Statement of
Lieutenant General Ronald T. Kadish, USAF
Director, Ballistic Missile Defense Organization
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Good afternoon, Mr. Chairman, Members of the Committee. Thank you for inviting me to testify today on the U.S. National Missile Defense (or NMD) program. I would like to use my time this afternoon to explain the progress we are making. As you know, we are preparing within the Department to undertake a Deployment Readiness Review (or DRR) this summer in order to assess the technological readiness and cost of the planned NMD system. The President will take the Secretary of Defense's assessment into account when he subsequently considers whether or not to proceed with NMD system deployment. The President, in making this decision, will consider four criteria: threat, status of the technology, affordability, and overall national security, including arms control. To support the technological assessment at the DRR, we have scheduled our fifth integrated flight test on July 7.

There are many decision points ahead of us, and we have a flight-testing program that extends out over the next five years, the results of which will be used to inform decision makers and to validate or improve elements of the NMD system. There has been extensive program progress in the past year, to include: a successful intercept, a demonstrated integration of many system elements, and extensive simulation and ground testing. To be sure, there is a lot of hard work ahead of us. But as we approach the DRR, I am convinced that we are on a path to prove the technological feasibility of deploying this country's first ever national missile defense system.

The goal of the NMD program is modest in scope, but technologically challenging. It is to develop and, when directed, field a limited, land-based national missile defense system to counter the emerging threat to the United States. The Director of Central Intelligence testified before Congress earlier this year that, "Over the next 15 years, our cities will face ballistic missile threats from a variety of actors . . ." And he specifically pointed to North Korea's ability to test its Taepo Dong II missile this year, a missile that "may be capable of delivering a nuclear payload to the United States." To meet this threat, an Initial Operational Capability, consisting of 20 interceptors, can be available by FY 2005. In light of the fact that some states could acquire a capability to launch more missiles in the next decade, our acquisition strategy supports growing that initial system to what we call an "Expanded C-1 architecture" of 100 interceptors. The full 100 interceptors can be deployed by FY 2007.

As I have testified before, the NMD program continues to be high-risk. The schedule is compressed and a significant setback in one element can delay the entire program. The unconventional acquisition approach we have adopted in order to meet the emerging threat requires developing and testing many of the elements concurrently. Maintaining schedule and meeting our commitment to deploy an initial operational capability by 2005 require aggressive management and constant attention. There is a long road ahead to maintain the balance of cost, schedule and performance of this system.

This summer's technological assessment is only the first of several decision points in this multiyear system development and deployment process. Each subsequent decision will take into account the progress of the program at that time and will determine whether to give authority to proceed on key activities. Our most immediate challenge is the prospect of completing an X-Band radar on Shemya Island, Alaska by 2005. Due to the often extreme weather conditions in the Aleutians and the short construction season, this is the long-lead item for the overall system. In Fiscal '01, we would conduct a Defense Acquisition Board review to reassess the status of the program. Based on program performance, we would seek approval to purchase long-lead items for our early warning radars, begin installation of the X-band ground-based radar and missile site, and start the multiyear process of integrating the Battle Management/ Command, Control, and Communications system. Authorization of interceptor missile production is not scheduled until 2003.

You are all well aware of the challenges we've faced in the development of our ballistic missile defense systems to counter the growing threat. There are two central technological problems confronting us with this type of system–a system that engages warheads in their longest phase of flight, what we call the "midcourse." The first is the discrimination problem: can we find the warhead? The second is the so-called "hit a bullet with a bullet" problem: once we find a warhead, can we hit it? Historically, both of these problems have been very difficult to solve, especially against a massive raid involving hundreds of warheads and countermeasures–decoys, radar chaff, and debris.

Until recently, many observers believed the chief technical barrier to NMD was that hit-to-kill was not technologically feasible–that we could not hit a bullet with a bullet. Yet, with the intercept tests executed in our NMD and Theater Missile Defense programs since March of 1999, we have demonstrated repeatedly that hit-to-kill can be done.

