

***Lake Wylie Pilot Study: A Pathfinder Guide for
South and North Carolina—and National—
Efforts to Protect the Electric Grid against the
Existential EMP Threat***

By

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See www.highfrontier.org for more information.

Rock Hill City Operations Center

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***For more information on the threat and how to get involved to protect
your family and friends, see www.highfrontier.org and its links to
others who are already engaged in this important fight.***

Electromagnetic Pulse (EMP) Protection: General Comments

- *Need Viable Response to EMP*

- *If protected from the Manmade Threat, then protected from a GMD (Geomagnetic Disturbance); but the converse is not true!*

- *How Best to Respond?*

- *Harden Critical Infrastructure to High Altitude EMP Threat*
- *Develop and Maintain Rigorous Hardness Surveillance Program*



- *We know how to do this—affordably! Based on how we have done it for decades to protect our most important military infrastructure.*

- *Learned during Cold War but not applied to critical civil infrastructure*
- *The Carolinas and the National Guard can make major contributions*

The Lake Wylie Pilot Study used Cold-War Lessons “from the bottom-up” to Recommend Affordable Protection

Participation of Local, County & State Officials & Citizens is Essential to Develop a Viable Solution!

Ted Koppel captured the essence of the problem and the challenge to solving it, whether the threat to the Grid comes from Cyber, Physical or EMP attacks on pages 231-2 of his 2016 book, Lights Out:

Given the Federal-State-Local “chain-of-command issues” and the legacy of posse comitatus legal constraints, he emphasized that the burden for protecting the average citizen will fall on the local community and its preparedness.

Specifically, he argued:

“In anticipating the event of a power grid going down . . . the process will have to be streamlined and rehearsed. During the time that it takes to alert and dispatch military personnel and to mobilize the National Guard, local and state police will need to immediately secure the stores and warehouses containing essential supplies that will otherwise be stripped bare in a matter of hours. The authority exists, but without the regular conduct of combined exercises specifically designed to respond to the aftermath of a grid going down, critical supplies will be gone before law enforcement even arrives on the scene . . .”

***Koppel echoed my earlier perspective in approaching Clemson’s EE Chairman for contacts with his Duke Energy Graduates—
leading to our cooperative Lake Wylie effort***

Our Lake Wylie Pilot Study supports President Trump's Emphasis on Protecting against the Existential EMP Threat

