DoD News Briefing by Lt Gen Kadish, Friday, 13 Jul 2001 - 1:30 pm

Good afternoon. I'm here to talk about the program, and I'll answer some questions about the tests, show how it all fits in. But this is a real exciting opportunity for me to talk about what we're about to do and show you how it connects to the past efforts. And I'd like to use some visual aids. I apologize for that, but I'm going to have to walk through a very complex description, and I think with the help of the packets that you have and these visual aids, we may be able to make some progress in understanding.

[Slides used in this briefing]

But first, I think it's important to review basic missile defense, if you will, and why we are doing what we are doing to accomplish that mission. And it starts with the first slide, and a ballistic missile trajectory. What is it that we're trying to defend against? And I know this is basic, but I think it's important for all of us to understand a common problem before I get into the explanation of why we're going to solve it in the way we're going to solve it.

Now, ballistic missile trajectory has three basic phases. I'd start out by saying you've got to boost the warhead into space to get it ballistic; that is, without powered flight. And it requires a boosting rocket to do that. So we define boost as the time of the warhead being under powered flight. Then you've got the other side of the spectrum of when it comes in from outer space, it's called the terminal section.

The boost lasts for about 180 to 300 seconds. All right? That's not a lot of time. The terminal side, when it's reentering towards a target, lasts for about less than a minute. And then when it's ballistic, without powered flight, sort of thrown off the booster, it lasts, for a long-range missile, somewhere in the neighborhood of 20 seconds.

Q: Twenty seconds?

Kadish: I'm sorry, 20 minutes; 1,200 seconds.

Q: What's that called?

Kadish: Midcourse. All right? And in the midcourse phase, you have the problem of countermeasures because when it's coasting along, there could be other things that look like the warhead and the things we talked about and were criticized for in the past few months. In the boost phase, there are problems in technology, trying to find it and to deal with it in those timelines. And in the terminal phase, turns out we've made the most progress in our systems. And I'll talk about that in a little bit.

Now that's the problem, the trajectory. That's been the problem since the early 1940s when we first encountered a ballistic missile in combat.

Next slide.

Now, in addition to that trajectory, all ballistic missiles have the same general profile. It's only how far they go. And that's a function of how energetic the booster is. This chart describes the different ranges. And it's all on one chart, but the way I would describe this is that you've got boost phase in every one of these things. So something that protects in the boost phase protects against all ranges.

But in the trajectory from zero to 600 kilometers, that's a short-range missile. That's a defense of the city, for instance, from -- from the Gulf War, it's Tel Aviv from Iraq, if you will. The medium-range ballistic missile is defense of Japan from North Korea, for instance. That type of range. The intermediate range ballistic missile is defense of Northern Europe from someplace like Libya. And then the longer-range missiles is defense against long-range ballistic missiles for the continental United States. So you've not only got the problem of a very fast trajectory, very small targets, but also the idea of different ranges.

Now, how do you defend against ballistic missiles using the technology we have today? So I'd like to take the next slide and explain that to you. There are basically two ways -- well, three ways to do it. You can use nuclear weapons itself, you can use hit-to-kill technology or kinetic energy, which is our choice at this point, and directed energy, laser, if you will. We have given up on nuclear interceptions with the safeguard system back in the early '70s. We are not considering that at all, although the Russians today around Moscow use this technique to defend against ballistic missiles.

Our technology is in the hit-to-kill. And hit-to-kill is nothing more than the sheer force of the collision, no explosives, no chemical explosives, that generates the destructive mechanism on the warhead. So you just run into it at very high speed. And to give you an example, a tank round goes about a kilometer and a half per second. Now, what we're talking about is five to 10 time faster than that in terms of speeds. And when we do that type of speed interceptions in closing velocities, when you collide it is a terrific explosion in and of itself.

That's what we're trying to accomplish with hit-to-kill.

Next chart.

This is an example of what laser gives us, is the speed of light. With any kinetic energy-type of weapons system, you have a time certain that it takes for that weapon to get to where it's supposed to go. In the boost phase, for instance, this is especially important, because I told you that there is about 180 to 300 seconds of boosting time. That's not a lot of time to intercept a boosting rocket.

So imagine you have an accelerating rocket reaching to outer space and then once you determine you want to shoot it, you've got to get another rocket to catch it. That's a tough problem, okay? The speed of light cuts down that distance rather tremendously, so that's why we like laser energy for that type of a system.

Now, having said all that, what are we trying to accomplish with this approach of having a very robust research, development, test and evaluation program?

Next chart.

This is an aggressive program that does not commit to a single architecture, and the reason why we don't do that is because we want to go into robust testing, take advantage of what we know today and then, over time, build the best system we can to take the problem of missile defense and make it simpler. To do this, we take parallel paths; and anybody in the development business will tell you, the more ways you have of achieving an object technically, the more chance you have of succeeding. So we have parallel paths in terms of the ways we're going to try to approach this problem -- air, land and sea and, eventually, space, potentially -- as well as having within those paths multiple technology sub-elements that we have parallel paths for. And I'll talk more about that later.

But this is an approach to achieve as rapidly as possible from a developmental point of view what we want, and that is a multi-layer, multi-faceted -- that means land, sea and air -- basing approaches to overcoming the missile defense problem.

We want to manage it as one system, because you can imagine, if you have a sea-based and an air-based and a land-based part of this system, they have to work together, and they have to be managed as one, at least in the development program.

