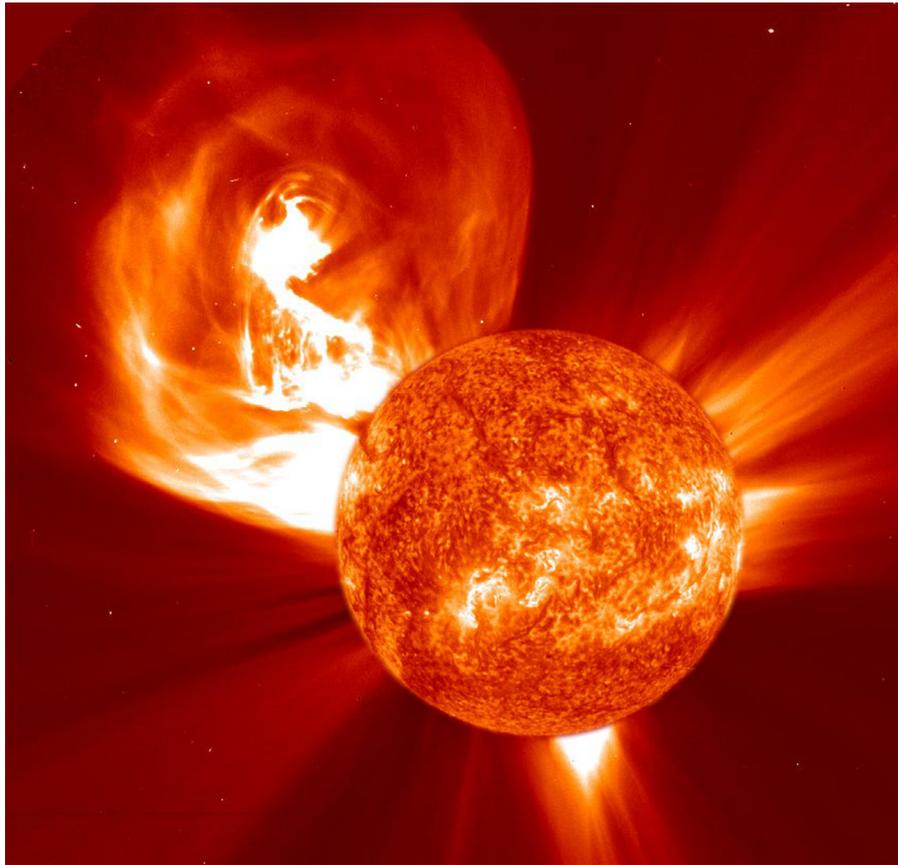


Electromagnetic Pulse

Thinking the Unthinkable



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“Modern society is utterly dependent on electricity. The electrical system is the master system upon which all others depend. And it is vulnerable to historically large space weather events.”

- Lawrence E. Joseph
Author of *Aftermath: A Guide to Preparing for and Surviving Apocalypse 2012*

Abstract

A major threat to America exists today that could wreak utter havoc on the nation's electronic systems —shutting down not only our power grids, but also the sources of power themselves. The result would be a complete disruption of our financial and banking institutions, the halting of our vast transportation and supply chain infrastructures, and it would mean quite simply: the complete shutdown of anything and everything containing electronics, up to and including communication equipment and life care systems. Like most modern civilizations, the physical and social fabric of the United States is reliant on a complex and dynamic network of interlocking and interdependent systems.

It is the harmonious functioning of these “critical national infrastructures” that enables a myriad of actions, transactions, and information flow that undergird the orderly conduct of civil society in this country.¹ Unfortunately, this potential threat to our way of life is something most Americans know very little about, and those who could prevent a catastrophe from occurring have largely ignored the dangers.

While oil plays a vital role in our food production, transportation and manufacturing needs, there is something even more indispensable to our way of life that most (if not all) of us take for granted —our reliance

on microprocessors, as well as the electricity used to power them. Endangering these two essential ingredients to our modern civilization is what is known as an electromagnetic pulse (commonly referred to as EMP), which can take one of two forms, both of which we will be covering in great detail. We'll expose the fragility of our electronically dependent world that would suffer utter devastation should an EMP event occur, while revealing that our critical defenses against such devastation are alarmingly insufficient.

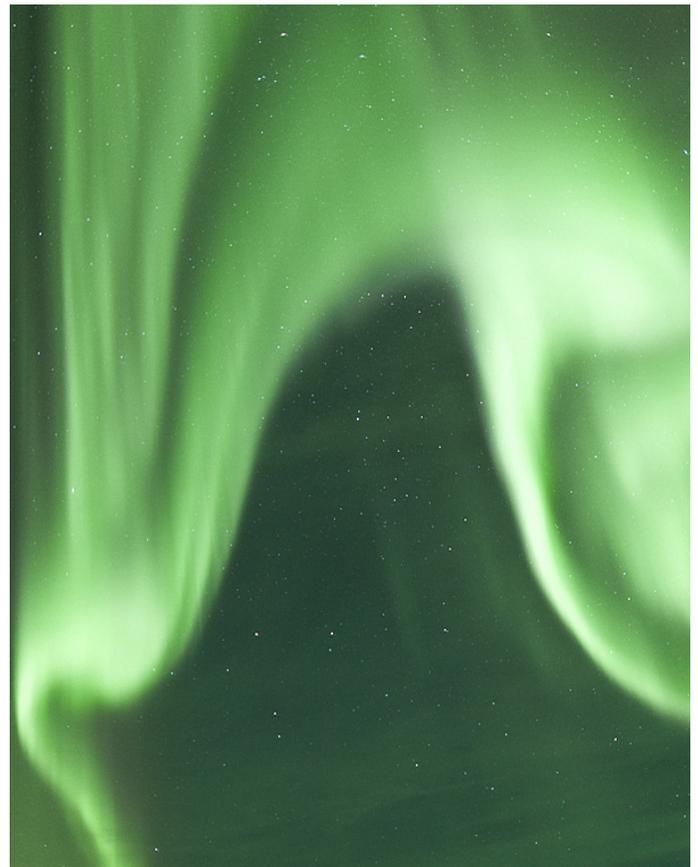


Photo Courtesy of: Kjetil Skogli Source: www.SpaceWeather.com

What is an Electromagnetic Pulse (EMP)?

An EMP is a high-intensity burst of electromagnetic radiation caused by an abrupt, rapid acceleration of charged electron particles. This burst causes catastrophic damage to electrical devices due to its impact on both electric and magnetic fields. Modern technology is extremely susceptible to these effects. Devices connected to electrical cables essentially act like lightning rods, attracting electromagnetic pulses, and although there are many variables determining what level of severity an EMP attack might have on modern our micro-circuitry (strength of the pulse, distance from the source, the direction it is traveling, etc.), the end result is always the same: an EMP will fry any electronic circuitry or microprocessor it encounters (regardless of surge protectors, or whether or not devices are plugged into electrical outlets), crippling critical infrastructure and worse, destroying our entire electrical grid damaging major distribution centers and fusing power lines.²

What or Who Causes an EMP?

There are two causes of EMP. The first is a massive solar flare event, also called a “solar storm ” or more technically known as a Coronal Mass Ejection (CME); the second is man-made , caused by the detonation of a nuclear weapon high in our atmosphere.

Coronal Mass Ejection (CME)—A Massive Solar Flare

CMEs are huge bubbles of gas that are thread with magnetic field lines , which are routinely ejected from the Sun. CMEs disrupt the flow of the solar wind and produce disturbances that strike the Earth with sometimes-catastrophic results.³ The Sun goes through periods of relative violence and calm every eleven years—thus the frequency of CMEs typically follow these cycles. At solar minimum, we observe about one minor CME a week. During a solar maximum period, like the period we have just entered, we may observe an average of two to three CMEs per day. The last solar minimum was longer and quieter than astronomers expected. Many space weather experts are predicting that the new solar maximum period will cause more frequent and severe flares than ever before.

There are three main components or waves in a Coronal Mass Ejection. First, is the intense radiation from these solar flares that arrive at Earth only eight minutes after being released. This radiation can alter the Earth's outer atmosphere, causing disruptions such as the February 14, 2011 event that temporarily knocked-out Chinese long-distance radio communication. The second wave arrives roughly an hour later, and is comprised of energized particles that are pushed along by the CME's shock wave.. Last comes the most destructive force , the actual coronal mass ejection itself, that hits Earth one to four days after the initial eruption, resulting in strong geomagnetic storms and electrical power blackouts.⁴ It has only been in the last hundred or so years that mankind has expressed a keen interest in studying solar storms. The ability to predict the path and time of a solar storm's arrival to Earth is critical, yet there are several historical and scientific developments⁵ that (when viewed as a whole) paint a disturbing view of our near-term future. Consider that:

- Since the 1940s (particularly since 2003), the Sun has behaved more tumultuously than it has since the rapid global warming that accompanied the thawing of the last Ice Age, 11,000 years ago. Solar physicists concur that solar activity will peak at record setting levels in 2012.
- Storms on the Sun are related to storms on the Earth. The great wave of hurricanes Katrina, Rita, and Wilma in 2005 coincided with one of the stormiest weeks in the Sun's recorded history.
- On December 21, 2012, our Solar System, with the Sun at its center, will eclipse the view from Earth to the center of the Milky Way. This only occurs once every 26,000 years.

“Without warning, the relatively calm solar atmosphere can be torn asunder by sudden outbursts of a scale unknown on Earth. Catastrophic events of incredible energy... stretch up to halfway across the visible solar surface, suddenly and unpredictably open up and expel their contents, defying the Sun’s enormous gravity.”

- Kenneth R. Lang
Author of Sun, Earth, and Sky

A Year-Long Blackout

Recently, space weather experts have changed their prediction of the effects of a 100-year solar storm from likely being a week long blackout across the East Coast through Chicago, to one that could easily be a year long, with restoration taking four to ten years.⁶ Metatech Corporation, a company that performs electromagnetic equipment testing, conducted a study for both the Electromagnetic Pulse Commission and the Federal Emergency Management Agency (FEMA) to examine the potential impacts of severe geomagnetic storm events on the U.S. electric power grid. These assessments indicate that these storms pose a risk for long-term outages to major portions of the North American grid. John Kappenman, a Division Manager of Metatech Corporation, remarked that the analysis shows “not only the potential for large-scale blackouts but, more troubling... the potential for permanent damage that could lead to extraordinarily long restoration times.” While a severe storm is a low-frequency-of-occurrence event, it has the potential for long-duration catastrophic impacts to the power grid and its users. Impacts would be felt on interdependent systems. Drinkable water distribution would be affected within several hours; perishable foods and medications lost in roughly 12-24 hours; and immediate or eventual loss of all heating and air conditioning, sewage disposal, phone services, transportation, fuel resupply, and the list goes on. Kappenman also stated that the effects on these infrastructures could persist for multiple years, with a potential for significant societal impacts and with economic costs that could be measurable in the several-trillion-dollars-per-year range.⁷

Recent Solar Events-- Waiting for The Big One

The sun kicked off its new solar maximum period on February 14, 2011, with one of the most powerful eruptions in more than four years. Many people and governments all over the Northern Hemisphere braced themselves for a geomagnetic storm. Space weather experts were predicting that the jets of charged particles funneling into the Earth’s magnetic field could disrupt navigation and communication systems. Fortunately not much happened—mostly because of luck—as it just so happened that the flare’s magnetic field was aligned parallel to the Earth’s, effectively blocking the charged particles from entering our magnetosphere. An identical flare with a perpendicular magnetic field would have triggered a much stronger storm. “If the magnetic fields are parallel, then the shields are up. We are well protected,” explained space weather expert, Juha-Pekka Luntama of the European Space Agency during the February 19th meeting of the American Association for the Advancement of Science (AAAS) in Washington, D.C.⁸

But next time we might not be so lucky. Experts say we can expect up to 1,700 more storms like last February’s in the coming months, as the sun enters the beginning of its eleven-year solar maximum cycle. The National Oceanic and Atmospheric Administration (NOAA) ranks geomagnetic storms on a scale ranging from G1 (minor storms that simply spark auroras in Michigan and Maine) to G5 (extreme storms that can shut down power grids) with ranks based on how much more active a local magnetic field is than that of a normal, quiet day.⁹ The February 2011 solar storm was relatively small. Scientists at the National Center for Atmospheric Research’s High Altitude Observatory anticipate that the upcoming solar maximum cycle will be 30% to 50% greater than ever recorded.¹⁰

“Each time we use a cell phone or pager, check a GPS locator, turn on a light, or take an over-the-pole flight, space weather could have an effect.”