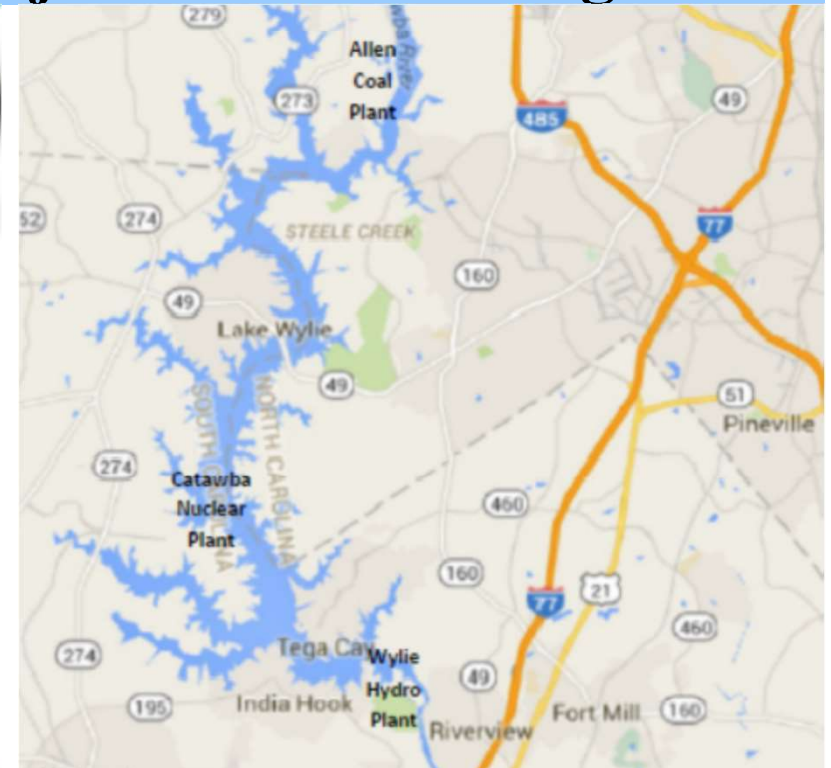
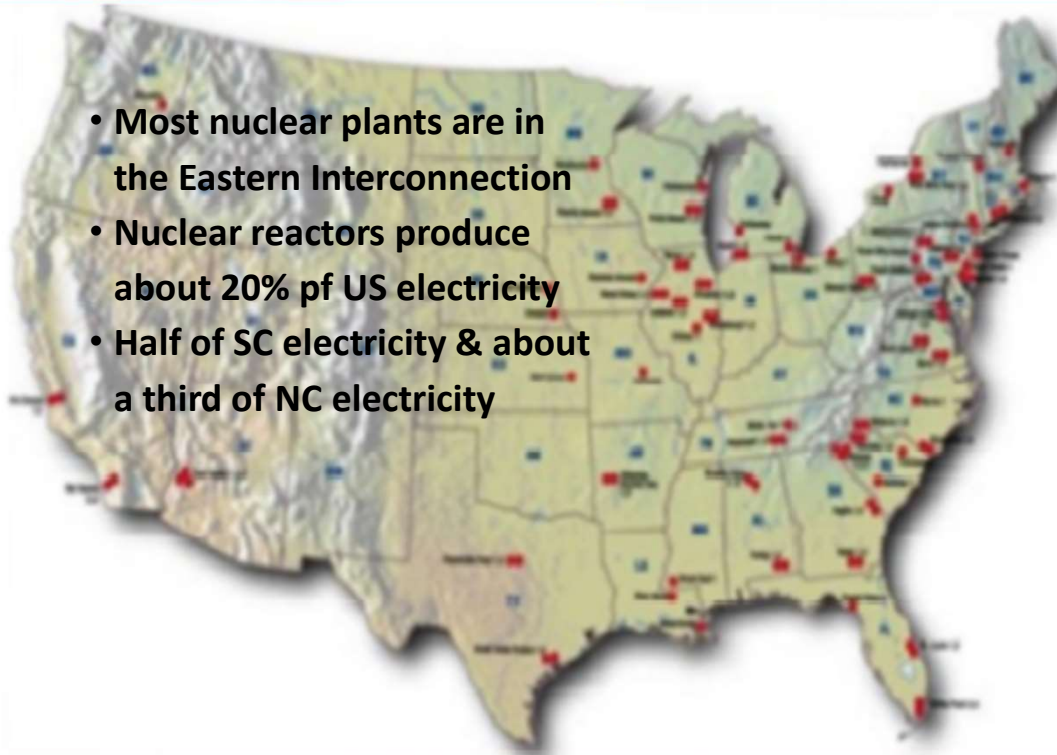
“Critical infrastructure keeps our food fresh, our houses warm, our trade flowing, and our citizens productive and safe. The vulnerability of U.S. critical infrastructure to cyber, physical, and electromagnetic attacks means that adversaries could disrupt military command and control, banking and financial operations, the electrical grid, and means of communication.”

President Donald J. Trump

December 18, 2017 National Security Policy

His March 26, 2019 Executive Order directed the Federal Government to develop an integrated plan to counter the existential EMP threat, and Wisconsin Senator Ron Johnson's Amendment to the 2020 National Defense Authorization Act made it the “law of the land.”

