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U.S. ARMY XM-1 TANK PROGRAM

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HEARINGS

BEFORE THE

COMMITTEE ON ARMED SERVICES

UNITED STATES SENATE

NINETY-FOURTH CONGRESS

SECOND SESSION

AUGUST 10, 27, AND SEPTEMBER 14, 1976

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U.S. ARMY AND AIR FORCE PROGRAM

HEARINGS
COMMISSION ON ARMED SERVICES
UNITED STATES SENATE

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(II)



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U.S. ARMY XM-1 TANK PROGRAM

TUESDAY, AUGUST 10, 1976

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The committee met, pursuant to notice, at 10 a.m., in room 212, Russell Building, Hon. John C. Stennis, chairman, presiding.

Present: Senators Stennis, Symington, Byrd of Virginia, McIntyre, Goldwater, Nunn, Thurmond, and Bartlett.

Also present: T. Edward Braswell, Jr., chief counsel and staff director; John T. Ticer, chief clerk; Phyllis A. Bacon, assistant chief clerk; George H. Foster, Jr., John A. Goldsmith, Edward B. Kenny, Robert Q. Old, Francis J. Sullivan, and George F. Travers, professional staff members; Roberta Ujakovich, research assistant; Jeffery Record, assistant to Senator Nunn; Charles Stevenson, assistant to Senator Culver; Doug Racine, assistant to Senator Leahy; Ronald Lehman, assistant to Senator Scott; Bill Lind, assistant to Senator Taft; and Fred Ruth, assistant to Senator Bartlett.

The CHAIRMAN. The committee will please come to order. Ladies and gentlemen, we have this matter regarding the decision of the Department of Defense on the Army's XM-1 tank program which I would like for every member of the committee to express himself on, so we can see what, if anything, we should do and can do.

Gentlemen, the Department of Defense has deferred the further steps in awarding the contract of the XM-1 tank.

Some 2 or 3 weeks ago I received a very good, very strong, letter from Senator Bartlett when this deferment was made. I had an oral conversation with Senator Culver who talked about his interest in it.

Senator Thurmond wrote to the Secretary of Defense and sent a copy of his letter to me on this subject matter.

I do not recall if Senator Nunn mentioned it to me, but, going back, he and I talked about the tank problem and the interchange of parts and so forth, and this possible arrangement with Germany. I know I asked him once to go to Western Europe for me and, upon his return, the tank was one of the things we discussed.

Anyway, I asked those four gentlemen (Senators Thurmond, Culver, Bartlett, and Nunn) to meet and discuss this matter and see if they could make a recommendation on what we should do about this most recent delay.

But, due to various reasons, that did not work out, so, I put it before the full committee for discussion or suggestions of what, if anything, we should do.

I called this meeting for today and thought we could discuss it some. I thought we would still be in session, with active legislation going on, too, but things have slowed down.

Now, Senator Bartlett, you and Senator Nunn come around. There are four members of the committee who have expressed their interest and concern. I do not know if anyone has any major suggestions to make, however.

I want to have a discussion. I will personally get some good out of the discussion; I think we all will. I have learned this problem has developed and the House is having hearings on this matter today. I think we are all interested in the tank. We all want to get results. Frankly, I do not know of anything we can do right now. But anyway, I get provoked by these things and believe in bringing them to a head.

Senator Thurmond, you are one of the first, if not the first, to mention it to me. I want to call on all four of you for a statement.

Senator THURMOND. I just want to say that the Army has been trying to build a tank now for years. And, it appears that when they get ready to go, and I believe the selection had been narrowed down to the two companies, and that when they were ready to go—and they are as I understand it—all of a sudden a change was directed by the Defense Department.

Now, there may be some wisdom in these changes, and I would like to hear more about that. But, I understand it will increase the cost of the tank at least 15 percent, or maybe a greater figure than that.

Senator Bartlett has done more work on this than any one else so I am going to defer to him now.

The CHAIRMAN. All right. While he is coming, suppose we turn to Senator Nunn. Senator Nunn, you have heard our statements. Do you wish to respond? I said the House is having hearings today.

Senator NUNN. Mr. Chairman, I will try to be very brief in my remarks.

Senator Bartlett and Senator Culver know much more about the details on the technical part of this than I do so I would defer to them and others on that particular point.

I have been very involved in the last 3 years since you asked me to go to NATO and report back on the lack of interoperability, not just standardization but the lack of interchangeability when you get into a fight in these major weapon systems.

Of course, the F-16 moved a long way toward standardization and interoperability, the biggest contract we have ever had. And, from that point of view, American aerospace has benefited tremendously from that contract.

In this particular case, this is more important to the Germans and to some of the other NATO allies than anything that will come along in the next 10 or 15 years.

I do not think we should buy any German tank unless it is as good a tank as we have, nor do I think we should buy German parts unless they are as good as ours.

But, it was very apparent back as early as 6 or 8 months ago that United States and Germany were heading on a collision course with the pride of both nations being involved, with a tremendous amount of contractor interest involved, and with a lot of politics involved. I do not mean that in a partisan sense, but strictly a lot of internal politics in this country and in Germany—with the overall decision.

Secretary of Defense in a letter, to make every effort to get some cross-licensing agreements so that whichever tank emerged in the competition as the winner, whether it was the Leopard or whether it was the American XM-1, that there would be an agreement in advance to produce those tanks in both countries so that there would not be—perceived to be a winner and a loser—but rather a winner with cross-licensing so that the production could take place in both countries.

To make a long story short, I think that this decision was the right decision. I think it was about a year too late.

The CHAIRMAN. Excuse me, this is the 90-day decision?

Senator NUNN. Yes; this 90-day decision. I think the 90 days—even if it turned out to be a 4, 5, or 6 months delay—would be one of the most important delays that NATO has had since 1948. I think it can be very positive.

I would like to have seen this done earlier. I think you have to back up and say, why was it not done earlier? But, nevertheless, it was not done earlier.

Secretary Rumsfeld had to make a decision based on the facts as they existed. He could not go back in history. But, that summarizes my general view on this situation. To look at it from a NATO perspective, as I see it, the defense perimeter of the United States of America is in Europe now. If we have any foreseeable chance of containing Soviet forces in a conventional warfare, the only place I know we have a chance to do that is in Europe, although I am not talking about mobility in that kind of war now; I am talking about major land war.

Even if the United States of America has the best tank, the very best tank that we can buy, and even if that tank is produced at the very best price that anybody could envision, and even if we buy three times as many as they are talking about buying right now, and even if we put them all in NATO, right over there with American forces, we are not going to have a strong conventional defense in NATO because our flanks are going to be exposed. And, if one of those tanks gets shot down in a German zone based on the present plan before Secretary Rumsfeld made his decision, there is not going to be any opportunity to interchange parts; there is not going to be any common maintenance.

So, what we really are perpetuating in Europe is the NATO museum. We are getting everybody with different weapons. There is no way you can fight a war with every one of the allies having different weapons across that common front, in my opinion. And, there is no way that the United States of America can take on the Soviet Union in Europe and conventional warfare no matter what we have in terms of tanks unless we have strong NATO support and unless we have on our flanks the British, the Germans, the Dutch and others, unless they improve that defense and unless there is some coherence and some interoperability and some standardization of weapons.

I think this decision was extremely important psychologically. I believe that if it had not been made we were heading down a disaster course with the tank no matter what it produced, in terms of America.

We are not going to use the tank in Southeast Asia. I do not believe anybody would predict that. We are not going to use the tank in any kind of island warfare in the Pacific. We are going to be using it in

Europe and under those conditions, I believe that Secretary Rumsfeld made the right decision. I believe it was, probably in this country, a very unpopular political decision with those who are very interested.

I can understand the frustration of the contractors. It is very apparent that they would have frustration. If I were them, I would have frustration, and I would be angry about it. I would be frustrated about it and I would be raising cane about it.

But, I do not think we can look at it from the point of view of the contractors. I think we have to look at it from the point of view of this country, our national security and NATO.

I took more time than I meant, but that is my general feeling.

The CHAIRMAN. That is all right. What year was it that you first went over there, 1973 or 1974?

Senator NUNN. I believe it was in January and February of 1974.

The CHAIRMAN. Yes. All right, Senator Bartlett. I appreciate your letter. I have already explained this to the committee. I wish you would state your views on this matter.

Senator BARTLETT. Mr. Chairman, I just wanted to review, briefly, my involvement. Senator Culver and I were appointed by the Chairman as an ad hoc committee of two to review the Army tank program with emphasis on the XM-1 tank.

George Foster, a professional staff member of this committee, worked very closely with us and I would say very strongly at this point, you have an outstanding staff, but you do not have anyone more outstanding or better qualified than George Foster.

George and I and the distinguished Senator from Iowa did disagree on certain aspects of the program. I think this was good and healthy because I think certainly I gained by it. I have a very high regard for both of their thinking and their knowledge of the XM-1 tank and the tank strategy and all the things that go into it.

The questions that I will read here, are questions that I think need to be asked and, include some that were suggested by Mr. Foster.

I want to remind the Senator from Georgia that I joined with him in signing the letter about the Belgian machinegun.

I want to say to my good friend from Georgia that I think he would agree that I do have an interest in commonality and standardization, that I was a signer of the letter that he and the Senator from Iowa signed in regard to the Belgian machinegun.

Senator NUNN. I certainly do. I think you made a tremendous contribution in that area and in this tank area. I have great respect for your opinion.

Senator BARTLETT. The problems that I have with the tank are really divorced from the matter of standardization, which I think, are also involved. I think this should be a part of the question, and it is certainly a part of my question.

But, as a background for this we were advised a year and a half ago that there would be a winner selected in July of 1976 between the two entries, the General Motors entry and the entry from Chrysler and, very importantly, that after selection took place the desirable components from the loser could and would be incorporated into the winner in order to have the best tank possible for the Army.

In other words, the contract permitted this interchangeability of component parts, important parts from one tank to the other.

I was aware of the Memorandum of Understanding with the Federal Republic of Germany which has just been updated regarding the desires for standardization. And, it was my understanding that the implications thereof were completely independent to the decisions to be made between the two U.S. contractors. This is still my understanding.

It is my understanding that the decision could have been reached in July and then the very valuable time following that to improve the U.S. version, and that matters of commonality of the main items of track and the various systems and the turret, the gun and so on could be worked out with Germany and, for that matter, with other nations.

Now, based on this background and the pride that the Army had in the contracts with the two competing companies, I was very surprised when they announced on the day that they were to announce the winner that it was delayed. I do not think they have offered any reasonable explanation.

I think on the one hand, they could have anticipated the desires of commonality because that was a part of the original Memorandum of Understanding.

So, here are some of the questions:

What was the basis for the decision by the Secretary of Defense to defer this selection of the U.S. winner? And, incidentally, it was the Secretary of Defense who made the decision to defer the selection, yet it was announced by the Secretary of the Army.

Another question: Was there an actual legal basis which has been claimed to delay the program, or was the basis purely political?

What are the implications on the tank program of the delay?

What additional costs will be incurred by this decision to defer the source selection and to revise the program?

Were these costs known and evaluated prior to making the decision?

What degree of standardization will be obtained by this effort between the Army and Germany for the new tank?

Have firm, decisive agreements been made that assure us that the Germans will use these standardization items involved in the Memorandum of Understanding?

For instance, if the United States decided to select the United Kingdom 120-mm gun for its XM-1 tank instead of the German 120-mm—the United Kingdom is more accurate as I understand it; it is a rifle bore, 120-mm gun. The German 120-mm gun is a smooth bore. If the United States decides to select the United Kingdom gun, will Germany also agree to do this?

Why was it not more reasonable to select the winning U.S. tank, proceed with the program as planned and then introduce these standardization items immediately? In other words, proceed directly with them just as they are now.

What is the estimate of the balance of payment effect of each country by this decision?

I would like to stress that I think the main value of any committee in Congress is the responsibility of oversight hearings.

I do believe in this very drastic change of plans that occurred right at the last moment, that this committee, the Armed Services Com-

mittee, should conduct oversight hearings and have answers. I think we should do it for our own protection, for our knowledge of commonality, for our knowledge of just what the motivating reasons were for this very abrupt action so that when the dust clears in a year or two years, we can look back and determine what delays there were, what costs there were, whether the Congress wants to pay for these costs, and we would then at least know that we found out what we could.

I am surprised that the Department of Defense or the Army did not suggest that the bill we handled yesterday on appropriations, not have an increase in it to take care of the action they took, because it is going to be a very expensive delay, and there are no appropriations for it, yet that was not suggested.

So, I think there are a lot of questions that need to be answered, answers that this committee should have. Today, the House—I do not think this is any reason for this committee to act or not to act—but, just for your information, the House is having oversight hearings. I strongly urge the chairman to call oversight hearings so we can look in detail into this.

Again, I want to stress I do not feel that the mention of commonality, which was about the only mention in the original release by the Secretary of the Army to the press, is a sufficient reason to proceed as he did, mentioning the updating of the memorandum of understanding with Germany.

I think there is a lot more involved than just that, and we should try to get to the bottom of it.

The CHAIRMAN. Thank you very much. Gentlemen, I am not trying to rush anyone. Is there any other comment? These comments have been very helpful to me. I want to thank all four of you, and I want to discuss this further in executive session.

Senator Thurmond, do you have anything?

Senator THURMOND. Mr. Chairman, I do not know how much time we want to take, but I do have some prepared questions. We have an expert on this staff that I think is just as good as they have in the Defense Department—George Foster. I do not know whether you want to ask him any questions or not.

The CHAIRMAN. Yes, but let us dispose with some of the other questions before we go into executive session.

Let's go into executive session, gentlemen. I so move, for consideration of the nominations and further matter that may come before us.

We appreciate our visitors being here and want you to come back as often as you can.

[Whereupon the committee recessed subject to call of the Chair.]

U.S. ARMY XM-1 TANK PROGRAM

FRIDAY, AUGUST 27, 1976

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The committee met, pursuant to notice, at 10:05 a.m. in room 212, Russell Senate Office Building, Hon. John C. Stennis, chairman, presiding.

Present: Senators Stennis, Symington, Nunn, Hart of Colo., Thurmond and Bartlett.

Also present: T. Edward Braswell, Jr., chief counsel and staff director; John T. Ticer, chief clerk, Phyllis A. Bacon, assistant chief clerk; Kenneth W. Fish, George H. Foster, Jr., John A. Goldsmith, Edward B. Kenney, Don L. Lynch, Robert Q. Old, E. George Riedel, Francis J. Sullivan, and George F. Travers, professional staff members; Louise R. Hoppe, and Roberta Ujakovich, research assistants.

David Raymond, assistant to Senator Symington; Susan Pitts, assistant to Senator McIntyre; Jeffery Record, assistant to Senator Nunn; Christopher Lehman, assistant to Senator Byrd; Charles Stevenson, assistant to Senator Culver; Doug Racine, assistant to Senator Leahy; Ron Lehman, assistant to Senator Scott of Virginia; Bill Lind, assistant to Senator Taft; and Fred Ruth, assistant to Senator Bartlett.

OPENING STATEMENT BY THE CHAIRMAN

The CHAIRMAN. The committee will please come to order.

Gentlemen, I called this meeting for today, Friday, because there was no other day available for the witnesses as we have been in committee conferences. There have been a lot of votes in the Senate, as there will be today.

Now, when this matter of the contract award concerning the tank was first postponed by the Department of Defense, I had several responses. I think the first one was a letter from Senator Thurmond or Senator Bartlett.

The two of them contacted me and we discussed it and both were concerned about it. Also, Senator Culver mentioned it to me very soon after the announcement, and there was another expression of interest from Senator Nunn, who had been working on the tank matter particularly with reference to coordination of the exchange of parts and so forth within the NATO sphere.

So it was discussed a little as there was a lot of interest in it. Two weeks ago I had asked the four Senators to discuss the tank problem to see if they had any recommendations to make, but there were so many other matters pushing that it did not work out.

I still wanted to have the matter of the tank problem gone into at least some, so I decided to call a hearing and have all of it open, if we could, to have different witnesses present their views and reasons and so forth and give all of the Senators a chance to ask questions and present their views. That is the purpose of the meeting this morning.

I have been watching the so-called problem of the tanks, particularly since I became chairman of this committee. I do not think there is anything more important or more involved than this very question. Of course, it has gotten over into the uptown money figure now, a tank program involving millions of dollars. Imposed upon that is this problem—and it is a problem—of possible partial NATO standardization. That is not something that is a theory, something that was done overnight or according to a blueprint. There are all kinds of cross-currents between nations and between members of the Congress.

I do not blame any individual member for sticking up for what he thinks is in the best interest of the people that he was chosen to represent. I have never faulted anyone for that.

But as we try to deal with this problem, we have to take a broad viewpoint.

Now, Mr. Secretary, and the Secretary of the Army, we are glad to have you gentlemen here, each of you—and anyone else who is scheduled to testify.

Secretary Clements, you speak for Secretary Rumsfeld, I am sure?

Mr. CLEMENTS. Yes, sir.

The CHAIRMAN. I bring that in because he was the one who issued the order. This hearing is not for the purpose of putting anyone on trial; nobody has done anything wrong. You are not charged with anything. We are just trying to get at the problem and get the benefit of different views.

I do not see why this should be an exhaustive hearing, gentlemen, but it may not be possible to finish today. We are going to have votes in the Senate, as Senator Bartlett knows. There is a major bill to be voted on at 12 noon for certain. I do not know about the afternoon program.

If we cannot finish in one sitting—and I doubt if we can—we will just have to have another sitting.

Senator, I referred to the fact that you wrote that warm letter to me and things have been moving.

All right, Mr. Clements, please proceed.

STATEMENT OF HON. WILLIAM P. CLEMENTS, JR., DEPUTY SECRETARY OF DEFENSE

Mr. CLEMENTS. Mr. Chairman, as always, it is a pleasure to be here with you and other members of the committee, and I appreciate this opportunity to appear before the committee and discuss with you the recent developments in the Army's tank program.

This program has been one of our most successful efforts in meeting its goals and performance objectives. As the time for final source selection approached, it became apparent that we could obtain a better tank for our forces by substituting selected components into alternative configurations of U.S. tanks and, at the same time, placing greater emphasis on commonality with our NATO allies.

The method we chose to obtain these goals, i.e., to request additional alternative proposals embodying these possibilities, adheres to sound management practice and should provide us with a better tank at minimum cost and minimum schedule increase.

If final source selection had been made as originally scheduled, we would have been placed in a position of having to negotiate these changes with a single contractor, a situation in which we are unlikely to obtain minimum cost and minimum schedule impact.

We examined and eventually selected the alternative of delaying source selection for a short, fixed period in order to receive appropriate additional modifications to existing proposals. These additional proposals will allow us to negotiate the improvements in a competitive environment and thereby minimize both cost and schedule impact.

Mr. Chairman, I would like to emphasize that we are not junking the two XM-1 prototypes that the Army has worked so hard to develop. There is a general misunderstanding regarding this, and I want to assure you that this is not the case.

We will build our tank here in the United States and it will not be a half-American and half-German tank. It will be all-American, produced in the United States, but also have parts that are interchangeable with a tank to be produced in Germany.

Before concluding, please be assured that this decision to achieve some form of standardization between the U.S. and the German tanks was not made overnight. As far back as a year ago, the Department of Defense and the Department of the Army representatives discussed this issue.

Also, your committee, as emphasized in your Senate Armed Services Committee report for the fiscal year 1977 budget asked that DOD seek new agreements for standardization with NATO countries regarding the main battle tank. It would be almost an impossibility to expect that the Germans would buy an American tank produced in the United States; however, our newest plan will achieve standardization through exchange of major components, and this is a realistic solution to our free world tank problem.

We are confident that we have made a wise choice in the best interest of the soldier on the battlefield, the American taxpayer, and our NATO allies. I would now like for Secretary Hoffmann to discuss the program in more detail and we stand ready to answer your questions at the conclusion of his statement.

The CHAIRMAN. All right. Thank you.

Gentlemen, if it is all right with the committee, we will hear Secretary Hoffmann now, and then move into the questions.

STATEMENT OF HON. MARTIN R. HOFFMANN, SECRETARY OF THE ARMY, DEPARTMENT OF THE ARMY; ACCOMPANIED BY HON. EDWARD A. MILLER, ASSISTANT SECRETARY OF THE ARMY FOR R. & D.; AND MAJ. GEN. ROBERT J. BAER, PROJECT MANAGER, XM-1 TANK PROGRAM

Mr. HOFFMANN. Mr. Chairman and members of the committee, good morning.

The concern shown within the past few weeks over the delay of the XM-1 program is indicative of a deep, healthy interest on the part of the Congress. We sincerely appreciate your interest and support.

I have corresponded with members of Congress on the reasons for our recent decision and have provided copies of the approved addendum to the Memorandum of Understanding with the Federal Republic of Germany. I am pleased to have this opportunity to give you additional details on the current status of the program and to report to you on matters you may wish to address.

The XM-1 tank will be a singularly important weapon in the Army inventory for the next several decades. It represents a sizable financial investment. A constant goal has been maintained—development of the most cost- and combat-effective tank possible.

The XM-1 program began in 1973 and has proceeded within cost and schedule and with a robust, competitive atmosphere. As we approached full-scale engineering development, we felt it important not to overlook any practical development options which might improve the selected configuration, and at the same time, achieve a significant degree of commonality and interoperability with our NATO allies.

During June and early July, personal discussions between Secretary of Defense Rumsfeld and Minister of Defense Leber revealed that an opportunity existed to more closely align the United States and Federal Republic of Germany tank programs. At the time originally scheduled for contractor selection, July 20, two alternatives appeared available to capitalize on the breakthrough in negotiations and to introduce the design modifications needed to achieve those standardization goals in a prompt manner:

The first alternative, selecting a winner and negotiating with a single contractor, thereby producing a situation in which we would be unlikely to maintain minimum cost and schedule impact and which violates our basic management tenet of promoting competition.

The alternative method at that point was delaying source selection and asking for appropriate modification to each of the existing proposals, thus capitalizing on the competitive environment.

The latter alternative appeared most reasonable because we could evaluate and negotiate improvements in a competitive atmosphere. Thus, we have embarked on a course of action to select our optimized set of tank components to achieve additional combat capability and growth potential, and at the same time enhance standardization of the XM-1 and the Federal Republic of Germany Leopard 2. I would now like to discuss the specific steps in this course of action.

First, we have initiated an intensive 120-day-or-less effort to solicit from our XM-1 contractors alternative proposals for our consideration. Basically, we have asked each contractor to resubmit his basic proposal, updated as necessary, and to provide an alternate proposal incorporating a hybrid turret, metric fasteners, and the German gunner's auxiliary telescope.

Additionally, General Motors has been asked to provide an option in their proposal to incorporate the turbine engine and Chrysler has been given the prerogative to submit an option incorporating the diesel engine.

These proposals, when received, will provide the basis for us to select a single contractor and to ensure the continued development of the most capable tank possible, considering both performance and cost, and offering the greatest growth potential.

I can also report that both contractors have responded extremely well to the reorientation. We were able to provide them the definitized amendment to the initial request for proposal on August 13, 5 days ahead of our planned schedule. The attitudes are all positive, and I am highly confident that we will award the full-scale engineering development contract on or before the 17th of November.

Returning now to the requests we have made of the contractors, I would like to discuss in more detail our rationale. The recently generated addendum to the earlier MOU with the Federal Republic of Germany identifies the basic areas in which we mutually see significant standardization potential.

Senator SYMINGTON. What does MOU mean?

Mr. HOFFMANN. Memorandum of Understanding. This was a 1974 document for the comparative evaluation of the German Leopard and the American tank.

Recognizing the strong encouragement of the Congress for standardization of military equipment within NATO, the addendum permits us to pursue commonality of key components which dominate maintenance and logistics support in the field.

The new understanding establishes commonality initiatives in such areas as ammunitions, guns, tracks, engines, transmissions, fire control, fuel, night vision devices—FLIR—gunner's telescopes and metric fasteners.

Both countries have agreed to develop turret technology which can accommodate either a 120-mm or 105-mm gun without major redesign; that is, a hybrid turret. I emphasize here that our intent is to arrive at a common 120-mm gun.

To this end, we will evaluate the Federal Republic of Germany smooth-bore and the United Kingdom-rifled 120-mm guns and ammunition. The Federal Republic of Germany plans to install a 120-mm gun beginning with the first production models of the Leopard 2, while the United States had planned to use a 105-mm gun and turret on the first production XM-1 tank. Reviewing these circumstances this summer, it became apparent that unless immediate action were taken there would likely be less, rather than more, commonality among the future tanks in NATO, since nearly all of today's tanks at least use the same gun and ammunition.

The CHAIRMAN. Pardon me. We have a vote.

You know, a good part of my knowledge on procurement matters relating to manufacturing is because of Senator Symington. I will yield to him if he desires. We have 5 minutes for questions.

Then, without objection, I propose to recognize Senator Bartlett next, because I know of his interest.

Senator SYMINGTON. You are very kind.

We have a Nuclear Regulatory Commission meeting today that I would like to go to also.

As I understand it, Secretary Clements and Secretary Hoffmann believe that the plan of theirs is in the best interests of the United States, and the idea of commonality, I know, appeals to everybody, with respect to our position in Europe where we have seen so many times a loss to the taxpayer because of duplication in many ways, and in many matters, including materials.

So if the desire is to delay the tank, based upon what I have read, that Secretary Clements said and what I have read to this point of

what Secretary Hoffmann said, I would be in favor of going along with their recommendations.

Thank you.

The CHAIRMAN. Gentlemen, I am not judging this thing finally. From what I have heard about it, to be frank, I lean toward the idea that you made a good decision, but that is not conclusive.

We want to get at the facts. If you will pardon the interruption, we will continue. I think it is the practical thing for us to do. We will be right back.

[A brief recess was taken.]

The CHAIRMAN. We are going to resume now with the testimony of Secretary Hoffmann, but before that, for reasons beyond his control, the Senator from South Carolina, Senator Thurmond, could not be here. He is very much interested and will be here as soon as he can.

All right, Mr. Secretary, you may proceed.

Mr. HOFFMANN. Mr. Chairman, I was on page 4, for those who were following this statement. I had reviewed the circumstances during the summer in which it became apparent that unless immediate action were taken, there was likely to be less rather than more commonality among the future tanks in NATO since nearly all of today's tanks at least use the same guns and ammunition.

Also, as tanks normally remain in inventory for an extended period of time—on the order of 20 years or more—this divergence would have an adverse impact on NATO standardization into the next century.

We have advised the Congress on a number of occasions that the 105-mm standard U.S. tank gun, with improved ammunition, is adequate to counter the near and midterm threat. We still consider this to be true. Recent threat estimates, however, indicate that the advanced armor techniques incorporated into the XM-1, Leopard 2, and other free world tanks may, in the near future, no longer be the exclusive possession of the free world.

The Soviets, as you are well aware, have an enormous and sophisticated armored vehicle technology and production base, and it is altogether possible that our Army may face, within the next decade, a Soviet tank with substantially improved ballistic protection. As the trilateral tank main gun working group agreed, a weapon heavier than the 105-mm may be required to counter this threat. The logistical advantage of parts and ammunition commonality with our allies is obvious.

Closely related to the 120-mm gun and hybrid turret is, of course, the fire control. Our agreement with the Federal Republic of Germany will result in a functionally common fire control system with future potential toward hardware commonality. The Federal Republic of Germany gunner's auxiliary telescope is one piece of that hardware which we already know is desirable and so it has been incorporated in guidance to the contractors. Similarly, we recognize that interoperability of components dictates use of common fasteners and thus we have chosen at this time to go to the metric fasteners to insure only a single set of tools will be required on board each tank.

The second major component I would like to address is the engine. Although diesel technology will meet our near-term needs, we recognize that the future in engine technology may lie with the turbine. The

turbine engine has several characteristics—greater horsepower growth potential and greater durability potential, low noise, minimal smoke, lighter weight, and superior acceleration—characteristics that both we and the Germans feel are desirable in a tank engine.

The agreement I referred to provides for the development and test of such an engine that will assure in addition to these advantages, fuel and parts commonality with the Federal Republic of Germany main battle tank.

While, in general, automotive turbine development is somewhat behind that of diesel technology, turbine developments appear promising and we would plan to take advantage of this important growth option if and as soon as it proves itself.

Obviously, the reorientation which I have described will have a cost impact on the program. A major purpose in soliciting new proposals from the competing contractors was to obtain accurate, competitive, cost estimates for each of the alternative configurations which are now under consideration.

Detailed cost data will not, therefore, be available until these proposals have been received and evaluated. As soon as we have these data, we will inform the Congress of our findings.

The most significant factors influencing potential changes in cost are the engine/transmissions and the gun/ammunition selections. Since a turbine engine was one of the two candidate power packages already under consideration, any future decision to adopt a turbine would not necessarily represent a change in cost.

Moreover, the less frequent overhaul requirements of the turbine should, in the longer term, produce significant operation and maintenance cost savings much as have been realized with the introduction of the gas turbine into fixed and rotary-wing aircraft.

With regard to the selection of a 120-mm gun, it has been noted on previous occasions that the Tripartite—Federal Republic of Germany, United Kingdom, United States—working group jointly concluded that a gun heavier than the 105-mm was necessary to consider for the future. Hence, the decision to incorporate a heavier gun in the near-term does not necessarily represent a basic new increase in cost either, but rather represents a moving forward of the point in time at which the additional funds needed to support the mounting of a 120-mm gun must be committed.

On the other hand, this earlier commitment minimizes the costs which otherwise might have been required for retrofit—not only of a gun but of a turret as well—should the threat so demand.

The CHAIRMAN. This is a short rollecall, gentlemen, if you would excuse me for a few minutes.

Senator Bartlett, if you would preside, you have already been recognized.

Mr. HOFFMANN. Most of the costs potentially to be sustained by the enhanced program therefore take the form of earlier commitment of funds which otherwise would have been expended later anyway. As I noted, the actual magnitude of these funds is totally dependent upon which specific option is selected at the end of the 120-day competitive phase.

If, for example, the most expensive set of components under consideration were all selected, and the cost thereof were compared

with the least costly hypothetical configuration, the unit cost would be expected to increase something less than 15 percent.

The overall program cost increase on this basis would be several hundred million dollars in research and development (R&D) and procurement. This would not necessarily exceed the cost ranges previously reported to Congress, since the reference point for this calculation is a "baseline" design which itself is well below those in the XM-1 selected acquisition report.

With regard to schedule, the time delay will result in a program slip of 4 months to contract award. Additional slippage, if any, will be entirely dependent upon which options are selected when the competitive proposals have been received.

Preliminary input from the contractors is to be provided to the Source Selection Evaluation Board by 1 October. Final offers will be due by October 28. Source selection and contract award is scheduled for November 17, although we are taking every practicable step to accelerate this effort and thereby initiate full-scale engineering development as quickly as practicable.

The accomplishment of these program changes will not require more advanced development funding than is allocated in the fiscal year 1977 budget. In that budget, \$16.1 million is available for advanced development with the remaining \$23 million specified by the Congress for use only by one contractor in full-scale engineering development.

If, for reasons we do not now anticipate, we are unable to accomplish these additional activities within the \$16.1 million, we will formally request your permission to make a conversion of the application of these funds. Depending on contractor responses, an adjustment to the fiscal year 1977 program may also be required. If so, a reprogramming request will, of course, be submitted to obtain the approval of the Congress.

Before closing, I would like to comment on two other important points. First, as you know, the modified Leopard 2 is scheduled to arrive in the United States within a few days for our evaluation under the terms of the December 1974 Memorandum of Understanding. The evaluation will continue as planned.

Following completion of that evaluation, we still plan to choose the better tank for manufacture in the United States and for provision to our forces. In the event the XM-1 proves to offer the greater benefit, the recently generated addendum to the earlier Memorandum of Understanding and the Federal Republic of Germany will assure that significant standardization can still be realized.

Second, It should be noted here that the addendum to the Memorandum of Understanding specifically states that all actions contemplated and agreed to will be implemented within the existing laws and regulations of the two countries, and that the Department of Defense must seek from the Congress the support needed to bring into being the provisions of the new understanding.

It is all of our common goal that the American soldiers of the future have the best possible equipment. Commonality with our allies has long been a rhetorical rallying cry which has produced less than impressive results. We now have the opportunity to significantly enhance the standardization of the most vital ground weapon in the

NATO arsenal. Most important of all is the fact that the end product will be the finest main battle tank ever built.

We ask your continued support of the XM-1 program and are now prepared to answer your questions.

Senator BARTLETT. Thank you, Secretary Hoffmann and Secretary Clements.

The Deputy Secretary of Defense testified earlier at the House Armed Service Committee hearing that it was the considered judgment of his office as well as the Director for Defense Research and Engineering, Dr. Currie, and his associates in the Installations and Logistics Department, as well as the Comptroller and the General Counsel who participated in this decision that we could save well over \$1 billion by going through this process on the cost of the program.

Secretary Hoffmann also testified at the same August 10, 1976 hearing, that he had made a recommendation to the Secretary of Defense that the Army proceed to accept one of the two bids accepted by the competing XM-1 contractors—in other words, selection of a winning U.S. competitor.

Since this plan had been previously discussed in the Defense Department, and, since earlier this year, the Army had testified that it was more cost-effective to continue the XM-1 program as planned rather than to defer the program to accommodate a tank with the capability to accept a 120-mm gun. Mr. Secretary, how is this \$1 billion savings computed?

Mr. CLEMENTS. Senator, there are several factors that enter into the savings, as you and I have discussed before. I have with me a schedule wherein I have worked with the people in DDR&E to develop, as closely as we could, our estimates of the savings as it would relate to the engine, the turret, the competition impact, the engineering cost reduction, spares, and design. I have these itemized.

I want to emphasize that these are not realized savings; they are anticipated savings. They are, therefore, estimated according to our best judgment, so they are not factual in the sense that they can be taken from an accumulated data base, from recorded expense items. They are estimates. But they are estimates by people who have considerable experience and business judgment in making these kinds of estimates, and we think that they are reasonably accurate.

This number comes out to \$745 million. I will be glad to submit this schedule for the record. I will be glad to discuss any particular pieces of it in detail with you, but I remind you, Senator Bartlett, that we are still in a competitive environment. I do not think that it would be in the best interests of the Department of Defense and the Army in this competition that we release these figures.

I have classified them secret. I think that it would be detrimental to the best interests of the Government to let these numbers become public. I think that would not serve our best interests.

Senator BARTLETT. Mr. Secretary, the total number in millions of dollars that you have is significantly under the \$1 billion that you stated in the House of Representatives. You said earlier that you have been working on this program for over a year.

When you picked the \$1 billion figure in the House, you picked that out of the air, then, is that correct? Or, did you pick that from these figures and, if so, why are these figures now changed?

Mr. CLEMENTS. We tried to refine them. You asked us to do that. We are just being responsive to what you asked.

Senator BARTLETT. Why the inaccuracy in your earlier figure in the House?

Mr. CLEMENTS. I am not sure they are inaccurate. The numbers we are giving you today, the total of \$745 million, are the considered judgment of the people who worked on them. I worked on them, Dr. Currie worked on them. Bob Parker and others. We think they are reasonably accurate.

On the other hand, what you are talking about is a margin of error of 25 percent. I am not sure that that is true. In the final analysis, when we actually have the numbers from the competitors who are going to submit their proposals to us and as we get into production run, it could well be that this could be a plus 25 percent and it would be closer to the \$1 billion than this number.

These figures are not that accurate, Senator Bartlett. I think you understand that.

Senator BARTLETT. Did you actually have figures such as these at the time that you used the \$1 billion figure?

Mr. CLEMENTS. I did.

Senator BARTLETT. Did these same people provide those for you at that time?

Mr. CLEMENTS. They were discussed with the same people.

Senator BARTLETT. Why, when you described these figures, did you say these are anticipated but not factual figures? How could you have any accuracy in your figures if they are not factual? Obviously they are anticipated, because the events have not occurred. They are not specific figures. Are they just strictly estimated figures?

Mr. CLEMENTS. I have already said that they are estimated figures. These figures have not come from either one of the contractors. It would be inappropriate for us to use those kinds of numbers.

This is not uncommon. It is a thing that we do on a lot of our estimates of this kind.

Senator BARTLETT. I have the paper that apparently you are referring to—it is marked "Working Paper, Secret, Competitive, Sensitive." It has the same figure at the bottom that you gave.

Mr. CLEMENTS. I gave your staff man a copy. I would assume that it is the same piece of paper.

Senator BARTLETT. Right. I am sure that it is. It does not appear to hold any information that would realistically affect competition between the competitors. Why do you feel that it would?

Mr. CLEMENTS. Our judgment on that is just different from yours, Senator. I classified it "Secret," and I think that is an entirely appropriate classification.

Senator BARTLETT. Mr. Secretary, how can a savings be computed from this plan, if all other presentations of this plan show program cost increases?

Mr. CLEMENTS. I think that you have missed a point. Secretary Hoffmann indicated in the previous hearing that he thought that the net effect in cost could be in the range of 15 percent, by making these modifications.

That, of course, is also an estimate, and it is estimated in the same spirit that this is estimated.

That estimate may or may not prove correct. We will not know until we have the contractors' proposals and can then make an estimate based on their proposals.

The additional cost that Secretary Hoffmann referred to would be additional to the costs, as submitted for the original program.

What I am saying is, if we had accepted the original program, as submitted, and selected the winning contractor, then went to that sole source and said, now Mr. Contractor—whomever that might be—we want to change the turret, we want to change the gun, we want to change the track, perhaps we might want to change the engine, we want to change some of the sight systems, and so forth, that we would be in a noncompetitive environment, and would be subject to probably very high prices from that contractor.

I am saying that what we are doing now will preclude that kind of circumstance and, in a business sense, is the proper way to approach this problem.

Senator BARTLETT. Mr. Secretary, how can a savings be estimated from the hybrid turret program if earlier testimony by the Department of Army to a subcommittee of this committee indicated that it was not a cost-effective approach?

Why does this paper refute the Army's own testimony?

Mr. CLEMENTS. Senator Bartlett, you again are missing the point. If we are going to have, as you call it, a hybrid turret—which I do not really like the terminology—

Senator BARTLETT. Would you prefer the term "dual turret"?

Mr. CLEMENTS [continuing]. We are going to have a dual turret here, dual meaning that it will take either gun. The German Leopard tank is equipped that way now. It will take either gun.