- Jack Hayes
Director of NOAA's National
Weather Service

Lawrence Joseph, author of *Apocalypse 2012: An Investigation Into Civilization's End*, started his solar research in January 2005, when the sunspot cycle was (by scientific consensus) approaching the solar minimum. However, instead of relatively weak solar activity, he discovered that the Sun has actually been throwing a rather nasty tantrum since Halloween 2003, when the largest radiation storms ever recorded were pounding our Solar System.¹¹ Fortunately for us, these unprecedented outbursts were directed away from the Earth, and it's a good thing too—the bursts were twice as strong as those recorded during a March 1989 storm that knocked out the Hydro-Quebec power grid (effectively blacking out over six million unsuspecting Canadians). Strangely enough, this 1989 event occurred around a solar minimum, the point in the eleven-year sunspot cycle where there is supposed to be little or no solar activity. Chilling? You bet. But not nearly as chilling as when, in September of 2005, the Sun went from perfectly calm and without a single blemish across its fiery surface, to being covered with sunspots and spitting-out record setting levels of radiation, right at the height of a hurricane season that produced Katrina, Rita, Wilma and so many others.¹² These events show that the Sun is behaving out of sync with its typical solar cycles—in both timing and intensity.

In January 2005, the Sun produced the most intense proton storm in decades. NASA did not disclose its data until mid-June and this unusual delay (as well as the puzzling lack of follow-up commentary), has made it impossible to assess the freak storm's impact, which could have been severe—since it hit the Earth directly. The January 20th storm that opened 2005, a solar minimum year, turns out to have been the largest radiation storm since October 1989, a solar maximum year.¹³

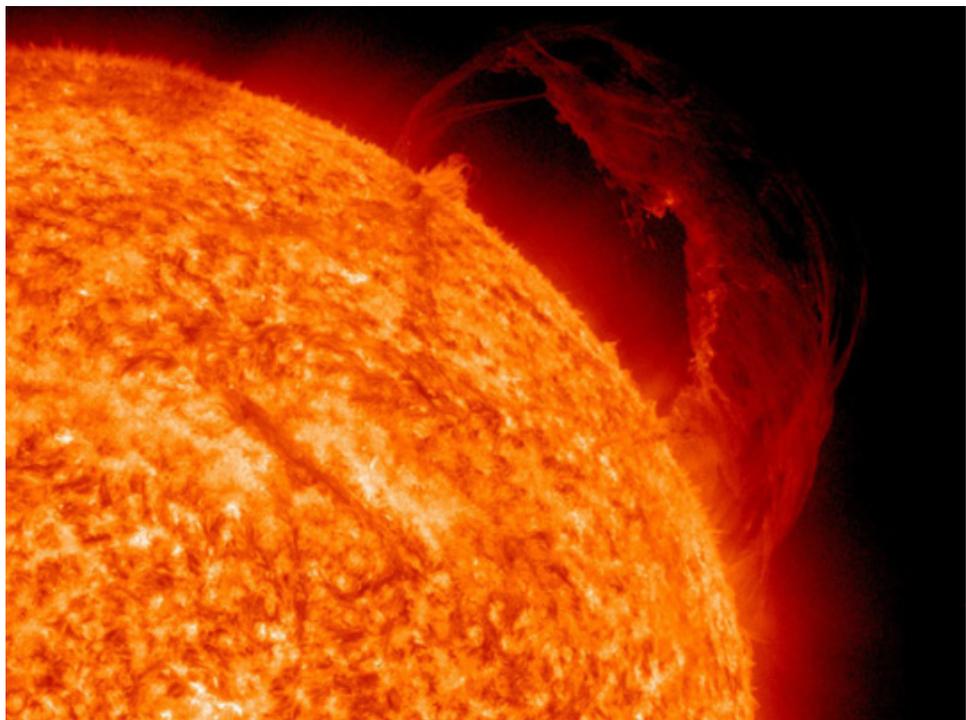


Photo Courtesy of: NASA

The remainder of 2005 continued to be stormy, climaxing in September with one of the most turbulent weeks in recorded solar history. On September 7, sunspot 798, returning from the far side of the sun, unleashed a monster solar flare, the second largest ever recorded. The blast caused a blackout of many shortwave, CB, and ham radio transmissions on the day-lit side of the Earth. Solar flares are classified as A, B, C, M or X according to the peak flux (in watts per square meter, W/m²) of 100 to 800 picometer X-rays near Earth. Each class has a peak flux ten times greater than the one preceding it, with X-class flares being the largest. Sunspot 798 was classified as X17 and, as mentioned, the largest ever recorded. Nine more X-class flares exploded from the Sun over the next seven days; several spurred radiation storms that pelted the Earth.¹⁴

Though this recent February 14th 2011 storm was relatively small for an X-class flare, it was notable because it was the first significant X-class flare of the new solar cycle. “Things have changed a lot since 2000,” Tom Bogdan, director of NOAA’s Space Weather Prediction Center, told reporters February 19th at AAAS. “What’s at stake are the advanced technologies that underlie our lives. A strong flare would send ultraviolet and X-ray radiation to the sunlit side of the Earth, ionizing the upper atmosphere and potentially shutting down GPS satellites. Losing GPS would cause chaos in more than just car navigation systems,” Bogdan said. “GPS is involved in everything we do,” he continued, “including financial transactions. Prices fluctuate so quickly that traders need a time stamp accurate to a millionth of a second every time they buy or sell something. Every time you swipe your credit card at the gas station or buy a bag of oranges, it goes through a GPS satellite.”¹⁵ Ten to twenty minutes after the flare, a burst of high-energy protons will enter the Earth’s magnetic field at the poles, causing processing errors in other satellites. About half an hour later, the hot cloud of plasma that the sun spat out along with that flare would bump into the Earth’s magnetic field. If it’s strong enough, the plasma’s magnetic field can induce currents in electric transmission lines, which could cause widespread blackouts.¹⁶

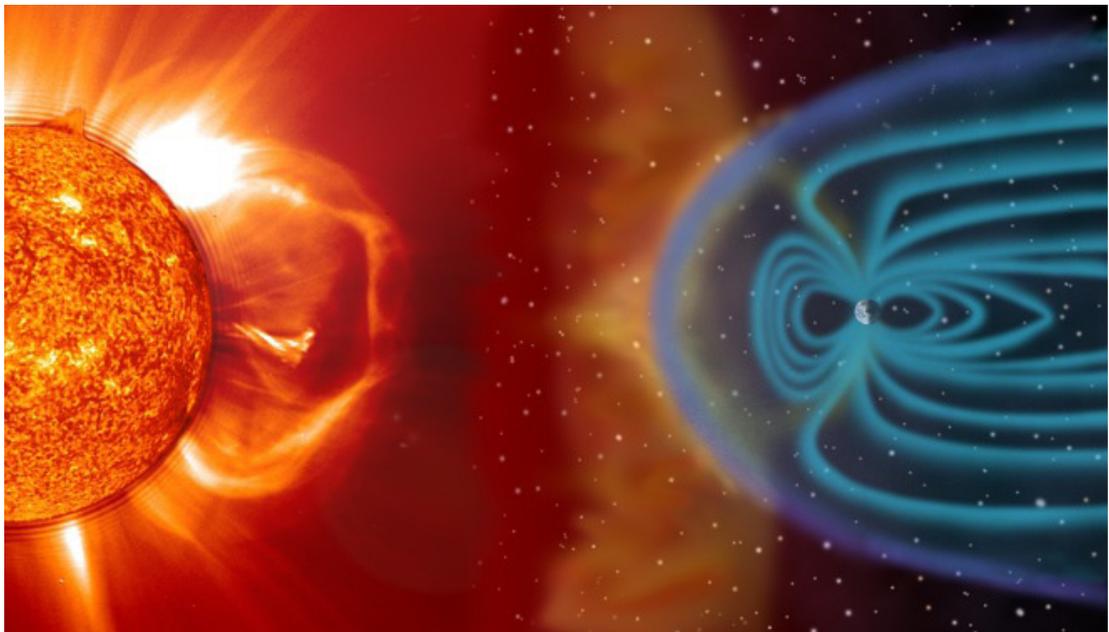


Illustration Courtesy of: Wired Magazine

“We know the Sun is capable of an 1859 event. It would be shortsighted to say that that’s the worst the Sun could ever do. It can probably do worse than 1859.”

**- Dr. Thomas Bogdan
Director, U.S. Space Weather
Prediction Center**

Mother of All Solar Flares: 1859, The Carrington Event

Did you know that in the last 150 years there have been two solar flares of such powerful magnitude that if one were to occur today it would essentially destroy our entire electrical grid? If one of these events occurred today, it could take years to recover from—if we could recover from it at all. The most severe space weather EMP event in recorded history was “The Carrington Event”, which occurred on September 1, 1859. This event was named after one of England’s foremost solar astronomers, Richard Carrington, who first observed an intense white-light flare associated with a subsequent geomagnetic storm. The next morning when the CME arrived, it crashed into Earth’s magnetic field, causing the global bubble of magnetism that surrounds our planet to shake and quiver. The rapidly moving magnetic fields induced enormous electric currents that surged through telegraph lines and disrupted communications. Just before dawn the next day, skies all over planet Earth erupted in red, green, and purple auroras so brilliant that newspapers could be read as easily as in daylight. Indeed, stunning auroras pulsated even at near-tropical latitudes over Cuba, the Bahamas, Jamaica, El Salvador, and Hawaii. With the light show came some disconcerting effects as telegraph systems worldwide went haywire. Spark discharges shocked telegraph operators and set their telegraph paper on fire. Even when telegraphers disconnected the batteries powering the lines, aurora-induced electric currents in the wires still allowed messages to be transmitted. The EMP not only sent currents through telegraph wires, it even set a few buildings on fire.¹⁷ Another Carrington-class flare hitting today would dwarf these effects due to our microprocessor dependencies and vulnerabilities. “Fortunately,” says David Hathaway, a Solar Physics Team Lead, at NASA’s Marshall Space Flight Center in Huntsville, Alabama, “Carrington-class flares appear to be rare: in the 160-year record of geomagnetic storms, the Carrington event is the biggest”—Yet!

Earth’s Natural Defense May Be Faltering

Looking into the near future, the next period of intense solar activity is expected in 2012, which coincides with the presence of an unusually large hole in Earth’s geomagnetic shield—meaning we’ll have less protection than usual from solar flares. This data is credible enough that some scientists and engineers are finally beginning to take the electromagnetic threat seriously. The Earth’s magnetic field (our primary defense against harmful solar radiation) has begun to dwindle, with California-sized cracks opening randomly and a pole shift (in which our protection falls nearly to zero, as the North and South magnetic poles reverse position) may well be underway. Dan Baker, the chair of a NASA workshop held at the Laboratory for Atmospheric and Space Physics, made some very strong comments regarding the workshop’s report about the potential connection between coronal mass ejections and power grids here on Earth: “There’s a direct relationship between how technologically sophisticated a society is and how badly it could be hurt,” he says According to Lawrence Joseph, author of *Apocalypse 2012: A Scientific Investigation into Civilization’s End*, “I’ve been following this topic for almost five years, and it wasn’t until [this] report came out that this really began to freak me out.”¹⁸

“We are not hardened against this. It is an enormous catastrophic threat.”

**- Newt Gringrich
Former Speaker of the House**

The Earth’s magnetic field acts as a shield against the bombardment of particles continuously streaming from the Sun. Because these solar particles (ions and electrons) are electrically charged, most are deflected harmless into space by our planet’s magnetic field.



