

# ***Electromagnetic Pulse (EMP) EPRI Project Update***

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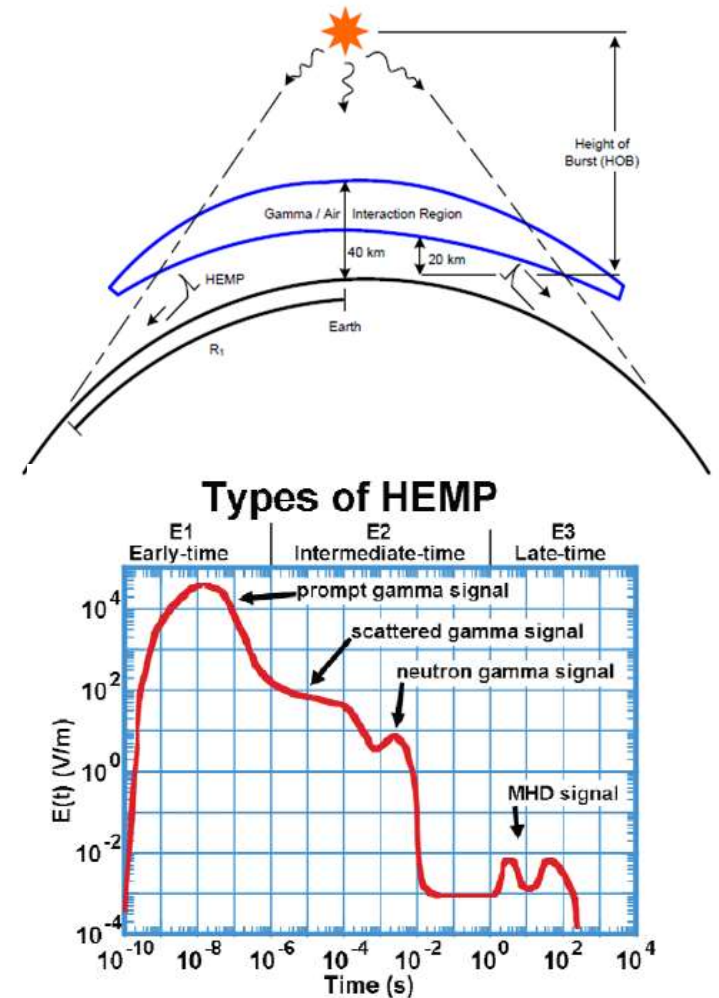
# Electric Power Research Institute





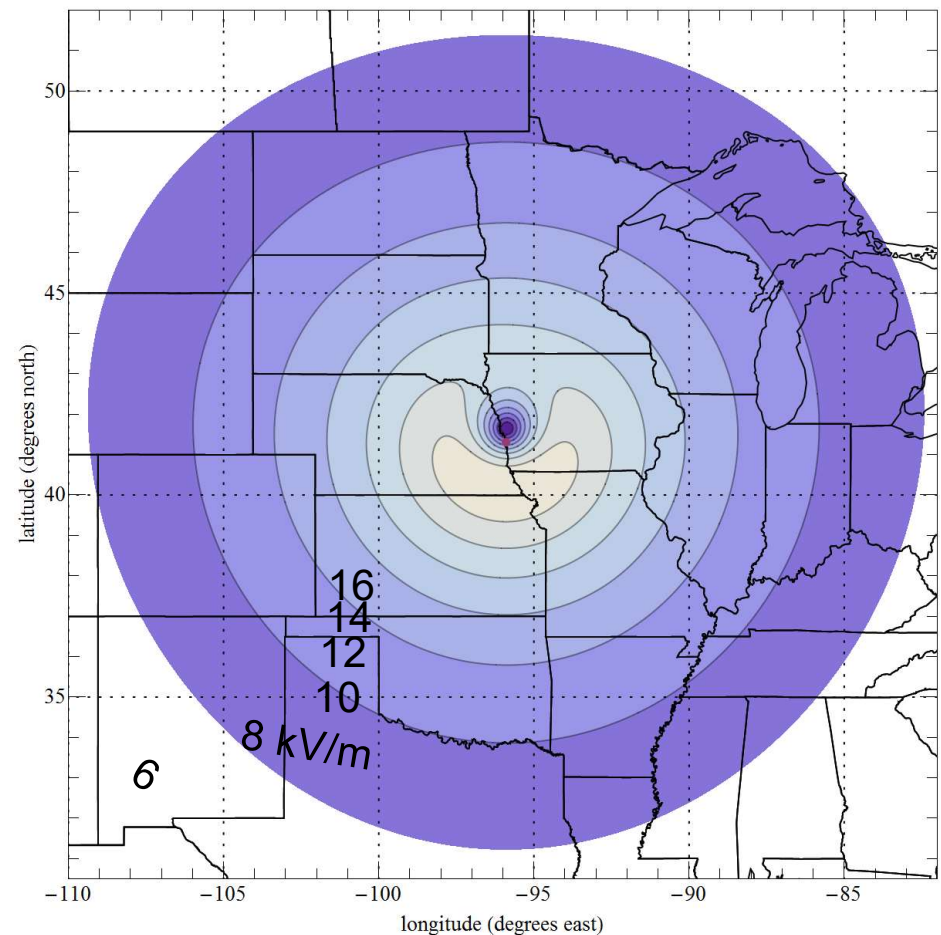
# Categorizing Electromagnetic Pulse (EMP)

- Intentional, man-made attack
  - **E1 – Very fast rise time**, may result in damage to electronic components either directly, or by coupling into the attached wires.
  - **E2 – Similar to lightning**, can result in damage to electronics and potential flashover of distribution class insulation.
  - **E3 – Long duration and low frequency**, similar to GMD, but EMP (E3) has two potential impacts; increased reactive power consumption and potential protection system misoperation as a result of harmonics.
- EMP can occur with little or no warning, most operational strategies are inapplicable.

