr. Moore said that the Defense Department would resume accepting shipments of affected weapons systems "incrementally, as we clear each of the components of testing problems." He said he could not estimate how long the procedure would take.

Shuttle Responsibility Denied

DALLAS, Sept. 11 (UPI) — A Texas Instruments executive today denied that "testing irregularities" of the company's microchips caused a delay in the launch of the space shuttle Discovery in June.

Norman Neureiter, the corporate staff vice president, acknowledged that a microchip that failed was made by the company, but said: "It is erroneous to say T.I. was responsible for the delay in the space shuttle. A tire goes flat, a light bulb burns out under certain circumstances. We and I.B.M. view it as a random failure."

Mr. Neureiter said, however, that a "handful" of tests were apparently improperly conducted at the company's military manufacturing plant in Midland, Tex., and in Taiwan.

He said the company brought the irregularities to the attention of the Defense Department. "We have found no evidence of fraud, but nothing has been ruled out," he added.

Mr. BROOKS. What lessons has the DOD learned as a result of the experience in producing the Roland missile?

Dr. KORB. I think that we learned that, with the taking of a missile from another country, there is a cost of technology transfer and there is a difficulty in developing a support system for a very low-density weapons system. The expense of translating the Euro-missile design, which was not as mature as we originally believed, into U.S. engineering and production practices was greater than anticipated, and changes were required to improve producibility, reliability, performance, and safety. Because of the higher than anticipated costs, the number of firing units was held to a very low number, and support costs for such one-of-a-kind unit are high. Because of these problems, this administration has canceled the Roland program.

Mr. BROOKS. The French-West German consortium designed and built the missile and the Army decided to Americanize it, gold plate it, and expended about a billion dollars. The Army found it cost about \$150,000 a missile compared with another U.S. missile called the Chaparral which costs \$88,000. The Army announced that the 600 missiles produced by Hughes and Boeing may be transferred to the New Mexico Army National Guard, which is part of the rapid deployment force.

I would like to include an article from the Armed Forces Journal International, dated September 1984, which, in substance, suggests that one proposal was to give them to Norway, but the high cost of \$60 million a year to keep them ready would be just as devastating to Norway as it would be to us.

Dr. KORB. Mr. Chairman, I would like to comment on that, if I may.

Mr. BROOKS. Go ahead.

Dr. KORB. First of all, those Rolands that were originally targeted to the New Mexico National Guard were not defective. They were Rolands that were already produced when the program was canceled. Second of all, in light of the high support costs of just maintaining a limited number of Rolands, the Department has actually in its budget proposed to Congress that Vulcan and Chaparral be substituted for those Rolands.

Mr. BROOKS. Yes; you have done that. You have already spent a billion dollars on this program and you still haven't figured out what to do with the missiles. There are proposals to give part of them to the National Guard, even though they still won't work, or give them to Norway. The high cost of maintenance is the reason you are not using them. I suggest that this article had a pretty interesting suggestion which an Army spokesman seemed to think was an interesting alternative.

I would submit that.

[The article follows:]

US Army Rolands for USAFE in Norway?

by Benjamin F. Schemmer

INSTEAD OF LETTING the US Army's 27 Roland air defense fire units bake in the New Mexico desert—at an annual operating cost of about \$60-million—why hasn't some Pentagon or NATO war planner brainstormed a more useful and less costly peacetime role for them?

There are a number of US Air Force Europe collocated operating bases in NATO that lack any active air defenses, and for which none are yet programmed—in Italy and Norway, for instance. Why not use the Rolands there, defending against a somewhat more immediate peacetime threat than vultures in the southwestern United States?

The Pentagon told Congress recently

that it wants to disband the few Roland fire units which the Army finally got for its abruptly-terminated \$1.2-billion investment (Aug *AFJ*), saying it just wasn't worth \$60-million a year to keep the brand-new systems battle-ready for the Rapid Deployment Force, to which the New Mexico Guard units will be assigned.

Although Congress scoffed at that proposal, budget cutters are sure to offer it again. Rather than throw the Rolands on the scrap heap, how about this for an alternative:

Give them to Norway, in exchange for Norway's agreement to man and operate them at USAFE's naked co-located operating bases and to provide the "minimum essential facilities" (aircraft shelters, protected fuel and ammunition storage, etc.) needed to make those bases survivable. (Norway was going to buy the US-built Rolands for its own airbases, until the Army abruptly cancelled further production in 1981: it has since decided on using improved Hawks.) But since Norway might also balk at operating a costly, one-of-a-kind air defense system, why not first pay the French and Germans \$100-million to "re-Europeanize" the Rolands our Army spent so much to "Americanize"? (A spokesman for Messerschmitt-Bölkow-Blohm tells *AFJ* that he doubts it would cost that much to "re-Europeanize" the systems.)

That modest additional investment would be paid back in less than two years in what the US Army would save not pointing the missiles at the sun rising over Albuquerque, and the Norwegian system could be logistically supported by the hot European production base which is building the 95 fire units that West Germany has agreed to buy as part of the US/FRG Patriot/Roland deal.

Queried for the Army's reaction, Army spokesman Maj. Don Maple told *AFJ*. "You propose an interesting alternative, but one on which it would be very imprudent for the US Army to comment. Such a proposition would first require a thorough study by departments higher than that of the Army, in close consultation with the governments of our NATO allies.