Photo: Courtesy of: Michael Jay, Los Angeles, CA

However, our magnetic field is far from impregnable and the number of particles breaching this shield depends on the orientation of the Sun’s magnetic field. It had previously thought that when the Sun’s magnetic field is aligned with that of the Earth, the door is shut and few if any solar particles enter Earth’s magnetic shield. The door was thought to open when the solar magnetic field direction points opposite to Earth’s field, leading to more solar particles inside the shield.¹⁹

Scientists continue struggling to find an answer as to why the Earth’s magnetic field is dwindling. It could be haphazard or strictly cyclical, but speculation ranges from turbulence in the interplanetary magnetic field, to chaotic fluctuations in the fluid dynamics of the Earth’s molten core. This has led to further speculation about whether or not the receding of our planet’s magnetic field means that the poles are about to flip (compasses that currently point north would point south, and vice versa), and the first step in this process would be a weakening of the overall field, such as we are now experiencing. This reversal process will take hundreds of years, during which time the Earth will have multiple magnetic poles, and compasses will point north, south, east, west and all points in between. In all likelihood, the weather will get even weirder... increasing the intensity of hurricanes, tornadoes, and other electrical storms.²⁰ Geologist William Hutton argues that even small shifts in the location of the magnetic poles can have significant consequences to life in the 21st Century. The poles appear to be moving far more rapidly, skittering across northern Canada and Antarctica by 20 or 30 kilometers per year, respectively. Hutton believes that we are experiencing what is known as a “mantle-slip mechanism”, referring to the slipping of the Earth’s mantle and crust over the liquid core, or over some malleable surface just above the core. This process could easily cause the “wandering pole” syndrome observed with some alarm over the past decade.²¹

Fortunately, as concern grows on these subjects, research continues—but will we come up with any solutions to these problems in time to prevent the catastrophic effects on our vulnerable planet? The European Space Agency has sent out Swarm, a trio of research satellites that will thoroughly examine the Earth’s magnetic field from 2009 to 2015. Well before the end of that study, let’s hope these scientists can unravel why the field has been cracking for as much as nine hours at a time. The largest, a 100,000-mile crack known as

“When we first tested nuclear weapons before Hiroshima, we tested some in the Pacific. Maybe a thousand miles away from Hawaii. But the electromagnetic energy that that generated carried all [the way] to Hawaii and actually blew out electric street lights and red and green signal lights in Hawaii.”

- Fred Levien
EMP Expert

the “South Atlantic Anomaly,” opened over the ocean between Brazil and South Africa. This hole is a gaping chink in our armor against solar and cosmic radiation, and may well be the first of many. A number of satellites passing through the South Atlantic Anomaly have already been damaged by solar outbursts penetrating the diminished magnetic



Photo Courtesy of: www.FutureScience.com/emp.html
field, including (ironically) a Danish satellite designed to measure the Earth’s magnetic field.

The South Atlantic Anomaly is unsettlingly close, just a few degrees north of the infamous hole in the stratospheric ozone layer over Antarctica, and it could well be that the two holes are related.²² One shudders to think of the impact that the surging solar UV rays pouring through the Earth’s cracking magnetic field might have on our planet, particularly as we head toward the unprecedented turmoil of the solar maximum projected for 2012.²³

Man-Made EMP: High-Altitude Electromagnetic Pulse (HEMP)

The second cause of EMP is entirely man-made. When a nuclear bomb is detonated high above the earth’s atmosphere (also referred to as HEMP or high-altitude EMP), an EMP is produced...and with frightening results. Just as the energized particles of solar storms penetrate the thin magnetic field surrounding our planet, so too would the charged particles caused by a nuclear detonation hundreds of miles above the Earth’s surface. Only in this event, the effects would be far more catastrophic due to the close proximity of the nuclear blast above the planet. As the bomb detonates, it releases a powerful wave of gamma rays that hit the upper atmosphere creating an electrical disturbance known as the Compton Effect. Traveling at the speed of light, the electromagnetic pulse races towards the earth’s surface. It is not something you would see or hear. As a matter of fact, the effects of the detonation would not level buildings or emit radioactive fallout like a surface detonation, nor would it pose a direct risk to humans—but for all electrical systems and microprocessors, it would be deadly.

HEMP Discovered: Starfish Prime

In July 1962, the US military detonated a 1.44-megaton nuclear bomb in space, 250 miles above the mid-Pacific Ocean. The test was code-named Starfish Prime, and demonstrated to nuclear scientists that the magnitude and effects of a high altitude nuclear explosion were much larger than previously calculated. Starfish Prime also made those effects known to the public by causing electrical damage as far away as Hawaii, which was nearly 900 miles from the blast. Hawaiians witnessed the blast knocking out 300 plus streetlights, setting off numerous burglar alarms and damaging a telephone company's microwave link.²⁴ This explosion also seeded the Earth's magnetic field with high-energy subatomic particles that took years to completely drain away. With Starfish Prime, the US Military had discovered EMP—and it didn't take long for them to realize just how vulnerable our armed forces were to its massive effects and promptly took steps to protect itself. During the Cold War, the U.S. government was highly concerned about EMP as the by-product of a nuclear attack on a battlefield. The United States went to great lengths and expense to harden itself against the effects of EMP. Unfortunately when the Cold War ended, the threat of nuclear attack dissipated and EMP ceased to be a concern. Since then, our society has built up an entire infrastructure utilizing ever-so-sophisticated technology and we have become increasingly dependent on these systems to conduct all aspects of our daily lives. Transport, finance, electricity, communication—virtually everything in our daily lives relies on a hidden network of millions upon millions of microchips. Each facet silently works for our benefit, while at the same time, all of this advancing technology, ironically, makes us more and more vulnerable to the effects of EMP!

Case Studies in Chaos: Overview

Obviously, the technology exists to build a weapon that could completely obliterate an entire infrastructure and bring a country like the United States to its knees. Not too long ago, the threat posed by an electromagnetic pulse was once considered by the mainstream as simply the stuff of science fiction or lone nut jobs living in rooms lined with tin foil, but people are now coming to understand that an EMP—whether from natural causes or a nuclear weapon—poses a real threat to America's electronics and could send the entire country into a new Dark Age. USA Today ran an article on October 27, 2010 that discussed the real-world threat and implications of such an event. At risk are more than 200,000 miles of high-voltage transmission lines that cross North America, supplying 1,800 utilities that power our TVs, lights, refrigerators, and air conditioners in homes and businesses, hospitals and police stations ... imagine what would happen if all those critical parts of our lives suddenly stopped—we only need look to several catastrophic events in recent history to get a picture of the chaos that is likely to happen in the wake of an EMP.²⁵

Case Study in Chaos: New York – 1977

A good example of the potential disruption and ensuing disorder from EMP is the New York City blackout that occurred on July 13, 1977. That night, two lightning strikes caused overloading in the electric power substations of the Con Edison power company. These lightning strikes also caused the Indian Point power plant north of the city to fail, as well as the Long Island interconnection—a regional, (and therefore, significantly larger) synchronized-frequency grid— and as a result, the power failure spread throughout the New York area.²⁶

This blackout lasted only one day, yet resulted in widespread looting and the rule of law vanished throughout many New York neighborhoods. The estimated cost of the blackout was approximately \$346 million, and nearly 3,000 people were arrested within the 26-hour period.²⁷ However, New York police officers were severely outnumbered and without the means of stopping such massive theft, and many had no choice but to stand by and watch the looters from a distance. In North Brooklyn (a community of more than a million residents), only 189 police officers were on duty that night.²⁸ The social order degenerated so quickly that Time magazine called it a *"Night of Terror."*²⁹

There were many explanations for the sudden violence in the aftermath of the blackout, with justifications ranging from racial animosities, to even the weather, but the simple fact is that during disaster, "under stress' or 'exceptional circumstances,' the poor saw 'no reason to play by the rules.'"³⁰ An astounding amount of violence occurred in the course of that single day. After an EMP attack, cities will likely lose power for weeks and months, and the National Guard cannot occupy every major city, assuming they are able to mobilize at all. Unfortunately, the historical evidence from the 1977 New York blackout bodes poorly for the prospect of maintaining order and the rule of law without electricity in those cities with high-density populations.

Case Study in Chaos: U.S. East Coast & Canada - 2003

In August 2003, a Northeast blackout hit Ohio, New York, Maryland, Pennsylvania, Michigan, and parts of Canada. During this incident, more than 200 power plants, including several nuclear plants, were shut down as a result of the electricity cutoff. Loss of water pressure led local authorities to advise effected communities to boil water before drinking due to contamination from sewage system failure and other health threats. Many backup generators proved unable to manage the crisis. The initial day of the blackout brought massive traffic jams and gridlock, as citizens tried to get home without the benefit of traffic lights. Additional transportation problems arose when railways, airlines, gas stations, and oil refineries were forced to halt operations. Telephone lines were overwhelmed due to the high volume of calls, while many radio and television stations went off-air. Overall, the blackout's economic cost was estimated between \$7—\$10 billion due to food spoilage, lost production, overtime wages, and other related costs inflicted on over one-seventh of the U.S. population.³¹ In spite of the resulting chaos, things could have been much worse: vehicles may have been at a standstill, but at least they worked; phones and police radios were unaffected; and once the power came back on, things quickly returned to normal— an EMP attack would make these events seem trivial by comparison.

Case Study in Chaos: New Orleans - 2005

Most of us should be familiar with the events of August 29, 2005, when Hurricane Katrina struck the city of New Orleans. Katrina is currently our best example of the type of catastrophe that would likely result from an EMP attack, since the hurricane and subsequent flooding disabled and demolished the city's infrastructure. Similar to an EMP attack, a large proportion of the population was not able to leave the disaster zone. Mayor Ray Nagin's order to evacuate the city was too late to effectively mobilize those who did not have access to transportation, and wound-up stranding some 10,000 people in the Superdome to ride out the hurricane, while a greater

number took shelter in the Ernest Memorial Convention Center. In total, about a fifth of the city was unable to escape before the effects of the hurricane hit the city. Much of the city was unable to organize when disaster struck, depriving citizens of food, water, power, and transportation. The direct impact of Katrina on New Orleans was relatively minimal, with relatively few casualties, when compared with the after-effects of the hurricane—when the city’s levees failed to contain a flooded Lake Pontchartrain from reaching the streets of a town that sits predominantly under sea level.

Leadership failed on all levels in response to this massive disaster. The mayor did not fully grasp the scope of the catastrophe, nor did the Louisiana governor, not even the President of the United States. There was much bickering over ultimate authority and chain-of-command for disaster response and, as a result, the emergency agencies were slow to mobilize and piecemeal in their eventual efforts. Immediately following the disaster, the Federal Emergency Management Agency (FEMA) allowed 1,000 rescue workers to take two days to arrive, while 2,000 more were given an entire week to mobilize to New Orleans.³² Federal disaster response did not anticipate the near-immediate and complete breakdown of social order, and looters and gunmen were running rampant. One day after the hurricane struck, flooding in neighborhoods developed into a massive outburst [of water] that destroyed much of the city. The metro area lost power.³³ By Tuesday, September 6, more than a week after the initial disaster, 10,000 people remained to be rescued from the city.³⁴ Moreover, much of the city was destroyed and order had yet to be restored.

Katrina exposed many flaws in the national capacity to respond to a catastrophic event, and poor advance planning made an effective response nearly impossible. FEMA was prepared to respond to a “normal” disaster, but had not prepared for something as overpowering as Katrina. Overall, the hurricane cost \$81 billion in damage and caused around 1,500 casualties.³⁵ The failure of transportation to get to New Orleans halted delivery of precious fuel needed to run the emergency generators required by cell phone towers, hospitals, and police forces.³⁶ The electrical failures resulted in the spoilage of food supplies which likely instigated much of the widespread looting. Even this partial knockout of power and transportation created a catastrophe of unprecedented proportions and threatened to destroy one of America’s major cities. We all witnessed how Federal, state, and local governments failed to adequately respond to Katrina during the first week of disaster. Imagine similar losses of infrastructure and the ensuing chaos, except on a much larger geographic scale.

Such a slow and weak disaster response would be insufficient if we are hit with an EMP event. There would be no relocation of refugees to relief facilities such as the Houston Astrodome, no fresh water, or blankets, or generators, or FEMA housing arriving on flatbeds. In the aftermath of an EMP strike, we would be unable to prevent the permanent collapse of the nation’s cities. There simply has not been any robust pre-disaster planning that integrates federal, state, local, private sector, non-governmental organizations, and international support necessary to handle such an event.

