



An illustrative rendering of an EMP attack on the United States. (Image source: Video screenshot from "33 Minutes")

Despite these previous warnings and North Korea's recent bomb test -- its fourth known nuclear test since 2006 -- "experts" are dismissing a nuclear threat from North Korea as of little concern because the apparent yield of the bomb was in the neighborhood of 10 kilotons or less.

Hydrogen Bombs, or thermonuclear weapons, which is what North Korea claimed to have detonated, produce yields higher than those.

In fact, however, these experts may be way off base. The yield of an EMP explosion is lower. The North Korean bomb capability that was tested may therefore well be that of a super-EMP.

Neutron bombs, or Enhanced Radiation Weapons such as Super-EMP weapons, are essentially very low yield H-Bombs. They typically have yields of 1-10 kilotons, exactly like North Korea's device. Indeed, *because* of their very low yield, all four North Korean nuclear tests look like Super-EMP weapons.

A Super-EMP weapon is designed to produce special effects (gamma rays, in the case of Super-EMP). A Super-EMP warhead, while having a seemingly insignificant explosive yield, could be far more deadly and dangerous to the United States than the most powerful H-Bomb ever built.

Russia's Tsar H-Bomb, (known as Tsar Bomba), the most powerful H-Bomb ever detonated, produced during its test in October 1961 a yield of 60 megatons. It would have been capable of flattening everything in the state of Rhode Island. [2]

A Super-EMP weapon, however, detonated 300 kilometers above the center of the U.S., could destroy the entire nation's industrial and military capacity, and kill a large percentage of the American people, by taking down the U.S. electrical grid. Once destroyed, the grid's elements would take decades to rebuild.[3]

Even if the U.S. were to protect its electrical infrastructure from such a threat -- legislation to protect the grid is now in Congress, primarily thanks to Rep. Trent Franks (R-Arizona) -- the parallel vulnerability of U.S. military forces to an EMP attack would be just as serious.

We know the Department of Defense has testified to Congress that 99% of the electricity for continental U.S. military bases comes from the civilian grid. Our military bases would thereby be without electrical power for decades as well. Unfortunately, the thousands of electrical transformers destroyed by an EMP attack were not primarily built in America. Even if they were, they require at least a five-year lead-time for production.

Overseas power-projection from U.S. military bases would be effectively impossible without an operational grid. Moreover, after such an EMP attack, the national focus would be on saving millions of Americans from mass starvation and preserving societal existence, not on going "over there" to fight a war or defend U.S. interests.

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If the EMP attack were executed anonymously, say, by a missile launched off a freighter at sea close-in to the United States, we would probably not even know against whom to retaliate. Thus, classical deterrence would not work, further "inviting" such an attack.

In 1999, for example, at a high level meeting in Vienna of a Congressional delegation with senior members of the Russian government, Vladimir Lukin, the chairman of the Duma's Foreign Affairs Committee, angry with American policy in the Balkans, issued the following threat: "If we really wanted to hurt you with no fear of retaliation, we would launch a Submarine-launched Ballistic Missile (SLBM), [and] we would detonate a nuclear weapon high above your country and shut down your power grid."

Congressman Curt Weldon, (R-PA), the American delegation chair, who understood Russian, turned to his Maryland colleague, (Roscoe Bartlett, D-MD) and asked, "Roscoe, did you hear what he said?"

The chairman of the State Duma Geopolitics Commission, Alexander Shabanov, smiled and said, "And if that one doesn't work, we have plenty of spares".[4]

Thus a nuclear weapon designed specifically for EMP attack, what Russian experts call a "Super-EMP" warhead, would constitute a worst-case threat.

A single Super-EMP warhead, detonated in the sky 300 kilometers over the center of the U.S., would generate such a powerful EMP field over all 48 contiguous United States that, not only would a protracted nationwide blackout result, but even the best protected U.S. military forces and C3I on all military bases—if not sufficiently protected-- could also be at risk.

The technology to protect the electrical grid is relatively straightforward and inexpensive. But only with action now could the grid be protected sufficiently to give the US industrial and economic capability a fighting chance to survive an "Electronic Armageddon".

