

# Electrical Power Outage Response Planning

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# History

- Low probability - high impact events
- Notable Brookhaven events over the past 35 years
  - Northeast blackouts of 1977 & 2003 (regional grid)
  - 1990's - Counterpoise unearthed during vegetation clearing activities (site wide outage)
  - Hurricane Gloria and Irene local outages to the Sewage Treatment Plant complex
  - Phone / data switch planned outage 2012

# Vulnerability assessment

- Overhead transmission lines are vulnerable
  - Tree and underbrush encroachment
  - High wind events (Island weather)
  - Brush fires
    - INL
    - LANL
  - Ice accretion
  - Transmission pole impact
  - Sabotage
  - Geomagnetic storm / EMP





# Assumptions

- Loss of power > 1 hour
- Declared Operational Emergency
- BNL is an electrical restoration priority
- Only generator equipped buildings may have power
- Cell phones lines may be overwhelmed
- UPS reserve power is limited
- Safety may be compromised after 1 hour
  - no lights, phones, data, air quality in labs, etc.

# Defined Critical Infrastructure

- Energy and Utilities
  - Potable Water, Steam, Chilled Water, Sewage Treatment
- Laboratory Protection
  - Fire-Rescue, Police, EOC, MET Tower, Main Gate Booth
- Shelter & Food (Berkner Hall)
- Select IT Facilities (Server farm, switches)
- Control Rooms for C-A and PSD (LHe)
- BLAF
- Biology cold rooms and freezers

# Defined Non-Critical Infrastructure

- Administrative offices and functions
- Experimental areas
- Scientific data processing and storage
- All other non-critical functions
  - Snow day shutdown acid test
- Unique situations
  - Political heavyweights
  - Traffic control devices, fuel pumps, etc.

# Generator Deficiencies

- Not all critical infrastructure is on emergency power
  - PBX phone switches
  - Network aggregation points
    - CWF Control rooms
  - Fuel stations
  - Chilled Water Facility
    - Computer Network Room HVAC
  - Helium compressors
  - Tower / Smoke stack lighting (airfield nearby)
- Genset auto start / power transfer failure

# Concerns

- Key infrastructure is aging
  - Unique electrical distribution
    - WW II era 2400 volt switchgear
    - 13.8 KV in core
    - Multi-voltage renovated buildings
- Gentle restoration of power
  - Tripped breakers
  - Auto-start equipment
- Alerting (messaging) time

# Voice & Data Services

- UPS capacity < generator setup time
- Chilled water based HVAC
- Unpowered aggregation points
- PSAP Ext. 2222 / 911 service interruption

# Timeline

- Immediate losses
  - Interior lighting
  - Elevators (except 400/735)
  - Traffic lights
  - Computers and network devices not on UPS
  - Particle Accelerators
  - Chilled Water Facility
  - Steam valves and condensate pumps
  - Sewage lift pumps
  - Site sirens
  - Stack lighting
- 200+ FACP power loss alarm simultaneously

# Timeline

- Less than 1 hour
  - Tone Alert Radios
  - Data Network (UPS exhausted and overheat)
  - Reduced air quality
- Less than 2 hours
  - Emergency lighting - 90 minutes
  - Telephone / data nodes & VoIP phones
  - Helium loss begins
- 4 hours - Local cell tower service interruptions
- 24 hours - FACP

# Questions?