Another feature of this that will be a major thing to understand is that in the development program we have test assets that, should the situation warrant from an emergency standpoint, and if directed, we could actually employ in the defense of the country. And that is ample precedent in the Department of Defense. We can talk about Joint STARS [Joint Surveillance Target Attack Radar System] deployment in the Gulf War, those types of efforts. But it is not planned to actually deploy these things right off the bat. It is a plan to make sure that we do the test program and, should the situation warrant, we could put them on alert.

Now -- (to staff) -- next chart -- what does a multi-layered system give us? Okay, the multi-layered system gives us a real potential to have two basic things: multiple engagements and multiple shots.

Multiple engagements, you can just shoot it in the boost, you can shoot it at midcourse, and you can shoot it, potentially, in terminal phases. And within each one of those engagements, you can take more than one shot. So intuitively, you can understand that that gives us a better chance of success than if we had only one area we were after -- that is, the midcourse, for instance, against long-range missiles, where countermeasures would become a problem for us. And we wouldn't have as much potential for success.

So on the boost side, you can destroy the missile, regardless of its aim point, and protect almost the whole world, if you get it there. On the terminal side, you have a localized area you're protecting from the world, if you will -- critical assets. And if you're in the midcourse, you can define -- defend an awful lot of territory because of the time that you have to sort out where it's going and where you ought to attack it, if you had the system.

So, as I said, multiple engagements, defense in depth, and it is, in and of itself, this layered defense system, an excellent counter-countermeasure. That is, you have to have countermeasures for boost, you have to have countermeasures for midcourse, and you have to have countermeasures for terminal. And they're all different, and it really complicates an adversary's problem if they're going to threaten us with a ballistic missile. So that's why a layered defense.

Now, how are we going to get there? This is not an easy problem. It hasn't been from the day we started handling a missile defense system.

(To staff.) Next chart.

As I said, we have multiple paths. Those multiple paths are built on the idea that we have had a lot of things in work in the last 15 to 20 years, and they are just now becoming to -- come to fruition with very difficult engineering problems that face us. So we start out by saying for all range of missiles, especially long-range missiles, we're going to have many ways of attacking them in the boost, midcourse, and terminal phases.

And we're going to start with where we've been -- that is, with our most mature technologies -- and then we're going to invest even more for new ideas that come out in each one of these areas.

So you can see from this chart that we have at least two parallel paths in each of the segments -- boost, midcourse, and terminal. That could lead, we believe, to an understanding of how we ought to build an architecture and potentially produce these systems somewhere in the 2004-2010 time frame -- not a date certain, but we're going to do the best we can to define that, based on real, live, real-world results.

And those triangles at the top of the chart indicate that there will be major departmental and congressional decisions every year to help us define and narrow down what that set is. So that's what we're trying to do in managing at one effort.

Now let me take you briefly through where all these segments lead us. And as I said, they're mature efforts, and they are -- and there are new ideas coming into the mix here. And I expect, over time, there will be even more ideas that we could look at, depending on whether or not we can afford to take them on from a financial standpoint.

(To staff.) Next chart.

In the terminal phase, right, we have these types of systems. And this is where we have been the most successful, for short-range missiles especially. The Patriot missile is ready for procurement right now. The Navy area is on the verge of going into its test program and is near procurement, and the MEADS program, the Medium Extended Air Defense System that we have in Italy and Germany, uses the Patriot 3 missile as its foundation and is more mobile in terms of development.

So based on the fact that they are most mature, that they are also after the air-breathing threat, we have decided to transfer those back to the services for the procurement and building of force structure. And that's in concert with this new idea that that BMDO does research, development, tests, and evaluation on an incremental basis, and then the services procure what's working for the layered defense system.

So the next chart, then, shows how we divvy this up. The Army gets the Patriot and the MEADS system. The Navy gets Navy area for procurement activities and final development activities. The Navy Theater Wide program that we have had for many years goes to the midcourse, because that's a midcourse killer, if you will. The THAAD [Theater High Altitude Area Defense] program then stays in the terminal area, because that's in the descent, in the terminal phase of the problem -- missile defense.

Now let's talk about the midcourse, and here is where we start getting more interesting in terms of the changes.

And by the way, in those terminal systems, our intent, although not immediately, is to grow those against longer-range missiles, if at all possible technically, all right? Because now they are against the shorter-range missiles.

In the midcourse segment we have the ground-based and now we're adding the sea-based idea. And the reason why we grouped them this way in the midcourse is because when you're in the midcourse against short-range missiles, intermediate-range missiles or, for that matter, the long-range missiles, the problem is the same. All right? You still have the same countermeasure problem; you still have the same intercept problems with hit-to-kill. You're just doing it off a different platform, which adds complexity in and of itself.

So that's the reason why we grouped them together. However, they could be very complementary. If you have a fixed site in the land-based side, you then have 24x7/365 reliability, if you will, in being able to have them on alert, just like our ICBMs [Intercontinental Ballistic Missiles]. If we have the mobile platform then, we get great advantages by being able to add to or actually replace the ground-based system by moving that platform where we need it to be, and that's an important element.

In addition to that, we're going to manage this so that we can get some commonality of components and address the affordability issue, as well as the technical risk issue sharing the technology. For instance, in naval applications, we like to have solid-state in our boosters and in our kill vehicles. Solid-state propulsion is a very difficult situation when you're looking at the kill vehicle and its maneuverability. In the land-based, you can get away with liquid, and those are the types of trade-offs that we're going to have to look very closely at.

