Solar Power Plant and Substation Design Project

IOWA STATE UNIVERSITY and BLACK AND VEATCH

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IOWA STATE UNIVERSITY

Safety Moment

Ladders

- Statistics:
  - Annually 90,000 emergency room visits from ladder-related injuries
    - 50% of these occur while carrying items
    - Most commonly some sort of fracture -- 32%
  - 50% increase over past 10 years
  - 15% of all occupational deaths
- Safety Precautions:
  - Selecting proper type of ladder, Proper Placement
  - If the ladder is in disrepair, do not use it
  - 3 points of contact while using ladder, do not
    - I.e. 2 feet and one hand
  - Do not use a ladder if you are experiencing:
    - Dizziness
    - Extreme Fatigue

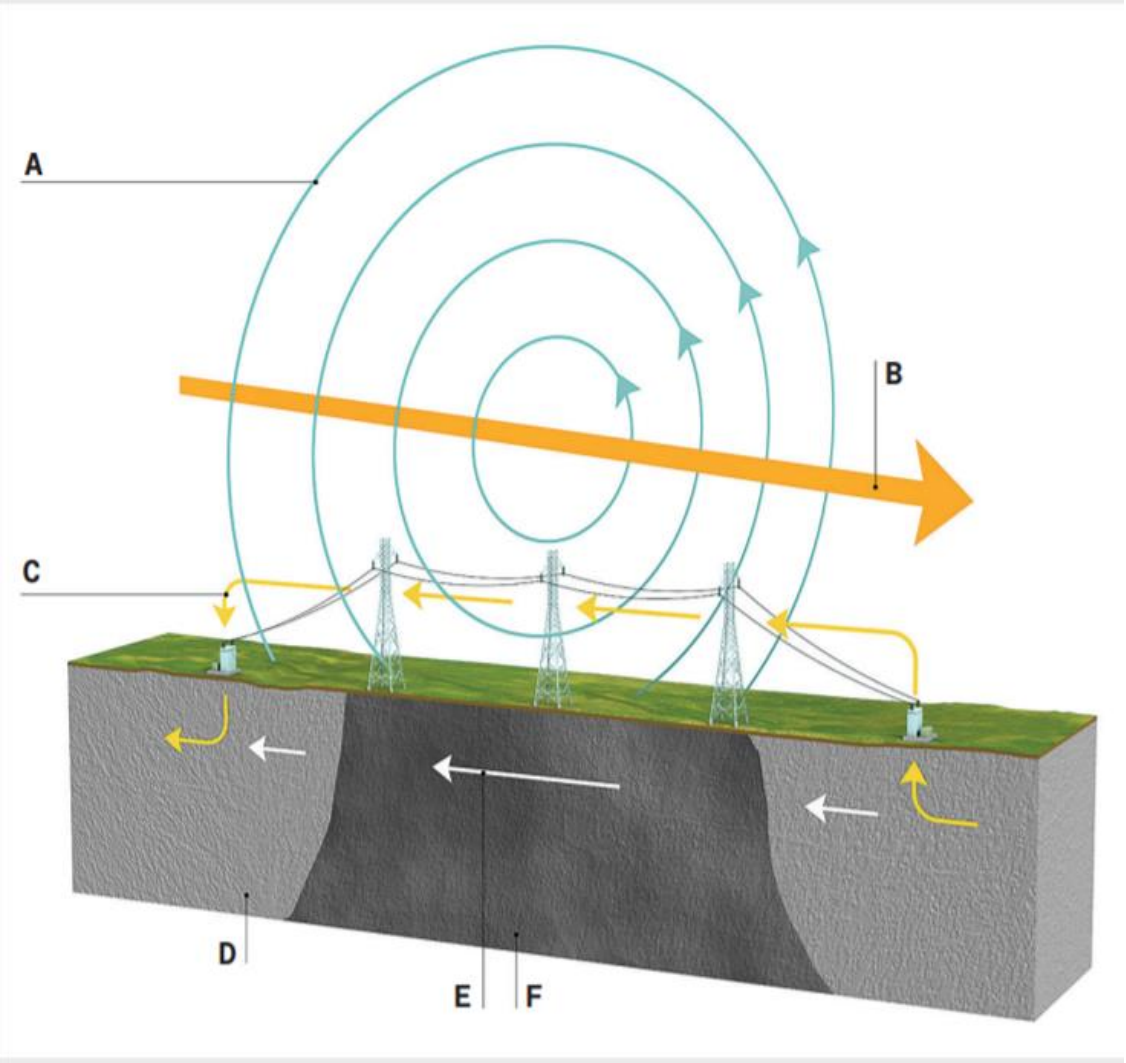
https://safetpros.com/construction-ladder-safety/
https://safety.nmsu.edu/occupational-safety/industrial-safety/fall-protection/ladder-safety/

