APPENDIX **3**

TESTIMONY FROM THE SENATE HEARING REGARDING THE V-22 OSPREY

THIS IS THE RECORD OF DR. L. DEAN SIMMONS'S and Dr. David Chu's testimony about the strengths and weaknesses of IDA's study and several prominent Senators' reactions to DoD's insistence on canceling the V-22 program. Dr. Simmons led the Institute for Defense Analyses study that we used at the end of many chapters in the text to illustrate the Executive Decision-Making Framework. Dr. Chu, the Director of Program Analysis and Evaluation of the Office of the Secretary of Defense testified after Dr. Simmons. Dr. Chu presented Secretary of Defense Cheney's position that the V-22 was not affordable. He received a heated reaction from several Senators. This is a rare example of two senior analysts placing opposing views on the record. This hearing also underscores the importance of supporting DoD leaders with high-quality rational analysis, captures the essence of the often fiery V-22 debate, and it shows the spirited nature Congressional inquiry can take when major defense programs affect jobs in members' districts.

INSTITUTE FOR DEFENSE ANALYSES STUDY OF
THE V-22 OSPREY
THURSDAY, JULY 19,1990

U.S. SENATE,
SUBCOMMITTEE ON DEFENSE.
COMMITTEE ON APPROPRIATIONS,
Washington, DC.

The subcommittee met at 9 a.m., in room SD-192, Dirksen Senate Office Building, Hon. Daniel K. Inouye (chairman) presiding.

Present: Senators Inouye, Bumpers, Lautenberg, Stevens, Garn, Kasten, D'Amato, Specter, and Gramm.

INSTITUTE FOR DEFENSE ANALYSES

STATEMENT OF DR. L. DEAN SIMMONS, RESEARCH STAFF, SYSTEM EVALUATION DIVISION, INSTITUTE FOR DEFENSE ANALYSES

ACCOMPANIED BY DR. DAVID L. RANDALL, DIRECTOR, SYSTEM EVALUATION DIVISION, INSTITUTE FOR DEFENSE ANALYSES

OPENING REMARKS OF SENATOR INOUYE

Senator INOUYE. The subcommittee meets this morning to discuss the future of Marine Corps aviation during a time of increasing fiscal constraints on defense spending. Today's hearing focuses on the V-22 tilt rotor aircraft, a program which has been killed by the Secretary of Defense but resurrected by Congress.

It is an understatement to say that the Secretary's decision to terminate the V-22 has been controversial. The issues are complex and the decisions Congress will make on the in-vestment or savings amount to billions of dollars. The V-22 proponents say that the aircraft represents a revolutionary technology, a technology with military and civilian aviation bene-fits, which justify the program costs. Opponents suggest that these benefits are not commensurate with the amount of scarce resources the V-22 would divert from the other higher priority defense programs.

The Marine Corps clearly wants the V-22 despite its official position to support the President's budget. The Defense Secretary is just as adamant in his position to terminate the program. So we are holding this hearing this morning to shed some light on both sides of this debate. The witnesses today are the Honorable David Chu, Assistant Secretary of Defense for Program Analysis and Evaluation, and Dr. L. Dean Simmons of the Institute for Defense Analyses. Dr. Simmons was the project leader for an IDA special study entitled "Assessment of Alternatives for the V-22 Assault Aircraft Program." Gentlemen, we look forward to your testimony. After any opening remarks by members of this subcommittee we shall first hear from Dr. Simmons. Dr. Chu will testify after that. Senator Specter.

STATEMENT OF SENATOR SPECTER

Senator SPECTER. Thank you very much Mr. Chairman. To begin with, Mr. Chairman, I thank you for convening this special hearing. I believe it to be necessary as the testimony presented by the military has very forcefully supported the V-22 Osprey. General Gray, head of the Marine Corps, testified as to some of the objections and called them totally ridiculous.

An independent report by the Institute for Defense Analyses has categorically stated that the V-22 Osprey is vastly superior to any alternative, and it is well within the budget constraints. The Department of Defense early opposed the Osprey, and has candidly maintained this position despite an overwhelming case in its favor.

The central point of our inquiry here today is to focus on the facts. What can the Osprey do?

Mr. Chairman, I would suggest that there is a very important subsidiary question in terms of procedures and, really, the good faith of the Department of Defense in terms of opening this process to Congress.

Last year, both houses of Congress mandated an independent study: a study to deter-mine facts. As the process has gone forward, there have been reports of a preliminary conclusion not made available to Congress. There were meetings on April 16 with no congressional participation. There was strong insistence in the Congress on getting access to the re-port which was finally made available under strong pressure by this Senator, talking to Dr. Chu and finally to the Secretary of Defense, on Friday when we left for the Fourth of July recess, which has the unmistakable imprint of trying to delay it as long as possible until 535 Members of Congress have left town.

The central question here is the quality of the plane. I think that there is absolutely no basis for any contention that this is a parochial issue. Obviously, Senators from Pennsylvania and Texas are going to take a special look because our states are so heavily involved, but this is a matter of national defense. The very distinguished chairman of this subcommittee has been very forceful on this issue, and all it can do is fly to Hawaii.

The ranking member of this subcommittee said last year that he would not vote for an appropriations bill that did not contain the V-22 Osprey. Now what is a Pennsylvania Senator supposed to do? Absent himself from these proceedings? This is not a matter of Pennsylvania or Texas or parochialism. This is a matter of national defense. We know that we are now going into an era in which B-2s and long-range missiles are less important. We know we have problems in Panama. We know we have problems in the Persian Gulf. We know we need flexibility.

I reviewed the matter again yesterday afternoon with General Pittman, who originally opposed the V-22. Now he calls it absolutely indispensable. He says we can document that had we had the V-22 in Panama, we would have saved lives. Why save lives? Because the V-22 can land like a helicopter after flying long distances as a fixed-wing plane. You do not have to jump people on parachutes. There is nothing more important than saving lives when we ask our military personnel to take action in the national interest.

If I sound just a little bit perturbed, Mr. Chairman, it is because I am. I think it is really important to have Dr. Chu and Dr. Simmons head to head addressing the facts. All we want are the facts and let the chips fall where they may. I am satisfied after reviewing a 1,200-page report that the facts are overwhelmingly in support of the V-22, and that any fair-minded interpretation or conclusion will support the V-22.

Thank you, Mr. Chairman.

Senator INOUYE. Thank you very much. Senator Specter.

Now, Dr. Simmons.

SYNOPSIS OF STATEMENT

Dr. SIMMONS. Mr. Chairman, members of the committee, I am quite pleased to appear before you this morning in connection with IDA's assessment of alternatives for the V-22 assault aircraft program. The Institute is one of our federally funded research and development centers.

We carry out studies and analyses for the Office of the Secretary of Defense, the Joint Staff, the unified commands, and the Defense Agencies.

ASSESSMENT OF ALTERNATIVES

The V-22 assessment that I will be reporting on this morning was conducted at the request of the Office of the Secretary of Defense, which, as you know, had responsibility for the study that was directed by the Congress last year.

The detailed results of our study have been documented in a five-volume draft report. Copies of that report have been forwarded by the Secretary of Defense to the Senate Appropriations and Armed Services Committees and to the corresponding committees of the House of Representatives. The report is now being reviewed within the Department of Defense by the steering group established for our study, and after consideration of comments that they may provide, IDA will publish a final version of the study.

Later this morning I will be presenting a short briefing of our findings. In my opening statement I would like to discuss two of the key considerations that relate to the cost of the aircraft: the overall cost-effectiveness of the alternative fleets measured over a 20-year period that we used as the principal basis for our conclusions, and the difference in the near-term costs for the alternative fleets.

PROCESS LEADING TO STUDY RESULTS

Before doing that, though, I would like to take a few minutes to describe the process that we used at IDA to arrive at our study results. To conduct a study of this scope, we need access to a considerable amount of information, detailed data related to the performance and costs of the alternative aircraft, descriptions of how our various military forces would employ the aircraft in combat situations, and estimates of the performance of the weapons that might be used against the aircraft by potential wartime enemies.

To obtain this information we met frequently with the three military services that have proposed to use the V-22 Osprey and the assault helicopters: the Marine Corps, the Navy, and the Air Force. We also had frequent and detailed discussions with the contractors that would build the different aircraft Bell, Boeing, and Sikorsky in the United States and Aerospatiale, Augusta, and Westland in Europe. We had numerous discussions with representatives from our intelligence community to obtain information on potential threat systems.

As one might expect, the study has been subject to considerable oversight and review both by IDA and by the Department of Defense. As is the case with every major study conducted at IDA, a review committee was established by IDA to provide guidance and rigorous review of the technical and operational inputs and the analytical methods. The review committee was composed of knowledgeable individuals from outside IDA and appropriate members of IDA's management and research staffs. The committee was chaired by Dr. David Randall, Director of IDA's System Evaluation Division, which is the component of IDA where I work. Dr. Randall has accompanied me today and will be available to help answer any questions that you may have.

STEERING COMMITTEE

The Department of Defense provided guidance and direction to the study through a steering committee that included representatives from a number of OSD staff elements, in particular those responsible for program analysis and evaluation, for overseeing the development and acquisition of tactical combat systems, for tests and evaluation, and for estimating the costs of future military systems.

In addition, the steering committee included representatives from the Joint Staff and the Department of the Navy.

Between the time the study was initiated in September 1989 and April of this year, members of the IDA study team met with the steering committee five times to inform them of our plans and to update them on our progress. The committee, for its part, provided us with additional sources of information, occasionally suggested alternative approaches from the ones we had proposed and identified a wide range of sensitivities to be examined.

The steering committee also asked other Department of Defense agencies to review specific portions of the assessment. The amphibious assault scenarios and concepts of operation were reviewed by the Marine Corps War Fighting Center at Quantico and by the Joint Staff. The specific aircraft configurations used in the assessment and the flight performance projected for those aircraft were reviewed in detail by the appropriate staff elements at the Naval Air Systems Command. The development, procurement, and operating costs estimated for the aircraft were reviewed by other staff sections at the Naval Air Systems Command and by OSD's Cost Analysis Improvement Group.

Our last presentation to the steering committee took place on April 16, when we briefed them on the overall results emerging from our study. At that time, however, we still had some additional analyses to perform, some additional sensitivities suggested by the steering committee, and additional analyses that had been suggested by our own IDA reviewers, and we had not yet completed our written report. Those tasks were accomplished over the next two-months. Following IDA's detailed review, the draft study report was forwarded to OSD in late June and thereafter to the Congress.

COST ISSUES

At this time, I would like to address the two cost issues that I mentioned in the opening. In our study, we specifically structured the alternative assault aircraft fleets so that the cost to develop, purchase, and operate those fleets for 20 years would be the same in constant, fiscal year 1988 dollars. This so-called equal cost approach is frequently employed in assessments of this type because it allows easier comparison of the alternatives with respect to the missions to be performed. When all of the alternatives cost the same, the one that provides the most capability is the most cost-effective. This simplifies the identification of the preferred alternative over the 20-year timeframe examined.

As you are all aware, the V-22 Osprey fared quite well in this assessment. As you also know, there is another perspective regarding costs that the Department of Defense and the Congress must consider, particularly when resources are as tightly constrained as they are at the current

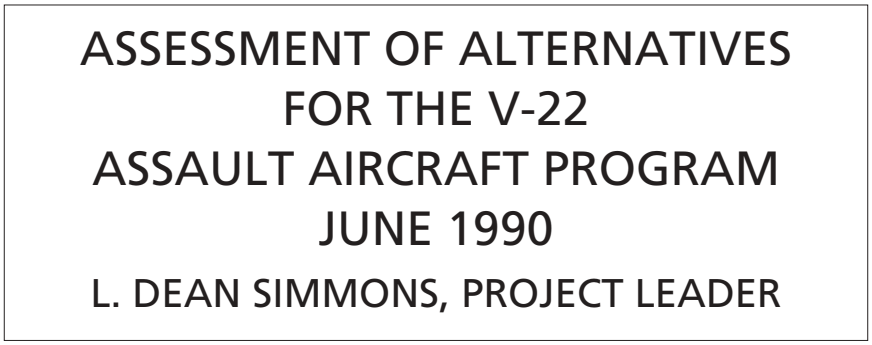
time. The alternative aircraft programs, while equal in cost over 20 years, would require different levels of funding in the near term.

Because the V-22 would cost more per aircraft than any of the other alternatives, and because completing its development and setting up projection facilities would require ap-proximately $1 billion, the V-22 program would cost more in the near term than the Department has currently allocated for all of the services' assault aircraft programs. Thus, although the V-22 appears to have advantages of the long term, we know of no way to avoid its greater expense in the short run.

At this time, I would be prepared to present a short presentation on our principal findings, and then Dr. Randall and I would be pleased to answer any questions at all that the committee might have.

Senator INOUYE. Please proceed.

SLIDE 1



SLIDE 2:

CONGRESSIONAL DIRECTION

HOUSE ARMED SERVICES COMMITTEE

THE COMMITTEE DIRECTS THE SECRETARY OF DEFENSE TO PROVIDE WITH THE FISCAL YEAR 1991 BUDGET REQUEST AN INDEPENDENT COST AND OPERATIONAL EFFECTIVENESS ANALYSIS (COEA) OF ALL REASONABLE V-22 ALTERNATIVES INCLUDING, BUT NOT LIMITED TO, THE CH-53E, BV-360, EH-IOI, CH-46E, CH-60 AIRCRAFT OR ANY COMBINATION THEREOF."

Dr. SIMMONS. As you are aware, Mr. Chairman, the original direction for this study was provided by the House Armed Service Committee, which specifically directed the Secretary to provide with the fiscal year 1991 budget request an independent cost-effectiveness assessment of the V-22 and all reasonable alternatives.

SLIDE 3:

CONGRESSIONAL DIRECTION

APPROPRIATIONS CONFERENCE

"… THE COEA STUDY SHOULD ADDRESS ALL ASPECTS OF OPERATIONS THAT COULD BE PERFORMED BY THE V-22 OR ITS ALTERNATIVE, NOT JUST THE OPPOSED AMPHIBIOUS ASSAULT MISSION. THEREFORE, IT IS PARTICULARLY IMPORTANT THAT THE ADVANTAGES OF THE V-22 FOR SPECIAL OPERATIONS FORCES AND DRUG SMUGGUNG INTERDICTION MISSIONS BE EXAMINED IN FULL."

"… INCLUDE THE FOLLOWING KEY FACTORS:

- MISSION ANALYSIS OF MARINE CORPS' AMPHIBIOUS SHIP-TO-SHORE MOVEMENT, LONG-RANGE SPECIAL OPERATIONS, OVER-THE-HORIZON LANDINGS, FOLLOW-ON OPERATIONS, COMBAT SEARCH AND RESCUE OPERATIONS, AND DRUG INTERDICTION OPERATIONS;
- SURVIVABILITY AND THE COST OF ATTRITION;
- COLLATERAL COSTS SUCH AS INCREASED MANPOWER REQUIREMENTS, INCREASED PILOT REQUIREMENT, AND THE IMPACT ON BOTH STRATEGIC AND AMPHIBIOUS LIFT;
- THE DATE WHICH THE V.22 OR AN ALTERNATIVE CAN BE FIELDED AND READY FOR DEPLOYMENT."

In addition, the appropriations conference from the House and the Senate provided some additional direction as to which missions were to be examined and some other factors to be included in the assessment, and this long list of factors accounts, in part, for the considerable length of our study report.

SLIDE 4

OVERVIEW

• AIRCRAFT EXAMINED:

V-22	NEW HELICOPTER (BOEING MODEL 360)
CH-53E+	EH-IOI (UK/ITALY)
CH-46E+	CH-47M
CH-60(S)	SUPER PUMA (FRANCE)

• MISSIONS EXAMINED:

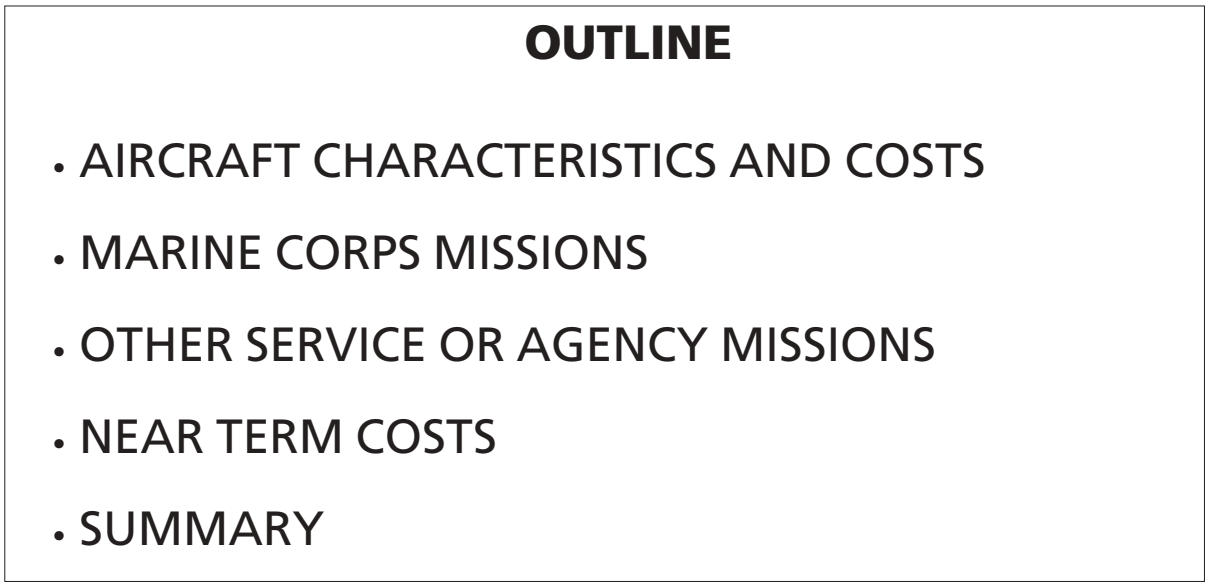
MARINE CORPS	OTHER SERVICE OR AGENCY
AMPHIBIOUS ASSAULT (INCLUDING OVER-THE-HORIZON LANDINGS)	COMBAT SEARCH AND RESCUE (NAVY)
SUBSEQUENT OPERATIONS ASHORE (INCLUDING RESUPPLY TO FORWARD DEPLOYED FORCES)	LONG-RANGE SPECIAL OPERATIONS (AIR FORCE)
DEPLOYMENT MISSIONS	DRUG INTERDICTION
HOSTAGE RESCUE OR RAID	ANTISUBMARINE WARFARE (NAVY)

• COST-EFFECTIVENESS ASSESSED BY CAPABILITIES OF EQUAL-COST AIRCRAFT FLEETS AT TWO FUNDING LEVELS

A quick overview: we examined eight different aircraft, singly and in combination, to provide the various assault aircraft missions—the V-22, all of the helicopter alternatives cited in the House Armed Services Committee directive, and two alternatives that we thought reasonable based on their capabilities (the Army's CH-47 Chinook, a marinized version of that aircraft, and the French firm Aerospatiale's Super Puma aircraft, which has about the same characteristics as some of the other helicopters we were examining). We examined eight different missions for the aircraft—four for the Marine Corps, four for other service or government agency missions. All of those had been identified in the directions provided by the Congress to the Secretary.

As I mentioned in my opening statement, we compared the cost-effectiveness of the alternatives by looking at the capabilities of aircraft fleet sizes with equal 20-year system cost.