If we are going to have a turret which has a considerable advantage to it, where we could go either way in selecting the gun, that is going to cost more money. Now, the difference is, when did we get the price for that turret? Do we get it while we are still in the competitive situation between two competitors who are competing and who are going to give us their best possible price for that dual turret, or do we wait until after we have determined a single source, then go to him and say, "Now we have decided we are going to change the turret. Would you please give us a price?"

All of my instinct and all of my experience tells me that we would be damn fools if we waited until after we had made selection. We need to do this in a competitive environment.

Senator BARTLETT. Why does this paper refute the Army's own testimony on the cost of the turret?

Mr. CLEMENTS. You will have to ask Secretary Hoffmann this question.

Senator BARTLETT. I will ask Secretary Hoffmann, but I would also like to ask you, because apparently Secretary Hoffmann certainly gave you the Army's position on this. I am sure you were aware of the testimony before the subcommittee by General Baer.

I would like to ask you, how does your paper show the Army was wrong, or why is your paper right? Why should we believe what you are saying as compared to what the Army said? Obviously, they are going in different directions here. We need to know why this change. Why are you right, and they wrong?

Mr. CLEMENTS. Senator Bartlett, I think I have already explained to you the procedures that my business judgment tells me is the best way to proceed, and I am convinced that this is so. I thought so at the time. I thought so before we got into the evaluation process, that this was the right way to do it. I can only say that this is not the first time that I have had a difference of opinion with one of the services. It probably will not be the last.

Senator BARTLETT. Another question.

Did you have detailed information to provide your answers as they had detailed information? Did you find that they were in error, or did you completely ignore what they had presented?

Mr. CLEMENTS. Senator Bartlett, you are not taking into consideration that at the point of decision that you get into a business judgment. At that point, is it better to do these things on a firm proposal in a competitive environment, or leave yourself at the mercy of a sole source contractor?

Forty years of experience tells me that it is better to have absolutely firm proposals in a competitive environment and you will save enormous sums of money. I just do not think that there is any reasonable person who can question this.

Senator BARTLETT. What you are saying is that your business judgment, rather than the detailed information provided by the Army to this committee, prevailed?

Mr. CLEMENTS. No, I am not. I am telling you that the detailed information that was supplied to you by the Army, and also to me, had nothing to do with this decision. I had the same information that you have. I am not going to argue with the numbers as submitted by the Army. I am just telling you that there are procedures in this instance that were wrong. I am convinced that we made the right decision. If I had it to do tomorrow, I would make the same decision again.

Senator BARTLETT. How can a significant savings be computed for the competition of these standardized items when the reported cost does not seem to warrant the amount?

Mr. CLEMENTS. Say that again?

Senator BARTLETT. How can a significant savings be computed from the standardization of these items when the reported increased cost does not appear to warrant such a sizable amount of savings?

Mr. CLEMENTS. It may not appear to warrant it. There could well be a considerable difference in opinion, and reasonably so, between what that additional cost is going to be.

Mr. Hoffmann has estimated that these changes are going to represent 15 percent. Perhaps they will. Perhaps it will be 10 percent, perhaps it will be 20 percent, 25 percent. We really do not know that, and the Army does not know that yet. If they tell you that they do, they are misrepresenting it to you, because they do not.

Senator BARTLETT. Has the Army Secretary, Mr. Hoffmann, reviewed and agreed with these savings that are projected from this plan, and what does the Secretary of the Army or the XM-1 project officer say on the savings from this plan?

Mr. HOFFMANN. You are talking with respect to the \$1 billion?

Senator BARTLETT. Yes.

Mr. HOFFMANN. These were discussions—I would have to ask General Baer if he participated. I had not heard the \$1 billion number.

We had discussions that related to a worst case situation where you would select a contractor, get a tank deployed as quickly as possible. Having the tank deployed, you would make ad seriatum changes to it. As you went out to retrofit those changes, you would have a fairly high turbulence in the process and, of course, a higher cost.

The cost of developing a 120-mm gun system in such a program, converting turrets and the like, I think \$1 billion on that basis, worst case as opposed to what we are doing now, is a pretty good number.

It is, of course, worst case, because it assumes that you are going to produce the XM-1, with the 105-mm gun system and turret. You are, at some future date going to go to a 120-mm gun, develop a new turret, retrofit the entire XM-1 fleet, and come up with the same result that we hope to get here, which is a tank that is equipped from the outset with a turret which will accept both the 105-mm and the 120-mm gun systems.

There may be lags in some of these ideas, but that figure, for comparative purposes, does not bother me—notwithstanding that I was not there at the formulation of it.

Senator BARTLETT. I would like to ask General Baer who testified before the subcommittee—I think he advised us that the proper way to go was a parallel program, that this would be cheaper than to retrofit. Is that correct?

The CHAIRMAN. Let him come up, if you want him to testify. We will proceed in the regular way.

Senator BARTLETT. Did the gentleman hear my question?

General BAER. Yes, sir. I think the explanation that Secretary Clements provided is the basis upon which the differences exist, Senator Bartlett, and do not negate anything I have said, nor do I have any reason to feel that anything that we put on the record then was inaccurate or is it today, in the context in which it was put there, and on the basis of the numbers of tanks that we were looking at, and on the basis of the assumptions that were made as to how the program would proceed. As Secretary Clements has said, we are talking about a procedural matter as to how we would proceed with the program. At that time, we envisioned a delay in the program of approximately 1 year, which would not make it a cost-effective proposition, for that reason, more than any other.

Senator BARTLETT. Do you still agree with your recommendation to the subcommittee that that is the way we should be going?

General BAER. Under the assumption that the statement was made, yes, sir. Those assumptions were valid, and there is no question in my mind that they would have been cost effective.

Senator BARTLETT. Do you think that those assumptions were valid?

General BAER. I do, sir.

Mr. CLEMENTS. We are talking about a year's delay now, is that right?

General BAER. That is what we envisioned at that time.

Mr. CLEMENTS. We do not envision that now. That is a significant change.

This is what he is really keying to.

Senator BARTLETT. You have been talking about the way that things may not turn out exactly as you are saying with these estimates and information that is not factual that you are using. It would seem to me that it is not a precise figure as to whether it is a year's delay or would have been the other way, or whether it is going to be a year's delay or less.

Mr. CLEMENTS. I do not think that any of us think that it is going to be a year's delay. I do not think that General Baer does, do you?

General BAER. No, sir.

Mr. CLEMENTS. I do not think that General Baer considers that it will be a year's delay. He may have at one time; the Army may have at one time.

As far as I know, there is nobody in the decisionmaking process of the Army today that thinks there is going to be a year's delay in this program.

Is that right, General Baer?

General BAER. That is correct, sir.

At the time, sir, the assumption for which the numbers were provided last year—and I think that this was stated at the time—would require a stop to the program in order to develop the hybrid turret.

Senator BARTLETT. You are referring to the dual turret?

General BAER. The dual turret; yes, sir.

Senator BARTLETT. I do not want to see you get into any trouble here.

General BAER. I am basically pleased with the change, sir, because the hybrid has been sort of a bad word in my mind for some time. The assumption at the time was that to go that route, to redesign with the single contractor, could result in as much as a 1-year delay. The numbers we provided at that time were based on that fact.

Senator BARTLETT. The testimony at that time was 1 to 2 years. Our testimony shows that not even up to 1 year. What happened in between that time? Why was that assumption wrong? Was this because of the business judgment made by the Deputy Secretary that that assumption is wrong? That apparently is his reason for proceeding the way that he has.

General BAER. At the conclusion of that testimony, because it appeared that the standardization issue was becoming a more vocal one and certainly one of more concern, there were additional studies done as to exactly what would be required and what would be the best way to approach the dual turret issue.

If I may also make a statement in relation to 2 years, I believe the 2 years also was tied into the time needed to incorporate the 120-mm gun system. If we went beyond the dual turret, to put in the gun, we did need additional time.

Senator BARTLETT. Were you consulted about the savings, in advance of the announcement of the billion-dollar savings that would be realized by the change in the program, by not selecting the winner?

General BAER. I am sorry. I did not get the first part of your question.

Senator BARTLETT. Were you consulted about the savings and the change of plan, the delay, rather than the selection of the winner?

General BAER. No, sir. I think Mr. Clements has indicated that that was done within the Office of the Secretary of Defense. I was not a part of that deliberation.

Senator BARTLETT. Secretary Clements, as I understand it, the winner could have been selected and efforts could have then proceeded with the Germans, as far as commonality items. Is that not correct?

Mr. CLEMENTS. That was the Army's recommendation.

Senator BARTLETT. That was recommended by Secretary Hoffmann?

Mr. CLEMENTS. That is right.

Senator BARTLETT. It did not have to slide?

Mr. CLEMENTS. It definitely did not.

Senator BARTLETT. Did the State Department have any input, or make any suggestions, that this program slide?

Mr. CLEMENTS. No, sir, none whatsoever.

Senator BARTLETT. Were there any agreements that the Secretary of Defense had with Minister Leber or any other citizen of the German Government that required or led to its sliding?

Mr. CLEMENTS. No; not in a formal sense, Senator Bartlett.

I discussed with Minister Leber over a year ago—I think it was in July 1975—the Leopard tank and the desirability of common parts between the tanks and what might be done in this regard, and subsequently Secretary Schlesinger discussed this with Minister Leber on more than one occasion, and then Secretary Hoffmann was in Germany, and he also discussed this with Mr. Leber.

There have been many discussions with the German Government with respect to comparisons between the Leopard tank and the XM-1, establishing commonality, and all of these various aspects of it, but to have you think that this delay was brought about by an agreement with the German Government would be wrong. That is erroneous; that is not true.

Senator BARTLETT. There was no commitment of any kind by the Secretary of Defense, or implication that would have led to such a delay? Is that correct?

Mr. CLEMENTS. What there was—and we have a Memorandum of Understanding to reflect this, that was signed here in the last 30 days—and that was the culmination of all of these efforts that we have been talking about that have gone on for over a year, and certainly the effort that now exists to establish a common gun, common ammunition, common tracks, and perhaps a common engine and other aspects in common, where these parts would, in fact, interchange. That effort and its final conclusion, then, brought about or contributed to what we are now trying to do with our two contractors.

It did not force that. It absolutely did not. They are related, but they are not cause and effect.

May I ask Mr. Hoffmann—he is thoroughly familiar with this—if he agrees with that?

Mr. BARTLETT. Yes.

Mr. HOFFMANN. I would agree with that. I think the standardization reasons are part of the reasons for what we did, as I pointed out in my statement. Underlying the decision are the capability questions that are assumed in any discussion on the 120-mm gun and the engine question. It is a dual basis. It was all taken into con-

sideration. The decision to delay took into consideration the possibilities that were enabled by the addendum to the memorandum, but that was only part of the consideration.

Mr. CLEMENTS. Only part of it.

Senator BARTLETT. Were there other written memorandums or letters between Minister Leber and the Defense Department or possibly even the Department of the Army?

Mr. CLEMENTS. As far as I know, all of these were with the Department of Defense and the Office of the Secretary. There has been some correspondence there, but no understanding, Senator Bartlett.

Mr. HOFFMANN. The operative document, the addendum to the MOU was signed by Under Secretary of the Army Augustine and his German counterpart in the FRG, following the negotiation and conclusion of the addendum agreement. There was also a covering note signed by Secretary Rumsfeld and Minister Leber which exhorted one and all to follow up on this and put the formal imprimatur on it.

Those are the two operating documents we are talking about, the substance that was contained in what was negotiated by Secretary Augustine and his counterpart in Germany.

Senator BARTLETT. Could this committee be provided with those two documents, plus all other written memoranda, letters, and cablegrams, whatever, that pertain to this whole matter?

Mr. HOFFMANN. Yes, sir.

[The documents are classified secret and for official use only.]

Senator BARTLETT. Mr. Chairman, I would also like to have a request made of the Secretary of State for any memoranda, written material, or correspondence on this matter.

The CHAIRMAN. Restate that, would you please?

Senator BARTLETT. I would like to request the Secretary of State to provide us with all written material concerning this whole matter of the XM-1 tank.

The CHAIRMAN. Could you specify a period of time, Senator?

Senator BARTLETT. The last year. The same period of time that Mr. Clements has been talking about.

Mr. CLEMENTS. I do not have any knowledge or recollection, Senator Stennis.

The CHAIRMAN. All right.

Mr. HOFFMANN. It was called to my attention in the House hearing, the fact that early in the year a letter had been sent from the State Department to the Office of the Secretary of Defense (International Security Affairs)—I have still not seen it. As it was represented to me, it could be taken to have had an impact on this matter.

What I told them—I will repeat here—I was not aware of the letter until they brought it up. I never heard it discussed in the meetings that we had on this matter. As the process went on, there may have been a letter that they brought over that had to do with standardization. It was not a factor, to the best of my knowledge, in the decision, and it was not a part of any discussions that I was a party to with respect to the decision on this matter.

Senator BARTLETT. Secretary Hoffmann, why would you recommend an alternate program to the Secretary of Defense in view of the testimony that \$1 billion could be saved from this new XM-1 program?

Mr. HOFFMANN. Why would I recommend a different program?

Senator BARTLETT. Yes.

Mr. HOFFMANN. I would like to be cautious in approaching an answer to that, because some of my rationale is tied up in matters that still have to be decided in the overall context.

Basically, I saw a different approach to solving this problem and I was not aware of the strength of some of the views held, up the line, as to what they would have liked us to have done with this. Generally, that was the context of it.

Senator BARTLETT. Were there reasons other than the savings? In other words, Secretary Clements emphasizes the savings as apparently the prime reason. Are there other concerns?

Mr. HOFFMANN. There were savings considerations involved.

Senator BARTLETT. By?

Mr. HOFFMANN. Back and forth.

Senator BARTLETT. By selecting the winner, you felt there were savings that way?

Mr. HOFFMANN. Again, that is difficult to discuss in an open session, because there is competitive, sensitive material involved. You have to get into the two proposals and how we were weighing various factors to see what was going on. It is complicated. I will say, we discussed everything from implementation date to the technology involved, the savings, commonality, increased capabilities.

There was a thorough discussion.

You recall that the widely anticipated date for the announcement was the 20th—I believe it was the 22nd, or possibly the 23rd. It was on for Wednesday or Thursday before we came out and said, "We are not going to announce the winner. We are going to delay the program for these additional alternative proposals."

During that time, there was some lively discussion as to what the best and most economical way to proceed was, and that, of course, depended on what you wanted to come out with at the other end.

Mr. CLEMENTS. May I comment on that?

Senator BARTLETT. Let me first, if I might ask the Secretary, when did you first learn that the Defense Department or Secretary Clements had a different opinion and wanted to delay for reasons of savings—I guess also commonality.

Mr. HOFFMANN. I was aware, as I put my recommendation forward, that there had been expressed to me, and as we discussed things in general, prior to that time, I was anticipating that there might be some disagreement with what we proposed to do.

The question of when it was decided to delay, I think probably took a matter of 24 hours to evolve, because the substantive discussions as to what we were seeking to accomplish and why we did this and that took most of the first day and a half.

We, of course, were doing other things, and we got back together and worked out this problem with the Secretary of Defense and with others. It just was not a fiat. This was worked on in conjunction with us, and we talked about it over a 2- or 3-day period.

Senator BARTLETT. It was a last minute matter? It was not something that had been worked on for a year or so, several months?

Mr. HOFFMANN. It did culminate. The decisions that had been taken were already there in the background. The standardization matters had been going on in which the Army was a full participant.

The capability questions had been argued back and forth in the general sense.

Senator BARTLETT. How long had the delay been argued back and forth?

Mr. HOFFMANN. Sir?

Senator BARTLETT. How long had the matter of delay been argued back and forth?

Mr. HOFFMANN. The matter of delay came up in the context of how best to get to where we had all concluded that we wanted to go from where we were at the present time.

Senator BARTLETT. The answer is 2, 3 days at the most?

Mr. HOFFMANN. Over the course of 2 or 3 days. Of course, had we come to a point of sitting down to discuss it earlier it would have come out earlier, given the differences, but in protecting the decisional process so that I was free as a source-selection authority to have my various consultative force to review the data based upon their best and final offer, come forward to me with the appropriate security and all, give us time to discuss our decision, formulate it up the line, this was all pretty structured and formal, and we tried to avoid definitive discussions as to source selection, prior to the presentation and balanced analysis of the best and final offers.

Mr. CLEMENTS. What I would like to comment on is very pertinent. I want to emphasize that in all of these discussions we were talking about the turret and the gun, as well as the track; these kinds of things had been discussed for over a year. Whether or not we could come to some kind of commitment based on what we should do to the turret, General Baer just talked about that, was not a last-minute kind of decision. It was a summary meeting that brought into focus these discussions that had been going on for a long time.

In the final analysis, if that 1-year delay that General Baer talked about earlier, and as you apparently understood was still the Army's opinion—which it is not—if that had still prevailed, we would have come out with a different decision.

What we did decide was that there was going to be a 4-month delay, and that the 4-month delay was not significant considering the competitive environment and savings to be obtained. That is what the decision really revolved around.

Senator BARTLETT. I was informed right after the delay was announced that it took place because the contract would not permit the decision to be made, and then the negotiations to proceed on interchangeable items. You apparently are saying that this had nothing to do with it, so we had prior to this all along been advised that the contract did provide for interchangeable items, then the decision could be reached on the target date for the selection of the winner and then the changes to be made to take the best items from the other losing competitor?

Mr. CLEMENTS. I certainly had no such impression.

Mr. HOFFMANN. There was provision in the original solicitation for proposals that would have allowed cross-fertilization under certain circumstances between the two American competitors. What we are talking about here, for instance, in the tract, we have ask the two competitors to look at the German track, the Diehl track, as well as one of the U.S. tracks. It is not just a transfusion between the two

that we know we can do. It is the transfusion with some German parts, including the telescope, the possibility of the track, and the like.

Within the American contracts, we have the right to transfuse. We had not requested them to make proposals, assuming such transfusion would be done with certain parts. Of course, as I pointed out in my statement, we have done that in the additional alternative proposal.

Senator BARTLETT. Is the Leopard 2 AV tank that will be tested in the fall equipped with the Diehl track?

Mr. HOFFMANN. It does, as I understand it.

General BAER. It will not. It was planned to do so, but the Germans made a change at the last minute, and they have what they will call the Gerhardt track.

Senator BARTLETT. You are not going to test the track for which this commonality was partially arranged, and for which this delay in the whole tank program was decided?

General BAER. As far as the specific item of that track, no, sir, it will not be available for testing.

The CHAIRMAN. Gentlemen, we must take an inventory of our time. Senator Thurmond is here, and the Chair wants to recognize him. It is now 11:30 a.m., and we have an important rollcall vote on final passage of a bill coming up at 12 noon.

I have already said that we could not finish this hearing today. Others have various obligations this afternoon, and it will not be a good time to meet. We will have to carry this over, when we do recess, until next week if possible, and if not, very soon after Labor Day.

I have a number of questions submitted by Senator Taft to be inserted at this point and, without objection, I will put them in the record with the request that you gentlemen to whom they are addressed answer them for the record, as soon as you conveniently can.

Senator TAFT. Mr. Chairman, I would like first of all to ask unanimous consent that a report I recently prepared, which deals with the need for a new tank, be printed in the hearing record at this point. This report critiques the GAO study on the acquisition of a new Main Battle Tank, and it is thus germane to the subject of our hearing.

[The report follows:]

[From the Congressional Record, Aug. 10, 1976]

CRITIQUE OF GAO REPORT ON TANKS

Mr. TAFT. Mr. President, the GAO report on the acquisition of a new main battle tank is an important document. It has served as the basis of much of the criticism leveled at the proposed new main battle tank.

I have prepared a critique of the GAO report, which attempts to put into perspective some of the GAO's arguments. I ask unanimous consent that this critique be printed in the RECORD.

There being no objection, the critique was ordered to be printed in the RECORD, as follows:

A CRITIQUE OF THE GAO REPORT, "CRITICAL CONSIDERATIONS IN THE ACQUISITION OF A NEW MAIN BATTLE TANK"

(By Senator Robert Taft)

The report of the General Accounting Office, "Critical Considerations in the Acquisition of a New Main Battle Tank," is an important contribution to the current debate surrounding the XM-1 Tank. It addresses a number of issues which are central to this debate, but the most important question it discusses is also the most basic: do we, in fact, need a new Main Battle Tank?

In its concluding recommendations, the GAO report states that:

"We therefore recommend that the Secretary of Defense accelerate ongoing studies which would consider the cost-effectiveness of an alternate armored force not wholly dependent on the use of costly heavy tanks and * * * (the Congress should consider) whether the Department of Defense should be encouraged to develop cheaper tanks which, fielded in greater numbers, might better offset the Warsaw Pact's numerical tank advantage than large numbers of heavy tanks."¹

In the same report, the GAO suggests two possible alternatives to a new Main Battle Tank: "to field more low-cost tanks and more anti-tank weapons,"² and to insure that 'obsolescent' tanks * * * are not disposed of but rather converted to diesel engines, given increased horsepower, and perhaps given improved fire control. The current price of the M-60A1 is approximately \$380,000, so the money spent on an XM-1 would buy two M-60's."³

The GAO in effect presents three basic alternatives to the acquisition of a new Main Battle Tank:

- (1) More anti-tank weapons;
- (2) A low-cost tank (light tank), to be procured in comparatively large numbers; and
- (3) Continued use of existing tanks or tank designs (M-60, M-48).

The GAO considers these alternatives in combination, including in combination with smaller-than-planned numbers of new Main Battle Tanks.

Unfortunately, there are serious flaws in the GAO's study of these alternatives, which become apparent as we examine more closely each of the GAO proposals: Alternative No. 1: more reliance on anti-tank weapons.

The last ten years have seen the development and world-wide deployment of light anti-tank weapons. While differing in certain respects, all such weapons have two characteristics in common: they are rocket-propelled, hence lower velocity than cannon projectiles; and they rely on a shaped-charged warhead to penetrate armor. The U.S. LAW, TOW, and Dragon; the Soviet Snapper, Swatter, and Sagger, and the European HOT and Milan are examples of weapons of this type.

The light anti-tank weapons used by the Egyptians in the last Mideast War did prove effective against Israeli tanks, although how much they altered the pre-existing tank/anti-tank balance is difficult to determine. Tanks have always suffered heavily when used frontally, without adequate artillery support, against prepared anti-tank positions. Even so, the vast majority of tank kills in that war were by other tanks, not by anti-tank weapons, and the decisive action on the Sinai front, the Israeli encirclement of the Egyptian Third Army, was an armored thrust on the classic Blitzkrieg model.

Nevertheless, these considerations have not served to lessen world-wide interest in light anti-tank weapons. Many countries now produce such weapons, and almost every army in the world has acquired them.

Ironically, it is precisely this fact which lends urgency to the deployment by the U.S. of a new Main Battle Tank. The development of a new type of armor, generally referred to as "Chobham Armor," gives the proposed Main Battle Tank an ability present tanks lack. The new armor, unlike the armor on the M-60, can defeat the light anti-tank weapon. The details of the composition of Chobham Armor are classified. However, it is known to be effective against all types of shaped charge anti-tank weapons and projectiles. Since all of the new anti-weapons depend on a shaped charge warhead, Chobham Armor represents a major breakthrough in tank design. Tanks protected with Chobham Armor are largely invulnerable to infantry and other light anti-tank weapons.⁴ In addition, many older tanks, armed with smaller caliber guns, depend on shaped charge (HEAT) ammunition; a tank with Chobham Armor would have similar invulnerability against their main guns.

Technological developments do not appear likely to reverse this situation. Light anti-tank weapons cannot utilize kinetic energy, the main alternative to a shaped charge warhead, because rocket-propelled projectiles simply cannot produce sufficient velocity. On the other hand, a shaped charge warhead of sufficient diameter to penetrate a normal thickness of Chobham Armor would be too large for control of its burning characteristics.

¹ GAO report, "Critical Considerations in the Acquisition of a New Main Tank," (unclassified version) July 22, 1976, p. 52.

² *Ibid.*, p. 24.

³ *Ibid.*, p. 25.

⁴ A data analysis of over 500 tanks sustaining hits in the Mideast War indicates that a high percentage of those hits were in the frontal arc of the vehicles, where Chobham Armor is extensively incorporated in the new Main Battle Tank designs.

The development of Chobham armor has two implications for the development by the United States of a new Main Battle Tank. It reinforces the need for a new tank, in that all of the new tank contenders (both the XM-1 designs and the Leopard) incorporate Chobham Armor, while the M-60 does not. A U.S. Main Battle Tank which is largely invulnerable to every active anti-tank system except a major caliber gun has obvious advantages.⁵

At the same time, the development of Chobham Armor raises serious doubt about the wisdom of suggesting that the U.S. increase its reliance on shaped-charge anti-tank weapons. Chobham Armor is not an American secret. It was developed by the British, and is now being incorporated in tanks built for Iran in Britain. The German Leopard 2, as well as the U.S. XM-1 contenders, also incorporate this armor. Given the general superiority of the Soviet Union over the West in basic metallurgy, there is little doubt that Soviet Main Battle Tanks will soon incorporate advanced armor with capabilities similar to Chobham Armor. Indeed, the newest Soviet tank, the T-72, may have advanced armor of some type.

Clearly it would be unwise for the United States to rely more heavily on shaped charge anti-tank weapons just as the future effectiveness of such weapons has been greatly reduced by new armor developments. Anti-tank weapons are becoming even less capable than previously of substituting for the large caliber, high velocity gun on the Main Battle Tank. The GAO has failed to take this fact into account in their recommendation of more anti-tank weapons as an alternative, or even a partial alternative, to a new Main Battle Tank.⁶ Similarly, the GAO report fails to give adequate weight to the advantages that would accrue to the U.S. from possessing a Main Battle Tank which would, through the incorporation of Chobham Armor, have an almost complete ability to defeat the opponent's anti-tank weapons.

ALTERNATIVE NO. 2: THE LIGHT TANK

The GAO report frequently suggests a new design of light, "more agile" tanks as an alternative to at least part of the planned new Main Battle Tank force. The GAO argument for light tanks ignores the fact that both the XM-1 contenders and the Leopard 2 are among the most agile armored vehicles of any type or weight in the world, thanks to their high horsepower-to-weight ratios and advanced-suspension systems.

A new light tank would be critically deficient in two respects concerning the relationship between Chobham Armor and anti-tank weapons. In the first place, Chobham Armor is not light. A tank that incorporates a sufficient thickness of it in critical areas must be a heavy tank. Thus, a new light tank could not possibly incorporate Chobham Armor, and would be highly vulnerable to all of the many anti-tank weapons which utilize a shaped charge warhead. This consideration alone appears to deny the cost-effectiveness of investing in a new light tank.⁷

This deficiency of the light tank concept is reinforced by the fact that the light tank itself would probably be compelled to have as its main armament a system dependent on a shaped charge warhead. The size, weight, and recoil of a high velocity gun of caliber 105 or larger would make it difficult to incorporate effectively such a gun in a light tank. Attempts to construct light tanks with heavy armament, such as the M551 Sheridan or the French AMX 13, have not been satisfactory. Yet only a high-velocity, large caliber gun can use a kinetic energy round with sufficient impact to be effective against even existing, much less future Soviet tanks. If the light tank could not carry a high velocity major caliber gun, it would be dependent on a shaped charge main weapon system, and hence incapable on the battlefield against any opponent whose tanks had Chobham Armor.

A third critical factor relating to the proposed light, low-cost tank alternative is the question of life-cycle costs. Despite increasing recognition of the need to

⁵ Guns of 105 caliber and higher can use kinetic energy rounds effectively against normal thicknesses of Chobham Armor.

⁶ The GAO also fails to discuss other weaknesses of anti-tank weapons unrelated to Chobham Armor. These include the high degree of vulnerability of such weapons to suppressive indirect fire, to active countermeasures, and to bad weather conditions. Operated by infantry, light anti-tank weapons suffer from all of the infantry's deficiencies in mobility and protection. Incorporated into vehicles, they only add the cost of the vehicle to the cost of the weapon. These deficiencies relate to the anti-tank weapon's ability against all tanks, not just the projected new Main Battle Tank, and must be evaluated in any recommendation of anti-tank weapons as an alternative to tanks.

⁷ A light armored vehicle would appear to be cost-effective only in cases where weight considerations preclude the extensive incorporation of heavy tanks into a force. In such cases, the force could either be motorized with light armored vehicles or structured as foot infantry; given the great superiority of any motorized force over a foot-mobile force, the investment in motorization and in the required lightweight armored vehicles would be justified. The Marine Corps would appear to be a force in this category.

consider the life-cycle costs of any proposed weapon system, the GAO report does not address the comparative life-cycle costs of a force based on a large number of light tanks.

When we examine the life-cycle cost of this proposed light tank force, we see that it would appear to be higher than the life-cycle cost of the proposed force of Main Battle Tanks. This is because the major element of the total life-cycle cost of any conceivable U.S. tank force will be manpower. Currently, at least 60% of the Army's budget goes for personnel costs; in comparison, only 16% is devoted to weapons procurement, 61% of the cost of an armored division is personnel cost.

A force with a larger number of light tanks compared to the planned number of new Main Battle Tanks will inevitably require more personnel than the force already planned. Crew functions, hence crew size, do not diminish in a light tank, so that tank-for-tank there is no personnel saving. Nor is there reason to believe a light tank will require less maintenance than a Main Battle Tank; indeed, lightweight weapons systems often must pay for their light weight with increased complexity, hence increased maintenance requirements. The M51 lightweight tank now in the U.S. Army inventory is a good example.

Thus, it seems that substituting light for heavy tanks would not produce any savings in personnel on a tank-for-tank basis. Since the GAO explicitly calls for a number of light tanks larger than the planned number of Main Battle Tanks. It seems that higher personnel costs would make the proposed GAO alternative more expensive than the planned Main Battle Tank force, if costs are calculated on a life-cycle basis.

The GAO fails to discuss these three weaknesses of the light tank. Each weakness by itself is sufficient to make the light tank a questionable alternative to a new Main Battle Tank at the present time; together they suggest that the light tank is simply not a viable alternative. Only in cases such as the Marine Corps, where weight considerations preclude a sizable force of heavy armor, is there a possibility that a light tank might serve as a potential alternative to a Main Battle Tank.

Alternative No. 3: continued use of existing tanks and tank designs, such as the upgraded M-48 (M-48A5) and the M-60.

While the GAO report does not explicitly propose the continued production of M-60 tanks as a complete alternative to a new Main Battle Tank, it does suggest the continued viability of the M-48A5 and the M-60, and it does infer that the comparatively low price of the M-60 makes it an attractive option for the present and the future.⁸

However, we can see, through a careful comparison of the M-60 tank with the proposed new Main Battle Tank, that the M-60 is materially inferior. The M-48A5, in turn, is inferior to the M-60.

A critical deficiency of the M-48A5 and the M-60 (all models) is in armor. We have already discussed the superior capabilities of Chobham Armor compared with existing armor, so it suffices to note that the new Main Battle Tank incorporates this armor, whereas the M-48 and the M-60 do not. The armor of the M-48 and the M-60 is vulnerable to shaped charge warheads, and thus to the broad range of battlefield anti-tank weapons. In contrast, the Chobham Armor of the proposed new tank is largely invulnerable to these systems.

Of equal importance is the difference in mobility between the M-60 and the M-48 on the one hand, and the new Main Battle Tank contenders on the other. A review of some relevant statistics shows the mobility difference clearly:

	M-48 (A5)	M-60A3	XM-1	Leopard 2AV
Horsepower ¹	750	750	1,500	1,521
Horsepower per ton ²	14.4	13.6	25.9	25.9
Road speed ¹	30	30	40-50	40-50
Cross-country speed ²	12	16	35	7
Acceleration ²	12	12.2	6	7

¹ From GAO report, app. III.

² From unofficial Army sources. Cross-country speed calculated on basis of Fort Knox medium. Acceleration is seconds required for a 0 to 20 mi/h; turbine engine assumed in XM-1.

⁸ GAO report, p. 25.

The suspensions of the new Main Battle Tank contenders are of an advanced "hybrid" type. They combine features from many individual types of suspensions, and give both a cross-country mobility and an ability to aim the main gun while moving that are far superior to those of the M-48 and the M-60.

One other mobility factor of great importance is the silhouette. The higher a tank's silhouette, the more difficult it is for it to move on the battlefield without being sighted and fired upon by the enemy. The M-60A3 tank, the latest version of the M-60, has a silhouette height) of 10.8 feet, which exceeds the height of any other Main Battle Tank in the world. In comparison, the M-60's Soviet counterpart, the T-62, has a silhouette of only 7.82 feet. Both of the XM-1 contenders as well as the Leopard 2AV have a silhouette of only 7.5-7.9 feet, a great improvement over the M-60.

The superior mobility characteristics of the new Main Battle Tank contenders, particularly the significantly lower silhouette of the new tanks, take on even greater importance when related to current doctrinal developments for U.S. Army armored forces. Depending on the armored doctrine that prevails, tanks can serve in two very different ways. In classic German "Blitzkrieg" doctrine, the tank serves primarily as a maneuver unit; its power comes not from its ability to destroy enemy tanks and personnel with its gun, but from its ability, through rapid, broad-scale maneuver, to create unexpected operational and strategic situations that break the will of the enemy high command. This might be called a "Maneuver Doctrine." The opposite doctrine sees the tank primarily as another piece of artillery, whose most important capability is the destruction of opposing tanks with its gun. Used this way, the tank becomes one more element of what might be called an "Attrition Firepower Doctrine."

The most recent doctrine for U.S. Army armored forces emphasizes the Attrition/Firepower approach.⁹ This doctrine has arisen, at least in part, because the Army has had to recognize the mobility weaknesses of the M-60, particularly its high silhouette. The vulnerability caused by this high silhouette has forced the Army to avoid exposing its tank more than is absolutely required. Doctrine must attempt to compensate for the design weaknesses of the M-60. It does so by recommending that the M-60 fight primarily from so-called "hull-defilade" positions, where the tank remains stationary behind a rise in the ground, or is even dug into an excavation. This means that our tanks are not used in the traditional manner, which would make use of their mobility, but rather as stationary anti-tank guns.

There are, of course, many tactical situations where it is desirable to use tanks in hull-defilade, and the new Main Battle Tank will have a sufficient ability to depress its main gun to be used in defilade at least as effectively as the M-60. However, the Army should not be forced to use its tank this way, without any regard for the objective requirements of the battlefield.

Historically, the Maneuver Doctrine has been more effective than the Firepower/Attrition Doctrine, particularly for armored forces. Tanks have always served best as weapons for a tactical and operational offensive. The improved mobility and lower silhouette of the new Main Battle Tank will restore our doctrinal freedom, because the new Main Battle Tank will be much more survivable on the move. This is a consideration of prime importance.

Thus, we see that from the standpoints of protection and of mobility, the new Main Battle Tank contenders are materially superior to the existing M-48 and M-60 tanks. What is more, this superiority should permit a substantial improvement in the armor doctrine of the U.S. Army. The GAO did not take these factors fully into account when it suggested increased reliance on existing tank designs as at least a partial alternative to a new Main Battle Tank. Indeed, the GAO report did not consider the doctrinal issue at all. These failures on the part of the GAO are of sufficient importance to raise serious doubts about its recommendations.

In conclusion, we see that none of the three alternatives to a new Main Battle Tank proposed in the GAO report takes all the relevant factors into account. In the light of all these factors, not one of the three alternatives seems to promise a cost-effective, or even a battlefield-effective, replacement for the new Main Battle Tank. Unless further alternatives appear, there is every reason for the United States to proceed as expeditiously as possible in building and deploying a new Main Battle Tank.

⁹ The December 15, 1975, draft of Field Manual 100-5.

proceed in order to have ready a gun more effective than the 105mm should the threat increase significantly in the out years.

Senator TAFT. General Baer, will you please give your opinion on the decision to delay the XM-1 program in the interest of interoperability?

Answer. My mission is to provide a proven and cost effective XM-1 tank to our troops as soon as possible. Accordingly, as Project Manager, I would have preferred to continue with the program as originally planned; then to orderly phase in the modifications to attain the interoperability goals.

Senator TAFT. Would you please provide an evaluation by the Armor Center of the breech mechanism on the German 120mm gun?

Answer. The Army has tasked the Commander, U.S. Army Armaments Command to conduct a "Tank Gun and Ammo Initiative". This study effort addresses 120mm gun options and will include an evaluation of the FRG breech mechanism. Results are expected within 30 days.

Senator TAFT. By 1990, what caliber gun will the majority of NATO tanks have? What does this imply regarding the best gun size for standardization?

Answer. The current status of tanks in NATO by gun caliber is as follows:

NUMBER OF TANKS (x 1000)

- 105MM GUN
- 110 or 120MM GUN
- OTHER

~~Deleted~~

US
 UK
 FRG
 US, UK, FRG
 NATO

1975
CURRENT
STATUS

In the event the US Army continues to use the 105mm gun with the new XM-774 depleted uranium round and the UK and FRG opt to use the 120mm gun with future tanks, the tank inventory by gun type in 1995 will be as follows:

NUMBER OF TANKS (x 1000)

Deleted

- 105MM GUN
- 110 or 120MM GUN
- OTHER

US
UK
FRG
US,UK,FRG

1995

NUMBER OF TANKS (x 1000)

STATUS
CURRENT
1975
1980
1985
1990
1995

If the UK, US, and FRG continue to use the 105mm gun with those tanks currently under development the NATO tank inventory by gun caliber in 1995 will be as follows:

NUMBER OF TANKS (x 1000)

- 105MM GUN
- 110 or 120MM GUN
- OTHER

US
UK
FRG
US, UK, FRG
1995

Deleted

105MM GUN
110 or 120MM GUN
OTHER

The decision now by the US, UK, and FRG to adopt the 120mm gun will result in the following tank inventory by gun caliber in 1995:

NUMBER OF TANKS (× 1000)

Deleted

105MM GUN
 110 or 120MM GUN
 OTHER

US
 UK
 FRG
 US,UK,FRG
 1995

In view of the above descriptions, the purpose of standardization can best be serviced by continued use of the 105mm gun.

Senator TAFT. Secretary Hoffmann, you imply on page 4 of your statement that a gun larger than caliber 105 may be required to defeat Chobham-type armor, and that this was indicated by the Trilateral gun test.