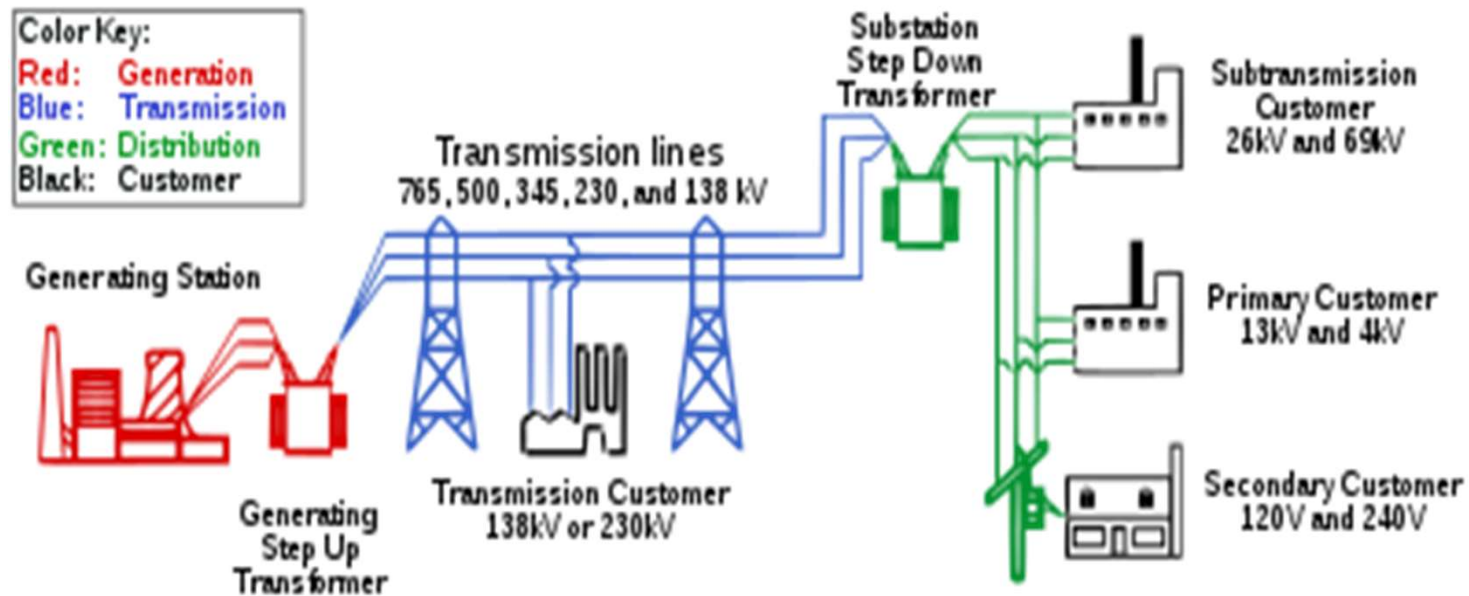
Lake Wylie Pilot Study pilot study seeks to assure viable power plant and transmission and distribution grid operations through & after a major attack on the grid!



- **Priorities:** Reactor Safety; Water-Wastewater Infrastructure; Hospitals; Emergency Management (Can't protect everything with confidence—these deserve top concern.)
- **Key Issues:** Communications; Transportation; Architecture; Planning; Preparation; Integration; Execution; Assessment; Testing; Upgrading; Hardness Surveillance; Funds

Studies show Prepared Local & State Responders are key to assuring viable recovery from a long duration Grid Blackout

Components of the Nation's Electric Power Grid



- **Bulk Power Grid = Generation Station (Red) + Transmission Lines (Blue)**—regulated by Federal Regulatory Bodies (NERC/FERC)
- **Distribution Grid (Green)** delivers electricity to customers, regulated by 50 state public regulatory commissions (PUCs), composes ~90% of the national grid and ~70% of the total investment in combined Transmission and Distribution Lines
- **Transformers are major components**—never yet tested; SRNL test of Duke provided transformer promises to be very important—awaiting DOE Funding

Lake Wylie Pilot Study so far has focused on Distribution Grid, plan with Duke Energy to move to their Bulk Power Grid components in the near future.