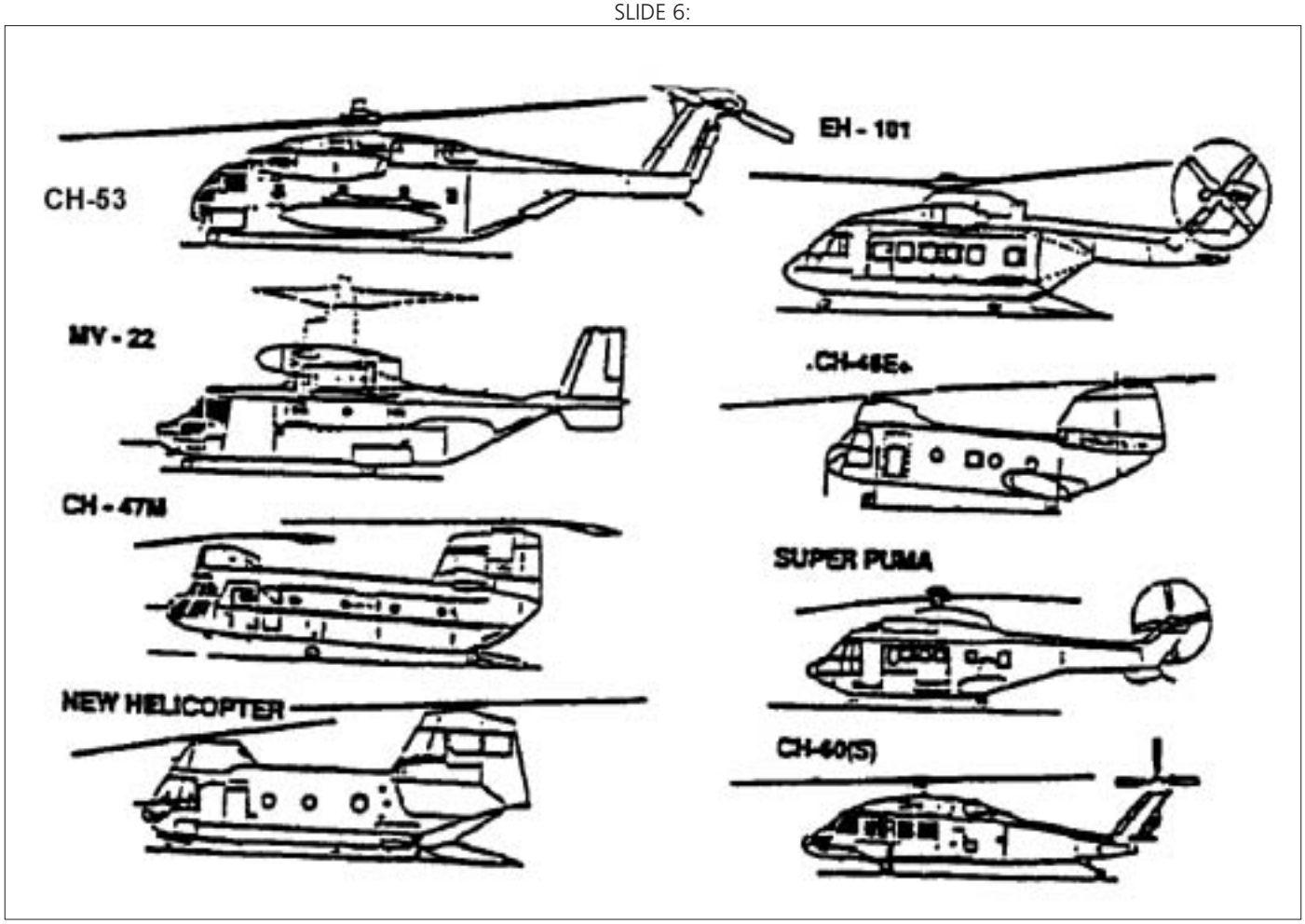
SLIDE 5:



The outline for the remainder of the presentation is shown here. I will discuss briefly the aircraft, spend a considerable amount of time on the Marine Corps missions, discuss the four other service missions, discuss briefly the near-term costs, and summarize with two quick overview charts.

ALTERNATIVE AIRCRAFT

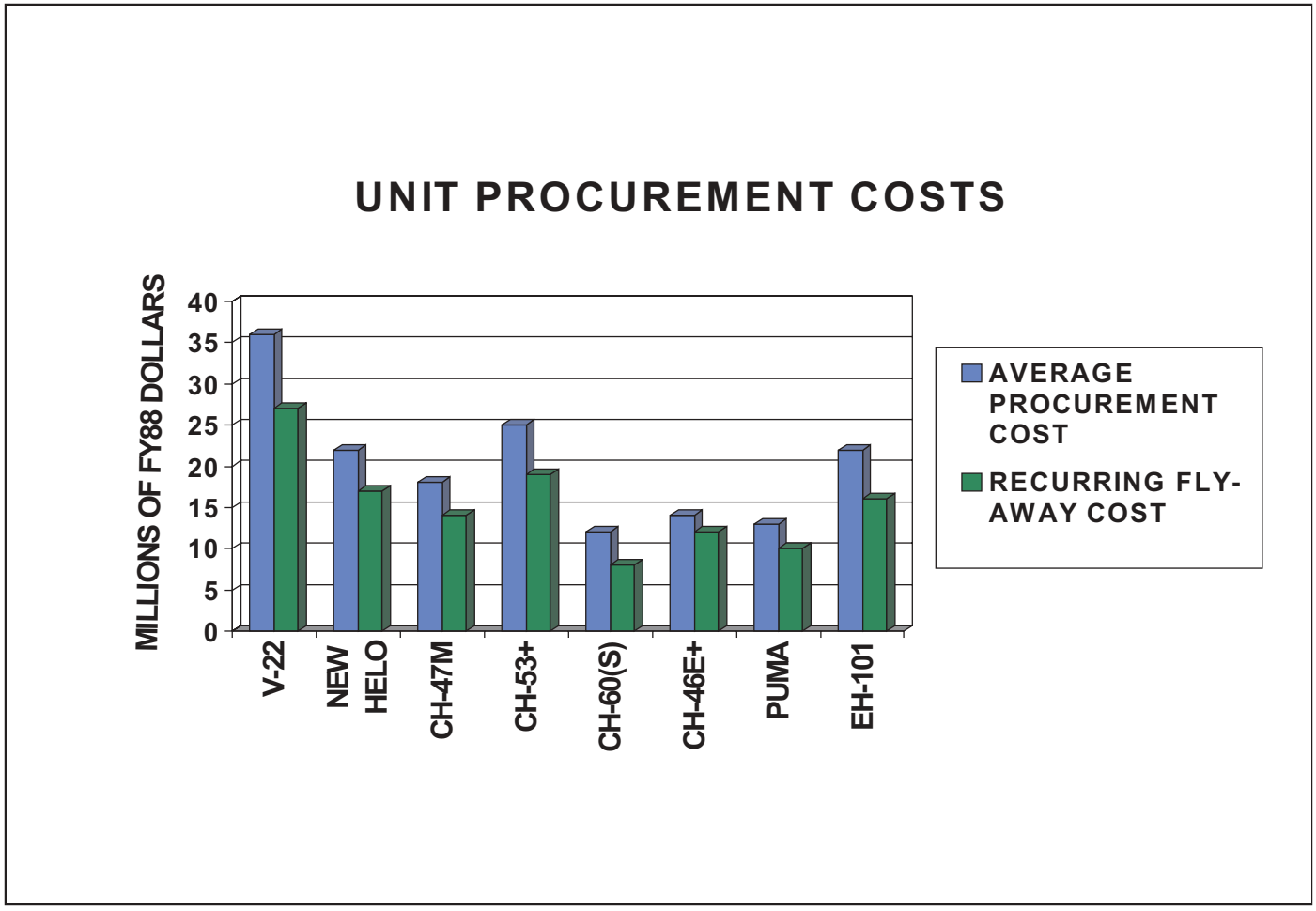
SLIDE 6:



Here, shown to the same scale, are all of the alternative aircraft that we examined. The V-22 is the second aircraft on the left side of the chart. It is the only non-helicopter aircraft that we considered, being a tilt-rotor aircraft. We show the standard airplane configuration of the rotor and the helicopter configuration of the rotor.

The largest aircraft we considered is the Marine Corps' current CH-53E heavy-lift helicopter. The Army's Chinook is shown here, a new helicopter modeled on Boeing's 360 technology demonstrator, the British-Italian EH-101, the Marines' current CH-46, the Aerospatiale Super Puma, and the Army's CH-60 Blackhawk helicopter.

SLIDE 7



The difference in costs for the aircraft are illustrated here, where we show the unit procurement cost, both the average procurement cost and the fly-away cost for the aircraft. The costs for the V-22 are estimated to be substantially larger than those for the other aircraft, an average of about $35 million per V-22 over the entire program buy that has been proposed. The next most expensive aircraft would be the CH-53 heavy-lift helicopter, at about $25 million. As you can see, some of the helicopters have cost only on the order of $l0 million each.

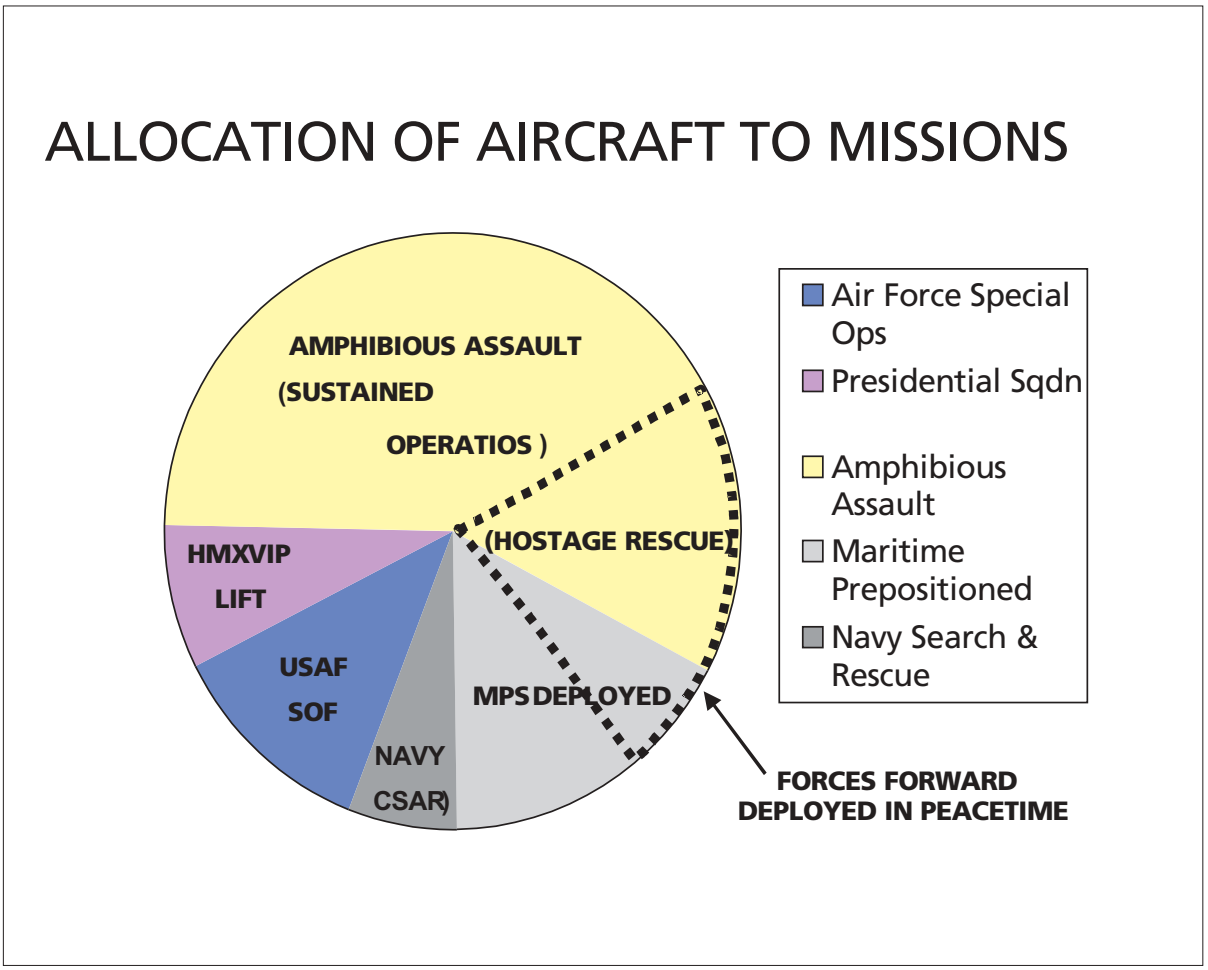
SLIDE 8:

MARINE CORPS MISSION

MISSION	CONTRIBUTION OF ASSAULT AIRCRAFT
AMPHIBIOUS ASSAULT	MOVE TROOPS AND EQUIPMENT ASHORE
SUSTAINED OPERATIONS	MOVE TROOPS AND EQUIPMENT TO SUPPORT COMBAT FORCES ASHORE
HOSTAGE RESCUE OR RAID	INSERT AND EXTRACT MARINE RESCUE OR RAIDING FORCE OR HOSTAGES
OVERSEAS DEPLOYMENT (NALMEB OR MPFMEB)	MOVE TO OVERSEAS THEATER AND TRANSPORT DEPLOYED MARINE FORCE TO COMBAT POSITIONS

At this point, I would like to move to a discussion of the cost effectiveness for the Marine Corps missions.

SLIDE 9:

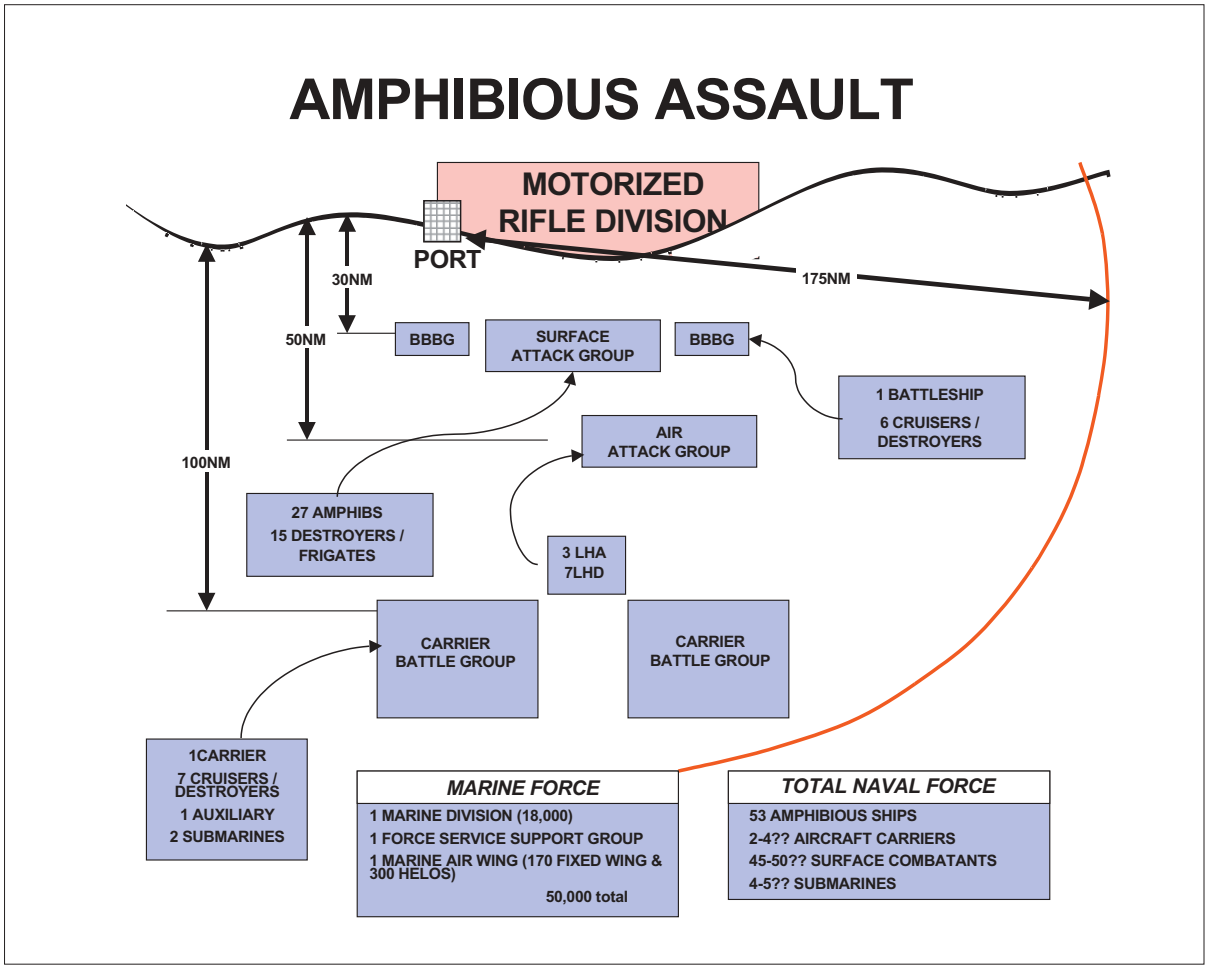


To give you an idea of how the aircraft are supposed to be used, on this chart we show the percent distribution of aircraft among the potential missions. Of the planned buy, about 60 percent of the aircraft would be designated for the amphibious assault or the sustained operations ashore mission. This is shown in the top portion of the chart that extends between the two solid black lines. An additional one-fourth or so of the total aircraft would be designated for the Marines' maritime prepositioned forces. For deployment missions they have two brigades, plus a brigade that is designated for potential use on NATO's northern flank in that context. In addition, we show the peacetime forward-deployed forces that we modeled as carrying out a hostage rescue or small-scale combat raid mission.

The Marine Corps had also planned to buy 20 aircraft for the Presidential support squadron to replace the existing aircraft that are used there. Two other services, the Navy and the Air Force, also proposed to use the V-22—the Navy for combat search and rescue and the Air Force for special operations.

In our assessment, we measured capabilities for all of these potential uses for the aircraft with the exception of the Presidential support squadron.

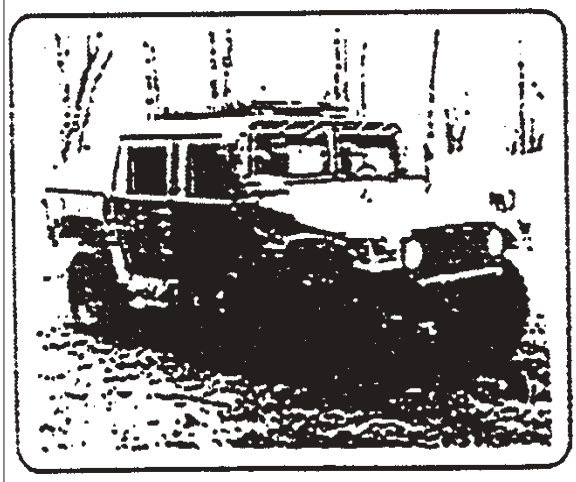
SLIDE 10:



The first mission we looked at is the amphibious assault. The scenario we used envisions a division-size amphibious assault supported by the types of military forces shown here; carrier battle forces from the Navy, the amphibious assault ships shown in the tan or light brown blocks, and other Navy supporting forces that would provide protection for the amphibious forces. The threat force is postulated as a division-size force deployed over the red area shown. In carrying out this assault, the Marine forces would be landed in two ways: one-half by surface assault vehicles and landing craft, and the other one-half of the assault force by assault aircraft the V-22 or one of the helicopter alternatives.

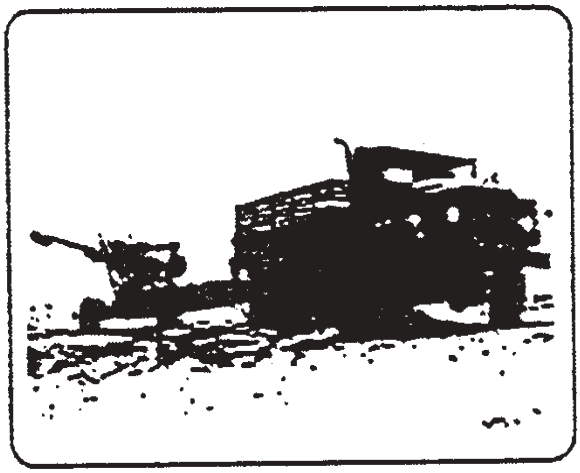
SLIDE 11

HIGH MOBILITY MULTIPURPOSE WHEELED VEHICLE (HMMWV)



WEIGHT: 7,500 - 9,150 LB

M923 TRUCK AND Mi98 HOWITZER



TRUCK WEIGHT: 21,800 LB
HOWITZER WEIGHT: 18,250 LB

The next chart will give you an idea of the kind of equipment that is included in the Marines' vertical assault force.

The largest number of items of equipment are [sic.] the high-mobility, multipurpose, wheeled vehicles, or HMMWV's. The typical Marine vertical assault force includes about 300 of these vehicles, which are too large to fit inside any of the aircraft and must be carried in sling loads externally.

The other major vehicles for the airlifted force are the trucks and the artillery pieces that they tow to provide fire support for the Marine forces. Those two pieces of equipment are so heavy that only the large CH-53E helicopter can carry them.