Case Study in Chaos: Haiti - 2010

The recent earthquake in Haiti can serve as yet another example of an EMP-level catastrophe. A magnitude 7.0 earthquake struck Haiti on January 12, 2010, destroying much of the country's populated areas and critical infrastructure, and nearly caused the collapse of leadership within the State. Between 100,000 and 230,000 people died as a result of the earthquake.³⁷ It has been reported that 50 to 70 percent of the buildings in Port-au-Prince collapsed, destroying nearly 250,000 homes and 30,000 businesses. More than a quarter of a million Haitians were injured.³⁸ More worrisome for recovery efforts, "the country's new and only undersea fiber link...suffered major damage from the earthquake"³⁹ and will likely impede the ability to coordinate relief efforts. Haiti's infrastructure is in complete shambles, yet would be in a far worse state were it not for significant international aid.

While an EMP might not cause the immediate wholesale loss of life and physical destruction seen with this earthquake in Haiti, we can see how the destruction of infrastructure added to the total chaos of that country. Were an EMP to strike the U.S., we would be plunged into a total catastrophe where the resources of the U.S. government alone would be insufficient to provide relief or maintain order in our society. When dealing with a disaster of this scope, there must be serious collaboration with foreign entities in order to plan the delivery of emergency supplies and alleviate the crisis. The plight of Haiti demonstrates the need for an international disaster response coordination plan in which the U.S. may be the recipient, not the donor, of massive foreign aid. This will be impossible without effective communication to provide situational awareness, transmit needs assessments, and organize the delivery of assistance. As of September 2010, \$3.3 billion in aid had been given to Haiti and another \$1.1 billion has been pledged.⁴⁰ The United States (among other nations) has become heavily involved in Haitian disaster relief, sending troops and medical ships to support the recovery effort, among other endeavors.⁴¹ The U.S. even took over the Port-au-Prince airport in order to organize aid flights coming into the country and ease a bottleneck that had been slowing the arrival of supplies.⁴² Foreign countries are heavily involved in the recovery efforts throughout Haiti as well, and in a sense have taken over the country in order to prevent its collapse. Would the international community marshal a worthy response to aid the US if we were the victim of such a catastrophe?

The most critical capacity provided by government in the face of disaster is legitimacy—providing the reassurance that government is functioning and the rule of law remains intact. This capability is impossible without the ability to communicate both within the country and with nations providing external support. The Haitian tragedy serves as a cautionary model for total catastrophe in the U.S., as Americans have never experienced nationwide disaster-- we as a society are completely unprepared for a catastrophe on the scale of an EMP attack and so the challenge for the U.S. is infinitely greater. In addition to taking care of its own citizens, the U.S. has global responsibilities, including military forces stationed worldwide, which will still require command and control from Washington.

“The Russian nuclear scientists told us that Russian scientists had gone to North Korea to work on building a super-EMP weapon. The North Koreans appear to have tested it in 2006 and again in 2009.”

**- Dr. Peter Vincent Pry
Former CIA Nuclear Weapons
Analyst and President of EMPact
America**

Threats from America's Enemies: Overview

Whether an EMP results from solar activity or from an enemy military source, these threats are a reality and right in front of us. We have experienced blackouts caused by solar flares within this last decade, and the threat of an EMP attack from one of America's enemies—who seem to be growing in number as we continue our interventionist foreign policy—seems greater than ever. There are even reports that rogue nations, like Iran and North Korea, have been working on an EMP-based weapon that could be launched from a ship off the American coast.

On November 8th, 2010 a mysterious missile was launched in the Pacific Ocean just off and the coast of southern California. Despite the government's attempt at a news blackout of the event, a CBS affiliate, KCBS, caught the launch on camera and reported that U.S. military officials were being “tight-lipped over the nature of the projectile.” While the Barack Obama administration denies it was a missile launch, numerous experts have said that's exactly what it was. At any rate, this provocation is glaring evidence that America is vulnerable to attack.⁴³ A report by MSNBC concurred, stating that both “Pentagon and Navy officials told NBC they have no idea who launched Monday night's missile off California's coast,” and questioned “could the North Koreans or Chinese have launched this missile to send a signal to Washington?” In a recent interview published by *NewsMax* magazine, Donald Rumsfeld admitted that he is worried about the threat from an electromagnetic pulse attack from countries such as Iran or North Korea. “We've thrown away the shoeboxes with the 3-by-5 cards,” he said, “so that cyberwarfare, and electromagnetic pulses and the things that can avoid competition with large armies and large navies and large air forces clearly have leverage, an advantage. And because of that, they're attractive to America's enemies.”⁴⁴

Threats from America's Enemies: North Korea

Gary Samore, a top national security official, warned of new sanctions if North Korea conducted a third round of nuclear tests, as reports surfaced that the country was miniaturizing its nuclear warheads so they can be delivered by ballistic missile. According to *Newsmax*,⁴⁵ North Korea's last round of tests, conducted in May 2009, appear to have included a “super-EMP” weapon “capable of emitting enough gamma rays to disable the electric power grid across most of the lower 48 states,” says Dr. Peter Vincent Pry, a former CIA nuclear weapons analyst. South Korea Defense Minister Kim Kwan-jin told his country's parliament on Monday that North Korea had succeeded in miniaturizing its nuclear weapons design. Kwan-jin's statement coincides with Lt. General Ronald L. Burgess, the Director of the Defense Intelligence Agency's testimony to Congress, stating that North Korea “may now have several plutonium-based warheads that it can deliver by ballistic missiles.” Even more troubling, was Pry's admission that a group of Russian nuclear weapons scientists approached him in 2004 to warn the United States that the technology to make that weapon “had leaked” to North Korea and possibly to Iran.

“The only plausible explanation we can find is that the Iranians are figuring out how to launch a missile from a ship and get it up to altitude and then detonate it. And that’s exactly what you would do if you had a nuclear weapon on a Scud or Shabab-3 or other missile, and you wanted to explode it over the United States”

**- William Graham
former White House science
adviser**

Threats from America’s Enemies: Iran

Apparently the former Secretary of Defense isn’t the only one who suspects Iran’s intentions. In Joseph Farah’s G2 Bulletin,⁴⁶ Farah wrote about evidence implicating that Iran is seriously planning an unconventional pre-emptive nuclear strike against the U.S. Farah shares that an Iranian military journal publicly considered the idea of launching an EMP attack as the key to defeating the world’s lone superpower. The article, entitled “Electronics to Determine Fate of Future Wars,” explains how an EMP attack would bring the U.S. to its knees. “Once you confuse the enemy communication network you can also disrupt the work of the enemy command- and decision-making center,” the article states. “Even worse today when you disable a country’s military high command through disruption of communications, you will, in effect, disrupt all the affairs of that country. If the world’s industrial countries fail to devise effective ways to defend themselves against dangerous electronic assaults then they will disintegrate within a few years. American soldiers would not be able to find food to eat nor would they be able to fire a single shot.”⁴⁷

In 2005, Iran reportedly acquired several medium and intermediate-range ballistic missiles from North Korea, with a range of 2,500 miles.⁴⁸ If such a missile were married to the appropriate EMP device and a suitable sea-going vessel, Iran could certainly be a threat to the continental United States! In 2006, Iran tested several of their Shahab-3 nuclear-warhead-capable ballistic missiles, which were exploded in mid-flight. While these explosions could have been the result of a missile self-destruct mechanism, Iran has officially described the tests as fully successful. It was noted by witnesses at a 2005 hearing of the Senate Subcommittee on Terrorism, Technology and Homeland Security that this event could indicate that Iran may be practicing for a HEMP attack.⁴⁹ In July 2008, Iran test-launched a series of long-range ballistic missiles. Some observers caution that these actions might simply be a scare tactic used by Iran, but without much substance.⁵⁰ However, can we really afford to ignore these threats?

The London Telegraph reports that while Tehran continues to deny it is trying to develop a nuclear arsenal, ballistic missile experts advising the United States say it has now succeeded in reconfiguring the Shahab-3 ballistic missile to carry nuclear weapons. “This is a major breakthrough for the Iranians,” said a senior U.S. official, according to the London paper. “They have been trying to do this for years and now they have succeeded. It is a very disturbing development.” Recent test firings of the Shahab-3 show Iran has been able to modify the nose cone to carry a basic nuclear bomb, these same experts concluded.⁵¹

There is also renewed alarm about the possibility of an EMP attack on the United States because of Iran’s work on a multi-stage Space Launch Vehicle, and experts forecast that if such an attack were a success, it could effectively throw the U.S. back into an age of agriculture. “Within a year of that attack, nine out of 10 Americans would be dead, because we can’t support a population of the present size in urban centers and the like without electricity,” said Frank Gaffney, president of the Center for Security Policy.

“We don’t shy away from declaring that Islam is ready to rule the world.”

**- Mahmoud Ahmadinejad
President of Iran**

“And that is exactly what I believe the Iranians are working towards.” In his recent congressional testimony, Dr. William Graham revealed that Iranian military journals (translated by the CIA at his commission’s request) “explicitly discussed a nuclear EMP attack that would gravely harm the United States.” Soon after, during a speech given in Huntsville, Alabama, then Secretary of Defense Donald Rumsfeld coined the phrase “Scud-in-a-bucket” on August 18, 2004. While explicitly not naming Iran, Rumsfeld revealed that “...one of the nations in the Middle East had launched a ballistic missile from a cargo vessel. They had taken a short-range, probably Scud missile, put it on a transporter-erected launcher, lowered it in, taken the vessel out into the water, peeled back the top, erected it, fired it, lowered it, and covered it up. And the ship that they used was using a radar and electronic equipment that no different than 50, 60, 100 other ships operating in the immediate area.”⁵²

Iran’s first test of a ship-launched Scud missile occurred on the Caspian Sea in 1998. Dr. William Graham warned that the U.S. intelligence community didn’t “have a story” to explain the recent Iranian tests. “They’ve got [test] ranges in Iran which are more than long enough to handle Scud launches and even Shahab-3 launches,” said Dr. Graham. “Why would they be launching from the surface of the Caspian Sea? They obviously have not explained that to us.” Another troubling group of tests involved Shahab-3 launches where the Iranian’s “detonated the warhead near [the missile flight] apogee, not over the target area where the thing would eventually land, but at altitude,” forcing Graham to consider “why would they do that?” Perhaps an EMP attack on United States was exactly what Iranian President Mahmoud Ahmadinejad was thinking about when he opined “... a world without America is conceivable.”⁵³ More recently, Iran’s elite Revolutionary Guards launched military exercises in late June 2011 including the launch of several different-ranged ballistic missiles according to the Iranian State News Agency (IRNA). These exercises, codenamed Great Prophet-6, will include a variety of missiles including the new Qiam-1, which is built locally and was first test-fired last August.

Threats from America’s Enemies: China

Reportedly, several other potential U.S. adversaries, such as Russia or China, are now capable of launching a crippling HEMP strike against the United States with a nuclear missile, with other nations, such as North Korea, possibly gaining that capability by 2015.⁵⁴ A discussion of asymmetric warfare and anti-satellite weapons at a June 25, 2008 hearing by the House Armed Services Committee included the possible example of the United States being targeted for attack by China using EMP,⁵⁵ and according to a 1999 DOD report, China has been actively pursuing EMP-based weapons, and has devoted significant resources to the development of other electronic warfare systems as well as laser weapons. The report also noted that China’s leaders view offensive counter-space weapons and other space-based defense systems as part of inevitable scenarios for future warfare. The report claims that China could have as many as 60 ICBMs capable of striking the United States by 2010, and may replace 20 of these with a longer-range missile by the end of this decade, or sooner.⁵⁶ So if you need to ask the question, the answer is yes—China is most certainly capable of launching an EMP attack against the United States.