And the next chart shows how complex these systems are, because especially when you go against long-range missiles, these things have to communicate, have to be very responsive, have to actually work together in ways that are unprecedented. So if you take a shipboard and a ground-based activity, the complementary nature of them are obvious, I think, for those who think about this problem. But also, the difficulties are the same in a lot of ways.

Now let's look at the boost phase.

Next chart, please.

Here is fundamentally where we get two different types of technologies; one, the directed-energy, the laser, if you will, and the other, we start a new effort in kinetic energy that I talked about. Having a booster chase another booster is kinetic energy in the boost phase.

So we want to do all these parallel paths. The most mature of this -- (to staff) -- next chart -- is the airborne laser.

We've been working on this for a number of years, and then the Air Force has brought this along, maturing that technology very well, such that in the late '03, '04 time frame, we have a potential to have our force shoot-down with the speed of light of a ballistic missile, which would be very exciting if we were able to make that technology work.

All of this is high-risk in terms of this type of technology, but we are building our confidence every day in our ability to do this.

On the kinetic energy side, we are going to institute intense concept studies and looking at concepts on how to do the boost phase with kinetic energy, as a hedge against the directed energy, should we run into problems there.

So we have some experiments in space with the space-based laser, and we're looking at whether we should be doing some experiments in space with kinetic energy that build on the terrestrial side for airborne laser and a sea-based kinetic energy killer. But those are all in planning and are further downstream in terms of our application.

(To staff.) Next chart.

Now tying this all together in one system -- sensors are very important to us. Our space-based sensors for infrared to detect launch and tracks is really a key element in the system. Our X-band radars, our early-warning radars are all very important. And what's new in our way of thinking about this is that now we want to take these sensors, in terms of a sensor net, and ink an experiment with putting these together, such that SBIRS-Low, space-based infrared satellites in space, can actually cue our terminal systems or cue our naval mobile systems, or cue systems that are available from our allies, should that become available. So that helps work make work -- all the elements work together in a very effective way, to enhance the overall capability of this multi-layered system.

And then the glue for it all is the battle management system, the computer systems that tells who to shoot, when, and where, which is a major technical challenge.

Now that's the vision of this new program from a research and development standpoint. Now I'd like to talk about tomorrow's test in the context of this new program. It's the next test in a series of many more tests that are coming up. This test -- we've had a year's hiatus, if you will, to go back and to make sure we were ready to do it.

But at the same time, we were making sure we were ready to do this next test for the ground-based system. We were able to make sure that can do follow-on tests in a more disciplined manner from a schedule standpoint.

So I expect to have a major event -- test event in this program every other month, if not every month, starting tomorrow.

Q: Are you talking about this kind of test, or are you talking about other tests?

Kadish: Next chart please. This kind of test.

Q: So $100 million each every other month?

Kadish: Um. The -- yes. (Laughter.) It's hard to come out when you're the steward of the taxpayers' money. (Laughter.) But that's true. We're going to spend enough money to make sure that we can pursue this technology reasonably.

Q: Every other month for how long?

Kadish: We expect to get four to six tests off next year -- between now and the end of next year. I think our ultimate goal on the land-based side is to get to eight a year. You know, we've been criticized for not doing enough testing, so we've laid in, and for somewhat good reason, I think. We all didn't want to rely on our models and simulations as much as we were planning, but affordability here becomes an issue. So if we are going to have a robust research and development program, we're going to have to pay for it.

Now that doesn't mean that we aren't worried about the costs. We're going to look for every opportunity to lower the cost of these efforts. And in my view, the overall cost of the testing per unit is going to come down when we actually do more of them. It's just that right now, we're in the transition period. So the reason I hesitated earlier is that by the time we reach two years from now, we should have a much lower unit price for test, because the infrastructures will be spread a little bit more.

Now, that's important to understand, because we expect successes and we expect failures in this high-tech technology that we're using. And tomorrow's test will either give us more confidence in our approach in hit-to-kill, or we're going to learn more from it if we fail, because it'll be an unexpected reason why we failed, and we'll go try to fix it.

Now, so let me go through what this test it. For those of you who experienced this last year, it's the same test. (Laughter.) All right? We never got a chance to do it last year. We'd like to get a chance to do it this year in this next test. So everything is basically the same. We're going to launch the missile out of Vandenberg.

It will bus off a warhead, same one we tried last year. It will have its MSLS (Multi-Service Launch System), the actual part of the machinery that this warhead comes off of, flying along with it. And it will have a balloon. Okay? A large balloon. It's a different one -- configuration than we had last year, because the last one didn't work, and we fixed it this year, hopefully, and it will be flying along. Same type of trajectory.

It will fly over Hawaii. The defense support satellite will detect the launch. It will tell the battle manager located in Colorado Springs that we've had a launch. The battle manager will start calculating what we ought to do to intercept it. The human in the loop will release the weapon to the battle management system. The battle management system will cue the radars out at Kwajalein Island, the X-band radar. The radar there will detect the warhead. It will tell the battle manager where it's going and what it is. The battle management will calculate a weapons task plan and send it to the interceptor, and then the interceptor will know what time it's supposed to launch and where it's supposed to go.

As that time arrives, the interceptor will launch, the kill vehicle will separate where it's supposed to separate. And this time it will separate. (Laughter.) Either that, or we're going to find another rocket. (Laughs.) (Laughter.)

The kill vehicle leaves the booster. It immediately wants to know where it is in relationship to what all the information it's got up until that point, so it will do two star shots. It will look for stars just like the celestial navigators of the past. It will calculate where it is, compare it internally, and turn to get an in- flight update from the ground.