Did the Trilateral gun test involve firings of the candidate guns against Chobham-type armor?

If so, can you supply the results of those firings? If not, did the Trilateral tests relate to this question?

Answer. No such firings were conducted during the Trilateral firing trials. Analysis of other firing tests at other locations indicate [deleted].

Senator TAFT. What is the Army's opinion, based on the subsequent tests, of the effectiveness of the 105-mm gun using depleted uranium ammunition against normal thicknesses of Chobham armor? Of Electroslag Armor?

What is the probability that Soviet tanks will carry thicknesses of Chobham armor so as to be able to defeat the 105mm gun using depleted uranium ammunition?

Answer. This question deals with special access material. Testing of this type ammunition is in process and results, to date, are encouraging. A specific probability cannot be determined at this time. However, the [deleted].

Senator TAFT. When do the Germans plan to receive the first production Leopard 2s?

Will these have the 120mm gun?

How many Leopard 2s will be produced with a 105mm gun, according to current German plans?

Answer. According to information we have, the first production rollofts of the Leopard 2 are planned for Fall 1979. The objective as we understand it is to have at least a few Leopard 2 tanks in the hands of the troops by early 1980. The first

production Leopard 2 tanks will have the 120mm gun. The FRG does not apparently plan to produce any Leopard 2's with a 105mm gun.

Senator TAFT. When do the Germans plan to have the 120mm gun completed—that is, all development completed, tested, and adopted—and in production?

Answer. The FRG plans for first production rollofs of its 120mm cannon in Spring 1979. First production rollofs of the ammunition will follow in the late summer. This ammunition will include KE and shaped charge service rounds. It does not include training rounds, which will follow, nor other service rounds such as anti-personnel and smoke, which RFG does not intend to develop. The March 1977 date which figures in the standardization MOU addendum refers to the point when developmental engineering is scheduled to be essentially completed, so that pre-production engineering can be initiated.

Senator TAFT. What effect will the adoption of the 120mm gun, with its attendant ammunition stock requirements, have on the life-cycle cost of the XM-1 tank?

Answer. Adoption of a 120mm gun will cause a net increase to the XM-1 life-cycle costs. Our current estimates of the total impact of the 120mm gun and its related ammunition on the XM-1 life-cycle costs is shown below.

	<i>In millions of dollars</i>
R. & D. gun and ammo:	
Cannon Development.....	\$4.2
Ammunition Development.....	33.6
System Support Hardware.....	3.2
Hybrid Turret Development.....	10.6
120mm Gun/Ammo Integration.....	33.4
Investment.....	+85.0
Hardware:	
Cannon, 22,600×2,970.....	67.1
Mount, 7,031×2,970.....	20.9
Turret, 1,684×3,312.....	5.6
Total.....	+93.6
First destination transportation.....	+.5
Cannon spares (ASF).....	+60.6
Royalties gun and ammo.....	+11.9
Ammunition stockpile.....	+64.0
Gun facilitation.....	+4.0
Ammunition facilitation.....	+108.5
Total increase investment.....	+343.1
Operating and support:	
Gun mount maintenance.....	+1.8
Ammunition/tube replacement.....	+157.2
POL usage.....	+2.0
Total increase O. & S.....	+161.0
Total increase life cycle cost.....	+589.1

It should be noted though, that the funds indicated above cost the entire 120mm ammunition stockpile and allow for all 120mm ammunition/tube replacement operating and support costs. As the 120mm tank is phased into the inventory many of the current 105mm corresponding costs will be reduced and the net additional costs are estimated to be below the total cost figures indicated above.

Senator TAFT. Does not the United Kingdom 120mm gun use separate loading ammunition? Does the U.S. Army feel it is desirable to have separate loading ammunition?

Answer. The United Kingdom 120mm gun currently uses separate loading ammunition although there has been research done in the UK toward development of fixed ammunition (projectile and case joined together). The U.S. Army has traditionally preferred fixed ammunition in order to achieve high rates of fire and reduce the costs associated with separate packaging of projectiles and cartridge cases. This preference does not preclude acceptance of a gun system using separate loading ammunition if the weapon proves, during test, to be responsive to all requirements.

Senator TAFT. Given the results of tests indicating the continued adequacy of the 105mm gun, and given the problems we have suffered with combustible casing ammunition, can we justify the assertion that the incorporation of the German 120mm gun will give the United States a better tank?

Answer. From the standpoint that the 120mm gun has a greater growth potential than the 105mm gun, the XM-1 tank equipped with the larger weapon has the built-in capability to counter a more difficult threat should it develop in the future. This additional flexibility is desirable providing the 120mm gun system meets all other Army requirements such as accuracy, lethality and, of course, system safety.

Senator TAFT. Mr. Secretary, in your opinion, what is the maximum cost increase in the XM-1 program that could result from the decision to delay the program in the interest of interoperability?

What is the maximum delay in the program that could occur?

Answer. As testified earlier in my opening statement, detailed cost data will not be available until the new competitive proposals are received and evaluated. Most of the costs taken the form of earlier commitment of funds which would ultimately have been expended later. Worst casing the selected configuration, we would expect a unit cost increase of something less than 15 percent.

The length of the delay beyond four months will depend entirely upon which options are selected when the competitive proposals have been received.

The CHAIRMAN. We have General Baer listed as a witness in his own right. I do not like to take a recess without giving him a chance to at least refer to his testimony.

We could insert your testimony in the record, General, if you have written testimony?

General BAER. I have no written testimony for the record.

The CHAIRMAN. Do you wish to make a brief statement?

General BAER. No, sir, I do not. I am here to answer any questions that the committee may have.

The CHAIRMAN. That is fair enough.

Mr. CLEMENTS. Senator Stennis, I would like to make a short statement on behalf of General Baer. He is, without any question, one of our outstanding project managers, regardless of service. He has done a marvelous job on the XM-1 tank, and I think the record should reflect that.

The CHAIRMAN. That is fine. I congratulate you for coming from the civilian side of the Pentagon.

Mr. HOFFMANN. I would second that.

The CHAIRMAN. I congratulate you again. It is rather reassuring, gentlemen, to see men of talent like you here this morning coming from the civilian part of our system of government, and others from the professional military. I am trying to compliment all of you, to see you all working together as a foundation, and being men of unusual competence and ability, and giving the Government the benefit of your effort and your counsel.

That offsets a lot of the things that you hear to the contrary. As a matter of fact, those of us who have been here awhile are aware of the dedication to the Government, coming from you gentlemen. This is very helpful, and very revealing to me.

May I ask this question? Gentlemen, I am not asking what conclusion you are going to reach but just what is the subject matter of your action this November? I want to get that straight in my mind. Mr. Secretary, or either one of you. Secretary Hoffmann?

Mr. HOFFMANN. We have had, up to this time, two contractors, each of which has developed a prototype tank. We have had two tanks, and they have both demonstrated the capability to meet the specifications we have laid out for the new tank. They have each built a tank that has been field tested. They have told us how they would produce that

tank, what it would cost, and we have asked them to make bids to do the full-scale engineering development.

In November we will go with one contractor into the full-scale engineering development phase.

We have also asked for options on the first production, and the hardest figure they can give us for the manufacture of that tank, so the decision we would have made on July 20, and which will be made on or before November 17, will be the decision, which of the two competitors, Chrysler or General Motors Corp., will be selected to take their prototype into full-scale engineering development.

The CHAIRMAN. That is your present purpose, without any strings attached, or anything, on the present facts?

Mr. HOFFMANN. Yes, sir.

Mr. CLEMENTS. We are in absolute agreement in that, and this is what the Army wants to do.

The CHAIRMAN. I have some questions of my own that I wish to submit now for the record as time is going to run out. Without objection, these questions will be inserted in the record at this point.

QUESTIONS SUBMITTED BY SENATOR STENNIS, ANSWERS SUPPLIED BY
DEPARTMENT OF DEFENSE

Mr. Secretary, why specifically was this change made to the Army's tank program at this time?

Answer. As indicated in my opening statement we felt it was important not to overlook any practical development options that could improve the selected XM-1 configuration, and at the same time achieve a significant degree of commonality with our NATO Allies. Delaying source selection and asking for appropriate contractor modifications to the existing proposals, to capitalize on the existing competitive environment, appeared to be the correct managerial approach to follow.

The CHAIRMAN. Mr. Secretary, why is this change good for the Army tank program?

Answer. Configuring the tank program in this manner provides the greatest probability of developing and producing the most cost-effective and combat-effective tank possible.

The CHAIRMAN. Mr. Secretary, what degree of standardization does the Defense Department expect to achieve from this agreement?

Answer. We intend to achieve maximum standardization in the specified areas of ammunition, guns, tracks, engines, transmissions, fire control, fuel, night vision devices, gunner's telescopes and metric fasteners consistent with production of the most combat-effective and cost-effective tank.

The CHAIRMAN. Mr. Secretary, is it the Defense Department position that the agreement for standardization with Germany is binding on the Army regardless of any cost, schedule, or performance degradations?

Answer. We have arrived at an understanding with the Federal Republic of Germany that binds us to develop a turret that is compatible with the 120mm and 105mm guns for incorporation on all our production XM-1's. We are also bound to initiate production of XM-1 tanks equipped with the 120mm gun and ammunition when it has been certified as meeting all of our requirements. This entire understanding is made with full knowledge and agreement that it "will be implemented within the existing laws and regulations of the two countries" and further that its implementation is to be limited to "all reasonable efforts".

The CHAIRMAN. Mr. Secretary, is it a firm determination that the Army will use a 120mm gun on their new XM-1 tank?

Answer. In 1975 the Tripartite Working Group consisting of representatives from the UK, FRG, and US jointly concluded that a heavier gun than the 105mm, now standard throughout NATO, may be necessary for the future. The recent decisions do in fact determine that the Army will incorporate a 120mm gun on the XM-1 tank.

The CHAIRMAN. Mr. Secretary, are the two United States contractors being asked to propose cuts on all the planned changes in the XM-1 tanks?

If not, will the Army not then have to negotiate with the winning competitor for any further changes?

Answer. Both XM-1 contractors will propose on the turbine, hybrid turret, gunner's auxiliary telescope, and metrication. Any future changes to the track or fire control will require negotiation with the winning contractor.

The CHAIRMAN. Mr. Secretary, what are the estimated added costs to execute this plan if it is firmly decided to proceed in this direction?

Answer. In constant year FY76 dollars, the estimated costs are: 120mm gun requires \$74.4M of development monies; an estimated \$89.1M additional cost for hardware; \$188.4M to \$565M for stockpile of ammunition and other related costs such as facilitization and an estimated increase in operating costs (due to the higher cost of the 120mm ammo) of \$158.8M. Consequently, the life cycle cost increase due to incorporating the 120mm gun and ammunition range from an increase of \$385.6M to \$886.7M, depending on the amount of ammunition stockpile required and the amount of offsetting funds made available by not purchasing 105mm rounds.

The CHAIRMAN. Mr. Secretary, what is the estimated schedule slippage in this program, if it is decided to go ahead with this plan?

Answer. The elements of schedule slippage due to the program delay to achieve interoperability are:

- a. Resolicitation time: 4 months.
- b. Additional full scale development phase time for redesign (contractor dependent): 6 months (maximum).
- c. Time lost in long lead items for turbine engine due to lack of 197T funds (only applies if turbine is chosen and additional funds for these items are not made available): 2 to 6 months.

Total, maximum expected: 16 months.

The CHAIRMAN. Mr. Secretary, will there be any degradation in performance of the XM-1 tank if these planned changes are effected?

Answer. The benefits of improved armor penetration and logistics are offset by a slight degradation in system performance:

The 120mm ammunition has a higher dispersion which results in a small decrease in hitting probability.

The installation of the 120mm gun results in a slightly larger silhouette, thereby increasing vehicle vulnerability to threat weapons.

A minor decrease in cross country mobility results from the added weight of the larger main weapon.

Because the ammunition is larger, fewer main gun rounds may be carried on the vehicle. This, combined with the greater dispersion results in a loss of "stowed kills."

Finally, the 120mm gun has a shorter tube life as compared with the 105mm gun.

The CHAIRMAN. Mr. Secretary, what other Army, Navy or Air Force programs do you plan to implement this policy with, and when can the Committee expect further commonality efforts with aircraft, for example?

Answer. We review our major weapon system program during the DSARC process for conformity to the Congressional Policy contained in Sec. 802 of Public Law 94-361. Where NATO commonality benefits (e.g., improved operational flexibility and logistics commonality) outweigh the costs involved, we would plan to make suitable adjustments to our programs.

In conjunction with our NATO allies we are giving major emphasis to solving current and longer range interoperability problems in fuels, ammunition, aircraft rearming, and communications. The Annual Report to Congress required by Public Law 93-365 will be one of the mechanisms by which we will continue to keep the Committee informed of our efforts toward NATO Standardization and Interoperability.

As reflected in the January 1976 Report to the Congress on Rationalization/Standardization, there are a number of initiatives that we are pursuing to achieve standardized armaments systems. For example, the US/FRG tank harmonization program, the ROLAND, F-16, SAM-D, Improved Harrier and other standardization efforts were described in this report.

The CHAIRMAN. Senator Thurmond sent a letter to Secretary Rumsfeld, dated July 22, 1976, and he sent a copy to me. It had a ricochet effect. Senator, I am glad you arrived. You may proceed in your own way, please.

Senator THURMOND. Thank you very much.

Mr. Chairman, Charlotte Airport was fogged in, so we were delayed by 2 hours. I regret being late, but I appreciate your consideration here now.

The CHAIRMAN. We are glad you are here.

Senator THURMOND. I would like to state for the record that I fully support standardization of all weapons systems, air and ground, to the fullest extent possible, contingent upon cost considerations and assurances that U.S. military personnel receive the best equipment possible. Commonality is a very desirable goal. The question is, what is the best way to achieve it?

The Congress has been impressed with the manner in which the Army has conducted the XM-1 tank program, by developing two excellent prototypes within the prescribed designs of cost constraints.

I think we should standardize in all areas possible, as soon as possible, but I do not favor extended delay of the hardware demonstrated XM-1 tank development program, nor the acceptance of significantly high costs which could result from the Memorandum of Understanding with the Germans.

Based upon the information available to me, the 120-mm gun may be the gun of the future, but to incorporate it now in the XM-1 program, I am informed, would delay the U.S. tank up to 2 years, according to the recent House testimony.

Also, a similar situation exists with the gas turbine engine, which is again, possibly, the engine of the future, but the question is, should we go forward with a tank program based upon the hope that this engine will do the job?

Essentially, it seems to me that both the engine and the gun are in need of significant and time-consuming tests. Both may well be acceptable within a few years, but I question the wisdom of the Army deciding within the next few months whether or not to accept these proposals when it appears that test data sufficient for such a decision will not be forthcoming for possibly several years.

My initial reaction to the Defense Department decision was why it is not better to go forward with the XM-1 development based upon hardware tests and put in these engine advances once they have been proven by thorough testing. Further, I am disturbed by the fact that the tripartite test clearly showed that we should go forward with the 105-mm gun and by so doing, we could achieve much better standardization than with the 120-mm gun.

My mind is open on this entire matter, and the chairman has graciously consented to this hearing in order that we might place in the record as many facts as possible, in order that the Congress can participate, since the ultimate responsibility, through the program financing, rests in the Congress.

Each of us around this table strongly supports standardization and strongly desires the best equipment for the Army.

It would appear that if we can get all of the facts out on the table, our decisionmaking responsibilities will be easier to fulfill.

Mr. Chairman, I thank you for allowing me to make that statement, and I have a few questions now, if it is agreeable.

The CHAIRMAN. Senator, proceed, I recognize you for questions.

Senator THURMOND. Mr. Secretary, does the Memorandum of Understanding partially commit the United States to the dual turret

and the gas turbine, regardless of United States studies between now and the final decision point in December?

Mr. CLEMENTS. Let me see. You have a double English on that.

Mr. HOFFMANN. The answer to the question is no. Let me enlarge upon that.

We are committed to do what we are calling a dual turret, to get proposals back for that. We agreed to do that in the addendum to the Memorandum of Understanding, although we are not required to have these changes on the first full-scale engineering development models. Our first production models will be dual 105-mm/120-mm capable.

With respect to the turbine, the Memorandum of Understanding states that when and as the turbine fulfills the requirements of our country, and it can be certified and meets the requirements of the Germans for their tank fleet, that it will be accepted by them. We have indicated what amounts to a supposition on our part that this is the technology of the future, but we are not committed to any specific time that we are going to make such a change.

Senator THURMOND. Will the Army still be free to decide in November—either one can answer any of these questions, if you wish—if it wishes to go ahead with its initial decision, which was to select one of the two hardware demonstrated prototype tanks?

Mr. HOFFMANN. That would be an option available to the Army at that time, yes, sir. That course is open.

There is, with respect to certain of the components, agreement with Germany that we will do them.

We would not be implementing the addendum to the Memorandum of Understanding immediately in this contract award. That would not preclude us from doing it later with one contractor.

The answer to your question is that we could go back and make the same decision we could have made back on July 20.

Mr. CLEMENTS. Of course, Senator Thurmond, under that circumstance, if we did that, what we would have done in this 4-month interval would be to develop the prices for these unit changes on a firm basis that would enable us to make far better decisions on down the road a year or two from now, if we decided to make those changes, then. This, at least, becomes a reference point for us in the future, and it is very important, because we are talking about big sums of money in these changes.

Senator THURMOND. I am concerned that there is not adequate time in this 4-month period for the Army to accommodate sufficient test data from the engine and the gun, to make a sound decision.

Would you comment on that?

Mr. HOFFMANN. Yes, sir.

It is contemplated that there may not be, and what we are doing—basically you will notice that there is a difference in the addendum to the MOU with respect to what we are going to do.

The dual turret allows us to go to a 120-mm later without the need to retrofit the entire turret. There would be a saving there if you found yourself in a position after initially deploying with the 105-mm in a 105-mm dedicated turret, and you saw that you had to go with the 120-mm in the middle of the program, or worse, you had to go to the 120-mm in the middle of the program and retrofit the earlier production with the 120-mm.

Do you see?

There is a saving, assuming that you are ultimately going to want to go to the 120-mm in your whole tank fleet, so for that reason we have said that we will do the dual turret.

With respect to the gun and the engine, there are as you know, several technologies represented in the decision that we had before us on July 20 and will again have before us in November. We can pick either engine and it will depend on the considerations that you discussed, whether the technology is here yet, what the costs are, and the maintenance requirements. All of these things will go into the decision of the most effective approach at that time.

We are not bound with respect to the engine, nor are we bound with respect to the gun, because the language is parallel in the agreement as to both parties. As to the gun, we are not obligated to take that gun or install it in the XM-1 tank until development has been completed, until it meets our standards and requirements for tank guns, and until it has been certified by the German Government.

It may be another year, but the point is that the program will not be delayed for the gun or the turbine. Turbine technology may be the technology of the future, but the decision as to whether it is the technology of right now has not been made.

Your question is, how about testing in the interim? There will be some testing. An intensive 60-day test of both of these engines had been planned for this period of delay. However, these tests are not possible now, because of funding constraints.

No 120-mm testing prior to November is possible.

Senator BARTLETT. Would the Senator yield for a comment?

Senator THURMOND. Yes; I would be pleased to yield.

Senator BARTLETT. In the testimony that General Baer gave us—I am citing this, because the Secretary is citing a “worst-case” situation—you testified, I believe, that the 105’s would not be changed or retrofitted; they would be continued. There would be ammunition required for 105’s and the existing M-60’s in NATO and in Europe, so that this course would not be followed.

We went into this, as I recall, in our questions. Is that correct, General?

General BAER. Yes, sir.

Senator THURMOND. Is it true that if we decide against the 120-mm gun—any of you can answer—is it true that if we decide against the 120-mm gun then the dual turret will be a liability rather than an asset to the tank.

Mr. HOFFMANN. I think that the answer to that is yes. It will not be a great liability, from the point of view of weight and protection in the event that you did not go to the 120-mm gun. It would be less effective for the 105-mm than the dedicated 105 turret.

Mr. CLEMENTS. I want to comment here.

The English have gone to a 120-mm gun. The Germans are going to a 120-mm gun, and I have not heard anybody in the Army that is saying that they think that there is not a strong possibility that we will go to a larger gun, the 120-mm gun, sooner or later.

The difference in opinion is when will it be advisable for us to do it? Not whether we will do it, but when.

Senator THURMOND. If we go with the dual turret—

Mr. HOFFMANN. That is a fair statement, but we subscribe to the findings of the 2-year study by the German, British, and our people in the tripartite tank gun evaluation.

The final report of the tripartite evaluation said the 105-mm, as I point out in my statement, is adequate for the near- and mid-term, but the growth potential lies with the 120-mm and again, depending on the threat, depending upon the circumstances of the tank fleets, this is a decision to which all countries might eventually come.

We agreed to do it then.

The question, as Secretary Clements said, is one of time.

Mr. CLEMENTS. The record should note here that the new Soviet T-72, the new designation for their tank that we have every reason to believe that from our latest intelligence that they are going to a larger gun, so that is a part of the threat that Secretary Hoffmann is talking about.

The CHAIRMAN. Senator Nunn, we are glad you could get here. The time is going to run out, as you know, at 12 noon. Senator Thurmond was delayed en route and has not had a chance to ask many questions.

Do you have any questions?

Senator NUNN. Yes, sir, but I do not want to interrupt Senator Thurmond. If I could get about 4 or 5 minutes at the end, it would be helpful.

The CHAIRMAN. We can arrange for that, and will let Senator Thurmond continue for now.

We are going to have to go vote at 12 noon. If you can stay a little beyond 12 o'clock anyone who wants to ask additional questions can come back and do so, then we will recess over until next week.

All right. I think that will take care of everyone.

Senator THURMOND. If we go with the dual turret, do we not commit ourselves to eventually take the 120-mm gun?

Mr. HOFFMANN. Not necessarily.

Senator THURMOND. I understand that you plan to go to the 120-mm gun. It is just a matter of timing, anyway.

Mr. HOFFMANN. A matter of timing and whether they can develop it sufficiently that it meets our requirements. We have some climatic requirements that the Germans do not have. It must meet our requirements.

Senator THURMOND. I understood that if you went against the 120-mm gun, the turret might not be an asset and it might even be a liability.

Mr. HOFFMANN. That is true in the sense that if you had two tanks side by side, and one had a dual turret designed to accept a 120-mm or a 105-mm, and the other had a turret that was optimized just for a 105-mm and you had a 105-mm in your dual turret, there would be a weight and protection penalty associated with the dual turret.

What we are saying is that on a cost-effective basis, in order to allow you to retrofit less expensively, if you do go to the 120-mm, it is an advantage to start right off with the dual capability.

Senator THURMOND. Is it correct that the Army will have—

Senator NUNN. Mr. Chairman, may I ask if Senator Thurmond will yield to me for one question? I have been called to the Floor.

Senator THURMOND. I will be pleased to yield.

The CHAIRMAN. All right, Senator Nunn.

Senator NUNN. I just want to say, Secretary Clements, and Secretary Hoffmann, that I agree with your decision. I think that it was perhaps late in coming, but certainly better late than never. I think that it is a move in the right direction at the right time.

I think that it was absolutely essential that you take this step. If you had not, I feel very strongly that standardization and/or interoperability of NATO would have been dealt almost a lethal blow.

I would like to put in the record an editorial from the Washington Post, I believe, dated August 21, Mr. Chairman, which I think is a very good analysis of the consequences had you not moved in the direction that you did.

The CHAIRMAN. Without objection, the editorial will be put in the record at this point.

[The editorial follows:]

[From the Washington Post, Aug. 21, 1976]

ARMORED BREAKTHROUGH

After a quarter-century of efforts to standardize weapons, the 12 NATO armies in Europe still have 13 kinds of close-range weapons, 6 short-range missiles, 7 medium-range missiles and 5 long-range missiles. At sea, NATO navies employ 36 types of radar, 8 kinds of surface-to-air missiles and 40 varieties of heavy guns.

NATO's former Supreme Commander, General Andrew Goodpastor, estimated that improvement in standardization could save the NATO nations \$12 billion a year and lift effectiveness 30 percent. But arms orders in the billions have proven to be too lucrative a source of profit and too susceptible to national political influences for the adoption of common weapons systems.

The six national armies stationed in Germany cannot resupply each other's ammunition and spare parts and often use different grades of fuel. The United States, which has talked the most about collective defense, has often done the least, except when American arms, such as last year's \$2 billion worth of F-16 fighters, have been sold to the allies.

It is against this background that the Congress and the country should evaluate the campaign just opened by the United States Army, its arms suppliers and their allies on Capitol Hill against the new effort by Defense Secretary Rumsfeld and West German Defense Minister Georg Leber to standardize the key components that will dominate logistical support for the main battle tanks the two countries are developing for the 1980's.

Competitive trials of a new American tank against Germany's projected Leopard II are still scheduled for this fall under a 1974 agreement. But it has become increasingly clear—with 10,000 NATO tanks due to be replaced at a cost of \$10 billion—that neither country was prepared to buy the other's tank, regardless of which proved superior. On Army urging, Congress already had voted funds for expensive advanced engineering development of the U.S. tank this summer, before the trials.

Instead, Mr. Rumsfeld now has postponed the choice between two competing American tanks. He has sent their developers—General Motors and Chrysler—back to the drawing boards to compete further on a list of major components that he and Mr. Leber have agreed will be common to the American and German tanks immediately, such as tracks, fasteners, wheels and advanced sighting devices.

The agreement also calls for the Germans to adopt an American turbine engine and transmission system and for the United States to buy a turret which could accept the German 120 mm. gun, when it is ready, to replace the current American 105 mm. That will mean standardization of ammunition, fuel and most spare parts, when the engine and guns have been developed. Eventually, little more than the hull and turret designs may remain "national."

Production of a new tank, 13 years in development, is urgent to match Russia's new model. But whether there now is to be a further delay of four months, as the Pentagon claims, or ten months, as opponents insist, it will be well worth waiting to achieve this degree of standardization. The tank is as central to the Army's strategy as the aircraft carrier is to the Navy's, and this one is planned for use into the 21st Century.

Senator NUNN. I thank Senator Thurmond for yielding.

One question, I am a little disturbed to find really that the MAG-58 machinegun that we thought was going to be a standardized item, we felt we were moving in that direction for standardization purposes, in addition to the fact that it is probably a better machinegun, that the Germans are not going to use the MAG-58.

That is my information; I hope that it is not accurate. If it is, I would certainly like to know why.

Mr. CLEMENTS. I do not know that, Senator Nunn. We will have to look into it. As far as I am concerned, I cannot comment.

Mr. HOFFMANN. The fact of the matter is that it was not encompassed, as I understand it, within the scope of the discussions that were on-going with the Germans.

Senator NUNN. I think that matter should be pursued vigorously, if we are going to accommodate the Germans on the 120-mm and we are going to move on the Belgian machinegun at considerable political cost in this country, which I agree with. I felt like we had to do it. It seems to me to be inequitable, to say the least, and inefficient, certainly, if the Germans do not move with the MAG-58 also.

Mr. CLEMENTS. I agree with you. We will look into that. I will report back to you what we find out.

Senator NUNN. Thank you very much.

Thank you, Mr. Chairman, I will submit additional questions.

QUESTIONS SUBMITTED BY SENATOR NUNN, ANSWERS SUPPLIED BY
DEPARTMENT OF DEFENSE

Senator NUNN. If we and the Germans achieve interoperability in the main components you have identified, what impact will this have on the cost of the XM-1?

Can you give us a ballpark estimate?

Do you think this additional cost will be offset by the benefits that will accrue as a result of interoperable main components?

Answer. We estimate that the impact on unit hardware cost will be an increase of \$77,000 per tank in constant year FY76 dollars. Consequently, the total procurement program increases \$269M with an additional \$188.4 due to gun and ammunition requirements. However, if we fully fund the 120-mm ammunition stockpile, and do not offset with 105-mm funds, the increase of \$188.4M for gun and ammunition becomes \$565.4M. All costs presented here are in FY76\$; they are not escalated.

The benefits of interoperable main components will be realized only if a European War breaks out. Basically, the benefits to be derived from standardization lie in two areas:

First, the 120-mm armor piercing round is capable of additional penetration. This will prove beneficial in the event that the present threat is increased during the life span of the tank. This is entirely possible with the armor technology available today.

Secondly, there are logistical advantages in maintaining alternate production facilities for such consumables and replacement parts as fuel, ammunition engines, tracks and main weapons. Resupply of these items could be a decisive factor in any conflict and as such the additional cost may be justified.

Senator NUNN. Would U.S. acceptance of the German 120mm gun mean acceptance of German combustible case ammunition?

If not, would not continued German reliance on combustible case ammunition be incompatible with the good of interoperability since it is unlikely that we would use it because it has been the Army's experience that such ammunition is dangerous and unreliable?

Answer. As presently configured the German 120-mm gun requires the use of combustible case ammunition. The Army, as part of its assessment of 120-mm gun, will carefully evaluate the performance of the combustible cartridge case with attention given to those areas that caused difficulty during the development of

of 152-mm ammunition. Experience with this technology indicates that the major problem of ammunition safety during firing, can be overcome by use of a Closed Breech Scavenger System. Should a similar problem exist with 120-mm ammunition this remedy will be proposed for incorporation into the gun system.

Senator NUNN. What, in your view, would be the consequences of failure to achieve interoperability in the logistically significant components of the XM-1 and Leopard 2?

Could you attach a price tag to these consequences?

Answer. Failure to achieve interoperability in the logistically significant components of the XM-1 and Leopard 2 would mean that potential gains in interoperability and final tank configuration areas would be foregone. The consequences, potential gain not realized, would be evident in continued duplication of effort, loss of operational flexibility, and increased combat response times.

There is no way to quantify these consequences.

Senator NUNN. If the divisional reorganization as proposed by the Training and Doctrine Command were undertaken, what effect would these changes have on the projected size of the U.S. XM-1 tank buy and upon the U.S. commitment to achieving interoperability with the Leopard 2?

Answer. Realizing that DA has not made any decisions regarding a reorganization of the division and TRADOC's proposal is currently being developed, it is premature to assess the impact of organizational changes upon the projected size of the US XM-1 tank buy. Concept planners do not believe the number of tanks in the armored division will change significantly; the total force structure could include more tanks; at this time, the outcome is not clear. The work of the Tank Study Group and Total Tank System analysis may impact on the final organizational structure tested. The reorganization would not be allowed to adversely impact on achieving interoperability with the Leopard 2.

Senator NUNN. Fifteen months ago, the Armed Services Committee requested DOD provision of an assessment of the utility large main battle tanks in future mid- to high-intensity combat environments.

When, if ever, will we have such a study in hand?

Answer. On August 25, 1976, Department of the Army forwarded a response to the Committee request citing the status of the desired assessment. It is expected that DA review of the study will be completed, and the information provided to Office Secretary of Defense in late December.

The CHAIRMAN. I want a letter prepared to all members who could not be here this morning giving a report of this hearing, asking if any member has questions to submit for the record, or anything that they want to proceed further with in reference to future hearings. I will sign that letter.

All right, gentlemen. After the rollcall vote, although I cannot come back myself, if you want to continue the hearing you may do so.

Senator BARTLETT. Mr. Chairman, if I might say, I would be back for a few minutes.

Senator THURMOND. Mr. Secretary, is it correct that the Army will have only 50 rounds on which to test the German gun?

Mr. HOFFMANN. No. There was originally set up—General Baer can check me on this—originally January 15, 1977 was set as the date when we would make a decision as to whether we go with the German smooth bore 120-mm gun or the rifled United Kingdom 120-mm. In the intervening period, a German supplier of powder has the occasion to find his plant burned down, and he could no longer provide ammunition or propellant for the 120-mm rounds.

At the present time, there are very few rounds available. Our answer to that is we will not test with only 50 rounds to reach a conclusion.

Is that correct?

General BAER. The latter part of it is your decision, sir. Senator Thurmond's point is that initially there will only be a limited number of rounds, 50 to 55 available, that is correct.

What Secretary Hoffmann is saying is we will not necessarily base our decision on that quantity of rounds. We will wait and get more ammunition, to do a proper amount of testing.

Senator THURMOND. How many rounds would normally be tested before an entire program is committed to the use of the new gun system?

General BAER. Before adoption of a system, sir, probably several thousands of rounds. As far as a determination of what the capabilities, respective capabilities of a system are versus some of the alternatives, that can probably be done with a few hundred rounds.

Senator THURMOND. In reference to the British gun, it is my understanding that it is even further behind than the German gun. The staff reports indicate that the Army feels that if we go with the 120-mm, the British gun, being rifled, may be better.

This determination could not be made within the time constraints imposed upon the Army.

Is that an accurate statement?

Mr. HOFFMANN. Not entirely. There are two areas for enhancement of the present British rifled 120-mm system. One is in the ammunition for their now standard L-11 120-mm gun. They have come up with ammunition that has improved lethality and various other enhanced capabilities similar to our 105-mm improved ammunition.

The United Kingdom is ready to have us look at that now. They also have a new 120-mm which is not ready for test yet. It includes a new high performance gun, plus ammunition that the United Kingdom would like to have us wait and take a look at.

Mr. CLEMENTS. Senator Thurmond, I think you should be aware that the British 120-mm gun, the L-11, is on their new Chieftain tank. It is their block one gun system they are using now. Then they will have the follow-on block two gun system that Secretary Hoffmann is talking about that they are developing.

General Baer, how many of those tanks do they have the 120-mm gun on at the present time, do you know?

General BAER. Approximately [deleted] in NATO.

Mr. CLEMENTS. So this 120-mm rifled gun is, in fact, in being right now on the standard British tanks.

Senator THURMOND. Have the British agreed to accept the German gun, if it is selected by the United States?

Mr. CLEMENTS. No, sir.

Senator THURMOND. Have the Germans agreed to take the British gun if it is selected by the United States?

Mr. CLEMENTS. No, sir.

Senator THURMOND. How are we going to get standardization if the British, Germans, and the United States have different type bores on their guns?

Mr. CLEMENTS. This reminds me of some of the legislative processes that I have observed. It is going to take a lot of accommodation, a lot of diplomacy, a lot of discussion, and we are all working hard on this.

The Ministers at the ministerial level have declared themselves that their intentions are all the same. We do want a standardized gun. But translating that and implementing that into a standard gun is not going to be easy.

Senator THURMOND. Speaking of efficiency, we expect the Defense Department to be more efficient than the Congress.

Mr. CLEMENTS. We will try.

Senator THURMOND. Mr. Secretary, it is my understanding that tripartite studies show that the 120-mm may be the gun of the future, but proper testing would be necessary and the gun could be brought into the program in about 10 years, someone said. Is that correct?

Mr. CLEMENTS. I think there have been various estimates. I have heard 10 years. I have also heard 3 or 4 years. I have heard 5 years.

I do not think that anybody really knows exactly the time frame we are talking about, Senator Thurmond. Part of it has to be a decision to move ahead in an aggressive fashion and really try to reach a determination.

Up until now, that kind of all-out effort has certainly not been made on our part.

I think that we are in that mode now. I think that we are going to move forward on this, and we are going to try to quickly come to a determination.

The CHAIRMAN. Excuse me, gentlemen. I will have to leave now.

Mr. CLEMENTS. We have enjoyed being with you.

Senator THURMOND. I believe the Germans have the 105-mm on the Leopard 2 AV. They are planning to convert the Leopard 2 AV to the 120-mm gun.

Why could we not follow such a plan once the 120-mm is proven and accepted by all NATO parties?

Mr. HOFFMANN. That is what we intend to do. The Germans feel that they will be fitting the 120-mm smooth bore gun on their first production models of whatever Leopard they build.

Our feeling is that if it gets there by that time and proves out, and is still the contender for the NATO standard gun, and the British have not intruded on that, or we have not gone another way, that we go ahead with the FRG 120-mm gun.

Otherwise, we will pick it up when it proves out.

Senator THURMOND. The Germans plan to use the 120-mm, but I understand they have not made a production decision to go with the 120-mm.

When will they do so?

General BAER. I think that the time is March 1977, sir, that they expect to make a production decision.

Senator THURMOND. If they are going from the 105-mm to the 120-mm, why are they retrofitting instead of using a dual turret?

General BAER. Actually, they are not retrofitting as I understand it, Senator Thurmond. The turret that has been built for the Leopard 2 tank is designed for the 120-mm system.

The tank that we will receive here for evaluation starting in September does have a 105-mm gun on it, and it is basically the same turret, but it has a fire control system developed by the Hughes Corp. for the Germans which is different than that on the preceding models of the Leopard 2, basically the same turret, with some internal readjustments.

Mr. CLEMENTS. Actually, Senator Thurmond, my understanding—and General Baer can correct me—but in effect I think that the turret would be termed a dual turret. I was told by some of the German

military, I thought also there was an understanding by our Army group, that they can change that gun in 24 hours from one to the other. That is the number that I was told.

General BAER. That has been given, sir, but the schedule we have been provided for a transition from a 105-mm to a 120-mm system called for 60 days for a checkout of that system.

Mr. CLEMENTS. That is quite a difference.

Senator THURMOND. If you will excuse us for a few minutes, we will be back.

[A brief recess was taken.]

Senator BARTLETT. The hearing will continue.

I would like to continue for another half-hour, if that would be all right, and stop at that point. I do have a lot of questions, much more than we can handle today, but I think that they pertain to areas that we have been over.

There were some comments made about General Baer and his qualifications, and I certainly concur in those, and I think we have been very fortunate to have him as project manager on the XM-1 tank.

General Baer, did you agree substantially with the decision of Secretary Hoffmann that the winning competitor would be selected more or less on the date of July 22 or 24, or whatever it was?

I assume that obviously you had a recommendation.

General BAER. Let me clarify my role on this. I am not a part of the source selection process. There are boards and councils which are advisory to the Secretary in that. I am not a member of that, although I have worked with them to assure that they have the basis on which to make their judgments.

Senator BARTLETT. Secretary Clements, apparently General Baer did not support it at the time that Secretary Rumsfeld, yourself and others made the decision.

Who was the tank advisor to the Defense Department group who made this decision?

Mr. CLEMENTS. Well, Senator, you have to realize that there have been a good many of us who have been actively engaged in the evaluation process on this tank for a long, long time.

