Could Balloons or Satellites Carry HEMP Weapons

I read an article on a news website about the Chinese spy balloon and noticed some of the comments voiced concerns that a balloon could be used to deliver an HEMP strike. Then came a bunch of comments along the lines of …

- "The powerful nuclear weapons necessary to generate an EMP big enough are far too heavy to lift with a balloon!"
- "They'll swarm us with hundreds or thousands of EMP balloons."
- "A balloon can't lift a nuke high enough to cause a HEMP."

The First Balloon Launched HEMP

In 1958, the United States commenced the Hardtack I series of nuclear tests, the first of which was called Yucca. For the Hardtack Yucca shot, we used a balloon to carry a 1.7 kiloton W-25 warhead (designed to be used in surface to air missiles) up to an altitude of 85,000 feet where it was detonated. Hardtack Yucca produced the first reported high-altitude electromagnetic pulse or HEMP. So, there is indeed a historical precedent for using a balloon to cause HEMP.

The nuclear weapon used in Hardtack Yucca weighed 218 pounds, and the entire package with instrumentation, weighed 762 pounds. The Yucca shot disproves the claims that a nuclear weapon capable of generating HEMP is too heavy to be lifted by a balloon and that a balloon can't lift a nuclear weapon high enough to cause HEMP. A nuclear weapon that would cause a devastating HEMP could be as light as 100 Lbs or so. A balloon could lift a nuclear payload high enough, as could some surface to air missiles, a U-2 spy plane, or even a specially modified commercial aircraft could probably do it.

Effects of a Balloon Launched HEMP

While a balloon launched HEMP attack is possible, it would have downsides as a delivery system for such an attack. The sweet spot for a nuclear weapon to cause HEMP is much higher than a balloon could carry a nuclear weapon. To get the most powerful field strength from the E1 component of HEMP, and to affect the greatest area of the United States, the nuclear weapon should be detonated much higher than it could be carried with current balloon technology by itself.

If the balloon carried a missile that lifted the nuclear weapon, that would be a different matter. In 2018, China tested what appeared to be three hypersonic glide vehicles (HGVs) launched from a balloon. China's DF-ZF HGV is a precision weapon that foils defenses by maneuvering at a velocity between 5-10 times the speed of sound. The test proves that China has tested balloon launched weapons, but a first strike by China would likely be a HEMP attack, not an attack directed at a ground target and China has many options for delivering such an attack.

According to EMP expert Jerry Emanuelson, B.S.E.E., a balloon launched attack could produce an EMP field strength up to 20,000v/m, damaging an area from New York to Washington D.C.. Although such as attack would be far from the worst-case scenario for an HEMP attack, it would be the single most devastating attack the U.S.A. has ever known. It would certainly be the most expensive attack, would cripple the U.S. both economically and governmentally, and would take a long

time to recover from. It could take years.

Why It Would Take So Long to Recover from a Chinese HEMP Attack

All nuclear weapons cause EMP, but when a nuclear weapon is detonated in the middle of stratosphere, it scatters high energy electrons in an effect known as Compton Scattering or the Compton Effect increasing the field strength of the EMP as much as 1000-fold.

In physics class, you may have moved a magnet back and forth over a conductor to generate electrical current. Generators use the same principle to generate electricity. They spin magnets over electrical conductors, generating current. You can imagine the Earth's electrical field lines as long rubber exercise bands under tension. If you pull the band and let it go, it snaps back into position, vibrating back and forth. A nuclear explosion forces the magnetic field lines out of position and then snap back into position like that rubber band. This generates current in conductors that run along the surface of the Earth such as power lines, telecommunication lines, pipelines, and railroad tracks, building up voltage for every meter or kilometer of conductor length and, within certain limits, the longer the conductor is, the greater the voltage that builds up. Because the conductors run along the surface of the Earth and the magnetic field lines circle the Earth, power lines are perfectly polarized to pick up this signal like an antenna. This is an imperfect analogy for one of the effects caused by HEMP.

