Extend the Lake Wylie Pilot Study to Support the National Guard

During the past five years, mostly pro bono authoritative efforts have assessed potential vulnerabilities of the Distribution Grid of York County, SC — and provided high confidence quite affordable cost estimates for hardening it to the existential threat of manmade and natural electromagnetic pulse (EMP) events. Extending this county-wide Lake Wylie Pilot Study provides an exportable model basis to support the "whole of government" response called for by President Trump's March 26, 2019 Executive Order on Coordinating National Resistance to Electromagnetic Threats, as strengthened and extended by the National Defense Authorization Act for 2020 — NDAA(2020) — including an important amendment from Senator Ron Johnson (R-WI), Chairman of the Senate Homeland Security and Governmental Affairs Committee and signed into law by President Trump on December 20, 2019.

Lake Wylie, on the Catawba River that flows from North to South Carolina, is illustrated in Figure 1. On it, Duke Energy operates the Wylie Hydroelectric Plant and the Catawba Nuclear Plant in York County, SC and the Allen Coal Plant in Gaston County, NC.

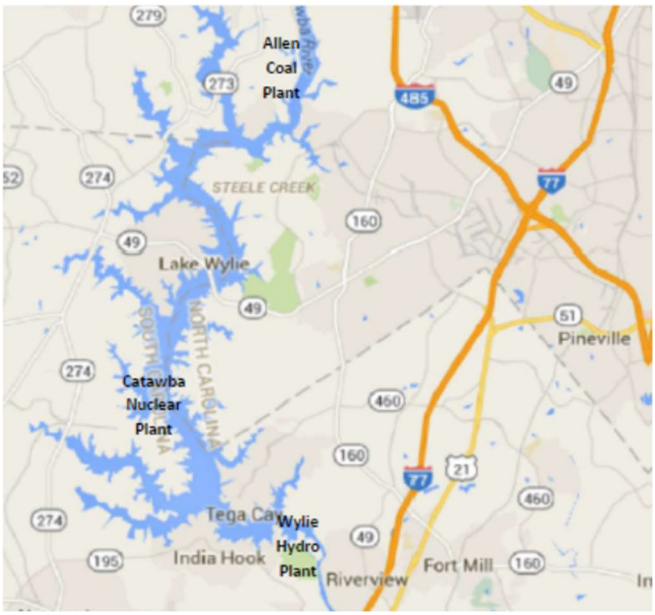

Fig. 1: Duke Power Plants Around Lake Wylie

Four years before President Trump's Executive Order calling for still yet to be conducted pilot studies, the Lake Wylie Pilot Study focused on the entire York County Distribution Grid, involving a much larger area and much more complex infrastructure than a major military base. That Distribution Grid is primarily owned and operated by the Rock Hill Utility and York Electric Co-op companies. Their management and engineers fully opened their critical infrastructure in concert with Duke engineers responsible for the Duke power plants and transmission lines from which the York County Distribution Grid receives its electricity.

Given this cooperation, a very competent assessment was made of Rock Hill/York County's Distribution Grid's potential vulnerability to a High Altitude EMP event. Then hardening costs were estimated based on the same methodology and standards used to protect our most important military systems. Included was York County's top priority critical civil infrastructure; e.g., the county's hospital, water-wastewater infrastructure, emergency management support and communications — including a hardened link to into South Carolina's statewide Palmetto 800 MHz emergency management communications system that supports local and state-wide government authorities.

The cost estimate for this hardening is $22 million — less than $100 per York County citizen. This one-time cost is less than what an average family pays per month for its medical insurance. (Additional costs would be required to assure the hardening upgrades are maintained, but they should be minimal — perhaps $10 per year/citizen for Red Team hardness maintenance.) These costs suggest protecting the grid is not a major funding issue, it is a bureaucratic/political one.

Figure 2 shows the patchwork of SC and NC counties suggesting the complex challenge for protecting the American people in keeping with the President's directive — and strong motivation for addressing the issues "from the "bottom-up." The 46 SC counties are

