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COMMISSION TO ASSESS THE THREAT
TO THE
UNITED STATES
FROM
ELECTROMAGNETIC PULSE (EMP) ATTACK
STATEMENT BEFORE THE
HOUSE ARMED SERVICES COMMITTEE
July 10, 2008**

Mr. Chairman, Members of the Committee, thank you for the opportunity to testify today on behalf of the Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack, established through the initiative of the House Armed Services Committee, mandated by the Congress in the Floyd D. Spence National Defense Authorization Act for Fiscal Year 2001 (Public Law 106-398), and subsequently reestablished in the National Defense Authorization Act for Fiscal Year 2006 (Public Law 109-163).

BACKGROUND

In accord with our statutory mandate, the Commission is composed of nine members, seven of whom were appointed by the Secretary of Defense and two of whom were appointed by the Director of the Federal Emergency Management Agency. In selecting individuals for appointment to the Commission, the Secretary of Defense was also directed to “consult with the chairmen and ranking minority members of the Committees on Armed Services of the Senate and House of Representatives.”

An executive report produced by the EMP Commission and delivered to Congress in 2004 provided an overview of the EMP threat to the U.S., its friends and allies, and its deployed forces. Part of the purpose of my testimony today is to introduce a new report produced by the EMP Commission. This report presents the results of the Commission’s assessment of an EMP attack on our critical national infrastructures, and provides recommendations for preparation, monitoring, protection, and recovery from such an attack. The assessment is informed by analytic and test activities executed under Commission sponsorship, which are discussed in the report. Four other EMP Commission reports were delivered to Congress in 2004, all classified, describing the status of the EMP threat over the next fifteen years as directed by our statutory mandate, and discussing the posture of U.S. military forces with respect to EMP.

Recent disturbing events involving the command and control of nuclear weapons have demonstrated the problems that can occur when the nation does not pay adequate attention to nuclear weapon matters. These problems reflect a shift in culture and attitudes regarding nuclear weapons and their role in today’s world. Our increased vulnerability to EMP is also a result of U.S. reliance on increasingly sophisticated

commercial technologies that have not been designed to withstand the stresses generated by an electromagnetic pulse attack. The Commission has identified important vulnerabilities in our nation's critical infrastructures, which are essential to both our civilian and military capabilities.

SUMMARY

It is the consensus of the EMP Commission that the Nation need not be vulnerable to catastrophic consequences of an EMP attack. As detailed in the Commission report provided today to the Congress, the Nation's vulnerability to EMP that gives rise to potentially large-scale, long-term consequences can be reasonably reduced below the level of a potentially catastrophic national problem by coordinated and focused effort between the private and public sectors of our country. The cost for such improved security in the next 3 to 5 years is modest by any standard—and extremely so in relation to both the war on terror and the value of the national infrastructures threatened.

The appropriate response to the EMP threat is a balance of prevention, planning, training, maintaining situational awareness, protection, and preparations for recovery. Such actions are both feasible and well within the Nation's means and resources to accomplish, and would provide further benefits to the U.S. by increasing the reliability of our critical national infrastructures and preparing them to manage the effects of other large-scale, widespread threats, both man-made, such as cyber attack, and naturally caused, such as very large-scale hurricanes and geomagnetic storms. However, if the EMP threat is unaddressed, the current status of U.S. critical national infrastructures can both invite and reward attack.

DISCUSSION

Although EMP was first considered during the "Cold War" as a means of paralyzing U.S. retaliatory forces, the risk of an EMP attack may be greater today than during the Cold War, as several adversaries seek nuclear weapons, ballistic missiles, and asymmetric ways to overcome U.S. conventional superiority using one or a small number of nuclear weapons.

The electromagnetic fields produced by weapons deployed with the intent to produce EMP have a high likelihood of damaging electrical power systems, electronics, and information systems upon which American society depends. Their effects on critical infrastructures could be sufficient to qualify as catastrophic to the Nation.