Speaking strictly for myself, I have visited both General Motors and Chrysler in this regard, and with Secretary Hoffmann, actually visited Aberdeen and drove both of the prototype tanks personally. As you know, General Baer is not just an advisor to the Army. He is also an advisor to me, and to Dr. Currie, and to the other people who participated in this decision, and his opinions and his observations and his reports that come to me directly every month, all of this information has been taken into consideration in this decisionmaking process.

We did not make this decision off in a dark closet by ourselves. We were in full consultation with all of our people.

Senator BARTLETT. Mr. Secretary, it seems to me that your decision ignored the advice from the Army and its experts and went in the opposite direction.

Mr. CLEMENTS. I would not want the record to stand on that. From my own standpoint, their advice and counsel and all of their data was certainly not ignored. It was given full consideration.

Senator BARTLETT. Let me rephrase it then; maybe that is unfair, but you went counter to it.

Mr. CLEMENTS. We did.

Senator BARTLETT. I wonder what tank expert concurred with you in the direction you went.

Mr. CLEMENTS. I consider that General Baer is my outstanding tank expert in this regard, and we listened very carefully to the full presentation the Army made.

We just came to a different conclusion. I would say that we used the same data base. We had all of the same information available to us. We came out at a different place.

Senator BARTLETT. Secretary Hoffmann mentioned a little bit ago that the decision reached was reached over 24 hours to postpone the selection and proceed as we are now proceeding, even though you mentioned earlier that this was a year's discussion on the tank, apparently it was a whirlwind finish and a snap judgment at the end.

Is that correct?

Mr. CLEMENTS. I do not agree with the terminology, "snap judgment" or "whirlwind finish." This was a normal process. We reviewed the recommendation—and Secretary Hoffmann, I think, will concur in that—the recommendation that he brought forward to the Office of the Secretary of Defense. It was done in a completely normal fashion. He never planned to do it in any other way, and that is the way all of these major weapons systems are brought forward, so institutionally the process was not violated. It went forward in exactly the right way, and this was not a snap judgment.

I take exception to the use of that term.

Senator BARTLETT. You feel it is a normal way to proceed, to make that decision on the date that the announcement of the winner is to be made? Not to advise anyone on this committee, including the chairman, of a very substantial change, or was this done?

Mr. HOFFMANN. May I speak to that, because I think that it is a point that should be cleared up.

As you know, under the rules, when we award a contract which would have been the action taken, and we announce a contract, we are precluded by law of advising the contractor prior to our announcement, so we announce to the Congress coincident therewith.

Because of the very competitive nature of the consultation process that attended the matter, between the time I left my office to go down to DOD and I came out with the final result, there was still a prospect that we might announce a winner, precluding notice to the Congress thereof until after we announced it.

What finally came out was the decision to delay, and we thought that it would be better to tell the Congress as early as we could, and the contractor and everybody got notice at the same time. That is why the consultation was not made, as a practical matter, could not have been made prior.

Senator BARTLETT. We have been advised that a delay of 4 months will be concurred for this new request for the proposal. I heard Secretary Clements say that once or twice.

The proposal itself, as I understand it, grants a further delay of 6 months from the development schedule.

Is that correct?

Mr. HOFFMANN. Not necessarily.

There are possibilities of delay beyond the 4-month period that we have specified. It depends what we do, what the contractors come back

with, what their time frames are, what the expenses are, what we elect to do as a matter of contract—all might interfere with that deployment time.

Senator BARTLETT. What total additional delays can be expected in this program?

What is the total program delay if this new plan is continued and followed?

Mr. HOFFMANN. This is one of the things that we are going back to the contractors to get a better handle on. There are considerations whether we will delay, depending whether we go back, go forward, do it with one contractor or the rest.

What we are trying to do is get the best evaluation that we can in this 4-month period as to what our best potential is, again keeping the competitive environment that we had which was a constructive one, a very energetic one, keeping that intact for long enough to let them look at these additional proposals.

I will not say that there will not be any delay beyond 4 months. There is a possibility, if we select certain contractors for certain components additional program slippage will be required. There are a number of variations that could result in additional delay.

Again, I will speak for myself and say that I hope that the delay would not be a significant one beyond 120 days. We all agree with that.

We may have differing ideas when it comes to decision time as to what sort of delay is worth how much enhancement. It is the same sort of thing that we talked about before in the decision process.

As far as I am concerned, the objective of this exercise is to enhance our overall program, and within that program, the deployment date is very important in our thinking.

Mr. CLEMENTS. Senator Bartlett, I want to add that I know of no one who does not want to keep this delay to an absolute minimum, and hopefully, in an optimistic sense, keep it to 120 days. No one wants to delay this program.

Senator BARTLETT. You emphasized the importance of competition in this, Mr. Secretary. These delays could have been avoided if you had insisted upon plans to be made earlier for these bids to be made by the contractors on the component parts interchanged from one tank to the other.

Why was that not done? Since you approved of the contract, or the Defense Department did, why did that not come up earlier, particularly since you have been working on this for a whole year?

Mr. CLEMENTS. Senator Bartlett, I think that that is a good point and certainly in retrospect if we had jointly—we, the Office of the Secretary of Defense and the Army and the Germans, considering all of the players, if we had gone about our business in a more orderly fashion and if we had anticipated, as perhaps we should have, some of these contingencies, we could have avoided this delay. There is no question about that, and I accept that criticism.

However, getting the full coordination of the three participants, not to mention the contractors as participants, that would be two other players, and getting full coordination between these five entities and have good communication and good cooperation, it just was not done, and we can be faulted for this. We should have done it. Perhaps it would have been impossible, I do not know, but we could have made a greater effort in that regard, and I take part of that blame.

Senator BARTLETT. One thing that I might mention to all three of you that has particularly bothered me, particularly to the two Secretaries, Mr. Damm, as you know, appeared before the R & D Subcommittee and the Manpower Subcommittee in a joint hearing and made the statement that the Germans would not buy AWACS unless we bought the Leopard tank but then upon question, did he mean that if the Leopard tank was not the winner in the competition with the American winner, and he said yes, he did, that they still expect the United States to take the Leopard tank if it were judged in the competition to be inferior.

It just seems to me that that signal to change at that point and a great interest on the part of the Defense Department to make some very substantive changes in their plans, I am amazed that the Diehl track is not even going to be tested.

The Secretary mentioned a tripartite testing of the guns, the 105-mm won that in the American's opinion. The Secretary was very careful to say that even with the dual turret there is no assurance that we will go the the 120-mm gun.

These are the main items to us, several main items that are involved in this trade that seems to be a very basic part of this delay of a new generation of main tank. That bothers me, Mr. Secretary, very much.

Mr. CLEMENTS. In the first instance, I would like to talk about this representative from Germany who appeared, I guess, before your committee.

Senator BARTLETT. A joint hearing of this committee and Foreign Relations.

Mr. CLEMENTS. I did not meet this gentleman, but some of his statements, as you might imagine, caused considerable uproar in the Department of Defense and, more particularly, in the Army as well as the Air Force. This was taken directly to Minister Leber. He was even more upset than we were, and he has officially declared to us, that is Minister Leber, that this man in no way was an official representative of the German Government, and certainly not of the Ministry of Defense, and that whatever opinions he put forth were his individual opinions and did not represent the opinions of either Minister Leber or the German Government in any way.

I think they should be looked upon in that context. We discussed before any linkage between what we are doing with respect to this tank and the AWACS issue, and I have told before, I certainly want the record to show that that was not in any way a part of a consideration that was discussed as we made this decision, as far as I know. It was never discussed with the Army, and was not a part of their decisionmaking process.

Mr. HOFFMANN. That is correct.

Mr. CLEMENTS. The record should reflect this.

Senator BARTLETT. I was also disturbed that the MAG-58 machine-gun that I signed a letter supporting as a part of commonality and a part of standardization was not in part at the insistence of the United States a commonality item as far as the Germans were concerned.

Why did not the United States insist on this action by the Federal Republic of Germany in the interests of standardization?

Mr. CLEMENTS. Senator Bartlett, I have heard for the first time this morning from Senator Nunn that this apparently will not be a standard item with the German Army, and you can be sure that we

going to look into this, and we will review this very carefully, because I had always understood that it was. So I am very much surprised—indeed, I am shocked, and we will look into this, and find out more detail.

Senator BARTLETT. It was very disturbing, because tearing up a program as important as the one in my opinion that is being jeopardized in the interests of commonality, not to pursue this in a successful way, it is my understanding too, it is not an item of the Germans in standardization.

Let me ask you, how can the Army expect to get a fair presentation and have a full evaluation of a major new turret design in a 2- to 4-month period when the Army previously took 4 years to develop prototype tanks and turrets for evaluation?

Mr. HOFFMANN. The previous estimates, again, following, or at least concurrent with, but I think following the testimony last spring, I had discussions with General Baer—several of us had. We went back and had some more work done on what was then called the hybrid turret proposal, so that we have the benefit of that experience, and also that 4 months that we are using here that goes against any time it would take to develop it.

Our feeling is we do not know until we see what the contractor comes back with, but given a bit of a lead by him and a headstart, and given some improvement to the overall design, you recall that the basis for the testimony you heard was work done the preceding summer on a dual turret, that we are refining this data, that we have some different concepts involved, I am told, and that the chances—there are chances that we could get a dual turret within this timeframe.

Senator BARTLETT. I believe we heard that testimony last February of this year.

Mr. HOFFMANN. April is the date that I have on my copy.

Senator BARTLETT. It was during the winter of this year, not last year.

Mr. HOFFMANN. I have April 1976 on this copy.

Senator BARTLETT. Is not the physical application of the new armor to the turret of major importance?

Mr. HOFFMANN. The application of the new armor to the turret, yes, sir.

Senator BARTLETT. Would this new dual turret require a complete new application?

General BAER. Not a complete new application, Senator Bartlett. It would require some changes, primarily in two areas, the frontal arc because of the expansion of that area to accommodate the larger gun, perhaps in the bustle area where ammunition is stored because of changes of configuration.

This will only be determined by the contractor in their design analysis.

If I may add one other comment to Secretary Hoffmann's, in addition to the studies and the design inputs that we will receive from the contractor, there will be some mockups made that will be provided to the evaluation board. They will have an opportunity to receive, at least in that sense, the configuration changes.

I think the other point, perhaps, that makes this a little bit better picture from this standpoint is that we are dealing with changes as

opposed to a completely new design, so you have some change, some base on which to work, based on the changes that are being proposed.

Senator BARTLETT. General Baer, I recognize the strong tendency for you to support what decisions have been reached. I would like to ask this question, and really get your honest, independent judgment, whether it happens to agree or disagree with the two civilian gentlemen sitting here.

Do you feel confident within a 2- to 4-month period that the turret design, the armor, can be properly done, to your satisfaction, or do you have some question in your mind concerning it?

General BAER. Without trying to dodge your question, I do not think in the armor area you get totally satisfied, that you are 100-percent confident that you have achieved all that can be worked out in the solution. I do believe, again based upon 3 years of very excellent work by our contractors and tremendous work done in-house by the Army, that we do have the basis to judge, with the level of confidence that would be necessary for a decision, whether we do or do not have an acceptable solution; also to judge the relative merits of the alternatives that the Secretary will be looking at, I think our analysis, that will be submitted as a part of the evaluation process, will provide a good basis for a sound decision.

Mr. CLEMENTS. I agree with that.

Senator BARTLETT. Will the Army under the new paper proposal be able to fully evaluate the best application of this armor by the contractor without reviewing the actual physical application, such as a prototype?

General BAER. Not to the degree that we have done previously, no question of that.

Senator BARTLETT. This would be cutting corners in the normal procedure?

General BAER. We will be much more dependent, again, on analysis of paper design as opposed to hardware design, no question of that.

Senator BARTLETT. Is this a corner-cutting measure, to do this? If it is not, then I ask you why do we just not use paper designs normally.

General BAER. I think what it is going to require is some additional work, again depending on which contractor we select, and the extent of the changes that have been made in his design.

Senator BARTLETT. That is going to extend the time?

General BAER. This is one of the things that we are trying to determine from the contractors as to what impact that may have on our ability to maintain our schedule of 36 months. That is why I say some additional time may be required. That is why the RFP recognized that there may be some extension required.

We are going to analyze that very carefully and try to minimize it, certainly.

Mr. CLEMENTS. Senator Bartlett, you have to remember that we have had these two very fine prototypes. They have been fully developed and tested.

This gives us an enormous data base and experience base from which to move. It is not as though you start from scratch with the so-called paper design and you never have anything in the way of hardware to work with.

Our data base is excellent.

Senator BARTLETT. Mr. Secretary, I also realize that you could have awarded the winner, as the Secretary of the Army wanted, and proceeded ahead.

Mr. CLEMENTS. We could have.

Senator BARTLETT. What we are talking about are the hazards of doing it the way that you and Secretary Rumsfeld wanted. How valid, Mr. Secretary, do you expect the contractor's proposal will be for a new turbine engine installation if the contractor is given only 3 months to consider this problem when another contractor has been working with the engine for 3 years. Will this, in any way, penalize either of the competing contractors?

Mr. HOFFMANN. Again, you have a disparity in the time. You make your evaluation based on what you have with the differing circumstances in mind, and you can come to a fair result.

Senator BARTLETT. Does that answer me? I think you restated the question, Mr. Secretary.

Mr. HOFFMANN. I have been known to do that, but I am not trying to avoid the question.

What I am saying is that—yes, there is a difference in time within which they would be able to consider the problem.

Senator BARTLETT. Will this in any way—this is the punchline question—Will this, in any way, penalize either of the competing contractors?

Mr. HOFFMANN. I would certainly hope not, sir.

Senator BARTLETT. You think it might?

Mr. HOFFMANN. I think it can be done, if we are not careful to carefully weigh what they are giving us, and realize that you could make a judgment that would not take that into account. That is not our purpose, to do that.

Senator BARTLETT. Have you consulted with the competing contractors or heard from them as to whether this is the case or not?

Mr. CLEMENTS. I have. Both contractors have assured me that they have not been penalized, as you have said, under these circumstances.

Senator BARTLETT. The diesel engine contractor?

Mr. CLEMENTS. Both contractors.

Senator BARTLETT. How about the contractors who provide the component parts, such as the diesel and the turbine engine?

Mr. CLEMENTS. I am sure that both of them are very much concerned about what the outcome is going to be, and they should be concerned. They are vitally affected.

Both of the prime contractors, Chrysler and General Motors, have talked to me about this at the highest level—I am talking about the Chief Executive Officers. They have assured me that they will suffer no penalties under this circumstances.

We do not want them to suffer any penalty.

Senator BARTLETT. How about the subcontractors on the diesel engine and the turbine engine, at the highest or lowest level?

Mr. CLEMENTS. I am sure whichever one is not chosen will consider that he has had a severe penalty.

Senator BARTLETT. Have you had—you have not answered my question, Mr. Secretary—have you had any discussions with them like you had with the prime contractors?

Mr. CLEMENTS. No; I have not.

Senator BARTLETT. You have not heard from them, either way?

Mr. CLEMENTS. I think it is inappropriate for me to talk to those subcontractors.

Senator BARTLETT. Do you think it will penalize either one of them?

Mr. CLEMENTS. No; I do not. One of them is going to lose.

Senator BARTLETT. I assume one of the general contractors, prime contractors, will lose also.

Mr. CLEMENTS. That is right.

Senator BARTLETT. They would have lost had the decision been reached on time.

Mr. CLEMENTS. You are talking specifically on the engine now, not the general contractor.

Senator BARTLETT. I am talking about both.

Mr. CLEMENTS. Wait a minute. We are talking specifically that one of the engineer manufacturers is going to lose; he is going to suffer a penalty, no question about it. That does not mean that the prime contractor or the general contractor, whichever engine is chosen, is going to suffer a penalty.

There are two different issues involved here.

Senator BARTLETT. This is a letter from Mr. Estes, with whom obviously you have discussed this matter, since he is the president of General Motors, to Secretary Rumsfeld.

He says, in part, "Second, it is most demanding to require General Motors in the 3-month response time to prepare a proposal for competitive evaluation when you require configuration as to design and costs which will change as major as deployment of the turbine engine."

I think he is showing concern there.

Mr. CLEMENTS. I think he is concerned. I do not question that. I want them both concerned.

Senator BARTLETT. That does not seem to be consistent with what you just said.

Mr. CLEMENTS. It is entirely consistent. I want those contractors concerned.

Senator BARTLETT. I want them competitive, too. This does not appear to be consistent with what you said he said.

Mr. CLEMENTS. I do not agree with that; I think it is.

Senator BARTLETT. He said, "it is most demanding."

Mr. CLEMENTS. It is demanding. We are the customer, he is the contractor. We are asking him to do things that in this instance he would prefer not to do.

Senator BARTLETT. He says, "Third, I feel it is improper to reopen the competitive evaluation after best and final offers were received from the contractors and made visible in the evaluation process." He does not seem to be agreeing exactly with your decision.

Mr. CLEMENTS. Your question to me was, is he going to suffer any penalty. I have assured you that he has told me that he is not going to suffer any penalty because of the engine to be chosen. That is exactly right.

Senator BARTLETT. How many of these Leopard 2 tanks do the Germans now plan to produce for their army?

General BAER. To the best of my estimation, about 1,000 in the initial procurement.

Senator BARTLETT. Will the Germans have as many tanks in NATO with the 120-mm guns as the United States when the program is completed?

General BAER. If we take strictly the numbers that we are both dealing with right now, they would not. If we assume, with all 3,300 of ours committed to the NATO forces—

Senator BARTLETT. The Senate, in 1975, proposed to defer the XM-1 tank program until the testing of the Leopard 2 competition could be evaluated for possible NATO standardization. This proposal was rejected in conference in the Congress. The position was that the XM-1 tank program should proceed as the Army planned.

Senator THURMOND. Excuse me, Senator. Are you going to 1 o'clock? I imagine that we will have to leave by then. If that is the case, since they are going to come back another day, I will wait to ask my questions. I understand the Secretary has to go out of town. I would not want to detain him.

As far as I am concerned, I think Secretary Hoffmann and General Baer can answer my questions another day without the Secretary coming back.

Senator BARTLETT. I will be glad to yield.

Senator THURMOND. That is all right. You go ahead. They are coming back anyway.

Senator BARTLETT. What I am getting at here is at the action, Mr. Secretary, that you have taken refutes the will of Congress. I wonder why you have done that?

Mr. CLEMENTS. I really do not understand that, and certainly nothing that we did was in that spirit, and—would you explain that to me, why this goes against the will of Congress? I do not get that out of what we did at all.

Senator BARTLETT. The Congress wanted the decision reached on schedule, planned and appropriated for that. That is its desire.

It seems to me that there was, as discussed, a delay of the program and the final decision was that it would stay on track.

Mr. HOFFMANN. If I may intervene, I will grant you that, in general, that was the objective of the Congress and, in general, was the objective of the entire group that worked on this decision. The delay that we are taking here was not coextensive with the delay that was proposed there, nor was it for the purpose of evaluating an overall German design.

We felt we should keep our program on track. If anything, the decision that was taken in favor of standardization, of course, that has been supported in language by the Congress.

We have been exhorted to do that.

While it is delay, Senator, I do believe that it is delay for the right reasons, nor does it fly in the face of the previous decision that was expressed in the matter that you related to, which had to do with delaying until the German program could catch up.

Senator BARTLETT. The United States appears to be doing most of the standardization for NATO. Would you provide for the record actions taken by our allies to standardize among themselves and what we are doing to encourage their participation in this effort?

Mr. CLEMENTS. I would be happy to.
[The information follows:]

Some of the more significant efforts toward standardization among our NATO allies include:

FH70/SP70 155mm Howitzer—Towed and self-propelled versions of this weapon are under development by Italy, the United Kingdom, and the Federal Republic of Germany.

The MILAN anti-tank missile system is being procured by Belgium, France, the Federal Republic of Germany, the United Kingdom and Greece.

The HOT anti-tank missile system is being developed jointly by France and the Federal Republic of Germany.

ROLAND air defense missile system was developed jointly by France and the Federal Republic of Germany before United States participation.

A common artillery computer fire control system is being developed by Canada, France, the Federal Republic of Germany, the United Kingdom and Norway.

A NATO frigate is under joint development by the Netherlands and the Federal Republic of Germany.

A Multi-Role Combat Aircraft (MRCA), a strike aircraft, is now in flight development to be adopted by Italy, the United Kingdom and Federal Republic of Germany. These countries are also jointly developing a scout helicopter.

Other aircraft being developed jointly among our allies include the Alpha Jet, the Jaguar, and the Lynx.

The United States encourages the NATO standardization effort through participation in various NATO rationalization and standardization groups. Also, the EUROGROUP, a consortium of European countries, is actively pursuing harmonization within the European countries of NATO.

Senator BARTLETT. I would also like to mention that it is my understanding that the M-48 tank, which was first sent to Germany many years ago was an American tank with 100-percent standardization with the United States, but as time went on, component parts of that tank were produced, so when it ended up, it was about 15-percent standardizable with the U.S. M-48 tank.

Mr. CLEMENTS. I cannot comment; perhaps General Baer can. I just do not know.

General BAER. Some changes were made. I cannot comment on the percentages, or anything of that nature.

Senator BARTLETT. I am very interested in standardization. I wonder what protection you are providing so that you can guarantee that the exact components that may be produced or parts of components in the other country are going to be usable, because you have a metric system, you have different design, you have different building, constructing practices, different materials.

You have a real problem doing it the way you are apparently planning to do it which is to have local production of these items.

Mr. CLEMENTS. We are talking about piece-part interchangeability, which is the word I would use, as opposed to standardization, or comparability, or any of these other words.

Senator BARTLETT. Can you insist upon that?

Mr. CLEMENTS. Yes, sir, we can.

Senator BARTLETT. How are you going to get the change in design or change in materials and changes brought into this?

Mr. CLEMENTS. The spirit of what we are talking about in using the track, or the engine, or the gun, or the ammunition, is that under a battlefield condition these pieces and these parts can be cannibal-

ized from one tank, a German tank, to an American tank, or vice versa. That is the spirit of what we are trying to do.

Senator BARTLETT. Does the Army have a preference for a smooth bore, or rifled bore?

Mr. HOFFMANN. At the moment, our lines are open with respect to the two prototypes that are available.

Senator BARTLETT. Would you provide for the record a detail of the advantages and disadvantages of each type of weapon in the 120-mm configuration?

Mr. HOFFMANN. Yes, sir.

[The information follows:]

Family of ammunition: Because of physical constraints, kinetic energy projectiles using long-rod penetrators require fin-stabilization. Conversely, relatively short and thick projectiles require spin-stabilization. The smoothbore cannon requires fin-stabilization. The significance of this point lies in the possibility that advanced armors can be tuned to keep out long-rod penetrators. Hence, the capability of using either mode of stabilization "keeps the Warsaw Pact armor designer honest." The lack of spin-stabilization also presents significant mechanization problems for high-explosive rounds other than shaped-charge munitions. The rifled cannon provides the flexibility of designing to incorporate any type of ammunition desired, and hence, represents a form of growth potential in that no specific type of munition is penalized or excluded from the ammunition family.

Tank cannon guided ammunition: A slight apparent advantage for the smoothbore cannon exists owing to possible reductions in complexity.

Sabot design: The sabot design is more complex for rifled tubes. However experience with the XM735 and XM774 cartridges shows that this does not impose a significant burden.

Tube and weapon unit cost: No significant differential.

Muzzle velocity, accuracy, tube weight, tube life: No significant demonstrable advantages for either system.

Replaceable tube liners: Potential advantage to the smoothbore cannon, but this has not been demonstrated in hardware.

Fuzing: Standard U.S. Army practice requires two independent arming modes for ammunition. This requirement is easily met with the rifled bore by using both setback and centrifugal arming. The requirement presents greater difficulty for smoothbore cannon, but this is not viewed as an overwhelming technology problem.

Senator BARTLETT. Have we evaluated the German 120-mm gun in terms of product and prudence?

General BAER. We have done some evaluation of the gun at the request of the Germans, and of course, the trilateral trials have provided some further information. Those are the two instances.

Senator BARTLETT. What is the Army's preliminary assessment of these two weapons?

General BAER. Our assessment is that the German gun performs up to its specifications. I think that we have some concerns about the maturity on the completion of the development of some of the ammunition items which are not again totally in line with our requirements.

Senator BARTLETT. Is the German 120-mm gun system and ammunition ready to go into production?

General BAER. Against the requirements we have, no, sir.

Senator BARTLETT. When do you think that they would? Do you have any time schedule on that?

General BAER. We would estimate, based on production of those items in this country, a period somewhere between 3 to 5 years.

Mr. CLEMENTS. I think General Baer said a moment ago that the Germans plan to make a production decision in March of 1977 on

their 120-mm gun and ammunition. The answer to your question is, their decision will be made in March 1977.

Senator BARTLETT. Three to 5 years. In the Army's opinion, when would be the earliest that the Army would be assured that the Army's 120-mm smooth bore gun system and ammunition would be ready for execution. Would that be 3 to 5 years?

General BAER. The estimates we have received assume a U.S. production base for both guns and ammunition. We are looking at a period of about 5 years. We would estimate about 1982 before the system is ready. If we bought offshore, certainly that time could be shorter.

Senator BARTLETT. Will you have the same ammunition requirements the Germans have?

General BAER. We have some differences, sir.

Senator BARTLETT. What are the U.S. unique requirements for 120-mm gun system?

Mr. HOFFMANN. Unique ammunition requirements?

Senator BARTLETT. Yes.

General BAER. The caution is a question again. We are walking a tightrope on some classified information. That is the issue here.

Primarily, we see a requirement for a greater variety of rounds for a gun weapons system than the Germans do. The Germans generally focus again on the tank killing capability, while we feel the tank cannon should also have the capability to engage in other targets out in the battlefield, which require different types of ammunition.

Senator BARTLETT. General Baer, is this 120-mm gun ammunition the same kind of ammunition that you have had problems with in the past?

General BAER. In the general sense it is, sir. There are some differences. The German round has a metallic base, where our round does not. The U.S. 152-mm round has a combustible base also.

There are some other differences; however, many of the concerns that are always raised concerning combustible case ammunition apply to the German rounds, as well as to our system.

Senator BARTLETT. What are some of the other problems, if you could tick them off?

General BAER. In general, there are two concerns. The full combustion of the round itself, is there residue left in the chamber after the round is fired. The fragility of the round as it rides in its container within the tank itself in the battle environment is also a concern.

Senator BARTLETT. Does the Army have satisfactory results from the use of caseless ammunition in the M-155 tank?

General BAER. That is a matter of debate, sir. In some eyes, many or most of the problems have been resolved. However, there are some, that perhaps some people would raise, that must still be dealt with.

Senator BARTLETT. Does the effectiveness of the 120-mm gun at long range depend on the fire control system?

General BAER. Yes, sir, I think it does.

Senator BARTLETT. Does the United States have an effective tank fire control system for a distance beyond 3,000 meters?

General BAER. The current systems generally have reached about the end of their significant operational capability at 3,000 meters. Certainly they could be extended.

There are state of the art improvements that could be made.

To answer your question, 3,000 meters is about the extent of the operational range at this time.

Senator BARTLETT. Does the Army believe that the German 120-mm gun is ready to commit to this XM-1 program at this time, or by January 15, 1977? I think you already commented on that.

The answer to that would be no.

Does the Army now, or will the Army by January 15, 1977 have sufficient data to make a decision to commit the XM-1 program to 120-mm system?

General BAER. We do not know that now. It depends upon the evaluation and testing that we plan to do.

Senator BARTLETT. Does the United States have stronger safety requirements for their ammunition than the Germans?

General BAER. Yes, sir, we do.

Senator BARTLETT. Have the Germans expressed, officially or unofficially, any opinion of the acceptance of the British 120-mm gun for their tank?

General BAER. They have made no commitment on that.

Senator BARTLETT. Have the British expressed any opinion on the acceptance of the German 120-mm gun for their tank?

General BAER. No, sir, they have not.

Senator BARTLETT. The addendum agreement with Germany states that the United States will be required to select a 120-mm gun configuration by the same date. We must submit our unique requirements to the Germans.

Is this a reasonable coincidence of dates? Does the Army have any recourse to first ascertain if these unique requirements can be met?

General BAER. I think that the dates that were arrived at there were considered to be reasonable, also consistent with the other actions that would take place, Senator Bartlett.

Senator BARTLETT. What effect on the weight of the XM-1 tank will this 120-mm gun system have? Is the weight of this tank a critical feature of its performance?

General BAER. We estimate that the 120-mm system will add perhaps 2 tons to the operational weight of the XM-1. Again, that will be dependent on the design work that the contractors have to do, and the final configuration and selection of components. At 60 tons, with the power that we have available to us in the current engine solution, the added weight probably will not be a significant factor from a mobility standpoint.

Only further testing and evaluation will determine if there have been adverse impacts.

Senator BARTLETT. Is this addition likely to lead to tradeoffs of some of the other items in the original design? In other words, the parameters in the original testing, parameters, requirements, of the two companies to create tanks?

Would this additional weight cause important tradeoffs that would adversely affect the utility of this tank?

General BAER. Again, Senator Bartlett, I do not know if that answer is available to us today. As far as the mobility characteristics are concerned and the suspension system, they have been asked from the very beginning, because of the decision by the Secretary of Defense quite

some time ago, to be prepared to accommodate the weight of the larger gun system.

They were asked to design their suspension system to accommodate up to 60 tons without any impact.

Senator BARTLETT. Was that a part of the reason why you wanted to have a parallel concurrent program for the development of the turret for the 120-mm? We would have much more time to make the decision.

General BAER. I think that is a fair statement.

Senator BARTLETT. In other words, the 2-ton additional weight is critical? It is important?

General BAER. The major impact of the 2-ton increase as I see it, comes from the question of overall survivability of the tank system. Our approach to this has been that we will accept the weight and accept no tradeoff as far as the level of ballistic capability of the XM-1 system is concerned.

Senator BARTLETT. Does the Army believe that the projected degradation of performance by this system is significant? In what areas of degradation in the performance of capability is the Army concerned?

General BAER. I do not know if I can answer that question until we have made a more detailed assessment. We believe that degradation will not be more than 10 percent overall, but it might be that much. Whether that is significant, I think, is only going to be determined when we see the tradeoffs that must be made.

Senator BARTLETT. I would assume that there would be tactical differences in deployment of tanks with 120-mm guns. Have there been meetings with the Germans on this?

General BAER. There is work in progress now between our Training and Doctrine Command and the Germany Army Command to try to standardize doctrine and tactics in the light of the new weapons systems being introduced.

Senator BARTLETT. I went longer than I had intended. I want to thank all three of you very much for staying as long as you have and being very patient.

I appreciate your answers and I will see you when further hearings are scheduled.

Thank you.

[Whereupon, at 1:05 p.m., the hearings in the above-entitled matter were recessed to reconvene at the call of the Chair.]

Senator BARTLETT. Senator McIntyre could not be with us today but has asked that his statement be included in the record at this point.

[The statement follows:]

PREPARED STATEMENT OF SENATOR MCINTYRE

Secretary Hoffmann, Secretary Clements, I first want to applaud the decision the Department of Defense and the Army have made relating to standardization of major subsystems of the XM-1 tank and the Leopard 2. The urgent necessity for standardization of weaponry within NATO has made an impact only slowly and after complications on both the international and domestic levels. This Committee has worked very hard to encourage an active policy of standardization, especially in the tank program. I will only deery the fact that this step was not taken sooner.

Within the context of my enthusiastic support for the decision you have made, I have a few concerns with the management and cost-implications of this revised tank program. Earlier this year, this Committee suggested that a deferral of the

XM-1 program might be in order until the new 120mm gun capabilities could be incorporated into the production effort of the XM-1. At the time, Army assured the Committee that early cost estimates indicated it would be more reasonable to have parallel development of the 105mm gun and the 120mm gun, and retrofit the 120mm gun capability into the XM-1 at a later time. Now, we find that not only does Army intend to redesign a turret which will accommodate both guns, you claim that this and other standardization changes will result in savings in the neighborhood of \$1 billion. I will be interested to learn in today's hearing, what assessments Army has made of the cost implications of this decision. Also, which estimates in particular led Army to reverse its earlier view that retrofitting, at least in the case of the gun, would be more reasonable. Last, I would like to know how Army arrived at the estimate that this new schedule would result in cost savings.

My concern is not necessarily that the United States' agreement with the Federal Republic of Germany might result in a higher program cost. It may well be that the long term benefits of an improved NATO force through interoperability of tank weaponry could outweigh a reasonable cost increase in the XM-1 tank program. However, Congress and the American public cannot be assured of this without confidence that the Departments of the Army and Defense have actually assessed the cost implications of their decisions.

Senator BARTLETT. Also Senator Culver's questions will be inserted at this point.

[Questions submitted by Senator Culver, answers supplied by Department of Defense:]

QUESTIONS SUBMITTED BY SENATOR CULVER

Mr. CULVER. Mr. Chairman, I fully support the thrust of this decision on the XM-1 program, for it enhances the chances for standardization in NATO and comports with the stated policy of this Committee. So that the record may be complete, I ask unanimous consent that there be included in the record a copy of the selection from this year's Committee report on the XM-1 program, as well as the more detailed letter from Senator Nunn and myself and the subsequent reply.

My first question for the witnesses is what effect this letter and our committee report had on this decision.

Mr. HOFFMANN. The Army is well aware of the intent of Congress relative to standardization within NATO. Therefore, I would say that previous Congressional actions, the committee report and your letter had a significant impact on the recent decision to delay the award of the contract.

Mr. CULVER. The bottom line question, Secretary Hoffmann, is this: Will this revised program still give the United States the best tank, at a reasonable cost, and on a timely schedule?

Mr. HOFFMANN. I think the answer to all three questions is a qualified yes. I previously testified in my opening statement that most of the increased costs take the form of earlier commitment of funds which would ultimately have been expended later. The final costs and the length of the delay beyond four months are dependent upon which options are selected for the final configuration. The selection of the available options will be based on cost and performance effectiveness to provide our forces with the best tank possible within cost constraints and the standardization objectives.

Mr. CULVER. Secretary Hoffmann, let me try to pin down the facts on your current cost estimates, compared with those given by the Army in our hearing last April. Although a lot of numbers were tossed around in that hearing, I think the key estimates were these:

To develop a hybrid turret would increase costs by \$517.7 million plus ammunition development costs, and involving a year's delay.

To continue with a 105-mm turret and then incorporate a 120-mm gun when ready would cost \$30 million less—\$488 million.

The Army also estimated that a retrofit of 120-mm guns was not contemplated because the added cost would be another \$143 million.

Thus, the Army preferred NOT to develop a hybrid turret, and NOT to retrofit.

Have these cost estimates been changed? If so, why?

What will the retrofit costs be with the hybrid turret?

Is this revised plan still cost-effective? Please explain.

Mr. HOFFMANN. This cost estimates you referred to have changed since April due to refinement of the estimates, the timing of the development of a dual turret

which significantly reduces that part of the estimate attributable to escalation, and a reduction of the number of tanks which would require retrofitting with a 120-mm gun.

The per unit cost of retrofitting a 105-mm gun on a dual turret with a 120-mm-gun is estimated at \$88,698 in 1976 dollars including the cost of the gun.

The revised plan is still cost effective by virtue of the fact that we will be entering the development phase of the dual turret system earlier, thereby reducing a significant part of the costs due to escalation. Further, costs determined under a competitive environment are expected to result in a significant reduction in the anticipated cost of the turret.

Mr. CULVER. Also in testimony last April, the Army said that a hybrid turret would require \$32 million more in FY 77 for a single contractor. Why then do you state that no additional funds are now contemplated?

Mr. HOFFMANN. Due to the 4 month slip in the program as a result of the proposal resolicitation, and the carryover of the FY 77 FSED funds into 1977, no additional funds will be required during 1977. However, it is anticipated that increased program funds in following years will be necessary.

Mr. CULVER. Since tanks on the central front in NATO now have 105-mm guns and diesel engines, a change to 120-mm guns and turbine engines will obviously reduce current standardization and increase logistical problems. To what extent, then, will this development increase standardization?

And what are the costs and problems of NOT having this agreement with the Germans?

Mr. HOFFMANN. As your question recognizes, a change to 120-mm guns and turbine engines, or for that matter, any new system, to the battlefield inventory will reduce current standardization and increase logistics problems. To the extent, however, that new equipment can be standardized among all users, these inherent problems can be significantly reduced. Our current efforts are designed to achieve that goal of long-range standardization and minimize the transient non-standardization and logistics problems.

The actual cost of not having this agreement is difficult to determine on a comparative basis over the life cycle of the system. However, the cost would be a significant amount. Without this agreement, we would be fielding a totally national tank and the Germans would do likewise. There would be no standardization and hence, little if any commonality and interoperability. RDT&E costs would be magnified; European support costs would increase; Ammunition stockage levels in Europe would be magnified if a common gun were not selected; And battlefield flexibility within NATO would be greatly restricted.

Mr. CULVER. What effect does this new decision have on the planned evaluation of the modified Leopard II tank?

Is the Leopard still a serious—and feasible—competitor for the engineering development contract?

Is it correct that Leopard manufacturers have been asked to respond to the new RFP, but that they have been given no funds to do so? Why not?

Mr. HOFFMANN. The new decision has no effect on the planned evaluation of the Leopard 2AV. As a matter of fact, the evaluation of the Leopard 2AV is currently being conducted at Aberdeen Proving Grounds on schedule.

The Leopard 2 remains both a serious and feasible competitor for the engineering development contract. The engineering development contract for the XM-1 is scheduled for 17 November 1976. That contract will contain a termination clause permitting us to cease development of the XM-1 should the Leopard 2AV prove to be of superior design and cost effectiveness.

It is not exactly correct to say that the potential US Leopard manufacturer has been asked to respond to the new RFP. They have been provided with a "planning RFP" with the option, their option, to respond if they so desire. Bid and proposal funds are usually corporate funds which in this case should be minimal since basic data required has already been paid for by the government under the terms of a \$4 million contract for the study of cost and productibility of the tank in this country.

Mr. CULVER. How soon do you expect that we will have a 120-mm gun and a turbine engine in our tanks? Has this estimate been changed in recent months?

Mr. HOFFMANN. I have no firm estimate of the time involved to incorporate the 120-mm gun or turbine engine into our tanks. I have stated repeatedly that neither will be put into the XM1 until such time as they meet our requirements. We may have a better idea on this when the current negotiations with the contractors are concluded during the next few months.