SLIDE 12:

AIRCRAFT FLEET ALTERNATIVES

HEAVY-LIFT AIRCRAFT

- ALL FLEETS INCLUDE PLANNED CH-53E FORCE

OTHER AIRCRAFT CAPABLE OF CARRYING HMMWVs

- V-22
- NEW HELICOPTER
- CH-47M

AIRCRAFT NOT CAPABLE OF CARRYING HMMWVs - ADDITIONAL CH-53Es REQUIRED

- CH-60 (STRETCHED)
- CH-46E+
- SUPER PUMA
- EH-101

So, based on this equipment, we have constructed fleets of aircraft that we then compare in our effectiveness assessments. Because we had those large items of equipment, we assumed that all of our fleets would include the Marine Corps' planned CH-53E large helicopter force.

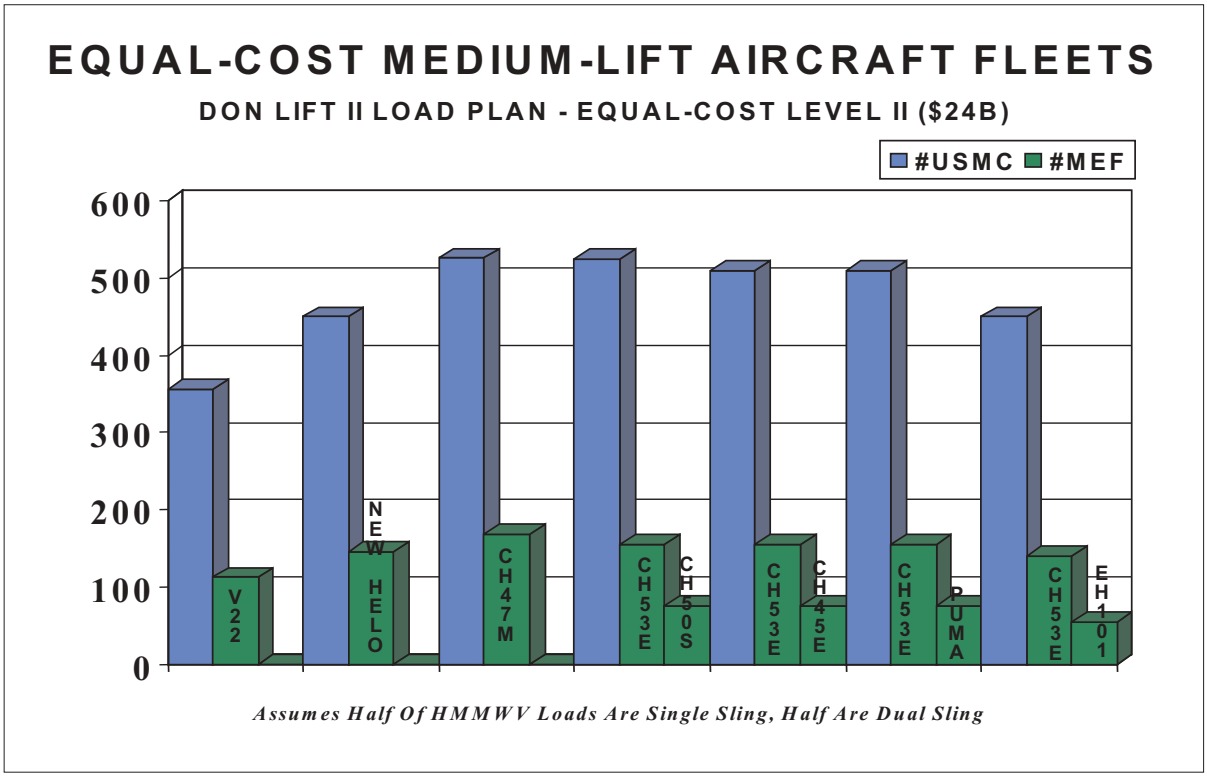
The other aircraft fall into two groups. [First,] those that are large enough to carry the HMMWV as an external load. The V-22, a new design helicopter, and the CH-47 would fall into that class. Four of the other aircraft are too small to carry the HMMWV and in order to use those aircraft another helicopter would have to be provided in the mix. The most efficient way of doing that would be to add additional CH-53E's, so that is the assumption we made.

The other aircraft are the CH-60, the CH-46, the Super Puma, and the EH-101. When we discuss alternatives, we will identify some of them by a single aircraft name—those are the ones that can carry the HMMWV. Other alternatives are designated by two names. That means that two types of aircraft are required, one to carry the Marine combat troops and one to carry the heavier equipment.

At this time, I would like to show you how we took the costs and constructed equal cost fleets.

(There is no SLIDE 13 in the Congressional Record.)

SLIDE 14:



The cost level that we have chosen to show you is what we call cost level II in our study, or $24 billion, the approximate cost of a fleet of CH-53E and CH-60 helicopters that would be comparable to the fleet that the Department of Defense substituted for the V-22 when that program was canceled.

Given the differences in the cost of the aircraft, you see on this chart that the number of V-22's that we can buy is lower than the numbers for any of the other alternatives. For this $24 billion, we could buy 356 V-22's and support them over 20 years of operation.

The lower portion of the bar designates the number of aircraft that would be available for the Marine Expeditionary Force, the division-size force that we assumed for our effectiveness analysis.

[There is no SLIDE 15 in the Congressional Record.]

MARINE CORPS MISSIONS COST EFFECTIVENESS

Now I would like to discuss the effectiveness or the combat capabilities of those numbers of aircraft.

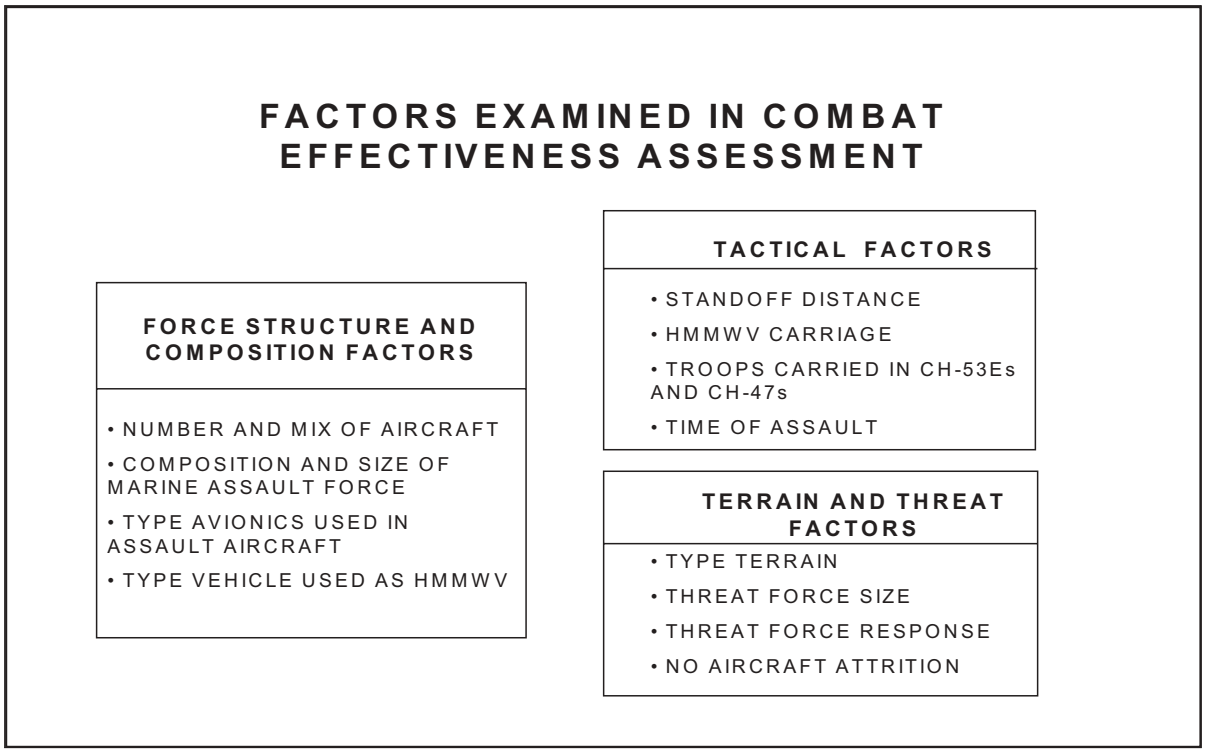
SLIDE 16:

MARINE CORPS MISSION

MISSION	CONTRIBUTION OF ASSAULT AIRCRAFT
AMPHIBIOUS ASSAULT	MOVE TROOPS AND EQUIPMENT ASHORE
SUSTAINED OPERATIONS	MOVE TROOPS AND EQUIPMENT TO SUPPORT COMBAT FORCES ASHORE
HOSTAGE RESCUE OR RAID	INSERT AND EXTRACT MARINE RESCUE OR RAIDING FORCE OR HOSTAGES
OVERSEAS DEPLOYMENT (NALMEB OR MPFMEB)	MOVE TO OVERSEAS THEATER AND TRANSPORT DEPLOYED MARINE FORCE TO COMBAT POSITIONS

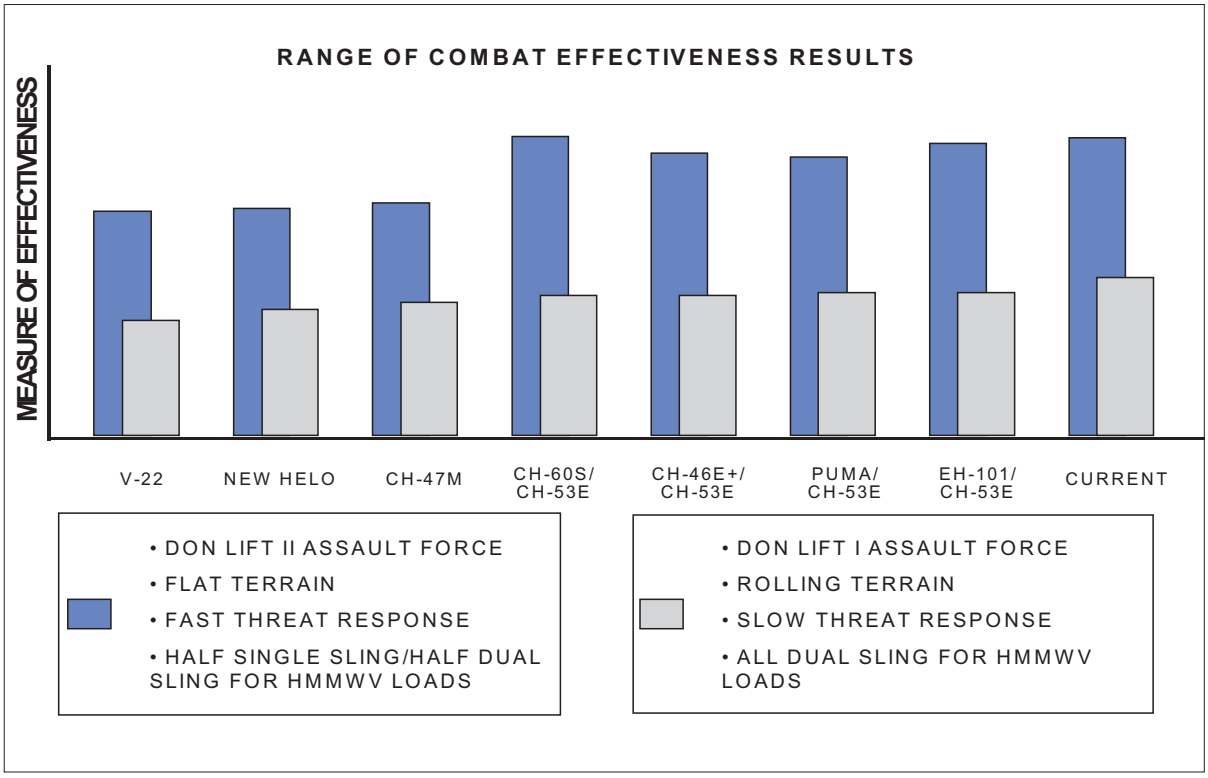
First, for the amphibious assault mission in which the aircraft are used to move marines and their combat equipment ashore.

SLIDE 17



In this portion of the assessment, we examined a broad range of factors that could potentially influence the results. The wide set of variations that we considered is another of the reasons why our report is so large. We looked at differences in force structure and composition, the number of aircraft in the fleet, the composition of the Marine assault force itself, the type of avionics used in the aircraft, and the type of vehicle used as a HMMWV. We also examined a wide range of tactical factors, and similarly a wide range of potential operating terrain and threat factors.

SLIDE 18:



The next chart gives you an idea of the range of combat effectiveness results that we obtained. The measure of effectiveness that we used here was the fraction of the marine assault force lost during the combat operation, both lost in assault aircraft en route to their landing zones and subsequent losses during combat operations ashore. So in this case, a lower number represents a more effective option.

We show two sets of results to give you an idea of the range of values that we obtained in our assessment. Under the first set of conditions, identified by the lower bars, there is very little difference among the alternatives, although if you look closely you will see that the losses incurred by the V-22 force are somewhat lower than those for the other alternatives. For a different set of conditions, particularly when the survivability features of the V-22 are more important, then the differences in losses are considerably larger.

SUSTAINED OPERATIONS

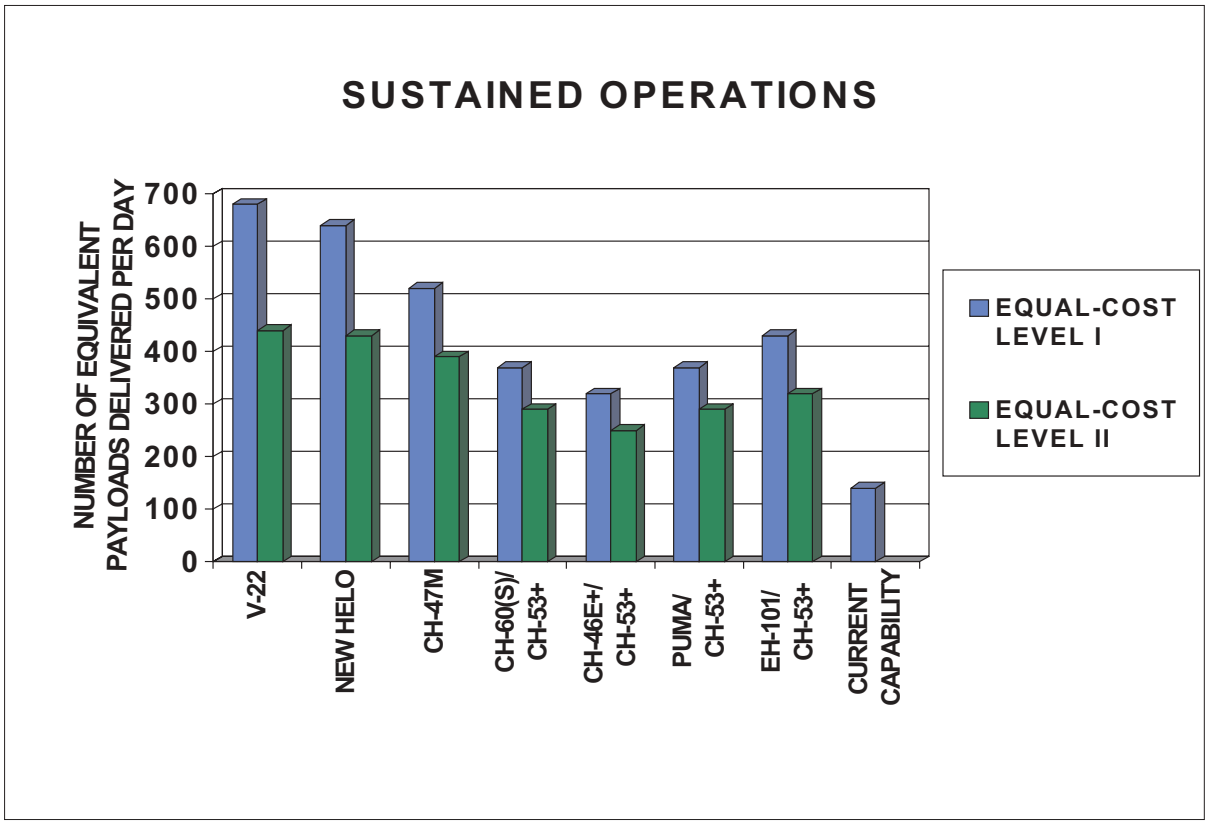
SLIDE 19:

MARINE CORPS MISSION

MISSION	CONTRIBUTION OF ASSAULT AIRCRAFT
AMPHIBIOUS ASSAULT	MOVE TROOPS AND EQUIPMENT ASHORE
SUSTAINED OPERATIONS	MOVE TROOPS AND EQUIPMENT TO SUPPORT COMBAT FORCES ASHORE
HOSTAGE RESCUE OR RAID	INSERT AND EXTRACT MARINE RESCUE OR RAIDING FORCE OR HOSTAGES
OVERSEAS DEPLOYMENT (NALMEB OR MPFMEB)	MOVE TO OVERSEAS THEATER AND TRANSPORT DEPLOYED MARINE FORCE TO COMBAT POSITIONS

The next mission that we examined was the sustained operations mission. During this mission it is assumed that the aircraft would have transitioned to shore from the amphibious lift ships where they would have been used for the amphibious mission, and at this time they would be used to support combat operations ashore.

SLIDE 20:



The measure of effectiveness we used here [slide 20] was the number of equivalent payloads that could be delivered per day over a 30-day period. Results are shown for both of the cost levels that we examined in the assessment—we have been focusing on the results obtained at cost level II at this point. Those are shown in the lower set of bars. Again, the V-22 provides more capability to deliver equivalent size payloads over the 30-day period that we examined.

You will also note, though, that all of the alternatives provide a considerable improvement over the Marines' current capability.

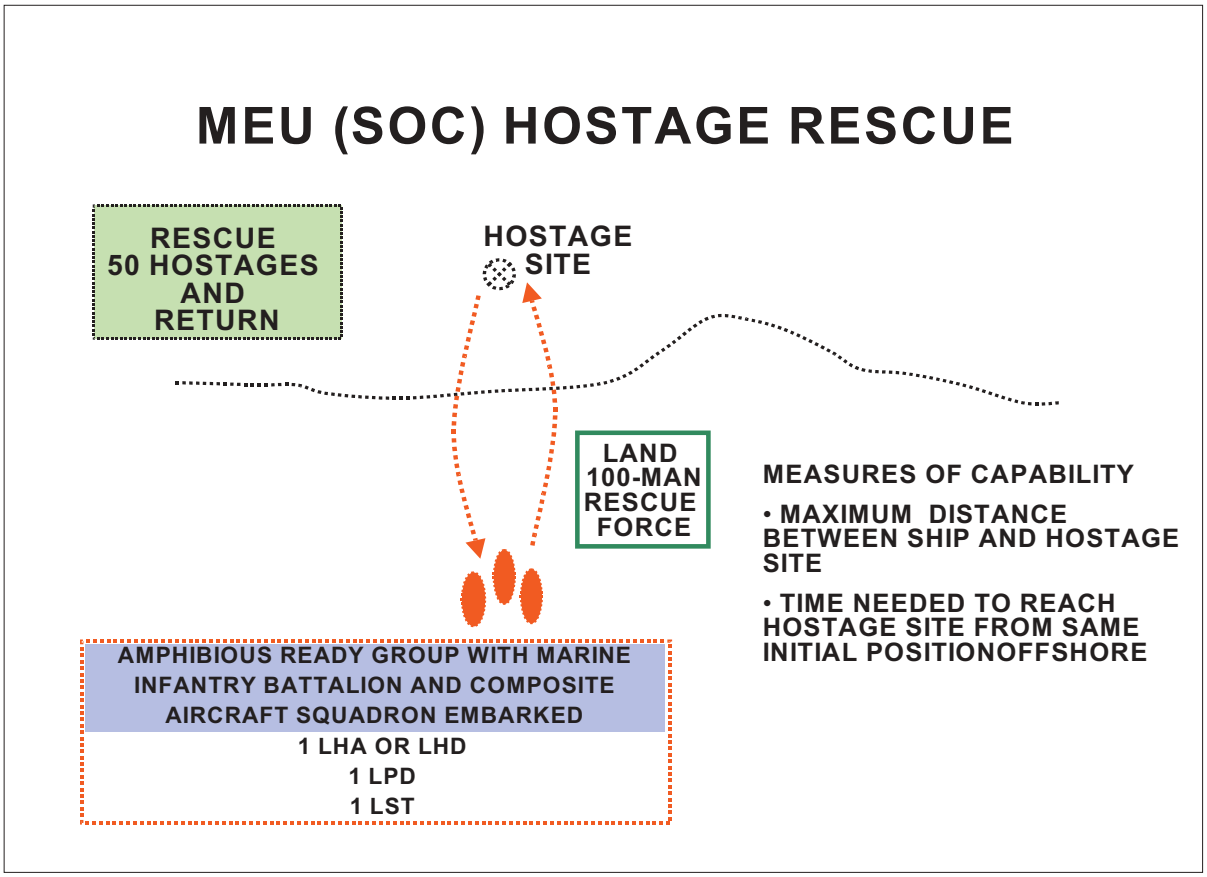
SLIDE 21:

MARINE CORPS MISSION

MISSION	CONTRIBUTION OF ASSAULT AIRCRAFT
AMPHIBIOUS ASSAULT	MOVE TROOPS AND EQUIPMENT ASHORE
SUSTAINED OPERATIONS	MOVE TROOPS AND EQUIPMENT TO SUPPORT COMBAT FORCES ASHORE
HOSTAGE RESCUE OR RAID	INSERT AND EXTRACT MARINE RESCUE OR RAIDING FORCE OR HOSTAGES
OVERSEAS DEPLOYMENT (NALMEB OR MPFMEB)	MOVE TO OVERSEAS THEATER AND TRANSPORT DEPLOYED MARINE FORCE TO COMBAT POSITIONS

The next mission that we examined was the small-scale hostage rescue or combat raid. In this mission the aircraft would be used to insert and extract a Marine rescue or a raiding force, and in the case of the rescue, to also extract hostages.

