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NUCLEAR POWER PLANTS: The Very Real Possibility of A Global Nuclear Catastrophe

By Washington's Blog
Global Research, March 25, 2012
Washington's Blog 25 March 2012

Region: USA
Theme: US NATO War Agenda
In-depth Report: Nuclear War

The Government Spends Trillions On Unlikely Threats … But Won't Spend a Billion Dollars to Prevent the Very Real Possibility of Global Nuclear Catastrophe

We're Spending Money Combating the Wrong Dangers

Studies show that people are worry about the wrong things.

We are terrified of things that will probably never happen, and underestimate the real dangers which face us.

As we noted last year, the extreme vulnerability of nuclear power plants to solar flares is a very real threat which we *must* address:

> Nasa scientists are predicting that a solar storm will knock out most of the electrical power grid in many countries worldwide, perhaps for months. See this, this, this, this, this, this and this.
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> Indeed, the Earth's magnetic field protects us from the sun's most violent radiation, and yet the magnetic field fluctuates over time. As the Telegraph reported in 2008:
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> > Large hole in magnetic field that protects Earth from sun's rays … Recent satellite observations have revealed the largest breach yet seen in the magnetic field that protects Earth from most of the sun's violent blasts.
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> I'm not predicting some 2012 Mayan catastrophe. [Indeed, I think the whole Mayan 2012 thing is fake.] I am simply warning that a large solar storm – as Nasa is predicting – could knock out power throughout much of the world, especially if the earth's magnetic field happens to be weak at the time.
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> What would happen to nuclear power plants world wide if their power – and most of the surrounding modern infrastructure – is knocked out?
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> Nuclear power companies are notoriously cheap in trying to cut costs. If they are failing to harden their electrical components to protect against the predicted solar storm, they are asking for trouble … perhaps on a scale that dwarfs Fukushima. Because while Fukushima is the first nuclear accident to involve multiple reactors within the same complex, a large solar storm could cause accidents at multiple complexes in numerous countries.

> If the nuclear power companies and governments continue to cut costs and take large gambles, the next nuclear accident could make Fukushima look tame.
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> I'm not saying this will happen in 2012, or 2013 (although Nasa appears to be hinting at this). But a large solar storm which knocks out electrical grids over wide portions of the planet will happen at some point in the future.
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> Don't pretend it is unforeseeable. The nuclear power industry is on notice that it must spend the relatively small amounts of money necessary to prevent a widespread meltdown from the loss of power due to a solar storm.
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> Most current reactors are of a similarly outdated design as the Fukushima reactors, where the cooling systems require electricity to operate, and huge amounts of spent radioactive fuel are housed on-site, requiring continuous cooling to prevent radioactive release. [Designs which would automatically shut down – and cool down – in the event of an accident are ignored for political reasons.]

The head of the leading consulting firm on the effect of electromagnetic disruptions on our power grid – which was commissioned to study the issue by the U.S. federal government – stated that it would be relatively inexpensive to reduce the vulnerability of our power grid:

> What we're proposing is to add some fairly small and inexpensive resistors in the transformers' ground connections. The addition of that little bit of resistance would significantly reduce the amount of the geomagnetically induced currents that flow into the grid.
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> We think it's do-able for $40,000 or less per resistor. That's less than what you pay for insurance for a transformer.
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> If you're talking about the United States, there are about 5,000 transformers to consider this for. The Electromagnetic Pulse Commission recommended it in a report they sent to Congress last year. We're talking about $150 million or so. It's pretty small in the grand scheme of things.

Mechanical engineer Matthew Stein does a good job of reporting on this issue today:

> There are nearly 450 nuclear reactors in the world, with hundreds more being planned or under construction.... Imagine what havoc it would wreak on our civilization and the planet's ecosystems if we were to suddenly witness not just one or two nuclear meltdowns, but 400 or more! How likely is it that our world might experience an event that could ultimately cause hundreds of reactors to fail and melt down at approximately the same time? I venture to say that, unless we take significant protective measures, this apocalyptic scenario is not only possible, but probable.
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> In the past 152 years, Earth has been struck by roughly 100 solar storms,

causing significant geomagnetic disturbances (GMD), two of which were powerful enough to rank as “extreme GMDs.” If an extreme GMD of such magnitude were to occur today, in all likelihood, it would initiate a chain of events leading to catastrophic failures at the vast majority of our world’s nuclear reactors, similar to but over 100 times worse than, the disasters at both Chernobyl and Fukushima.

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The good news is that relatively affordable equipment and processes could be installed to protect critical components in the electric power grid and its nuclear reactors, thereby averting this “end-of-the-world-as-we-know-it” scenario. The bad news is that even though panels of scientists and engineers have studied the problem, and the bipartisan Congressional electromagnetic pulse (EMP) commission has presented a list of specific recommendations to Congress, our leaders have yet to approve and implement any significant preventative measures.

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Unfortunately, the world’s nuclear power plants, as they are currently designed, are critically dependent upon maintaining connection to a functioning electrical grid, for all but relatively short periods of electrical blackouts, in order to keep their reactor cores continuously cooled so as to avoid catastrophic reactor core meltdowns and fires in storage ponds for spent fuel rods.