Today, the primary concerns surrounding the capability of the planned NMD system have a new focus. Some now maintain that the system cannot accurately discriminate–that is, pick out the warhead from the countermeasures. In fact, they claim that this problem is so hard that it is impossible to overcome and therefore the NMD system should not be built. I disagree. To be sure, this is a challenge we cannot ignore and we are not ignoring it.

In order to understand the discrimination challenge before us, I believe we have to look at three basic aspects of the NMD program–first, the countermeasures the NMD system is expected to face; second, the tools that the NMD system will be using to enhance its ability to discriminate the warhead in the target cluster; and third, our testing objectives and approach. Let me take the rest of my time this afternoon to address these.

As I indicated earlier and in my previous testimony, the operational requirements of the NMD system are limited. If we proceed with deployment, we would initially build a system designed to defend all fifty states against a few long-range missiles with simple countermeasures. So it's very important to understand what the threat will be in the 2005-2007 timeframe, and this will mean considering both the <u>source</u> of the missile threat and the <u>number</u> and <u>sophistication</u> of missiles and warheads we anticipate the states of concern will have. While many types of countermeasures can be postulated based purely on scientific principles, we are initially concerned with countermeasures that, based on intelligence estimates, a state of concern could make effective as it struggles to make its basic system work.

The primary states of concern are North Korea, Iran, and Iraq. As a result, the Expanded C-1 NMD system is not designed to face more than a few tens of warheads or sophisticated countermeasures that these states are unlikely to use. I believe the Expanded C-1 system will be very effective at defeating the most likely threats from these states. The planned system, involving 100 operational interceptors by 2007, is not designed to counter much larger and more capable forces of long-range ballistic missiles. The system we are designing for the 2005-2007 timeframe could not defend against a massive attack involving hundreds of warheads, nor is it intended to defeat more sophisticated countermeasures.

We fully expect that the threat of missile attack from states that threaten international peace and security will evolve over time, and accordingly, we have a follow-on NMD to meet a larger, more sophisticated threat. As with the initial system, follow-on deployment could not harm the Russian deterrent. As the system progresses and we approach 2010, we believe we will be able to develop future capabilities that will handle the more sophisticated countermeasures we expect to face from states of concern. There are practical limits to engineering a countermeasure capability, just as there are practical limits to the defensive technology. We will not be perfect against every conceivable countermeasure, but neither will our adversaries be perfect against our capabilities. Our sensor capabilities will improve over time.

The second aspect of the NMD system it is important to understand is that there are several tools available to us to address the discrimination challenge. The planned system of systems uses more than the kill vehicle to weed out countermeasures and select the right object for destruction. In addition to the infrared and optical sensors on the kill vehicle, we will use the early warning radars and X-Band radar to decrease the volume of space needed to be searched by the sensors on the EKV. The X-Band radar also assists in the discrimination of the target complex. There are many other discrimination technologies and techniques that I cannot talk about in this public forum. But the plain fact is that effective countermeasures would have to defeat more than one aspect of our discrimination capability. With regard to countermeasures, there is a lot of redundancy and synergy built into this system, so that very often the performance we get is greater than the sum total of the parts. Those who say that it is technologically impossible for the NMD system to do adequate discrimination do so on the basis of very limited knowledge and without the benefit of the testing results that we have generated to date and will generate in the years ahead. In the future, we will add even more tools to the discrimination toolbox, to include the infrared sensors on SBIRS-Low satellites, which will be used to help track the warhead. As our computing power grows and discrimination sensors improve and multiply, it will get harder and harder to defeat our maturing NMD system.

The third aspect of the NMD system that must be understood is that we need to have confidence in our discrimination capability, which we get through our testing program. In general terms, the approach we have chosen is to test individual system components, one by one, and then gradually link them for partially-integrated and, later, fully-integrated testing. The results from each test are fed into subsequent tests, so that incremental improvements may be made to the elements and the system. We are just now entering the fully integrated testing phase. The tests we plan will become progressively more stressful. The increasing complexity of our tests will involve, among other things, greater discrimination challenges, longer ranges, higher closing speeds, and day and nighttime shots. The way our current testing program is planned, we will do a series of tests that become increasingly operationally realistic by 2004.

