DEPARTMENT OF HOMELAND SECURITY

DHS Electromagnetic Pulse (EMP) Protection and Restoration Guidelines for Equipment and Facilities

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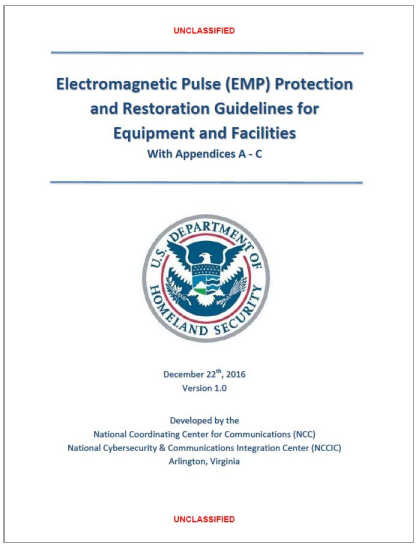
The following guidelines were obtained from the website of the Infragard EMP Resource Center.

Electromagnetic Pulse (EMP) Protection and Restoration Guidelines for Equipment and Facilities With Appendices A - D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Electromagnetic Pulse (EMP) Protection and Restoration Guidelines for Equipment and Facilities
With Appendices A - C

December 22th, 2016
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Developed by the
National Coordinating Center for Communications (NCC)
National Cybersecurity & Communications Integration Center (NCCIC)
Arlington, Virginia

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This document provides recommendations for protecting and restoring critical electronic equipment, facilities and communications/data centers from:

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(1) High Altitude EMP (HEMP)
(2) Surface-burst Source Region EMP (SREMP) fields propagating outside of the radiation region
(3) Currents induced on undersea cables and long lines by solar storm generated geomagnetic disturbances (GMDs)
(4) Intentional Electromagnetic Interference (IEMI) from nearby sources such as Electromagnetic (EM) weapons (also known as Radio Frequency (RF) weapons).

Collectively, these will be called by a general term in this document: “EMP”. However, it should be recognized that nearly all of the protection recommended in this document is for the frequency range above 10 kHz, which is the frequency range for E1 HEMP, SREMP and IEMI. A presentation describing the background, characteristics and effects of EMP is included in the Appendices to this document.

There are four DHS EMP Protection Levels defined herein, as outlined in Table 1. These levels were initially developed for use by the federal continuity community, such as for the Continuity Communications Managers Group, but are also applicable to any organization that desires to protect its equipment, facilities, and services against EMP threats.

In addition to making recommendations on how to physically protect electronic equipment from EMP, this guide provides guidance on how to help ensure communications and information systems (and their supported missions) can continue to function (or be rapidly restored) after one or more EMP events. Hence, Appendix C contains information on priority service programs (like GETS, WPS, and TSP) as well as on the SHARES alternate communications service that can be used to support critical missions and to facilitate and coordinate restoration activities.

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Table 1. Four DHS EMP Protection Levels for equipment and facilities

Level 1: Low $s	Level 2: Hours	Level 3: Minutes	Level 4: Seconds
Use procedures & “low cost” best practices to mitigate EMP effects. Unplug power & data lines into spare/backup equipment. Turn off equipment that cannot be unplugged & that is not immediately needed for mission support. Store one week of food, water, & critical supplies for personnel. Wrap spare electronics with aluminum foil or put in Faraday containers. Have backup power that is not connected to the grid (generators, solar panels, etc.) with 1 week of on-site fuel (like propane/diesel). Use GETS, WPS, & TSP services; join SHARES if applicable (see Appendix C for more information).	In addition to Level 1, use EMP rated surge protection devices (SPDs) on power cords, antenna & data cables & have EMP protected back-up power. Use SPDs (1 nanosecond or better response time) to protect critical equipment. Use true on-line/double-conversion uninterruptible power supplies (UPS). Use fiber optic cables (with no metal); otherwise use shielded cables and ferrites/SPDs. Shielded racks/rooms &/or facilities may be more cost-effective than hardening numerous cables. Use EMP protected HF radio voice/email if need long-haul nets. Suppress EMP fires.	In addition to Level 2, use civil EMP protection standards (like IEC SC 77C). Use EMP shielded racks/rooms and/or facilities to protect critical computers, data centers, phone switches, industrial & substation controls & other electronics. Shielding should be 30-80 dB of protection thru 10 GHz. Use SPDs to protect equipment outside of shielded areas. Can use single-door EMP-safe entryways. Use ITU & IEC EMP standards for design guidance and testing. Have 30 days of back-up power with on-site fuel (or via assured service agreement with EMP resilient refuelers). Use EMP protected HF radio & satellite voice/data nets if need long-range links to support missions.	Use Military EMP Standards (MIL-STD-188-125-1 & MIL-HDBK-423), and 80+ dB hardening thru 10 GHz. Use EMP/RFW shielding in rooms, racks, and/or buildings to protect critical equipment. Use EMP SPDs to protect equipment outside of shielded areas. Use EMP protected double-door entryways. Have 30+ days of supplies & EMP protected back-up power (to include on-site fuel) for critical systems. Don’t rely on commercial Internet, telephone, satellite, or radio nets that are not EMP protected for communications. Use EMP protected fiber, satellite, & radio links & Appendix B services