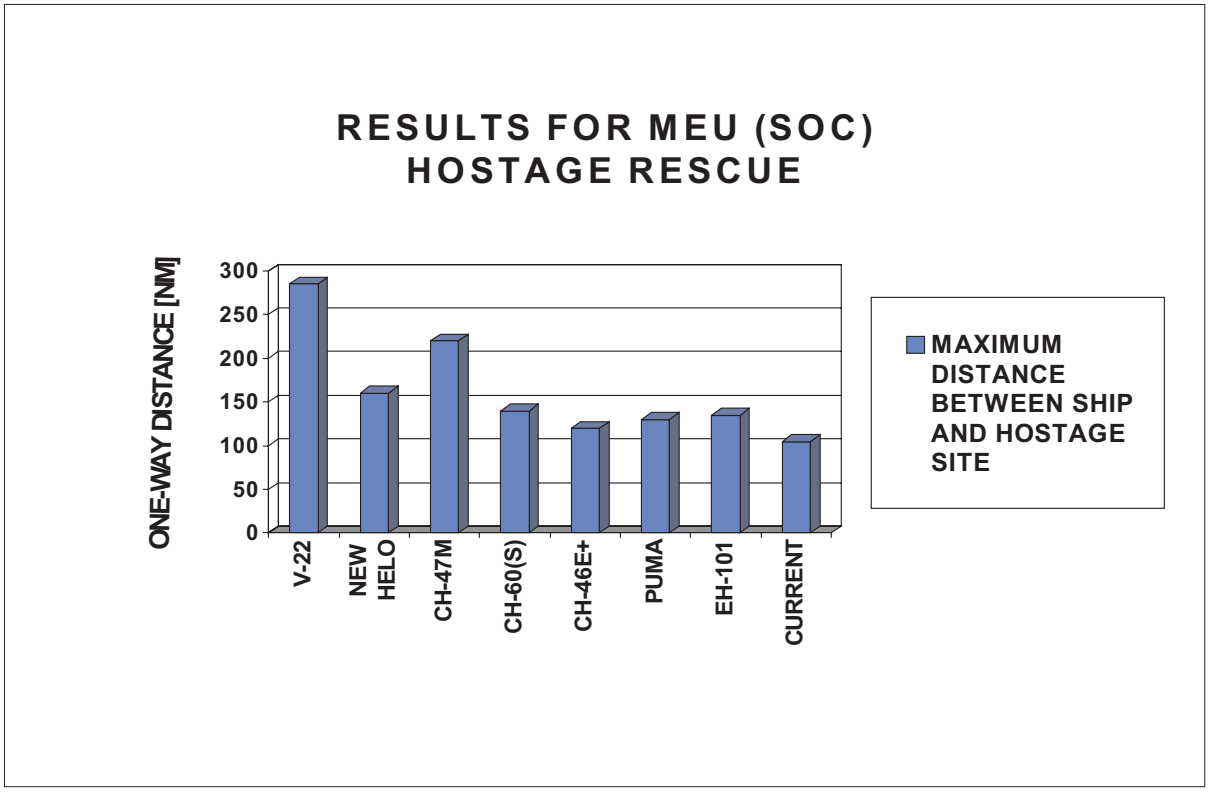
SLIDE 22:

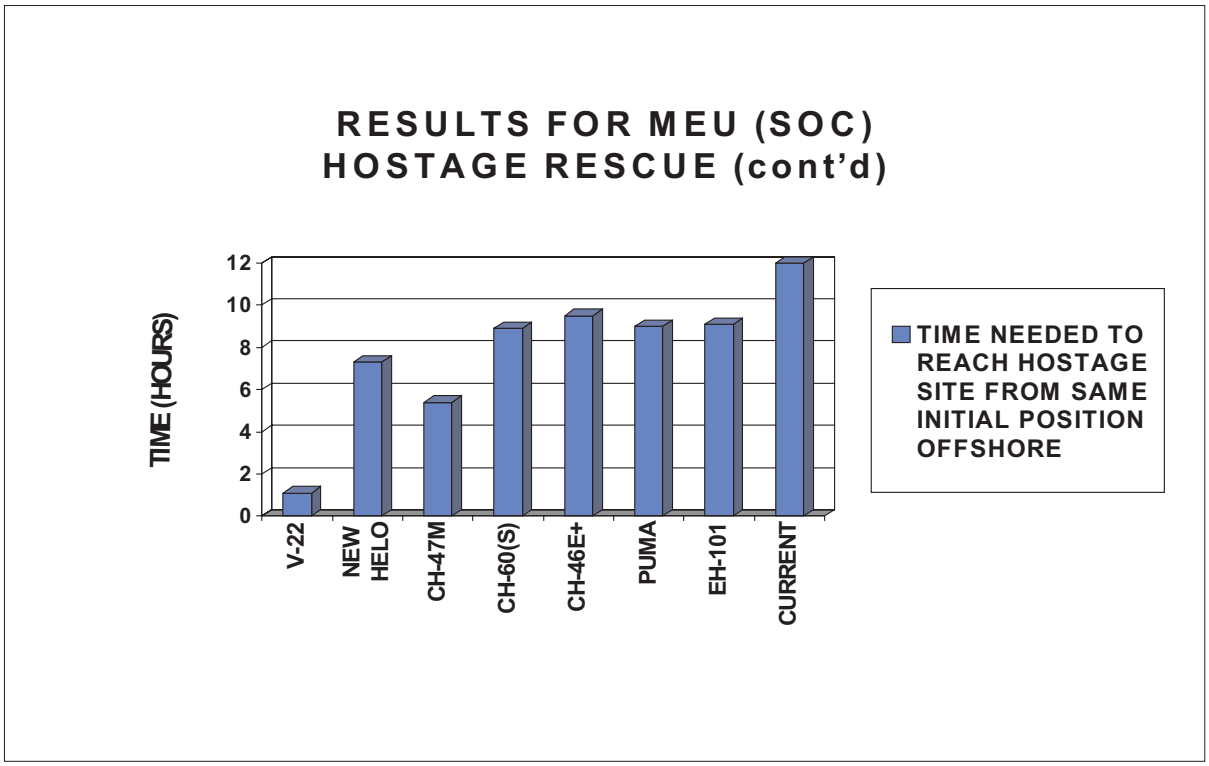


How this operation would be conducted is depicted on this chart. It is assumed that it would be carried out by the forces deployed with a Marine amphibious ready group. We have two such units forward deployed at all times. During peacetime conditions it consists of an infantry battalion and a composite aircraft squadron that would include the assault aircraft and typically three ships. We assumed that the aircraft would be launched from these ships into some hostage site or a location for a combat raid. The rescue or raiding force would consist of 100 marines and they would rescue some number of hostages.

We measured the capability for this mission by looking at the maximum distance that we could be away from the raiding site and conduct the operation and the time it would take to reach that site from the same starting position offshore.

SLIDE 23:





The results are depicted on this chart. The maximum distance between the ship and the hostage site is shown in the left-hand set of bars. Distance is measured in nautical miles and the various alternatives are listed along the bottom of the slide. The speed and range of the V-22 would allow it to conduct this operation from substantially greater distances off-shore or to substantially greater distances on land than would be the case with any of the other alternatives.

Given this advantage in stand-off distance, if we were to start the operation from the same point and we chose the largest of those distances as our starting point, the V-22 would have a five to perhaps 12-hour advantage in the amount of time it would take to reach the hostage site from the same starting position offshore.

The last Marine Corps mission we examined was the overseas deployment that would be

SLIDE 24:

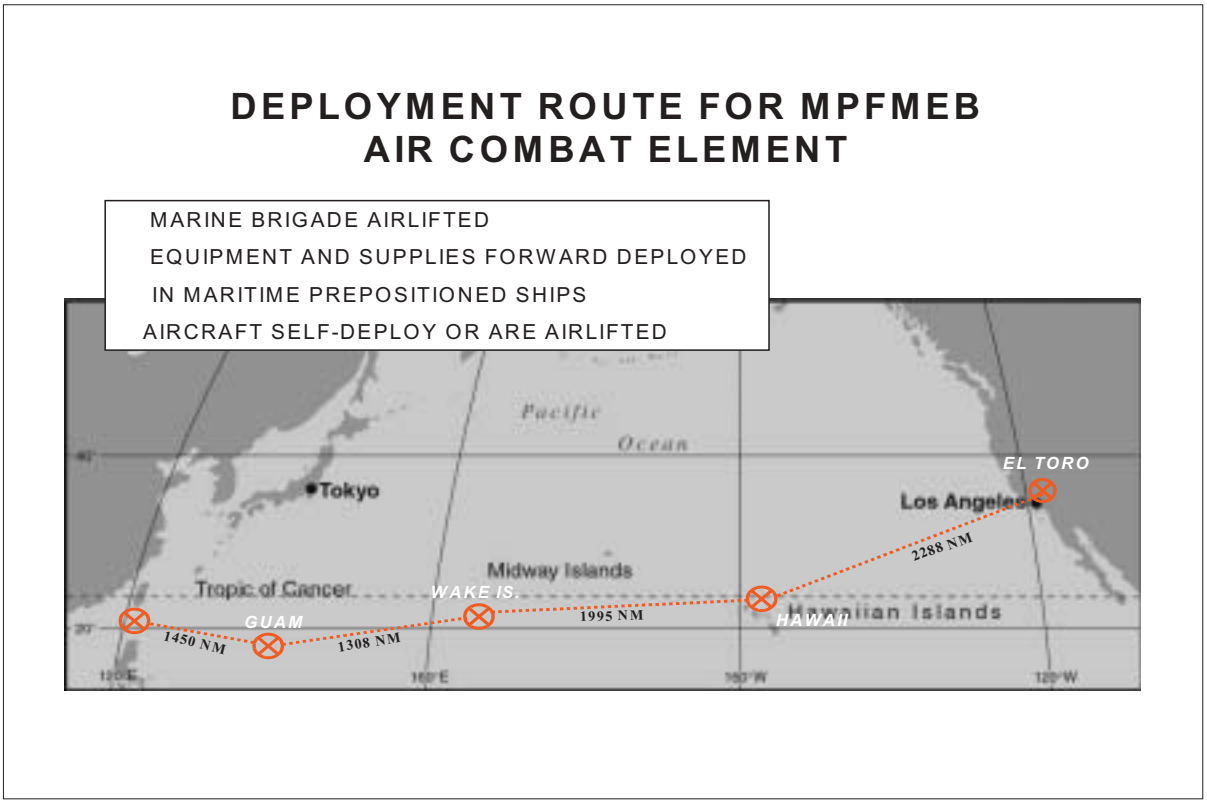
MARINE CORPS MISSION

MISSION	CONTRIBUTION OF ASSAULT AIRCRAFT
AMPHIBIOUS ASSAULT	MOVE TROOPS AND EQUIPMENT ASHORE
SUSTAINED OPERATIONS	MOVE TROOPS AND EQUIPMENT TO SUPPORT COMBAT FORCES ASHORE
HOSTAGE RESCUE OR RAID	INSERT AND EXTRACT MARINE RESCUE OR RAIDING FORCE OR HOSTAGES
OVERSEAS DEPLOYMENT (NALMEB OR MPFMEB)	MOVE TO OVERSEAS THEATER AND TRANSPORT DEPLOYED MARINE FORCE TO COMBAT POSITIONS

used with our Norway air-landed brigade to move a brigade-size force to NATO's northern flanks or with one of our maritime prepositioned force brigades to operate in conjunction with the Navy's maritime prepositioned squadrons.

In this case, the assault aircraft would be moved to the overseas theater either by self-deploying in the case of the V-22 or being airlifted in strategic airlift aircraft. Once overseas, the aircraft would deploy Marine forces to their combat positions.

SLIDE 25:

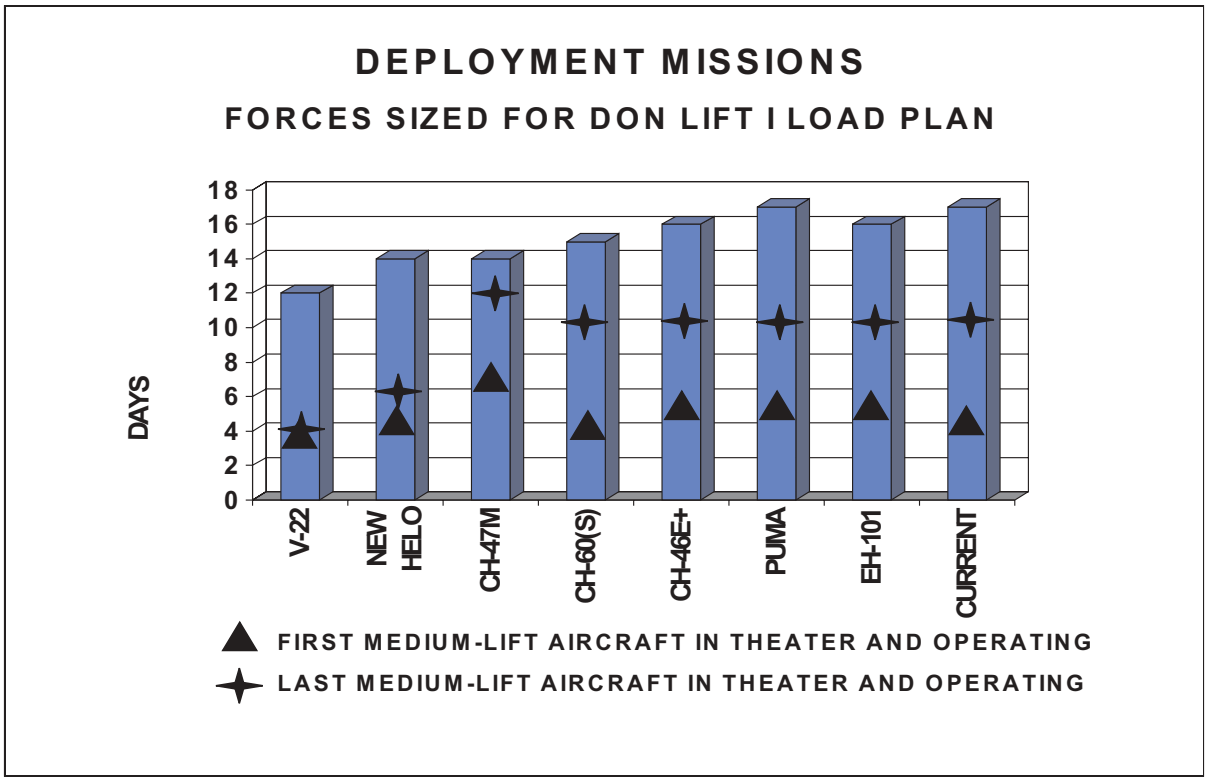


The typical deployment scenario is shown here. Moving from a Marine Corps base at El Toro, CA, to a combat site in the Philippines with intermediate stops as indicated in Hawaii, Wake, and Guam, the Marine infantry forces would be airlifted by Air Force aircraft. The equipment and supplies are already forward deployed in maritime prepositioning ships that are based at Guam in peacetime. The aircraft would self-deploy or be airlifted.

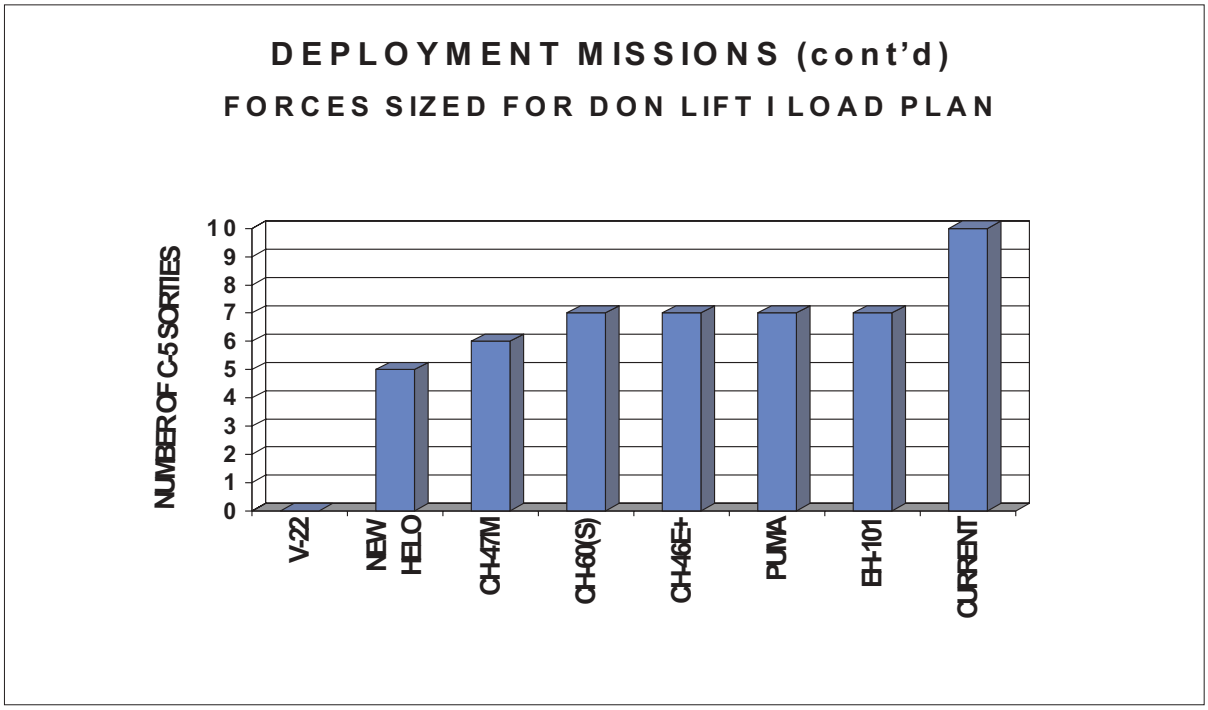
The results for that mission are shown here.

The time to complete the aircraft deployment and move troops is shown in the left-hand set of bars, the faster time giving you an advantage. The V-22, because it can self-deploy and the helicopter alternatives cannot, is able to reach the theater sooner, as indicated by the location of the two triangles, and complete the deployment of troops in the theater more rapidly than any of the helicopter alternatives.

SLIDE 26:



SLIDE 26 CONTINUED



The helicopters are at a disadvantage in this mission because they do not have sufficient range to self-deploy. At these distances, they would have to be disassembled, loaded into strategic airlift aircraft, flown to the theater, and then reassembled and flight tested be-fore they could be used. That difference is indicated by the number of C-5 sorties required. The V-22 would require no sorties because it can self-deploy.