Threats from America's Enemies: Russia

And so goes for Russia. Vladimir Lukin, former Soviet Ambassador to the United States and former Chairman of the International Affairs Committee for the Russian Parliament, has reportedly stated that his country currently has a capability to create a HEMP effect over the United States.⁵⁷ During 1962, the then Soviet Union conducted a series of atmospheric nuclear tests and observed HEMP effects that included surge protector burnouts, power supply breakdowns, and damage to overhead and underground buried cables at distances of 600 kilometers. Since then, Russia has reportedly made extensive preparations to protect their infrastructure against HEMP by hardening both civilian and military electronic equipment, and by providing continuous training for personnel operating these protected systems.⁵⁸ Other sources have reported that Russia may also have some of the leading physicists in the world currently researching electronic warfare weapons and electromagnetic pulse effects.⁵⁹

The General Consensus

The consensus opinion among experts is that solar storms can have 10X greater impact than expected, and that man-made EMP is more likely than previously thought, threatening the U.S. sovereignty. It has been long understood that the resulting ground-induced currents caused by an EMP attack could damage hundreds of high-voltage transformers that could take over a year to manufacture, creating blackouts over large regions of the country—blackouts that could last a year or longer. The findings of the National Academy of Sciences concluded that our electric power grids continue to become more vulnerable to disruption from geomagnetic storms. For example, the evolution of open access on the transmission system has fostered the transport of large amounts of energy across the power system in order to maximize the economic benefit of delivering the lowest-cost energy to areas of demand. The magnitude of power transfers has grown, and the risk is that the increased level of transfers, couple with multiple equipment failures, could worsen the impacts of storm event.⁶⁰

How Serious is This?

According to Chuck Manto, author of Grid Act Impact Report,⁶¹ a large enough EMP event could contain a sizeable pulse that creates ground-induced currents similar to an extreme solar storm. While these storms may not contain the same magnitude of pulse generated by that of a high altitude nuclear weapon, they can disrupt and damage transformers, along with anything connected to grounded lines. Given that, Manto concluded that the cascading effects of a long-term blackout would inevitably lead to ecological disasters, such as what we witnessed with the recent nuclear disaster at Japan's Fukushima Daiichi nuclear power plants. The EMP will not destroy a nuclear power plant, but it will quickly compromise the spent-fuel containment facilities' ability to continuously pump water to cool spent fuel rods. So, the answer to the question above seems obvious, given the information we have compiled at hand, yet only recently has this topic moved from Sci-Fi theory to one that is attracting mainstream attention..

So the real question becomes—can we act in time to prevent an EMP catastrophe?

“That is a very serious threat, and one thing we need badly to do is to figure out ways to harden our electricity grid and various types of key nodes so that electromagnetic pulse blasts of nuclear weapons, or other ways of generating electromagnetic pulse, even if it knocks out our toaster ovens will not knockout, for example, our electricity grid.”

- Ed Royce
Congressman (R-Ca)

On March 30, 2011 President Barack Obama executed Presidential Policy Directive (PPD-8).⁶² The subject of this directive was National Preparedness and is aimed at strengthening the security and resilience of the United States through preparation for threats posing the greatest risk to our nation, which include acts of terrorism, cyber attacks, pandemics, and catastrophic natural disasters. Arizona Congressman Trent Franks introduced H.R.668, commonly known as the “Shield Act” — a proposed bill⁶³ to amend the Federal Power Act. In short, the Shield Act is designed to protect the bulk-power system and electric infrastructure critical to our defense and specifically cites the findings of the EMP Commission Report⁶⁴, which detailed the vulnerability of our electrical grid to both man-made EMP, as well as geomagnetic storms. The commission’s report found that given the particular damaging effects caused by an EMP, the dependence of the United States on its electrical power system, along with its vulnerability to an EMP attack, creates the possibility of long-term, catastrophic consequences.⁶⁵

EMP Threat: What We Must Do

Nearly two decades have passed since the March 1989 solar storm that knocked out the Hydro-Quebec power grid. During that time, awareness of the risks involving extreme space weather has increased among the affected industries, mitigation strategies have been developed, new sources of data have become available (e.g., the upstream solar wind measurements from the Advanced Composition Explorer), new models of the space environment have been created, and a national space weather infrastructure has evolved to provide data, alerts, and forecasts to an increasing number of users.⁶⁶ On Nov. 17th, 2011 The Heritage Foundation issued the report *EMP Attacks — What The U.S. Must Do Now* outlining the dangers of an EMP attack and suggested a to-do list for our government to better prepare the nation for such an event. According to The Heritage Foundation, the U.S. must plan for the unthinkable. We must have robust pre-disaster planning with practical exercises that include top officials, who rehearse a wide variety of contingency scenarios that integrate federal, state, local, private sector, non-governmental organizations, and international support. One of the Heritage Foundation’s recommendations is to protect our ability to communicate. The U.S. must have the means to establish assured emergency broadcast and interactive communications, both within the nation, as well as across the globe. In the words of Arizona Senator Jon Kyl, “EMP is one of only a few ways that the United States could be defeated.”

Wouldn’t Circuit Breakers And Surge Protectors Stop It?

This is where the effect of EMP starts getting complex. All electricity travels at the speed of light, and circuit breakers are designed to “read” the flow of that current. If the current exceeds a certain level, the breaker snaps and takes you off line, thus protecting everything beyond it. More than a few of us have discovered that when you purchase an inexpensive surge protector, it will cut off when a surge occurs, but the high electrical current has already passed through and fried your expensive plasma television or new computer. Unlike a lightning strike or other power surge,

occurs, but the high electrical current has already passed through and fried your expensive plasma television or new computer. Unlike a lightning strike or other power surge, an EMP surge is “front loaded” —meaning it doesn’t allow enough time for the circuit breaker to “read” that trouble is on the way. Instead, the surge from an EMP is like a wall of energy, slamming through nearly all commercial and military surge protectors already in place-- and is past the “safety barrier” and into delicate electronics before the systems have time to react.⁶⁷

EMP Effects: Overview

As we have explained, the United States is completely reliant on “critical national infrastructures,” which are extremely vulnerable to the effects of an EMP. Next we will describe in detail how an EMP will affect each of these components.

EMP Effects to Our Power Plants

The North American power grid is comprised of more than 200,000 miles of high-voltage transmission lines, thousands of generation plants, and millions of digital controls.⁶⁸ More than 1,800 entities own and operate portions of this system, with thousands more involved in the operation of distribution networks. In the early stages of an EMP attack, even before the disruptions could be sensed, many of the protective devices will be damaged that ensure fast recovery of critical system components. As a result, much of the electrical infrastructure would be unable to protect itself from the effects of simultaneous failures. Widespread damage to the generation, transmission, and distribution infrastructures and equipment are probable.⁶⁹ The EMP Commission’s findings also recognized that the skilled labor needed for a massive repair effort is not available if we are forced to allocate over a large geographic area.

The scope of the damage could cover 70% or more of the continental United States, as well as a significant part of Canada. Fuel supplies required for power generation would most certainly be interrupted, with SCADA (Supervisory Control and Data Acquisition Systems) and DCS (Distributed Control Systems) used in delivery of these supplies adversely impacted, as much of our fuel supply infrastructure is dependent upon the electrical system. For example, natural gas-fired plants (which make up a large share of domestic generation) would be rendered inoperable. Nuclear plants would be reasonably expected to still have fuel supplies, but might have to forego protective regulations in order to continue operations. Many renewable fuel resources would retain their fuel supply, but EMP effects on their controls might still render them inoperable.⁷⁰

According to the High-Impact, Low-Frequency Event Risk to the North American Bulk Power System report the computer controls at power generation facilities are vulnerable to an EMP event. Such effects may complicate restoration efforts until this equipment is repaired, replaced, or restored to service. As with the relays, it is possible to protect the existing equipment through a high-frequency facility protection program that involves improved grounding, shielding, fiber optic cabling and/or the addition of surge protection devices.⁷¹ “American society has grown so dependent on computer and other electrical systems that we have created our own Achilles’ heel of vulnerability, ironically much greater than those of other, less developed nations,” wrote Senator John Kyl of Arizona. “When deprived of power, we are in many ways helpless, as the New York City blackout made clear. In

"The only plausible explanation we can find is that the Iranians are figuring out how to launch a missile from a ship and get it up to altitude and then detonate it. And that's exactly what you would do if you had a nuclear weapon on a Scud or Shabab-3 or other missile, and you wanted to explode it over the United States."

- Dr. William Graham
former White House Science
Adviser

that case, power was restored quickly because adjacent areas could provide help. But a large-scale burnout caused by a broad EMP attack would create a much more difficult situation. Not only would there be nobody nearby to help, it could take years to replace destroyed equipment." Because of this, officials in the U.K. and the United States are preparing to make controlled power cuts to their national electrical grid in response to a warning of increased solar activity for fears of a powerful solar storm hitting the Earth. Thomas Bogdan, Director of the U.S. Space Weather Prediction Center recently told *The Independent*⁷² that controlled power "outages" will protect the National Electricity Grids against damage which could take months or even years to repair should a large solar storm collide with the Earth without any precautions being taken.

EMP Effects to Petroleum and Natural Gas Infrastructure

The United States is the largest producer of refined petroleum products in the world. In 2006, 149 refineries were producing approximately 23% of the world's output. These refineries range in production capabilities from 5,000 barrels to approximately 500,000 barrels per day.⁷³ Many aspects of American life and our economy revolve around the easy on-demand availability of energy. While much of the energy we consume originates in natural resources such as coal, hydroelectric, and nuclear materials and is distributed to users through the electric power grid, more than 60% of all U.S. domestic energy usage derives from petroleum (about 40%) and natural gas (more than 20%) and is distributed to users through an extensive national pipeline system.⁷⁴ Refined petroleum products and natural gas power our cars, heat our homes, energize our factories, and comprise critical elements of industrial materials ranging from fertilizers to plastics, all enabling the normal functioning of our energy intensive civil society. Most people don't realize that we have over 180,000 miles of interstate natural gas pipelines and more than 55,000 miles of large 8 to 24-inch diameter oil pipelines that supply natural gas across our nation.⁷⁵

The EMP Commission report determined that if the microprocessor-based control systems of these pipelines were to fail due to an electromagnetic pulse, the companies operating these complex pipelines do not have enough personnel to manually operate their systems through telephone communications (which may not be available after an EMP event) with a central control center, due in part to the multiple sites that would need to be monitored and controlled during an emergency.⁷⁶ The bottom line here is that our petroleum and natural gas infrastructures are critically dependent on the availability of assured electric power from the national [power] grid as well as other national infrastructures, including food and emergency services that sustain the personnel manning these infrastructures. Petroleum and natural gas systems are rely heavily dependent on commercial electricity during throughout the entire cycle of production, : refining, processing, transport, and delivery to the consumer. The availability of this commercial power is the most important dependency for the domestic oil sector. The production and delivery of natural gas infrastructure depends on electric power to operate lube pumps for compressors, after-cooler fans, electronic control panels, voice and data telecommunication, computers, SCADA communication

and controls infrastructure, gas control centers, and a multitude of other critical components.⁷⁷ While the petroleum and natural gas infrastructures is capable of providing uninterrupted services for several days following a catastrophic event, but if faced with extended outages that last a more than a few days, we will would certainly see these services cease.

EMP Effects to Our Transportation Systems

The transportation sector of our economy is often addressed as a single infrastructure, but in reality it is fragmented into several separate, but still related systems: for example rail refers to the long-haul railroad and commuter rail infrastructures; air combines both commercial and general aviation; road covers automobile and trucking; and water includes both maritime shipping and inland waterway infrastructures.⁷⁸ Airlines play a critical role in commerce, allowing industries to conduct face-to-face business, while maritime shipping keeps our global supply chain interconnected. Once goods manufactured across the globe arrive on our shores, we rely on rail and truck transportation to deliver these products to various distribution centers that in turn will supply retail stores across the nation—clearly a disruption of this infrastructure has the potential to create widespread economic chaos.