The in-flight update will tell it where the battle manager thinks the warhead is at that point in time based on what the radars are seeing, and it will go to that point to intercept. A little longer into the flight, it will do another series of star shots to find out where it is more accurately, and then get another flight update form the ground, last final update it will get to tell it where it thinks the warhead is.

And then from that point on, the kill vehicle is on its own. It will get to the point in space where everybody said it should go. It will open up its sensor's eyes, and right in the cross-hairs, we expect the warhead to be. It will go through a discrimination routine because there will be two other objects up there, make sure it got the right one, and use its divert capability and its very sophisticated rocket motors on board to maneuver in a position to hit that warhead in a spot that big. And what you'll see is a blinding flash of light indicating that we intercepted it.

That's the test tomorrow. Very complex. Repeat of what we tried to do last year.

Next chart.

Q: I'm sorry, it's going to discriminate between two objects or three objects?

Kadish: Two -- well, there's three objects in there --

Q: There's -- (inaudible) -- with a warhead and the booster?

Kadish: It'll be the part of the booster that the warhead was on -- that's normally what flies along with the warhead anyway -- the warhead itself and this other balloon.

Now, watching this test is this next slide. We have a very complex test range. We want this test range to do three things. One is to conduct the test and to provide redundancy for the test. The next thing we wanted to do is to provide what we call "truth data." When we do a developmental test, we want to know exactly what happens to every piece of the test. So we need to know exactly where the warhead's going, with great precision. We need to know exactly where the missiles are going to intercept it. So all these range assets keep track of that so that when the flight is over, we can go back very precisely and tell whether we were successful in all elements of the test and what worked right.

And if we have a failure, we need to know what truth was. For instance, we need to know where that warhead was when we missed it, to see how close we came. That's what the range assets do. And the third and most important thing it does, it provides us safety. We throw a warhead over the South Pacific and it goes over Hawaii, we want to know where it's going. Okay?

Now, what this does, and I mean to make this very clear, and this is a source of some criticism in the past, it introduces artificial realities into the test --

Q: (Off mike.) (Laughter.)

Kadish: Good, Tony. That's a great response. Because we need to have this stuff for developmental tests. That doesn't mean that we aren't eventually going to get more operationally realistic.

Now, this is operationally realistic in the sense that we've got these things in flight and want to intercept it, and if it turns out that we can, we get more confidence in our ability to move to the next step of complexity. So artificial realities are in the test. Now, do we like them? No. Eventually, we want to take them out. Now, how do you do that? We do that by building a testbed that's more complex.

Next chart.

As complex as this test is, all right? -- intercontinental ranges, many hundreds of people involved, many, many hardware assets to make this thing work, what we basically end up having is one trajectory from California to the South Pacific, and that little white circle is the area we would intercept in, if we did nothing else than pay $100 million a test.

This is very valuable to us, and you can extrapolate from this with some precision. But if we're going to get realistic operational testing of multiple launches at the same time, the geometries that we need to prove our envelopes -- speed and range and those types of things -- and to test off-nominal types of situations, we've got to build further on this test range.

We've also got to build a test range to test the ballistic missile defense system layered approach. We don't have one of those yet. So if we're going to do boost, midcourse and terminal testing, we've got to build that test range. So this idea of a testbed then becomes very important to get the ranges and velocity type of envelope expansion, get the geometries we need, and take out all the artificial realities that I just told you about, to the maximum extent consistent with safety, and include other components.

So are you ready for the test range? (Laughter.)

Next chart.

That's it. This is the first iteration understanding of the midcourse test range, because that's our most mature. I will say that the Navy systems, as we get into the longer-range defensive capability, need to have the same test range. It's just a different place to launch it from, and we need to understand the same types of things for mobile platforms as we do for fixed land-based platforms. So the idea here is if you just look at those yellow circles, they're examples of areas where we can do more intercept tests. And we have more sensors in this.

And the idea of having Fort Greely there is very simple. If you're going to have an operationally realistic test structure, you ought to put the major components where you plan to put them operationally. I mean, that seems self-evident, to me. However, because of safety considerations of launching out at Fort Greely, we would actually do launches out of Kodiak, down south, which is many miles away, for safety reasons. But that doesn't negate the importance of Fort Greely for other activities of communications, logistics, construction, timelines and a whole host of other things.

Q: The launches you're referring to are target and interceptor launches from Kodiak?

Kadish: Primarily interceptors, but we could also launch targets out of Kodiak.

Q: But no launches from Greely?

Kadish: At this point, no. I don't -- I think we have to be very careful, because we haven't been able to fully analyze whether we ought to launch out of Greely, because we have some safety issues that would take time for us to work out.

Now the other reason is, because I told you about that interim capability, we want to be in a position to have test assets, should the need arise, to put on alert if the situation warrants.

Q: So that would be Greely or Kodiak?

Kadish: That would be Greely. And a third reason is, we've done all the environmental and planning for Greely as well. So this all kind of fits in our idea of this testbed.

So when you add the Aegis cruisers to start going against longer-range threats and characterizing them, and as we are able to put boosters on those cruisers or shipboard assets to go against longer-range threats, then this becomes a very important testbed -- integrated testbed, and when you add SBIRS-Low to it, we can then do even more geometry and test out an integrated system.

So in ultimate, if I would envision this as a ballistic missile defense layered testbed, I could see an airborne laser, for instance, in a multiple-shot target-shot engagement being told to take out the first missile that's launched and then the midcourse system take out the second missile launched, and take two shots at it, one from a ship and one from the ground-based activity.