Congress and the DoD now support modernizing National Guard air defense units with improved Chaparral, and are funding such programs. New Mexico National Guard units should be the first to be provided improved Chaparrals as a *quid pro quo* for transferring their Rolands to Norway. ■ ☆ ■

Mr. BROOKS. I would also like to place in the record an article with regard to the Hughes matter—it is a long story and I want to put it in the appendix, but I do want to make reference to it at this point in the record—from the Washington Post of September 4, "Pentagon Slow To Act on Hughes Problem, Hughes Missile Problem Long Known." The article states:

Last spring, for example, the Pentagon proposed doubling its annual budget at Hughes missile division from \$1 billion to \$2 billion after problems had been reported here and in the Pentagon.

It quotes A. Ernest Fitzgerald—

Why should they build a decent missile? Until now, they've gotten paid for building bad ones, and then gotten paid for repairing them.

I will just say it doesn't change a whole lot, Dr. Korb, but it is a good example of how we spend \$1 billion plus for a program that didn't work. We always pick the worst alternative. It is always sad to me that we just throw away \$1 billion like that.

Dr. KORB. Again, I would like to correct the record, if I may, Mr. Chairman. The missile works. It was canceled—

Mr. BROOKS. \$60 million a year to keep it going, that was why you discarded it. It was not practical.

Dr. KORB. Well, it was canceled because of the fact our budget was reduced below the level we had originally anticipated when we came into office. It was canceled for cost reasons.

Mr. BROOKS. But you had an alternative that worked just as well, it costs \$88,000, the Chaparral.

Dr. KORB. That was part of the reason; that is right.

Mr. BROOKS. That is a pretty good reason, \$88,000 versus \$150,000. It adds up.

Dr. KORB. The reason that we decided not to give it to the New Mexico National Guard, as some had suggested—

Mr. BROOKS. You did decide not to?

Dr. KORB. That is correct.

Mr. BROOKS. You have changed that?

Dr. KORB. That is correct.

Mr. BROOKS. That idea wasn't so good, was it?

Dr. KORB. The reason was that since it was a one-of-a-kind, the operational costs would be very high, as they are when you are maintaining one of a kind.

Mr. BROOKS. How would it do in Norway?

Dr. KORB. Well, again, if it would go to a European nation that already has it, then the maintenance costs would not be as great because of the fact that they already have that capability.

Mr. BROOKS. The Americanized version, they already had that?

Dr. KORB. No; they have the European version—

Mr. BROOKS. And they are both the same, or you spent a billion for nothing putting changes in them?

Dr. KORB. No. What I am saying is that the maintenance costs—because of the similarities, the maintenance costs per unit would not be as great. Remember, in Europe we have an organization called the NATO Maintenance and Standardization Agency, which does it for all the European countries. But, again, that would be up to the allies to decide if, in fact, they wanted to take that.

Mr. BROOKS. Mr. Horton.

Mr. HORTON. Thank you, Mr. Chairman.

I also would ask unanimous consent to include this article from Aviation Week & Space Technology, September 17, 1984, entitled "Microchip Test Problem Halts Weapon Deliveries." Basically, this is of the same nature as the articles included earlier.

Mr. BROOKS. Without objection.

[The article follows:]

Microchip Test Problem Halts Weapon Deliveries

Washington—Defense Dept. last week suspended acceptance of weapon systems and military equipment containing certain Texas Instruments microcircuits after a technical review determined that irregular test procedures were used in the production of some microchips.

The Defense Dept. said it was weighing the possibility of launching a criminal investigation of Texas Instruments' testing methods in the production of microchips sold to defense contractors.

The suspension order to Defense Dept. quality assurance representatives at more than 80 defense contractors' plants will be in effect until the results of the testing irregularities can be evaluated and resolved, Defense Dept. officials said.

Device Recall

Texas Instruments said it will recall the suspect chips on which the microcircuits are printed and will stop some shipments.

As many as 15 million microchips produced by Texas Instruments in Taiwan for International Business Machines during the last eight years may be involved in the improper testing procedures.

Earlier this year, the National Semiconductor Co. agreed to pay the government \$1.752 million in fines and cost reimbursements to settle all criminal and civil claims arising from the sale of inadequately tested microcircuits to the Defense Dept. between May, 1978, and August, 1981 (AWAST July 2, p. 24).

Testing deficiencies involved converting commercial microcircuits to meet military specification control drawings (SCD), according to Donald E. Moore, Defense Logistics Agency executive director for quality assurance. "Right now we don't know of any weapons systems that have failed because of these components," he said. The Defense Dept. directed all contractors using the suspect microchips to return their unused inventories to Texas Instruments for retesting with corrected test specifications.

Government experts will be assigned to validate the decisions of industry teams that will review the test requirements.

A Defense Dept. official said some of the parts "do not work, or else they fail after installation and usage."

Texas Instruments was directed by the Defense Dept. to initiate an urgent data request to better determine the incidence of circuit failures. The data request was sent through the Government Industry Data Exchange Program to gather information from all industry users.

The suspension order was issued after a

lengthy technical review by the Defense Dept. at the IBM Federal Systems Div.'s production facility at Owego, N. Y., where some of the chips are integrated into military equipment.

IBM officials said the microchips were part of navigation, bombing and computer systems for several military aircraft, including the Rockwell International B-1B bomber, the Boeing B-52 and E-3A/B, the McDonnell Douglas F-15 fighter and F-4G Wild Weasel electronic warfare aircraft and the Lockheed S-3.