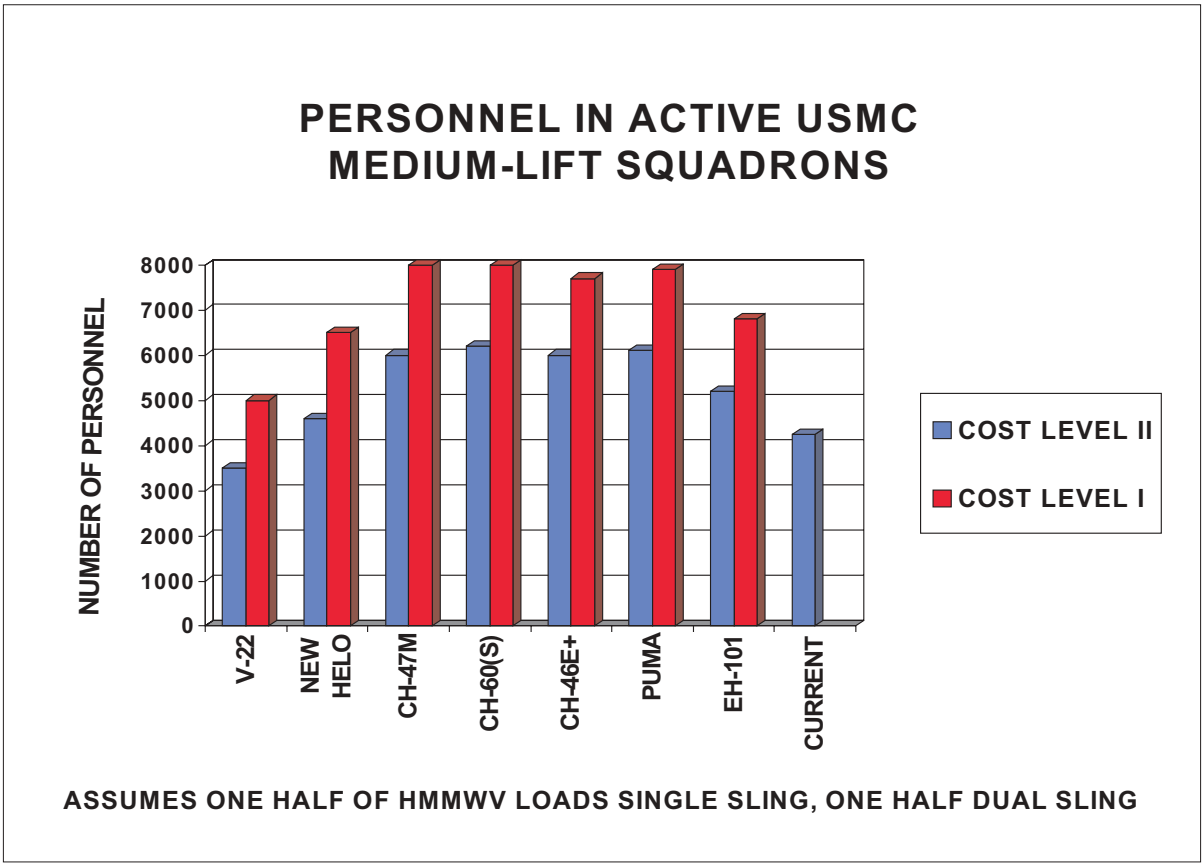
Moving any of the helicopter alternatives would require 5 to 10 sorties to move the air assault portion of the brigade force.

[There is no SLIDE 27 in the Congressional Record.]

MARINE CORPS MISSIONS
OTHER FACTORS

One other important factor with regard to the Marine Corps mission that we wanted to discuss is the manpower requirements.

SLIDE 28:



We show them on this chart. This is the number of personnel in the Marine Corps' active medium-lift helicopter squadrons. The number in those units today is shown by the bar on the right; about 4,500 Marines are assigned to those units. At the higher of the two cost levels examined all of the alternatives would add additional Marines to those units, with the V-22 adding the least about 500 additional personnel.

At cost level II, the $24 billion level we have been focusing on in our briefing, the V-22 would allow a reduction of about 700 Marines from current levels. All of the other alternatives for an equal cost force would require the addition of more Marines for this mission.

OTHER SERVICE OR AGENCY MISSIONS

Now I would like to quickly discuss the other service or agency missions that we examined. [Slide 29 omitted from the record.]

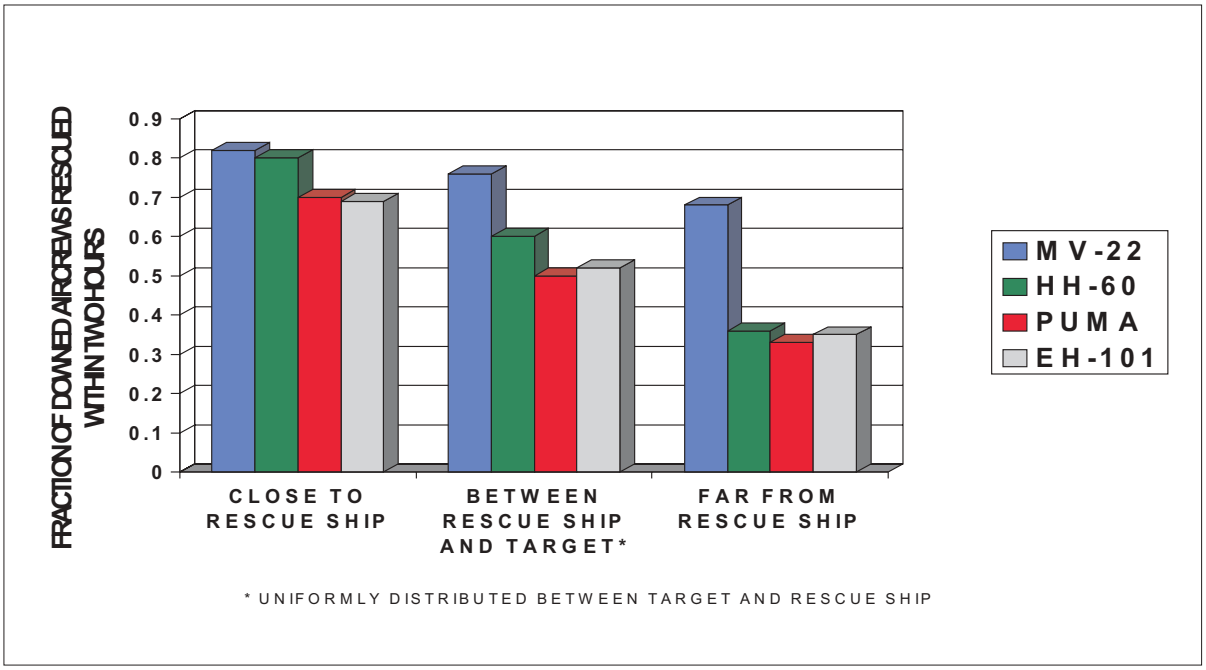
[There is no SLIDE 29 in the Congressional Record.]

SLIDE 30:

OTHER SERVICE MISSIONS	
MISSION	**CONTRIBUTION OF ASSAULT AIRCRAFT**
COMBAT SEARCH AND RESCUE	**RECOVER DOWNED AIRCREWS**
SPECIAL OPERATIONS	**INSERT AND EXTRACT SPECIAL OPERATIONS FORCES**
DRUG INTERDICTION	**TRAIL COURIER AIRCRAFT AND BOATS, DEPLOY LAW ENFORCEMENT PERSONNEL**
ANTISUBMARINE WARFARE	**DETECT AND ATTACK SUBMARINES**

The first of these is the Navy's combat search and rescue mission. The aircraft are used to recover downed aircrews from strike or fighter aircraft.

SLIDE 31:



The range of results we obtained for that mission are indicated on this chart. The measure that we used to compare capabilities is the fraction of the downed crews that can be rescued by the different aircraft within two hours. We looked at four alternatives: the V-22, the H-60, the Puma, and the EH-101.

Again, the range of results shown are for different conditions. If all of the aircrews are downed close to the rescue ship, the V-22 has only a slight advantage over the H-60. But as the distances increase, the speed of the V-22 gives it an additional capability relative to the helicopters. In the most extreme conditions that we examined, the V-22 would have a factor of two advantage in the fraction of crews that it could rescue.

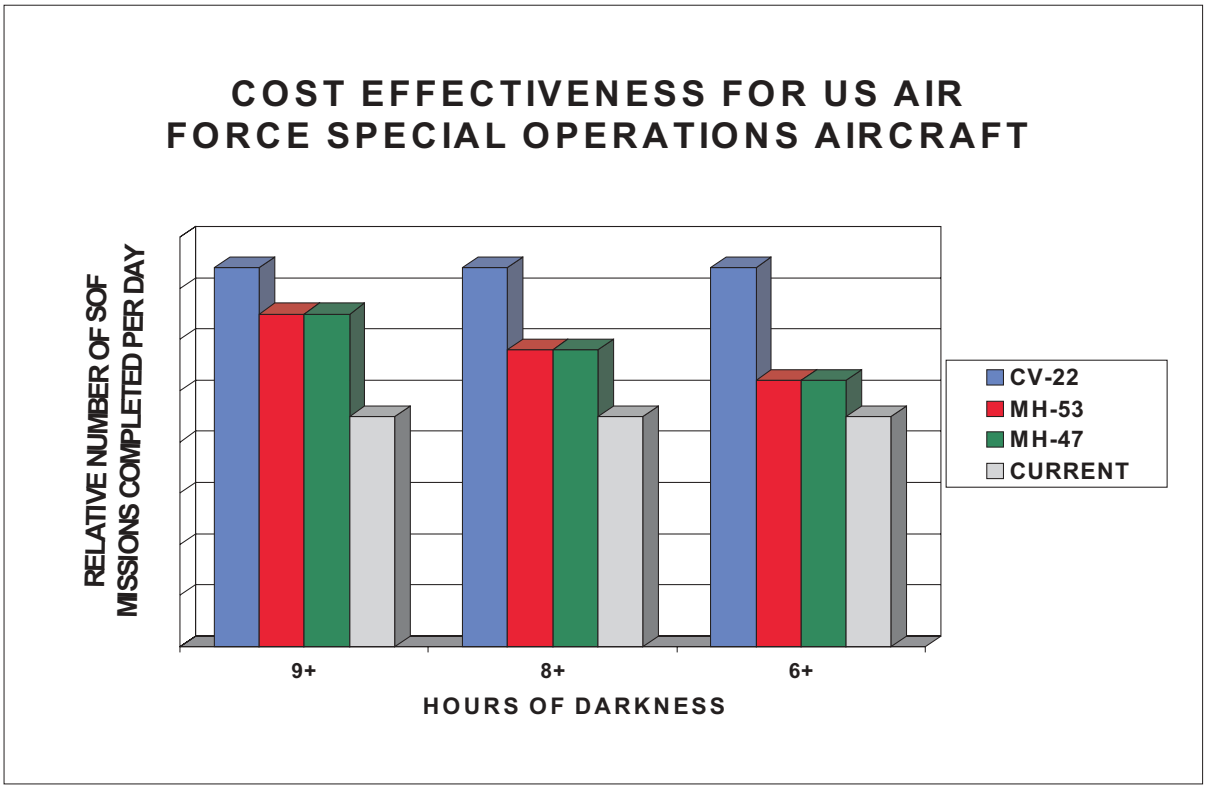
AIR FORCE SPECIAL OPERATIONS

SLIDE 32:

OTHER SERVICE MISSIONS	
MISSION	**CONTRIBUTION OF ASSAULT AIRCRAFT**
COMBAT SEARCH AND RESCUE	**RECOVER DOWNED AIRCREWS**
SPECIAL OPERATIONS	**INSERT AND EXTRACT SPECIAL OPERATIONS FORCES**
DRUG INTERDICTION	**TRAIL COURIER AIRCRAFT AND BOATS, DEPLOY LAW ENFORCEMENT PERSONNEL**
ANTISUBMARINE WARFARE	**DETECT AND ATTACK SUBMARINES**

The next mission examined was the Air Force special operations mission. In this mission, the aircraft are used to insert and extract special operations forces.

SLIDE 33



Our measure of effectiveness here is the relative number of special operations missions that can be completed each day. We looked at three alternatives: the V-22, the MH-53, and the H-47 helicopters. We also show our current capability.

The important variable in this portion of the analysis was the amount of darkness available to accomplish this mission. For obvious reasons, the Air Force would like to be able to carry out the special operations airlift under cover of darkness to maintain the covertness of those operations. So as the number of hours of darkness diminishes, the speed of the aircraft becomes more and more a factor in the ability to accomplish the mission. You can see that there is very little effect on the V-22 as the number of hours of darkness is reduced from 9 to 6 hours. The helicopter alternatives, given their substantially slower speed, would be able to complete far fewer operations in a limited period of darkness.

SLIDE 34:

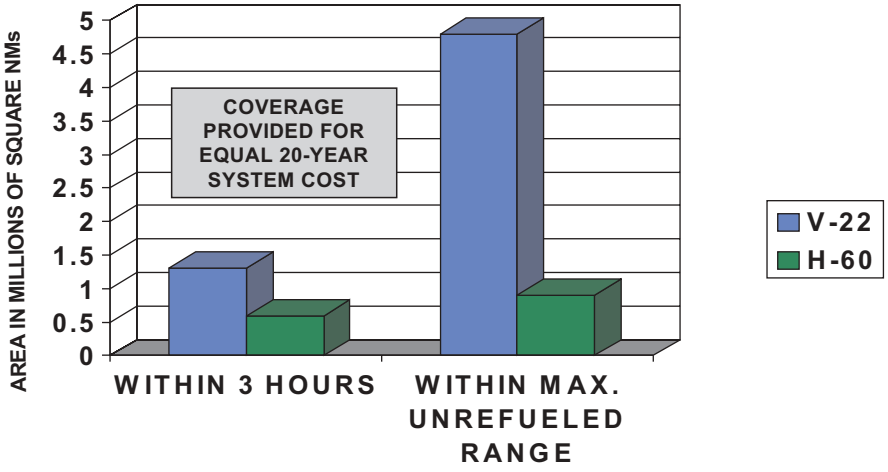
OTHER SERVICE MISSIONS	
MISSION	**CONTRIBUTION OF ASSAULT AIRCRAFT**
COMBAT SEARCH AND RESCUE	RECOVER DOWNED AIRCREWS
SPECIAL OPERATIONS	INSERT AND EXTRACT SPECIAL OPERATIONS FORCES
DRUG INTERDICTION	TRAIL COURIER AIRCRAFT AND BOATS, DEPLOY LAW ENFORCEMENT PERSONNEL
ANTISUBMARINE WARFARE	DETECT AND ATTACK SUBMARINES

The next mission examined was a drug interdiction mission that could be carried out by the Department of Defense or one of the other Government agencies. The aircraft would be used to trail the aircraft and boats that are used by drug couriers and to retrieve evidence and deploy law enforcement personnel.

SLIDE 35

DRUG INTERDICTION MISSION

- **AIRCRAFT CONFIGURATION**
  - **Air Surveillance Radar**
  - **Infrared Search and Track System**
  - **Turreted Gun or Two Machine Guns**
  - **Four-Man Crew**
  - **Five-Man Apprehension Team**
- **INTERCEPT CAPABILITY VERSUS LIGHT AIRCRAFT**
  - **Only Smallest Light Aircraft are Slower Than H-60 (160 knots)**
  - **Only Turboprops and Executive Jets are Faster Than V-22 (275 knots)**
- **COST-EFFECTIVENESS**



To carry out this mission we assumed the aircraft would be configured as shown here with a radar and an infrared search and track system. It would carry a four-man crew and a five-man law enforcement team.

We measured capability for this mission by looking at the ability of the aircraft to overtake the light aircraft that might be used by drug couriers. A helicopter with a dash speed of 160 knots would be able to overtake only the smallest light aircraft, whereas the V-22 with its dash speed of 275 knots would be able to overtake all but the larger turbo prop and executive jets.

In terms of cost-effectiveness, we measured the coverage that could be provided by the aircraft for equal 20-year system costs. The coverage that could be provided within a 3-hour time period is about 1.5 million square miles for a V-22 compared to about one half that number for a helicopter. The maximum distance in unrefueled range would be nearly 5 million square miles for the V-22 and only about 1 million-square miles for a helicopter.

NAVY'S ANTISUBMARINE WARFARE

SLIDE 36:

OTHER SERVICE MISSIONS	
MISSION	**CONTRIBUTION OF ASSAULT AIRCRAFT**
COMBAT SEARCH AND RESCUE	RECOVER DOWNED AIRCREWS
SPECIAL OPERATIONS	INSERT AND EXTRACT SPECIAL OPERATIONS FORCES
DRUG INTERDICTION	TRAIL COURIER AIRCRAFT AND BOATS, DEPLOY LAW ENFORCEMENT PERSONNEL
ANTISUBMARINE WARFARE	DETECT AND ATTACK SUBMARINES

The final mission that we examined is the Navy's antisubmarine warfare mission in which the aircraft are used to carry sensors that detect enemy submarines and then launch torpedoes to attack those submarines.

SLIDE 37:

RELATIVE CAPABILITY TO DETECT ENEMY SUBMARINES			
AIRCRAFT OCEAN	**NORTH ATLANTIC**	**NORTH PACIFIC**	**INDIAN**
SV-22	1.0-1.1	1.0-1.1	1.0-1.1
S-3B	1.3	1.4	1.4

An unclassified version of our results is illustrated here, where we show the relative capability of the aircraft to detect submarines. In this case the Navy currently does not plan to replace its S-3 aircraft until the late 2010-20 period. Thus, on an equal-cost basis, the current S-3 fleet would provide 20- to 30-percent more capability than could be provided by the SV-22 alternative.

[There is no SLIDE 38 in the Congressional Record.]

SLIDE 39:

NEAR-TERM COSTS FOR ALTERNATIVE FLEETS

AIRCRAFT ALTERNATIVE	COSTS INCURRED FY 1991-1997	NET PRESENT VALUE OR DISCOUNTED COSTS	YEAR MEB ASSUALT CAPABILITY ATTAINED
V-22 - NORMAL PRODUCTION	$13.1B	$16.3B	1996
V-22 - SLOWED PRODUCTION	7.7	13.0	1998
NEW HELO	6.6-8.7	11.8-13.0	1999
CH-47M	5.8-7.9	11.6-12.8	1997
CH-60(S)/CH-53E+	8.4-10.5	13.6-14.8	1996
CH-46E+/CH-53E+	8.3-10.4	13.3-14.5	1998
PUMA/CH-53E+	9.0-11.1	13.6-14.7	1998
EH-101/CH-53E+	9.6-11.7	14.0-15.2	1997
ALTERNATIVE IN FY1990 PRESIDENT'S BUDGET	5.2	—	—

NEAR-TERM COSTS

As I mentioned in my opening statement, there is considerable concern about the near-term cost of the aircraft. We tried to take that into account in our assessment.

This is a duplication of one of the tables printed in our summary. We show the near-term costs for all of the alternatives that would be incurred in fiscal years 1991 through 1997, the net present value or discounted cost associated with the cost flow for each of the alternatives, and then the year that a typical operational capability could be attained—in this case a brigade-sized amphibious assault. At the nominal production rate that has proposed for the V-22 aircraft before the program was canceled, its cost would have been markedly higher than those for any of the alternatives, $13.1 billion planned over the 7-year period 1991 through 1997.

Given that, we constructed with the aid of the steering committee a slowed production alternative for the V-22 that would stretch the program out and procure aircraft at a slower rate than had been originally proposed. The original production rates were on the order of 40 to 60 aircraft per year. We slowed that rate to 36 aircraft per year. Doing that would reduce the near-term cost of the V-22 to just under $8 billion. Those costs would be in the range of those that we estimated for the helicopter alternatives. The alternative that was proposed in the President's fiscal year 1990 budget would amount to $5.2 billion. There are some reasons for those differences. I would be prepared to go into those during our question session if you would like. The principal effect of slowing the production rate for the V-22 would be to delay by 2 years the

time that it could have an effective operational capability from 1996 until 1998. Some of the helicopter alternatives would provide an earlier capability: a CH-60 fleet, for example, in 1996, the CH-47 or the EH-101 by 1997.

SLIDE 40:

SUMMARY

MARINE CORPS MISSIONS

- GREATER SURVIVABILITY OF V-22 AND NEW HELICOPTER PROVIDES THEM A SLIGHT TO MODERATE ADVANTAGE IN AMPHIBIOUS ASSAULT MISSION
- V-22 IS MOST COST-EFFECTIVE ALTERNATIVE FOR SUSTAINED OPERATIONS, HOSTAGE RESCUE/RAID AND OVERSEAS DEPLOYMENT MISSIONS

ALTERNATIVES TO V-22

- NEW HELICOPTER DESIGNED TO MARINE CORPS REQUIREMENTS IF WILLING TO START NEW DEVELOPMENT
- MARINIZED CH-47 IF PROBLEMS WITH QUADRICYCLE GEAR CAN BE OVERCOME AT LOW COST
- COMBINATION OF SMALLER HELICOPTERS TO CARRY TROOPSAND CH-53ES TO CARRY HMMWVs

SUMMARY OF RESULTS

A concise two-slide summary of our results is shown next. For the Marine Corps mission, we found that the greater survivability of the V-22 and the new helicopter, which we assumed to be designed with survivability characteristics comparable to those of the V-22, would provide them a slight moderate advantage in the amphibious assault mission with a range of values typical of those that we showed you earlier.