It is also possible to protect military assets through "hardening," but doing so after production and the fielding of equipment is time-consuming and costly. The sooner the U.S. starts with hardening its equipment, sooner the job will get done. The U.S. is seriously behind schedule in what is required to protect it.

It is not as if the threat is "over the horizon." Russia and China already have Super-EMP warheads. Moreover, according to the Congressional EMP Commission, the design of Super-EMP warheads is no secret: "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."

The EMP Commission warned that non-state actors -- terrorists -- could also pose an EMP threat: "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."

The EMP Commission also warned that the Department of Defense has failed to maintain adequate EMP protection for U.S. military forces since the end of the Cold War:

"The end of the Cold War relaxed the discipline for achieving EMP survivability within the Department of Defense, and gave rise to the perception that an erosion of EMP survivability of military forces was an acceptable risk. EMP simulation and test facilities have been mothballed or dismantled, and research concerning EMP phenomena, hardening design, testing, and maintenance has been substantially decreased. However, the emerging threat environment, characterized by a wide spectrum of actors that include near-peers, established nuclear powers, rogue nations, sub-national groups, and terrorist organizations that either now have access to nuclear weapons and ballistic missiles or may have such access over the next 15 years have combined to place the risk of EMP attack and adverse consequences on the US to a level that is not acceptable."

The EMP Commission further warned that even U.S. strategic forces and C3I may be at risk from an EMP attack:

"Current policy is to continue to provide EMP protection to strategic forces and their controls. The Department of Defense must continue to pursue the strategy for

strategic systems to ensure that weapons delivery systems of the New Triad [land, sea and air] are EMP survivable, and that there is, at a minimum, a survivable 'thin-line' of command and control capability to detect threats and direct the delivery systems."^[5]

U.S. strategic forces today are also relatively more vulnerable than they were during the Cold War: they are far less numerous and located on fewer bases, so an adversary could more easily target peak EMP fields on each base. Compared to Cold War era systems, the more modern and sophisticated C3I systems for command and control of U.S. strategic forces could be vulnerable to EMP, unless they are hardened to withstand such electromagnetic pulse attacks. This is also true for the entire industrial infrastructure, the most critical of which is the electrical grid.

The EMP Commission also warned that as U.S. conventional forces become more dependent upon high-technology, they also become more vulnerable to EMP attack:

"The situation for general-purpose forces (GPF) is more complex. The success of these forces depends on the application of a superior force at times and places of our choosing. We accomplish this by using a relatively small force with enormous technological advantages due to superior information flow, advanced warfighting capabilities, and well-orchestrated joint combat operations. Our increasing dependence on advanced electronics systems results in the potential for an increased EMP vulnerability of our technologically advanced forces, and if unaddressed makes EMP employment by an adversary an attractive asymmetric option."

The above alarming assessments about the vulnerability of U.S. military forces to EMP attack are what the EMP Commission decided must be stated publicly, in its unclassified Executive Summary. The EMP Commission submitted a separate, classified, report to the Department of Defense analyzing these and many other vulnerabilities in far greater detail.

What progress has the Department of Defense (DoD) made to protect itself and the nation from EMP attacks since the reports were completed?

When the EMP Commission terminated in 2008, it was on the understanding that DoD would move aggressively to protect U.S. military forces from EMP, and report biennially to Congress on progress being made implementing the EMP Commission recommendations. The only unclassified biennial report from DoD indicates that there were still serious deficiencies in protecting U.S. military forces from EMP in 2011.

On April 7, 2015, the North American Aerospace Defense Command (NORAD) chief, Admiral William Gortney, announced that NORAD was moving critical assets back into the nuclear bunker inside Cheyenne Mountain and spending \$700 million to harden the mountain further against a potential nuclear EMP attack from North Korea. That the nation's most critical C3I node is just now being adequately protected does not bode well for the preparedness of U.S. military forces as a whole for an EMP Doomsday scenario.^[6]

Fortunately, Congress re-established the EMP Commission in the recently completed and passed Fiscal Year 2016 National Defense Authorization Act, to serve as a watchdog on U.S. preparedness and the fast-evolving EMP threat.

