

THE PROBLEM

Electromagnetic pulse (EMP) and geomagnetic disturbance (GMD) events pose significant threats to the nation's critical infrastructure. Gaps exist in hardening the nation's infrastructure (e.g., the power grid and communication systems) against these events. Given the wide-ranging nature of the threat posed by an EMP or GMD event, cross-sector risk assessment, prioritization, and modeling of potential impacts of EMP and GMD events must be defined and verified. Furthermore, the Department of Homeland Security (DHS) is directed to conduct research and development to better understand impacts of EMP and GMD events and develop technologies and guidelines to enhance and protect critical infrastructure per statutory requirements in the National Defense Authorization Act for Fiscal Year 2020 (FY20), Executive Order 13865, and 6 U.S. Code §195f.

S&T'S EMP AND GMD PROJECT

The DHS Science and Technology Directorate (S&T) EMP and GMD Resilience Project was initiated to identify and prioritize elements of the communications sector (e.g., long-term evolution networks and emergency public safety communications), based on the statutory requirements. The project comprises separate activities that will identify the EMP/GMD event risks in critical infrastructure systems or components via modeling and testing.

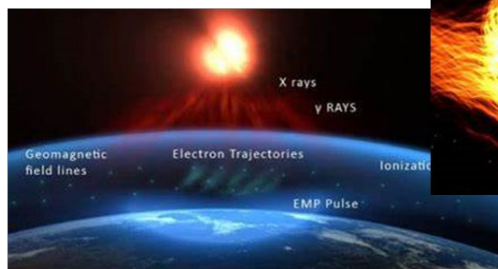
The project will analyze the results of the testing to identify potential mitigation strategies. The potential mitigation strategies will be modeled and tested to verify their ability to protect applicable communications sector systems and components from EMP/GMD events.

PROJECT IMPACT

- This project will provide DHS, its Cybersecurity and Infrastructure Security Agency (CISA) Component, and critical infrastructure owners and operators actionable information to protect their systems against EMP/GMD events.
- The knowledge products generated will identify risks associated with key, critical infrastructure components, including emergency communications networks/components, and provide infrastructure owners and operators potential mitigation strategies to harden those systems against EMP/GMD threats.

Solar EMP (GMD)

High Altitude EMP (HEMP)



HEMP and GMD event examples

ACCOMPLISHMENTS TO DATE

- "Electromagnetic Pulse Mitigation: Best Practices for Critical Infrastructure Operators and Owners" knowledge product published (released jointly by S&T and CISA).
- Initial version of "Assessment of EMP and GMD Threats and Mitigations for Electrical-Utility Communication Systems" submitted by Sandia National Laboratories (SNL).
- "E1 HEMP Coupling Simulation Using SPICE Software" knowledge product completed.

UPCOMING MILESTONES

- Modeling and Simulation for EMP Risk Assessment and Mitigation Final Technical Report (Q4 FY24)
- Operability of Emergency Operations Centers through an EMP Event Final Mitigations Report (Q4 FY26)
- HEMP and GMD Communications Consequence Model Final Code and User Manual Delivery (Q4 FY27)

PERFORMERS/PARTNERS

- ISA, Washington, DC
- Department of Energy National Energy Technology Laboratory, Morgantown, WV
- Department of the Navy, Naval Surface Warfare Center, Indian Head, Port Hueneme, CA
- Electric Power Research Institute, Washington, DC
- Syncsis, Champaign, IL
- SNL, Albuquerque, NM