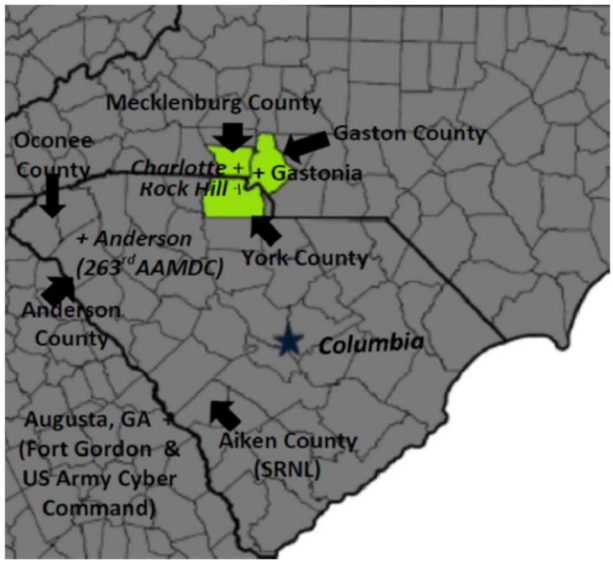

Fig. 2: Principal Counties Bordering and Extending the Lake Wylie Pilot Study

supported by 40 utility and co-op companies — that receive their electricity from Duke Energy, Dominion Energy and Santee-Cooper Power companies. Dealing with the obvious complexities is the goal of extending lessons-learned from the Lake Wylie Pilot Study. Rock Hill Utility and York County co-op managers are members of state-wide agencies of their professional colleagues and will extend Lake Wylie lessons-learned throughout South Carolina—and beyond.

The Lake Wylie Pilot Study bottom-up approach will confront" head on" several daunting issues that must be solved if ever we are to protect the nation's Distribution Grid, which supplies electricity to our citizens and their supporting industries and services. It composes 90-percent of the nation's overall grid and about 70-percent of the total investment in Transmission and Distribution Lines. Regulatory issues involving 50 Public Utility Commissions (which vary from state-to-state) must be addressed — as well as issues involving the Federal Energy Regulatory Commission that is not responsible for the Distribution Grid. This "bottom-up" approach, beginning with local and state levels, provides needed insight for those managing the nation's efforts to protect our overall electric grid from existential EMP threats.

The highlighted "green shaded" counties in Figure 2 are York County in South Carolina and Gaston and Mecklenburg Counties in North Carolina. Follow-on efforts in North Carolina would go first due-North to Gaston County, which is comparable in complexity to York County, and then to the much more complex Mecklenburg County, home of Duke corporate headquarters and Charlotte International Airport. The family of counties including and surrounding Charlotte compose a major U.S. metropolitan area.

However, the first proposed extension of the Lake Wylie Pilot Study is to integrate the follow-on efforts into a strategy that links to important homeland defense/ security mission centers across the nation—especially by emphasizing the role of the National Guard.

The SC Adjutant General and Director of Emergency Management — and their key staffs have participated in the Lake Wylie Pilot Study from its inception and are fully supportive of extending its lessons-learned throughout South Carolina to North Carolina and nationally to support SC National Guard missions.

Most pertinently, the 263rd Army Air and Missile Defense Command (AAMDC) in Anderson, SC reports to the SC Governor through National Guard channels and the SC Adjutant General. Its commander is a direct report to the commanders of NORTHCOM in Colorado Springs, CO, Army North on Ft. Sam Houston in San Antonio, TX and First Air Force on Tyndall AFB, in Panama City, FL — all have important national missions so their critical infrastructure also should be protected by Federal programs, preferably via cooperative efforts.

For example, such an initiative with the 263rd AAMDC could link Lake Wylie Pilot Study "lessons-learned" to Army North and the Joint Base San Antonio Electromagnetic Defense Initiative (JBSA-EDI) activities, currently considering how best to protect that local power grid. Such support can be framed in concert with provisions of the NDAA(2019) and NDAA(2020).

NDAA(2019) SEC 1651 calls for "collaborative interagency education and training for the members of the Army National Guard" while linking via its mission structure to national command responsibilities in which both the Army and Air National Guard play vital national defense roles. It explicitly relates to federal and state teams to protect against cyber attacks, but it should be understood that the most severe cyber threat would come from an EMP attack. Dr. William R. Graham, a longstanding EMP expert who served for 17 years as Chairman of the Congressional EMP Commission (and who served as President Reagan's Science Advisor) has authoritatively linked these issues in observing:

> *"The implementation of cybersecurity for the electric grid and other critical infrastructures include EMP protection, since all-out cyber warfare as planned by Russia, China, North Korea, and Iran includes nuclear EMP attack ... integrating EMP and cyber-protection will be both the least expensive and most technically sound approach."*

So, threatening military doctrines include CYBER and EMP attack strategy/tactics to attack important targets.

As noted in Figure 2, extending the Lake Wylie Pilot Study/York County experience to Aiken County would engage a major residential area supporting Army Cyber Command Headquarters on Ft. Gordon in Augusta, GA and the Savannah River National Laboratory (SRNL) that, among other things, will conduct the first-ever EMP testing of a major High Voltage Transformer given to them by Duke Energy, when and if the DOE provides the needed funds to ship it up the Savannah River to the SRNL site and to conduct its subsequent needed tests.