Mr. CULVER. Do you still plan to procure about 3,300 XM-1 tanks? Is that figure still considered sufficient for the Army's needs?

Mr. HOFFMANN. The initial procurement objective remains at 3,312 tanks. However, due to increased war-time attrition factors used for planning replacement stocks, and changing force structures, that figure is expected to increase. The new estimate will be reflected in the POM for fiscal year 1979-83.

Mr. CULVER. Section 803 of the recently enacted military procurement bill contains a declaration that weapons developed primarily for use in NATO shall conform to a common NATO requirement, including a common definition of the threat. Although the formal report on this matter is not due until next January, what progress can you report on reaching this common threat definition? Has this in any way affected the recent U.S.-German tank agreement?

Mr. HOFFMANN. With respect to the tank main armament issue, the Army has proposed on several occasions the necessity for a common threat definition. Initial planning has been accomplished by the Army; however, the Department of Defense has not to date formalized the review. Despite the divergence in threat assessment between the FRG and the U.S., this did not impact on the recent tank agreement.

Mr. CULVER. What are the baseline figures from which you calculate increases and savings (Sec. Hoffmann's estimated 15 percent increase in the price of the tank and Sec. Clements' estimated \$745 million in savings)?

Mr. HOFFMANN. The baseline figures used to calculate increases and savings are: RDT&E—\$282.6 million, PEMA—\$3,254.9 million, Life cycle operating and support costs—\$6,252.2 million, unit hardware cost—\$753.56. These figures are all in FY 1976 dollars.

Mr. CULVER. If in November, you decide *against* a 120-mm gun and *against* the turbine engine, how will standardization have been advanced? What will the Germans then be expected to do?

Mr. HOFFMANN. If we should decide against the 120-mm gun, our only remaining option for the present is the 105-mm gun. Selection of the 105mm would enhance standardization through the near and mid-term since the vast majority of tanks currently deployed in NATO have a 105-mm gun.

If we should decide against the turbine engine, standardization, with respect to eventually having a common engine, will not have been advanced. Nevertheless we would retain the advantage existing now of having common fuel and common operating principles since each of the tanks would then incorporate a diesel engine.

The Germans are expected to continue with their 120-mm smooth bore gun and their diesel engine.

U.S. ARMY XM-1 TANK PROGRAM

TUESDAY, SEPTEMBER 14, 1976

U.S. SENATE,
COMMITTEE ON ARMED SERVICES,
Washington, D.C.

The committee met, pursuant to notice, at 10:15 a.m. in room 212, Russell Senate Office Building, Hon. John C. Stennis (chairman) presiding.

Present: Senators Stennis, Symington, Jackson, Byrd of Virginia, Nunn, Hart of Colorado, Leahy, Thurmond, Tower, and Bartlett.

Also present: T. Edward Braswell, Jr., chief counsel and staff director; W. Clark McFadden II, general counsel; Charles J. Conneely, Charles H. Cromwell, Kenneth W. Fish, George H. Foster, Jr., John A. Goldsmith, Edward B. Kenney, Don L. Lynch, James C. Smith, Francis J. Sullivan, and George F. Travers, professional staff members; John T. Ticer, chief clerk; Phyllis A. Bacon, assistant chief clerk; Louise R. Hoppe and Roberta Ujakovich, research assistants; Susan Pitts, assistant to Senator McIntyre; Christopher Lehman, assistant to Senator Byrd; Charles Stevenson, assistant to Senator Culver; Doug Racine, assistant to Senator Leahy; Will Ball, assistant to Senator Tower; Ron Lehman, assistant to Senator Scott; and Fred Ruth, assistant to Senator Bartlett.

The CHAIRMAN. All right, the committee will please come to order.

This is an open meeting and we will continue open until otherwise decided.

We have several matters on the agenda for today. The most immediate one, though, for evidence is the broad question of the situation as to the XM-1 tank. We considered this matter at our hearing last week, but left it open for further consideration. In the meantime, all members were notified by letter that it was left open, and they were to let me know if they had anything further to present.

A communication came in from Senator Bartlett, and Senator Thurmond had expressed continuing further interest in it. Senator Bartlett did not finish asking his questions and I believe Senator Thurmond has additional questions.

We have with us Under Secretary of the Army, Mr. Norman R. Augustine, and also Maj. Gen. Robert Baer. Do we have any other witnesses?

Come around gentlemen.

Mr. AUGUSTINE. Thank you, Mr. Chairman.

The CHAIRMAN. We are glad to have you gentlemen here today, and I have already made my preliminary remarks.

Senator Thurmond.

Senator THURMOND. Thank you, Mr. Chairman.

The CHAIRMAN. Do you gentlemen have an additional statement?

STATEMENT OF HON. NORMAN R. AUGUSTINE, UNDER SECRETARY
OF THE ARMY; ACCOMPANIED BY MAJ. GEN. ROBERT BAER,
U.S. ARMY, PROJECT MANAGER, XM-1 TANK PROGRAM

Mr. AUGUSTINE. Mr. Chairman, we did not bring a prepared statement. If I might just make a 1-minute opening remark.

The CHAIRMAN. Sure.

Mr. AUGUSTINE. The XM-1 program, as you well know, is certainly one of the most important research and development programs to the Army. There are many who would say it is our most important program. Right now, we find the program in what might be described as an interim state or state of transition, and the major point I would like to leave with the committee is that we are not in a situation that is an open ended transition.

We are targeted toward November 17, about 2 months from now, to have a specific contract with a specific contractor to build a specific tank. We have a plan, that if followed, will have us on the path by November 17 toward getting the tank the Army has such a great need for. That, sir, is the main thing I would like to leave with the committee.

We are prepared to answer any questions you may have, Mr. Chairman and Senator Thurmond.

The CHAIRMAN. All right. Thank you, sir.

General BAER. I have no statement, sir.

The CHAIRMAN. Senator Thurmond has questions and I am pleased to call on him now for such procedures as he may wish.

Senator THURMOND. Mr. Chairman, thank you. We submitted the questions that I had before, and I thought as far as I was concerned that would take care of it.

However, since then, a member of the staff has gone overseas to NATO and returned with a few additional questions, I think, that might add to the record if we would propound those.

I was thinking some of these could be answered for the record.

Mr. AUGUSTINE. Thank you.

The CHAIRMAN. All right, without objection, those questions for the record are to be answered as soon as you can within a week.

Mr. AUGUSTINE. Yes, sir.

Senator THURMOND. Mr. Secretary, based on staff studies, a much greater amount of standardization would be achieved in NATO up through the year 2000 if the United States goes ahead with its own 105-mm gun and the improved ammunition. Based on the strict account of tanks, is that accurate?

Mr. AUGUSTINE. Mr. Chairman, I believe that is accurate.

Senator THURMOND. Mr. Secretary, now we all desire achieving standardization. However, many feel that at the moment the British and Germans are developing type 120-mm guns, is that correct?

Mr. AUGUSTINE. Yes, sir. Major emphasis among our allies is on the 120-mm gun.

Senator THURMOND. Mr. Secretary, recognizing the 120-mm gun is the gun of the future, would it not be desirable for the United States to standardize on the 120-mm with some agreement in NATO other than the bilateral agreement with Germany?

Mr. AUGUSTINE. Senator Thurmond, that would be very desirable. The bilateral agreement with the Federal Republic of Germany was really viewed as a starting point. Certainly since the major preponderance of tanks in NATO are provided by the United States and the Federal Republic of Germany, it was believed that if two countries could standardize, that it would be a major step toward standardization throughout NATO and perhaps other countries of NATO would follow the lead.

Senator THURMOND. Mr. Secretary, a staff member who just returned from Europe has found that the British gun is at least 1 year behind the German gun in development. In a year our country might really be able to determine whether the British or the German gun is the better gun.

If we are to obtain the best 120-mm gun for our own troops, would this not be better accomplished by allowing the British and Germans to proceed to full development and field testing before the United States commits itself to either gun?

Mr. AUGUSTINE. That is certainly one point of consideration. You are correct, the British gun is somewhat behind the German gun in its state of development.

The alternatives one has certainly includes delaying the selection of a specific 120-mm gun until we have collected test data on both the new British gun and the German gun.

The difficulty one encounters in this is that the new British high performance gun is an upgrading of the earlier 110-mm version that was tested in the tripartite trials. There is always a continual progression of new guns. For example, when the tripartite gun tests were conducted about a year-and-a-half ago, there was, at the time, a series of new guns for evaluation.

It is now argued that we should wait and see the new guns that are just around the bend. One problem is this continual evolution. One must eventually draw a line and make a choice. There is always a new gun somewhere just beyond the horizon.

Senator THURMOND. Mr. Secretary, that being the case, we would have to deviate from the Memorandum of Understanding with the Germans then because they are pushing us to make a decision in November, I believe.

Mr. AUGUSTINE. I believe they need their decision in March, Senator Thurmond.

Senator THURMOND. Now, I just wonder how there could be a fair competition when the two countries are at different points of development.

Mr. AUGUSTINE. There is no question but that they are at different points in development and that is certainly a liability to the British gun in the evaluation. There can be no two ways about that.

Senator THURMOND. Now, Mr. Secretary, our staff investigation also reveals that the British tank design authorities agree with the U.S. Army testimony before this committee that the best way to proceed now is to go ahead with selection of the winning U.S. prototype with the 105-mm as planned by the Army this summer.

Secretary Hoffmann testified that that is one of our options.

Now, can you assure us that the points I have made here this morning will be fully considered in that decision process?

Mr. AUGUSTINE. Senator Thurmond, we will certainly consider those points. I should add a point of clarification—to be sure there isn't a misunderstanding—that the agreement, the addendum to the Memorandum of Understanding with the Federal Republic of Germany, does provide that by January 15, 1977, the United States will select a version of the 120-mm gun to be installed in the XM-1, but only at such time as the gun meets the prespecified criteria.

So, it would only be in the initial production as plans now lay, that we would put the 105-mm gun in the XM-1 dual turret.

Senator THURMOND. Mr. Secretary, much is said about congressional direction to standardize with NATO. The British have developed all tank guns since World War II with U.S. design being a British development. The German tanks have also used the British guns and the current German 120-mm appears to be an excellent gun, but is their first great development since the 1930's.

Therefore, I am concerned that the United States is apparently attempting to standardize with only the Germans, while excluding the British and other NATO allies.

Would you comment on that point?

Mr. AUGUSTINE. Yes, sir, Senator. The standardization agreement provides that the Federal Republic of Germany and the United States will look at all guns that are available for consideration next January, and that would include the L11 standard 120-mm British gun firing improved ammunition as well as any other guns that may be in development.

In addition, it provides that we all attempt to obtain the involvement of other NATO allies in this process of trying to select a standard weapon system.

With respect to the fact that the Germans have not developed a major new gun in many years and that most all of NATO today does indeed, as you point out, use the British gun, the 105-mm gun, that is certainly true.

The nature of the agreement, however, provides that until the German 120-mm, or whatever gun is selected, is fully tested and meets the specific requirements that the United States places upon it, it, of course, would not be installed in our tank and we would continue to install the standard 105-mm gun.

So, if there is any risk in the gun, it would not impact on our tank. We would just not install the 120-mm until the risk was removed, and that is in keeping with our understanding with the Federal Republic of Germany.

Senator THURMOND. Mr. Secretary, would you agree that because the British development of their new 120-mm gun—and they have been using a 120-mm for 10 years, but now are developing a new version—is at a great disadvantage to compete with the German gun in the time established by the German-United States Memorandum of Understanding?

Mr. AUGUSTINE. Having less maturity, I think unquestionably it is at a disadvantage in competing.

Senator THURMOND. Mr. Secretary, what confidence do you have that the combustible case ammunition used by both the British and Germans will actually work?

We have had great difficulty with it on the Sheridan tank and the Germans are offering us only 55 rounds for the U.S. test.

Would you comment on that point?

Mr. AUGUSTINE. That is an important consideration. Both the M60A2 and Sheridan, as you point out, use the combustible cartridge case ammunition, and in their initial deployment were plagued with serious problems.

Those problems have now basically been overcome and the rounds function well in the field. The British and German designs are somewhat different.

Let me comment on the German round, which is also a combustible case round.

That particular round has passed a number of tests in the FRG, and the German developers seem very satisfied that the FRG ammunition avoids the incomplete combustion problems that we have encountered with the Sheridan and the M60A2 combustible case ammunition.

On the other hand, we want to go through that test data ourselves because in one particular area the FRG developers have not been terribly concerned about the effect of humidity on the combustible round. That is an area of particular concern in our mind because of our bad experience with this type ammunition in the Vietnam environment.

Of course, the U.S. Army is more likely to use its ammunition in a climate that is humid than the FRG is, and so there is a greater interest on our part.

We will provide a humidity specification and some other test criteria that the United States wants to impose, and we will not adopt that round of ammunition until it is tested and has demonstrated to our satisfaction that our specifications have been met.

Senator THURMOND. Mr. Secretary, I have an extensive set of questions which I now submit for the record. I thought they had already been submitted, but evidently they were not. These include 38 questions on the point of whether we should go with the diesel or turbine engine, 24 questions on the problems connected with the combustible case ammunition, and 14 questions on cost and design problems.

If you would kindly answer those for the record.

[Questions submitted by Senator Thurmond, answers supplied by the Honorable Norman R. Augustine, Under Secretary of the Army.]

Question. In the XM-1 tests what were the performance results of the diesel and turbine engines?

Answer. Both turbine and diesel powered XM-1 prototype met all the material need performance requirements with one exception. The exception being that the diesel engine prototype exceeded the minimum speed requirement by 68 percent.

Question. We know the diesel can perform in harsh environments. Has the turbine been tested in such environments?

Answer. An early model AGT-1500-04 turbine engine was tested under extreme dust and high temperature conditions at Yuma Proving Grounds in 1973. This was a government test on a 56-ton vehicle test rig. During the past 3 years in Michigan and Aberdeen Proving Grounds, the engine was laboratory tested for cold starts down to -25°F ; was operated in a simulated compartment in a hot room at temperatures up to 125°F with solar radiation; and was operated under water both in the lab and in the vehicle to confirm submerged operation.

Question. How much dirt and dust has the turbine taken in the most recent tests? Is this acceptable?

Answer. The vehicle installed XM-1 turbine engine must operate with an air cleaner; which is similar to the diesel air cleaner in both the XM-1 and M-60 tanks possessing an inertial separator and barrier filters. The turbine filters must

have a generator capacity to allow for a higher air flow rate. Operation to date, including 881 miles under extreme dust conditions at Yuma and over 20,000 miles under normal operation have been satisfactory and acceptable with proper air filtration.

Question. How much longer will we have to test the turbine before we know that it can go in the tank with acceptable risks?

Answer. The turbine engine has demonstrated its performance capabilities during the XM-1 validation phase. If the turbine is selected for full-scale engineering development phase its performance characteristics will be verified prior to a decision to initiate low-rate production.

Question. Is this consistent with the memo direction to make a decision in November?

Answer. The direction to select a contractor in November does not change the objective of the XM-1 full-scale engineering development (FSED) phase. The objective of the FSED program is to refine the XM-1 design including the engine, fully test the design in pilot vehicles and enter low-rate initial production. The testing and associated activity necessary to bring the engine to this state of readiness will be programed and accomplished during the XM-1 FSED phase irrespective of the decision date. As such, the engine program is consistent with the plan to make a decision in November 1976.

Question. What are the advantages and disadvantages of the two engines?

Answer.

<i>Turbine</i>	
ADVANTAGES	DISADVANTAGES
Minimal cooling power.	Higher fuel consumption.
Superior acceleration.	High acquisition cost.
Low noise and smoke.	Deep fording requires snorkel.
Low weight.	
Low temperature startability.	
Multifuel tolerance.	
Increased durability potential.	

<i>Diesel</i>	
ADVANTAGES	DISADVANTAGES
Low acquisition cost.	High cooling power.
Fuel economy.	Excessive smoke during acceleration.
Producibility.	Low temperature starting.
Deep fording without exhaust snorkel.	

Question. Why is the turbine not used more in private industry?

Answer. Ground vehicle usage of the turbine has been restricted because of the higher purchase price and higher fuel consumption of the turbine compared to a diesel of equal power.

Question. Which engine would have higher life cycle costs?

Answer. Based on production of 3,312 vehicles, operation of 1,940 XM-1 tanks for 20 years at 967 miles per year, the turbine life cycle cost exceeds the diesel by \$151.3 million.

Question. Which burns more fuel?

Answer. The difference in fuel economy will vary as a function of the type of operation. On an overall basis, an AGT-1500 turbine powered tank is expected to require 15 to 20 percent more fuel than an AVCR-1360 diesel powered tank.

Question. Does any other nation have a turbine engine in its tank?

Answer. Yes. In 1968 Sweden fielded the Strv 103-B, or "S" tank which has two engines: a diesel for use at idle and on hard surfaced roads plus a turbine which is used for extra power during cross-country operation.

Question. Why are the Germans not interested in their own gas turbine engine?

Answer. To the Army's knowledge, the Germans do not have a gas turbine designed for the military tracked vehicle environment.

Question. What is their opinion on the turbine?

Answer. The German Government has expressed considerable interest in the turbine, contingent upon its successfully completing development.

Question. Are any other nations developing a gas turbine for their tank?

Answer. With the exception of the Swedish turbine engine, already described, there are no other countries that the Army is aware of that have a turbine engine for a tank in engineering or advanced development.

Question. What effect would the larger 120mm gun have on either engine when firing across the back of the tank?

Answer. Neither engine will be affected by firing of the 120mm gun across the back of the tank. The gun muzzle extends beyond the engine compartment and the difference in overpressure levels behind the muzzle of either the 120mm or the 105mm gun is not significant.

Question. Does the agreement push the Army more toward accepting the 120mm gun or the U.S. turbine engine?

Answer. The addendum states that the United States will initiate production of the 120mm gun and ammunition at such time as it meets the requirement of being ready for production and is certified as such by the developing nation including all specified unique U.S. requirements. It further states that the United States will continue development of the standard AGT-1500 turbine power package, consisting of an engine and transmission, and will incorporate that power package into the XM-1 at the earliest practicable date. Although it thus appears that the language utilized in the addendum tends to indicate that the incorporation of the 120mm gun system into the XM-1 is of more pressing priority than is the incorporation of the turbine power package, the time of incorporation of either item into the XM-1 tank will be extremely dependent upon development success and attainment of specified requirement criteria.

Question. Is it true that the Army is in the process of upgrading some of the M-48 tanks with the diesel engine?

Answer. That is true. The Army is upgrading a significant number of the M-48 series tanks to M-48A5 which includes the incorporation of a diesel engine.

Question. Are any foreign nations which have U.S. tanks converting to the diesel engine?

Answer. Yes. Some countries which have our M-48 series tanks have already converted to the diesel engine. Others are in the process of converting and more are expected to convert to the diesel engine in the near future.

Question. When two contractors are directed to submit a bid with an engine they did not have in their hardware demonstrated tank, does that not put them in a position where their cost estimates are less reliable?

Answer. Yes. The estimates may be less reliable, but not drastically so.

Question. Is it possible, at a higher cost, to eliminate the smoke and get higher acceleration and horsepower out of the diesel?

Answer. Smoke cannot be eliminated from the diesel engine but can be significantly reduced by incorporation of variable area turbocharger (VAT) and universal fuel injection system (UFIS). These components/systems also produce higher acceleration by increasing low end torque with a more exact air to fuel mixture for responsive detonation rather than wasted fuel out the exhaust. Higher horsepower and, therefore, higher acceleration is expected with the VAT and UFIS systems but must be confirmed with testing. These systems are presently being developed under the direction of the Tank Automotive Research and Development Command. The effect on cost of the production engine would be minor since the superchargers, which were required for low end torque, are eliminated. Additional funds are required to complete the laboratory and vehicle development of the VAT and UFIS.

Question. Can you get higher horsepower out of the turbine engine?

Answer. Yes. We estimate about 1,700 to 1,800 gross horsepower as compared to the current 1,500 horsepower.

Question. In what way did the Army request for proposal limit the smoke output?

Answer. The Army request for proposal did not indicate a specific limit for engine smoke output; however, it does require that all XM-1 characteristics must be equal to or better than the M-60 vehicle.

Question. What is new about the diesel engine as compared with current diesels?

Answer. The XM-1 diesel engine has a variable compression ratio (VCR) piston which permits the high horsepower to displacement ratio without exceeding acceptable combustion pressures. This permits the engine to operate at the high compression ratio (16:1) during idle and light loads and decrease to the low compression ratio (9:1) during maximum loading of the engine.

Question. What is the difference in the procurement cost of the two engines?

Answer.

	<i>Fiscal year</i> 1976 dollars
Diesel.....	62,031
Turbine.....	100,000
Difference.....	37,969

Question. General Baer, what year would you estimate would be the earliest we would accept the turbine engine for full up production?

Answer. Selection of the turbine engine would not change our production plans. Low rate initial production is planned to begin in August 1980 with full production reached in September 1981.

Question. Mr. Secretary, what are the findings of the DOD and Army blue ribbon studies on the two engines? The 120mm gun?

Answer. The DOD and Army blue ribbon studies considered only the engine comparison. A summary of their findings was as follows:

1. There are no state-of-the-art risks with either engine.
2. There are time and schedule risks associated with each of the engines—greater risk with the turbine engine.
3. Diesel engine more durable.
4. Turbine has better long term potential.
5. Intensive engineering effort is required for turbine engine.

Question. Would it cost more, less or about the same to switch engines now or later in the program once tests have proven out the turbine?

Answer. To change engines once production has started would cost more because of facilitization costs for a second engine, cost to retrofit prior produced vehicles, and costs to restock supply pipeline.

Question. What standardization savings do we realize with the turbine engine?

Answer. When the turbine engine is incorporated into the XM-1 and accepted by the FRG, we expect to realize savings through the use of common fuel, common repair parts and reduction of the logistical effort required to support the tank systems. Savings may also be realized through the possible off-shore procurement of repair parts, thereby saving shipping costs attributable to repair parts. The amount of savings is dependent upon the time the turbine is incorporated into both the Leopard 2 and the XM-1.

Question. Do the Germans plan to retrofit the turbine on their Leopard 2 tanks?

Answer. According to the addendum to the Leopard 2/XM-1 Harmonization MOU, the Germans plan to adopt a turbine in the near future contingent upon its meeting unique German requirements yet to be specified. The Army does not know whether this would include a retrofit of Leopard 2 tanks equipped with diesel engines.

Question. How many Leopard 2's would be built by the time we could prove the turbine sufficient for acceptance by the Germans?

Answer. The army cannot answer that question until Germany provides us with its specified unique requirements for the turbine.

Question. Has the turbine been tested in the different environments required by the U.S. Army? Has the diesel?

Answer. To date, the XM-1 model turbine and diesel engines have operated under extreme temperature conditions only in laboratory simulated conditions. This includes cold starts, without aids, down to -25°F ; operation in simulated hull compartments at temperatures up to 125°F ; and operation in a submerged condition both in the lab and in the vehicle. Operation in the Arctic for extreme cold conditions and at Yuma for hot and dusty conditions is normally conducted in the vehicle final development phase and is scheduled for FT/OT II testing.

Question. Have the British agreed to take the turbine as a standardization item?

Answer. Not to the Army's knowledge.

Question. What is the proven rebuild requirement for the turbine? The diesel?

Answer. At this time, there are no proven rebuild requirements for either engine. To date, insufficient engine tests of the expected final engine configurations have been accomplished to set any statistically valid numbers.

Present engineering estimates project a mean time to replacement of 600 hours for both the turbine and diesel at the end of the FSED phase. Assuming suitable product improvement efforts, it is predicted after 5 years into production the diesel will achieve approximately 650 hours and the turbine should approach 1,000 hours.

Question. Is the turbine required for vehicle performance?

Answer. No. The vehicle mobility performance requirements as stated in the materiel need can be met with either the turbine or diesel engines that were evaluated during the validation phase.

Question. What differences have your tests shown in performance between the two engines?

Answer. The results of DT/OT I testing with XM-1 prototypes are still competition sensitive. In accordance with DOD policy and previous arrangements

made with this committee, I would prefer to make this information available for review in the Pentagon.

Question. How long will the Army have between acceptance of the paper proposals and the date on which a decision is required?

Answer. The proposals are due on October 1, 1976, with best and final offers expected on October 28. Current planing calls for a decision on November 17, 1976, leaving approximately one and a half months for Army review of the proposals.

Question. The Congress has provided no money for this new program. How do you expect to fund it when the decision is made after Congress adjourns?

Answer. As previously explained by Secretary Hoffmann before this committee, additional funds are not anticipated during fiscal year 1977. If additional funds are needed to support this program following the November 17 decision, appropriate reprogramming action will be initiated.

Question. In fact, has not Congress already rejected congressional attempts to force the 120-mm German gun on the Army?

Answer. The Army is not aware of any specific attempt by Congress to force the German gun on the Army.

Question. What savings to our Government can be assured by going with the turbine engine?

Answer. No savings can be assured to the Government by requiring the turbine engine. The turbine, through its longer life potential, offers the possibility of reduced maintenance costs, overhaul costs, and transportation costs. The ability to realize these savings is dependent on the priority and amount of funding provided to develop the turbine during the FSED period and through the early years of XM-1 production.

Question. Describe the German 120-mm round for the committee.

Answer. The German 120-mm main armament system uses two service rounds: a fin-stabilized discarding sabot kinetic energy round, and a high explosive antitank-multipurpose chemical energy round. Both rounds use combustible cases with metallic stubs at the base. The rounds are fired from a high-pressure smoothbore cannon.

Question. Mr. Secretary, before approving selection of a tank gun, how many rounds would normally be fired in the gun tests?

Answer. A total of 7,600 rounds would normally be fired prior to the approval of the tank main armament for production. This is based upon testing two types of ammunition and the main weapon for fatigue, wear and environmental conditions. This is broken down as:

	<i>Rounds</i>
a. Ammunition qualification.....	700
b. Fatigue life (gun).....	4,000
c. Wear (gun tube).....	1,200
d. Environmental.....	200
e. Slugs (cannon development).....	1,500

Question. How many rounds will be fired in the 120-mm gun by your team before a decision must be made?

Answer. Approximately 55 rounds will be fired through the German 120-mm gun before a decision must be made. These will be fired from a ground mounted gun, not from a tank mounted cannon. The German Government is also furnishing us 50 additional rounds for firing in a 120-mm Leopard 2 prototype; however, these will not be fired until after the 120-mm decision is made.

Question. Why so few rounds?

Answer. The German Government states this is the maximum number of rounds which can be made available to the U.S. before the decision scheduled for the 15th of January.

Question. Mr. Secretary, why are the Germans developing only one or two different type rounds?

Answer. The German user requires only two different types of service rounds: a kinetic energy round and a chemical energy multi-purpose round. Therefore, German developers are not developing additional types of ammunition.

Question. How many different type rounds are required by the U.S. Army?

Answer. Six different type rounds are required by the U.S. Army. They are the Kinetic Energy (KE), KE Training, Chemical Energy (HEAT), HEAT Training, Smoke-White Phosphorous (WP), and the Antipersonnel (Beehive) rounds.

Question. How long will it take to develop these rounds and at what cost?

Answer. The first delivery of the six types of required 120-mm rounds will take approximately 5 years, and at a total cost of \$41 million (fiscal year 1976).

Question. How many types of rounds have the British developed for their gun?

Answer. The British currently have in the inventory two types of service rounds: a spin-stabilized kinetic energy round and a high explosive plastic round. In addition, the British are developing a fin-stabilized kinetic energy round and a high explosive antitank shaped charge round; the latter round is being developed primarily to meet German requirements for the projected Anglo-German future main battle tank. Thus, when the British field their complete improved system there will be four different types of service ammunition available.

Question. Are you confident the combustible round can be made acceptable for U.S. standards of heat, humidity, and safety?

Answer. We don't have enough data on the German combustible case round as yet to determine whether it can be made acceptable by U.S. standards.

Question. I presume the Germans based on their one or two rounds and cooler temperature requirements, could find that their operational requirements for the 120-mm are met. Would that mean our requirements are met?

Answer. If the German developers meet their own requirements this would not necessarily mean that the U.S. requirement, which is more stringent, has been met.

Question. Under the agreement, I believe we are to take the 120-mm and ammo based on their findings that it meets requirements. Is that correct?

Answer. Yes. The addendum states that the United States will initiate production of the 120-mm gun and ammunition at such time as it meets the requirement of being ready for production and is certified as such by the developing nation including all specific unique U.S. requirements, and the manufacturing data used by the developing contractor is made available to the USDA or its contractor(s). The above specified unique U.S. requirements will be defined by the USDA and delivered to the FRG by January 15, 1977.

Question. Mr. Secretary, I believe the combustible round is relatively fragile and has frequently broken in Sheridan tanks where it is now used in the U.S. Army. What problems might this round cause for the shoot-on-the-move concept of the XM-1?

Answer. Problems that could affect the shoot-on-the-move concept are associated with the adequacy of the combustible round stowage provisions and the fragility of the combustible round. Both of the aforementioned problems must be addressed in tests to establish impact on operational suitability.

Question. Will special cases be needed to protect it in a fast moving tank, and will this casing delay the loader in getting the round in the breach?

Answer. It has not yet been determined by the Army whether special cases will be required. If special cases are required, however, we would expect a reduced rate of fire based on our experiences with the M-551 Sheridan.

Question. What is the difference in the size of the 120-mm and the 105-mm?

Answer.

	105 mm	120 mm
Diameter of tube (inches).....	8.9	12.2
Length of cannon (inches).....	218.5	220.2
Rear of breech to center of gravity (inches).....	62.8	55.1
Weight (pounds).....	2,516	4,563

Question. What problems have tankers experienced with the combustible round in the Sheridan tanks?

Answer. The M-157 low-density case was very susceptible to damage. The case would break, expand, and it was susceptible to moisture in the air. The new M-205E1 high-density case, when properly stowed in the ammunition racks, has been holding up very well. However, the case can be damaged when attempting to remove a round that has become jammed in the cannon.

Question. Have there been any serious accidents with this type of round?

Answer. Yes. Three tankers were killed in Europe while attempting to load and fire a broken round. The round fired either when the breech was closing or when they were attempting to open the breech after a misfire. The report is unclear as to the cycle they were in. In either case, the round was fired without the breech being locked.

Question. Are unusual safety measures required for training and field use?

Answer. Special handling is required due to the fragility of the round. In addition, the rounds must be properly stowed in the ammunition racks with the water-proof bag and ballistic cover in place.

Question. Are there any unusual storage or transportation problems?

Answer. Combustible cased 120-mm ammunition would increase the logistical burden, primarily due to special packaging requirements and increased bulk. For example, each tank battalion would require five additional GOER cargo vehicles.

Question. Are internal explosions more likely when the tank is hit?

Answer. Yes, although it would be more of a violent burning than an explosion. To attain protection equivalent to that when using metal cased ammunition, protective covers would have to be employed.

Question. Describe for the committee the condom type casing used for the U.S. combustible round and why it was necessary? Would the 120-mm combustible need such a casing?

Answer. The condom is made out of butyl rubber and acts as a vapor barrier. The end of the condom fits tightly on the base of the projectile thus providing the seal. Its function is to prevent moisture from being absorbed into the combustible case, thus, improving the burning of the case material and reducing the residue problem.

The Federal Republic of Germany's position is that the condom type casing is not required. The United States has not tested the 120-mm ammunition to determine if a condom would or would not be required; however, such a casing is very likely required to meet U.S. Army requirements.

Question. How many 105-mm rounds can be placed in a tank vs. the number of 120-mm rounds?

Answer. The number of 105-mm rounds that can be placed in the XM-1 tank is 61. The number of 120-mm rounds is 49. The U.S. user has stated that, with a 120-mm system, the 55-65 round stowed load requirement for XM-1 remains in effect. The feasibility of meeting this requirement must be addressed by the U.S. tank system developer.

Question. Would not the lesser number of 120-mm rounds force a change in U.S. tank tactics or doctrine?

Answer. No. A decrease in the number of rounds stowed in the tank will have no significant impact on doctrine or tactics. However, the reduced number of rounds carried on the tank and the slight decrease in accuracy of the round could make the tank commander more hesitant to engage at longer ranges. The bulkier 120-mm combustible cartridge would be more difficult to handle and load because of the limited space within the turret and the fragility of the combustible cartridge. This becomes very important at close ranges where rapid fire is more important than carefully aimed fire. An impact would be realized by the logistical and supply segments of the Army by dictating more frequent intervals of resupply which would require additional support personnel and resupply vehicles.

Question. Why is the 120-mm round more suitable for German tank doctrine than United States?

Answer. U.S. doctrine associated with design and employment of the tank main armament places emphasis on engaging the full target array to include lightly armored vehicles, bunkers, and troops as well as tanks. The Federal Republic of Germany places more emphasis on the tank versus tank dual and less emphasis on other battlefield targets. The major difference in United States and Federal Republic of Germany philosophy with respect to the selection of a tank main armament system is that the Federal Republic of Germany is primarily interested in terminal ballistics performance against armor plate. This translates into "The bigger the gun the better". The United States on the other hand is interested in killing known and postulated targets across a complete spectrum. This translates into "The gun with the highest probability of kill against the target array is better".

Question. What is the difference in the tank doctrine of the two nations?

Answer. The United States and Federal Republic of Germany concepts and doctrine for use of the tank are virtually the same. For the United States and Federal Republic of Germany the tank is the backbone around which the combined arms team is formed. The United States and Federal Republic of Germany consider the tank as both an offensive and a defensive weapons system. In the current European environment, with its unique requirements, the tank is the mainstay of the NATO ground forces which are in a defensive posture. In the

defense of Europe, United States and Federal Republic of Germany doctrine calls for the combined arms concept, attrition well forward, and an active defense—that is where the firepower, mobility, and protection of the armored force moves rapidly on the battlefield to confront the enemy main effort and reacts rapidly to changes in the enemy's point of concentration. Thus, the Federal Republic of Germany may well emphasize the tank in a defensive role and may translate that into optimizing their tank gun for long-range defense. The United States, however, emphasizes the role of missiles and air-delivered weapons to attrite the enemy at long ranges.

Question. How would the requirement to reload the tank with 120-mm rounds impact on U.S. tank tactics?

Answer. This requirement would impact in the area of reduced staying power—smaller basic load of ammunition—and would require tanks to be more frequently resupplied. This would limit the operational commitment time of our tanks on the battlefield.

Question. Mr. Secretary, the combustible round leaves debris in the tank gun muzzle. We have met that problem on the Sheridan by using a scavenger system. Are the Germans using such a system?

Answer. No, the Germans are not using a scavenger system on Leopard 2.

Question. How long could it take to solve the problems of the 120-mm combustible cased round?

Answer. We are unable to say how long it would take to solve problems with the 120-mm combustible case round, as we don't have enough test data from Germany nor have we had a chance to test these rounds ourselves.

Question. Could we use such a system if we go with the 120-mm gun?

Answer. We do not know if it would be technically feasible with the 120-mm breech design, but even if it were it would not be acceptable.

The U.S. Army user has stated that the existence of unsafe (burning) residue is unacceptable, as is the incorporation of a bore scavenger system to eliminate residue.

Question. If we decide to go with the 120-mm what would be required in setting up a supply system since the 105-mm will be in the inventory through the year 2000?

Answer. Use of 120-mm on the XM-1 would not require significant changes, but would require additions to the supply inventory. Addition of the gun tube, gun system repair parts, and at least six types of 120-mm training and service rounds would only require additional supply management effort. The additional effort is considered insignificant in view of the vast numbers of line items already in the supply inventory.

Question. Would this mean additional storage, transportation, personnel and supply trains? How would it affect our tooth-to-tail ratio for a tank unit?

Answer. Yes. The cube of packaged 120-mm ammunition is the critical factor affecting transportation and storage. Using current packing methods, the 120-mm would be packaged 2 per wooden ammunition box. The standard NATO pallet will accommodate thirty 105-mm rounds and twenty 120-mm rounds. The tank battalion supply trains will require one additional GOER cargo truck to store and transport nonpalletized 120-mm ammunition and four additional GOER's for palletized ammunition.

Question. What are the advantages of the 120-mm gun over the 105-mm gun?

Answer. The singular advantage of 120-mm gun system has over a 105-mm gun system is its ability to deliver greater levels of projectile energy, assuming equal technologies, which results in more armor penetrating potential.

Question. What are the advantages of the 105-mm gun over the 120-mm?

Answer. Simply stated, the 105-mm main armament system is more cost effective given the threat as we understand it. This is well documented in the trilateral evaluation and in the national supplementary study the Army performed using trilateral methodology and ground rules. Specifically, the 105-mm costs less, weighs less, and is physically smaller so that more rounds can be carried in the same space. Like the German 120-mm, the 105-mm overmatches the known and projected threat, but the 105-mm is more accurate and therefore more lethal. The 105-mm is also the lowest-risk system, has the best gun tube wear life, and presents the least burden to the Army's logistical system. An additional advantage is the 105-mm is already a defacto NATO standard and will continue to be, regardless of the XM-1 gun decision, at least through the midrange time frame.

Question. The selection of which gun would achieve the greatest commonality and standardization in NATO over the next 20 years? 30 years?

Answer. Over the next 20 years, the greatest commonality and standardization in NATO as a whole would be achieved by selection of the 105-mm gun. This is attributable to the great number of tanks with 105-mm guns already in NATO. However, if the 120-mm gun is selected now, commonality and standardization would be expected to shift in the direction of the 120-mm gun during the 20 to 30 year time frame.

Question. What did the tripartite study show on this subject?

Answer. The results of the tripartite study were previously provided in reply to a similar question from Senator Taft during the SASC hearings of 27 August 1976. Information is classified.

Question. If there are more tanks with the 105-mm in the forces of the United States, Germany and Britain, what is the case with the other NATO nations?

Answer. The great majority of tanks in NATO, exclusive of the United States, Germany and Britain, use the 105-mm cannon.

Question. How much weight would be added to the XM-1 if we adopt the 120-mm gun?

Answer. Approximately two (2) tons which breaks out as follows:

	<i>Pounds</i>
Cannon.....	1900
Turret structure and shield.....	1500-1800
Gun mount.....	400-600

Question. How does this impact on the tank speed?

