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Emergency Management Plan to Improve Resilience in the Transportation Sector to an EMP Attack

An emergency management plan was developed to increase resilience of transportation sector vehicles to an attack utilizing a nuclear WMD deployed 30-400 Km above the earth to generate an Electromagnetic Pulse (EMP). The recent FY2020 National Defense Authorization Act (NDAA) and March 2019 "Executive Order on Coordinating National Resilience to Electromagnetic Pulse" directed government agencies to investigate and implement measures to strengthen our critical infrastructure to become more resilient to an EMP attack. A threat assessment analysis was conducted for potential state actors and terrorist organization deployment scenarios. An engineering sub-systems and critical components reliability analysis was conducted to visualize critical electronics sub-systems and components, their respective potential failure modes, and proposed mitigation countermeasures. A hybrid emergency management / engineering failure modes & effects analysis (FMEA) template was created for the hazards risk analysis. A newly proposed comprehensive test plan was designed to enable a prioritized risk assessment for "electronics-heavy" modern vehicles at 200 KV/m optimized EMP levels. Plausible mitigation proposals developed for initial validation testing. Finally, an emergency management plan was proposed assuming a strategic retrofit of vehicles supporting delivery of emergency services and lifeline supplies to the public, and enhanced logistics systems to address non-retrofitted

vehicles repairs. The goal of the study was to provide a foundation for future funded projects that can be executed to yield a more resilient transportation sector infrastructure to an EMP attack consistent with the recent NOAA legislation and Presidential executive order.

Presentation Theme: The purpose of this study is to develop an emergency management plan that would include concepts that can be applied during the response phase and recovery phases, and plans for potential mitigation actions that can improve the resilience of transportation vehicles to a nuclear EMP attack that should minimize loss of life and disruption to our economy. The lessons learned from past research on this topic will be applied to potential mitigation action plan proposals for each transportation sector vehicles. The methodology is unique in that it will combine disciplines from both the engineering and emergency management disciplines utilizing a failure modes and effects analysis framework to define and prioritize the hazard risks, and the most cost effective mitigation measures that can be applied to improve resilience to the EMP national security threat.

Collaborators, Advisor(s) and Department(s) that assisted with this research:

Thesis Committee Members:

- Dr. Mariama Yakubu (UNH Emergency Management Thesis Advisor) – overall advisor for thesis work.
- Dr. Jeff Triestman (UNH National Security Department Graduate Program Director) – Threat assessment, EMP deployment scenarios, general comments.
- Mr. Matt Van Benschoten (VP Advanced Engineering, Roush Industries, Inc.) – comments on engineering mitigation approach for transportation sector vehicles.

- Dr. Ed Goldberg (Manager, Eversource Business Continuity, Disaster Recovery and Threat Assessment Eversource, Inc.) – Input on the overall threat; impact on the electric grid; comments on engineering mitigation approach.
- Mr. Wayne Sandford (UNH Emergency Management Program Director) – General comments, emergency management approach, and encouragement.

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