Other suspect parts were used in computers in the General Dynamics F-111, the LTV Aerospace A-7, the Grumman A-6E and the Sikorsky SH-60B Seahawk helicopter. They were also used in the McDonnell Douglas Harpoon antiship missile, Texas Instruments HARM anti-radiation missile and sonars for several Navy submarines.

The investigation is attempting to determine if approximately 4,700 different types of chips have defects. Other military contractors, including United Technologies, Northrop Corp., General Dynamics, Hughes Aircraft and Lockheed Corp. also launched internal investigations to see if the microchips had been used in military equipment.

A Texas Instruments official said the company originally believed the difficulty was due to a paperwork problem. "Later we began to conclude that perhaps some of the tests had been omitted. It is our belief that overall it is only a handful of tests, but we are investigating each one of these 4,700 devices one by one as rapidly as we can," he said.

Approximately 2,200 of the suspect types of chips had been tested and revalidated by Texas Instruments and IBM. Richard D. DeLauer, under secretary of Defense for research and engineering, said late last week. He said no problems were uncovered in any of the devices tested.

The remaining 2,500 types of microchips believed to have been improperly inspected are expected to be tested and revalidated within the next 3-4 weeks. One type of device identified by DeLauer among those tested was a 64-kilobit memory chip.

Defense Dept. officials maintained that no aircraft or other equipment has been lost because of any parts failure due to the microcircuit problems.

1983 Audit

IBM identified a potential problem in the equipment during an audit of Texas Instruments in May, 1983. While first estimates were that the problem was minor and was administratively related to a mixup of drawing revision numbers, further investigation revealed that it was more serious and that the product might be affected.

IBM informed government officials in January, 1984, of the situation at Owego. In February, they stopped shipment of all equipment containing suspect Texas Instrument parts until authorized after appropriate technical evaluation by government officials.

The government requested that Texas Instruments do an in-depth investigation in order to determine if the product, which was not in compliance with requirements, was being delivered to any other customer.

The results of the investigation showed that the problem was more extensive than first estimated and affected all of Texas Instruments' more than 80 customers. The new information of a widespread

Texas Instruments Chip Linked to Shuttle Delay

Dallas—A Texas Instruments microchip similar to those under investigation in military weapon systems caused a delay in the launch of the space shuttle in June.

Donald E. Moore, Defense Logistics Agency executive director for quality assurance, said the chip was part of the shuttle's computer system and apparently had a broken circuit. The scheduled launch of the shuttle Discovery was postponed a day to allow for a change in the computer (AWAST June 18, p. 18).

Norman P. Neuriter, Texas Instruments vice president, corporate staff, said the flight abort was due to the shutdown of one of the five redundant computers on board the shuttle. The computers were produced by International Business Machines. "When that computer was returned to the IBM facility and taken apart, it was found there was a defective core driver in the heart of that computer," Neuriter said. The core driver of the integrated circuit that powers the memory core was manufactured by Texas Instruments.

"We performed a failure analysis on it," he said. "It appeared that there was a spot of contamination on the chip, which had gotten on the chip at some point during processing." He said the chip had corroded over time and had shorted at the moment of launch.

There were 800 operational hours on the computer, and the lack of response during shuttle launch was considered a random failure and not related to testing, Neuriter said.



Ford Aerospace Developing Saber Weapon System

Details of the dual-purpose, man-portable Saber precision-guided weapon system under development by the Ford Aerospace & Communications Corp. for the defense of light infantry divisions against both air and ground threats are shown in an engineering mockup. The Saber missile is 43 in. long, 120 mm. (4.7 in.) in diameter and weighs approximately 25 lb. High lift/drag body configuration is used along with a reduced-diameter aft body section that accommodates four clipped-delta planform folding fins. Opening at center in the aft end of the missile is the exhaust nozzle for the launch motor. Smaller circle above the launch motor nozzle is the receiver for the laser beam guidance system. Ejection nozzles for the sustainer rocket motor, which ignites after the missile is a safe distance from the launch tube and system operator, are located ahead of the fins. The Saber is shoulder-fired from its launch tube by a single infantryman and can be used against armored ground targets or attacking aircraft. The entire system, including launch tube, missile and laser guidance system, weighs less than 40 lb.

problem was presented to the government on Sept. 6 by top Texas Instruments officials.

The Defense Dept. also is scheduled to initiate an investigation of Texas Instruments' operation at its Midland, Tex., plant on Sept. 17.

Defense Dept. officials said government prime contractors are responsible for the quality and reliability of all component parts used in systems and other components manufactured and delivered to the government. Each contractor is responsible for visiting and monitoring its parts suppliers to ensure that suppliers comply with every requirement for the original equipment manufacturer.

The Defense Dept. recently has established a procedure to increase surveillance of a prime contractor's quality assurance systems. The procedure includes a revision to military test methods and procedures for microelectronics.

One clause written into the new procedures requires that any supplier that manufactures and tests specification control drawings must fully comply with all advertised parameters.

Any departures from the testing requirements by a specification control

drawing manufacturer may be scrutinized as fraudulent, according to the clause.

Norman P. Neuriter, Texas Instruments vice president, corporate staff, said the company was disturbed by charges of "testing irregularities" occurring in one of its operations.

"We believe our product is entirely reliable, and we are confident that when this inquiry is completed our belief that the product is reliable will be reaffirmed," he said.

Neuriter said irregularities have been found, and a Texas Instruments investigation brought the problem to the attention of the government. "We had already stopped shipments of affected products in that particular operation," he said.