Answer. Maximum speed of the XM-1 on level hard surface roads is not affected by the additional weight. Speed of the XM-1 on slopes is decreased by approximately 5 percent.

Question. How does this impact on the tank's rate of fire?

Answer. The XM-1 contractors addressed this during their 120-mm gun studies. They estimated the degradation in rate of fire to be less than one round per 2-minute firing period.

Question. How does this impact on the number of enemy tank kills per load?

Answer. Our studies show that the total kills per stowed load over the expected combat engagement ranges is consistently higher for a 105-mm XM-1 tank than for a 120-mm XM-1 tank.

Question. How does this impact on the tank's mobility?

Answer. The XM-1 will suffer some degradation in mobility due to the increased weight; 5 percent or less with the exception of maximum speed on hard surface roads which is unchanged.

Question. How does this impact on the tank as an enemy target?

Answer. The probability of hit on a 120-mm XM-1 tank by an enemy tank increases by 1 to 3 percent over a 105-mm XM-1 tank. The probability of kill given a hit increases by 4 to 5 percent.

Question. How does this impact on the tank's ability to hit another tank on the move?

Answer. The 120-mm smoothbore ammunition has a slightly higher dispersion which results in approximately a 5-percent decrease in hit probability at normal tank engagement distances.

Question. How does this impact on the range you would engage the enemy tanks?

Answer. It would tend to make the engagement ranges shorter. Specifically, the reduction in stowed ammunition load tends to offset any and all gains attributed to terminal ballistic increases, as these are in fact not realized because of the offsetting loss in system accuracy with increased range.

Question. At what ranges were the Egyptian-Israeli tank battles in the desert?

Answer. In the initial attack across the canal, engagements of 300 meters to pointblank range were common. In other areas of the Sinai, the Israelis engaged Arab tanks at ranges in excess of 3,000 meters, with an average engagement range of approximately 1,000 meters.

Question. At what range did the NATO range study show most of the NATO targets would be engaged?

Answer. It showed that approximately [deleted] of armored targets are expected to be engaged at ranges of [deleted] meters or less.

Question. Is it true that the tank which fires first has a higher success rate?

Answer. Yes. Assuming equal quality tanks and both tanks having relatively same degree of exposure. The tank that fires first has obviously acquired the target, initiated the necessary firing procedures, and will be ready to fire a second round if necessary, while the target is attempting to overcome surprise and fire his initial

round. For example, it is possible to gain a significant advantage by firing fast first. Statistics also show that good crews firing fast do not sacrifice accuracy. In a 60-second tank duel with both tanks stationary, a well trained tank crew that fires fast first accurately multiplies the chances of winning from two to nine times, depending on range.

Question. Which gun has a higher probability of a first round hit?

Answer. Hit probabilities calculated in the Tripartite evaluation show that the 105-mm gun has a slightly higher first round hit probability for both kinetic energy and HEAT rounds.

Question. Is accuracy more important than velocity when firing the tank gun?

Answer. Yes, accuracy is more important than velocity given that the ammunition has the basic capacity and sufficient terminal velocity to defeat the target.

Question. Is the German smoothbore 120-mm or the British rifled bore more accurate?

Answer. Based on the firing results in the tripartite evaluation conducted during 1975, the British rifled bore system is somewhat more accurate.

Question. Which gun is more accurate at those ranges?

Answer. Firings during the Trilateral evaluation were carried out at ranges up to 3,500 meters. The results, broadly speaking, were that the American and British systems were both somewhat more accurate than the German system at all ranges tested.

Question. What is the wear life of the 105 versus the 120-mm barrels?

Answer. The German and British 120-mm systems are both developmental; wear life has not been precisely established. Based on available data, wear life of the 105-mm is estimated to be about twice that of either 120-mm.

Question. How does this—tube wear life—impact on success on the battlefield?

Answer. All factors being equal, a lower tube life indicates a lower availability rate, which does impact adversely upon success on the battlefield.

Question. Which gun is the most complicated, or has the most parts to wear out or be replaced?

Answer. The 120-mm gun breech has approximately 345 parts compared to the 100 parts of the 105-mm design. Both breeches are the "drop block" type and perform the same function. Although sufficient test data is not available at this time, it is expected that the 120-mm breech, because of its parts count, would inherently have a lower reliability and durability than the less complex 105-mm weapon.

Question. Would maintenance costs be significant?

Answer. Maintenance costs for the 120-mm system are significantly higher than those anticipated with the 105-mm system in the area of gun and tube replacements. The FRG 120-mm hardware cost exceeds the 105-mm by approximately \$4,900 per tube and \$22,600 per gun. The overall peacetime cost impact on the XM-1 fleet [1940 vehicles operated for 20 years] would be an increase of about \$50 million. Wartime operations would significantly increase this cost difference since the 120-mm gun and tube life is approximately half of the 105-mm life.

Question. In what year, in your judgment, would be the earliest the U.S. could achieve full up production on the 120-mm?

Answer. The earliest date for initial production of 120-mm XM-1's is projected to be March 1982. Full production with the 120-mm could not be realized until late in calendar year 1982.

Question. When will the Germans go into production?

Answer. The Germans intend to produce their 120-mm cannon with first roll-offs in the spring of 1979. The two service rounds that they are developing are scheduled to follow in late summer.

Question. What is involved in converting the German 120mm to U.S. specifications and requirements?

Answer. The translation program starts with the receipt of a foreign technical data package (TDP) and ends with a round that has passed U.S. qualification tests and a U.S. TDP that is suitable for mass production.

No attempts will be made during the translation effort to product improve weapon system performance. Sufficient hardware will be produced to qualify the rounds and cannon and to supply sufficient hardware for vehicle DT II/OT II programs.

All component, subassembly, and assembly drawings will be converted to the U.S. format. Materials will be converted to existing U.S. Government or commercial specifications wherever possible or to a performance type specification. Mechanical and chemical processes, where unique, will be detailed. Safety standards will be reviewed to determine conformance to U.S. requirements and where

deficient, modification to that particular component, that is, fuzing system, primer ignition system, et cetera, will be made. Engineering analysis of the interior, exterior, and terminal ballistics and strength will be performed for complete understanding of the systems performance. Quality assurance provisions will be incorporated to complete the component specifications for quality conformance and ballistic acceptance testing.

Question. Will the United States have to develop its own fuzes for some of the 120-mm ammunition?

Answer. It is probable that the United States will have to develop its own fuze for the German shaped charged chemical energy round, if that round is adopted by us. Insofar as we understand it, the Germans have not yet satisfactorily developed their shaped charged fuze, also, there is a possibility that when it is fully developed it will not meet U.S. troop safety standards.

Question. Why is the German fuze not usable?

Answer. The FRG fuze problem is associated with their heat-multipurpose cartridge.

The basic cartridge propellant system and warhead are fairly well developed as was evidenced in the trilateral trials. However, the fuze design is in its infancy, and only 80 firings have been conducted to evaluate the fuze dynamic performance.

The fuze does not embody dual, independent arming modes, which is a requirement for U.S. ammunition.

Fuze functioning and reliability will probably not meet the U.S. requirements as the FRG depend on striking either the nose of the projectile spike or on the attainment of a tuned level of deceleration (that is, they do not have a full frontal area impact switch).

Question. Why do the Germans have the 105-mm on the Leopard 1?

Answer. The Leopard 1 is a tank whose technology dates back to about the same time frame as the U.S. M-60A1. The Germans adopted the British 105-mm gun for Leopard 1 for the same reason we adopted it for M-60. It was the best gun available in the world. The German 120-mm development did not begin until 1966. The Leopard 1 does not have a dual turret. The Leopard 2 does have a turret which is capable of accepting either a 105-mm or 120-mm gun. This capability was built in because originally Germany was uncertain whether she would adopt the 105 or the 120.

Question. Do they have a dual turret for conversion purposes?

Answer. As indicated in response to your previous question, the Leopard 2 does have a turret which is capable of accepting either a 105-mm or 120-mm gun.

Question. Why did they not go with the dual turret if they knew they were going to convert?

Answer. To the best of our knowledge Germany has no intention of converting any of the Leopard 1 tanks. They are programed to remain as 105-mm gun tanks. The Leopard 2, on the other hand, will be built exclusively with 120-mm's.

Question. Would it be cheaper to convert when we know the 120-mm is ready to go on the U.S. tank or cheaper to go with the dual turret?

Answer. Two main factors impact on whether or not it would be cheaper to go initially with the 105-mm gun turret or the dual turret: The point in production when (and if) the 120-mm gun is introduced and whether or not the tanks already fielded with the 105-mm gun are retrofitted with the 120-mm system. If the 120-mm is introduced fairly early in production then it would be cheaper to go with the dual turret initially. If the 120-mm gun is introduced fairly late in production or deferred pending emergence of a threat necessitating its use, the cost savings inherent in the 105-mm gun and turret could be expected to more than offset the cost of converting the 120-mm gun system on new production vehicles. However, if at that time, the decision is to retrofit fielded tanks with the 120-mm gun, the cost advantage would revert to the initial use of the dual turret. Given the possibility that a 120-mm gun or comparable weapon is never mounted on the XM-1, the 105-mm turret would be the less expensive approach.

Question. Is this substantiated by previous Army testimony?

Answer. Yes. On Tuesday, April 6, 1976, the U.S. Senate Subcommittee on Research and Development of the Committee on Armed Services heard testimony from Maj. Gen. Robert J. Baer which stated that it would be cheaper to develop a hybrid turret now than to apply a 120-mm system at a later date, and retrofit the early production vehicles.

Question. What are the advantages of the British rifled bore over the German smoothbore?

Answer. In the general case neither rifled nor smoothbore systems have any significant inherent advantages except for the very important point of the greater

flexibility of rifledbore systems. Rifled cannon can fire long-rod kinetic energy projectiles requiring fin stabilization and relatively short and thick projectiles requiring spin stabilization. The smoothbore can fire only the fin-stabilized projectiles. [Deleted.]

Rifledbore systems also offer a less complex approach to the design of companion rounds such as antipersonnel and smoke. The standard U.S. Army practice requiring two independent arming modes for ammunition is more easily met with the rifledbore using both setback and centrifugal arming.

Question. What are the advantages of the smoothbore over the rifled?

Answer. In the general case, smoothbore systems offer no significant advantages over rifled bore. The only advantage of the German system over the British is its earlier availability for the Leopard 2 tank.

Question. Which country, Germany or Britain, has had more experience with the 120-mm?

Answer. Great Britain has had its 120-mm Chieftain gun in production approximately 10 years and is therefore considerably more experienced than Germany, which has only a developmental system.

Question. How much time would be required for the United States to make a conservative decision between the British and German guns? Does the Memorandum of Understanding allow for this time?

Answer. The British have offered to provide their developmental M13A 120-mm system to us for evaluation in late 1977. Assuming the availability of sufficient test ammunition of both systems, a decision could be made by early 1978. The Memorandum of Understanding requires a decision by January 15, 1977.

Question. We all want commonality, the question is what is the best way to get there. Before the June decision, what was the Army's opinion on the 120mm gun?

Answer. The Tripartite tank armament evaluation program, concluded in 1975, did result in a trilateral agreement concerning the future selection of a main gun at the working group level. The working group recommended that the XM-1 production be initiated using the improved 105-mm armament system with consideration given to incorporating a 120-mm system at a later date. The U.S. Army believed the 105-mm rifled gun would be a viable weapon in the foreseeable future. Should the postulated threat require a larger caliber, the United States was willing, in the interest of standardization, to participate in the testing and evaluation of a larger caliber gun for the future.

Question. General, one argument for the 120-mm is the belief that the Soviets will come up with better armor in the future. Would the 105-mm depleted uranium round be as effective on advanced armor as the 120-mm?

Answer. Although there is no corroborative test data, it is estimated by the Army's Ballistic Research Laboratory that the 105-mm XM774 depleted uranium round will be as effective as the current 120-mm APFSDS round against postulated improved armor and that this capability would be sufficient.

Question. General, I believe there are studies that show the primary goal for the tank of the future is to reduce its size and therefore reduce the size of the target. Is that true? Why?

Answer. This is generally true. The smaller the size of the tank the harder it would be to hit. However, the size of the tank is determined by a number of factors including: size of the gun, amount of ammunition to be carried, amount of fuel capacity, size of the engine, and number of crew members. Once space demands of these elements have been determined, the required level of armor protection must be determined. Then tradeoffs are made and the overall size of the tank determined.

Question. Does not the 120-mm gun with the larger turret take us in the opposite direction?

Answer. The 120-mm gun requires a slightly larger turret. Thus, it increases silhouette, and therefore, the vulnerability of the tank.

Question. General, I presume if we go with the 120-mm it will delay our program. Also, I understand the United States plans to restrict foreign sales of U.S. tanks until our own inventory requirements are met. How many years ahead of the United States do you expect the Germans to lead us in the foreign sale department?

Answer. The development of the 120-mm gun system for the XM-1 will not result in cannons ready for installation on production vehicles until approximately mid-1982. Therefore, the first 2 years' production of XM-1 tanks will have the 105-mm gun installed. In this way we expect to minimize the delay to the XM-1 program.

It is true that we plan to restrict foreign sales until the U.S. priority requirements are met, and we expect the Germans will have similar restrictions. While the German requirement for the Leopard 2 will be less than our requirement for

the XM-1, their production rate will also be less. Hence, it would be very difficult to predict at this point which country will be ready to accept a foreign sales commitment first.

Question. How does a dual turret differ from a 105-mm turret or a 120-mm turret?

Answer. The dual turret is a turret structure that has been designed to accept either the 120-mm or 105-mm cannons without structural changes. The gun/turret drive and fire control electronics are designed such that they can be optimized for whichever weapon is selected.

Question. If you accept the dual turret, does that not almost certainly force you to take the 120-mm gun?

Answer. No. Except for the structure, the control system can be modified for whichever weapon is selected.

Question. If we decided not to go with the 120-mm, but have the dual turret, what disadvantages would we be stuck with as compared to having gone with the 105-mm turret to begin with?

Answer. The dual turret results in a weight increase on the order of 1,500-1,800 pounds and a slightly larger vehicle silhouette. This slightly larger silhouette and a larger 120-mm gun shield slightly increases the vehicle vulnerability to threat weapons.

Question. General, are we not committed to large numbers of M-48 tanks and production numbers of M-60 tanks which will have the 105-mm gun? How long will these tanks be in our inventory?

Answer. By the end of the production of the M-60 series tanks projected in 1981, we expect to have over 11,000 105-mm gun tanks in our inventory. The latest model, the M-60A3, will probably remain in inventory at least until the mid-1990's whereas the M-48 series will be phased out after the mid-1980's.

Question. Provide for the committee a brief summary of the procedures of the tripartite gun tests, the conclusions, and why those conclusions were reached.

Answer. Chapter 101 of the trilaterally-agreed report of the tripartite tank main armament evaluation is a brief summary of the entire evaluation. It is provided under separate cover.

Senator THURMOND. Mr. Secretary, you must be aware of the report language of the Appropriations Conference Committee. Are you familiar with that?

Mr. AUGUSTINE. Yes, sir.

Senator THURMOND. Stating that the Congress has approved no funds for the hybrid tank and the Army should take no action without congressional concurrence. How do you expect to achieve this at the time your decision is to be made when Congress is out of session?

Mr. AUGUSTINE. The Department of Defense, at the present time, is reviewing that language which we received only a few days ago. If it is determined that the language demands that we come back to the Congress with a reprogramming, we would then, of course, initiate a reprogramming action.

We would do it very promptly so that something could be done before the Congress adjourns. I believe Mr. Clements plans to meet with the chairmen of the four committees in the next 2 or 3 days to discuss that very issue.

Senator THURMOND. Do you expect your request for reprogramming approval in the next 2 weeks? We will adjourn, I believe, October 2.

Mr. AUGUSTINE. Yes, Senator Thurmond, that is a major concern to us and is the subject of Mr. Clements' discussions with the chairmen. When we have the outcome of those meetings, I will be able to better answer that question.

Senator THURMOND. Mr. Secretary, are we still open to buying Leopard 2. How do you pronounce that?

Mr. AUGUSTINE. I know only one word of German and that is leopard; it means leopard in German.

Senator THURMOND. Will the tank we test this fall be exactly like the tank we will buy?

Mr. AUGUSTINE. If we were to buy the Leopard, Senator Thurmond, you mean?

Senator THURMOND. Yes. Are we still open to buying that Leopard 2?

Mr. AUGUSTINE. Yes.

Senator THURMOND. Will the tank we test this fall be exactly like the tank we will buy?

Mr. AUGUSTINE. First of all, let me answer that; we are still open to selecting the Leopard 2 and producing it here in this country. If the Leopard 2 proves to be a better overall tank, including cost, performance, schedule and risk, than the XM-1, we have indicated for some time that we would adopt the Leopard 2 design and produce it in this country.

If that were to happen the tank we produced in this country would be very similar to the tank we are testing right now. There would be some differences, but those differences would be of the same nature as those you would expect to find in the XM-1 production model as compared with the XM-1 prototype we tested.

Senator THURMOND. Mr. Secretary, what were the conclusions of the blue ribbon panel on the tank engines, the diesel versus the turbine, especially as to reliability and cost?

Mr. AUGUSTINE. That tends to be a complex issue. I would say the general consensus is that a turbine engine is likely to cost more to procure initially and is likely to cost less to maintain over the long term.

With regard to reliability, we use two measures of reliability. One is the mean time between failure, and the other, the mean time between overhaul.

With respect to mean time between failure, in our testing to date—Senator Thurmond, I am having a problem answering that question without getting in a sensitive area.

Senator THURMOND. Do not give anything that is classified.

Mr. AUGUSTINE. To answer as explicitly as I would like, I must.

Senator THURMOND. If you want to elaborate on the answer you submit to us, you can do that.

Mr. AUGUSTINE. Fine.

[The information follows:]

Part of the information requested has been provided in response to an earlier question. The remainder is still competition-sensitive. Therefore, in accordance with previous arrangements with the committee and Department of Defense policy, I would prefer to make the detailed findings of the blue ribbon panel available for review by the committee or staff in the Pentagon.

The CHAIRMAN. Senator, I hate to interrupt you. Let me see what these other gentlemen have.

Senator Hart has been here.

Senator HART. I pass.

The CHAIRMAN. Senator Nunn.

Senator NUNN. Just a couple of questions.

I asked Secretary Clements a question the other day when he was here testifying on the same subject, the MAG 58 machineguns. It seems to me that the Memorandum of Understanding between the U.S. and FRG should have contained some reference to the MAG.

58 machinegun, particularly since we are buying the Belgian gun on the basis of standardization and interoperability.

When we are making the kind of concessions we are at this stage to try for operational and standardization with the FRG, it seems to me we ought to rightly expect them to go for the same kind of machinegun. I realize that is not the most important part of the tank, and yet it is one of the important component parts.

I just wondered why the MOU did not have any reference to the MAG 58 machinegun, and, also, are you going to be able to pursue that subject with the Germans?

Mr. AUGUSTINE. The machinegun certainly is an important part of the tank. Let me answer your latter question first.

Yes, we will pursue this matter with the Germans.

Turning to your first question, the reason it was not raised at the time of the initial standardization discussions was twofold.

First, the XM-1/Leopard 2 discussions were obviously very complex, discussion of the items that were already on the agenda, transmission, engine, fuel, main gun, ammo, and so on, was time consuming and there was a desire to not make the session any more complex.

The second and probably overriding consideration was that at the time of those discussions we were in court here attempting to go forward with our decision for adopting the MAG 58. The GAO was reviewing whether or not we should be able to adopt the MAG 58, and there was a concern that we not put ourselves in a position of getting the Germans to agree to adopt the MAG 58 and then finding ourselves precluded from buying it.

Senator NUNN. We did have a couple of battles on the floor of the Senate.

Mr. AUGUSTINE. Yes. Now that those issues are basically removed, we will be going ahead with the MAG 58 and it would be very appropriate to raise this issue with the Germans.

Senator NUNN. We can count on the fact that the Administration and the Department of Defense and, more particularly, the Army will raise that issue with the Germans in a rather vigorous advocate way?

Mr. AUGUSTINE. You can count on it.

Senator NUNN. One other question that is rather academic, but I think very important for the future.

I happen to agree with this decision by Secretary Rumsfeld, Deputy Secretary Clements, and the Department of the Army. As I said the other day, I think it is the right decision, but one year later than I would like to have it.

I don't think it is too late, but it is very complicated and complex and going to be difficult because it did not come earlier. It would have been a difficulty even if it had come early, but not as difficult as it is going to be now to implement.

My question is, with the experience you have had, the expertise in this area, whether you assume the same thing I do about the timeliness of the decision? What could you do if you were backing up, say, 2 years or 24 months? What could you do in this overall effort toward standardization of a tank's operability of the major parts to make the road easier to travel both for our country and for Germany, if you were given the benefit of hindsight?

Mr. AUGUSTINE. That is a very difficult question.

Senator NUNN. But it is very important for the next weapon system, that is the reason I am asking. I think we have to get started at each earlier stage. I think we have to go to the research and development stage. I talked to Dr. Currie about this. I am not asking for 30 minutes on this subject, but some of the main things you think we could do if we were starting over.

Mr. AUGUSTINE. I think one thing that stands out in my mind would be very early before you begin a great deal of development, have a firm agreement between the two countries on the requirements for the system you are going to build. If you can agree on what the requirements are for the item, one is a long way toward achieving standardization.

Senator NUNN. By that, you mean the military, you mean by the U.S. Army, the people who are working up the requirements in the very beginning?

Mr. AUGUSTINE. That is right.

Senator NUNN. That was not done?

Mr. AUGUSTINE. There was a difference and there still remains a difference in opinion between the German Army and U.S. Army as to what the requirements are for the various parts of the tank.

There is another thing that comes to mind why this agreement is possible now, and it wasn't possible a year or two ago. Emphasis at the top level.

Mr. Leber and Secretary Rumsfeld are very dedicated to trying to improve standardization between our two nations and in the absence of that type of interest, it is very hard to reach an agreement.

Senator NUNN. Does that mean the Secretary of Defense in the future is going to have to inject himself at the very early stages in the planning of these weapon systems and insist that military, whether it is Army, Navy, or Air Force, work with their counterparts in NATO at this very beginning?

What level does it take to get down to the decisionmaking at the lower level in terms of effectiveness?

Mr. AUGUSTINE. I think there is and has been a strong effort at lower levels, particularly within the military, to work with our allies toward standardization. There are differences of opinion that are deep seated between and among the various NATO countries on what is required to really get standardization going. To require a degree of compliance means compromise, and it really takes senior involvement to be able to bring about those compromises.

Senator HART. I just want to make one observation and it is not in the form of a question. That is, I think more and more people, including myself, are asking even more fundamental questions about the future of weapons like this, and particularly their vulnerability to precision-guided munitions.

I know it is too late to get into that controversy with this weapon, if this were now into the turrets and sizes of guns and things like that, and too far down the road. But I think for some of us that are going to be facing these weapon systems at their initiation, we are going to want to ask some very hard questions about whether it makes some sense to have a million-dollar tank running around that can be knocked out by a very small—the whole Middle East experience and

Vietnam also, that escalating costs and individual units, standard World War II type weapons that can be knocked out with various inexpensive weapons, and by very few people, and the whole vulnerability question is one I know has been discussed with regard to the XM-1.

But really, I don't think it has been debated at the level it should have been in the Congress. That is my own feeling.

Mr. AUGUSTINE. I would like to comment very briefly on that.

As you say, it is not a topic you dismiss in a few moments, but I have had many people suggest to me perhaps the tank is obsolete and our discussions really here are moot.

My answer to them always is, I hope they are right; and the reason, of course, is that the Russians have about 45,000 tanks and we have about 7,000, so if the tank is obsolete, that would be a very great windfall for us, not something we should hope is not the case.

All of the best military minds in the world today are developing new tanks—Germany, France, Israel, the United States, and Japan—are all developing new tanks. To the question of whether or not the antitank missile has made the tank obsolete, I answer no. But that the missile has made the tank more vulnerable, that is without a doubt correct.

The data from the Middle East war does show that, without getting into classified data, the major tank losses were not due to antitank missiles. The killer was other tanks, by far the greatest preponderance of tank kills on both sides were from other tank guns.

The antitank missile was not that decisive in the Middle East. Certainly the current family of tanks that we have in the inventory now will have a tough time standing up to this growing threat. This is the reason we feel that the kind of breakthroughs embodied in the XM-1 are essential if the tank really is to survive on the kind of battlefield you describe.

Senator NUNN. I have a couple more questions, but I probably used my time.

The CHAIRMAN. Senator Bartlett will be here in just a very few minutes.

All right, Senator Thurmond, do you have anything further?

Senator THURMOND. Mr. Chairman, I don't have many more questions. I have a good many questions here that can be answered for the record.

The CHAIRMAN. Without objection.

Senator THURMOND. I will go about 10 minutes more and stop.

Mr. Secretary, the Army testified that it is cheaper to retrofit if we decided to go to the 120-mm than it is with the dual turret.

Why are we not going with this cheaper approach which also gives us an opportunity to thoroughly check the 120-mm before committing the new U.S. tank to that gun?

Mr. AUGUSTINE. Senator Thurmond, could you restate the first part of the question again?

Senator THURMOND. The Army testified that it is cheaper to retrofit if we decided to go to the 120-mm than it is with the dual turret. The question is, why are we not going with this cheaper approach which also gives us an opportunity to thoroughly check the 120-mm before committing the new U.S. tank to that gun?

Mr. AUGUSTINE. The turret that will be designed will be a dual capability or hybrid turret that will accept either 105-mm gun or the 120-mm gun. The cost of retrofitting a 120-mm gun into that turret is modest, on the order of—our original estimates, I believe, were like \$33,000 a tank in fiscal year 1976 dollars for the gun system.

Now, if one doesn't design the turret in the hybrid fashion and later decides that he wants the 120-mm gun, then the entire turret has to be replaced and the cost of that runs in the hundreds of thousands of dollars. That is very expensive.

So, the approach that is being pursued of the dual capability turret provides the greatest flexibility to put in the 120-mm gun and also to leave the 105-mm gun in it until the 120-mm is fully proven.

Senator THURMOND. I believe the Army testified last spring that it would be cheaper to go the other way. Maybe General Baer testified, I don't remember.

General BAER. We did, sir, and based on the conditions under which that statement was made, those numbers are still valid.

The thing that has happened subsequent to that time is really two-fold. One, of course, is considerable additional work has already begun on the development of the hybrid turret in the interim period.

The second and primary consideration that drove the cost up was how you assess the program delay, and that has been somewhat modified by what work has been done in the interim period. There were certain differences that took place, for instance, in the way in which the numbers were assessed at the time.

Senator THURMOND. Will we take the 120-mm gun and go with the turbine regardless of cost increases?

Mr. AUGUSTINE. Of course, what we do depends on the proposals we get in the November time period.

Unless there is some completely unforeseen result, our plan would be to eventually have a turbine engine and 120-mm gun. The question particularly with regard to the turbine is how soon. It depends strictly on the maturity of of the turbine design.

Senator THURMOND. Mr. Secretary, I understand the program unit cost of the tank is \$1½ million per copy for our program of 3,300 new tanks.

What would be the program unit cost if we convert to the more expensive turbine engine, 120-mm gun, and new ammunition?

Mr. AUGUSTINE. Let me place a few definitions on the record.

The program unit cost, is the total program including development and engineering; that is about \$1½ million. The design unit cost number, in today's dollars, is about \$753,000 per tank. The increase in tank unit cost, if one compares the most sophisticated, if you will the most costly tank that we are considering, with the minimum cost tank we had been considering prior to July 20, I think one could speak to a cost increase of 15 percent or less.

Senator THURMOND. Thank you.

Mr. Secretary, what was the previous design-to-cost goal for the XM-1 tank and what is the new design-to-cost goal under the amended program?

Mr. AUGUSTINE. The design-to-cost goal as you probably remember originally stated was \$507,000 and that was in 1972 dollars for 3,312 tanks built at the rate of 30 per month. That equates to the number

I just quoted of \$753,000 in today's dollars. The design-to-cost goal for the new tank remains unchanged and that is still our goal.

Senator THURMOND. Mr. Secretary, if the Army should find upon receiving the new bids by the contractors that the cost of the standardization proposals is excessive, will the Army go forward with the tank without the 120-mm gun and gas turbine engine?

Mr. AUGUSTINE. I would say that the evolution of that circumstance depends completely on the nature of the bids we get about a month from now. If there were some completely unforeseen event in the costs that made the whole program unreasonable, we obviously wouldn't do something unreasonable. But from the costs that we expect, it is not likely that one would rule out either the turbine or the 120-mm gun based purely on cost.

Mr. THURMOND. Mr. Secretary, in what way is the Memorandum of Understanding agreement subject to concurrence by the Congress?

Mr. AUGUSTINE. The addendum to the Memorandum of Understanding has a provision in it to the effect that both countries agree to seek the support of the Congress to carry out this program and that its execution obviously requires the approval of funding by the Congress.

The discussions that took place prior to the signing of the addendum were rather explicit in that. The FRG's situation with respect to their Bundestag is identical to the Department of Defense's with respect the Congress. If the addendum isn't supported by the Congress or the Bundestag obviously it can't be executed, and that is very clear to both parties.

Senator THURMOND. Mr. Secretary, what do you consider to be acceptable cost in achieving the standardization goals?

Mr. AUGUSTINE. Senator Thurmond, to answer that I really would have to equate it to the benefits one gets. If one gets substantial benefits in performance or in growth potential, or in standardization, and an ability to exchange parts and ammunition with our allies, the degree of those benefits would be the measure that I would use to determine what is an acceptable cost.

Senator THURMOND. Mr. Secretary, when the Army says a 15-percent cost increase, does that include the higher life cycle cost associated with the new engine and gun?

Mr. AUGUSTINE. That 15-percent cost, Senator, applies strictly to the design-to-unit cost, the hardware costs, of the vehicle and not to the life cycle cost.

As it happens, the life cycle cost probably would change within that same general realm of number. The life cycle cost of the gun very likely will go up because the ammunition costs more and the gun itself costs more. The life cycle cost to the engine may well go down because of the better reliability and maintainability of the gas turbine.

On the other hand, the initial costs of the turbine will be greater and those are tradeoffs that we don't yet have the answer to. We will have this information when we get our bids from the two competing contractors.

Senator THURMOND. Does that include setting up a separate transportation storage and maintenance program and additional personnel needed for handling the 120-mm combustible case round?

Mr. AUGUSTINE. The cost numbers General Baer and others have testified to include the cost of setting up a production base of handling the 120-mm rounds.

Senator THURMOND. Mr. Secretary, is it correct that you have testified in the House, or it may have been Mr. Hoffmann, that if the 120-mm gun was selected the XM-1 tank program could be delayed up to 2 years?

Mr. AUGUSTINE. I believe Mr. Hoffmann testified to that about 6 or 8 months ago when he was describing a situation somewhat different from that we face today. He was describing the impact if one were to stop the program and wait to get a 120-mm gun on the first XM-1 tank off the production line. That differs from our current plan. Our current plan is to put a dual turret on the first tank and then put 105-mm guns on the initial tanks and introduce the 120-mm gun later on in the program when it is ready. The delay due to this type of 120-mm gun introduction is probably between a maximum of 1 to 4 months in addition to the 4 months delay that we are now encountering while we resolicit our contractors. So I would say the maximum delay to the gun decision per se will be no more than 1 to 4 additional months.

Senator THURMOND. Mr. Secretary, what will be the general cost of the time delay if the United States selected the 120-mm gun?

Mr. AUGUSTINE. I might ask General Baer to address that.

Do you know the specific number for that?

General BAER. I think we had better provide this for the record, Senator Thurmond.

[The information follows:]

We currently estimate the stretchout, including development of the dual capability turret, could be up to 6 months. The additional cost due to program stretchout, not considering the effects of inflation, is currently estimated to be approximately \$2.3 million fiscal year 1976 per month of stretchout.

The CHAIRMAN. Pardon me, what was your question?

Senator THURMOND. I asked what would be the general cost of the time delay if the United States selected the 120-mm gun.

The CHAIRMAN. Time delay, dollar cost?

Senator THURMOND. Yes. Mr. Secretary, this is about the last question.

The staff advised me if we take the 120-mm gun instead of the 105-mm we will not have commonality or standardization because the vast majority of tank forces use the 105-mm. In fact, we are now converting M-48 tanks to the 105-mm gun, producing M-60's with the 105-mm, and neither can handle the 120-mm. Someone has said even if we go with the 120-mm now that in the year 1975, 75 percent of the tanks in the world would still be equipped with the 105-mm.

Would you care to comment on these points?

Mr. AUGUSTINE. Those are very appropriate comments. The majority of tanks in NATO today, as you point out, do have 105-mm guns, as do most of our own tanks. Certainly the larger number of tanks in the foreseeable future would be standardized with the 150-mm gun.

The thing that argues against that is the adequacy of the 120-mm gun to meet the threat and the 105-mm gun adequacy to meet the threat on the battlefield. At the present time we find the Russians with 115-mm guns or above on their tanks, the Germans going to

120-mm, the French going to 120-mm and the British going to the 120-mm. The only other major tank power in the world is ourselves and we are at 105-mm. The trend of the future in NATO seems to be toward the 120-mm gun, and if we are to have standardization in the future, one could argue that movement in the direction of the 120-mm gun now would be a basis for achieving that future standardization.

Senator THURMOND. Mr. Secretary, if the Army goes to the dual turret the Army is committed to the 120-mm gun regardless of test results over the next 2 years, as I understand it. The dual turret is bigger than needed for the 105-mm gun. That gives us a bigger turret and any enemy target area allows the tank due to more weight. XM-1 was designed for 105-mm, not the 120-mm, was it not?

Mr. AUGUSTINE. The XM-1 was originally designed for the 105-mm. The dual turret will take either the 120-mm or 105-mm. The 120-mm would be introduced into that turret only when it has met the test specifications that have been prescribed for it. It wouldn't go in if it were having technical problems.

Senator THURMOND. Now, the general feeling is that we should standardize with NATO. I think we all favor that. The only thing is not standardized with one or two members of NATO, that we should get an agreement with most of the members rather than dealing bilaterally or multilaterally, don't you think?

Mr. AUGUSTINE. I think that would be very desirable if that could be accomplished. It is very difficult.

Senator THURMOND. The rest of the questions I have submitted to you. If you will kindly answer those for the record and get them back to us as soon as you can.

The CHAIRMAN. All right.

Mr. AUGUSTINE. Thank you.

The CHAIRMAN. All right, thank you, Senator.

Senator Tower, do you have any questions?

Senator TOWER. I have no questions.

The CHAIRMAN. Senator Bartlett, we will recognize you now.

Senator BARTLETT. I want to thank both General Baer and Secretary Augustine for appearing here today.

One thing that concerns me generally is the Army took a very strong position, as I think both of you will concur, in not wanting to delay the selection of the XM-1 tank. It is very clear from the testimony we have had so far that the decision to delay the selection was made by the Secretary of Defense. To my knowledge I know of one person in the Army who hasn't changed his position from what it was. I am just wondering if there are any others who haven't. Secretary Augustine, you have been one I haven't talked to lately. I can't understand really why because there is a difference of opinion that there has to be such a difference of change of basic opinions in the Army. In other words, I can visualize the Secretary of Defense overruling the Secretary of the Army. People with innovative, good ideas, intelligent people, will have differences of opinion, but I don't quite see why so many in the Army have abandoned the ship, in this case the tank. Will you explain? You and I fought the battle in this committee for some time and lost it in the Senate and finally the delay was forestalled in the House over a year ago and now we have a position where the Army

tends to be supporting the Defense Department in that delay, sort of the opposite of the B-1 bomber.

Mr. AUGUSTINE. I think the answer to that is that the Army very badly needs a new tank. The Army tank that we have now was developed in the fifties. The new threat makes it questionable how long that tank is going to be viable on the battlefield.

The Army feels that it must provide its soldiers with a modern tank and do so very promptly.

The way we can get that tank, at this point in time, is to proceed along the path that I have described, which will permit us in November to select one of the two contractors that are now preparing bids and continue on with the program.

The answer to our question, when one looks where we stand today and where we want to go, is to move ahead quickly toward contractor selection in November, and development of the new tank so badly needed by the Army. Most of us are driven very hard by that motivation.

Senator BARTLETT. Have you changed your opinion on a delay that you and I discussed many times over the last year when the question was before the Senate and the House?

Mr. AUGUSTINE. We need the tank badly and, of course, I hope the delay will be the very minimum. I most certainly would argue against any long delay.

In fairness to those who feel maybe even longer delays are appropriate, I guess I have to say that a tank tends to stay in the inventory 20 or 25 years and there are those people that argue that perhaps 3 or 4 months of additional delay to get a better tank or a more standardized tank is a worthy endeavor.

Senator BARTLETT. Where would you draw the line on the delay?

Mr. AUGUSTINE. I think, Senator Bartlett, it would depend on the benefit to be had from that delay. If there were a major benefit I would be willing to delay some period of time.

For example, in going from the XM-803 to the XM-1 the benefits appeared to be very major and, as a consequence, the Army was willing to delay a number of years.

On the other hand, if the benefits are small, I would hope the delay would not be more than a few months.

Senator BARTLETT. In other words, you would not set an absolute limit of whatever the date is, November 17? Is that one date that has been mentioned?

Mr. AUGUSTINE. We hope to have a contract awarded by November 17 and unless there is something completely unforeseeable that I am not now aware of, we won't go beyond that date. I would hope we could even beat that date.

Senator BARTLETT. There is no guarantee, that is not a firm date, that is just a hoped-for date.

If the Defense Department wants to wait past the 17th, maybe they pick a date in December even, what is the Army going to say then? Are they going to still say this is a good idea?

Mr. AUGUSTINE. Unless there is completely new information the Army will strongly defend the date of November 17. At the present time the Defense Department is committed to that date also.

Senator BARTLETT. It bothered me in the last discussion with Secretary Clements that the Defense Department per se has no tank

experts or at least he didn't claim that they had, that the tank experts are in the Army. I believe that is true, and they are very proficient—one of them sitting right here now.

So when the Defense Department overrules the Army, it is not as if the tank experts are suggesting those overrulings, it is for other reasons, and I think there is some matter of real concern in this delay.

I wanted to ask you a question about the gun. The Federal Republic of Germany has really unilaterally rejected the result of the trilateral gun evaluations, have they not?