EMP Effects to Our Automobile and Trucking Transportation Systems

Progress makes us stronger, right? Well, at least in most ways it does— but the paradox of progress is that it fosters dependency. For example: if all of the automobiles in the world stopped running, we would be in a much worse situation than if there had never been any automobiles in the first place. Over the past century, both our society and economy have evolved in tandem with the automobile and trucking industries. With the proliferation of suburbs, citizens are traveling greater distances to work, or to shop, or to obtain medical care and a host of other activities, making automobiles vital to our daily lives. And make no mistake: our rural counterparts are also dependent on automobiles, if not more so. If a typical person lives three miles east of the supermarket, seven miles out from the nearest hospital, and twelve miles from an employer, their ordinary activities can become a huge program without a car.⁷⁹

At the instant an EMP strikes, the body of your car and its radio antenna will feed the power surge into your vehicle's computer—rendering it completely inoperable. Some police departments are currently experimenting with a specially designed bumper for vehicles used in high-speed chases. If they can brush up against the car they are pursuing, the officer simply hits a button and a high-energy surge is delivered through these bumpers, flooding a suspect's vehicle and shorting out its computer system. Result... whether the police is chasing you with this new device, or an EMP burst has been fired off... your car will essentially be a useless hunk of metal that will slowly roll to a stop. In that instant, most of America will be on foot again.⁸⁰

The potential EMP vulnerability of automobiles has been greatly increased with the adoption of microprocessors and electronic components used in their manufacturing. Modern automobiles have as many as 100 microprocessors that control virtually all functions, and the effects of EMP could disable a major portion of the 130 million cars and some 90 million trucks on the road today. Since so many of these vehicles are on the road simultaneously, the risks for accidents and massive congestion in large metropolitan areas, not to mention malfunctioning stoplights and train crossing signals, are a frighteningly realistic possibility. The longer-term effects will hinge on our ability to obtain fuel and the

“[An EMP Attack]...would change the game. It would change the world the order.”

- Dr. Vincent Pry
Former CIA Nuclear Weapons
Analyst and President of EMPact
America

means to recover commercial power. Consider how many police officers may be required to replace automated traffic controls at the same time that they are critically needed for other emergency services.⁸¹

The 2008 EMP Commission report highlighted our dependence on the trucking industry to continuously supply food from scattered farms and processing centers. Today, a typical city's food supply consists of what's available on grocery shelves for consumers—enough for several days at most. Replenishment of that supply depends on the flow of trucks from processing centers to distribution centers to warehouses, and eventually to stores and restaurants. The commission stated that if “urban food supply flow is substantially interrupted for an extended period of time, hunger and mass evacuation, even starvation and anarchy, could result.”⁸² The commission also tested the vulnerability of automobiles in their EMP simulation laboratory, with vintages ranging from 1986 through 2002. They concluded that at least two out of three automobiles on the road will manifest some level of inoperability due to an EMP attack and that the “ultimate result of automobile EMP exposure could trigger crashes that damage many more vehicles than are damaged by the actual EMP, with consequent loss of life and multiple injuries.”⁸³

EMP Effects to Our Railway Transportation Systems

To this day, rail transportation continues to be our nation's primary long-distance heavy freight carrier. Class I railroad freight⁸⁴ in 2003 totaled roughly 1.8 billion tons. The major categories of freight carried by railroads include coal, chemicals, farm products, minerals, food products, and a variety of other goods essential to our economy.⁸⁵ Of these categories, coal dominates all other categories of freight, accounting for nearly half of all railroad tonnage, and of the 700 million tons of coal-transported annually, 90% is delivered to coal-fired power plants. These plants account for more than 1/3rd of our electricity production. According to the 2008 EMP Commission report,⁸⁶ these coal-fired plants typically have no more than a month's supply of coal on site. While this reserve provides a useful buffer, under prolonged conditions of railroads failing to deliver coal, these plants would simply have to shut down. And while some coal-fired power plants utilize natural gas, this alternative fuel may not be available after an EMP attack, affecting electricity production throughout the Midwest, Southeast, and Southwest, regions of the United States more heavily dependent on coal-fired power.⁸⁷

The U.S. rail lines themselves are unlikely to suffer direct destruction as a result of EMP, but rather it is the control computers onboard locomotives, countless traffic signals, and numerous control centers that will most likely be disabled. The EMP Commission conducted an EMP vulnerability survey⁸⁸ of CSX Transportation, which operates the largest rail network in the eastern United States. Like other major railroad companies, CSX has centralized its critical control facilities in a single geographical area, handling approximately 1,200 trains per day. These railroad control centers rely on personal computers, servers, mainframes, servers, routers, phone communication and local area networks—to this date, neither of these control centers, nor the equipment operating inside them, have been hardened against electromagnetic pulses.

“The September 11 commission report stated that our biggest failure was one of ‘imagination.’ No one imagined that terrorists would do what they did on September 11. Today few Americans can conceive of the possibility that terrorists could bring our society to its knees by destroying everything we rely on that runs on electricity. But this time we’ve been warned, and we’d better be prepared to respond.”

- Senator John Kyl
R- Arizona

EMP Effects to Our Airline Transportation Systems

Air travel has become ingrained in our way of life, transporting over a half a million domestic passengers daily. Navigation, communication and tracking equipment are critical to modern flying technology and will be vulnerable to the effects of an EMP. New airline designs (such as the Boeing 777) are particularly susceptible, due to the lack of a direct mechanical or hydraulic link for safety procedures.⁸⁹

Airline control towers would obviously suffer irreparable damage, and the aviation industry would likely be grounded for a significant time. According to the 2008 EMP Commission findings, if the FAA air traffic control system is damaged by exposure to EMP environments, its reconstitution would take considerable time to rebuild.⁹⁰ One could surmise that the aviation industry may never recover from a serious EMP event. As we’ve discussed, an EMP itself might not directly cause death, but it could



Illustration Courtesy of: Steve McGhee

easily start a rapid chain of events that may be especially deadly to those onboard aircraft in flight. No government report has publicly discussed the potential casualty rate resulting from the instantly disabled aircraft in the first seconds after an EMP event. It is estimated that at any given moment, during regular business hours, somewhere between three to four thousand commercial airliners are crisscrossing the skies, meaning between 250,000 to 500,000 people may be at risk in those first few minutes—more than all of our battle casualties across four years of World War II.⁹¹ It is a sobering thought that many experts believe that planes falling from the sky may in fact be one of the first telltale signs of an EMP event.

EMP Effects to Our Sea Transportation Systems

The key elements of our maritime infrastructure consist of ocean-going vessels and the key dockyards in their ports. While the 2008 EMP Commission did not perform an EMP assessment of ships, they did conduct an in-depth analysis of the vulnerabilities of ports. It should be noted that many of the nation's seagoing vessels may experience the loss of communication and navigation (GPS) capabilities, but more importantly, the effects of an EMP attack may significantly impair American dockyards. Cargo cranes contain upwards of 100 vulnerable computers and sensors for functionality, and the distribution centers linking shipping containers with the U.S. trucking industry could be destroyed.⁹² While U.S. seafaring transportation will not be the immediate lynchpin of a recovery from an EMP strike, our nation's long-term recovery would hinge on aid from other nations who are primarily separated from us by the big blue sea. If we hope to recover from such an event, EMP resilience in our maritime and seaport resources will be crucial.

EMP Effects to Our Food Production and Transportation Systems

The 2008 EMP Commission also studied the United States' food infrastructure, whose operation depends critically on electricity. An EMP attack could disrupt, damage, or destroy the systems necessary in making, processing, and distributing food. Agriculture for growing major crops requires large quantities of water supplied through irrigation or other artificial means that utilize electric pumps, valves and other machinery to draw or redirect water from aquifers, aqueducts, and reservoirs.⁹³ U.S. food production primarily consists of motorized tractor equipment ranging from combines, to planting, seeding, and harvesting machines. These vehicles have similar EMP vulnerability as automobiles. The EMP Commission also concluded that an attack could render inoperable the electric equipment and automated systems that are ubiquitous and indispensable to the modern food processing industry.⁹⁴ Cleaning, sorting, packaging, and canning of all kinds of agricultural products are performed by electrically powered machinery. Butchering, cleaning, and packaging of poultry, pork, beef, fish and other meat products are mostly automated operations these days, done on electrically driven processing lines.

The storage and distribution of food is directly dependent on the electrical infrastructure to power refrigerated warehouses, with distribution entirely at the mercy of the trucking industry. Without refrigerated warehouses and with increasing spoilage in supermarkets (that typically only have three days of backup stock), the country would only be more dependent on the trucking sector.⁹⁵ The EMP Commission concluded that the transportation and distribution of food to supermarkets may be the weakest link in the food infrastructure in the event of an EMP event.⁹⁶ Widespread damage to these infrastructures would impede the ability of undamaged fringe areas to aid in recovery. The consequences of our food infrastructure failing poses a clear threat to life, industrial activity and social order. Therefore, it is highly possible that the recovery time would be very slow and the amount of human suffering great, including loss of life.⁹⁷

EMP Effects to Our Water Systems

Since the invention and proliferation of the electric water pump early in the last century, urban growth, planning, and architecture have been liberated from dependence on gravity-fed water systems. Electrically driven pumps, valves, filters, and a wide variety of other electrical machinery are indispensable for the purification of water used for drinking and industrial purposes. Not to mention delivering water to consumers! The removal and treatment of wastewater also relies heavily on electrical machinery. The commission concluded that an EMP attack could degrade or damage these systems, affecting the delivery of water to a very large geographic region for a protracted period of weeks or even months.⁹⁸

The consequences of disrupting our water infrastructure are catastrophic. Denial of water can cause death in as little as 3 or 4 days, depending on the climate and level of activity (and an EMP event definitely means more walking, folks!). Stores typically have only a maximum 3-day stockpile of consumable liquids, which would quickly disappear from the shelves if the smallest population suddenly didn't have access to fresh tap water. Re-supplying these depleted stores with water would be difficult in the EMP aftermath given the disruption to our transportation systems. People would most likely resort to drinking from lakes, streams, ponds and other sources of surface water. Unfortunately, most surface water, especially in urban areas, is contaminated with wastes and pathogens, which could cause serious illness if consumed. The EMP Commission concluded that a prolonged water shortage might quickly lead to serious consequences. People preoccupied with finding or producing enough drinking water to sustain life would be unavailable to work at normal jobs; most industrial processes requiring large quantities of water and would cease; demoralization, and the eventual deterioration of social order can be expected if a shortage is protracted; and anarchy will certainly loom if government cannot supply the population with enough water to preserve health and life.⁹⁹

EMP Effects to Our Communication Systems

The crucial role that telecommunication plays in a modern society cannot be overstated, and the loss of this infrastructure would seriously impede the routine communication between individuals, business, and government. The vital components that make telecommunications possible include send-and-receive devices for voice and data, such as standard and cellular phones, not to mention personal computers. Consider the effects of EMP on wireless transmission facilities, as well as the monitoring and management systems that identify, mitigate, and repair problems that can impact all those services that make modern communication possible. The major elements of civilian communication networks have electrical systems with circuit boards, integrated circuit chips, and switching equipment such as routers that are inherently susceptible to EMP attack.¹⁰⁰ In March 2005, testimony before a U.S. Senate subcommittee the Acting Director of NCS noted that "EMP presents a less significant direct threat to telecommunications than it does to the National Power grid but would nevertheless disrupt or damage a functionally significant fraction of the electronic circuits in the Nation's telecommunications systems in the region exposed to EMP (which could include most of the United States)."¹⁰¹ Unfortunately, mustering a global response to such a catastrophe requires the capacity to communicate—and redundancy in communications will be vital.