"We are working with the government and our own Texas Instruments engineers to correct the problem, to solve it as quickly as we can," he continued.

Neuriter admitted that "apparently, our testing procedures in this operation got out of line somewhere along the way and a handful of the required tests may not have been correctly run. We view that as serious. We are taking steps to see to it that every test procedure is done exactly right," he said. □

Mr. HORTON. Dr. Korb, the GAO study included four types of missiles—air-to-air, surface-to-air, air-to-ground and surface-to-surface. In general terms, do you find considerations that might make live firing a more valuable part of training for one type than for another?

Dr. KORB. In general, for those missiles requiring a degree of marksmanship, live fire training would be more essential than for a fire-and-forget type of missile. The Dragon antitank missile would require more live firing than the Hawk antiaircraft missile.

It is also true, however, that the more complex missiles would require more test firing for training in some combat situations. For example, 1-on-1 aircraft engagements, instrumented ranges and dry firings are essential to realistic training.

Mr. HORTON. What is the value of training with live ammunition if, as you noted, those fired exclusively for training purposes are generally drawn from older versions of the weapons?

Dr. KORB. I think that training is undiminished in most cases, since actions that must be taken by the trainee are identical for different versions of the missile. For example, it makes no difference to a TOW gunner in training whether the missile has a 5-inch warhead or a 6-inch warhead, although the effect in combat is quite different. If the firing of an older missile were not similar to missiles, we wouldn't use that missile for the training purposes.

Mr. HORTON. What about increased costs of simulators? Has this led to any reassessment of the cost effectiveness of these training devices in meeting service training objectives?

Dr. KORB. Well, as you might expect, the services re-evaluate their training programs on a continuing basis. The cost and effectiveness of current and alternative simulators, as well as live firings and other training options, are integral parts of these re-evaluations. The general trend is toward more use of simulation because, as mentioned here, it is very expensive to use live firings.

Mr. HORTON. But when you match the cost of the simulator up against the cost of live firing, I would think that the cost of using simulators would be a lot less than the live firings.

Dr. KORB. There is no doubt about it. That is why I would argue that, on a comparative basis, we only do so few live firings. After all, the pilot fires a live missile once in 3 years. I would not say that is too much firing. But since we do need to have that pilot ready to go into combat, it is important that we make use of these other things like simulators, and that is why we do that.

You know, back when we were in Vietnam in the beginning of the war, the Navy found that, in the initial air-to-air engagements, they were not doing well. One of the reasons was that they did not have enough live firings for the pilots. So I would hesitate to see the day when we get away from live firings completely.

Mr. HORTON. They didn't have the simulator setup that they have today, either.

Dr. KORB. No, they didn't. But they had other types of training devices that were used then.

Mr. HORTON. I have visited, as I indicated before, the simulators that they use at Griffiss Air Force Base. They have a B-52 squadron that is equipped with the cruise missile, and they have an interceptor squadron there, too. I was tremendously impressed with

the simulator. They can put all kinds of information into that, and they can give you a threat atmosphere even better than a drone can. They can give you a battle situation by just feeding information into the simulator. They put turbulence in and everything else, which gives you every benefit that you would not get from training with a drone.

Dr. KORB. I agree with you. That is why I say we are going more in that particular direction.

Mr. BROOKS. Let me add, Mr. Horton, that they have simulators at NASA on which astronauts are trained. I went in one of those with a former astronaut, and he said that the re-entry simulation was a little stronger than actual re-entry, and that the stresses were just as strong or stronger, and that the skyline and the view and the visual presentation, plus the actual physical jolts, et cetera, and stresses were so close you couldn't tell the difference. It means that the state of the art of simulation has increased so much they can make you think you are in that rocket.

Dr. KORB. That is correct.

Mr. BROOKS. We started out with weather simulation, but we have been doing that for 20 years, and they have come a long way from that.

Dr. KORB. That is correct, Mr. Chairman.

Mr. HORTON. When the Office of the Secretary of Defense reviews the services' budget requests for munitions of the sort that we are discussing, is each service's training requirement a visible part of those requests?

Dr. KORB. When we review it, we look at the training budgets, we look at what they are expected to do in terms of certain readiness for the deployable units, and we look at their sustainability posture when we make a judgment as to exactly how many missiles they will require for training. We also have to take a look at the various stages that they are in.

You know, when people are making comparisons between the Navy and the Air Force, I think they have to keep in mind that the Air Force essentially modernized its tactical air arm a little bit ahead of the Navy, so we can't compare them on a year-to-year basis. The Navy, for example, is bringing in more and more planes in this decade; the Air Force brought in more new planes in the last decade. So we take a look at all of those when we make our decisions on how much money to put into these missile firings.

Mr. HORTON. I think my question has more to do with visibility than it does with the explanation you just gave. The thrust of the question is, I think, is it visible so that the committees of Congress, the Appropriations Committee particularly, can see what is involved with regard to training, as far as live ammunition is concerned?

Dr. KORB. Yes; it is visible, and it can be visible to us if we ask for the information.

Mr. HORTON. But do you make it visible for the committees of Congress?

Dr. KORB. If they so request.

Mr. HORTON. But you don't do it voluntarily?

Dr. KORB. Well, again, we do whatever Congress asks us to do. I myself am up here about 25 times a year. So whatever level that Congress would like to get into, we will get into.

Mr. HORTON. You heard the testimony of the General Accounting Office. Generally, as I understood their testimony, they were suggesting some need for coordination between the services with regard to live ammunition and live training. What comment would you make with regard to that suggestion?