It is my hope that the Commission's work can help play a role in restoring a national consensus on the need to take nuclear threats seriously – including the threat posed by an EMP attack – and to strengthen U.S. efforts to deal with that threat. In so doing, the U. S. will reduce the incentives for adversaries to contemplate conducting such an attack on our homeland, our friends and allies, and our forces deployed abroad.

A high-altitude electromagnetic pulse results from the detonation of a nuclear warhead at altitudes in the range of about 40 to 400 kilometers above the Earth's surface. The immediate effects of EMP are disruption of, and damage to, electronic systems and electrical infrastructure. EMP is not reported in the scientific literature to have direct physiological effects on people.

EMP and its effects were observed during the U.S. and Soviet exo-atmospheric nuclear test programs in the early 1960s. During the U.S. STARFISH nuclear test at an altitude of about 400 kilometers above Johnston Island, some electrical systems in the Hawaiian Islands, 1400 kilometers distant, were affected, causing the failure of street lighting systems, tripping of circuit breakers, triggering burglar alarms, and permanent damage to a commercial telecommunications relay facility that caused it to cease functioning.

In their exo-atmospheric nuclear testing, the Soviets executed a series of nuclear detonations in which they exploded 300-kiloton weapons at approximately 300, 150, and 60 kilometers above their test site in South Central Asia. In the 1990s, Russian scientists reported that on each shot they observed damage to overhead and underground buried cables out to distances of 600 kilometers. They also observed surge arrestor burnout, spark-gap breakdown, blown fuses, and power supply breakdowns.

What is significant about an EMP attack is that one or a few high-altitude nuclear detonations can produce EMP effects that can potentially disrupt or damage electronic systems over much of the United States, virtually simultaneously, at a time determined by an adversary. EMP is one of a small number of threats that can hold our society at risk of catastrophic consequences. EMP will cover the wide geographic area within line of sight to the nuclear weapon. It has the capability to produce significant damage to critical infrastructures that support the fabric of U.S. society and the ability of the United States and Western nations to project influence and military power.

The common element that can produce such an impact from EMP is primarily electronics, so pervasive in all aspects of our society and military, coupled through critical infrastructures. Our vulnerability is increasing daily as our use of and dependence on electronics continues to grow in both our civil and military sectors. The impact of EMP is asymmetric in relation to potential antagonists who are not as dependent on advanced electronic technologies.

The current vulnerability of our critical infrastructures can both invite and reward attack if not corrected. Correction is feasible and well within the Nation's means and resources to accomplish.

Several potential adversaries have the capability to attack the United States with a high-altitude nuclear weapon-generated electromagnetic pulse, and others appear to be pursuing efforts to obtain that capability. A determined adversary can achieve an EMP attack capability without having a high level of sophistication. For example, an adversary would not have to have long-range ballistic missiles to conduct an EMP attack against the United States. Such an attack could be launched from a freighter off the U.S. coast using

a short- or medium-range missile to loft a nuclear warhead to high-altitude. Terrorists sponsored by a rogue state could attempt to execute such an attack without revealing the identity of the perpetrators. Iran, the world's leading sponsor of international terrorism, has practiced launching a mobile ballistic missile from a vessel in the Caspian Sea. Iran has also tested high-altitude explosions of the Shahab-III, a test mode consistent with EMP attack, and described the tests as successful. Iranian military writings explicitly discuss a nuclear EMP attack that would gravely harm the United States. While the Commission does not know the intention of Iran in conducting these activities, we are disturbed by the capability that emerges when we connect the dots.

Certain types of relatively low-yield nuclear weapons can be employed to generate potentially catastrophic EMP effects over wide geographic areas, and designs for variants of such weapons may have been illicitly trafficked for a quarter-century. Recently, as reported in the press, United Nations investigators found that the design for an advanced nuclear weapon, miniaturized to fit on ballistic missiles currently in the inventory of Iran, North Korea, and other potentially hostile states, was in the possession of Swiss criminals affiliated with the A.Q. Khan nuclear smuggling network.