If an extreme GMD were to cause widespread grid collapse (which it most certainly will), in as little as one or two hours after each nuclear reactor facility’s backup generators either fail to start, or run out of fuel, the reactor cores will start to melt down. After a few days without electricity to run the cooling system pumps, the water bath covering the spent fuel rods stored in “spent-fuel ponds” will boil away, allowing the stored fuel rods to melt down and burn[2]. Since the Nuclear Regulatory Commission (NRC) currently mandates that only one week’s supply of backup generator fuel needs to be stored at each reactor site, it is likely that, after we witness the spectacular nighttime celestial light show from the next extreme GMD, we will have about one week in which to prepare ourselves for Armageddon.

To do nothing is to behave like ostriches with our heads in the sand, blindly believing that “everything will be okay” as our world drifts towards the next natural, inevitable super solar storm and resultant extreme GMD. Such a storm would end the industrialized world as we know it, creating almost incalculable suffering, death and environmental destruction on a scale not seen since the extinction of the dinosaurs some 65 million years ago.

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There are records from the 1850s to today of roughly 100 significant geomagnetic solar storms, two of which, in the last 25 years, were strong enough to cause millions of dollars worth of damage to key components that keep our modern grid powered.

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“The Carrington Event,” raged from August 28 to September 4, 1859. This extreme GMD induced currents so powerful that telegraph lines, towers and stations caught on fire at a number of locations around the world. Best estimates are that the Carrington Event was approximately 50 percent stronger than the 1921 storm.[5] Since we are headed into an active solar

period much like the one preceding the Carrington Event, scientists are concerned that conditions could be ripe for the next extreme GMD.[6]

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The federal government recently sponsored a detailed scientific study to better understand how much critical components of our national electrical power grid might be affected by either a naturally occurring GMD or a man-made EMP. Under the auspices of the EMP Commission and the Federal Emergency Management Agency (FEMA), and reviewed in depth by the Oak Ridge National Laboratory and the National Academy of Sciences, Metatech Corporation undertook extensive modeling and analysis of the potential effects of extreme geomagnetic storms on the US electrical power grid. Based upon a storm as intense as the 1921 storm, Metatech estimated that within the United States, induced voltage and current spikes, combined with harmonic anomalies, would severely damage or destroy over 350 EHV power transformers critical to the functioning of the US grid and possibly impact well over 2000 EHV transformers worldwide.[7]

EHV transformers are made to order and custom-designed for each installation, each weighing as much as 300 tons and costing well over $1 million. Given that there is currently a three-year waiting list for a single EHV transformer (due to recent demand from China and India, lead times grew from one to three years), and that the total global manufacturing capacity is roughly 100 EHV transformers per year when the world's manufacturing centers are functioning properly, you can begin to grasp the implications of widespread transformer losses.

The loss of thousands of EHV transformers worldwide would cause a catastrophic grid collapse across much of the industrialized world. It will take years, at best, for the industrialized world to put itself back together after such an event, especially considering the fact that most of the manufacturing centers that make this equipment will also be grappling with widespread grid failure.

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In the event of an extreme GMD-induced long-term grid collapse covering much of the globe, if just half of the world's spent fuel ponds were to boil off their water and become radioactive, zirconium-fed infernos, the ensuing contamination could far exceed the cumulative effect of 400 Chernobyls.

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The Congressionally mandated EMP Commission has studied the threat of both EMP [i.e. an electromagnetic pulse set of by terrorists or adversaries in war] and extreme GMD events and made recommendations to the US Congress to implement protective devices and procedures to ensure the survival of the grid and other critical infrastructures in either event. John Kappenman, author of the Metatech study, estimates that it would cost about $1 billion to build special protective devices into the US grid to protect its EHV transformers from EMP or extreme GMD damage and to build stores of critical replacement parts should some of these items be damaged or destroyed. Kappenman estimates that it would cost significantly less than $1 billion to store at least a year's worth of diesel fuel for backup generators at each US nuclear facility and to store sets of critical spare parts, such as backup generators, inside EMP-hardened steel containers to be available for quick change-out in the event that any of these items were damaged by an EMP or GMD.[12]

For the cost of a single B-2 bomber or a tiny fraction of the Troubled Asset

Relief Program (TARP) bank bailout, we could invest in preventative measures to avert what might well become the end of life as we know it. There is no way to protect against all possible effects from an extreme GMD or an EMP attack, but we could implement measures to protect against the worst effects. Since 2008, Congress has narrowly failed to pass legislation that would implement at least some of the EMP Commission's recommendations.[13]

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Citizens can do their part to push for legislation to move toward this goal and work inside our homes and communities to develop local resilience and self reliance, so that in the event of a long-term grid-down scenario, we might make the most of a bad situation. The same tools that are espoused by the Transition movement for developing local self-reliance and resilience to help cope with the twin effects of climate change and peak oil could also serve communities well in the event of an EMP attack or extreme GMD. If our country were to implement safeguards to protect our grid and nuclear power plants from EMP, it would also eliminate the primary incentive for a terrorist to launch an EMP attack. The sooner we take these actions, the less chance that an EMP attack will occur.
