SCHEDULING NOTE

Title: **Hearing on Combined Licenses for William States Lee III Nuclear Station, Units 1 and 2: Section 189a. of the Atomic Energy Act (Public Meeting)**

Purpose: To receive testimony and exhibits regarding the application of Duke Energy Carolinas, LLC (Duke Energy) for two combined licenses (COLs) to construct and operate two new nuclear power generation units at a site in Cherokee County, South Carolina. The testimony will focus on unique features of the facility or novel issues that arose as part of the review process, as well as other significant technical or policy issues associated with aspects of the staff's review that are important for the Commission to consider when making its final decision. The Commission will determine whether the staff's review has been adequate to support the findings required by 10 C.F.R. §§ 52.97(a) and 51.107(a).

Scheduled: **October 5, 2016**
9:00 am

Duration: 1 Day

Location: Commissioners' Conference Room, 1st Floor OWFN

NOTE: Chairman to provide opening remarks, admit exhibits, and swear in witnesses. **20 mins.**

Participants: **Presentation**
(Note: Presenters seated at the table are listed, other staff available to answer questions will be seated in the well and reserved seats)

Overview (Duke Energy) (9:20 am) **30 mins.***

At the table:
Christopher Fallon, Vice President, Nuclear Development, Duke Energy
Robert Kitchen, Director, Licensing Nuclear Development, Duke Energy
Paul Snead, Manager, Siting and Licensing Support, Duke Energy

Topic: Overview

Commission Q & A (round of questions; 6 minutes each) **18 mins.****

Overview (NRC Staff) **30 mins.***

At the table:
Vonna Ordaz, Deputy Director, Office of New Reactors (NRO)
Francis Akstulewicz, Director, Division of New Reactor Licensing (DNRL), NRO
Samuel Lee, Acting Deputy Director, DNRL, NRO

Topic: Overview, including use of the design-centered review approach for AP1000 COL applications*** and summary of regulatory findings.

Commission Q & A (round of questions; 6 minutes each) **18 mins.****

BREAK **5 mins.**

NOTE: For the remaining panels, the applicant is expected to discuss the contents of the COL application while the staff is expected to discuss its review process and regulatory conclusions. Each panel should include a discussion of site-specific Inspections, Tests, Analyses, and Acceptance Criteria (ITAAC) or other license conditions associated with the subject matter of the panel.

Safety Panel (11:05 am)
Applicant **5 mins.***

At the table:
Robert Kitchen, Director, Licensing Nuclear Development, Duke Energy
John Thrasher, Director, Engineering Nuclear Development, Duke Energy
Lawrence Taylor, Lead, Procedure and Program Development, Nuclear Development, Duke Energy

Staff **15 mins.***

At the table:
Brian Hughes, Senior Project Manager, NRO
Robert Roche, Structural Engineer, NRO
Kenneth Thomas, Emergency Preparedness Specialist, Nuclear Security and Incident Response

Topics: Relevant sections of the application and the following chapters of the Final Safety Evaluation Report (FSER):

- Chapter 3 "Design of Structures, Components, Equipment, and Systems," The Lee site-specific response spectra exceeds the response spectra for AP1000 design certification, therefore a site-specific evaluation is required to determine the acceptability of the AP1000 standard design for the Lee site.
- Chapter 13, "Conduct of Operations, "Duke Energy has filed a request to have the emergency operations facility (EOF) located in Charlotte, North Carolina. Commission approval prior to implementation is required in accordance with Appendix E, Section IV.E.8.b of 10 C.F.R. 50 ("Content of Emergency Plans; Emergency Facilities and Equipment") because the location of the Charlotte EOF is greater than 25 miles from the affected reactor site.

NOTE: The panel will not have specific topics to discuss for the remainder of the FSER. If the Commission wishes to ask questions on other topics, this panel would be the appropriate time.

Commission Q & A (round of questions; 6 minutes each) **18 mins.****

BREAK (Lunch Break-Approx. 11:45 am - 1:15 pm) ***~1.5 hour***

Environmental Panel (1:15 pm)

Applicant **5 mins.***

At the table:
Robert Kitchen, Director, Licensing Nuclear Development, Duke Energy
John Thrasher, Director, Engineering Nuclear Development, Duke Energy
Paul Snead, Manager, Siting and Licensing Support, Duke Energy

Staff **15 mins.***

At the table:
Patricia Vokoun, Project Manager, NRO
Lance Vail, Senior Research Engineer, Pacific Northwest National Laboratory

Topic: Relevant sections of the Final Environmental Impact Statement related to one novel issue: the proposed addition of a new offsite reservoir (Make-Up Pond C).