Dr. KORB. I would say that there is a fine line between getting the guidance so specific that it hinders the services and the field commanders from doing what they think is necessary and—

Mr. HORTON. I can understand that. But on the other hand, isn't there a need for coordination?

Dr. KORB. I think there is a need for coordination. But, again, I think coordination, in itself, will not result in, say, two services which have completely different missions doing the same thing, even if they are using the same weapon. I think it is important to share this information. We have just set up down in Orlando a Training Development and Concept Center so that there will be more of this sharing so people understand what the other services are doing.

Mr. HORTON. I have some other questions I will submit to you, and then perhaps you could submit your answers in writing.

Dr. KORB. Certainly. I would be happy to.

Mr. HORTON. Thank you very much.

Mr. BROOKS. Without objection.

[Dr. Korb's submissions to additional questions of Mr. Horton follow:]

ADDITIONAL QUESTIONS OF MR. HORTON
FOR DR. KORB

Question: GAO has estimated a replacement value of \$437 million for the 7,900 tactical missiles that will have been fired during 1984. What is the average age of the missiles fired? How many would be disposed of in the coming year if not fired in 1984? Using a valuation other than replacement cost, how would you assign a value to the missiles fired for peacetime purposes in 1984?

Answer: The average age of missiles fired in FY 84 is between 10 and 12 years. None of the missiles would have been disposed of in the coming year had they not been fired. We retain our older missiles in the inventory as we continue to build up our inventories with newer missiles capable of defeating the constantly improving threat. Only when they become essentially non-capable against the threat and are no longer useful as training weapons, would we retire missiles from the inventory.

The value of the missiles fired in FY 84, on the basis of initial procurement costs, is about \$220 million. Considering, however, that at least half of the useful (for war reserve purposes) lifetime of the weapons had passed, it could legitimately be said that the actual value is significantly less.

Question: Dr. Korb's testimony states that missiles "that are fired exclusively for training are, almost without exception, the older versions of those systems that are nearing the end of their shelf-life." How many of the 7,900 missiles to have been consumed in 1984 in live-firing programs do you consider "exclusively for training?" Please break out that number by system, also, if possible. If not possible, give the basis for that statement. Finally, how does the shelf-life for each weapon type compare with the average age of the weapons of that type consumed for practice purposes?

Answer: Army -- The Army fired 3045 TOW missiles and 329 Redeye missiles (as a substitute for Stinger) exclusively for training. The average age of the TOW missiles was 13.5 years compared to a shelf life of 18 years; the age of the Redeye missiles was 15 years compared to a shelf life of 22 years.

Navy (including Marine Corps) -- No missiles were fired exclusively for training, although training value was received from each firing. Air-to-air missiles are fired for the purpose of evaluating total weapons system effectiveness. The only way to evaluate the interface and overall performance of weapon, aircraft and aircrew is by live firings. Surface-to-air missiles firings contribute to:

- verification of the ship missiles fire control and launching system interface with the missile;
- verification of ship capability to engage targets using STANDARD missile following combat system overhaul or installation of equipment needed to fire newer missile blocks;
- collection of data to evaluate actual missile flight performance against various threat types; and
- quality evaluation of the inventory.

Air Force -- the Air Force does not fire any missiles

exclusively for training. In the case of Shrikes and Mavericks, however, training requirements drive the actual number of missiles fired. For both systems, the component that requires replacement or rework due to shelf life is the rocket motor. For the Shrike system, missiles having the oldest rocket motors are in most cases fired first; in some instances, newer missiles are fitted with older rocket motors for live-firings to meet that goal. Because of larger numbers, Mavericks to be fired are taken from all lots manufactured to provide a more meaningful data base for the inventory; however, even the newest AGM-65 (A and B) rocket motors are approaching the end of their original shelf lives. The average age of the Shrikes is about 12 years compared to a shelf life of 16.5 years. The average age of the rocket motors on fired AGM-65As was 12 years and on AGM-65B was 6 years against an original shelf life of 10 years. (Shelf life on the A version has been extended on a year-by-year basis.)

Question: What have been the levels of expenditures in DoD over recent years for sophisticated training devices such as air combat simulators? Using the USAF Air Combat Maneuver pod as an example, what is the life-cycle cost ratio of the simulator/analysis equipment to the live munitions/drones/other equipment that would be necessary to accomplish equivalent training objectives? If there are other training devices for which you would also like to make a parallel cost comparison, please do so. What is the unit cost in FY 1985 for the ACM pod?

Answer: The only sophisticated training devices used by the Air Force for air combat training acquired in recent years have been the Air Combat Maneuvering Instrumentation (ACMI) Systems, Acquisition costs for the ACMI systems, associated remote display and debriefing systems (DDS), and ACMI pods are:

FY 80	\$18.8M
FY 81	6.3
FY 82	37.4
FY 83	4.2
FY 84	10.6

No useable ratio can be developed using the ACMI pod versus expenditure of actual munitions for training, since there is no acceptable method for determining "equivalent training objectives." The ACMI system allow the aircrews to practice their maneuvers, conduct simulated missile firings, and be thoroughly debriefed on their performance including the outcome of each simulated missile firing; the live missile firing program is used for total system evaluation.

The estimated unit cost for the ACM pod was \$145,322 in FY 84. The FY 85 cost is estimated to be about the same (plus inflation).