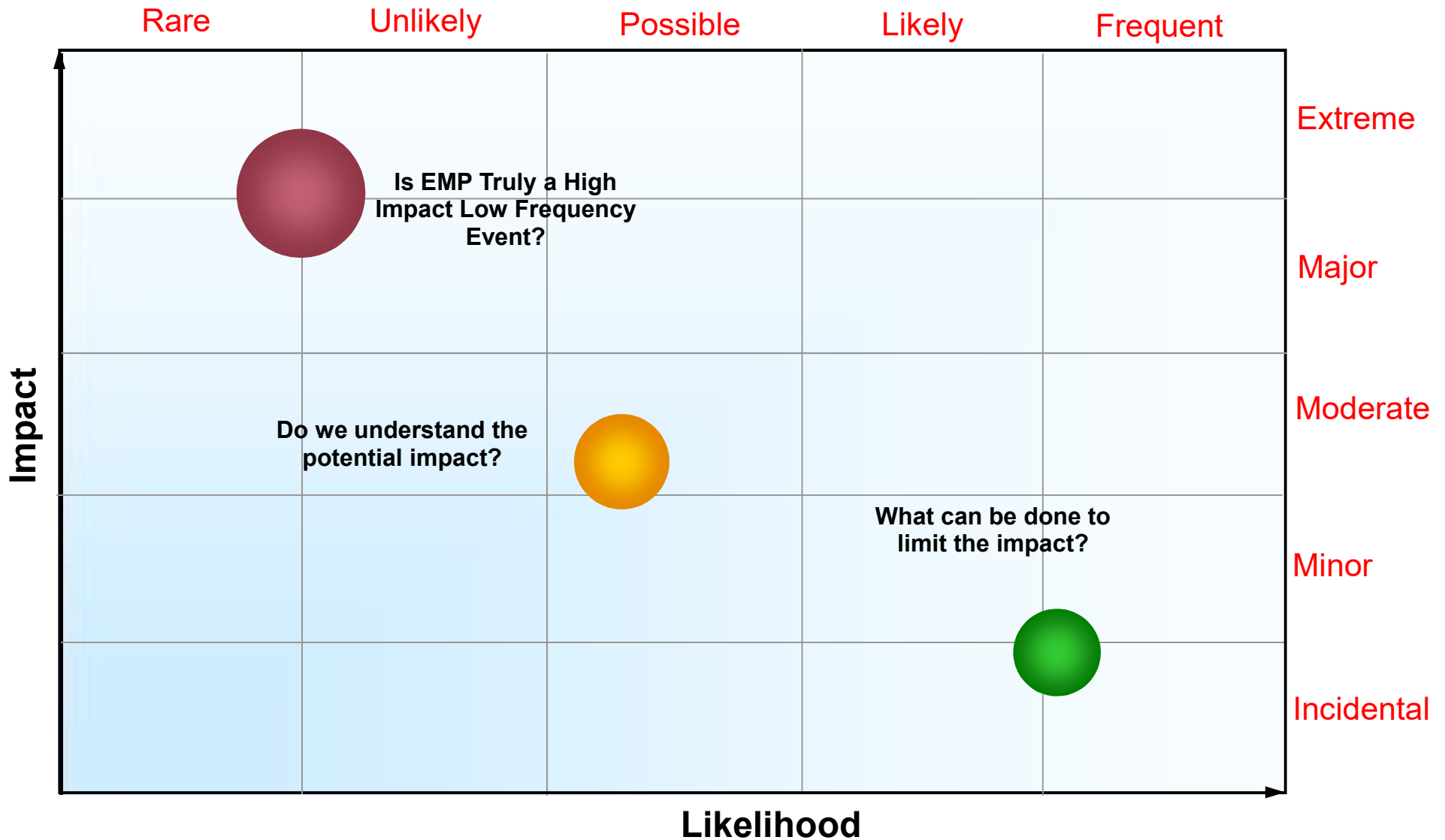


# High Altitude Burst Generated EMP (HEMP)

- The HEMP signal extends to the visual horizon as seen from the burst point
- A large device detonated at 400–500 km over central USA would affect all of the continental USA
- Effects depend on: altitude of the detonation, energy yield, gamma ray output, interactions with the earth's magnetic field, and electromagnetic shielding of targets



# Understanding Probability and Consequence



# EMP Project Plan – Initial Focus on Transmission





# Together...Shaping the Future of Electricity

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