So if we're going to realize this vision of a multi-layered system, we've got to figure out how to test it. And this is our look at having the capability of doing two things: realistic testing that we're all after, and having a capability of transitioning from test assets, should we need them in operation, to an ultimate architecture that makes sense for us.

Q: General Kadish?

Kadish: Yes?

Q: There's a serious safety issue that maybe it would be a good time for you address right now. The current plan has BMDO launching targets from California away from the United States, and this is contemplating, it looks like, launching from the Pacific towards the United States --

Kadish: Right.

Q: -- with the interceptor rushing up to meet it. What if it misses?

Kadish: The launch, if you -- from here --

Q: Yeah.

Kadish: -- to there is to that point.

Q: Uh-huh. So it'll splash down there?

Kadish: Yes.

Now there are some people who have postulated letting it circle once and then come in.

Q: Circle what?

Kadish: Circle the globe.

Q: (Laughs.)

Kadish: But we don't want to do that.

Q: No.

Kadish: No. These would be operationally realistic targets that would simulate aim points that are intercontinental in range but nowhere near the continental United States.

Q: So if it doesn't have the same trajectory as an intercontinental ballistic missile, which if obviously cannot if it's --

Kadish: I don't agree with that.

Q: How can it at such a short distance?

Kadish: The reason is it could go very high.

Q: Yeah.

Kadish: And the speed -- because it goes very high, the speeds will be replicated in the area of intercept that would be very operationally representative of an intercontinental --

Q: The speed would, but wouldn't the trajectory path be different if it's going straight up and coming essentially straight down?

Kadish: There will be some differences, but we could live with those differences.

Q: Why is it safer to launch from Kodiak than from Fort Greely?

Kadish: Because Fort Greely, being in central Alaska, what happens -- we haven't been able to make a booster that doesn't have any stages, all right? So you're going to have three stages on it, and as these things burn out, they fall to Earth. And we want to make sure they don't fall on anybody.

Q: But you're going to have that problem any time.

Kadish: That's correct.

Q: So what are you going to do for a contingency system? Are you just going to tell the caribou that that's life?

Q: Or the people of Anchorage? Well, just caribou.

Kadish: That's right.

Q: I mean that the interceptors -- that the only reason for having interceptors in Fort Greely is to have that interim capability.

Kadish: No. And this is -- this is going to be somewhat arcane, but it's important to us. When we have silos that are operationally representative hooked up and in the way we were going to use them, with all the cabling and the command and control and all, we learn an awful lot, other than waiting to build it and then find out about it.

Let me give you an example. We put silos in Fort Greely, and the command and control elements and the maintenance activities. There are two things that I could explain this by. The first one is communications latencies. When you're talking about the timelines that we are trying to deal with, less than 30 minutes, we've got to get this thing launched within five minutes and on its way if we're going to have any hope of hitting these things in an operationally realistic way.

So the timelines of when the one and zero digits originate from Colorado Springs and end up in that silo become very important to us. And getting that connectivity and seeing how reliable it is and whether power outages or communications inks have those problems is something we're very interested in. The way you understand that is to hook it up in an operationally realistic environment. That's one small example.

Another example is just plain logistics; is the thing going to survive the way we think it's going to survive in the silo? Those types of things. And that's why it's important to us.

Q: You seem to be taking questions. May I throw two quick ones for you. One, you talk about artificiality. And I won't call them failures, but out of three tests, only one kill vehicle has hit the target.

Kadish: Right.

Q: And regardless of what we hear in this building, there must be more than just subtle pressure to make sure that the kill vehicle hits the target tomorrow night. Is this test overly simplistic to give you a better percentage of doing that?

And secondly, there are many people who say that there are advantages to actually concentrating on the booster phase rather than the terminal, but if you look at Korea and Libya, that would require stationing Aegis ships or others off the coast 24 hours a day, but if you look at Iraq or Iran, it means you would have to have laser aircraft circling up there 24 hours a day. Is that realistic, do you think, under the current environment?

Kadish: The idea of a multi -- let me take the second question first. By the way, I'm finished my -- let me finish my briefing first.

Next chart.

That's what we're trying to do. And you can read it. I don't need to go through it. (Laughter.)

One of the things that we worry about a lot is that if you have just one system to take care of everything, just a boost-phase system, the things that you brought up are real problems. Keeping -- geography counts in boost phase. You've got to be close to the boosting rocket. All right? So to get close, if it's airborne or ground, terrestrial, you've got to keep it going, and that's a very difficult issue.

Now, if you supplement that -- for instance, the airborne laser. Even though there might be some safe havens that it can't reach, it has a pretty good capability for the ones it can reach, and you supplement it with a midcourse system. The layering effect. Then you have the situation where you've greatly complicated the adversary's problem because he doesn't know whether or not that airborne laser is going to take this thing out, and if he does the calculations and wants to take the chance, and he's right, we still have another system to go after it. So this becomes very important, to have a layered system. And it doesn't have to be up and operating all the time. Okay?

Now, overly simplistic tests. I think as I went through that description, from my simple-minded point of view, that's about as complex as it gets. All right? Now, what we can do is add complexity to that by putting more countermeasures in it and multiple shots at the same time.

I just told you we're going to do that, over time.