For the other three Marine Corps missions, the sustained operations, the hostage rescue, and the overseas deployment, the V-22 was clearly the most cost effective of the alternatives.

In terms of the Marine Corps missions, the next best alternative would be a new helicopter specifically designed to Marine Corps requirements if the government were willing to start a new development program at this time.

After the new helicopter, the next best alternative would be a marinized version of the Army's CH-47 Chinook. There is a potential problem with its landing gear and the ability to use that aircraft aboard ship. It would be necessary to find a solution to that problem. We were not able to examine that in detail in our assessment. After those, the next best alternative would be a combination of any of the smaller helicopters such as the H-60 Blackhawk, to carry troops and the larger CH-53's to carry the marines' equipment.

SLIDE 41:

SUMMARY (Continued)

OTHER SERVICE MISSIONS

- V-22 IS MORE COST-EFFECTIVE THAN HELICOPTER ALTERNATIVES FOR SPECIAL OPERATIONS, SEARCH AND RESCUE, AND DRUG INTERDICTION MISSIONS
- S-3B IS MORE COST-EFFECTIVE THAN SV-22 FOR ANTISUBMARINE WARFARE MISSION

NEAR-TERM COSTS

- HIGHER PROCUREMENT COST OF V-22 LEADS TO LARGEST NEAR-TERM COSTS
- BY SLOWING PRODUCTION AND LENGTHENING TIME TO FIELD AIRCRAFT, NEAR-TERM COSTS FOR V-22 COULD BE REDUCED

For the other service missions, the V-22 was the most cost effective for the special operations, the search and rescue and the drug interdiction missions. Given the Navy's plan to retain the S-3B aircraft well into the post-2000 time period, that aircraft would be more cost effective than an antisubmarine warfare version of the V-22 aircraft.

As we showed you, the higher procurement costs and the near term funding requirements in terms of facilities and production line development would make the V-22 have the largest near-term cost of any of the alternative fleets. To some extent, we could mitigate those costs by slowing production and lengthening the time to field the aircraft.

At this time, Dr. Randall and I will be glad to answer any questions you have about our work.

Senator INOUYE. Dr. Simmons, I thank you very much. Your testimony has been extremely helpful.

I am certain all of us here are aware that this special hearing was convened because of the extraordinary concerns expressed by my colleague from Pennsylvania, Senator Specter. I believe he has spent more time than any one of us in studying the cost factors, the capability and effectiveness of the Osprey. Accordingly, I will yield to Senator Specter.

Senator SPECTER. Thank you very much, Mr. Chairman. Again, let me express my thanks to you, Mr. Chairman, for convening this hearing. I think that its importance was established

when Secretary Cheney, in making a long list of proposed cancellations, put the V-22 Osprey at the top, No. 1, and I think that there have been very substantial concerns expressed in many quarters about the conflict between what Dr. Simmons has concluded and the summary rejection by the Secretary of Defense.

PANAMA

Dr. Simmons, I begin with the question as to General Pittman's statement that the V-22 would have saved lives in Panama. I would ask you whether you agree with General Pittman's conclusions that had we had the V-22, in fact, lives would have been saved in the Panama operation?

Dr. SIMMONS. Senator, I cannot answer that question directly because I have had no detailed knowledge of the Panamanian operation other than what has been discussed in the news or the print media. Certainly, the V-22 relative to the other aircraft that we examined specifically in our assessment would have considerable survivability advantages. A considerable amount of attention has been paid to the design of the V-22 aircraft that would give it a greater ability to survive hostile fire than would be the case in particular for some of the helicopter alternatives that we examined.

Senator SPECTER. With respect to a very fundamental point, there is no doubt that the V-22's landing ability would have prevented combat losses, deaths and injuries attributable to the parachuting operation.

Dr. SIMMONS. Again, Senator, I am not aware of the details, so I really cannot discuss or answer the question in that regard.

Senator SPECTER. Let me move to another high-profile item.

Senator INOUYE. Would the Senator yield? Maybe Dr. Randall can respond to that. Can you, sir?

Dr. RANDALL. I would be in pretty much the same situation, Senator. I think that is not an operation that we have analyzed at IDA and not something that we could comment on very directly.

Senator SPECTER. I will not press the Institute of Defense Analyses any further, Mr. Chairman. I think we might take congressional notice, or judicial notice, that if you can land in a helicopter, you can avoid death or injury from an airborne jump, and that those casual-ties could have been avoided. I think that attests to the conservatism and adds credibility to the testimony of Drs. Simmons and Randall when they conclude that the V-22 is a superior craft for the reasons that they have articulated. I start with General Pittman because it is on the record that the V-22 would have saved lives in Panama. I wanted to cover that point and I think we have.

HOSTAGE RESCUE

I was about to turn to another very high visibility operation, and that is the operation for the hostages in Iran in 1980. Fortunately, we have not needed another such rescue operation, but I think it is very important when we evaluate the V-22 and alternatives that very considerable attention paid to hostage rescue, as you have. While I realize that you have not made a specific study of the rescue operations in Iran in 1980, there has been considerable commentary on the

failures of the helicopters and the difficulty of moving in the rescue operation. I would ask for your generalized opinion as to the significant, if not vast, superiority of the V-22 should the United States again be confronted with a similar rescue operation as that of 1980.

Dr. SIMMONS. A representative hostage rescue or small-scale combat raid was, in fact, one of the missions we examined in our assessment. As we showed there, the speed and range capabilities of the V-22 which, as you have noted, Senator Specter, are superior to those of the helicopters would, in fact, give an advantage in those types of operations.

CRITICAL CONCLUSIONS

Senator SPECTER. Dr. Simmons, I appreciate the testimony that you have given today and the very extensive report covering approximately 1.200 pages. I would summarize for purposes of this hearing your critical conclusion at volume I, page 13, and ask if you stand by this central and critical conclusion: "The V-22's speed, range, and survivability advantages could enable even the 356 aircraft fleet"—that is the number purchased with the smaller figure—"to be more effective, sometimes significantly more and other times only slightly more, than all of the proposed helicopter alternatives in each of the four Marine missions examined."

That, I believe, Dr. Simmons, is the central issue as far as the Marines are concerned. Is that accurate?

Dr. SIMMONS. Yes, Senator; that is the principal summary statement of our report, and we continue to stand behind that statement.

Senator SPECTER. The other critical summary statement appears in Volume I, page 15, and you have covered this in extenso but I think the crisp conclusion is important. I ask the same question about the accuracy of this conclusion. I will skip to Volume [?], page 22. "The V-22 is more cost effective than helicopter alternatives for the Navy combat, search and rescue, Air Force special operations, and DoD or other Government agency drug interdiction missions."

Is that precise and accurate?

Dr. SIMMONS. Yes, sir.

COST EFFECTIVENESS

Senator SPECTER. Coming to the issue of cost, Dr. Simmons, there is a statement in the letter of transmittal from Secretary Cheney that your report's V-22 program would cost about $3.7 billion more than the Secretary of the Navy has recommended for the Marine Corps medium-lift operation.

My question to you is whether that statement excludes the budgeted cost of the heavy lift in the special operations?

Dr. SIMMONS. Yes, sir; I think it does. As I understand it and perhaps you could seek clarification from Assistant Secretary Chu later on - no funds are currently provided in the DoD budget for either the CH-53 heavy-lift or the Air Force special operations aircraft.

Senator SPECTER. Could you give us an approximation as to what those costs would be?

Dr. SIMMONS. Yes, sir; the totals that we have estimated and, in fact, the totals we show in the final table of the executive summary of our report include the costs not only for the Marine

Corps medium-lift assault aircraft but the Marine Corps heavy-lift assault air-craft, the special operations aircraft and the combat search and rescue aircraft.

Senator SPECTER. What is the figure for heavy lift?

Dr. SIMMONS. The heavy-lift CH-53E helicopter, depending on the rate at which the aircraft would be bought over the 7-year period from fiscal year 1991 to 1997, would total from $1.1 to $1.7 billion.

Senator SPECTER. How about the special operations?

Dr. SIMMONS. Again depending on the rate at which aircraft are bought for that mission, the costs would be from $0.7 billion to $1.5 billion, all in the same constant fiscal year 1988.

Senator SPECTER. And what was the third category?

Dr. SIMMONS. Navy combat search and rescue.

Senator SPECTER. What would that cost be?

Dr. SIMMONS. $0.5 to $1.2 billion, again depending on the rate at which aircraft are bought for that mission.

COST DIFFERENCES

Senator SPECTER. You testified, Dr. Simmons, with respect to the $5.2 billion figure on the alternative in fiscal year 1990's Presidential budget, and you said you might have some additional amplification to give. Would you please do so at this time?

Dr. SIMMONS. Yes, Senator. There were three principal factors that account for the differences between our estimates of the cost for a CH-60/CH-53 fleet that would be comparable to the one that the Department of Defense substituted for the V-22. The first of these factors is that we elected to stretch the configuration - the fuselage of the CH-60 so that it could carry more troops at once. This increased the near-term costs for the CH-60 but reduced the overall cost for that portion of the alternative fleet. The second area in which costs differed were the avionics assumed in the aircraft. We found in our assessment that all of the alternatives benefited substantially by having avionics comparable to those planned for the V-22. The greatest benefit comes from increasing the ability of the aircraft to operate at night, particularly by the provision of the infrared night piloting system. This feature would make all of the aircraft substantially more survivable than they would be without that type of avionics. As a result, we elected to include the costs for those avionics in the summary table that we showed in the front of our report. The option of using less capable avionics in all of the aircraft, including the V-22, was also examined in the study and the same relative rankings obtained for the alternatives; namely, that the V-22 was slightly to moderately more cost effective than the helicopter alternatives.

The third factor that accounts for the difference in the costs are increases in the estimated procurement cost for the CH-53 heavy-lift helicopter. In the interval since, the Department's estimate for the costs of the CH-60/CH-53 fleet were prepared, the contractor that builds the CH-53 for the Government has indicated that the costs of that aircraft would be $5 to $7 million higher than was last reported to OSD.

So those are the principal factors that made our fleets more expensive than the alternative proposed by the Department.

COMPARABLE COSTS OF ALTERNATIVES

Senator SPECTER. Dr. Simmons, where you have projected the cost of the V-22 at the slow production, what would be the comparable cost of some alternatives? You have testified that in order to perform the functions of the V-22 you are going to need a combination of the CH-53's and the CH-60's; if you add those two together, what cost figure do you get in the comparable period?

Dr. SIMMONS. At the production rates we assumed, those costs would be as we showed in the summary chart. I believe the numbers were on the order of approximately $8 billion, give or take.

Senator SPECTER. For the alternatives, $8 billion, contrasted with $7.7 billion for the V-22 at the slow production rate.

Dr. Simmons, when the results of the Institute of Defense Analyses were disclosed, a statement was made on behalf of the Secretary of Defense, Mr. Cheney, by Mr. Pete Williams, saying that the Secretary disagreed with the assumptions of the Institute for Defense Analyses. Did not the Department of Defense have total opportunity to question your assumptions or to provide additional information at every stage of your proceeding?

Dr. SIMMONS. Yes, sir; I would say they did. As I mentioned in my opening statement, we interacted five times during the course of the study with our steering group, of which more than half the members of the committee were members of the Secretary's staff.

Senator SPECTER. Mr. Chairman, there are many, many more questions, but that is the distillation of the highlights. And my suggestion would be that if we hear from Dr. Chu, I would like to reserve the balance of the questions until Dr. Chu has a chance to present the essence of his conclusions, and then really get a more effective contrast of the expert judgments. So I would limit my questions at this time to the ones that I have asked, which are relatively minimal.

Senator INOUYE. Do you wish to have Dr. Simmons remain here?

Senator SPECTER. Yes, Mr. Chairman, I think that would be the better process, so that he could hear Dr. Chu. And where there are differences, we can crystallize them in the course of the hearing.

Senator INOUYE. Would you favor us with your presence?

Dr. SIMMONS. Yes, sir.

Senator INOUYE. Thank you very much, sir. I have a few questions here. Your study shows that the unit cost of the Osprey for the first 12 will be $123 million.

Dr. SIMMONS. I think one has to exercise some caution, Senator, in making the divisions from the cost numbers that we have shown. If one were to include that portion of the nonrecurring, one-time facilitization and production line setup expenses, then, yes, sir, that division would be accurate. We typically take the one-time costs out and set them aside to be added up later. And I believe what would be called the recurring costs for the aircraft would start out at around $80 million per aircraft, and then rapidly drop off to $30 million to $35 million. And, in fact, over a 356 to 400-aircraft buy, the average cost would be about $35 million.

CH-53

Senator INOUYE. In your study, it appears that the depot maintenance costs for the CH-53E are about 28 percent higher than that of the V-22. Considering that the Osprey is a bit more sophisticated than the helicopter, how do you explain this difference?

Dr. SIMMONS. Well, in estimating not only the depot level costs, but all of the operating and support costs for all of the aircraft, we used the same cost-estimating methodology in all cases. That methodology was one that had been originally developed by the Navy specifically to estimate the cost of rotary wing aircraft. The cost analysts who worked with me on the study obtained that model from the Navy, went through it in detail, collected all of the necessary inputs, and estimated the cost based on the characteristics reported for the aircraft.

I think one factor that needs to be taken into account is that in our analysis in the cost that you are describing, the V-22 and the CH-53 would be assumed to have the same avionics. So one of the principal differences between the V-22 and the current aircraft would have been removed in estimating those costs.

As to whether the V-22 is considerably more complex, I am not sure I would go that far. The two aircraft—the CH-53 and the V-22 —are approximately the same size within a few thousand pounds. Both of them are around 30,000 pounds empty weight aircraft. And I am not sure there would be that much difference in complexity. One of the factors that could be contributing to the difference in the depot level maintenance costs would be the fact that the CH-53 has three engines and the V-22 has only two. And engine costs could contribute a substantial amount to that.

Senator INOUYE. Why did you assume that all the aircraft considered would have the same avionics?

Dr. SIMMONS. We considered actually, Senator, a range of avionics in the aircraft. We wanted to eliminate from the argument the differences in capability that would result from differences in avionics. So at the extreme end we assumed that all of the aircraft would have avionics comparable to those of the V-22, which, as you know, has about $2.6 million per aircraft planned for the avionics suite.

As a percentage of the total aircraft costs that is a relatively small amount of average procurement devoted to avionics. It is something on the order of 8 to 10 percent.

As you know, some of our other more modern aircraft have substantially greater amounts of avionics. So we did not think that the V-22 type avionics was a dramatic departure in fitting that into all of the aircraft. But we went ahead and looked at other levels of avionics, leaving out some of the items that have been planned for the V-22 and seeing how the aircraft would operate with those.

As I mentioned earlier, one of the big differences was in the capability of the aircraft to operate at night. The infrared night piloting system planned for the V-22 and included in that set of avionics provides substantial night operations capability that results in greater survivability for the aircraft. And those results were apparent in the effectiveness results that we calculated for the amphibious assault mission.

Senator INOUYE. Dr. Simmons, as I have indicated, if you could step aside for a few minutes, we would appreciate it very much.

DEPARTMENT OF DEFENSE

STATEMENT OF DAVID S.C. CHU, ASSISTANT SECRETARY OF DEFENSE FOR PROGRAM ANALYSIS AND EVALUATION

Senator INOUYE. And now, may I call upon Dr. Chu, the Assistant Secretary.

David Chu, Assistant Secretary of Defense for Program Analysis and Evaluation.

Secretary Chu, we are very happy to have you with us, sir.

Dr. CHU. Thank you, sir. Good morning. I do have a longer statement, which I would like to submit for the record if I may.

Senator INOUYE. It will be made part of the record.

Dr. CHU. Thank you.

And I would attempt very briefly to summarize the principal points behind the Department's position on this aircraft, particularly in light of the IDA study, before responding to your questions.

COST CONCERNS

As Mr. Cheney has stressed, the fundamental difficulty with the V-22, as far as the Department of Defense is concerned, is the high up-front investment costs that are involved. If you translate the costs in the IDA report into today's dollars, fiscal year 1990 dollars, and look at the 356-aircraft buy averaged over the life of that program, this aircraft will cost us on average about $42 million apiece. The hope from the beginning with this program has been that one could amortize the high up-front investment costs with smaller operating costs at some future point. Speaking frankly, the Department's track record in estimating future operating costs of new systems is not splendid. And in general, people tend to underestimate, even with the best intentions and the best models, what future operating costs are going to be.

The difficulty here is you are comparing a new system and its unknowns and uncertain-ties, the V-22, or a new helicopter, which was also looked at in the IDA study, with a series of systems with which the Department has a great deal of experience. And there is great doubt that one would ever realize the kinds of operating cost savings necessary to offset the up-front investment costs. Even if one did, it would be well beyond the year 2000, perhaps 2010 or 2015, before you saw a break-even point, and ignoring the fact that one is always more worried about money today than money tomorrow.

Perhaps more to the point, as Mr. Cheney stressed in his testimony to you just last month, the department's difficulty, as you all appreciate at least as well as we do, is how to manage in the decade of the 1990's with substantially less funds than it has previously enjoyed; how to do reasonably well in that fiscal climate with its most important missions; how to avoid letting "better" be an enemy of "good enough."

We have to do reasonably well, not perfectly, with these major missions with a lot less money than we have had before, and a lot less money than people had previously planned on when this aircraft development program was launched in the early 1980s. And, in fact, as Mr. Cheney stressed in his testimony, relative to the fiscal profile that pertained last year when he made his decision to cancel this program, the Department's top line in terms of the President's recom-

mended numbers for fiscal years 1990 through 1994 has fallen by $167 billion, the equivalent of roughly one-half to two-thirds of a year's budget for the Department.

And in fiscal year 1991 alone, $22 billion has been removed. That top line, as you all appreciate, is substantially higher than the Congress is likely to enact for the Department. The Senate Armed Services Committee has, as we are all aware, removed approximately $18 billion from the fiscal year 1991 number already in its mark.

Therein lies the great difficulty with proceeding with this program. As the Secretary stressed in his letter, relative to what the Secretary of the Navy would recommend we spend on the medium-lift requirement, setting aside heavy-lift and other missions as separate issues, you would need almost $4 billion more in the period 1991 through 1997 than the Navy is prepared to spend on this mission, even at the President's fiscal numbers, which are higher than the Congress is likely to sustain in the end. Moreover, it would take you to about 2009 to finish buying the aircraft, even for the smaller IDA buy, and at the slower procurement profile that IDA has identified in its summary report.

What this would compel the Department to confront are a series of very painful tradeoffs to find the several billion dollars necessary to sustain that buy, not only in the period 1991 through 1997, but in the years beyond. The Secretary specifically pointed to the clear tradeoff within the amphibious mission area, which is whether we have enough money to buy both the ships that the Marines need and the aircraft, if we go for an elegant aircraft solution.

I think the essence of the Secretary's decision a year ago and his reconfirmation of that decision today has been to try to preserve sufficient funds so we could have a reasonable amphibious lift shipbuilding program, and a reasonable helicopter lift program for the Marines. If we instead select the V-22, what we are doing is driving some other important element out of the Department's budget or limiting our ability to afford it. And one of the things the Secretary has pointed to that we would have to consider is whether we can afford the kind of amphibious lift that we would need to get the troops to the theater of operation in the first place, however elegant the method then used to get them ashore.

STUDY ASSUMPTIONS

Now let me turn to the study itself. As in any study, as I think the questions here have elicited already, the conclusions are a function of the assumptions that one makes. And I think there are three broad assumptions or sets of assumptions that are useful to focus on in thinking about the conclusions this study has reached.

V-22 PRODUCTIVITY

One is that for the V-22 itself, what IDA has done in its smaller buy, the 356-aircraft buy, is, in essence, assume much higher productivity from the V-22 than the Marine Corps itself has heretofore been willing to assume in positing landing requirements in its studies.