This fact suggests that other advanced nuclear weapon designs may already be in the possession of hostile states and of states that sponsor terrorism. This fact also suggests that it would be a mistake to judge the status and sophistication of rogue nuclear weapon programs based solely on their indigenous national capabilities, since outside assistance may well have been provided.

Depending on the specific characteristics of the EMP attacks, unprecedented cascading failures of major infrastructures could result. In that event, a regional or national recovery would be long and difficult, and would seriously degrade the safety and overall viability of our Nation. The primary avenues for catastrophic damage to the Nation are through our electric power infrastructure and thence into our telecommunications, energy, transportation, and other infrastructures. These, in turn, can seriously impact other important aspects of our Nation's life, including the financial system; means of getting food, water, and medical care to the citizenry; trade and production of goods and services. The recovery of any one of the key national infrastructures is dependent upon the recovery of others. The longer the outage, the more problematic and uncertain the recovery will be. It is possible for the functional outages to become mutually reinforcing until at some point the degradation of infrastructure could have irreversible effects on the country's ability to support its population.

Given our armed forces' reliance on critical national infrastructures (e.g., electric power, telecommunications, food and water, etc.), a cascading failure of these infrastructures could seriously jeopardize our military's ability to execute its missions in support of our national security. Projection of military power from air bases and seaports requires electricity, fuel, food and water, and the coordination of military operations depends upon telecommunications and information systems, that are also indispensable to society as a whole. Within the U.S., these assets are in most cases obtained by the military from our critical national infrastructures.

EMP effects from nuclear bursts are not new threats to our nation. What is different now is that some potential sources of EMP threats are difficult to deter—they can be terrorist groups that have no state identity, have only one or a few weapons, and are motivated to attack the U.S. without regard for their own safety. Potentially hostile states, such as North Korea and Iran, may also be developing the capability to pose an EMP threat to the United States, and may also be unpredictable and difficult to deter.

China and Russia have considered limited nuclear attack options that, unlike their Cold War plans, employ EMP as the primary or sole means of attack. Indeed, in May 1999, during the NATO bombing of former Yugoslavia, high-ranking members of the Russian Duma, meeting with a U.S. congressional delegation to discuss the Balkans conflict, raised the specter of a Russian EMP attack that would paralyze the United States. As recently as two weeks ago, Assistant Secretary of Defense for Asian and Pacific Security Affairs James J. Shinn testified before this Committee that China's arms buildup is increasing the danger of a future conflict over Taiwan. Mr. Shinn disclosed that China's military is working on exotic electromagnetic pulse (EMP) weapons that can devastate electronic systems using a burst of energy similar to that produced by a nuclear blast. "The consequence of EMP is that you destroy the communications network," Mr. Shin said. "And we are, as you know, and as the Chinese also know, heavily dependent on sophisticated communications, satellite communications, in the conduct of our forces. And so, whether it's from an EMP or it's some kind of a coordinated [anti-satellite] effort, we could be in a very bad place if the Chinese enhanced their capability in this area," he concluded.

U.S. military forces, allies, or interests could also be affected inadvertently by an EMP attack between other actors in a conflict not involving the United States, as in hostilities between India and Pakistan, for example.

Another key difference from the past is that the U.S. has developed more than most other nations as a modern society heavily dependent on electric power, electronics, telecommunications, information networks, and an extensive set of financial and transportation systems that leverage modern technology. This asymmetry is a source of substantial economic, industrial, and societal advantages for the U.S. But the critical interdependencies and normally reliable operation of the infrastructures create potential vulnerabilities if multiple, simultaneous disruptions and failures can be made to occur.

Therefore, terrorists or state actors that possess one or a few relatively unsophisticated nuclear armed missiles may well calculate that, instead of or in addition to destroying a city or military base, they could obtain the greatest economic-political-military utility from conducting an EMP attack.