Mr. AUGUSTINE. The trilateral evaluations said that in the near term, I believe the near and middle term, in fact, that 105-mm gun was adequate. It is my understanding that the Federal Republic of Germany senior levels, upon reviewing the tripartite evaluation, concluded that the risk of going with the 105-mm gun was greater than stated in the trilateral study and, therefore, they decided to go to the 120mm gun in the first Leopard 2 production series.

Senator BARTLETT. Mr. Secretary, I don't think you answered my question. In fact, I don't think you answered the last two questions. So I am going to ask them both again and I will do it in order.

Have you changed your opinion about the arguments in favor of the 105-mm gun that you made a year ago against delaying the tank, or were you wrong then? I know you want the tank. That is not the kind of answer I want.

Mr. AUGUSTINE. My hope is that we will not have to delay the tank program beyond the 4-month resolicitation period.

Senator BARTLETT. I understand that, but you are not answering my question. I think you are a very candid person and certainly would like to answer it and tell me whether you have changed your basic opinion about the tank or whether you have not. I will try to help you. I assume you have not.

Mr. AUGUSTINE. Well, you know—

Senator BARTLETT. If you do not want to answer it you do not have to.

Mr. AUGUSTINE. Let me answer it.

Senator BARTLETT. I would rather have you not answer it than tell me you want the tank because I want the tank.

Mr. AUGUSTINE. I would prefer not to have delayed the program and I would hope that we won't sustain any additional significant delay. There were considerations relating to the importance of standardization that have recently become more important than when I talked to you before. These standardization considerations were viewed as being overriding in importance to avoiding a few months delay.

Senator BARTLETT. I wonder what some of those considerations really were. I asked you the question, did not the Federal Republic of Germany unilaterally reject the results of the testing of the trilateral evaluation on the gun? They didn't go along with the U.S. evaluation, did they?

Mr. AUGUSTINE. They did not accept the results in the near term and middle term time frame, that is right.

Senator BARTLETT. Now it bothered me when Mr. Damm testified before the joint committee much earlier in the year that Germany wasn't interested in the best tank, they would be interested in selling the Leopard 2 tank. I am wondering whether they are really interested

in the best gun or whether they are interested in selling their gun. The testing did not show their gun to be the best gun, isn't that correct—it did not?

Mr. AUGUSTINE. The testing, of course, showed that it would make the biggest hole in the target. Obviously the 120-mm is going to have more penetration capability. It wasn't as good in terms of cost or accuracy and so it became a question of how much is enough to defeat the nature of the threat you are trying to penetrate.

Senator BARTLETT. Aren't there other tradeoffs too, speed and maneuverability and weight?

Mr. AUGUSTINE. Cost.

Senator BARTLETT. And cost and other delays, and all those things. But all those things were taken into consideration at that time by the Army, were they not? When the Army testified, I believe General Baer did, that the cheapest and best way was to proceed in a parallel course. So in a sense I think the Army felt it could feel its way but also felt that that was the cost-effective way; is that not correct?

Mr. AUGUSTINE. I think that is right, that was the Army position. The thing that has changed is that much greater emphasis has been placed on the payoff of standardization. When one assigns increased importance to standardization, the arguments that forced us to take our position a year ago are, of course, changed.

Senator BARTLETT. But the arguments we just talked about that were considered by the Army are the same?

Mr. AUGUSTINE. I think they are very valid arguments. I don't think we would disown any of them. We would now have to say that standardization has taken on a much greater importance than it did at the time we stated that position.

Senator BARTLETT. As far as the merits of the German gun, those haven't changed compared to the others?

Mr. AUGUSTINE. The technical merits are just what they were, of course, before.

Senator BARTLETT. And the advantages and disadvantages of delays and all that are the same as far as commonality is concerned—standardization is no different there. I am wondering are we talking about standardization or are we talking about trading with Germany, buying German weapons, perhaps not because they are the best, because it is not shown that the German gun is the best gun for our tank is it, necessarily? In fact, I think we established the last time we met that the final decision would not be made for how many years, General, was it stated?

General BAER. Well, as far as our ability to produce the gun, we said it would be available in 1982; yes.

Senator BARTLETT. When would the decision have to be made if we are going to select the gun? In other words, there is no decision yet to select the gun, is that right?

General BAER. There has not been.

Senator BARTLETT. So all this is being delayed and done so far as the turret is concerned for a gun we are not sure we want, is that correct?

(No response.)

Senator BARTLETT. Is that correct?

Mr. AUGUSTINE. The specific gun will be selected in January.

Senator BARTLETT. Am I correct in saying that is all being done for a gun that has not been selected?

Mr. AUGUSTINE. The changes that are being made now are compatible with whichever gun we would select in January, so we are not on a path that is dead ended.

One of the reasons, if I might add, why the changes are being made now—

Senator BARTLETT. If the German gun is not selected there is no need to make this change?

Mr. AUGUSTINE. That is correct.

Senator BARTLETT. So if we are making the change not knowing that we were going to use the German gun—

Mr. AUGUSTINE. If a British—

Senator BARTLETT. Not knowing it is to our advantage.

Mr. AUGUSTINE. If the 120-mm gun, German or British, or whatever, is not selected then it is not necessary to make the change we are now making with regard to the dual turret.

Senator BARTLETT. Well, it bothers me a little bit that we seem to be interested in standardization but I am not sure Germany is.

Has Germany agreed to buy our tank if it were considered the superior tank? I think the answer is no, it would not.

Mr. AUGUSTINE. That is right.

Senator BARTLETT. So it appears to me that Germany decided they couldn't win the tank competition and so what they are trying to do is keep some viability of their component parts without having tests to show those component parts were superior.

As I understand it, the track is not going to even be tested, the Diehl track, is that correct?

General BAER. That is correct.

Senator BARTLETT. It is not going to be on the Leopard tank that is here for test—I assume it is here now or will shortly be. So we are not even going to have a test of that component part but apparently we are making an agreement to buy it.

General BAER. Let me be sure that is put in the proper perspective, Senator Bartlett. The tank as we have it now does not have the Diehl track on it. The Germans made the decision not to ship the tank with that track installed. They do still have some hopes that they can get a Diehl track here sometime during the test cycle so that some test data can be acquired on that particular component. You are correct; as of now, the Leopard vehicle that we have starting testing at Aberdeen, Md., does not have the Diehl track on it.

Senator BARTLETT. And we have no test knowledge of it of our own testing, do we?

General BAER. We completed testing of a Leopard 2 automotive test rig in 1974 which did have the Diehl track installed. The test results of that test are fairly compatible with that to the German testing and the deficiencies and the advantages of that track were pretty well borne out in the testing conducted.

Senator BARTLETT. That is not the kind of testing we require of our own manufacturers, is it?

General BAER. No, sir, I think you could say that we would be a little more demanding today than what we were in that particular test.

Mr. AUGUSTINE. It should be added that we would not select a Diehl track until it has been tested side by side with a comparable U.S. track and it proved the better track for the dollar. So no decision has been made in that regard.

Senator BARTLETT. I can understand the interest in the Diehl track and the interest in the German gun, but when we haven't tested the track and don't know that we want it and did test the gun and it didn't come out first in testing, and yet we had altered the course, I can't see why we decided to delay. In the interest of the tank, do you think we were ahead by delaying it?

Mr. AUGUSTINE. In the interest of standardization, I think we are ahead. In the interest of getting a tank early, we are obviously behind. In the interest of getting a better engine, we may or may not be ahead, and I guess I won't know the answer to that for a little while longer. We paid some penalties, obviously, and I hope we made some gains.

Senator BARTLETT. As far as the German tank, Leopard 2 is concerned, no major modification is required of it, but of the American tanks they are both back on the drawing boards for an indefinite period, and as far as the competition between them is concerned it puts the American tank at quite a disadvantage with the German tank?

Mr. AUGUSTINE. There were two ways to implement this decision. One was to continue ahead with selecting a contractor and continue ahead, in which case there would not have been the delay that we are now undergoing.

The other way was to do what we are now doing and resolicit both bidders. I think Mr. Clements testified before the committee that the payoff of getting quotes on this new design from two competing contractors was viewed as a good business judgment. That the benefits of nailing that design down in a competitive environment would have a substantial dollar savings. So it really was not so much the decision to standardize that caused the delay. The things that caused the 4-months delay was the decision to continue the competition in order to get quotes in a competitive environment, a business judgment.

Senator BARTLETT. Is that for the best interests of the XM-1 tank or does that actually possibly put it in jeopardy in competition with the Leopard 2? The Leopard 2 is not going back to the drawing boards as our tanks are going back, postponing the decision, possibly increasing the cost substantially. It just appears to me this smacks, as you say, of a business deal, of a trade to buy from Germany not necessarily the best component parts, that we are not sure are the best. We don't know that they are the best or that we even want them so far as the track is concerned, or so far as the gun is concerned.

Mr. AUGUSTINE. There is no decision to buy the German track. We would continue to test it side by side with U.S. track.

The Germans have agreed to buy the turbine engine or to build in Germany the turbine engine and transmission under much the same circumstances that we would build the German ammunition and gun in this country.

Senator BARTLETT. Let me put what I have been asking in maybe a slightly different form but in a specific question.

The argument has been made that the Federal Republic of Germany is not interested in NATO standardization per se but is interested

only in making certain that the Leopard 2 remains competitive with the XM-1. Though the modification required by the addendum to the MOU increases the XM-1 unit cost to the point that there is no differential between the XM-1 and the Leopard 2 and, therefore, would argue in favor of the Leopard 2 from a cost point of view.

Mr. AUGUSTINE. It is likely to increase the cost of both the Leopard and the XM-1 and the nature, the relative magnitude of those cost increases will depend on the specific configuration we pick in November. I think there is a reasonable chance it will increase the cost of the XM-1 more than the Leopard but probably not decisively so.

Senator BARTLETT. What tends to increase the cost of the Leopard?

Mr. AUGUSTINE. An example would be that the inclusion of the turbine engine and transmission in the tank would increase its cost.

Senator BARTLETT. Well, the Memorandum of Understanding says that it will not be selected until the testing is completed and it is in production, is that correct?

Mr. AUGUSTINE. On the engine?

Senator BARTLETT. Is that on the engine?

Mr. AUGUSTINE. Yes; the engine would not be introduced into either country's production until the tests were completed and the engine had met the prespecified requirements of both countries.

Senator BARTLETT. As I understand it, the German tank is made by, I probably won't pronounce it correctly, Krauss-Maffei.

Mr. AUGUSTINE. Krauss-Maffei.

Senator BARTLETT. Mr. Secretary, do you have any recent information on that company's financial condition? I have information that, I have no idea whether it is correct or not, that they may be in financial trouble. Is there anything to that?

Mr. AUGUSTINE. I know nothing about that. Let me ask General Baer.

General BAER. I have only hearsay information, too, Senator Bartlett, and I wouldn't want to qualify it other than that it was reported that they were in some type of financial difficulty in the recent past. Whether that situation is still true today or not, or whether it was true at any time or not, I can't attest to.

Senator BARTLETT. Well, the hearsay that I have had was that they were in serious financial trouble and required a bailout. Mr. Chairman, I don't know what the proper procedure would be here. I suppose we should ask the Defense Department or the Secretary of the Army, or both, to make an evaluation of this situation. Mr. Secretary, would you give us your response to that and give us the facts on their financial condition?

Mr. AUGUSTINE. I never heard that until this moment but we will certainly look into it.

Senator BARTLETT. I have heard this as hearsay and I think it should be checked out and evaluated.

Mr. AUGUSTINE. We will do that.

[Information will be provided separately.]

Senator BARTLETT. Do you envision any problems with the standardization of the metric fastener on the main battle tank? If so, what kind of problems?

General BAER. As far as the application, the changes in the tanks to put the metric fastener on, I think the honest answer would be

"No." These are things that we have planned for, they were part of the planning that went into the MBT-70 program and follow-on XM-803 program. I think if there is any question to be raised about the metric fasteners it will be primarily from a maintenance analysis, not from application to the tank; no.

Senator BARTLETT. Is the Federal Republic of Germany cooperating with the United Kingdom on weapons development such as the 120-mm gun?

General BAER. Yes; they are.

Senator BARTLETT. Are they cooperating fully?

General BAER. I don't know that I can answer that. I know that they were part of the trilateral group which has continued to meet and to exchange data. I know there were recent meetings between the Germans and United Kingdom armament people both in London and in Bonn. So I can only say it appears to be on the surface that there is a continuation of the trilateral work.

Senator BARTLETT. I asked Secretary Clements in our last hearing what steps the United States has taken and is taking to encourage all of our NATO Allies to standardize. Mr. Secretary, can you or General Baer answer the question?

Mr. AUGUSTINE. I will try to comment as best as I can. That is really a DOD function so it is hard for me to be very specific.

The main approach has been to encourage, on an item-by-item basis, groups of countries to adopt a specific item. Those things that the Army, for example, has adopted to standardize, partly the standardization within NATO would include the MAG-58, the ROLAND, the Aden DEFA rounds for AAH and these itemized components of the XM-1.

I strongly feel that the basic thrust of standardization, and I believe this view is shared by DOD, should be that the countries that adopt the standardized item get a better system for their money in addition to the standardization capability. One has to get a better overall capability, including the logistic support advantage, from standardizing.

Senator BARTLETT. General Baer, have you requested any reprogramming approval for funds to continue this new program through fiscal year 1977?

General BAER. We have a followup to the previous testimony that was presented, Senator Bartlett, when Secretary Hoffmann indicated we would seek to do the work during the 4 months reproposal period within the \$16.1 million that was in the 1977 budget, not specifically identified with full-scale engineering work. That has been our objective and we have proceeded along with that goal.

There is a question that has been raised as to the desirability of some additional funding to perhaps continue some arrangements that the contractors had with suppliers during this period.

That is under consideration right now by the Department of Army and if that is their decision, we should indeed support these requests from the contractors. Then, there will probably be some additional reprogramming requested.

This would be in the range of about \$2.5 million.

Senator BARTLETT. Will you continue the program as presently planned through September 1976 with the \$16 million allowance?

General BAER. We believe that we can continue the program through the November 17 period for that amount of money with the exception of the item that I just discussed.

Senator BARTLETT. How concerned will you be if November 17 comes along and there is no official commitment on the awarding of the contract? Apparently we cannot get a specific date or a specific commitment, but come what may, that is the date when the award will take place.

General BAER. I would not be very honest if I did not say that I would be very concerned if we did not have a decision by that time, and I think that is what Secretary Hoffmann stated in his testimony. We feel this is an absolute "must" date and we believe that the Office of Secretary of Defense shares that viewpoint.

Senator BARTLETT. There is no commitment. Why wouldn't there be a commitment if your feelings and the Secretary's were thoroughly endorsed by the Secretary of Defense.

General BAER. I must assume, Senator Bartlett, if we did not proceed with the decision at the time, it would be for a very justified reason like not having a basis to support a decision, and I don't believe that is going to happen. It is certainly my intent to do everything to see that it does not happen.

Mr. AUGUSTINE. At the present time, both the Army and DOD are committed to November 17 and we are moving toward that date.

Senator BARTLETT. What kind of commitment is that? That is not a commitment is it?

Mr. AUGUSTINE. Speaking for General Baer and myself, I am sure we can say we will do everything we can to get there. I guess a commitment is no better than that.

Senator BARTLETT. Your word is very good. I am afraid we are not getting a real commitment from the Defense Department and I guess your commitment would be subject to their decision.

Mr. AUGUSTINE. Absolutely.

Senator BARTLETT. What worries have you about the tank after November 17 if there is no commitment, say, it is just like it is today with all indications of cooperation for an early date, but it is still up in the air and there are still things to be done or things that somebody wants to do?

Why are you worried about the November 17 date being a firm decision date as, say, compared to one in July? I think we were worried about that one, too.

I am not trying to put words in your mouth. I think you were concerned but I think you are showing more concern now; is that correct? If so, why?

General BAER. I think my position on that has been stated before these committees many, many times. I look back at history, Senator Bartlett, at the time of the MBT program, the XM-803 program, and our history of tank development, and I feel the things that have been most contributive to the lack of success in those programs—and this is a poor way of putting it—have been the delays brought about which result in additional costs for which you can see very little productive work.

Just maintaining a work force with no real direction being provided during these periods of indecision, when we are sort of sitting and

waiting for somebody to say get on with it, very honestly that is the concern I had in July. I have that same feeling to a greater extent, now in September, simply because we have a 4-month delay already built into the program and any proposal for additional delay will come easier.

Senator BARTLETT. According to the House Appropriations Committee, apparently they believe you will have to come before Congress within the next 2 weeks if you want to continue the program. Is that your understanding of their thinking, if there are any changes in the program?

General BAER. That is the way we understand the language in the appropriations bill, yes.

Senator BARTLETT. So, how does that affect your thinking and planning?

Mr. AUGUSTINE. The language in the appropriations bill is something we have only had a couple of days, but it suggests that if the program changes relative to the way it was originally justified, that we would have to come back for reprogramming.

I believe Mr. Clements plans to meet with the chairman of this committee and the other three committees, with which the Defense Department is most closely associated, in the next 2 or 3 days, to find out exactly what we need to do in the way of reprogramming. If it turns out that a reprogramming is required, of course, we would do that right away because we would need some kind of indication, before the Congress adjourns, as to whether that reprogramming approval would be forthcoming.

Senator BARTLETT. How much money is estimated to be required through the planned period before a new source selection is anticipated?

Mr. AUGUSTINE. \$16.5 million, not including the \$2.3 million General Baer just mentioned, which is for a somewhat different purpose.

Senator BARTLETT. You have not requested reprogramming approval for this program to cover the funding needs yet?

General BAER. It has not been submitted to the Congress, no, sir.

Senator BARTLETT. Either one of you—have the British expressed any displeasure with the conditions of the addendum as it relates to the gun selection?

General BAER. Senator Bartlett, I think the answer is "Yes." The British have expressed some displeasure because they feel that their opportunity to compete, particularly with a more advanced technology gun, is restricted if indeed a decision is to be made in January.

They will not be able to have the new guns available in late 1976 for evaluation. So, they have expressed their concerns to the Department of Defense.

Senator BARTLETT. What would be the reaction from the British on this new agreement as it relates to the gun selection?

General BAER. Well—

Senator BARTLETT. Would it be the same?

General BAER. It is really the same answer, yes.

Senator BARTLETT. What effect does this have on the gun competition and attempts at 120-mm gun standardization? Do you think there is any chance for the 120-mm gun standardization in NATO?

By that, I mean are all parties willing to standardize or is it just a one-way street as far as Germany is concerned?

General BAER. I think there is great agreement that the gun of the future should be the 120-mm within the NATO community. This is certainly reflected in the attitude of the French, the British, and the Germans.

As far as this particular gun, I think there is a difference in views. Certainly, these differences have been brought forth by the United Kingdom and by the Germans. The smooth bore versus rifled bore question is certainly there and to that extent if a decision must be made fairly early in time, of course you must consider those candidates that are available in that point of time, which takes us back to the 105-mm with improved ammunition.

Senator BARTLETT. Is there a willingness on the part of both the United Kingdom and Germany to try to determine which is the superior 120-mm gun and both countries field that gun?

One way or the other, there will always be a gun beyond the ones we tested. There is historical evidence to support that viewpoint.

I understand there are some problems with standardization even if we start out with exactly the same tank. For example, in the M-48 tank program differences in technology resulted in a lack of commonality in standardization of a very high percentage of the M-48's, even though the tank itself was an American tank.

What is the present status of agreement between the Army and the British regarding 120-mm gun competition?

General BAER. Discussions have taken place within the last week on this, Senator Bartlett. The provision of the agreement calls for the British to provide to us two of their current 120-mm L-11 guns in the November time frame with a certain quantity of ammunition. A draft test program has been worked out for this work focusing initially on some penetration analysis, which was one of the items that came out of the trilateral report, somewhat in debate. We are trying to resolve that.

That will take place probably at the Aberdeen Proving Grounds sometime this fall and that will be the first requirement of that letter of agreement.

The CHAIRMAN. Will you gentlemen excuse me. This is on the record.

Gentlemen, I am going to have to go for this sitting. I am going to ask Senator Bartlett to be in charge.

Senator Thurmond was going to try to come back if he could. We have had a good hearing, gentlemen, as I see it, and from my experience we know that these efforts to get international agreements and binational and all are very, very difficult to work out.

Congress has a problem in connection with it. Each individual Member of Congress has a problem, as you know, but as I see it, I lean toward approving this delay. It has not been a great delay, but, I think we ought to get this tank moving now.

You know, it has been hanging for a long time. It and its predecessors, and the committee has fully considered, every member has had a letter, more or less, inviting them to come today if they had anything further to say.

We have no pending resolution or bill before us or anything like that. This is, nevertheless, an important hearing, I think.

Senator Bartlett, I want to thank you for your special effort in this field and for getting here this morning under the circumstances. Will you gentlemen excuse me now, and when you do recess in whatever form that will end the hearings on this phase of the tanks, but I am satisfied every member has had every chance.

Senator BARTLETT. I thank you very much for making the hearings possible. I think they have brought out some very important information. I have a few more questions and I would like to alert Senator Thurmond so that he can ask some questions.

The CHAIRMAN. All right, you can adjourn, subject to the call of the Chair when you finish today and that will conclude the hearing. Thank you.

Mr. AUGUSTINE. Thank you, Mr. Chairman.

Senator BARTLETT. The hearing will continue.

I have here a proposed draft of a letter dated June 3, 1976, unsigned, on the Secretary of Defense's stationery, unclassified. Then, I have classified letters from the Department of State. One of them refers to this letter and the other one refers to the tank matter.

This is a letter to Minister George Leber, and I will put this in the record. I will read from it also.

(See letter from Secretary of Defense, p 116.)

It says, "Our reassessment of the main armament for the XM-1 has now been completed. This consisted of an exhaustive review of the entire record of the trilateral evaluation, including the conclusions and recommendations of the working group and steering group;"

Let me say right off the bat, this is a proposed draft—I assume this was not sent.

"A review of both the current and the projected threat tanks; and a review of the U.S. supplemental study which was previously provided to the BRD, and which contains additional analysis of the implications associated with the various gun candidates. I also carefully considered the views as expressed in your letter of April 30."

I earlier asked for correspondence that might have taken place between the Army or the Defense Department and the Germans and I did not receive any information on that, any letters or any memos.

I wouldn't necessarily have expected to receive the proposed draft, but there are letters that apparently are copies which refer to this letter which apparently the State Department was commenting on.

Mr. AUGUSTINE. Excuse me, is that a letter drafted to Minister Leber? Is he the addressee?

Senator BARTLETT. Yes.

Mr. AUGUSTINE. OK.

Senator BARTLETT. It says, "During the reassessment, I was impressed by the degree of standardization already achieved within NATO by virtue of the 105-mm gun. Over 45 percent of the NATO tank fleet now has the 105-mm and with the conversion of the M-47's and M-48's, that figure could approach 90 percent. A decision to move to a different size gun will obviously dilute the degree of standardization we now enjoy and certainly adversely impact on our logistical support."

The main argument made by the Secretary of Defense for the delay of the MOU was, of course, standardization.

Could you comment on this? Are you familiar with this proposed draft?

Mr. AUGUSTINE. Yes, I am. Let me back up.

Minister Leber wrote to the Secretary of Defense some months ago prior to that letter that you are reading from and the Army was asked to prepare a draft to Minister Leber for the signature of the Secretary of Defense.

I believe what you have there is the draft that the Army prepared expressing the Army's views at the time, and those views are basically consistent with what we have testified to before you and your committee, and that is that most of the tank guns in NATO are 105-mm's. Therefore, going away from the 105-mm, at least in the short term, would not help standardization.

The broader view of the standardization problem that was taken on July 20, of course, puts a different perspective on the things we believed at the time. I think the facts are still correct.

Senator BARTLETT. You are saying that this was prepared by the Department of the Army for the Defense Department? This is on Defense Department stationery.

Mr. AUGUSTINE. Senator Bartlett, if it is a letter, I am quite sure it is a draft prepared by the Army for DOD for the Secretary of Defense to sign. That is a fairly standard procedure. It would be coordinated by the OSD staff before it was presented to the Secretary for his actual signature. In this case, it never was presented to him to sign.

Senator BARTLETT. Did the State Department disagree with that letter?

Mr. AUGUSTINE. Let me be very careful to state the extent of my knowledge on that.

Until about a month ago, I was not aware that the State Department had commented on this. About a month ago, and well after July 20 and July 28, key days in the revision of the program and in the signing of the addendum, I did see a letter from the State Department which took issue with the Army's proposed draft and the letter from State indicated that it would make very difficult the achievement of any standardization with the Germans. In fact, as the Secretary of Defense has pointed out, we seemed to be drifting apart instead of coming together.

Senator BARTLETT. Was that this letter?

Mr. AUGUSTINE. Yes, this is the letter from State to Defense that I saw about a month ago.

Senator BARTLETT. You did not see that right after this letter was transmitted?

Mr. AUGUSTINE. I was not aware of any correspondence between State and Defense until just recently.

Senator BARTLETT. Does it appear to you that the change of views—it appears to me at the last minute the change that took place in the Defense Department resulted from this point of view expressed by the State Department.

Mr. AUGUSTINE. It is consistent with that point of view although I did not detect anything that would suggest that the State Department influence was driving at all.

Senator BARTLETT. But it is consistent with it?

Mr. AUGUSTINE. Basically consistent.

Senator BARTLETT. Did that point of view come from any other Department?

Mr. AUGUSTINE. Well, the Department of Defense itself put, as I say, a major premium on standardization and I think shared the views that are expressed in the State letter of its own account.

Senator BARTLETT. I thought this next sentence in the proposed draft prepared by the Department of Army was rather interesting. It said the following, citing the high level of standardization that hopefully would be achieved with a 105-mm after the M-47 and M-48 were changed over to it.

It reads as follows:

The reassessment also highlighted that although a penalty is paid for staying with the 105-mm now and later converting to a larger gun, there is also a considerable penalty paid in moving to a later gun and later finding out that it is not required.

Mr. AUGUSTINE. Absolutely.

Senator BARTLETT. That is the situation, is it not, as you look at it today, just as it was on June 30?

Mr. AUGUSTINE. The penalty is just the way it is described there. Whether or not that penalty is paid, of course, depends on the evolution of the threat. If the threat doesn't get worse, you can get by with the 105-mm. If it does, you wish you had the 120-mm.

Senator BARTLETT. This letter talks about the threat analysis. Is there an agreement on the threat analysis or is there disagreement?

Mr. AUGUSTINE. Between the Germans and the United States or States or between OSD and Army?

Senator BARTLETT. Both.

Mr. AUGUSTINE. I would say that the Germans have quite a different view of the threat than does our Army. In particular, they feel that fighting will be at longer ranges against a tank with a large gun and against a tank with heavier armor, harder armor to defeat than our view has been.

The OSD and the Army, I think, are in general agreement. We both use the DIA's data so there is no reason for any difference of opinion with respect to the threat.

Senator BARTLETT. Are you expressing Army views, those pretty much of General DePuy?

Mr. AUGUSTINE. Let's see. Whether there is a difference of opinion with regard to OSD and Army on the threat, I can't speak for General DePuy, but I am not aware of any disagreement on the threat.

Senator BARTLETT. But between the Germans and the United States, General DePuy would be expressing a difference there, or are you just expressing a broader Army point of view?

Mr. AUGUSTINE. Well, I think that it is a general Army view that the threat that forces you to leave the 105-mm is yet in the future.

The Germans, on the other hand, like the British and the French, seem to feel that it is upon us today, so there is a legitimate difference of opinion, I guess.

Senator BARTLETT. This letter goes on and says:

In view of the above and the demonstrated performance of the 105-mm gun system, I believe it would be premature to move away from that system at this time.

I have, therefore, directed the U.S. Army to continue with their plans for use of the 105-mm gun on the initial production of the XM-1 and would hope that you might also consider a similar course of action with reference to the Leopard 2.

Has the Army position changed from that position and the one expressed earlier on the value of staying with the 105-mm for the interest of standardization as well as others?

Mr. AUGUSTINE. The initial tanks we would produce under the current agreement would still be 105-mm, but we would transition to the 120-mm in the relatively near term future a couple of years into production.

I think the Army position continues to be that against the near and midterm threat, the 105-mm is adequate from a standpoint purely of penetrating the enemy's armor. From the broader standpoint of promoting future standardization with the NATO countries, almost without exception for the argument has been made that as we stay with the 105-mm and our allies move to the 120-mm, we actually wind up with less standardization than we have today if we don't also adopt the 120-mm.

Senator BARTLETT. Well, if these views have stayed the same with the Army, then the Army would be in disagreement with the actions that are now being followed. Is that correct or wrong?

Mr. AUGUSTINE. Senator Bartlett, the answer is that you have to really take into consideration the set of objectives that one is trying to accomplish. From the pure standpoint of meeting the threat, I think it is true that the Army believes in the short and the midterm, that we can meet the threat with the 105-mm gun. We still feel that way.

In the longer term, we have always said we may well have to go to the 120-mm in the interest of standardization which, of course, has a significant payoff in its own right.

The 120-mm is a sensible thing to do, I can't argue that it is not sensible. On the other hand, just to meet the threat, I don't think it is required in the near and midterm.

Senator BARTLETT. But isn't it possible to have the 120-mm without delaying the selection of the winner in the U.S. competition. So, that is not a matter for consideration necessarily, is it?

Mr. AUGUSTINE. That is right. You could go to the 120-mm without delaying the winner and the argument in favor of delaying the selection, as I mentioned, was to be able to negotiate with two competitors at the time you do the redesign so that you don't wind up with a bunch of large change orders and a contractor with his cost getting out of control. It was a business judgment.

Senator BARTLETT. I think it is obvious what the Army position was in not wanting the delay and in wanting to stay with the 105-mm, following the parallel track with the 120-mm.

Mr. AUGUSTINE. The Army position before July was basically that.

Senator BARTLETT. Now, has the Army position changed? I realize it changes to coincide with the Defense Department situation. But, has the Army's position changed?

I don't see how it could have changed, if you state it has, because you haven't decided that the 120-mm is a better gun. You have not decided that it is going to provide standardization.

Mr. AUGUSTINE. Within the set of perspectives the Army had prior to the middle of July, our position has not changed. Obviously,

our position today on whether we want a 120-mm or 105-mm has changed.

When one takes in the broader perspective of standardization as being a major objective, then clearly our position has changed and we went from the 105-mm to the 120-mm to support standardization.

Senator BARTLETT. Did your position change or the Defense Department position override the Army's? I am asking you—has your position actually changed?

Mr. AUGUSTINE. Well, the Army's—

Senator BARTLETT. Just to correlate with the Defense Department's view or has it changed because it believes that the Defense Department is right?

Mr. AUGUSTINE. I cannot answer it quite that simply. The Army does not have standardization as one of its major driving objectives.

Senator BARTLETT. I don't see how you can say that when you wrote this letter on June 3 saying that the 105-mm would provide much more standardization—stressing standardization for the Secretary of Defense to write the Minister of Defense of Germany.

Mr. AUGUSTINE. That was because the subject of the Leber letter to which this responds was standardization.

Senator BARTLETT. It gave a very strong argument, so obviously the Army was not oblivious to it.

Mr. AUGUSTINE. I stand behind those arguments. I, today, believe those arguments—I am just saying they were broader considerations.

The Army is a part of the Defense Department and when those broader considerations are applied, of course, we support them.

Senator BARTLETT. Would you disagree with me and say I am wrong when I say that the broader considerations apparently came as a result of inputs and letters from the State Department?

Mr. AUGUSTINE. I really don't have any basis to judge that. I would not have sensed that at all, and the only input I know of is this letter that we have talked about, but I really don't think I am in a position to know.

Senator BARTLETT. You would not be in a position to say that I am wrong? I asked you if I am wrong. You would be in no position to say I am wrong?

Mr. AUGUSTINE. I couldn't address it one way or the other.

Senator BARTLETT. Couldn't you address it from the letter? Let me ask you to read it carefully once again.

Start right off with the first sentence and a few of those choice words. If it doesn't emphasize the broader point of view, then I would like to know what it does.

Mr. AUGUSTINE. There is no question but that this is a broader point of view. It emphasizes the importance of standardization within NATO and it is consistent, I think, with the view OSD has held all along.

Senator BARTLETT. Am I not correct that it expresses political viewpoints, particularly in that first sentence or second sentence?

Mr. AUGUSTINE. Political in the sense that it affects the important policies; yes.

Senator BARTLETT. Foreign political policy.

I have a number of questions to submit for the record.

[Questions submitted by Senator Bartlett, answers supplied by Norman R. Augustine, Under Secretary of the Army.]

QUESTIONS SUBMITTED BY SENATOR BARTLETT

Question. Why does the Army believe that it would take so long to test and evaluate the German 120mm gun system?

Answer. The German Government unfortunately does not have a large quantity of ammunition available for test. They have promised us 105-mm rounds of 120-mm ammunition in the near time frame. They have told us that the leadtime for additional ammunition will be approximately 12 months. Adding to this leadtime, the time required to carry out a comprehensive test program in the United States at U.S. proving grounds, we get to early 1978.

Question. How much will it cost for the development and procurement of guns and ammunition to meet requirements for all XM-1 tanks?

Answer.

	[Fiscal year 1976 dollars]	<i>Millions</i>
Gun/ammunition development total cost.....		\$48.2
Gun/ammunition procurement total cost ¹		693.2

¹ Does not include spares or provisions for retrofit of 105-mm gun.

Question. Did the Army try caseless ammunition in the previous MBT-70/XM-803 tanks?

Answer. Yes, combustible case ammunition was used in the MBT-70/XM-803 tanks. The ammunition was never completely tested but a problem associated with burning residue in the combustion chamber surfaced early in the program. This forced the adoption of a bore scavenger system which added complexity and cost to the vehicle. As previously stated, the United States, United Kingdom, and Federal Republic of Germany have agreed that the existence of unsafe (burning) residue is unacceptable, as is the incorporation of a bore scavenger system to eliminate residue.

Question. Does the Army believe that the XM-1 tank can incorporate a scavenger type system as required in the M-551 tank for the caseless ammunition?

Answer. The technical feasibility of a scavenger type system has not been proven since the United States, United Kingdom, and Federal Republic of Germany have already agreed that a scavenger system is not acceptable.

Question. Have the Germans and the British achieved full success with the use of caseless ammunition?

Answer. Neither the Germans nor the British have at this time fielded a system using ammunition with a rigid combustible case.

Question. Is the 120-mm gun and improved ammunition any more effective than the 105-mm gun and improved ammunition at 1,500 meters? 2,000 meters? 3,000 meters?

Answer. The probability of kill per each round fired is slightly higher for the 105-mm gun and ammunition system than for the 120-mm gun and ammunition system at the ranges specified.

Question. What is the percent of targets that are expected to be engaged over 2,000 meters in a NATO environment?

Answer. Approximately [deleted] of armored targets are expected to be engaged at over 2,000 meters.

Question. How much additional cost, therefore, are we paying per target kill over 2,000 meters for the use of this additional 120-mm gun capability? This delta cost should have been considered in any cost effectiveness studies of the 120-mm gun?

Answer. The added hardware cost associated with placing a 120-mm gun of the current German design on XM-1 is \$33,000 per vehicle.

Within the context of a battle, cost per kill is dependent on target array, threat, and weighting. Assuming acquisition cost sunk, battle cost revolves about gun efficiency and ammunition cost. For the current threat, T-72, the 105-mm system firing XM735E2 ammunition is superior to the 120-mm system at long ranges (currently estimated on the order of 4 percent, considering all firer target conditions). Ammunition for the 120-mm KE round costs 19 percent more per round. The combination of efficiency and ammunition cost yields a cost per kill advantage to the 105mm system of more than 20 percent for ranges beyond 2,000 meters.

If a threat tank with XM-1 levels of protection is assumed, the 120-mm gun is more efficient (currently estimated on the order of 13 percent considering all firer target conditions). Given ammunition cost, cost per kill favors the 105-mm system by 5 percent. If the XM-774 round replaces the XM735E2, the 105-mm advantage returns to the 20-percent range.

Question. Considering the Army's development plan for a 120-mm gun, how many XM-1 tanks would be produced before the 120-mm gun would be incorporated?

Answer. Between 300 and 600 tanks depending on program slip.

Question. Do the Germans or the U. S. contractors or arsenals have sufficient existing production capacity to produce all of the 120-mm gun requirements when required?

Answer. At the present time the answer is a qualified no. The Germans have a very limited capacity to provide 120-mm guns; if the U.S. Army should decide to go with the 120-mm gun, sufficient U.S. production capacity would be converted to provided adequate quantities of the 120-mm gun while retaining adequate capacity to produce the 105-mm gun.

Question. Does the United States have stronger safety requirements for this ammunition than the Germans?

Answer. Yes. The United States requires two independent actions to occur before a fuse is set, while the Germans use a single-action, two-stage fuse setting mechanism.

Question. How has the Army determined that \$16.5 million in the fiscal year 197T funding can be applied for this reproposal and to keep the contractors going during this period? Is this in testimony before the Congress? Wasn't it intended that this funding would be used for program managers office funding as well as to conduct Leopard 2 testing?

Answer. The issue of the \$16.5 million of fiscal year 197T funding was previously addressed by Secretary Hoffmann in his opening statement before the HASC on August 10, 1976 and the SASC on August 27, 1976.

The breakdown of the fiscal year 197T funds available during the reproposal period and the budgeting of these funds are shown in the following table. Funding for the program manager's office is included in the budget.

XM-1 fiscal year 197T fund status

[Dollars in thousands]

Authorized program.....	\$39, 353
Withheld pending FSED contract award.....	23, 000
Balance fiscal year 197T program available.....	16, 353
Fiscal year 1976 dollars recoupment available.....	472
Total funds available through Nov. 18, 1976.....	16, 825
Current budget through Nov. 18, 1976:	
Leo activities (contract, test, salaries).....	1, 296
Armor (in-house).....	634
PMO (salaries and support).....	1, 319
SSEB.....	350
Contractors (CH & CDE latest negotiations).....	13, 226
Total budgeted amount.....	16, 825

Question. What effect has this standardization effort had on the German contractors?

Answer. The standardization effort has had very little effect on the German contractors. The Leopard 2 test program has been slowed up by approximately 2 months; this is the only known effect. The Germans expect to produce Leopard 2 on the same schedule as existed before the July 28, 1976, addendum was signed.