Dr. George Baker assessed Key Rock Hill/York County Infrastructure and Estimated Hardening Costs

Direct¹ System Effects Vs. Threat

System Type		EMP/E3 or GMD Vulnerability	EMP/E1 Vulnerability
Electric Power	Grid High Voltage Transmission/ Distribution Equipment	3	3
	Electric Power Grid Electronic Control, Monitor Systems	1*	3
Telecom/ Internet	Telecom/Internet Communication & Data Center Electronics	1*	3
	Telecom/Internet Long-Haul Lines, Line Drivers & Repeaters	3	3
Common Electronics	Ubiquitous SCADA, Process Control Systems	1*	3
	Vehicles, Ships, Aircraft Electronics	0	2
	Hand-held Electronics	0	2

¹As opposed to cascading
*Vulnerable to transformer saturation harmonics

3 – High Vuln.
 2 – Medium Vuln.
 1 – Low Vuln.
 0 – No Vuln.

Systems Addressed

- Hardening Top Priority Distribution Grid elements
 - Duke Energy responsible for Hardening Generation Plants, Transmission Grid, and some Distribution Grid
 - Most York County Distribution Grid is maintained by Rock Hill Municipal Utility Company and York County Electric Company
- Water/Wastewater – next in importance to electricity, with emphasis on intake and treatment plants and their connectivity to support the General population
- Hospital and medical support infrastructure
- Emergency Communications and links to Columbia and other South Carolina counties to support Emergency Management

Rock Hill Utility & York County Co-op Leaders and State Emergency Managers opened their Distribution Grid critical infrastructure for EMP Vulnerability assessment

Baker EMP Protection Cost Matrix Summary

Locale	Facility	Cost
CITY OF ROCK HILL	Water Intake Plant	\$ 790K
	Water Filter Plant	\$2730K
	Wastewater Treatment Plant	\$3500K
	Piedmont Hospital	\$3230K
	911 Emergency Center	\$1170K
	City Operations Dispatch Center	\$ 640K
	Law Center- Police/Courthouse	\$ 850K
	Rock Hill Emergency TV- FM Broadcast Station, WNSC	\$1260K
	Distribution Substations, 5 critical	\$1350K
	EMP Protection Cost Estimate TOTAL	\$15,520K

Locale	Facility	Cost
YORK COUNTY	Distribution Substations, 6 critical	\$2650K
	Pump Stations, 3 total	\$ 18K
YORK CITY	Pump Station	\$ 6K
	Water And Sewer Plant	\$ 640K
FORT MILL	Wastewater Treatment Plant	\$ 760K
YORK COUNTY/ ROCK HILL	800 MHz Emergency Radio Stations, 10 total	\$1660K
YORK COUNTY	SMALL WATER PLANTS, PUMP STATIONS	\$ 500
	EMP Protection Cost Estimate TOTAL	\$6240K

**TOTAL COST ESTIMATE
ROCK HILL + YORK COUNTY SITES
= \$ 21.8 M**

This ~\$22 million one-time cost estimate amounts to ~\$100 per York County citizen—less than an average York County family’s monthly health insurance cost

Baker's Summary Comments on Assessment and Hardening Cost Estimates for York County

Summary

- Scenarios exist where multi-state and even national scale and long term grid outages are possible – physical, cyber, or EMP attacks can precipitate such blackouts.
- A defense-conservative approach to infrastructure assurance necessitates built-in protection of power grid and critical infrastructures
- A major impediment to national infrastructure EMP protection has been cost uncertainties
- Lake Wylie demonstration project is first comprehensive effort to quantify costs.
 - Effort not possible without approval and assistance from public officials and system engineers
 - We have developed and exercised a cost estimate approach for local community infrastructures
 - Approach is based on DoD's low risk approach embodied in MIL-STD-188-125
 - Approach is scalable and portable to other locales
- Based on costs of prior EMP protection projects, hardening of minimum essential infrastructures in Rock Hill and York County would cost approximately \$22M.
- Turn-key contractors exist to implement EMP protection on complete facilities



We need no more studies to affordably protect the grid! We just should export the Lake Wylie Lessons-Learned! The key question is: “How?”