A key element in that productivity is flying the aircraft at fairly high speeds with external cargo loads. There had been some doubts earlier about whether that was wise or feasible. There still, in fact, remain some things that have to be tested and proven out. And obviously, there is the doctrinal question of whether the Marines want to move to the kind of sortie rate implied by

the 356-aircraft fleet. It is a higher sortie rate than even their most recent amphibious lift study has identified as being their standard.

HELICOPTER PRODUCTIVITY

On the other hand, as far as the helicopters are concerned, I think the study limited helicopter productivity relative to their potential by a number of different assumptions. One of them is this question of whether you can carry, and to what extent can you carry, two vehicles externally as cargo under the larger helicopters, the CH-53 and the CH-47, or what is called dual-sling loading in the study.

I think some perspective on this issue is helpful. A year ago at this time, although the concept was tested in 1985 by the Marine Corps and viewed as promising, based on the limited tests that were done at that time, dual slinging was viewed as a heretical proposition. In the year that has elapsed, the Marines themselves in their latest lift study have come to the conclusion that one-half the time one could dual-sling load such cargo and the other one-half of the time carry only one vehicle per helicopter.

This is an important assumption in differentiating the productivity of the helicopters from that of a V-22 force. The larger helicopters could carry two vehicles apiece. To the extent they can carry two more frequently, they would be more productive, and you cut the size of the helicopter fleet that you need.

A second assumption that limits helicopter productivity is the issue of how many troops are carried internally in a helicopter. To take an example, as I understand the study at least, typically, when the CH-47 is used in the study, only 24 troops are carried internally. The helicopter is capable of carrying 42 troops.

Why were 24 assumed?

That is the Marine Corps standard, and it was not challenged in the study.

A third assumption that is important in the results is the doctrinal view that troops move first, then vehicles. This is an assumption that I think, on a net basis, disadvantages helicopters vis-à-vis the V-22. You basically have a certain amount of helicopter capacity waiting in the all-helicopter cases until all the vehicles are moved.

A fourth assumption that I think has an important effect on the results is the use of what is called the HMMWV, the high-mobility multipurpose wheeled vehicle, which is the small truck to which the Marine Corps has moved for its payloads. That, in essence, is the big element in cargo movements from ship to shore.

If one were willing to consider going to a smaller vehicle and downsizing some of the cargo payloads that are now put on that truck, which the Marine Corps is examining, to be fair about it—it is currently debating an operational requirement for just such a vehicle—such a vehicle could fit inside many of the aircraft, now being discussed, as opposed to being carried externally. This would have a significant effect on the cargo-carrying capability of the different alternatives. I think it would reduce substantially the size of the helicopter fleet one would have to have in order to move the same force from ship to shore.

Finally, we would have some quarrel and this is really an empirical matter about which we are still engaged in dialog with IDA regarding the reliability assumptions that are made in the

study, vis-à-vis the helicopters. I think we would argue they are somewhat more reliable than they have been assumed in the study to be. That also affects the kind of results that one gets from the study.

DISCOUNTING

The third broad class of assumptions to which I would call attention is the focus in the study on undiscounted costs. The alternatives were developed before any attempt was made to even out the differential time streams by applying discounting. So that one does not get the same appreciation of the cost problem as one does by focusing on the large upfront, near-term investment costs associated with the V-22, as opposed to the hoped-for long-term savings that it might produce.

And as a further element of that, one does not, I think, as much consider the uncertainty that is attached to the operating support costs of the V-22 as ought to pertain.

SUMMARY

To sum up, the Secretary has stressed repeatedly, I believe, that he views the V-22 as a potentially interesting aircraft. He is not criticizing the airplane. It is simply a matter that the Department cannot afford the near-term, up-front costs of buying this aircraft. And I think it is important to put its attractiveness and its many fine features into that perspective.

I think one of the very interesting conclusions in the IDA report is that all the alternatives, including the helicopter alternatives, generally perform better than the current force, often substantially better. And so this is not an issue of whether the Department is going to upgrade medium lift for the Marine Corps. The debate is over the best way in which to do that what is the best way, in particular, in light of the very severe fiscal constraints the Department faces in the coming years.

Thank you, Mr. Chairman.

[Dr. Chu's prepared statement follows:]

STATEMENT OF DR. DAVID S.C. CHU

Mr. Chairman, Members of the committee:

Good morning. I am David Chu, the Assistant Secretary of Defense for Program Analysis and Evaluation. I am here at the request of the Subcommittee, and I will do my best to answer your questions concerning the Department of Defense's position on the V-22 program in light of the draft IDA study report that has been provided to you.

To summarize the Department's position: The V-22 program even the scaled-down version in the IDA study remains unaffordable in today's budgetary climate, which is likely to become even more stringent. While the V-22 has many positive attributes that no existing helicopter can match, it is still a tactical transport that would cost about $42 million per copy in today's dollars.

The major problem with the IDA study is that it attempts to optimize the use of resources at levels much higher than those now planned for the missions it examines, whereas the Depart-

ment's problem is to find ways of performing the most critical missions at acceptable levels with considerably smaller resources. More specifically:

- The up-front costs of the V-22 significantly exceed those of the helicopter alternatives. (IDA does not seem to disagree on this basic point.)
- Offsetting long-term savings associated with the V-22 option are dubious and would accrue gradually over many years to the extent that they occur at all.
- The alternative helicopter forces perhaps in smaller numbers at lower investment and operating costs can perform the higher-priority DoD missions at acceptable levels.
- In fact, all of the helicopter forces examined by IDA do better than today's force: thus the issue is how much more performance we should seek.
- Viewed in that broader context, the V-22's acknowledged advantages diminish in attractiveness.
- And the V-22 versus helicopter comparison is inapplicable for two of the missions treated in the study because DoD does not currently plan to buy mare aircraft of any type to support these missions.

The attached paper elaborates on these points and provides additional material on the DoD position. In this paper we have generalized for brevity and to provide an unclassified discussion. We have attempted to do so fairly.

I would be delighted to answer your questions.

DOD POSITION ON V-22 IN LIGHT OF THE IDA STUDY

Introduction

- The Institute for Defense Analyses (IDA) study of the V-22 and helicopter alternatives was directed by the Congress; the Congressional tasking also mandated coverage of several potential V-22 missions that had not previously been considered.
- The study provides a lot of new information on the cost-effectiveness of the V-22 versus helicopter alternatives, but it does not support reversal of Secretary Cheney's decision to cancel the V-22 program on the basis of affordability.
- The decision to terminate the V-22 was made in the context of an overall Defense program that was considerably larger than the FY92-97 program now being developed by DoD, which many In Congress argue should be reduced further.
- The principal shortcoming of the IDA study is that it focuses on optimizing the use of a resource level that is far higher than DoD will receive. DoD's challenge is to figure out how to accomplish its most important missions—perhaps less well than would be possible with more resources—while achieving substantial savings.
- Moreover, the IDA study assumes we can change operational practices to play to the V-22s major strengths but downplays the advantages of the larger helicopters in the alternative forces. For example:
- In its primary sizing case—opposed Marine Corps helicopter assault—the V-22 flies at a sortie level almost 50% higher than the rate posited in the Navy's most recent amphibious lift requirements study. To achieve this sortie level, V-22 must fly at speeds

approaching 200 nautical miles per hour, with externally carried loads, without damage to that cargo.

- The substantially greater payload of the CH-53E and CH-47M helicopters at ranges out to 200 or 300 NM is given relatively little credit (e.g., the CH-53E requires one-fourth fewer sorties to move HMMWVs, although this does not change the number of CH-53s bought for IDA's equal-cost forces).
- While these large helicopters are more vulnerable than the V-22 to enemy small arms fire, it should be noted that we already have CH-53s for demanding combat missions Marine Corps helicopter assault and special operations behind enemy lines and we are also buying MH-47Es for special operations.

- The remainder of this paper deals first with near-term and long-term cost aspects of the IDA study: it then discusses separately seven of the mission areas covered in the study: and it concludes with some brief observations concerning commercial applications of the V-22. In summary form, the following key points are made:
  - The up-front costs of the V-22 significantly exceed those of the helicopter alternatives.
  - Offsetting long-term savings associated with the V-22 option are dubious and would accrue gradually over many years to the extent that they occur at all.
  - The alternative helicopter forces perhaps in smaller numbers at lower investment and operating costs can perform the higher-priority DoD missions at acceptable levels.

Near-Term Costs

- The driving factor underlying the V-22 cancellation decision was the comparative "up-front" investment cost of the V-22 versus an alternative force of helicopters that was judged capable of performing two of the three military missions posited for the V-22 - Marine Corps helicopter assault and Navy search and rescue—reasonably well. (The third mission, extraction of special operations teams at ranges beyond helicopter capabilities, was simply eliminated as unaffordable.)
- The previously noted higher V-22 sortie rate (coupled with lower assumed peacetime attrition and modestly offsetting changes in lift requirements) results in a much smaller Marine Corps V-22 force than was under consideration when the program was terminated last year (356 versus 552 aircraft, a decrease of 36%).
- Even this downsized V-22 program would cost considerably more to buy in the up-coming program period than the same fraction of the equal-cost helicopter fleets developed in the IDA study.
- Over FY91-97, the IDA study posits buying 86 V-22s for Marine Corps missions (24% of the Marine Corps total of 356) at a cost of about $5.6 billion (FY88 $).
- The cost to buy the same 24% of the study's larger CH-47M, CH-53/60 and CH-53/46 fleets would range between $2.7 billion and $3.3 billion.

Long-Term Costs

- In the IDA study, the up-front costs of the V-22 are offset by the larger operating costs of the alternative helicopter forces over roughly the next 20 years.

- V-22 operating costs per aircraft assumed in the IDA study are slightly higher than those of the helicopters, as shown below (in FY88$)
  - $2.28 million per year for the V-22
  - $2.13 million per year for the CH-47M helicopter
  - An average of $2.14 million per year for a mix of CH-53 and CH-60 helicopters
- Helicopter force operating costs are increased in the IDA study through buying helicopters in considerably large numbers.
  - To some extent this is an artificiality of the IDA study's "equal cost" methodo1ogy—it keeps buying helicopters until the sum of acquisition and operating cost is even.
  - Whether helicopter forces of the resulting size would be needed is unclear, as discussed later.
- Two other points should be noted on this approach to determining force costs:
  - Future operating costs of the V-22 are more uncertain than those of the better-known helicopters. Whether the V-22 force will really cost less than IDA's much larger helicopter forces is simply unknown at this time.
  - Even if V-22 force operating costs are considerably lower, the savings thus generated would accrue in small annual increments that would not "break even" until 2015-2020. The annual operating cost for IDA's Marine Corps V-22 force of 356 aircraft would be about $530 million in FY88 dollars; IDA's 527 CH-47Hs and its mix of 525 CH-53 and CH-60 helicopters would both cost about $730 million per year. (Operating costs are only computed for 65% of each force that is actually operational; the remaining 35% are for "pipe-line" and peacetime attrition.)

Marine Corps Aerial Assault

- The MEF-size amphibious assault constitutes the most important prospective V-22 mission.
  - It determines the size of the total Marine aircraft buy (other elements are essentially developed proportionally).
  - And the Marine buy was 84% of DoD's previously planned V-22 acquisition (552 out of 657 aircraft).
- If one accepts as inviolate statements of lift requirements and aircraft load restrictions, and if one credits the V-22 with roughly 50% greater productivity than helicopters due to its speed/sortie rate, then the sizes of equal-cost helicopter fleets developed in the IDA study are correct.
- But if one changes productivity and requirements/loading assumptions the V-22 and helicopter forces converge in size.
- In fact the IDA study identifies the CH-47M as the best existing helicopter alternative to the V-22.
- This aircraft, although slower than the V-22 by a factor of 30 to 50%, is also capable of carrying payloads roughly 50 to 70% greater than the V-22 out to ranges of around 300 NM (allowing a round trip at the longest amphibious force standoff distance treated in the study, 100 NM).

  - The CH-47H can carry up to 42 troops, whereas the V-22 can only carry 24.
  - The CH-47H can also carry the High Mobility Multi-purpose Wheeled Vehicle, the dominant equipment item moved by the V-22 and alternative helicopters and 24 troops besides; the V-22 cannot do so.
  - If the HMMWV were replaced by a smaller vehicle, it could be carried internally by the CH-47H, producing greater mobility and firepower early in an assault. The V-22 can also carry a small HMHWV internally, but with only 11 troops vice the desired load of 24. (Aircraft carrying externally slung loads are more vulnerable as they must hover longer prior to landing; since the current HHMWV must be carried externally by all candidate aircraft, a potentially significant combat advantage could accrue to aircraft that can carry a smaller vehicle internally.)
- If one were to fully exploit the CH-47M' s larger troop-carrying capacity by moving 42 versus 24 troops in the initial assault phase of the operation, IDA's CH-47M force could be reduced by about 8%.
- If in addition one assumes that all HMMWVs can be carried in double loads (e.g., a smaller version internally and a regular one externally), then the CH-47M force could be cut by about 40%.
- If one instead assumes that only 30% of the aerial assault force's HMMWVs are converted to smaller versions that can be carried internally by the CH-47M along with 24 troops—to provide greater mobility and firepower early in the assault phase—then the CH-47H force could be cut by about 20%
- Another way of reducing helicopter loads would be to "double-sling" HMMWVs from the larger helicopters. (This concept has been tested on the CH-53 but not on the CH-47M, although the latter aircraft has the load-carrying capacity. The IDA study's base case assumes double-slinging of half the CH-53E's HMMWV loads.)
- While the IDA study suggests that the CH-47M is the existing helicopter that would cost least for approximately equivalent aerial assault capability, it is also likely that more flexible usage of the CH-53E and/or adoption of a small HMMWV would produce CH-53/60 and CH-53/46 helicopter combinations that could perform the aerial assault mission acceptably with smaller numbers than IDA computed on an equal cost basis.
- Regardless of whether we buy V-22s or helicopters for Marine missions, the "small HMMWV with troops" option should be examined carefully. (In the IDA study this concept only appears as an excursion.)

Sustained Marine Corps Operations Ashore

- "Requirements" for tactical airlift in support of combat operations are highly scenario dependent and therefore inherently soft.
- The IDA study's examination of this mission area is based on an Army study that assumed operations over a much larger area than would be typical for the Marine Corps following a MEF-sized amphibious assault.
- If larger forces and areas are involved, it is reasonable to assume tactical airlift support by Army helicopters and Air Force C-130s—forces we plan to have in any event.
- As shown in the IDA Study, the Marine helicopter forces perform fairly well in more confined areas.

- Out to radii of operation of around 150NM, for example, the CH-47M has 50 to 70% better troop and cargo-carrying capacity than the V-22, which could be important in some situations. The slower speeds of the helicopters are less important over short distances.

- A critical factor driving the greater productivity of the V-22 is its higher utilization rate and ability to carry relatively small payloads over longer distances due to its speed. Again, this advantage shrinks as areas of operation become smaller.
- The study seems unduly pessimistic about the assumed utilization rate of the helicopters. For example, it employs the CH-47M at a rate of 1.7 hours per day, whereas Army data for the CH-47D suggest that a rate of 4 hours per day could be achieved.

MEU/SOC (Marine Counter Terrorist) Operations

- For this mission the IDA study looks at a specific scenario involving rescue of 50 hostages from a location within range of a Marine force embarked in amphibious ships.
- In this case, the V-22's speed, longer range, and assumed greater reliability confer advantages on the order of 5 to 7 hours in response time, which the study points out could be critical to mission success if the terrorists were to discover that the hostages' location had become known.
- Situations where this extra degree of responsiveness would be critical could of course occur, but they might not occur very often.
  - It is much easier to foresee cases (assuming any intelligence is available in the first place, the real problem here) in which neither a V-22 or helicopter equipped Marine force could respond in time, or in which both forces could.
  - If one makes less pessimistic assumptions about helicopter reliability, the response time advantage of the V-22 over the CH-47M drops to about 2 hours. If one further assumes random location of the amphibious group within 2 days steaming time of the hostages' suddenly-revealed position, and that use-ful intelligence expires linearly over the two day period, then the overall probability of mission success is on the order of 3% greater for a V-22-equipped force than for a CH-47M-equipped one.

Deployment Capability

- The IDA study points out the V-22's capability to "self-deploy" to considerably greater ranges than the alternative helicopters can achieve. While this is an acknowledged V-22 advantage, it should be put into context.
- The V-22 force does not entirely "self deploy;" at extremes of range it cannot carry any of the additional ground support equipment needed to operate, which must be airlifted by other aircraft.
- The overall difference in strategic airlift required to move a MEB-size force equipped with V-22s versus helicopters is small. For example, the percentage of projected airlift capacity generated over 20 days in moving to materiel pre-positioned on MPS shipping would be:
- 1.66% for a V-22 equipped MEB
- 1.77% for a CH-47H equipped MEB

- 2.04% for a MEB equipped with a mix of CH-53s and CH-46s

Special Operations

- DoD had planned to buy 55 V-22s for special operations, largely for long-range extraction of SOF personnel. (The V-22 can make such pick-ups at distances 40 to 70% beyond the capabilities of the helicopter alternatives; the HC-130 can insert and re-supply Special Forces at considerably longer ranges than either helicopters or the V-22 could retrieve them.)
- In this case, the decision was made simply to forego the capabilities brought by V-22 to this mission, relying on shorter-range helicopters already bought, or being bought, for SOF airlift, together with the longer-range HC-130s. Major savings on both acquisition and operations resulted from this decision.
- With the sizable investment already made, or planned, to build up SOF airlift capabilities, DoD can meet a substantial majority of currently postulated requirements.
  - Due to changes in world conditions and US force planning concepts, these requirements—particularly for long-range operations—are being re-evaluated.
- In the absence of firm, critical needs for extracting special operations forces in the range interval made feasible by the V-22, DoD's decision not to spend the IDA study's nominal 16 billion (or any other large amount) for either the V-22 or a lesser-capability helicopter force remains sound.
- In fact, IDA's results could call into question our decision to procure HH-47s; the study suggests that we might need a greater proportion of aerial tankers relative to helicopters.

Search and Rescue

- When the V-22 program was terminated, 50 H-60 helicopters were substituted for the 50 V-22s programmed for the Navy's search and rescue (SAR) mission (a variant of the H-60 is used by the Air Force for this mission).
- Considerable savings also resulted from this decision, although the loss in SAR capability was clearly recognized.
- While the V-22's SAR capabilities are superior in the cases examined in the IDA study, in other situations the difference could be less pronounced, e.g., when search speed is reduced to account for weather or light conditions.
- Overall Navy priorities for keeping carrier force levels up, and combat aircraft inventories modernized, effectively preclude expending additional resources to re-institute a V-22 buy for the SAR mission.

Drug Interdiction

- This is another case in which IDA did the best it could in examining V-22 or helicopter use in a new mission area, but appears to have focused somewhat too narrowly.
- DoD does not buy any aircraft explicitly for drug interdiction; instead it assists other government agencies in counter-drug operations, employing ships and aircraft procured for military purposes.

Commercial Applications

- Some supporting the V-22 cite its potential to give US industry the dominant role in what is asserted to be a lucrative commercial market, thus generating thousands of jobs and improving the U.S. balance of trade.
- This may or may not be an accurate forecast, but it should be noted that DoD has already, funded V-22 R&D amounting to more than $12.3 billion; it is not clear that further subsidy is needed.
- Moreover, if there were a profitable commercial market, presumably the V-22 consortium would stake its own money on behalf of such an enterprise. One has to believe that Boeing, a partner in V-22 and a world leader in aviation, with a proven track record of judging which are the profitable investments, would fund a commercial development if it were indeed an attractive proposition.

[End of prepared statement]

Senator INOUYE. Thank you, Mr. Secretary. Senator Specter.

Senator SPECTER. Thank you, Mr. Chairman.

SURVIVABILITY

Secretary Chu, do you disagree with General Pittman's conclusion that the V-22 would have saved lives in Panama?

Dr. CHU. I am not aware of his statement on that matter, sir. And I think I would be careful not to get into what could be construed as an inter-service rivalry on who was best equipped to carry out that particular mission.

Senator SPECTER. Well, the absence of General Pittman would certainly facilitate no inter-service rivalry.

Dr. CHU. Excuse me, sir?

Senator SPECTER. Keeping General Pittman away from these hearings helps out.

Dr. CHU. I am not quite sure what you are referring to.

Senator SPECTER. Let me begin again.

I represent to you that General Pittman said that the V-22 would have saved lives in Panama. Do you disagree with that conclusion?

Dr. CHU. I am not sure I could assess that conclusion without looking at the details of the actual operation and what kind of aircraft were or were not used. The V-22, of course, was not available in that particular timeframe.