Army expenditures for training devices have risen from \$100 million in FY 80 to \$457 million in FY 84, with \$565 million programmed for FY 85. Of particular note is the AH-64 Helicopter Combat Mission Simulator (CMS). Preliminary analysis of the AH-64 CMS shows operating costs of less than \$300 per simulator hour whereas aircraft costs is approximately \$2,000 per hour. Furthermore, the costs of firing a HELLFIRE missile costs nearly \$45,000, whereas the simulated firing in the CMS is essentially free. The CMS will allow aviators to train to maximum aircraft limits and to deliver (simulated) ordnance to the maximum effective range on a day-to-day basis safely in all environmental conditions. In contrast, live-firing requires access to laser-safe ranges. The Army expects to pay \$227.5 million to develop and procure seven AH-64 Combat Mission Simulators.

The Navy currently has one Air Combat Maneuver simulator, the 2E6 ACMS, which is operational at NAS Oceana, Virginia. This part-task trainer possesses twin 40 foot spherical domes, each with an F-14 or F-4 cockpit to provide for intergrated or independent engagements in visual range air combat training. This device was put into operation in FY 79; procurement cost was \$18.2 million. A similar Trainer, the 2E7 F/A-18 weapons tactics trainer is currently being introduced into fleet use. The first unit went on line in January, 1984, and the procurement cost was \$22.7 million. Analyses of training objective fulfillment have shown that weapons system trainers are critical to aircrew mission readiness due to their capability to perform evolutions with stop/freeze/playback mission analysis and debrief that cannot be captured or duplicated in live weapon firing scenarios.

Question: In response to a question by Mr. Horton, Dr. Korb stated that live-firing contributes to proficiency particularly on systems which are not "fire-and-forget" type weapons, but which required the operator to maintain "markmanship" skills. Please give examples of these two categories from among the ten weapon systems included in GAO's study. Specifically, for which ones do you believe live-firing is justified overwhelmingly in terms of confidence building and morale? With which ones do you believe live-firing makes a unique contribution to proficiency -- aside from confidence factors -- that simulators cannot adequately substitute for?

Answer: Of the missiles covered in the GAO review, the TOW is probably the one requiring the greatest degree of marksmanship, particularly when firing against moving targets. No present simulation can adequately duplicate the actual launch characteristics associated with the weapons system such as noise, weight shift, recoil, blast and over-pressure at the time of blast. On the other hand, the most important training aspect of air-to-air missile firing is getting into position to fire -- most of the live firing of these missiles is in conjunction with testing.

Question: Please give an example, if one can be envisioned, of how a unit's C-rating might hinge on the accomplishment of a live-firing training objective. Please explain how the results from the "Red Flag" exercises are factored into a unit's readiness profile.

Answer: During FY 84 a Marine Infantry Bn reported C-2P citing MOS shortages; the specific MOS short was 0352, antitank assaultman (gunner). Although 0350 (antitank assaultman) MOS Marines were assigned, they required a "live fire" to obtain the billet MOS. Subsequent to a live fire of their T/O antitank weapon the billet MOS, 0352, was assigned and the unit reported C-1 in personnel.

Red Flag exercises are not specifically reported in UNITREP. They are a qualitative training factor used by unit and combat commanders to subjectively assess overall capability of their units, usually in SITREPs.

Question: Dr. Korb noted in his testimony that force employment plans dictate the level of readiness a unit should maintain, and that missiles should not be fired for training purposes in excess of the number needed to meet the training objectives for that readiness level. Yet GAO reports its finding that in most cases, live-firings are not a criterion for readiness ratings. How, under those conditions, should the services arrive at the number of missiles that must be fired by their units? Is the "STRAC" initiative the kind of solution you envisioned to this problem?

Answer: In accordance with Secretary of Defense guidance, each Service is expected to develop training programs that are consistent with force deployment plans. With regard to missile firing for training, the Services are expected to analyze all relevant factors -- the contribution of missile firings to crew proficiency, the availability and training effectiveness of simulation and other training alternatives, requirements for test firings which can also be used for training, etc. -- and to develop integrated training programs. This analytical process results in requirements for numbers of missiles to be fired for training. The Army STRAC (Standards in Training Commission) initiative is an appropriate process to determine training ammunition requirements, to include training missile requirements, for the Army. The other Services use appropriate analytical processes to determine their training missile requirements.

Mr. BROOKS. Thank you, Mr. Horton.

Mr. Erlenborn.

Mr. ERLBORN. Thank you, Mr. Chairman.

First, let me commend you, Mr. Chairman, for raising the Texas Instruments issue. It shows a commendable lack of chauvinism on your part, I believe.

Dr. Korb, you mentioned in your testimony that the missiles that are used often are those that are reaching the end of their useful life. What is the useful lifespan of a typical missile? I suppose it varies from one to the other, but what sort of lifespan do they have?

Dr. KORB. Again, as you say, it does vary, and I would prefer to give it to you by specific missile, because any number that I make would be kind of an overgeneralization. Normally, we expect them to be there for about 15 or 16 years, that they are useful.

Mr. ERLBORN. In your experience, do you use up most of these missiles in this way or, at the end of their lifespan, do you have missiles that have not been fired, are no longer useful, and must be disposed of?

Dr. KORB. Normally, we will fire them for training rather than just throw them away.

Mr. ERLBORN. You say normally. Are there other circumstances—

Dr. KORB. Again, that is generally what happens. I cannot certify that in every case. You know, you might not be able to fire it because of the weather or some operational commitments. But, generally, that is what has happened. In fact, those are the ones that we use when it is specifically for training.