The time required for full recovery of service would depend on both the damage to the electric power infrastructure and to other critical national infrastructures. Larger affected areas and stronger EMP field strengths will prolong the time to recover. Some critical electric power components are no longer manufactured in the United States, and their

acquisition ordinarily requires up to a year of lead-time in routine circumstances. Damage to or loss of these components could leave significant parts of the electric power grid out of service for months to a year or more. There is a point at which the shortage or exhaustion of sustaining backup systems, including emergency power supplies, standby fuel supplies, communications, and manpower resources, leads to a continuing degradation of critical infrastructures for a prolonged period, with highly adverse consequences to our population and forces.

The ability to recover from an EMP attack is complicated by increasing sophistication and automation that has made manpower less necessary to running the critical national infrastructures. The use of automated control systems has allowed many companies and utilities to operate effectively with small work forces. Thus, while manual control of some systems may be possible, the number of people knowledgeable enough to support manual operations is limited. Repair of physical damage is also constrained by a small work force. Many maintenance crews are sized to perform routine and preventive maintenance of high-reliability equipment that is not expected to fail simultaneously over a widespread area. When repair or replacement is required that exceeds routine levels, arrangements are typically in place to augment crews from outside the affected area. However, due to the simultaneous, geographically widespread effects from EMP, many workers will be occupied in their own areas, and unavailable to help other areas. Thus, repairs normally requiring weeks of effort may require a much longer time.

In closing, allow me to give a preview of the EMP Commission's findings to date for its next report, due to Congress in November, which will assess the progress being made to protect the Nation from EMP attack.

The Commission requested and received information from a number of Federal agencies and Department of Energy National Laboratories. We received information from the North American Electric Reliability Corporation, the President's National Security Telecommunications Advisory Committee, the National Communications System, the Federal Reserve Board, the Department of Defense, the Department of Homeland Security, and the Intelligence Community. While it benefited from these inputs, the Commission developed an independent assessment, and is solely responsible for the content of its research, conclusions, and recommendations.

Early in this review it became apparent that only limited EMP vulnerability testing had been accomplished for modern electronic systems and components. To partially remedy this deficit, the Commission sponsored illustrative testing of current systems and infrastructure components. The Commission's view is that the Federal Government does not today have sufficient human and physical assets for reliably assessing and managing EMP threats.

While measures to establish a balance of prevention, planning, training, maintaining situational awareness, protection, and preparations for recovery from an EMP attack will require a sustained effort, the Commission wishes to note an increased focus within the Department of Defense since it received our earlier reports. Our report to the Congress,

due in November, will address this in more detail as part of the Commission's required assessment of DoD's progress in implementing steps to mitigate the risk of EMP attack. In particular, the Commission takes note of revived DoD efforts to address survivability concerns of weapons systems considering chemical, biological, radiological, and nuclear effects.

CONCLUSION

The United States faces a long-term challenge to maintain technical competence for understanding and managing the effects of nuclear weapons, including EMP. The Department of Energy and the National Nuclear Security Administration have developed and implemented an extensive Nuclear Weapons Stockpile Stewardship Program over the last decade. However, no comparable effort was initiated to understand the effects that nuclear weapons produce on modern systems. The Commission reviewed current national capabilities to understand and to manage the effects of EMP and concluded that the U.S. is rapidly losing the technical competence and facilities that it needs in the Government, the National Laboratories, and the Industrial Community.

An EMP attack on the critical national infrastructures is a serious problem, but one that can be managed in an orderly way at reasonable cost. A serious national commitment to address the threat of an EMP attack can lead to a national posture that would significantly reduce the payoff for such an attack and allow the United States to recover from EMP, and from other threats, man-made and natural, to the critical national infrastructures. A failure to do so will not only leave the critical infrastructures necessary for our society to function at risk but will also place our ability reliably to conduct military operations in jeopardy.

This concludes my prepared statement. Thank you again, Mr. Chairman, for the opportunity to present the Commission views and for your support of our efforts.

At this time, I would be happy to respond to any questions you have.