Propose Lake Wylie Pilot Study extensions to fit NDAA(2020) and NDAA(2019) Provisions

- *NDAA(2020) Section 1740 Section (e) and (f) call for Pilot Tests by DHS and DoD (in coordination and with others) to develop and implement Pilot Tests to evaluate EMP hardening approaches for (1) DHS for the most vulnerable critical infrastructure systems and networks and assets and (2) for a strategic military system, including its critical supporting infrastructure.*
- *NDAA(2020) Section 1720 directs the Chief of the National Guard, working with the NORTHCOM Commander, to report on an assessment of each state's resources and ability, among other things, to respond to a "homeland defense or security incident, with a particular focus" on a multi-state EMP event.*
- *NDAA(2019) Section 1651 calls for a Pilot Program to aid Army National Guard training, especially with regard to the Cyber treat and in conjunction with Army Cyber Command. Section 2861 supports funding for protecting "community infrastructure" in rural areas surrounding a base—most pertinent potentially for the 263rd AAMDC in Anderson, SC.*

My proposals for extending the Lake Wylie Pilot Study are formed consistent with these provisions, especially in assuring the viability of the 263rd AAMDC and its support to NORTHCOM, Army North (and its associated proposed San Antonio Pilot Study) and First Air Force.

The South Carolina National Guard has an Important National Role—including the 263rd Army Air and Missile Defense Command (AAMDC)

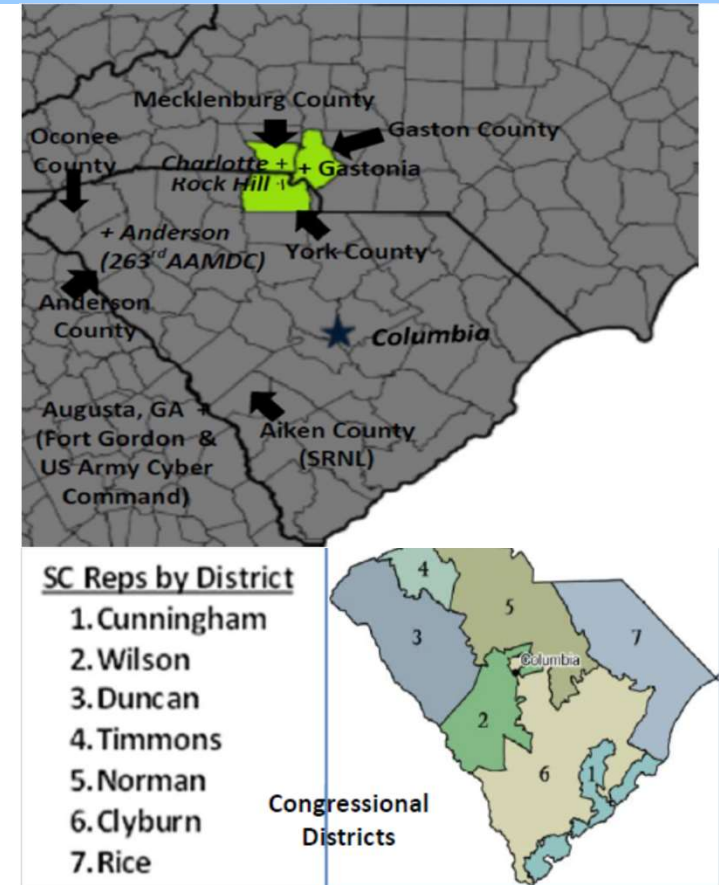
- ***In Anderson, SC, manned and led by SC National Guard personnel—a direct report to SC Adjutant General, under the SC Governor***
- ***Already linked to critically important elements of our Homeland Defense via:***
 - ***Commander Northern Command in Colorado Springs, CO***
 - ***Commander First Air Force on Tyndall AFB in Panama City, FL***
 - ***Commander Fifth Army (Army North) on Ft. Sam Houston in San Antonio, TX***
- ***DoD should maintain hardened connections, assuring post-EMP event communications***
 - ***Extend Lessons-Learned from Lake Wylie Pilot Study to Oconee and Anderson Counties, SC with the same partnership between Duke and Utility and Co-op companies***
- ***ASAP extend throughout SC , NC & beyond***
 - ***Several important Military Bases can be linked—e.g., Shaw AFB, Ft. Jackson, Ft. Gordon (Army Cyber Command)***



Including the 263rd AAMDC in extensions of our Lake Wylie Pilot Study will assure involvement across the nation—responsive to NDAA(2019) & NDAA(2020) directives

Game plan for Extending Lake Wylie Pilot Study.