The technologies in the NMD system, having been developed and engineered over several decades, are not revolutionary. We are not awaiting some technological breakthrough. The technologies are there because of the significant investments we've made in years past. So what we really have before us is an engineering and integration challenge. The test program we have devised is designed to demonstrate, not only the effectiveness of many of our more advanced discrimination technologies, but also the integration of numerous system elements. This is a stiff challenge, but in my professional judgment, not an insurmountable one.

I want to describe our flight-testing program, but before I do I want to highlight one very important point. We don't just rely on test data from intercept flight tests. There has been significant ground testing as well as flight testing against the radars for many years, and we use the data from these tests to validate the results we derive from our extensive modeling and simulation exercises. So, while our integrated flight tests are very important, and while we all wait in great anticipation for the outcome of IFT-5, they are not the only basis for developing a recommendation about the technical feasibility of the system. Our track record is good, and our entire testing program has given us a lot of good and very valuable data upon which we can base our decisions.

There's been a great deal of public focus in the press about this flight testing program, including allegations by some that we are making the tests too easy. This is simply not the case. Our flight tests are tough and unprecedented with clear testing objectives, protocols, and specific sequences. We established early on and are adhering to a test strategy designed to address specific objectives with increasing complexity. The flight test plan has always incorporated three major phases. In the first phase, two initial flights were designed to identify the different capabilities of the EKV sensors. In the second phase, the objectives of the flights were to look at aimpoint selection and also address hit-to-kill. And in the third, we will then execute intercept tests against increasingly complex target sets.

The first major phase in our program involved two seeker characterization flight tests on our interceptor kill vehicle, which we executed in order to test on equal terms two competing suites of sensors, one built by Boeing, which flew the EKV during Integrated Flight Test 1A, and the other built by Raytheon, which flew an EKV in Integrated Flight Test 2. The testing objectives for these first two flight tests were very different and much simpler from the testing objectives of the integrated flight tests that followed because they tested only how well the two competing sensor suites could see the dummy warhead and countermeasures. Hit-to-kill was not attempted in these first two tests.

In effect, in this first phase we threw a giant eye chart up there in space before each of the EKVs in order to evaluate their vision. We wanted to test more than just whether each could see the big "E" on that chart, so we included more objects within the field of view so that we could determine how refined the vision of each EKV was. These vision tests also were unassisted–we made no effort to use ground-based radars to assist the sensor suites. The EKVs were on their own, and the NMD team evaluated EKV performance on the basis of their ability to collect target data to validate our discrimination capability.

The target clusters released in space for the first two flight tests contained the reentry vehicle, nine decoys, and the target deployment mechanism. This significant countermeasures package contained more objects than the countermeasures packages we employed during IFT-3 and IFT-4 because we wanted to see how well the EKVs could discriminate within the target complex and identify the warhead. We gathered an immense amount of data that increased our confidence in our ability to meet the discrimination challenge. IFT-1A and 2 demonstrated a robustness in discrimination capability that went beyond the baseline threat for purposes of designing the Expanded C-1 system.

The second major phase of our flight-testing program is designed to test more than the EKV’s vision. This phase began with IFT-3, a partially integrated intercept test, when we successfully demonstrated our ability to do on-board discrimination and target selection as well as hit-to-kill. We dramatically reduced the number of objects in the target complex because our testing objective changed from one of simply seeing and discriminating among the objects to seeing the objects, discriminating among them, evaluating them, and selecting the warhead instead of the decoy or rocket stage, and colliding into the warhead’s "sweet spot." The challenge here, as you can see, is much greater.

These early intercept missions are intended primarily to prove and, if necessary, refine the hit-to-kill technologies. Even here, of course, the discrimination technologies must work well if we are to be able to test our ability to collide with the RV, but we did not set out in these early tests with the goal of stressing the sensor suites to their maximum by releasing multiple objects before them. This will come later. These smaller target sets are not only consistent with our early test flight objectives, they also are representative of some of the threats emerging missile states can pose.