When Russia did HEMP tests in Kazakhstan, the voltage in telecom wires was so high, that it burned right through the wires, and they disconnected from telephone poles. All that voltage that builds up in the power lines damages electrical transformers in the electrical grid. The very large transformers (VLTs) that step-up power for transmission over long distances and then step it back down to voltages usable

by neighborhood substations, are custom built. They contain tons of rare earth metals and are shipped by sea from China. China produces around 70 percent of the world's rare earth metals and makes most of the very large transformers in our electrical grid. It can take years to design, build and ship them, but if China is at war with us, they probably won't be in any hurry to replace them. China holds nearly all the cards in this game and is very aware that they do. They have even threatened a HEMP strike in the past.

The Rare Earth Metals Problem

A short time ago, China produces over 90 percent of the world's rare earth metals. They now produce about 70% of them because the U.S. has realized how vulnerable we are and has upped our production to about 15%. Although China reigns supreme if their production, rare earth metals do not only occur in China. In fact, rare earth metals are somewhat evenly distributed over the surface of the Earth. It's that, until very recently, there was so much red tape to mine them and process them in the United States.

Because of environmental restrictions in the U.S., the rare earth metals we did produce, were put on ships (that spew pollution, ram whales, and chop up dolphins their giant propellers, the whole way over to the other side of the planet) which shipped them to China to be processed there, not because it does any less damage to the Earth when the processing happens outside the U.S.A. (because the damage would be less if it was done here because of strict adherence to environmental guidelines), but because it's cheaper and because the "environmental" lobby wouldn't let it happen here. Then the rare earth metals were used to build the very large transformers we needed for our grid. Each one custom designed and built and sold back to the U.S.A. at an enormous profit, put back on another ship and shipped back to the other side of the planet (again, burning fossil fuels spewing carbon into the atmosphere and ocean and killing marine life the whole

way), and then shipped by truck to the destination where they will be installed. And the environmentalists patted themselves on the back because they did many times more damage to the Earth, but most of it happened outside the U.S., so it was all good.

Now, politicians are attempting to reverse the decades of damage done by a combination of liberal policies and corporate hunger for short-term economic gain and are scrambling to fix the rare earth metals disparity. One side is doing it because we are on the verge of war with China, and the other is doing it because they need rare earth metals for batteries for electric cars, green energy. Despite President Trump's executive order Coordinating Resilience Against Electromagnetic Pulses, the DOE and DHS have done virtually nothing to harden the U.S. electrical grid against HEMP or to prepare the population for war in case China pulls the trigger. While they have engaged China on the subject of protecting our supply chain for advanced semiconductor chips made in Taiwan, regarding the HEMP threat, the current administration is asleep at the wheel.

Should we Worry about a Swarm of HEMP Balloons?

In short, no, probably not, at least not one right after the other in the same region. The reason is that once the Compton Effect is triggered, that area of the atmosphere is polarized, and another nuclear detonation would not yield the same effect until more high energy electrons can build up again. I do not know precisely how long that will take, but it would certainly take at least days, so there wouldn't be any point is detonating multiple weapons one right after the other. For a second weapon to have to be in another region of the atmosphere. The altitude of the burst would affect the size the area of the atmosphere affected, so at altitude reachable by a balloon.

What About Satellites?

In my opinion, a satellite launched HEMP attack is by far the greater threat. Even North Korea could pull it off and China, Russia, and North Korea could have HEMP weapons in orbit the pass over the north-central U.S. on a daily basis.

Unless we had advance warning, we have little means of preventing such an attack, and as long as such a satellite remains in orbit, we have limited means for determining the payload, which would surely be shielded. Satellites must be heavily shielded against electromagnetic threats to survive solar weather. Several countries have anti-satellite missiles and the U.S. and Russia have researched the use of lasers, but if any country starts shooting down satellites, low Earth orbit could become unusable because collisions with debris could create debris faster than atmospheric drag would cause it fall to Earth, a syndrome known as the Kessler Syndrome or Kessler Effect.