But in the test tomorrow -- and I've said this many times in this room -- we are going to try to do the basics first and then add complexity. And the basic for us in this test is to do hit-to-kill reliably. We've done it once, we've missed twice, and we're going to try it some more, until we can get it to the point where we are confident that in the -- even without countermeasures, we can hit this thing. And then when you add countermeasures into it, can it hit it in the presence of countermeasures? And that comes later.

So no one test tells us everything we need to know about the system. And tomorrow's test is as complex as we can get it today for the objectives that we're trying to go after. And we're not trying to build and test a fully operational capability tomorrow and then turn around and put it on alert. That's not what we're doing tomorrow.

This is one test in a series of tests, and if it's successful, we'll gain confidence. And if it fails, we will learn a lot.

And that's the history of what unprecedented system development has been. If you go back to Polaris, it failed -- I don't know -- 15 or 16 times straight, right out of the bag, and all the other ones that Secretary Wolfowitz talked about in his testimony yesterday.

Q: General, at what point do you say, "Enough is enough"? I mean, you're talking about 15 with Polaris and, you know, a number in other programs. Where do you draw the line? Do you give yourself a year? Do you give yourself five years? At what point do you make the system more sophisticated?

Kadish: You could make those decisions incrementally, based on very statistical analysis of the testing that you're doing. And I can't tell you what that number is.

I can tell you what our criteria was last year to go ahead and build the radar, and that is, we wanted two shots out of four. And we only got one. Now that was just to build the radar. All right.

So we will have confidence-building criteria as we go through this, but we will develop them based on the progress of the systems at the time. And it's not only the ground-based system; it's going to be the sea-based system and the ABL [airborne laser] and all the other things in the mix. And if one thing is doing better than the other, we're going to start looking at things differently in terms of our criteria.

Q: What is your schedule to begin construction at Fort Greely?

Kadish: If you want to define "construction" as "site- clearing," the schedule that we're trying to put into place is to start knocking down the trees at Fort Greely this August.

Q: And when do you intend to start digging holes, you know, pouring concrete, laying rail lines --

Kadish: As soon as we can in the construction season up there. And that has to do with a lot of planning that's ongoing now, and I can't be very specific, other than general time frames that the secretary mentioned yesterday.

Q: He mentioned --

Q: So you're talking about probably the construction season in 2002?

Kadish: That's what we would like to do. I mean, the idea here is not only a robust test program but to go as rapidly as practical, given all the constraints that we're under.

Q: Secretary Wolfowitz mentioned April 2002 for that laying of -- pouring of concrete for the silos. Isn't that what -- isn't that the plan?

Kadish: That's the first element of the plan. But as we were trying to articulate yesterday, there are other things that come into play in terms of detailed planning that needs to go on. So we haven't flowed this down to every element of the contractor system, because we've spent this time putting the program together. As it flows down, these things will come up and we'll discover them. So it's a process of discovery.

Q: What contractor's doing the site clearance?

Kadish: The Corps of Engineers is letting that contract. I'd have to get it. But I think it's a small business up in Alaska.

Q: (Off mike) -- operationally representative silos at Greely so you can check communication late in season and so on. Time lines are pretty important for ICBMs. So when we developed the MX [Peacekeeper missile], did we develop an -- put an operationally representative silo at Warren and wire it into the tests at Canaveral, or how many -- or did we not bother to do it then, or what?

I'm trying to think of what parallel is, you know, where you --

Kadish: MX would not be a good example. I think Atlas [missile] would be a better one, because we were to that level of understanding of the technology, if you will, and I just don't know what they did. But I knew they -- I do know that history tells us that during the Cuban missile crisis we put missiles on alert in the silos at Vandenberg, the test silos. So I do know that.

Q: General, when you spoke about the human in the loop in Colorado Springs, is that NORAD [North American Aerospace Defense Command] then that will serve as the battle management headquarters?

Kadish: For the test program, we simulate a command element that may be NORAD, may be CINCSPACE (Commander in Chief, Space Command]; whoever the U.S. decides is in charge of this. But the system is designed to have a -- to meet a rule of engagement, if you will, to release the weapon, and that's -- and that'll be -- I'm not sure who the individual is, but it's a test person. It's not an operational person.

Q: Where do we stand in terms of dealings with Canada on any agreement on Canadian participation in a future battle management headquarters that would be located at NORAD?

Kadish: I'd have to refer you to the policy folks as to when that might occur, and the negotiations with Canada over that issue.

Q: General, can we ask you a courtesy? Tomorrow -- and we understand what Craig said -- but it's very important for many of us, echoing what my colleague said, to know as soon as possible if it's a hit or a miss. As to the reasoning, we're perfectly willing to wait an hour or an hour and a half, but is there some way you could get word to us as soon as you know whether it's a hit or a miss?

Kadish: We will do our best. But let me explain something to you. In the complexity of these tests, it's kind of like major events that happen in the military world where the first word may not necessarily be right because of enthusiasm and other things. Anything can go wrong. You could hit the wrong item in the three -- that would be devastating to me, but you could do that, and I'd hate to be standing up in front of you and telling you we hit something and then tell you we hit the wrong thing. So we want to be as precise as we can, but we will make every effort to balance this all out and recognize your needs. But my main idea is getting to truth, and I will try to tell you exactly what went on to the best of our ability.

Let me try some of the folks --

Q: General, how far would you say Aegis might be from being a working part of this system, being able to do a midcourse hit?

Kadish: There are two answers to that question. It could be relatively close, in the next five years, if you will, against short- and medium-range missiles, based on the results of the Aegis LEAP [lightweight exoatmospheric projectile] interceptor tests that are about to begin this September.