So far, we have had two intercept flight tests to support the DRR decision process. The October 2nd, 1999 test demonstrated the ability of the kill vehicle to locate--that is, discriminate the warhead from the simple countermeasure we employed and the target booster’s final stage--and engage and destroy a reentry vehicle above the atmosphere. IFT-3 demonstrated we could overcome the technical complexity of colliding directly with a missile warhead traveling in space at a closing velocity of more than 15,000 miles per hour. Because of this test, we now know our interceptor concept works, a fact that has helped to build our confidence that it is possible to maintain our aggressive schedule.

In that regard, I’d like to emphasize that we did not hit the target in IFT-3 by accident. Although there were anomalies in that test, the discrimination capability of the EKV performed essentially as intended. The decoy was the biggest object in the EKV’s field of view when the seeker opened its eyes. But the EKV rejected the decoy as the improbable target, resumed its search, and identified the right target before diverting towards and slamming into it.

IFT-4, which occurred in January of this year, was partially successful. Although we did not hit the warhead, we did test and demonstrate the integrated functionality of the major NMD system elements, the operation and performance of the ground sensors, operation and functionality of the Battle Management/Command, Control, and Communications, and EKV performance up to the last seconds in its flight. We also used a simple target complex during this flight test, which, but for the EKV anomaly, showed every sign of being a fully successful test. This test was important because it demonstrated that the X-Band radar and upgraded early warning radars we would deploy as part of the system could make their expected contribution to solving the countermeasures problem.

Next month, IFT-5 will be another full system test of the prototype NMD system, using all of the elements representing a future operational system. The discrimination challenge will involve the dummy warhead, a decoy, and the discarded rocket stage. A new in-flight communications capability providing real-time data to the EKV will be tested. At least 16 more intercept tests are planned by 2005, with eight intercept tests scheduled to take place prior to any commitment to purchase interceptors in 2003. Subsequent flight tests will become progressively more difficult. Retired Air Force General Larry Welch supported this event-driven approach. It is worth noting that there was one piece of advice offered to us by General Welch that we did not follow. This independent panel recommended, in the interest of keeping the tests simple, that we conduct these early intercept tests without countermeasures in order to test more thoroughly the hit-to-kill technique. We thought it was important to add a little more complexity into IFT-3, 4, and 5. We believe that this testing strategy, thus far, has paid off in better discrimination data.

The NMD Joint Program Office is following a rigorous system engineering approach and executing a multi-year testing plan for developing the country's first operational ballistic missile defense system. Given the complexity of the NMD system and the fact that we are now just in the early phases of development, it would be irresponsible, both from a programmatic and financial standpoint, to rush into a testing program that sought to prove the system's effectiveness against the most stressful targets. A test failure, under these conditions, would make it very difficult to identify the points of weakness, and I would be less certain that I could get results useful for subsequent tests. One of our testing goals is to learn about and refine different parts of the system as we are developing it. Our test evaluators cannot learn by overloading system components and testing them too early under highly adversarial conditions. We cannot learn if we cannot isolate results. We cannot acquire the data we need, in other words, unless we use a more scientific, incremental approach.

The NMD program is unique for the amount of attention and intense scrutiny it receives daily. Hundreds of dedicated program and data analysts in government (within both the Congress and Executive branch), in industry (to include the manufacturers of the NMD system elements, the lead system integrator and its subcontractor team), and independent review panels (most notably the panel headed by General Welch) routinely and aggressively analyze and catalogue our testing results and investigate the validity, utility, and authenticity of the data generated by every test executed by the NMD Joint Program Office. Simply put, Mr. Chairman, this program has been turned inside out and placed under a microscope. A problem for one is a problem for all–there are many parties who have a lot invested in the development of an effective NMD system and who will flag any problems in the program or inaccuracies in our reporting.

We will continue to test our NMD system based upon the disciplined, proven, and scientific methods learned over more than four decades of missile development, deployment, and operations. While we strive for success on every test, we do not expect that we will always achieve it. Very often problems occur and elements of our tests fail. Yet we learn a lot from our testing, both successes and failures. We must ensure that the NMD system will work with a very high level of confidence against the threat we believe will exist–the testing program is designed to do just that over the course of the next five years.

Mr. Chairman, that concludes my remarks. I would be pleased to address the Committee’s questions.