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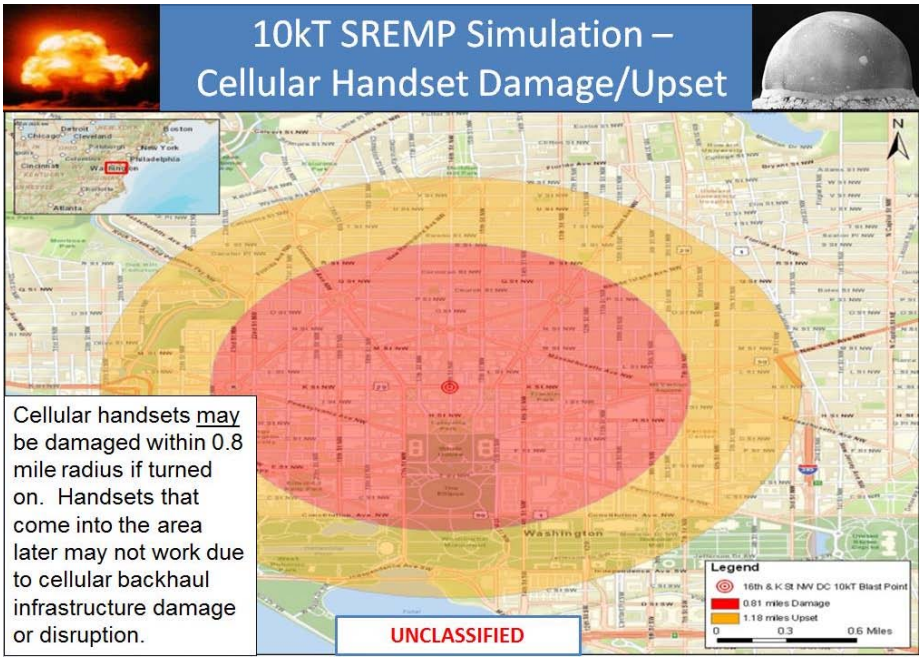