Okay? Those were designed against shorter-range missiles.

Longer-range missiles is going to take more time, and we're going to aggressively pursue the complementary nature of that. And if we can find a very realistic approach to doing that more rapidly, we will, but my expectation right now is it will be the end of the decade before we can actually get those systems potentially into an architecture, and maybe in the '07 and '08 time frame for tests. We'll just have to wait and see based on the results of this.

Quigley: Mick?

Q: Three quickies. What is your criteria now for building the X-band on Shemya? And when might that happen? Number two, you said four to six tests in the next 18 months? Is that correct? Or is it four to six tests between now and the end of the year?

Kadish: I have to parse that out. The land-based system, the one we're testing on Saturday, will have Saturday's test, a test in October, another test in February, potentially one in June and another one in the fall. But that gets fuzzier in the planning based on where we are right now. So that's four. And I think we're looking at having an additional test added, but we haven't done the planning yet.

Q: And no sea-based tests that you want to tell us about?

Kadish: And then the sea-based tests start in September, we have another one in December, and then about one every other month after that, as I recall, depending on how successful they are. And then in the land-based side, we have booster tests, the one that's behind schedule. We start that in August and then we do another one in October, I think. So there are some major launch events --

Q: So it sounds more like 10, roughly 10 or a dozen tests between now and in the next year and a half of all of the different systems that you're talking about.

Kadish: Right. I'd like to get -- we have some of that data very precisely, if you want it precisely. But again, I want to tell you that whatever schedule we give you on the tests, they're subject to the normal test type of activities.

Q: X-band radar on Shemya, what's the schedule, what's the criteria now for going ahead and doing that?

Kadish: The X-band radar on Shemya is still in the planning stages, and we will review -- my intention, subject to the secretary's approval, is to provide a decision point at every opportunity to do the radar at Shemya.

And that's all a part of the architectural discussions.

Q: It's not a cost issue? Because --

Kadish: It's always a cost issue --

Q: -- you know you're going to need it, right? Or do you not know you're going to need it?

Kadish: We know we need X-band radars, and we have to go through confidence-building in our test program as well as the architectural discussions of where we want to put these things, because one of the things we're looking at, as outlandish as it might seem, is putting that very large radar on a mobile sea platform. And we've got to look at whether or not that makes any sense.

So that -- the best way to answer that is that that will be a decision that will continually be reevaluated and made when it's ready to be made.

Q: One final easy question. How long will the kinetic kill vehicle be on its own, when it's in the final terminal stages of closing and you've stopped all other systems and it's using its own system? How many seconds is that?

Kadish: I'd have to get you the exact number, but my memory, I think I recollect about 300 seconds.

Q: Three hundred seconds?

Kadish: Yeah.

Q: And what's the closing speed?

Kadish: The closing speed will be about four and a half miles per second.

Q: Is that combining the closing speeds, or just the --

Kadish: Combined.

Q: In your testifying to Congress, in the section on testbeds, there's a reference to two flight tests in 2002. What is that? Do you know what that -- I mean, what was that all about?

Kadish: (Off mike.)

Q: Two flight tests in 2002.

Kadish: Well, I just told you how many flight tests we're going to --

Q: (Off mike.)

Kadish: But that will be done right now out at Vandenberg in that one trajectory that I talked about.

Q: Okay.

Kadish: It won't be done -- the testbeds are going to take three years to build up, under current planning. We may be able to find ways of doing it better, but that's the current plan.

Q: General, what has changed with the Shemya X-band radar consideration? Because under the Clinton administration, that was the first groundbreaking that was at issue, had you been given a deployment decision. I don't understand what changed this in your thinking about the need for an X-band radar in Shemya?

Kadish: There is no change in the thinking for X-band radar in Shemya for an architecture; the production decision, an operational system.

Q: Right.

Kadish: But this program does not have one of those now.

We know we're going to potentially need a large X-band radar, because one of the basic rules of missile defense is, you want very powerful radars as far forward to -- closest to the threat as you can get them. And you want your missiles as far back as you can get them, because then they work best. That's where the trade-offs are.

So we know we need an X-band radar in our production architecture. Where to put it and when to put it is a function -- that we have decided that robust testing needs to build confidence in these systems, and then when we try and add the requirement to look at how we might protect allies and friends, as well as deployed forces, and make these things work synergistically, the architecture will change. So that's why that decision is not part of the process --

Q: So is it possible you could be looking to place eventually an X-band radar somewhere in Europe or somewhere in Canada, or somewhere in --

Kadish: Take your pick.

Q: -- or somewhere in Latin America? (Soft laughter.)

Kadish: I have a hard time with Latin America. (Laughter.) But if they were threatened, I think we'd have to look at that.

Q: But General, I thought the X-band radar was the schedule driver, it was going to take about four years to build it, and so if we wanted to be able to deploy 2004-2005, that had to get started right away. What's changed there? It sounds -- you guys are suggesting that you're going to have a system that can be deployed on an interim basis, if need be. But without that radar belt, how will it work?

Kadish: It'll work as good as we can make it work. But -- see, that -- one of the main features of this program -- and this gets little arcane, so you've got to stick with me on it -- the way we normally do major defense procurement programs is that we set a very rigid requirement from a military standpoint. We want to do X, Y, and Z, and if you can't do that, we don't want it. That's called threshold or key performance parameters.