EMP Effects to Our Satellite Systems

Over the past decade, there has been increased focus on U.S. space systems in Low Earth Orbits (LEO). These commercial LEO satellites support many significant services for the Federal Government, including communications, remote sensing, weather forecasting and imaging. Both the National Security and Homeland Security communities use commercial satellites for critical activities, including direct and backup communications, emergency response services, and continuity of operations during emergencies. Satellite services are important for national security and emergency preparedness telecommunications because of their ubiquity and separation from other communication infrastructures.¹⁰² It has been demonstrated that large EMP attacks may cause a significant portion of satellites to fail,¹⁰³ meaning most of our modern modes of navigation (GPS), communication, even television broadcasts would be utterly crippled by EMP attack. The 1962 STARFISH high-altitude nuclear burst greatly enhanced the high-energy electron environment in LEO, resulting in the early demise of several satellites in orbit at the time.¹⁰⁴

EMP Effects to Our Financial Systems

The financial services industry comprises a network of organizations and attendant systems that process instruments of monetary value in the form of deposits, funds transfers, savings, loans, and other financial transactions. This infrastructure is the record keeper for financial transactions and repository of national, organizational, and individual wealth.¹⁰⁵ Today most significant financial transactions are performed and recorded electronically; however the ability to carry-out these transactions is highly dependent on other elements of the national infrastructure. According to the President's National Security Telecommunications Advisory Committee (NSTAC), "The financial services industry has evolved to a point where it would be impossible to operate without the efficiencies of information technology and networks."¹⁰⁶

The 2008 EMP Commission found that the U.S. financial infrastructure trends toward ever more sophisticated and powerful electronic systems capable of an ever-increasing volume and velocity of business. The increasing dependence of the United States on an electronic economy, so beneficial to the management and creation of wealth, also increases its vulnerability to EMP.¹⁰⁷ Their report also states that an EMP would probably not erase data stored on magnetic tape. However, by shutting down power grids and damaging data retrieval systems, an EMP event could deny access to essential records stored on tapes and compact discs. Moreover, because EMP physically destroys electronic systems, it is also in the category of threats that NSTAC concludes are more worrisome than cyber-terrorism: "Physical attacks remain the larger risk for the industry." Unfortunately, the vast majority of electronic systems supporting the financial infrastructure of our nation have never been tested, let alone hardened, against EMP and would be unlikely to withstand the kind of mass systemic destruction likely to follow an attack.¹⁰⁸

Damage to these systems would force consumers to operate in a cash economy, or since cash withdrawals would be impossible without financial records, a barter economy. The August 2003 Northeast blackout was a successful test of post-September 11 safeguards, but that event happened under ideal conditions for the financial market. It occurred after the 4 p.m. market closing time, was largely over by 9 a.m. the next day, and business was light as usual for a Thursday in August. Even

“An EMP attack on America would send us back to the horse and buggy era—without the horse and buggy. If you are a terrorist, this is your ultimate goal, your ultimate asymmetric weapon.”

**- Trent Franks
Congressman, (R- Az)**

some traders could not access the NASDAQ electronic exchange by telephone, ATMs failed all over New York City and elsewhere, transportation systems were interrupted regularly, power outages continued to randomly disrupt business, and many companies had trouble obtaining backup diesel fuel for their generators. Banks borrowed a total of \$785 million from the Federal Reserve System to compensate for imbalances. This was the result of a disruption that lasted a few days at most, not the weeks or months that an EMP is likely to inflict.¹⁰⁹ The EMP commission report concluded that in the immediate aftermath, banks would find it very difficult to operate and provide the public with the liquidity they require to survive; that is: to buy food, water, gas, or other essential supplies and services.¹¹⁰ Business transactions that create wealth and jobs could not be performed. Loans for corporate capitalization and for private purposes could not be made. Wealth, recorded electronically in bank databases, could become inaccessible. Credit, debit, and ATM cards would be rendered useless. The bottom line is an EMP attack on this nation would stop the heart of the U.S. economy.

EMP Effects to Our Emergency Response Services

Emergency services are essential to the health and safety of the general public. Law enforcement is equally essential for the maintenance of law and order, protection of property and the public's safety. Americans rely on the prompt and effective delivery of fire, police, rescue, and emergency medical services. Augmenting these services in time of natural disasters are the state police and National Guard. The demand for emergency services is enormous. Across the United States more than 200 million 9-1-1 calls are fielded annually.¹¹¹ Responding to these calls is an army of some 600,000 local law enforcement officers, 1 million firefighters, and more than 170,000 emergency medical technicians and paramedics.¹¹² Anticipated expenditures over the next 5 years for emergency response services are estimated at \$26 to \$76 billion at the state and local levels, supplemented by an additional \$27 billion at the federal level.¹¹³

Obviously, emergency responders can be expected to experience an increase in demand following an EMP attack. This will only be further complicated by their inability to communicate with each other and the general public. Commuters will be trapped on subways, while many office workers may find themselves trapped in elevators. These people will require timely rescue. If looting or other forms of civil disorder break out, it is likely the local police services will be overwhelmed. When the failure of police and emergency services becomes protracted, lawlessness could escalate beyond the level of control – everybody remember what we witnessed the days after Hurricane Katrina? Consider this: the cell phone towers and radio antennas that were crucial to the operation of emergency communications were damaged by the hurricane, and the protracted blackout of the power grid eventually caused the generators supporting emergency communications to exhaust their fuel supplies or simply fail from overuse. Consequently, government, police, and emergency services were severely impacted in their ability to communicate with the public and with each other.¹¹⁴

Emergency medical services respond to approximately 3 million 9-1-1 calls annually for people with cardiac problems and 2.5 million others for respiratory problems.¹¹⁵ Fire departments respond to over 1.7 million commercial and residential fires. These fires resulted in property damage estimated at \$10.3 billion and 3,380 civilian deaths.¹¹⁶ Lives and property saved by fire departments are undoubtedly also very large numbers. The EMP Commission concluded that it had no accurate way to measure the impact of degraded emergency services on lives lost, health impaired, or property damaged.¹¹⁷ One can imagine the chaos that an EMP attack would have on our social fabric, as we suddenly find ourselves without electricity, transportation, food, water, communication, healthcare or access to emergency services and a prolonged event would no doubt strain the system to a breaking point as our emergency responders might very well find themselves not reporting to work out of fear for the safety of their own families.

EMP Threat is Real

Clearly, an electromagnetic pulse attack represents one of the greatest threats imaginable—to the United States and to the entire world. All past calamities of the modern era would pale in comparison to the catastrophe caused by a successful high-altitude EMP strike.¹¹⁸ Several nations, including reported sponsors of terrorism, may currently have the capability for using EMP as a first-strike weapon in cyber warfare or cyber terrorism to disrupt communications and other parts of the U.S. critical infrastructure.¹¹⁹ “A terrorist organization might have trouble putting a nuclear warhead ‘on target’ with a Scud, but it would be much easier to simply launch and detonate [one] in the atmosphere,” wrote Senator John Kyl(R-AZ) in the Washington Post. “No need for the risk and difficulty of trying to smuggle a nuclear weapon over the border or hit a particular city. Just launch a cheap missile from a freighter in international waters—al-Qaida is believed to own about 80 such vessels.”

If a small atomic bomb were to explode 400km above Chicago it could fry all electronically based technology from Chicago to Dallas, affecting the infrastructure of all major cities on the east coast and as far as South Dakota—such an attack would shut down the national power grid. Air traffic would be grounded, automobiles and other forms of transportation would be halted; telephone, Internet and other communications would be shut down indefinitely. America would be reduced to an agricultural economy similar to that of the 1800s. EMP is a legitimate weapon, and a legitimate threat to the security of our nation.¹²⁰ On the floor of the House, Rep. Roscoe Barlett (R-MD) recounted a story of a Russian who, prior to the G-8 meeting said that “if we really wanted to hurt you, with no fear of retaliation, we’d launch an SLBM, submarine launch missile.” He went on to state that the U.S. “wouldn’t know where it came from; it came from the sea. And we’d detonate a nuclear weapon high above your country, and it would shut down your power grid and your communications for 6 months or so.” Our enemies are well aware of what an EMP attack is, and just what precisely it would do.¹²¹ Senator Kyl and Congressman Barlett aren’t alone in clearly expressing the real threat posed by EMP. Jerome Corsi, author of Atomic Iran, recently told World Net Daily about his new findings regarding Iran’s electromagnetic pulse experiments, which significantly raise the stakes of the Mullah regime’s bid to become a nuclear power. “Up until now, I believed the nuclear threat to the U.S. from Iran was limited to the ability of terrorists to penetrate the borders or port security to deliver a device to a major city,” he said. “While that threat should continue to be a grave concern for every American, these tests by Iran demonstrate just how devious the fanatical mullahs in Tehran are. We are facing a clever and unscrupulous adversary in Iran that could bring America to its knees.”

In 2005, the Senate Judiciary Subcommittee on Terrorism, Technology and Homeland Security chaired by Senator Kyl, held a hearing on the EMP threat. "An electromagnetic pulse (EMP) attack on the American homeland," said one of the distinguished scientists who testified at the hearing, "is one of only a few ways that the United States could be defeated by its enemies – terrorist or otherwise." Kyl expanded by stating: "And it is probably the easiest. A single Scud missile, carrying a single nuclear weapon, detonated at the appropriate altitude, would interact with the Earth's atmosphere, producing an electromagnetic pulse radiating down to the surface at the speed of light. Depending on the location and size of the blast, the effect would be to knock out already stressed power grids and other electrical systems across much or even all of the continental United States, for months if not years."¹²²

William R. Graham, President Reagan's top science adviser and Chairman of the Commission to Assess the Threat to the United States from Electromagnetic Pulse Attack told World Net Daily could think of no other reason for Iran to be experimenting with mid-air detonation of missiles than for the planning of an EMP-style attack. "The radical Shiite regime has conducted successful tests to determine if its Shahab-3 ballistic missiles, capable of carrying a nuclear warhead, can be detonated by a remote-control device while still in high-altitude flight," Graham said. "There was no other plausible explanation for such tests than preparation for the deployment of electromagnetic pulse weapons – even one of which could knock out America's critical electrical and technological infrastructure, effectively sending the continental U.S. back to the 19th century."¹²³

"EMP is one of a small number of threats that can hold our society at risk of catastrophic consequences," a report by Joseph Farah's G2 Bulletin, published by World Net Daily News' founder stated. "EMP will cover the wide geographic region within line of sight to the nuclear weapon. It has the capability to produce significant damage to critical infrastructures and thus to the very fabric of U.S. society, as well as to the ability of the United States and Western nations to project influence and military power." The major impact of EMP weapons is on electronics, "so pervasive in all aspects of our society and military, coupled through critical infrastructures," explained Farah's report. "Their effects on systems and infrastructures dependent on electricity and electronics could be sufficiently ruinous as to qualify as catastrophic to the nation," Lowell Wood, acting chairman of the Commission to Assess the Threat to the United States from Electromagnetic Pulse Attack, told members of Congress. The commission report went so far as to suggest, in its opening sentence, that an EMP attack "might result in the defeat of our military forces."¹²⁴

Recent reports¹²⁵ indicate Iran could have a nuclear bomb by 2015, if not earlier, but what has been largely ignored is Iran's ability to acquire an (EMP) weapon. Having already conducted tests from sea-based platforms, detonating warheads at the highest point of a missile's trajectory, might this not very well be Iran exploring a workable research program to deliver an EMP attack against the United States. Clifford D. May, president of the Foundation for the Defense of Democracies, along with James J. Carafano, a senior research fellow for National Security at the Heritage Foundation recently penned an article published in the Washington Times, *A World Without America*, describing how Iran can achieve its destructive ends.¹²⁶ May and Carafano contend that until recently, "...it was possible to believe that whatever Mr. Ahmadinejad's intentions, Iran was a long way from acquiring the capabilities it needs to achieve its goals. But a blue-ribbon commission has reported to Congress

on what appears to be an Iranian drive to obtain the means to carry out an EMP attack.” Their article outlines a scenario where a short-range ballistic missile could be carried on one of the thousands of commercial freighters sailing under “flags of convenience” that maneuver through U.S. waters every day. Without ever piquing the interest of the Navy, the Coast Guard, or the Customs and Border Protection, the ship could sail within range and deliver its payload over American territory. Even a modest warhead placed at the right spot over the East Coast could take down 75 % of the electrical grid.¹²⁷ The genius of such a covert attack is that it doesn’t come with an obvious “return address.” The ship might be registered in Liberia; the crew might be Lebanese; the ship might disappear into the night - or be scuttled quietly. Another advantage for a would-be attacker is the bang that can be achieved for the buck: an EMP attack would allow an enemy to wreak an enormous amount of destruction for a modest investment. It would mean no electricity for their enemies, no food on their shelves, no phones, no fuel deliveries. Life would look more like the barter system of the 19th century, not to mention the millions that would die from traffic accidents, fires, failed hospital equipment, disease and the other chaos that would result from such an attack.¹²⁸