Question. When these new cost proposals are received will the Defense Department analysts or the Army do the evaluation work?

Answer. The Army will perform the evaluation in accordance with established source selection evaluation procedures.

Question. Is it now planned for the Defense Department analysts to perform cost-effective analyses of this new program, or will the Army analysts perform the cost-effectiveness studies of this new plan?

Answer. The Army will do these studies and the Defense Department will review them.

Question. Does the Army plan to retrofit the M-60 tanks with the turbine engine if it is accepted by the Army?

Answer. The Army is considering putting a more powerful engine in the M-60A1 and M-60A3 tanks but no decision will be made until after the XM-1 engine issue is decided.

Question. Recently the Army and Defense Department had panels of experts review these engine programs. What were their determinations?

Answer. The answer to this question has already been provided in response to Senator Thurmond's question on the same subject.

Question. Do the Germans and the British have a separate agreement currently in being for a completely new tank?

Answer. The Germans and the British have a cooperative program to develop a future main battle tank for FMBT scheduled for fielding in the late 1980's.

Question. What effect would a decision to go with a heavier 120-mm gun have on the Defense Department's program to develop a lighter, higher velocity tank gun of 70-75 millimeters? Will this decision to go with a 120-mm gun cause this program to be defined?

Answer. The decision regarding the selection of a main armament system for the XM-1, either 105-mm or 120-mm, is not expected to impact upon current plans to continue the advanced development work on the light, high-velocity tank guns, or on program definition.

Question. What are the advantages and disadvantages of the turbine versus the diesel engine planned for the XM-1 program? What are the cost differences in each?

Answer. The advantages and disadvantages were provided in response to Senator Thurmond's question. The cost difference is approximately \$38,000 in favor of the diesel engine in 1976 dollars.

Question. Provide for the record a chronology of turbine and diesel engine development including test hours accumulated to date on each.

Answer. The AVCR-1360 diesel engine and the AGT-1500 turbine engine both initiated development programs in the mid-1960's.

The diesel engine development was included in the US/FRG MBT-70 program at 1,475 gross horsepower and in the XM803 program at 1,250 gross horsepower. As a result of this extensive development, the diesel engine accumulated 43,000 test miles and 27,000 test hours prior to the initiation of the XM-1 program.

The turbine engine development was never associated with any vehicle programs prior to the XM-1. As a result, the turbine accumulated 6,400 test miles and 7,000 test hours prior to the XM-1 program.¹

A summary of operation is shown below:

	AGT-1500		AVCR-1360	
	Hours	Miles	Hours	Miles
Prior to XM-1.....	7,000	6,400	27,000	43,000
XM-1.....	2,100	14,250	4,500	15,000
Total.....	9,100	20,650	31,500	58,000

Question. What additional tooling will be required for these standardization items if they are in metric standards?

Answer. Standardization items are interpreted to mean those components currently identified in the amended RFP. They include metric fasteners, Federal Republic of Germany gunner's auxiliary telescope, hybrid turret, turbine engine and 120-mm gun. Generally, tooling cost will be approximately the same whether an item is produced to inch or metric dimensions.

Question. How much money has the Defense Department ascertained could be saved each year through standardization efforts with NATO countries?

Answer. The Department of Defense report to the Congress in January 1976 reflects that lack of standardization costs the NATO alliance several billion dollars each year.

Question. When was the most recent study completed by the Defense Department that would demonstrate potential savings through standardization?

Answer. In 1975, the Department of Defense conducted a study of the economic costs of nonstandardization within NATO. The results of that study were pre-

¹ The test hours do not include time spent in accumulating the test miles. Test miles were accumulated at the rate of approximately 10 miles per hour.

sented to Congress in the Secretary of Defense's report of April 1975 on rationalization/standardization within NATO. In addition, several other studies on this subject have been conducted for the Department of Defense, the most recent being a study of NATO standardization and licensing policy, conducted by General Research Corp. and completed this month.

Question. What are the major programs that are in the fiscal year 1977 budget that are included in the Defense Department study on savings from standardization?

Answer. Secretary Rumsfeld's January 1976 report to the Congress on rationalization/standardization within NATO lists 28 systems which are being considered for standardization, including the main battle tank, tank main armament, ROLAND, AWACS, and the F-16 fighter aircraft.

Question. Are there any studies that specifically identify by program or projects of all of the NATO countries where savings would be implemented, or are the studies on standardization theoretical discussions without any relationship to the real world?

Answer. The studies conducted by the Department of Defense during 1975 and presented to the Congress in April 1975 address specific programs and projects. While the estimates in that study were very rough and no precise formula to determine savings was found, estimated savings were based on real world assumptions.

Question. What percent of all the tanks projected to be in NATO through 1995 will have the 105-mm gun as compared to a newer gun?

Answer. The answer to this question including a variety of options relative to the 120-mm gun was previously provided to this committee in response to a similar question from Senator Taft on August 27, 1976.

Question. Do the Germans still have a considerable number of M-48 tanks with a 90-mm gun and gasoline engine? Have the Germans announced plans to convert these tanks to the 120-mm gun and turbine engine?

Answer. The Germans have over [deleted] M-48A1 tanks. We know of no plans to convert the 90-mm gun to 120-mm or the gas engine to the turbine engine. They have, however, expressed interest in purchasing 105-mm gun kits for over half of the M-48A1 tanks in their inventory—a gun conversion similar to what we have done in the M-48A5 program.

Question. What will be the effect on standardization of tank gun ammunition if either the Germans, British, or the United States don't all agree on the particular type of 120-mm gun—smooth bore or rifled?

Answer. There will be a proliferation of ammunition types and standardization will not be enhanced.

Question. How will our efforts on standardization help us in the machinegun area if an XM-1 tank is in a combat area with only the German Leopard 2 tanks?

Answer. Through previous efforts at standardization, machinegun ammunition is now standardized in the 7.62-mm caliber. The interchangeability of ammunition for the machinegun would be greatest benefit under the conditions you described.

Question. Have the Germans, British, and the United States made any effort to standardize the fighter aircraft when some countries select the F-16 and the Germans, British, and Italians are selecting the Tornado Multi-Role-Combat Aircraft?

Answer. The fact that the Germans, British, and Italians are selecting the Tornado MRCA is a manifestation of the standardization effort. When national requirements are similar, standardization efforts are ongoing as has been demonstrated by the United States, United Kingdom, and Federal Republic of Germany in the use of our F-4 aircraft in support of tactical fighter and reconnaissance missions. The F-16 and MRCA aircraft are not designed to perform the same missions in that the F-16 is primarily an air superiority aircraft while the MRCA is a low altitude attack and interdiction aircraft.

Question. What degree of standardization has the U. S. Navy and Air Force achieved in the engine, fire control, and airframes sections of our newest F-16 and F-18 fighter aircraft?

Answer. The Navy and Air Force are exploring a number of possibilities to provide standardization between the F-16 and F-18 aircraft. As an example, commonality is planned for short range air-to-surface munitions, the munition suspension equipment, short range air-to-air missiles, and missile launchers. Also, the F-16 has the Tri-service standard 1553 multiplex data bus and standardized microprocessors are used wherever possible within the avionics equipment. A joint Air Force/Navy internal electronic countermeasures system is also being evaluated for use with the F-16. Since both the F-16 and F-18 are still in various

stages of research and development, final aircraft configuration is not yet fully defined; however, the services fully realize the advantages of equipment standardization and are maintaining a continuing effort to achieve commonality wherever possible.

Question. The agreement stipulates that the United States will immediately initiate development of a turret design for the XM-1 which is compatible with both the 105-mm and the smooth bore and rifled bore 120-mm guns. Which of the British 120-mm guns is turret design to incorporate? Is the present British 120-mm gun and ammunition of the configuration that the Army would desire for transfusion into the XM-1 tank?

Answer. The United Kingdom is proposing and has certified as a candidate for the XM-1 a new 120-mm rifled bore, high pressure, high velocity weapon which is designated as the M-13a. This weapon is based on current technology to meet the threat of the future, is consistent with the XM-1 design, is similar in design to the Federal Republic of Germany's 120-mm gun and, therefore, should permit a turret design that is compatible with the 105-mm weapon and either the Federal Republic of Germany's 120-mm smooth bore or the United Kingdom 120-mm rifled bore.

The present United Kingdom weapon, which is designated as the L11 (Chieftain) was conceived 18 years ago and was fielded approximately 10 years ago. The weapon is a low pressure, low velocity system and is not consistent with the XM-1 design. Utilization of this weapon will adversely affect survivability, stabilization error and rate of fire. It is characterized by a long tube and separate loading ammo which will in all probability result in a turret design that is very different for the Federal Republic of Germany's 120-mm, or else a massive counterweight to balance the weapon system. The Army would oppose the transfusion of the L11 into the XM-1 tank.

Question. Have the Germans delivered any technical data at this time for the installation design of the 120-mm smooth bore gun in the XM-1 tank? What is the Army's present assessment of the completeness and adequacy of the technical data required to be received under the agreement for the installation of the 120-mm smooth bore gun in the XM-1 tank?

Answer. Yes. The Germans have delivered technical data at this time for the installation design of the 120-mm smooth bore gun in the XM-1 tank.

The data provided are adequate for this phase of the design effort.

Question. The addendum to the agreement for standardization with the Germans also indicates that other standard items will be selected (including track and possibly fire control system hardware) as a result of the testing of the Leopard 2 at Aberdeen during 1976.

(a) If the purpose of this action to stop the program at this time was to have competition and the U.S. contractor proposals are to be submitted prior to completion of the test and evaluation of the Leopard 2 tank, how does the Department of Defense expect to get competition between the U.S. tank competitors for items that have not been selected?

(b) Are these other possible items for standardization estimated in the projected additional cost for the XM-1 tank program?

Answer. The purpose of the delay is to give the competitors time to consider the possibilities for commonality pointed out in the addendum to the MOU, and provide cost estimates based on those options. Therefore, the cost of the options selected as a result of the evaluation of the Leopard 2 will have been determined in a competitive environment prior to the actual selection of those options. Components selected for standardization after source selection which were not included in the amended request for proposal will have to be negotiated with the winning contractor.

The cost of the fire control system hardware or other items that may be selected for standardization as a result of the evaluation of the Leopard 2 are not included in the projected additional cost for the XM-1 program.

Question. Is it correct that the selection of the 105-mm gun for the German, British, and United States tank programs would have achieved a significantly higher degree of standardization (nearly twice as much) in tank ammunition as the selection of the 120-mm system?

Answer. Yes, the statement is correct.

Question. Do the Germans have the 120-mm gun installed in their Leopard 1 tank?

Answer. No, nor do we know of any intention of the German Government to put 120-mm guns on Leopard 1.

Question. Have the Germans even made a decision yet to produce the Leopard 2 tank and with the 120-mm gun?

Answer. I can't speak for the German Parliament but the German Ministry of Defense is fully committed to producing the Leopard 2 tank and with the 120-mm gun. The formal German Government decision to terminate development and enter preproduction engineering is scheduled for March 1977.

Question. Have the Germans or British any present plans to incorporate in their new tank the MAG-58 machinegun that the United States is planning for the XM-1 tank?

Answer. No. The Germans have no present plans, to our knowledge, to incorporate the MAG-58 machinegun. They plan to use the standard German MG-3 machinegun in Leopard 2. The British use a United Kingdom-produced version of the MAG-58 in the Chieftain tank. The British plan no new tank until the Anglo-German FMBT scheduled for [deleted]. This tank is at too early a stage for a decision on complementary weapon usage.

Question. Does the Army have a preference for a smooth bore or a rifled bore gun? Provide for the record the detail of the advantages and disadvantages of each type of weapon in a 120-mm configuration?

Answer. The Army prefers a rifled bore system, based primarily upon its greater flexibility in being able to fire a greater variety of munitions.

The advantages and disadvantages of each type of weapon were provided in response to Senator Thurmond's questions.

Question. Has the Army evaluated to any degree the German 120-mm gun and ammunition including product improvements? What are the Army's preliminary assessments of these two weapons?

Answer. Yes. Both United Kingdom and Federal Republic of Germany developmental materiel, including product improvement now being developed for the British system, have been evaluated to some degree by the Army, primarily as part of the Tripartite Tank main armament evaluation program. Considerably more information would be required for a decision between the concepts. However, the Army's assessments have indicated that either the new British system with M-13A gun or the German system would, when fully developed, in all probability will be suitable for XM-1 should threat growth require a larger gun. The Army does have reservations regarding the combustible cartridge cases used in both systems and the adequacy of stowed load. The Army believes that both the United Kingdom royal ordnance factories and the German contractor Rheinmetall make excellent hardware, and its preference for the British approach is primarily based on its use of the rifled bore.

Question. Is the German 120-mm gun system and ammunition ready to go into production?

Answer. The German 120-mm gun system and ammunition are not "ready to go into production" as the United States generally defines the term. Both the gun and the ammunition are scheduled to complete development in March 1977, at which time the gun and ammunition will enter into preproduction engineering. First production rollofs of the gun are scheduled for spring 1979, with the two types of ammunition which the Germans are developing to follow in late summer 1979.

Question. In the Army's opinion when would be the earliest that the Army could be assured that the German 120-mm smooth bore gun system and ammunition is ready for production and installation in the XM-1 tank?

Answer. Based on the leadtime requirements that the German Government has given us for ordering new ammunition for U.S. tests, the Army probably could not have this assurance until sometime in early 1978.

Question. What are the U.S. unique requirements for a 120-mm gun system?

Answer. The so-called unique requirements to be specified by the United States are currently being formulated by the U.S. user, developer, and tester. A complete definitized list is not yet available because we do not have enough data to insure that our list is all inclusive. Also, we have to translate generalized U.S.-user requirements into testable specifications which the German Government can place upon its contractor. The following tentative listing, which is not considered all inclusive, indicates the type of questions which must be resolved prior to the Army's adoption of a foreign-designed 120-mm system.

Testing under adverse environmental conditions (high temperature combined with high humidity) will be required to insure that combustible cases have adequate moisture resistance and do not produce dangerous smouldering residue.

Rounds must be shown to be safe to fire at 145° F.

The amount and detail of technical documentation which is adequate for Federal Republic of Germany and United Kingdom purposes is not necessarily adequate for the United States, which must be able to compete procurement. Hence, the provision of substantial data and know-how over and above that normally prepared for the developing country's own use will probably be necessary.

The U.S. user requires as a minimum a kinetic energy antiarmor round, a chemical energy multipurpose round, and training rounds for each. Desirable, but less critical, is an antipersonnel capability greater than that exhibited by the FRG 120-mm multipurpose round to date. Neither country's system currently includes the required training rounds. It is anticipated that the requirement for training rounds, as well as for any other capabilities (e.g., BEEHIVE, smoke) which the U.S. user may desire, will have to be met by a U.S. developmental effort.

The U.S. user has stated that, with a 120-mm system, the 55-65 round stowed load requirement for XM-1 remains in effect. The goal as stated by the user is: "maximum survivability with at least the specified minimum number of readily accessible rounds." The feasibility of meeting this requirement must be addressed by the U.S. tank system developer.

Question. Is this 120-mm gun ammunition the same type of caseless ammunition that we have had problems with in the past?

Answer. Yes. The Federal Republic of Germany cartridge case material is based on a U.S. patent; therefore, it is expected that its susceptibility to water/humidity could be similar to that experienced by the United States in the M-551 and M-60A2 programs.

Improvements have been made, however, in the new U.S. M-205E1 (high density) combustible case ammunition. Aside from the addition of a metallic stub case, the extent of any improvements in Federal Republic of Germany combustible case ammunition is unknown.

Question. What are the problems with the caseless ammunition?

Answer. The major problems associated with combustible case ammunition are its susceptibility to water/humidity, fragility and the possibility of leaving unsafe (burning) residue in the chamber of the cannon.

Question. Does the effectiveness of a 120-mm gun at longer ranges depend heavily on the fire-control system?

Answer. No more so than for the 105-mm gun.

Question. Does the United States have an effective tank fire-control system for use beyond 3,000 meters?

Answer. The United States has the technical capability to field such a system, but it is not required. Analyses such as the NATO range study, confirmed by our combat experience and that of others, show that 3,000 meters is the practical limit required for direct-firing tank-mounted guns.

Question. Earlier this year the Army testified that it was more cost effective to proceed with a parallel development program with the 120-mm gun rather than stopping the program at this time. Has the Army changed its position on this earlier testimony? Is it still more cost effective to have a parallel program for development of the 120-mm gun with the present XM-1 plan rather than stopping the program to allow initial XM-1 production with a 120-mm gun?

Answer. No, the initial production of the XM-1 tank will still incorporate the 105-mm gun system.

Yes, it is still more cost effective since the 120-mm gun system will not be available until March 1982.

Question. Does the Army believe that the German 120-mm gun is ready to commit to this XM-1 program at this time or by January 15, 1977? Does the Army now, or will the Army by January 15, 1977, have sufficient data to make a decision to commit the XM-1 program to a 120-mm gun system?

Answer. No. The Army does not believe on the basis of the currently available evidence that the German 120-mm gun is optimal for XM-1. The Army will acquire between now and January 15, 1977 as much data on the German system as can be obtained with the very limited hardware available.

Question. Have the Germans expressed officially or unofficially any opinion of acceptance of the British 120-mm gun for their tank? Have the British expressed any opinion of acceptance of the German 120-mm gun for their tank?

Answer. Yes. Officially, each country has expressed a willingness to accept a system developed by the other country. Unofficially, officials in both countries have expressed reservations.

Question. The addendum to the agreement with Germany states that the United States will be required to select a 120-mm gun configuration by the same date

they must submit unique requirements to Germany. Is this a reasonable coincidence of dates, and does the Army have any recourse to first ascertain if these unique requirements can be met?

Answer. No. The date of January 15, 1977 will permit Germany to make a final decision on components for the Leopard 2 tank system, to include the gun, by March 1977 and, thereafter, to enter into preproduction engineering. The Army estimated during the negotiations that up to 6 months might be needed to acquire sufficient information and test data to fully define the requirement which the United States would have to specify for the German gun. This was the basis for the January 15 date for the unique requirements. The Army simply does not know enough today about the German system to provide a list with full confidence that it would be all inclusive. Even if the Army had already finalized its listing, it would have no recourse under the MOU to determine prior to January 15 whether its unique requirements can be met. Such determination will require substantial testing, and, given the 12-month leadtime which Germany has informed us will be required for new rounds, could not be made until early 1978 at the earliest.

Question. What effect on the weight of the XM-1 tank will this 120-mm gun system have? Is the weight of this tank a critical feature in performance?

Answer. The use of a 120-mm gun will increase the weight of the XM-1 tank by approximately 2 tons. The weight of the tank at its current value or projected value for the 120-mm gun system does not vary enough to significantly impact XM-1 automotive performance.

Question. Does the Army believe that the projected degradation of performance caused by this 120-mm gun system is significant? In what areas of degradation in performance and capability is the Army concerned?

Answer. The projected degradation of mobility performance is not considered significant. There are no areas of mobility degradation that the Army feels are significant enough to raise concern. Firepower degradation is not significant although hit probability will be slightly lower due to the higher dispersion characteristics of the 120-mm ammunition. Performance, as related to vulnerability, is of concern for two reasons: (1) the silhouette with the 120-mm gun is increased and (2) the potential of providing additional armor protection within a 60-ton-weight ceiling is essentially eliminated.

Question. We have been advised that a delay of 4 months will be incurred from this new request for proposal. The proposal itself grants a further delay of 6 months in the development schedule. What other delays can be expected in this program, and what is the total program delay if this new plan is followed?

Answer. You have been advised correctly that the resolicitation process will require a 4-month delay and that the proposal allows for an additional 6 months in the full-scale engineering development phase.

While no other delays are expected, the total delay will depend on which options are selected for incorporation in the XM-1.

Question. Has the Army imposed a new design-to-cost figure for the "standardized" tank? If so, what is the new procurement unit cost that would compare to the original design-to-cost figure of \$507,000?

Answer. No. Such a cost ceiling which would be imposed on the Army by OSD has not been established. However, the Army estimates that the \$507,000 figure adjusted for standardization items could be as high as \$548,000.

Question. How can the Army expect to get a fair presentation and have a full evaluation of a major new turret design in a 2-4 month period when the Army previously took 3 years to develop and test prototype tanks and turrets for evaluation?

Answer. Each of the competing contractors has been exposed to the problem of a major turret redesign. First, as part of the tripartite study, each contractor prepared a study delineating the problem areas and design impacts associated with the installation of a United Kingdom 110-mm gun and the present Federal Republic of Germany 120 smoothbore. The time frame for these studies was June 1974 through January 1975.

A second study was completed by both contractors in June 1976 which addressed the impacts of installing only the Federal Republic of Germany 120-mm weapons system into the present 105-mm turret. This concept is now referred to as a "hybrid" turret and we believe the design impacts are well understood.

Obviously the evaluation process must be made on a "paper tank" and the evaluation cannot be as extensive or complete as evaluating the actual hardware in a test environment. The technical engineering staff of the source selection evaluation board (SSEB), however, will have access to a full-scale engineering

wood mockup of the turret designs which coupled with the contractor's technical data—engineering drawings, weight analyses, computer system studies, et cetera—should provide sufficient information to prepare a reasonable assessment of the adequacy of the proposals.

Question. Isn't the physical application of the new armor on the turret of major importance in the development of the tank? Would this new hybrid turret require a complete new application of this armor? Will the Army under this new paper proposal be able to fully evaluate the best application of this armor by the contractor without reviewing the actual physical application such as a prototype?

Answer. Although the physical application of the new armor on the turret is of major importance, preliminary indications are that a new hybrid turret would not necessitate a complete redesign of the armor. The protection afforded by the proposed new configurations could, therefore, be evaluated without resorting to prototype hardware.

Question. How valid do you expect the contractor's proposal would be for a new turbine engine installation if the contractor is given only 3 months to consider this problem when another contractor has been working with the engine for 3 years? Will this, in any way, penalize either of the competing contractors?

Answer. The turbine power package—engine and transmission—is identical for both contractors and, therefore, the 3 year history is available to both contractors. The design and installation of the associated components, such as, air cleaners, cooling system, fuel system, hydraulic power supply, and electrical system will have to be conceived by General Motors in 3 months to match vehicle design. This results in a paper concept for the turbine engine installation for GM and a second generation hardware design for Chrysler. However, early in the validation phase GM studied the feasibility of installing the turbine power package and made provisions in the engine compartment to accommodate this package in the event the Army elects to technically transfuse it. To verify the paper concept, GM will now have to modify and test the validation phase vehicles to demonstrate the concept prior to fabrication and assembly of the full-scale engineering development pilot vehicles. This additional effort may result in increased cost and time for the FSED phase which is not required by Chrysler contractor. The contractor's extensive experience with turbine engines for aircraft plus current developmental efforts on truck and bus turbine engine installations indicate a significant level of expertise in this area. Because cost, schedule, and technical risks associated with paper concepts are factors in the source selection process, it is expected that the contractor, knowing this, will make every effort to submit a viable and convincing proposal. Whether or not the paper concept on application of the turbine will penalize either of the contractors cannot be prejudged. A similar situation exists for the turbine engine contractor in his diesel engine application for evaluation. This would also be based on a paper concept.

Question. How many of these Leopard 2 tanks do the Germans now plan to produce for their Army? Will the Germans have as many tanks in NATO with 120-mm guns as the United States when the programs are completed?

Answer. The Germans currently plan to produce [deleted] Leopard 2's for their army, as compared with 3,312 XM-1's.

Question. What degree of standardization will we achieve in NATO in the 1995 time period if we select a British 120-mm gun?

Answer. Considering only United States, United Kingdom and Federal Republic of Germany future tank fleets, if the United States and the United Kingdom use the British 120-mm rifled gun and the Federal Republic of Germany continue with their 120-mm smoothbore gun, we would expect to achieve 26 percent standardization in 120-mm rifled ammunition.

Question. What percent of standardization of tank main gun ammunition will we achieve in NATO in the 1995 time period if we select a German 120-mm gun?

Answer. Considering only United States, United Kingdom and Federal Republic of Germany future tank fleets, if the United States and the Federal Republic of Germany use the German 120-mm smoothbore gun and the British elect to continue with their 120-mm rifled gun, we would expect to achieve approximately 43 percent standardization of ammunition.

Question. Is it correct that the United States will have more tanks with the 105-mm gun in their inventory through 1995 than they will have tanks with the 120-mm gun?

Answer. Yes. This will be true regardless of the decision on the 120-mm gun.

Question. Deputy Secretary of Defense Clements testified earlier at the House Armed Services Committee hearing that it was the considered judgment of his

office as well as D.D.R. & E., Dr. Currie, and his associates, and the installation and logistic department, as well as the comptroller, and the general counsel, all of whom participated in this decision, that we could well save over a billion dollars by going through this process to the cost of the program.

Secretary Hoffmann also testified at this same hearing (August 10, 1976) that he had made a recommendation to the Secretary of Defense that the Army proceed to accept one of the two bids submitted by the competing XM-1 contractors. In other words selection of a winning U.S. competitor. Since this plan had been previously discussed in the Defense Department, and since earlier this year the Army had testified that it was more cost effective to continue the XM-1 program as planned rather than defer the program to accommodate a tank with capability to accept a 120-mm gun, how is this billion dollar savings computed?

Secretary Hoffmann, why would you recommend an alternate program to the Secretary of Defense in view of the testimony that a billion dollars could be saved from this new XM-1 program plan? Was the Army able to arrive at the same billion dollar savings in their analysis of the program as it related to these standardization efforts?

Answer. Senator Bartlett, these same questions were addressed in direct testimony before this committee on August 27, 1976. I have nothing further to add to that testimony.

Question. Does the United States plan to manufacture all of the XM-1 tank and components domestically?

Answer. The Army intends to produce all components for the XM-1 tank domestically.

Question. The introduction to the addendum of the memorandum of understanding that was signed by the Secretary of Defense and the German Minister of Defense states that "we hereby direct our departments to undertake implementation of the above mentioned agreements without delay." Does this direction mean that this agreement is firmly binding on the Army and that all of these agreements must be carried out regardless of cost or other effects on the Army's tank program?

Answer. Not necessarily. The agreement stipulated that it "will be implemented within the existing laws and regulations of the two countries" and further that its implementation is to be limited to "all reasonable efforts." This is interpreted to mean that congressional approval and funding are required for implementation.

Question. Does the Army have satisfactory results from the use of caseless ammunition in the M-551 tank?

Answer. The answer to that is a qualified yes. The major problem with our caseless ammunition for the M-551 is the reduction of the hygroscopicity of the combustible case. Our caseless ammunition for the M-551 also requires the use of a scavenger system.

Question. The addendum states that all production models of the XM-1 will incorporate this dual-capable turret.

a. If the United States decides to select a 120-mm gun, why would the XM-1 tank require a dual capable turret for all of its production models?

b. Was there any consideration given in this direction to the potential for foreign sales of the XM-1 with the 105-mm gun?

c. If so, what effect does that have on standardization efforts?

d. From an engineering viewpoint, is it more efficient to build separate 105-mm and 120-mm gun turrets rather than a hybrid turret?

Answer. The application of a 120-mm gun to the XM-1 is possibly 4 to 5 years away if we depend on U.S. production capability. The design work and testing required to prove that system would have to be parallel program to the XM-1 engineering development. Consequently, if the XM-1 production begins with a hybrid turret and 105-mm gun with the application of the 120-mm gun when it is available, the tank program remains on track. Consideration was not given to foreign military sales of the XM-1 with 105-mm gun. However, it should be noted that should the US and FRG jointly agree to adopt the 120-mm gun, the remainder of the free world would be influenced by this decision.

From an engineering standpoint, it is more efficient to build a turret for a specific gun. It is difficult to optimize for both the 105-mm and 120-mm gun configurations without having to accept some penalty for overdesign. Such penalties have implications upon fuel and ammunition storage, overall vehicle weight, and armor configuration.

Question. The addendum to the German agreement states that the United States will, and I emphasize will, initiate production of the 120-mm gun and

ammunition at such time as it meets requirements of being ready for production and is certified as such by the developing nation including all specified unique U.S. requirements.

a. Again, I ask how binding is this statement on the Army?

b. The agreement does not make any reference to or assumption of the Army being able to refute the certification for any reason. Where it is implied by this agreement or any other agreement that the Army does not have to comply with this agreement if (1) the technology is not believed to be in hand, (2) the test data is not satisfactory, or (3) the cost of this is in excess of the Army's goals?

Answer. The agreement can only be implemented within the existing laws and regulations of the two countries; it is subject to congressional processes. The specific and unique requirements have been outlined to the Federal Republic of Germany concerning items which will be type classified by them as the developer. These requirements are monitored by program manager personnel who are working with the Federal Republic of Germany manufacturers. The Federal Republic of Germany provides drawings and technical specifications which will provide the basis for the item to be licensed and manufactured in the United States; evidence of insufficient technology, unsatisfactory test data can easily be confirmed or denied during the workup processes. As in every aspect of the agreement, the control of costs assumes that the program will be funded by the Congress.

Question. Another agreement with the British that was made prior to the German addendum indicates that the United States must notify the British of an acceptance of their product improved 120-mm rifled bore gun by March 31, 1977.

a. Since this agreement was before the German agreement, was it originally anticipated that no gun selection would be made until March 31, 1977?

b. Was the earlier date of January 15, 1977, in the German agreement an attempt to circumvent the earlier British agreement?

c. Does the agreement with the Germans to select a gun configuration by January 15, 1977, essentially nullify any agreement with the British for a product improved 120-mm gun and ammunition?

Answer. The Letter of Understanding describes March 31, 1977 as the date by which the United States must notify the United Kingdom that the United States would desire to test the product improved 120-mm gun in the United Kingdom in or about October 1977; otherwise, the gun would be available for testing in the United States in or about December 1977. In the construction of the Letter of Understanding, the British thoroughly understood the schedule implications and the urgency for a gun decision. There is no evidence that the January 15, 1977 date in the German agreement was an attempt to circumvent the British; the German's schedule for production of their 120-mm gun dictated, at least in part, the requirement to move ahead with a decision. The agreement with the Germans states that the Federal Republic of Germany, United States, and hopefully the United Kingdom and other NATO nations will agree by January 15 upon a 120-mm configuration—smooth or improved rifled bore—meeting both the XM-1 and Leopard 2 requirements and suitable for introduction into production by March 1977.

Question. Why is a January 15, 1977 date established for selecting a 120-mm gun? What is the significance of that January 15, 1977 date?

Answer. The date does not have any particular significance to the XM-1 program. The FRG has indicated that they must have a gun decision in a very early time frame in order to place the 120-mm gun into 1979 Leopard 2 production planning. If the United States intends to standardize a gun with them, then we are obligated to make our judgments in the same time frame.

Question. The addendum to the agreement with Germany also indicates that there will be a total and complete disclosure of technical data pertaining to the agreed upon common subsystems as well as technical knowhow and manufacturing techniques.

a. Has the Defense Department received complete assurance from the contractors and subcontractors that they would be willing to transfer proprietary data and manufacturing techniques to another manufacturer?

b. If the contractors do not agree to give up their proprietary data or manufacturing techniques, will this agreement be voided?

Answer. The Department of the Army has assurances that contractors will transfer proprietary data and techniques to another manufacturer. In the case of transferring U.S. information to Federal Republic of Germany manufacturers, the U.S. Government owns the greatest portion of the data. Presently, the completion sensitive classification restricts a free exchange; upon entry into

single contractor FSED, information under government control can be exchanged; proprietary data will require negotiation with the holder. In the case of Federal Republic of Germany providing data to the United States, the Federal Republic of Germany does not own the data; however, the Federal Republic of Germany under their law, can compel disclosure to any NATO country under fair and reasonable terms. Contractual obligations between contractors and their respective governments will include provisions requiring its contractors to enter into agreement for and to expeditiously transfer such technical data upon fair and reasonable terms. In the event contractors do not respond in the spirit of the addendum, the wording does not specifically provide for a voiding of the understanding.

Senator BARTLETT. I do have this to put in the record.
[Letter to the Honorable Georg Leber follows.]

THE SECRETARY OF DEFENSE,
Washington, D.C.

HON. GEORG LEBER,
*Minister of Defense,
Ministry of Defense,
Federal Republic of Germany.*

DEAR MINISTER LEBER: Our reassessment of the main armament for the XM1 has now been completed. This consisted of an exhaustive review of the entire record of the Trilateral Evaluation, including the conclusions and recommendations of the Working Group and Steering Group; a review of both the current and the projected threat tanks; and a review of the U.S. Supplemental Study which was previously provided to the BRD and which contains additional analysis of the implications associated with the various gun candidates. I also carefully considered the views as expressed in your letter of 30 April.

During the reassessment, I was impressed by the degree of standardization already achieved within NATO by virtue of the 105-mm gun. Over 45 percent of the NATO tank fleet now has the 105-mm and with the conversion of the M47's and M48's, that figure could approach 90 percent. A decision to move to a different size gun will obviously dilute the degree of standardization we now enjoy and certainly adversely impact on our logistical support. The reassessment also highlighted that although a penalty is paid for staying with the 105-mm now and later converting to a larger gun, there is also a considerable penalty paid in moving to a larger gun and later finding out that it is not required. For those reasons I believe that we must be as certain as possible that our decisions are correct.

The key factor which appears to have greatly influenced the past positions of both our countries on tank main armament is a different assessment of the threat tanks likely to be faced in the late 1980-90 time frame. US intelligence agencies do not postulate at this time the fielding or intended fielding of a new threat tank unable to be defeated by the improved 105-mm ammunition at expected engagement ranges. This seems contrary to the trends mentioned in your letter as guiding the BRD to a larger gun. The situation is further clouded by the fact that the 105-mm kinetic energy round already meets the BRD/UK stated requirement for the FMBT which we assume is envisioned to meet the threat of late 1980-90's. The differences are of considerable concern to me since a departure from the current standard gun has such far reaching consequences for us all. It is for that reason that I suggest a new approach to the problem.

Since there is an obvious difference in threat interpretation and since it is the threat which should drive our future gun selections, I believe we should establish as first priority a group to provide a common agreed upon threat analysis and target definition. This should include a reassessment of the validity of the currently defined NATO target plates in view of the recent advances in armor technology. Against the background of that work, I think we would be in a much better position to judge which gun system would best meet future requirements in a cost effective sense.

The Army has done some preliminary planning for the type of cooperative effort recommended and I have asked Lieutenant General Cooksey, the Army's Deputy Chief of Staff for Research, Development and Acquisition, to discuss our ideas in more detail with your staff and that of the United Kingdom when he visits Europe later this month.

In view of the above and the demonstrated performance of the 105-mm gun system, I believe that it would be premature to move away from that system at

this time. I have, therefore, directed the US Army to continue with their plans for use of the 105-mm gun on the initial production of the XM1 and would hope that you might also consider a similar course of action with reference to the Leopard 2.

I very much appreciate your offer of assistance in our reassessment to include the supply of a 120-mm weapon with ammunition. Although we have considerable data on the system from the Trilateral Evaluation, we would be interested in accepting your offer of a weapon and ammunition in order to do some comparative firings with the 75-mm hypervelocity automatic cannon, the XM150E6 152-mm gun, the further improved 105-mm ammunition and, when available, the UK and French 120-mm system. I have asked General Cooksey to discuss this topic also with your staff.

Sincerely yours,

Senator BARTLETT. Mr. Secretary, I want to thank you very much. I appreciate your contributions to this program and I also want to thank General Baer. I think both of you are greatly responsible for a wonderful program.

I hope you will do everything you can to keep this program on track if it happens to disagree with the Defense Department and the State Department. I think it is very important that the program not slip beyond the 17th of November and I am afraid that once it has slipped beyond that point, then it is sort of out of control. It may be anyway, but I think it is a vital program.

We haven't built a main battle tank in many years, as you all know much better than I do. I guess it gives me an uneasy feeling when this thing is sort of up in the air. I imagine the uneasy feeling I have is small compared to what you both have, because I think that the program has been such a success to a great extent because of the two of you.

So, I will assure you that I will be standing strongly with you or behind you in any efforts that you make to express strong opinions if there are unnecessary delays in your opinion or if there is anything that jeopardizes the program.

I would certainly ask you to stand up and be counted loud and clear regardless of what, because I think the tank is a lot more important than trading with Germany, a lot more important than a lot of other things that are involved in this.

I certainly don't want to stand critical of Germany because I think that without Germany we would not be in NATO. I admire them very much. But I think it is obvious they want to sell tank parts. I think that is fine, as long as the tank parts that we buy from them are the best and as long as the whole process of buying tank parts also, in addition to being the best available, don't result in delays that are injurious to our best interests of a main battle tank.

I thank you both very much.

Mr. AUGUSTINE. Just in closing, Senator Bartlett, we thank you for the opportunity to tell the Army story about the program. We appreciate the support you have always given us during rather difficult times in the past.

Our driving goal at this time is to get the Army the best tank possible. We feel that this is most important and worthy of all of our effort.

We certainly have had ample opportunity to state our case and we will continue to state it, as you have recommended, and we look forward to coming back on the 17th of November with a program that is well on its way to accomplishing these goals.

Senator BARTLETT. Well, I think it is important in the relations between the services and the Defense Department that the various services, including the Army, state their cases even when they are overruled. I think if they disagree, they should say so, obviously point out they are going along and cooperating.

I wouldn't avoid indicating anything but full cooperation with the Defense Department. I think it is understandable that there can be when Defense Department overrides a basic Army decision, a policy of long standing that I wouldn't expect the Army really to change their position.

I realize this puts you in a difficult spot, but nonetheless, I think it is important to stick to your guns, your tank, when you think you are right, and obviously, if you think you are wrong, obviously you should say so.

Mr. AUGUSTINE. I think we all have a common goal now and that is to get the program moving. I believe the Congress shares that objective and that is what we will seek to do.

Senator BARTLETT. One final question. What are the prospects of making the November 17 date?

Mr. AUGUSTINE. Considering those things that are under the control of the Pentagon, I am excluding any difficulties resulting from possible reprogramming action, I think the 17th date is very good.

Senator BARTLETT. Thank you very much.

Mr. AUGUSTINE. Thank you.

[Whereupon, at 12:25 p.m. the committee adjourned to reconvene subject to the call of the Chair.]