And then we set a plan to accomplish that. All right. Usually those things are set at a very bar in terms of performance. So what that does to us in a development program -- it works very well when you got mature technologies. We've been working on an airplane for a hundred years now, and we're pushing the envelope, but we know a hundred years' worth of stuff about how to handle airplanes. So you're able to take schedule and planning milestones to meet that requirement. And that's what we were trying to do with the old national missile defense construct. It's not that that's an unproven method; it's just what we were trying to do.

This approach takes a different tack. It says that technology is so difficult and so uncertain that we think we can accomplish this, we know we have a good shot at it, from an engineering perspective, but we're going to take the approach that we're going to do this incrementally. We're going to have this idea of the military requirement out there, but we're going to provide the military decision-makers and users what we can produce and ask them a very simple question -- "We can do this technically; is this good enough for you to use?" -- all right? -- instead of working very hard, very high risk, trying to meet a requirement that they can say they need.

And that's a very important difference for us developers. And that's what we're trying to do with this idea of interim test assets on the way towards a very incremental, very progressive way of developing these systems. So you don't birth them full-born. We're not trying to go for a layered system with a specific architecture and spend any amount of money and time to do it.

Quite frankly, my record of predicting when we've been doing things is not very good. (Laughter.) And I would match that not very good record with everybody else in history on this program, because nobody's been right on when we're going to do this. So we're going to take an approach where we're going to have internal plans and we're going to try to work to them, but we're going to be flexible and realistic to know whether or not we can do something. And we want to do that through realistic testing.

Q: Well, it sounds like a massive lowering of expectations and standards.

Kadish: Not to me it doesn't.

Q: I mean, how do I write this so that it doesn't sound like, well, they're spending the same, more than they were last year, but now they've really lowered the bar on what they expect to get out of it?

Kadish: I just thought I've increased the bar. We're going to have boost, midcourse and terminal systems against all ranges of threats. And we're going to work very hard, in an unprecedented technology, to produce those as rapidly as possible with confidence that you can write about that says that these things work.

Q: What's your confidence that tomorrow's test will be a success? And what were some of the technical issues in the last few weeks leading up to the test that you had to deal with?

Kadish: The way I would describe it right now is that I'm quietly confident that we will accomplish our objectives. And the reason why I say that is that we're still dealing with prototype hardware. We took the approach that we're going to do the ground testing as we would fly it, and we took a year to go through that and make sure that the hardware's as best as could be. But it is what it is. It's prototype hardware. So we have, just as I said before, somewhere around a 50-50 chance of making this work in total, but the confidence of the intercept is higher than that, and the countdown has been working very well.

That's indicative of the fact that we have good hardware out at Kwajalein. The team is working very, very well together. I'm very proud of them. No matter what happens, they have done an excellent job and, given all the factors that I look at, I'm cautiously optimistic about tomorrow. But I could be standing here tomorrow saying, "Well, we did it again." (Laughter.)

(Cross talk.)

Q: (Inaudible) -- and just a couple more --

Q: Could you bring the champagne -- (inaudible) -- will you?

Q: General, what would be the initial operating capability of the system that you now think you may deploy sometime between 2004 and 2008? Against how many missiles would it be effective, this new multi-layered approach?

Kadish: I cannot tell you that now, and I will not.

Q: General, if you're up here tomorrow night saying, "We missed again," what impact is that going to have on your fairly robust test schedule for the next year?

Kadish: I'm hoping to execute the test schedule regardless of what happens tomorrow. As opposed -- I think we're to the point now with the systems we're testing tomorrow that we should be able to test -- I don't want to make it sound like I'm going to say it, but -- test through failure, if you will, and that is, the one in October we're going to take up to the 10 days -- right to the 10 days minus the launch, and unless we have a good reason not to shoot it, we're going to shoot it and we're going to learn more. So -- as opposed to the approach we've been taking where we want to make sure it's right before we do it; therefore we take a schedule penalty. So we're going to rapidly test this system.

Q: Would you say you're under more pressure now, because you've had a whole year to engineer it and look at the problems, and if you fail after one year of analyzing this and getting ready, you're really going to get a lot of bad publicity and a lot of pressure on you to hold off?

Kadish: Well, I don't mean to be smart when I say this, but if we succeed, people will write about the fact that it was a simple test and -- (laughter) -- and it's rigged. If we fail, it'll never work and we're wasting our money. So I'm going to go right down the middle on that one.

Q: General, could I ask you sort of a personal question? Could you describe for us how you feel about the, sort of, the new gloves-off marching orders you've been given by his administration in contrast to what you were working under the old administration, and particularly as regards the ABM Treaty [anti-ballistic missile]. In the old administration, we were basically developing a system that was basically ABM-compliant, and all these activities were pretty much ABM-compliant. And you've sketched out for us today things that clearly aren't ABM-compliant at all. What's the difference?

Kadish: I don't think about -- my job is to do development.

And I'm happiest when I can serve the country by producing the best systems we can. And we were trying to produce the best system we can under the rules of engagement we had in the last administration, and we're going to try like heck to do the same here.

Q: General --

Kadish: So --

Quigley: Last one, please, ladies and gentlemen.

Q: General, you mentioned the two sea-based tests. I'm not sure if that's -- if that's going to be next year. Could you describe those tests --

Kadish: We have a schedule right now that has the Aegis LEAP intercept tests scheduled for September as a fly-by, with a possible intercept attempt as a secondary objective and another one, I think, in December. I have to get you the exact dates, but there are two this calendar year that there are currently on the schedule.

Q: Are those ABM-compliant or --

Kadish: They're against short-range type targets.

Q: Against short-range type targets. Okay.

Quigley: Thank you.