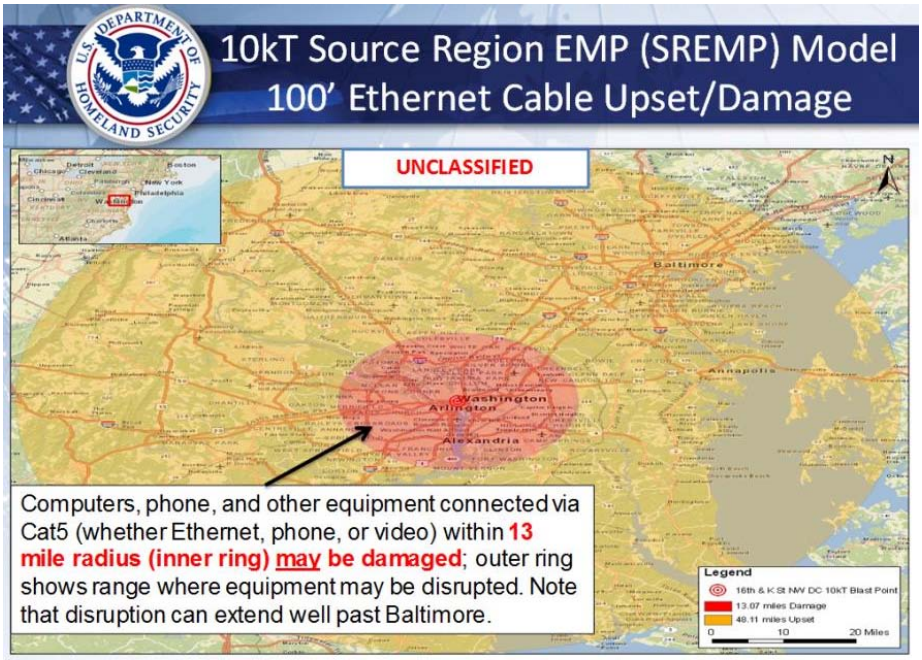

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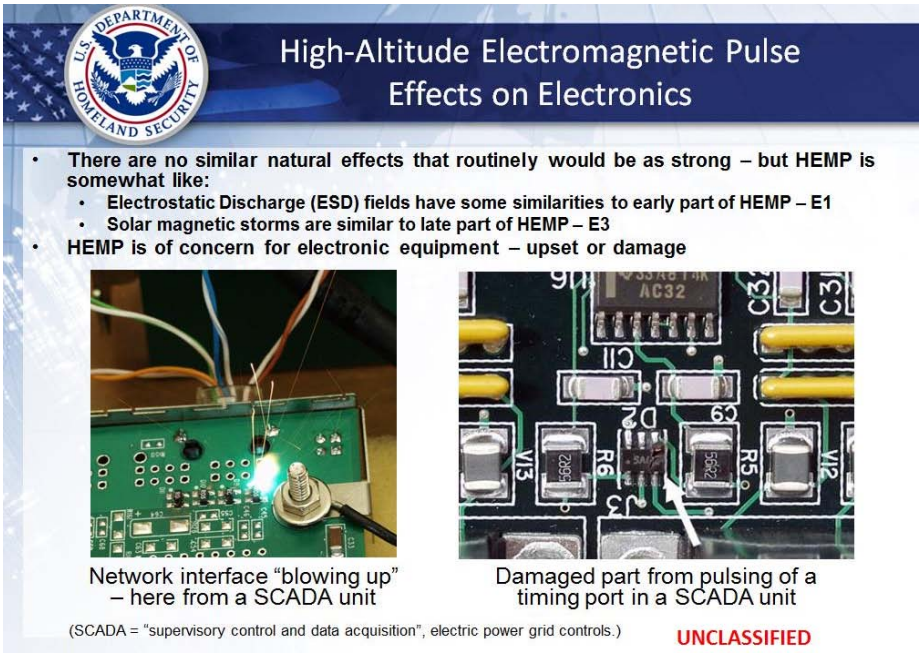

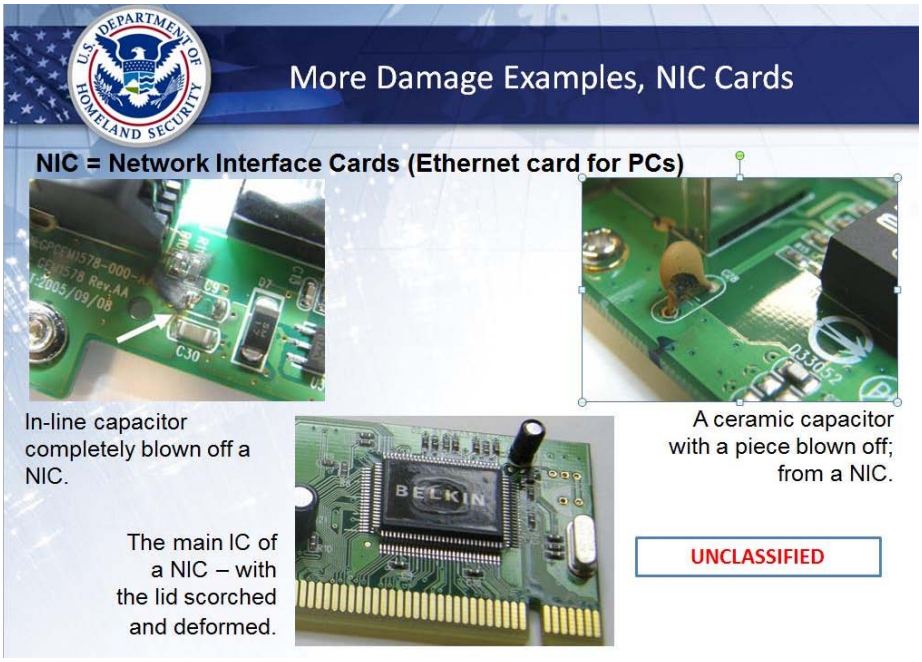

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