Senator SPECTER. Are you aware of the loss of lives and injury in Panama, which resulted from parachuting operations?

Dr. CHU. Yes, I am.

Senator SPECTER. Would the V-22, which eliminates the necessity of parachuting, have saved lives and injuries?

Dr. CHU. Not necessarily. I think that is an important point. It raises a very interest-ing question. I think it is important to stress that, as the IDA study shows, all aircraft take losses in these operations. The issue is what is the relative loss. I would argue the differences are modest. But you are not going to conduct these operations without losses.

And so the issue you are raising is, would we have fewer losses if we used an aircraft approach, specifically V-22, as opposed to paratroopers. Without some careful calculations, and I am sure some quite energetic inputs from the Army, I would be unwise to speculate on which one is the better approach.

Senator SPECTER. So you say there would be modest differences, but differences nonetheless?

Dr. CHU. No, sir; that is not what I said.

Senator SPECTER. Wait until I finish the question, Dr. Chu.

Dr. CHU. Excuse me.

Senator SPECTER. And I will not interrupt your answer.

So you say there would be modest differences, but necessarily some differences, in loss of life and injury if you had the V-22, contrasted with not having it?

Dr. CHU. No, sir; what I said was that the IDA study indicated that you would have losses with all aircraft. Essentially, in terms of what the study focused on, the only difference in losses were to small arms fire. I would view the size of those differences as modest.

They are a function of whether the operations are at night or in daytime. The differences are much reduced at night. They are a function of the kind of terrain. They are a function of the specific assumptions IDA made about the altitude at which the aircraft flew. IDA did not, in fact, have the helicopters flying nape-of-the-earth operations, which would presumably reduce losses when carrying troops. The differences are a function of the reaction time one assumes for small arms fire.

My statement goes to what IDA found in its report. To the larger question you are raising, would we be better off eliminating paratroopers from the nation's military force structure and buying the V-22, I think I would defer in trying to speculate on what the answer to that question would be.

Senator SPECTER. All right. Apart from the obvious conclusion that there are no parachuting losses if a helicopter lands the troops, let us go to the report of the Institute of Defense Analyses specifically and pick up the comment on page 13:

The large CH-53E and CH-47M helicopters are 1.7 to 3.5 limes more likely to be downed by enemy air defenses than is the V-22.

Do you disagree with that very important finding?

Dr. CHU. I think I disagree with the implication you would like to draw from it, sir. No one disagrees with the specific calculations IDA has made. The absolute numbers are classified. I think when one looks at the absolute numbers, one puts these proportional differences into perspective. I think it is also important to stress that those numbers are a function of the assumptions made in the study.

Specifically, in the study, if I understand it correctly, the reaction time assumed for enemy small arms fire is right at the edge of the speed envelope of the V-22, such that, in fact, the enemy gunners do not have much chance against the V-22, and that accounts for its small losses. As-

sume a faster reaction time and the helicopters will look better relative to the V-22. Assume a slower reaction time and everybody is going to look great.

The other thing I think important to stress in this debate is, as the study indicated, that all aircraft in these operations are going to take losses. The CH-53, as I think you appreciate, sir, is going to be used in these operations in any event, whatever decision is made on the V-22. In the Marine Corps' earlier calculation of requirements, just under 30 percent of all sorties have to be flown by the CH-53 because it is the only aircraft either it or the CH-47 that can carry the heavier loads, the artillery, the larger trucks, the light armored vehicles that in earlier landing scenarios the Marine Corps planned to use.

So the CH-53 is going to be present, and we are going to endure losses for that aircraft whatever choice is made on the V-22. And the other point that I think is important to stress is we will have losses for the V-22 as well. It is not invulnerable.

Senator INOUYE. Will the Senator yield?

Senator SPECTER. Yes; I need time to reread the answer in any event, Mr. Chair-man.

Senator INOUYE. I gather that you may have classified information, which could materially affect the outcome of our decision. If you wish to submit such classified information we would be very happy to receive it in our secure facilities.

Dr. CHU. I would be delighted to, sir.

Senator INOUYE. Senator.

Senator SPECTER. Well, I am not going to pursue the question, except to restate the IDA conclusion about the high level of downing of the 53's and the 47's. And no one denies that there is a V-22 problem, but the comparison is very plain. There are so many questions to be covered that I think it not advisable to reanalyze your answer in terms of the question.

PRODUCTIVITY

You have testified, Secretary Chu that the higher productivity assumed by the Institute of Defense Analyses is higher than the Marine Corps has been willing to assume. Let us cut right to the core of the issue to General Gray, the Commandant's position, summarized in the Navy Times on March 5, 1990, "Gray: The V-22 substitute scheme is ridiculous."

Now the Marines have testified on many different occasions about their very, very, very, very, very strong preference for the V-22. Do you disagree with General Gray that all of the proposed alternatives, all the proposed substitute schemes are ridiculous?

Dr. CHU. Yes, sir; I respectfully do. After all, we are living with one of those substitutes—the least attractive alternative in the IDA study—today, and that is the current fleet. I think one of the very important points the IDA study makes is that the current fleet really ought to be replaced. Then the debate begins on what the replacement should be. What Mr. Cheney endorsed a year ago at this time was an alternative that had long been viewed as the Marine Corps', if you will, fallback position if it did not get the V- 22. That is, a combination of CH-60's—a fairly modern helicopter, with the survivability advantages of more modern helicopters, and that the Army is buying today and using today, and plans to use for a long time to come for combat assault—and additional CH-53's to carry the heavier materiel, specifically the HMMWVs.

There may be other alternatives that are just as good in the helicopter class, just as good or better than that one. In fact, I think the one, at least to my reading of the IDA report that comes out as the alternative that clearly merits further consideration is some variant of the CH-47. This aircraft, as I know you are aware, is being pursued today for use by the special operations forces in the form of the MH-47E variant, with highly sophisticated avionics aboard.

This aircraft, in fact, has the advantage of a very large payload, not as fast as the V-22, not as modern in terms of survivability enhancements as a CH-60, but it is a very attractive alternative, at least as presented in that study. So I would have to disagree with General Gray's view. I, more keenly than anyone, I think, appreciate how much the Marine Corps would like to have this airplane. Mr. Cheney's decision is simply that we cannot afford it in this decade.

V-22 COSTS

Senator SPECTER. Secretary Chu, the transmittal letter from the Department of Defense of the IDA report states that the smallest V-22 program contained in the report would cost about $3.7 billion more than the Secretary of Navy has recommended for the Marine Corps medium-lift aviation. It is difficult to come to a precise minimal characterization, but I would suggest that this is misleading, if not disingenuous. Because there are other functions, such as the heavy lift and special operations, which are comprehended within the V-22 mission. So when you put a figure on a transmittal letter which says that it is $3.7 billion more than the Navy has budgeted, you left out very critical aspects of what the Navy budgets in other lines.

Now, you heard the testimony of Dr. Simmons that when you add in the other functions you come to the range of $2.3 billion to $4.4 billion, so that, in fact, the budgeting of the Navy is just about the same for the V-22 as the other missions' budgeting, and is in fact nowhere near a $3.7 billion differential. How do you respond to the modest characterization of that statement as misleading or disingenuous?

Dr. CHU. I do not think I said it was misleading or disingenuous.

Senator SPECTER. No; I said that.

Dr. CHU. I apologize then, sir.

Let me stress, I think you misunderstood the Secretary's statement. The statement in the letter is an apples-to-apples comparison that compares only the V-22's that are bought for the medium-lift requirement with the funding that the Navy has proposed for that requirement.

If we want to add back in amounts for special operations forces (SOF) and for other missions, in terms of what the Navy's recommended amounts are, frankly, that is only going to widen the differential that was stated in the Secretary's letter. The bottom line here, sir, with great reluctance by the Department, is, we cannot afford to spend the kind of money that starting this production line and buying these aircraft in reasonable numbers would re-quire. What we tried to provide was an apples-to-apples comparison, not a comparison that tries to slant the issue in one way or the other.

Now, the Secretary may overrule the Navy and decide to spend more money, but the Navy feels that it cannot spend anywhere near the amount of money necessary to start this line, begin production and buy aircraft for the Marine Corps, keeping in mind most of the aircraft that would be bought in the V-22 line would be for the Marine amphibious assault mission; that is, a preponderance of the buy, something like 85-percent of the aircraft.

You could always argue we should add other missions, but then we have to add them into the base, and all you are doing by that is just raising the two absolute levels. The difference is going to be the same or greater if we compare recommended positions within the fiscal guidance the Department has to live with for those missions, with how much it would cost to buy the kinds of numbers of V-22's that are talked about in this report.

Senator SPECTER. Secretary Chu, I am prepared to stay apples to apples, but you have three bushels, not one bushel, and the fact is that the V-22 performs not only medium-lift but also heavy-lift and special operations, so that when Dr. Simmons testifies that if you take the $7.7 billion figure for the V-22 and you add the comparable alternatives, you come to $8 billion, which is slightly higher, which is at direct variance with the assertion in the DoD transmittal letter that the V-22 program is still more expensive than the alternative.

So my question to you is, do you disagree - well, I know you are going to disagree, so let me articulate it slightly differently. What reasonable basis do you have to disagree with Dr. Simmons's conclusion that the comparable alternatives would cost $8 billion contrasted with the V-22 at $7.7 billion?

Dr. CHU. I think for the specific figures that you asked Dr. Simmons about, he is buying helicopters at a far higher rate in terms of proportionate completion of the mission area than he is buying V-22's. If you look in my prepared statement, I have tried to show you what would occur if he bought the same proportion of the helicopter lift with his helicopter fleet sizes in the 1991-97 period constrained by his V-22 numbers. What you get are numbers that are in the same ballpark as the Secretary's $3.7 billion figure.

The essence of the answer, and I think Dr. Simmons would agree that the figures underlying the IDA report sustain it, is that all of the helicopter alternatives, even though more numerous in terms of the quantities of helicopters bought, cost less to procure. Now, because there are far more helicopters in the force—a point we might quarrel with in terms of how many are really needed if you move to an all-helicopter force—they, in the IDA procurement quantities, cost more to operate over the longer term than the V-22, at the force levels assumed for that aircraft in the report.

But I do not think IDA would disagree, and I think Mr. Simmons's prepared statement, at least as I read it, indicated that the up-front investment costs of a V-22 program are going to be larger than those of a comparably sized helicopter program. There is no way around that fundamental fact. This airplane will cost, in terms of the 356-aircraft program that IDA is citing as a smaller possible buy, $42 million a copy, on average, in fiscal 1990 dollars, to procure. That is higher than any other helicopter in sight, in some cases, several times higher.

Senator SPECTER. Mr. Chairman, I have many, many more questions, but I think at this juncture that the time of the subcommittee could be best used by contrasting the views of Secretary Chu and Dr. Simmons; Secretary Chu has made a great many assumptions which I would question him on at length, but I think it best if we put the two witnesses, the experts, head-to-head on that.

So I would conclude at this juncture with a very brief statement about what I see as the predisposition of the Department of Defense against the V-22 last year at a time when the projections for the DOD budget were vastly different. In the face of the specific factual information that the Institute for Defense Analyses has projected, there has not been the slightest acknowledgment of their very strong case.

Of course, when the judgments have to be made as to the needs of the United States, you consider strategic needs of the B-2, of the multiple missiles, contrasted with flexibility and what we may face in the Persian Gulf or a hostage rescue operation and in Panama: that is a Congressional decision in which alternatives must be discussed.

We are well aware, here, of the very profound budgetary limitations. There is not a week, not a moment, not an hour, not a minute that goes by without our being acutely aware of that. That is what we spend all of our time on—making ends meet.

So we have to assess the flexibility of a V-22 contrasted with other needs, but these various missions of medium-lift and heavy-lift and special operations all have to be fulfilled, regardless of how many bushels of apples you have. But I think that would be better illustrated when we have Dr. Simmons and Dr. Chu seated side by side, Mr. Chairman.

I thank you.

Senator INOUYE. Thank you very much, Senator.

I have invited the gentleman from Texas, Senator Gramm, to join us today, because he has expressed special interest in the future of the Osprey and so with the permission of the subcommittee I will call upon Senator Gramm.

STATEMENT OF SENATOR GRAMM

Senator GRAMM. Mr. Chairman, let me thank you for your kindness to me. I am happy to be here. I have been over at another discussion of the overall budget, and I want to begin by assuring the chairman that I am not going to agree to a budget summit that does not provide a better overall defense number than we adopted at the full Committee on Appropriations yesterday. Mr. Chairman, I am haunted by the fact that we are in the process of reliving history, in the sense that we are doing today what we did in 1945. We are implicitly assuming that we will never need swords again, as we begin the process of beating swords into plow-shares, and I am painfully aware of the fact that within five years after the end of World War II we needed swords again in Korea. A Third World country in North Korea deployed a tank, a T-34 tank, that we did not have a weapon in our arsenal, at least for use on the ground at the time the North Koreans attacked South Korea, that would kill the T-34 tank, and as a result tens of thousands of Americans died due to the fact that we were not prepared.

Now, Dr. Chu, I have concluded in a very short period of time, in listening to Senator Specter ask questions and listening to you respond, that you are not going to be convinced on this subject, but let me tell you why I am convinced. First of all, I am far more concerned about modernization than I am about the size of the overall force. It is far more important to me that we have a quality force with the best equipment in the world than it is that we have a large force.

I am for the V-22 for several reasons. No. 1, I think it does represent the kind of modernization in capacity that we need to be able to carry out the missions that we are going to be called upon in the decade of the 1990's and in the 21st century to perform. Second, I am very concerned about the technology it embodies, because I really believe that with military production and use we can develop an aircraft for commercial use that can be a godsend to us in terms of commercial transportation.

So in a sense, as an expender of the taxpayer's money, a task I do not enjoy, I get two for one. I get a modern weapons system, better than anything else in the world, that maximizes our ca-

pacity to do a job and to do it safely from the point of view of the military, and at the same time I get the development of a new technology that can literally make any little town a town that has commercial transportation, whether they have an airport or whether they do not.

So I understand your position. I understand the budget constraint that we are under. It is a very binding constraint. I personally believe that we are declaring this peace dividend at least one year too soon. We do not have a single agreement with the Soviet Union in terms of conventional or nuclear force reduction, and yet we are in the process of having not a defense build-down but a defense meltdown.

I also am old-fashioned enough that while the Bible predicts that the lion and the lamb will lie down together, the lamb lies down with the lion only at the lion's sufferance, and so if the lion and the lamb are about to lie down together, I want to be sure we are the lion, and I see the V-22 as being an important part of that.

So I understand your position. I respect the recommendation that you have made. I just simply disagree with it, and obviously it is our job to take your input, to take the facts as we come to see them, and then to make a decision. I am proud of the fact that the Senate Armed Services Committee provided funding for R&D. I wish we had started procurement, at least at some level. I am hopeful that on the Appropriations Committee we are going to fund the V-22 at least to the degree that the Armed Services Committee authorized. I am going to work for that effort.

Now, obviously, that means less funding in some other area than you would propose. I would pose one question to Dr. Chu, Mr. Chairman. To what degree—and I know this is a difficult question, but I really think it is relevant.

One of the concerns I have, and it may sound a strange concern coming from me, but one of the concerns I have is that so many of our defense decisions are being driven not by life-cycle cost, not by cost in capacity for the whole decade, but by the bottom line in the 1991 budget.

I understand why that is the case, but if you were making this decision where you could have a defense budget for the next ten years, and look at a decade decision instead of this one-year budget decision, to what degree do you think that might affect your decision on the V-22?

MULTIYEAR PERSPECTIVE

Dr. CHU. I think, sir—and I appreciate the chance to hear your views very much—while I would agree with you that taking a multiyear look would change many decisions, in the specific case of the V-22, because so much of the investment cost is in front of us, I do not think it would change things all that much. One really would have to take a much longer perspective.

As I indicated, the break-even point under the small IDA buy is not until about 2010 or so, at least as I understand the numbers, in terms of the hoped-for payoff in lower operating costs, because you buy such a smaller fleet of aircraft in the first place. So one does need to take a very long view in order to get that, to have the salience of the operating cost perspective thrust upon you in a way that might really change the decision.

But I agree with the general principle you are raising. I think many decisions in this context, both by the executive branch and the legislature, would be different if we took a multiyear perspective. I think the Secretary generally would like to take a multiyear perspective and shares many of your concerns, particularly on the modernization front. I think this is just one specific place where he disagrees on a particular choice.

Senator GRAMM. Thank you, Mr. Chairman.

Senator INOUYE. Thank you.

IDA STUDY ASSUMPTIONS

Before I proceed with my question I would like to make an observation relating to the credibility of IDA. I have been a member of the subcommittee for about 20 years now. During that time I have had the opportunity to read several reports issued by IDA. To the best of my recollection, this is the first time that the Office of the Secretary of Defense has come out with full force to attack the assumptions, the credibility, the results, and the recommendations of IDA.

If I had just walked into this committee room for the first time, and not having had the opportunity of reading other IDA reports, I would have to ask myself what is the Secretary of Defense doing with an organization such as that, that he cannot rely upon. If you had placed the V-22 on a high priority as a result of availability of funds, would you have still questioned the assumptions made by this report?

Dr. CHU. I think so, sir. That is my responsibility, to question everyone's assumptions. And I think I would draw a distinction between relying on IDA, which the Department does extensively and has done so very happily, as you indicate, for a long period, and necessarily agreeing with the results of specific reports. This is a report, because it is about a pro-gram with so much political salience that has received extraordinary attention. Never before have we been asked to send a draft report before the final version is completed. We have done so in this particular case because of the great interest in it.

But we, as the IDA staff I think is painfully aware, ask a lot of questions about the assumptions in all their reports. This is one that has spilled over into the public domain. I regret the fact that it has become such a public matter. But we have a frank, candid, friendly, and I think constructive dialog on the entire range of the reports.

We do not agree with every conclusion they reach. This report, in particular, the Congress stressed must be independent. And so our comments to IDA were advisory and not directive in character. They were free to choose what they thought were the best points, and they remain free in writing their final report to do so.

We will obviously make our input and recommend that they look at particular cases and particular changes of assumptions, but it is their call what they put in that report.

CHANGING THREAT

Senator INOUYE. During the past year in my capacity as chairman of this subcommittee, I have either listened to or read dozens of speeches made by DOD officials and military officers on the situation in the world. Just about every speech would begin about the crumbling of the wall and the dramatic changes in Eastern Europe and the demolition of the Warsaw Pact. Then at the same time they speak of the change in military focus to contingency and low-intensity and regional-type conflicts. If that is the case, would not this V-22 be just the type of weapon you would need for that type of contingency, low-intensity regional conflicts?

Dr. CHU. I think Mr. Cheney's view as he has expressed it, is that if he had substantially more money it might be something he would buy. But the problem is, if I might borrow Senator Specter's bushel analogy, we have only one-half a bushel of money, and it has to be made to

stretch over the whole range of modernization programs that Senator Gramm identified, including the weapons, most importantly, without which delivering the troops a little earlier, a little faster, a little more safely, will not do any good.

And so the Secretary has made a judgment. Obviously, you and your colleagues may come to a different conclusion, and he recognizes yours is the final conclusion on the matter. But he has concluded that spending as much money as opening this production line and pro-curing these aircraft would require is not the best use of the department's resources at this time.

He is clearly in favor of a strong amphibious program. In fact, as I read his initial decision and his reconfirmation of it this year, what he is clearly trying to do is protect enough money so we can buy both ships and aircraft, which the Marine Corps must have. There is, as you appreciate, a big, looming problem with the block obsolescence of amphibious ships toward the end of this decade. If we do not build amphibious ships in the decade of the 1990's, we will not have any meaningful amphibious force as we pass the year 2000.

And that is one of the underlying problems in this debate that the Secretary, in my judgment, is trying to confront. He is not going for quite as elegant a solution in terms of the aircraft portion of moving troops ashore. Obviously, you have the LCAC air-cushion landing vehicles for a great deal of movement as well. He is reserving funds to buy amphibious ships in this decade.

Senator INOUYE. We are awaiting the resolution of the START agreement, and with that I suppose we will be cutting back on some of the strategic weapon systems in order to bring about a change in military focus on regional and contingency warfare. When that comes about, should we rehabilitate the V-22?

Dr. CHU. People may decide to do so. I do not think the technology will go away. Obviously, there is a cost to restart something, but we have not, as you appreciate, started production yet. The development program is virtually complete. There is not that much more to go. It is a set of ideas you can put on the shelf, and if circumstances later dictate their revival, it is obviously an option we could come back to.