- *Obtain funding to validate Rock Hill/York County findings*
 - *Discuss lessons-learned throughout SC Piedmont Region via PMPA and throughout SC via SCAMPS/ECSC*
- *Repeat Lake Wylie in Anderson & Oconee Counties*
 - *Duke Oconee Nuclear Plant, Transmission + Distribution Grid operated by Duke and Blue Ridge Electric Co-op.*
 - *Assure viability of 263rd AAMDC and associated linkage to other important headquarters, including NORTHCOM, First AF (in Panama City, FL) & Fifth Army (in San Antonio, TX)*
- *Extend Lessons-Learned in SC and NC*
 - *In North Carolina, first to Gaston County which mirrors York County; then Mecklenburg County, home of Duke's Corporate Headquarters—and then to other neighboring Counties*
 - *In SC beyond Oconee and Anderson Counties to Aiken County which is a neighbor to SRNL and Army Cyber Command Headquarters on Ft. Gordon, Augusta, GA*
- *Export throughout the nation*



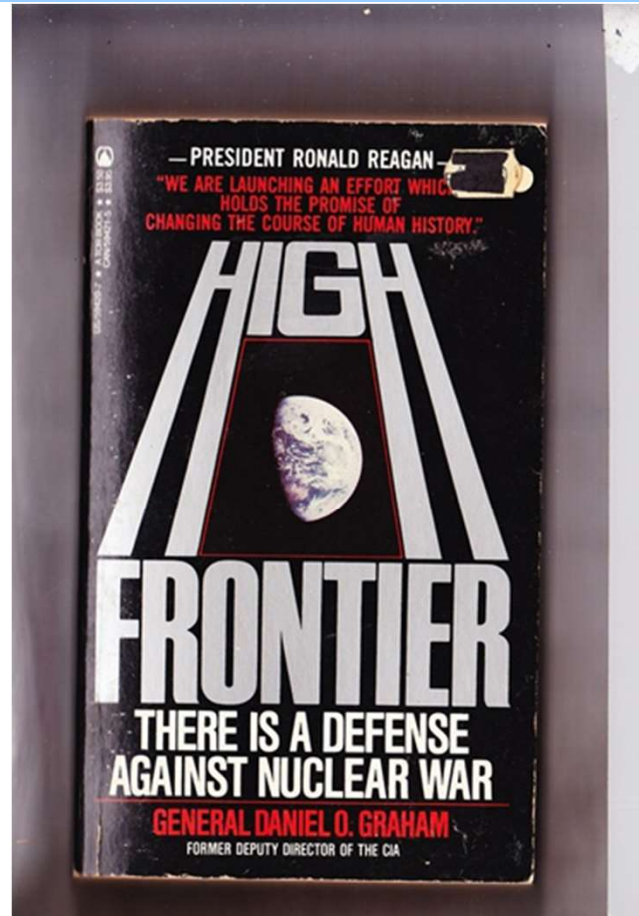
Counting on support from Reps. for Districts 2, 3, 4, and 5; haven't contacted those for 1, 6 and 7

As soon as possible connect with other "Pilot Studies" throughout the Nation—beginning with the San Antonio Joint Base Electromagnetic Defense Initiative?

Please Let Us Hear From You!

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Daniel O. Graham



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Thanks for your support—the vision lives on!!!

*At High Frontier, we dedicate ourselves to passing to future generations
the blessings passed to us by the Founders and Forefathers.*

May God bless America!