The recent military writings and exercises of potential adversaries, for example, combine EMP with cyber-attacks, sabotage, and kinetic attacks against the national electric grid and other critical infrastructures -- a decisive new way of warfare described by Russian experts as a "Revolution in Military Affairs."^[7]

The U.S. response has recently gotten some important traction. The House, on November 16, 2015, unanimously passed the Critical Infrastructure Protection Act (CIPA -- House of Representatives bill number HR 1073).

CIPA directs the Department of Homeland Security (DHS) to educate emergency planners and first responders at all levels of government about the EMP threat, and to prepare plans to protect and recover the electric grid and other critical infrastructures from an EMP attack and from natural EMP that can be generated by a rare solar super-storm. The House Energy and Commerce Committee also passed provisions to secure the electric grid from EMP, including by stockpiling spare parts and incorporating the SHIELD Act, which gives new authorities to the

U.S. Federal Energy Regulatory Commission to protect the grid.

Protecting the national electric grid from EMP is necessary to preserve the existence of American civilization, to sustain U.S. military power-projection capabilities, and it would also mitigate worst-case threats from cyber warfare, sabotage, kinetic attacks, and even severe weather. CIPA and SHIELD are the crowning achievements of Rep. Trent Franks (R-AZ), who for years has been the conscience of the Congress, warning about the existential threat from EMP. [8]

While both bills now await action in the Senate, there is an increasing threat from Iran, which recently successfully tested two nuclear-capable missiles, and from a North Korean satellite, the KSM-3, which regularly orbits over North America at the optimum trajectory to evade U.S. national missile defenses. If the KSM-3 were to carry a nuclear weapon, it would project an EMP field over all of the 48 contiguous United States.

North Korea is Iran's strategic partner, and there is a treaty between the two countries that obligates the sharing of scientific and military technology.

North Korea's military recently carried out what some have described as an attempted **test from a submerged barge**, an indication that an earlier test failure has not derailed its underwater missile program, according to U.S. defense officials.

Add North Korea's missile capability and a super EMP weapon to this potential, and the significance of the recent North Korean nuclear test comes into better focus. The possibility of a North Korean or Iranian EMP attack seems to be gathering strength.

We may have already seen what such an attack might look like. During the 2014 Gaza War, Hamas, the Syrian Electronic Army, and Iran attempted mass cyber-attacks, coordinated with massive missile strikes, on Israel's electrical grid. Hamas launched over 5000 rockets and missiles against Israel. Prepared, Israel's cyber defenses defeated the cyber-attacks, and the Iron Dome missile defense system shot down all the missiles aimed at the Israeli grid.[9]

There are important lessons here. Missile and cyber defenses work: they are critically important parts of any national security strategy.

Israel had also made a prior decision to harden its grid against threats by EMP attacks. The combined efforts of this crucial ally of ours gives us a roadmap to follow: robust missile defenses to defend the homeland from EMP-armed missiles; cyber defenses to protect critical assets and the infrastructure; and EMP defenses to protect national security and defense assets and the electrical grid from attack.

Both the 2004 and 2008, EMP Commission reports urged America's leaders to protect against such threats as EMP. The House of Representatives has now passed the necessary legislation to protect the grid. The Senate has a champion -- Senator Ron Johnson (R-WI), who has pledged to secure Senate passage.

But there are serious pressures working against its passage. Too many "experts" currently dismiss any such threat to the American homeland.

Just recently, for instance, a former intelligence specialist in the U.S. government, Paul Pilar, **argued in *The National Interest*** that Iranian ballistic missiles were "here to stay" and were simply elements of Iran's defenses -- and, despite repeated Iranian calls for "Death to America," were no threat to the United States homeland or its overseas interests.[10]

Such conventional complacency, such as calling ISIS the jay-vee team, is not uncommon in Washington, D.C. The National Intelligence Estimate on Iran in 2007 argued that Iran had stopped all its nuclear weapons work in 2003[11]; the International Atomic Energy Administration has now determined that Iran's nuclear work had continued to at least 2009.[12]

Unfortunately, there is real-world experience -- in Israel -- that such threats from missiles and cyber-attacks are constantly serious and looming: the entire job of an adversary is to look for weak spots to attack.