The 263rd AAMDC and its connections in South Carolina and throughout the nation via its National Guard responsibilities can generalize Lake Wylie lessons-learned in protecting the nations electric power grid from both EMP and CYBER threats.

NDAA(2019) SEC 2861 emphasizes the important role of surrounding small towns and rural arears neighboring with important military installations, such as the 263rd AAMDC. Anderson, SC meets the "under 50,000" inhabitant provision to avoid Sec. 2861 cost sharing

provisions. And the surrounding area in Anderson and Oconee counties meet the "community infrastructure" definition associated with providing military base support; e.g., schools, hospitals, police, fire, electric gas or other utility infrastructure provided by others.

Duke Energy operates a nuclear plant in Oconee County and its Transmission and Distribution Grid infrastructure provide electricity to the 263rd AAMDC — but much surrounding "community infrastructure" support relies on electricity from public utility and co-op companies, just like in York County. So, the lessons-learned in York County can be directly linked to meeting the needs of Oconee and Anderson Counties. Duke Energy engineers have indicated their support in exporting the lessons-learned from the Lake Wylie Pilot Study to an Oconee County-Anderson County Pilot Study.

Extensions to Aiken, SC would also meet the "under 50,000" inhabitant provision of NDAA(2019) Sec. 2861 — as would numerous other small towns/residential areas supporting the growing number of workers supporting Ft. Gordon's Army Cyber Command in Augusta, GA and the SRNL within Aiken County.

NDAA(2020) SEC 1720 calls for a National Guard and NORTHCOM report on their capacity to meet homeland defense/security incidents, including resources to respond to "current homeland security threats to our country," including resources to respond to a homeland defense or security incident, "with a special focus on a multi-state electromagnetic pulse event." It also calls for an assessment of "strengths and areas of improvement in working with State and Federal interagency partners."

Validating Lake Wylie Pilot Study "lessons-learned" and extending them to an Anderson-Oconee County initiative would support these National Guard and Department of Homeland Security (DHS) interests — extension into Gaston and Mecklenburg Counties of North Carolina would provide a "bottom-up" multi-state assessment responsive to the NDAA(2020) SEC 1720 objective and a basis for further extension throughout South and North Carolina, as well as the rest of the nation. Linkage to a related Army North/JBSA-EDI could yield informative results over two of the Nation's three Electric Power Interconnections.

Furthermore, these efforts would couple into the mission of the Department of Homeland Security (DHS) through existing organizational channels. (Notably, the defense conservative EMP environments used in assessing the York County Distribution Grid are the same as "Level 4," the most defense conservative level proscribed in the February 5, 2019 DHS manual, "EMP Protection and Resilience Guidelines for Critical Infrastructure and Equipment.")

NDAA(2020) SEC 1740 e) calls for DHS Pilot Tests to evaluate engineering approaches that could be integrated into Lake Wylie Follow-on efforts to "develop and implement a pilot test to evaluate available engineering approaches for mitigating the effects of EMPs and GMDs on the most vulnerable critical infrastructure systems, networks and assets." When protecting against manmade, high altitude EMP events, the GMD threat will also be countered—but the contrary is not so because GMD threats do not include the threatening high frequency EMP component.

NDAA(2020) SEC 1740 f) calls for a DoD Pilot Test of engineering approaches that could also be integrated with the Lake Wylie Pilot Study follow-on effort.

FUNDING:

A total of $30 million, potentially over two years—preferably beginning this year, could:

- Validate the $22 million cost estimate to protect the York County Distribution Grid and its Palmetto 800 UHF link to the state Capitol in Columbia — by funding already recommended hardening;
- Cooperate with Duke Energy efforts to estimate the costs of protecting its Power Generation Plants on Lake Wylie and Transmission Grid infrastructure;
- Estimate the cost of protecting the Palmetto 800 MHz Emergency Management communication system throughout the State of South Carolina;
- Link 263rd AAMDC and JBSA-EDI activities; and
- Recommend more pathways to export the lessons to other states and regions throughout the U.S..

For additional background on the Lake Wylie Pilot Study, see Ambassador Henry F. Cooper's May 4, 2017 testimony before Senate Energy and National Resources Committee ("On Protecting the Electric Power Grid") and his soon to be published with the InfraGard National Defense Resilience Council (NDRC) Powering Through Report, as Appendix B (PROTECTING THE ELECTRIC POWER GRID FROM THE BOTTOM-UP: Lessons learned from the Lake Wylie Pilot Study