Mr. ERLBORN. What about the experience of the use of these missiles in actual combat by allies of ours to whom we furnished the missiles? What program do you have for evaluating their performance?

Dr. KORB. We have, as you probably know, as a result of the Israeli engagement last year in the Bekaa Valley and, of course, the Falkland Islands with the British, gotten together quite extensively with them to get the data and to use it in our own training.

Mr. ERLBORN. Does this involve our personnel on the ground making observations, or do you rely solely on the reports that are given by, in this case, the Israelis?

Dr. KORB. What it involves is our sending teams and their sending teams back and forth.

Mr. ERLBORN. Thank you.

Thank you, Mr. Chairman.

Mr. BROOKS. Thank you, Mr. Erlenborn.

Mr. Clinger.

Mr. CLINGER. No questions.

Mr. BROOKS. We want to thank you very much.

Today we have heard testimony that the military services intend to fire missiles valued at nearly one-half billion dollars for training and weapon system evaluations during the current fiscal year. We are concerned that the use of these expensive missiles for these purposes may not only be unnecessary, but may actually deplete our inventory of missiles when we are already short of our wartime requirements.

The testimony shows that, due to the lack of overall departmental policy on the use of missiles, the services have developed policies that differ widely.

I think the Office of the Secretary of Defense should exercise stronger leadership in establishing training standards for each weapon system. These standards should be tied to a unit's readiness level and individual combat proficiency. The services should be required to make every effort to use live missiles only when it can be fully justified. At other times, the use of simulators and other training devices should improve operator proficiency and system evaluations, and result in significant savings.

I think the Department of Defense also needs to correct the quality control problems it is presently experiencing with the Phoenix, Maverick and TOW missiles. The extent of unreliability must be determined and corrected so that the readiness and sustainability of our Armed Forces is not adversely affected.

The hearing is adjourned, to reconvene subject the call of the Chair.

[Whereupon, at 12 noon, the subcommittee adjourned, to reconvene subject to the call of the Chair.]

A P P E N D I X

MATERIAL SUBMITTED FOR THE HEARING RECORD

THE WASHINGTON POST
September 4, 1984

Pentagon Slow to Act on Hughes Problem

Hughes Missile Problem Long Known

By Fred Hiatt
Washington Post Staff Writer

TUCSON—Each afternoon 6,500 employees of Hughes Aircraft Co.'s missile factory here drive past a series of small, sandblasted signs as they head from their fenced compound toward the Nogales highway.

"How Do You," "Spell," "Job Security," the signs read from the sandy border of the access road. And then: "Q-U-A," "L-I-T-Y," "Do It Quality."

It is a painfully apt exhortation for Hughes, which had to shut down assembly lines early last month after the Pentagon complained about shoddy workmanship in three of the nation's premier missiles. The action was highly unusual for the U.S. defense industry but reflected what some officials have called an industry-wide problem of lax controls.

The shutdown made people nervous in Tucson, where Hughes is the largest private employer, but it did not come as a shock, many residents said in interviews last week.

Pentagon whistle blower A. Ernest Fitzgerald told the Air Force more than two years ago about what he calls "catastrophic" management practices at the plant, and last fall The Arizona Daily Star detailed many of the problems.

So several residents said they wonder not why the Defense Department took tough action, but why it waited so long.

Last spring, for example, the Pentagon proposed doubling its annual budget at Hughes' missile division from \$1 billion to \$2 billion after problems had been reported here and in the Pentagon.

"Why should they build a decent missile?" Fitzgerald, an Air Force management analyst, said last week. "Until now, they've gotten paid for building bad ones, and then gotten paid for repairing them."

"One of my general friends said the other day, 'What's wrong with Hughes?'" added Fitzgerald, who was once fired for exposing cost overruns on another

Air Force program. "I said, 'What's wrong with the Air Force to let this go on so long?'"

Until recently, the Air Force dismissed Fitzgerald's complaints and impeded his inquiries, he has said, while Hughes rejected all criticism. On July 19, Hughes President D.H. White said in a letter to The New York Times that "what is involved . . . is not correcting 'shoddy workmanship,' but achieving a higher degree of perfection."

Now, however, the Air Force is withholding progress payments to Hughes, which has transferred its plant manager and closeted its workers for weeks of analysis and improvement efforts. Hughes' recent openness about its problems has won praise from workers, city residents and Pentagon officials.

"If they wanted a change in attitude, they're getting it. I guarantee you," one Hughes engineer said last week.

The young engineer and a colleague were discussing the company's troubles over lunch at a Mexican restaurant. They said the firm has grown too rapidly under the Reagan administration's military buildup and has been pressed to move complex projects from development into production too quickly.

More serious, they said, is a complacency in top management fed by years of cost-plus contracts, when the government paid for all mistakes. And the laxness has been encouraged, they said, by a warm and forgiving relationship with the Air Force, hundreds of whose officers have retired to Tucson or southern California to work for Hughes.

The Hughes Aircraft Co., based in southern California, is named for billionaire Howard Hughes, its original owner. Hughes took over Air Force Plant No. 44 in Tucson in 1951 and, although the factory is still owned by the Air Force, Hughes Aircraft has operated it since.

"I remember how excited everyone was about it," said Abbey Grunewald, a retailer who has lived here since the 1940s. "Here was this rinky-dink town in the middle of nowhere . . . It was the biggest thing that had ever happened."

"Howard Hughes used to spend a lot of time here, too," she added. "He'd fly in with his entourage. It wouldn't be in the papers, but somehow everyone would know."