There always seem to be those who wish to downplay all threats and are reluctant even to invest in an "insurance premium." The consequences of failing to protect America against such threats, however, will be far more serious than future embarrassment for some head-in-the-sand bureaucrats.

An EMP attack would shut down the country; lead to the loss of millions of lives, and set it back into effective defenselessness.

It is a threat as serious as any estimates of what a mushroom cloud at the height of the Cold War would have entailed. Instead, it kills by sending the country back to what former House Speaker Newt Gingrich has described as early 18th century America: people would not be able to function in even the simplest of ways. Buildings would be left standing but the ability to live in them would not. People would be unable to move about, eat, drink, shop or communicate.

It therefore requires full attention, in this era of increased cyber-sophistication, especially among enemies of the West, to see that an EMP attack is never "invited" to happen in the U.S.

Peter Huessy is President of GeoStrategic Analysis of Potomac, Maryland and Senior Defense Consultant to the Mitchell Institute of the Air Force Association and a guest lecture at the US Naval Academy on nuclear deterrent policy and the founder of the 36 year AFA-NDIA-ROA Congressional Breakfast Seminar Series on Nuclear Deterrence, Missile Defense, Arms Control, Proliferation and Defense Policy.

[1] Previous such threat analysis had been classified; the Report of the Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack, July 2004 and April 2008 was issued in both classified and unclassified versions; see also Henry F. Cooper and Peter Vincent Pry, "The Threat to Melt the Electric Grid," *Wall Street Journal*, April 30, 2015; and Former Director of Central Intelligence, R. James Woolsey, testimony before the U.S. Congress, May 21, 2013.

[2] "Big Ivan", The Tsar Bomba", Viktor Adamsky and Yuri Smirnov, 1994, "Moscow's Biggest Bomb".

[3] EMP Commission, April 2008.

[4] Committee on Armed Services, House of Representatives, July 22, 2004, Hearing on the Report of the Commission to Assess the Threat to the US from Electromagnetic Pulse Attack.

[5] "Report of the Commission to Assess the Threat to the United States from Electromagnetic Pulse (EMP) Attack", Volume I: Executive Report; hereinafter cited as EMP Commission Report 2004.

[6] EMP Commission Report 2004, p. 47.

[7] "Defense Science Board (DSB) Task Force on the Survivability of Systems and Assets to Electromagnetic Pulse (EMP) and other Nuclear Weapon Effects (NWE)", Summary Report No. 1, Interim Report of the DSB Task Force, 2011. See also Dr. Peter Vincent Pry, *Apocalypse Unknown: The Struggle to Protect America from an Electromagnetic Pulse Catastrophe*, Task Force on National and Homeland Security, 2013, pp. 158-164.

[8] For a good history of these efforts, see Congressman Trent Franks, remarks at the AFA-NDIA-ROA Congressional Breakfast Seminar, December 17, 2015, transcript available from Peter Huessy at AFA (Phuessy@afa.org).

[9] Information from Uzi Rubin, President of Rubicon, to the authors.

[10] See an excellent rejoinder by Emily Landau and Shimon Stein, INSS, National Defense University, "Iran's Ballistic Missiles Are Actually a Huge Problem", January 5, 2016.

[11] Paul Pillar spoke approvingly of the 2007 NIE at "The Iran National Intelligence Estimate and Intelligence Assessment Capabilities", December 20, 2007, the Brookings Institution.

[12] IAEA Board Report: Joint Comprehensive Plan of Action implementation and verification and monitoring in the Islamic Republic of Iran in light of United Nations Security Council Resolution 2231 (2015), Resolution adopted by the Board of Governors on 15 December 2015.

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Contact: info@gatestoneinstitute.org

Membership: membership@gatestoneinstitute.org

Editorial: editor@gatestoneinstitute.org

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