A New Dark Age

According to Dr. James Carafano and Dr. Richard Weitz, authors of The Heritage Foundation’s report entitled *EMP Attacks – What the U.S. Must Do Now*, an electromagnetic pulse attack, whether it is natural or man-made, represents one of the greatest threats imaginable—to the United States and the world. The report describes how, in less than a billionth of a second, microprocessors and solid-state circuitry will fry; power lines will be overloaded and the electric grids would ultimately collapse, producing almost unimaginable devastation as a post-EMP event would cripple one of the most wired nations in the world. Everything would just suddenly go... dark. This eye opening report suggest that a global humanitarian effort mounted by our allies would not be enough to keep hundreds of millions of Americans from death by starvation, exposure, or lack of medicine. Without the American economic engine, the world economy would quickly collapse—and Earth would most likely recede into the “new” Dark Ages.¹²⁹

Look around you and imagine a world without electricity – now try for a moment to imagine what life would be like in a world without that power. We’re talking about an electronic Armageddon. In a blink of an eye the most powerful superpower the world has ever known could be destroyed. All past calamities of the modern era would pale in comparison to the catastrophe caused by a successful high-altitude EMP strike or solar event. At a minimum, should the effects of an EMP take out the electrical grid, the surges alone might simultaneously cause electrical fires and incapacitate traffic and emergency dispatch systems. As a result, responders will be unable to respond; resulting in mass fires.¹³⁰ William R. Graham of the EMP Commission describes the potential “cascading effect” of an EMP attack. If electrical power is knocked out, and circuit boards are fried, telecommunications are disrupted, energy deliveries are impeded, the financial system breaks down, food, water and gasoline becomes scarce.¹³¹

Thinking the Unthinkable: The Grim Reality After an EMP Event

We've all been temporarily inconvenienced during a power outage due to weather. Imagine being trapped in an elevator, twenty stories up... Or on the underground subway... Suddenly the power goes out. You stop moving. It is pitch dark. Emergency lights don't flicker on. People around you reach for their cell phones. None work. Real panic starts to sink in. Perhaps you're one of the lucky ones. Lucky enough not to be trapped in that elevator or on the underground subway – or on a jet liner plummeting to the earth. Perhaps you are traveling on the Interstate and suddenly your vehicle powers down. Ahead, a driver is caught unaware and swerves into a delivery truck causing an accident. Traffic comes to a standstill and mass confusion sets in. You realize that you're trapped in a bumper-to-bumper traffic jam of stalled vehicles stretching as far as the eye can see. You reach for your cell phone ... it's dead. Now what?

Perhaps you are home when it happens. You're checking email, maybe just enjoying a mindless sitcom on TV, when suddenly the power in your home goes out. The ceiling fan overhead slows, then stops spinning. Your television has gone dark. Your laptop computer dies—which strikes you as odd because, wasn't it fully charged? You reach for the phone to call the power company and report the problem, but like all the other electronic equipment in your house and everyone's house around you—it too is dead. You go outside to see if the neighbors have power, and you see someone getting out of their car – stalled in front of your house. What is happening? You go into your garage to get that ancient Sony Walkman radio that you sometimes still listen to ball games on, when you realize that it too is dead. No problem—probably just needs new batteries. You replace them. Still no luck, and it begins to dawn on you that your sixteen-year-old daughter took her car to the shopping mall – roughly fifteen miles away. But there's no way to communicate with her to see if she's all right. Twelve hours have now gone by. Still no power. Still no answers. Despite your reassurance, your wife is beside herself worried about your still-missing child. By now, the water pressure in your house has been reduced to a bare trickle, toilets aren't working, food in your freezer is starting to thaw...

Your grim reality following an EMP event has just started.

Frank Gaffney, President of the Center for Security Policy, summed it all up when he said, "Within a year of that attack, nine out of ten Americans would be dead, because we can't support a population of the present size in urban centers and the like without electricity..." At first glance one could easily dismiss such statements as fear mongering to help make the case our Federal Government's inactivity on passing legislation to harden our electrical grid against the effects of an EMP. Our exhaustive research leads us to believe that Gaffney's source for the 90% kill rate, might have been William Graham, chair of the EMP Commission, who told the House Armed Services Committee last year that an EMP attack could so thoroughly damage the country's electronic infrastructure—including its transportation and food and water delivery systems—that within a year only about 30 million Americans would still be alive.

Consider those less fortunate under the circumstances of an EMP, after all—we said that you are at home – but what about those who aren't? Our interstates will most likely become graveyards for those initially stranded by the EMP—and without food or water (or the ability to secure these critical life-sustaining requirements), many commuters will face the nightmare of dying hundreds or thousands of miles from their homes. The tens of millions of vehicles traveling on our interstates could suddenly lose power with the initial blast of an EMP. The potential for massive pileups and gridlock would litter America's highways and interstates. Countless numbers of people could be killed and injured as the highways come to a sudden traffic jam as drivers of cars and trucks crash into each other. With no working cell phones or towers required to call 9-1-1, those in need of medical attention would be left to their own accord. Even if they could, first responders would be unable to get to them without hardened vehicles and while the death and destruction on our nation's highways would be unprecedented in size and scope, this would still only be the first act of this horrific story.

After the first couple of days following an EMP event, as the confusion begins to wear off and people begin to grasp that the problem isn't just localized—our social order will inevitably begin to break down when people realize they need water to drink, food to eat, and medical supplies to sustain their families. Credit cards and debit cards, and even ATMs could be rendered useless in the aftermath of an EMP event. As grocery store shelves are picked clean, starvation will set in for many since farmers wouldn't be able to harvest crops and distributors wouldn't be able to get food to the supermarkets. Our modern "just-in-time" methodology of distributing food to our local grocery stores would be severed. Social chaos will quickly ensue on a massive scale when home cupboards and taps run dry. Compounding this nightmare is the unpleasant fact, is that most the average American household Americans have less than a week's worth of food stored in their house. Even more disturbing is that and the average household has less than 3 days of drinking water on hand.

The social fabric of our society would begin to fray within 72-hours of an EMP event, ushering in widespread looting, household break-ins, rape and murder. Police departments, without vehicles, command and control, or communication, will be powerless to stop widespread violence. Declaring a state emergency to call out the National Guard may also be ineffective—while our military may have hardened EMP-proof vehicles, many of our weekend warriors might be unable to reach their units, as 95% of all civilian and public transportation could be permanently crippled. Those men and women in our armed forces, police, fire and medical staff will be forced to make a very difficult decision of whether to leave their families in the midst of such chaos or report to duty. That's not forgetting the multitude of power plant and utility workers, and the hospitals—doctors and nurses will also be faced with this complex choice as well.

The human body can survive weeks without food. Unfortunately we can only live days without water. The very young and elderly can die in less than a day from severe dehydration and electrolyte imbalance. Because our modern society is so accustomed to using (more like wasting) hundreds of gallons of water per person per day, the vast majority of us will not be able to cope without water when it doesn't magically appear from our faucets. Without access to clean water, the vast portion of people living in major urban areas will be susceptible to deadly gastro-intestinal ailments within days of an EMP event. Other types of diseases will spread rapidly, as human waste is improperly disposed of and likely contaminates what natural waterways remain available for water collection.

When the nation goes dark, asphyxiation from carbon monoxide poisoning will claim tens of thousands of lives, as people try to cook meals and heat their homes in the winter using outdoor propane and tailgating grills. Similar use of these outdoor devices may cause innumerable accidental house fires. Today we are accustomed to having fire, police and ambulance response units on site within minutes of a 911 phone call. Following an EMP event, how long before we have working phones again? How long will it be before emergency response personnel are coming to assist you? Without the local city or volunteer fire department able to respond, entire neighborhoods and apartment complexes could catch fire as blazes are left to burn...

Think of those dependent on others—such as in nursing homes, hospices and hospitals whose life-sustaining medical equipment, such as respirators and dialysis treatments, will fail to work and whose critical care staff may fail to show up to work. Those with acute ailments requiring daily medication or treatment will run out of their life-sustaining medication within weeks of an EMP event. The stress, fear, even the unaccustomed physical exertion of having to walk ten miles to get home, or forage for food and water on a daily basis, will trigger countless heart attacks and strokes. Depending on the severity of the winter or summer heat—many could freeze to death or die of heat stroke. When one factors in the large percentage of our society that are dependent on mood altering or psychoactive medication—what happens when those folks are faced with the reality of running out of drugs they depend on?

Lawlessness may run rampant, as millions of Americans will be forced to take to the streets in search of food and water, ultimately making themselves vulnerable to a variety of factors—including gangs of thugs out to prey upon the helpless. The sad reality is that anarchy and looting will be widespread. Those trying to survive in major metropolitan areas will be extremely vulnerable due to the sheer number of other inhabitants, desperate and trying to survive themselves. Those who happen to live in apartments will quickly comprehend the new nightmare of living in these buildings, when their elevators no longer work, and they're forced to hike up and down dozens of floors—only to venture out of their poorly ventilated and impossible to heat glass, steel and concrete modern day castles and realize that living in the major cities will be nothing short of a death sentence. They'll have little choice but to abandon their homes in the city to journey out in the false hope that they can find the means to survive in the "country." Without the experience and equipment to live off the land, these urban refugees will not last long outside the larger cities either.

Conclusion

In a blink of an eye, one of the most advanced civilizations mankind has ever known could be crippled by an EMP strike. Our reality would revert to how it was for those living in the 1800s without access to computers, electricity, vehicles and communication. While that may sound appealing to some, the grim reality is that the knowledge to live off the land has long since been lost. The vast majority of Americans are overweight and soft compared to prior generations—few of us today are used to backbreaking manual labor and or walking vast distances. Even the laborers of today are accustomed to relying on modern equipment to do the great majority of their work. The injuries resulting from the unfamiliarity of working with common tools such as axes, shovels, and saws will result in scores of injuries, which more than likely could become casualties. In a world with little or no access to medical care, even the simplest injury could result in infections and eventual death. Life after an EMP-event will be focused around simple survival – foraging for food, obtaining water and finding safety and shelter.

On a personal level, anyone interested in survival should be implementing long-term food and water storage plans, stockpiling medical supplies or items that could be used for barter. They should be planting gardens and relearning what our ancestors practiced when we were an agriculture-based society. Survivors should get mentally and physically fit, taking measures to protect themselves and their families by purchasing firearms and learning how to properly use them. Perhaps some of you reading this can take comfort in the knowledge that there are like-minded people who are doing something to prepare for such an event, people who share a common vision and who do not want to end up being a statistic, or who don't want to wait before it's too late to start preparing; people who don't want to have to live with themselves after the fact, knowing that they had an opportunity to do something about it, while there was still time—yes, there are people just like you.

Our Wake Up Call

The recent natural disasters in Japan, Alabama, Oklahoma and along the swollen banks of the Mississippi River should serve as a wake up call that our modern society is not immune to catastrophe. These disasters have not only claimed thousands of lives, but also have left a half an estimated million people without food, water, shelter or basic sanitation and electricity. It warrants pointing out that these devastating events didn't happen to third world, under-developed countries where such calamities seem almost common. Instead these disasters struck two of the most technologically advanced and industrialized countries in the world—Japan and the United States.

These events should serve as a reminder to all of us, especially those who live in major urban centers in the U.S. like New York, Los Angeles, and Chicago, how vulnerable we truly are. While the likelihood of such a major catastrophe hitting each of us in the future is speculative, I'm sure the poor victims of the Japanese disasters are reflecting on a lot of things they, as individuals and as a community, would do to prepare for another catastrophe. The earthquake/tsunami combo in that country and the massive tornadoes and floods that have caused so much destruction in our own borders should motivate us with grim determination to assess our own levels of personal preparedness.

How Prepared Are You?

It is easy to become overwhelmed with the thought that your world can be turned upside-down in an instant. But if you are remotely concerned about your own well being and that of your family, it would be disastrous to ignore threats like EMP altogether. How prepared are you if such a disaster strikes close to your home? If you are like most of us, you will find gaping holes in your levels of personal preparedness and even getting started with preparations can seem utterly daunting.

There is still time to act if you haven't put in place complete preparations for your family's physical and financial security. Simply waking up and recognizing the need to do something is the first step. Secondly, it is important to recognize that it is impossible to prepare for everything. Some degree of preparation can make a big difference for most scenarios, so now that your eyes are open to some of the threats that loom ahead of all of us, it's time to do something about it. It's time to get in motion.

"A market rout is on. Food, water medical kits, shelter, cash out of the bank, and all the rest should absolutely be in place at this time. Get the basics done. Now."

- Chris Martenson, Ph.D
Author of *Crash Course*

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