The company, which despite its name has never built an airplane, built thousands of Falcon air-to-air missiles in the Tucson plant.

After Hughes died, the company stayed in the hands of the nonprofit Howard Hughes Medical Institute, where it remains today. That unusual arrangement frustrated the Internal Revenue Service, and several employees said it also allowed top management to operate without having to be accountable to any stockholders.

At the same time, though, it allowed the company to plow profits into research instead of dividends. In the 1970s and early 1980s, the company won contracts for increasingly sophisticated radars, targeting devices and tactical missiles—the TV-guided Maverick, the imaging infrared and laser-guided Mavericks, the \$1 million long-range Phoenix and the Advanced Medium-Range Air-to-Air Missile (AMRAAM).

Aided by the administration's rapid increases in military spending, sales of the company's missile group grew from \$415 million in 1980 to \$700 million in 1983 to the \$900 million that had been expected for this year. In Tucson alone, employment grew from 3,900 in late 1981 to 6,500 today.

But with growth came trouble. Critics said that the infrared, or heat-seeking, Maverick could not tell a tank from a burning bush in wartime and that its tests had been rigged, and the program fell behind schedule. The AMRAAM likewise fell behind.

On May 19, 1982, Fitzgerald sent his Air Force superiors a memo saying there were serious problems at Hughes. He said that workers were spending 17 hours to do an hour's worth of work, at which rate, he said, they would have to charge more than \$100,000 for a color television set.

His civilian superiors gave him permission to investigate further, he has said in congressional testimony, but the generals in charge frequently would not give him the financial data he needed. But by the spring of 1983, Fitzgerald and his deputy, Thomas S. Amle, believed that they knew enough to recommend that the Air Force shut the Tucson plant.

Last fall The Arizona Daily Star in Tucson reinforced Fitzgerald's complaints, reporting allegations of mismanagement, fraudulent time card forgeries and poor quality control.

The newspaper found that Hughes was the third most active employer of retired military officers in the defense industry. According to the Star and other sources, Hughes had hired Malcolm Currie, an under secretary of defense in charge of weapons development who became a company vice president; a lieutenant colonel who had headed the controversial Maverick test program; three Maverick program managers; two Defense Department auditors who had been in charge of monitoring Hughes contracts, and more than 200 others in just a two-year period.

The day after that article ran, retired Lt. Col. A. Grant Hird began working for Hughes. Hird had been, until two months earlier, the Air Force plant representative in Tucson.

Asked whether he regards the so-called "revolving door" between the military and industry as a problem, Hird said last week, "I would rather not say on that. I guess you know my opinion without my saying."

The newspaper also reported that Hughes employes were building cable television receivers and jewelry on government time and with government materials, which the company denied. Company officials also said that Fitzgerald's 17-hour allegation unfairly judged hand-assembled early models of new missiles by production-line standards.

But Air Force officials apparently were beginning to believe that all was not well at Hughes. Air Force Secretary Verne Orr met with Hughes officials last fall and told them improvements had to be made.

Last spring, FBI and Defense Department investigators seized records and parts from Rausch Manufacturing Co. in St. Paul, Minn., which supplies Phoenix missile parts to Hughes. Daniel Schermer, an assistant U.S. attorney in Minneapolis, last week would say only that the investigation, still going on, involves possible "fraud against the government," but other sources said that other Hughes suppliers also are under investigation.

But if the Pentagon had doubts about Hughes products, they were not reflected in its fiscal 1985 budget request to Congress. The administration proposed doubling spending on the infrared Maverick, from \$303 million to \$608 million; expanding the AMRAAM program

from \$58 million to \$431 million; increasing spending on Phoenix from \$333 million to \$472 million; tripling the laser Maverick budget, from \$36 million to \$110 million, and increasing the budget for the Army's TOW antitank missile, the third product involved, from \$217 million to \$298 million.

Altogether, the tactical missile budget for Hughes more than doubled, from just under \$1 billion to just under \$2 billion. Navy officials assured congressional committees that problems with the Phoenix had been resolved.

But a "tear-down" of a Phoenix missile in June, a routine operation for a relatively new program, showed otherwise, the Navy said, revealing poor soldering, metal filings and other debris and shoddiness. That triggered a series of blows to Hughes that continued into last week, as the Pentagon examined and claimed to find flaws in one Hughes system after another: the TOW, the infrared Maverick, radars for the nation's top-of-the-line fighter jets and optical devices for bombing.

Tucson Mayor Lewis Murphy, a conservative Republican, said he wonders whether "a mountain is being made out of a molehill." Murphy telephoned the office of Sen. Barry Goldwater (R-Ariz.) last week urging the senator to make sure no political skulduggery is afoot.

A senior Pentagon spokesman, speaking to reporters on condition that he not be identified, said the "tear-downs" and subsequent suspension of payments show that the Air Force quality control system works. Senior officers are inspecting a Hughes get-well plan, due momentarily, and they are expected to resume payments gradually on some programs, while seeking second sources to manufacture some missiles and so provide competition for Hughes.

In Tucson, meanwhile, the level of concern is less than might be expected, especially for a city that has absorbed thousands of layoffs in nearby copper mines.

"If people felt the place was going to close down, there would be a lot of alarm," said David A. Yetman, a Democratic Pima County supervisor. "I haven't detected that. I think they figure, what the heck, it's like any other government contract; it's cost-plus, open-ended, a minor slap on the wrist and then business as usual."