Electric Grid Vulnerabilities to EMP Attack

From *IEEE Spectrum* October 2021, "One Atmospheric Nuclear Explosion Could Cripple the Entire Grid"

Mechanism:

1. Nuclear explosion in upper atmosphere or space pushes current of ions and electrons through atmosphere**(B)** produces magnetic field**(A)**. Currents are induced in the earth
2. Regions of high conductivity**(D)** carry more current than low conductivity regions**(F)**
3. Large E field in these regions **(E)** coax current out of the ground and through the wires of power lines**(C)**
4. Result is a potentially ground-crippling power surges



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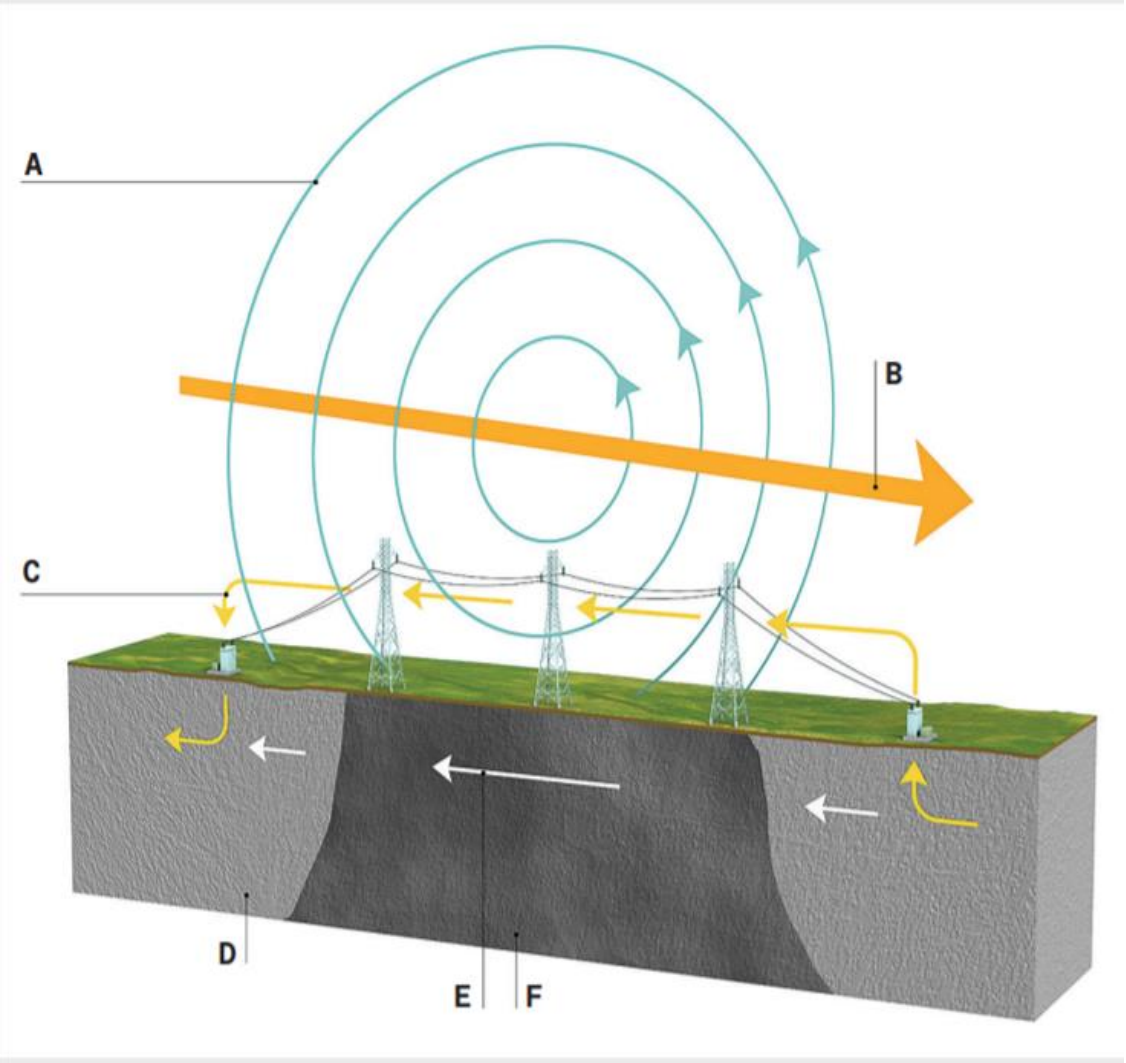
High altitude EMP 3 Waveforms:

1. E1 - High-frequency pulse disruptive to consumer electronics
2. E2 - Behaves like lightning, Electric Grid is mostly protected
3. E3 - Low amplitude part of EMP signal, lasting 0.1 to several hundred seconds

Conclusions:

Research team is calling for USGS to analyze surface impedance across regions of US to assess EMP threats and prioritize improvements



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