

# EMP – A National-Scale Threat to the U.S. Infrastructure

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Since the nuclear weapon atmospheric test days of the 1950s, it has been known that a single nuclear weapon detonated at altitudes from about 30-500 kilometers generates a strong electromagnetic pulse (EMP) that can disrupt electronic systems on the ground at large distances from the burst. During the Cold War, the effects of high altitude nuclear detonations were considered by many to be ephemeral, second order effects in comparison to direct blast/thermal/radiation effects from near-surface bursts in the context of mutually-assured-destruction (or MAD) scenarios. However, as infrastructure objectives have gained prominence in military operations, the likelihood of high altitude nuclear scenarios have gained wider

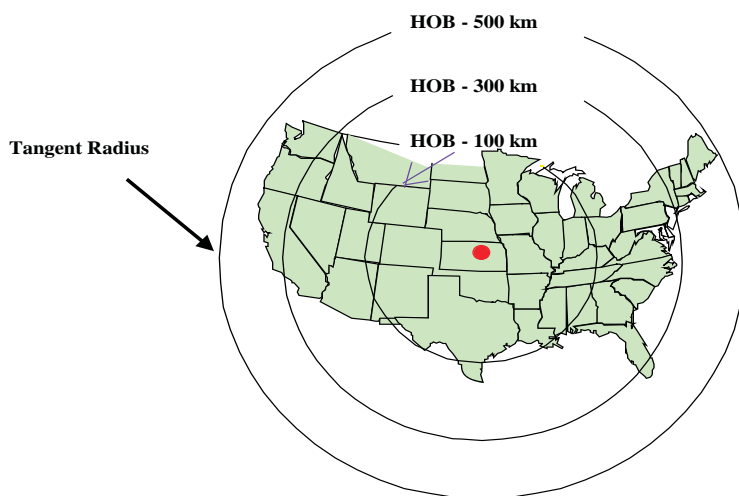
acceptance among strategic planners. When viewed in the context of infrastructure debilitation, high altitude nuclear attacks begin to make sense as a primary tactic to deny or delay an adversary's ability to respond. The use of nuclear weapons at high altitudes could prove decisive in future conflicts.

Because a national-scale disruption may accrue from the detonation of a single weapon, EMP is arguably the most serious threat to U.S. infrastructure. The EMP induces large voltages and currents in wires and antennae connected to electronic systems that may upset operation or damage circuit components. Integrated circuits used in computers, infrastructure controls, and com-

munication systems are particularly susceptible to these effects. Long line networks such as the electric power grid and telecommunications systems receive and propagate the largest EMP currents, making them most likely to fail. The military has taken steps to protect its most critical systems. The civilian economy has not.

In 2002, recognizing our crucial dependence on advanced electronic systems, Congress established a nine-member panel headed by Reagan administration science adviser, William Graham, to examine the threat from such an explosion to critical infrastructure. Representative Roscoe Bartlett (R-Md.) wrote the legislation to create the Commission. The Commission issued its report to Congress in 2004. The EMP Commission hearing was eclipsed by the 911 Commission hearing which was held on the same day. The report represents the unanimous views of the Commission members.

The Commission's unclassified executive summary recognizes EMP as one of a very small number of threats that can hold the entire nation at risk in terms of significant damage to critical infrastructures and the ability of the United States to project influence and military power. The Commission explains  
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Single High Altitude Detonation EMP Ground Coverage for 3 Heights of Burst (HOB)

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EMP (Continued from Page 2) that our vulnerability is increasing daily because of our growing dependence upon electronics. The effect is asymmetric, both in terms of the continental-scale effects from a single weapon, and that potential protagonists do not depend upon electronics to the extent that we do. The report identifies several potential adversaries that have or can acquire an EMP attack capability, including China, Russia, North Korea, Iran and non-state malefactors. Achieving an attack capability is facilitated by the fact that there is no need to smuggle a weapon across the border (an offshore detonation will expose large, adjacent land areas) and no need for missile sophistication or accuracy. Short-range Scud missiles, readily available on the international arms market, are sufficient to get a nuclear weapon to the required altitude. The Commission expressed concern that the present vulnerabilities of our critical infrastructures both invite and reward attack if not corrected. The Commission is convinced that correction is feasible and well within the Nation’s means.

The Commission provides guidance for reducing long-term consequences below catastrophic levels. This will require a coordinated and focused effort between private industry and the public sector. The Commission projects the cost for such improved security in the

next three to five years to be modest when compared to the war on terror and the value of the national infrastructures at risk. Preparations will involve a balance of prevention, protection, planning, and preparations for recovery. A number of these actions will also reduce vulnerabilities to other serious threats to our infrastructures.

It will be important to identify and protect key vulnerabilities in the most critical infrastructure systems. Recognizing that it is not possible to protect everything, planning is needed to recover essential services to eliminate adversaries’ prospects to achieve large-scale, long-term infrastructure outages. The Commission believes that adequate preparation could be achieved within three to five years, given a dedicated commitment by the federal government and an affordable investment of resources.

Because of the national security implications of EMP, the Commission recommends that the federal government shoulder the responsibility of managing the most serious infrastructure vulnerabilities per Homeland Security Presidential Directives 7 and 8. These Directives give DHS the authority it needs to deal with civilian consequences of an EMP attack. The Commission laid out the following strategy to address the EMP threat:

- Pursuit of intelligence, interdiction, and deterrence to discourage an EMP attack against the U.S. and its interests.
- Protecting critical components of the infrastructure, with particular emphasis on those that, if damaged, would require long periods of time to repair or replace.
- Maintaining the capability to monitor and evaluate the condition of critical infrastructures.
- Recognizing an EMP attack and understanding how its effects differ from other forms of infrastructure disruption and damage.
- Planning to carry out a systematic recovery of critical infrastructures.
- Training, evaluating, red-teaming, and periodically reporting to Congress.
- Defining the Federal Government’s responsibility and authority to act.
- Recognizing the opportunities for shared benefits.
- Conducting research to better understand infrastructure system effects and developing cost-effective solutions to manage these effects.

Details of this strategy are included in the Executive Summary, available at the following website: <http://empreport.ida.org>.

Because of the material implications of the initial Commission findings and recommendations, the current Congress has rechartered the group to assist in planning and implementation. ❖