NOTE: The panel will not have specific topics to discuss for the remainder of the final environmental impact statement. If the Commission wishes to ask questions on other topics, this panel would be the appropriate time.

Commission Q & A (round of questions; 6 minutes each) **18 mins.****

Closing (1:55 pm)

Closing Statement by Applicant **10 mins.***

Christopher Fallon, Vice President, Nuclear Development, Duke Energy
Robert Kitchen, Director, Licensing Nuclear Development, Duke Energy

Closing Statement by Staff **10 mins.***

Vonna Ordaz, Deputy Director, Office of New Reactors, NRO
Francis Akstulewicz, Director, DNRL, NRO
Samuel Lee, Acting Deputy Director, DNRL, NRO

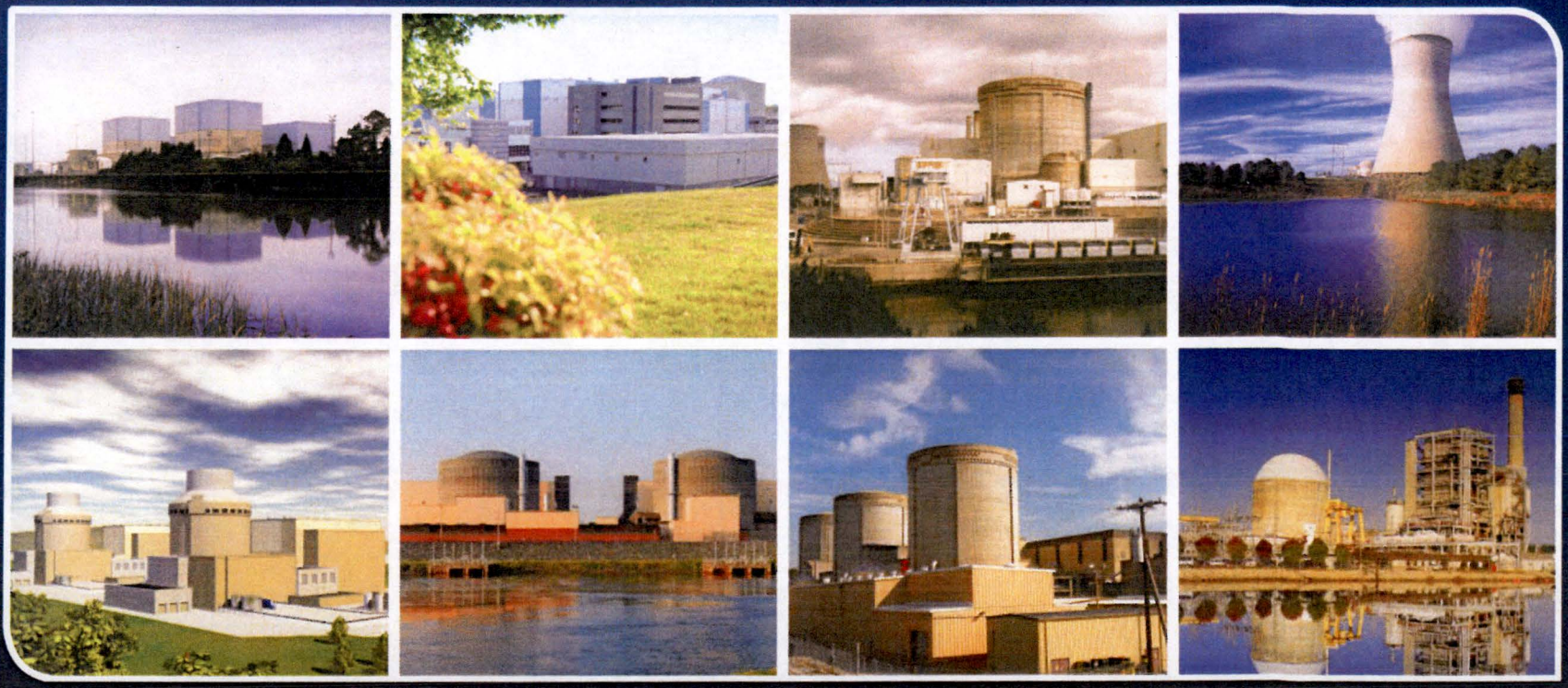
Commission Q & A and Closing Statements **18 mins.****

*For presentation only and does not include time for Commission Q & A's.

**All Commissioners will have an opportunity to ask questions after each panel. Commissioners will start the Q&A with their total time allotted to allocate as they see fit among the panels.

*** Design issues associated with the AP1000 incorporated by reference have been resolved in the context of the design certification rulemaking but are discussed here to provide context for the COL review.

EXHIBIT DEC-005



Lee Nuclear Station – Overview

Chris Fallon – Bob Kitchen – Paul Snead

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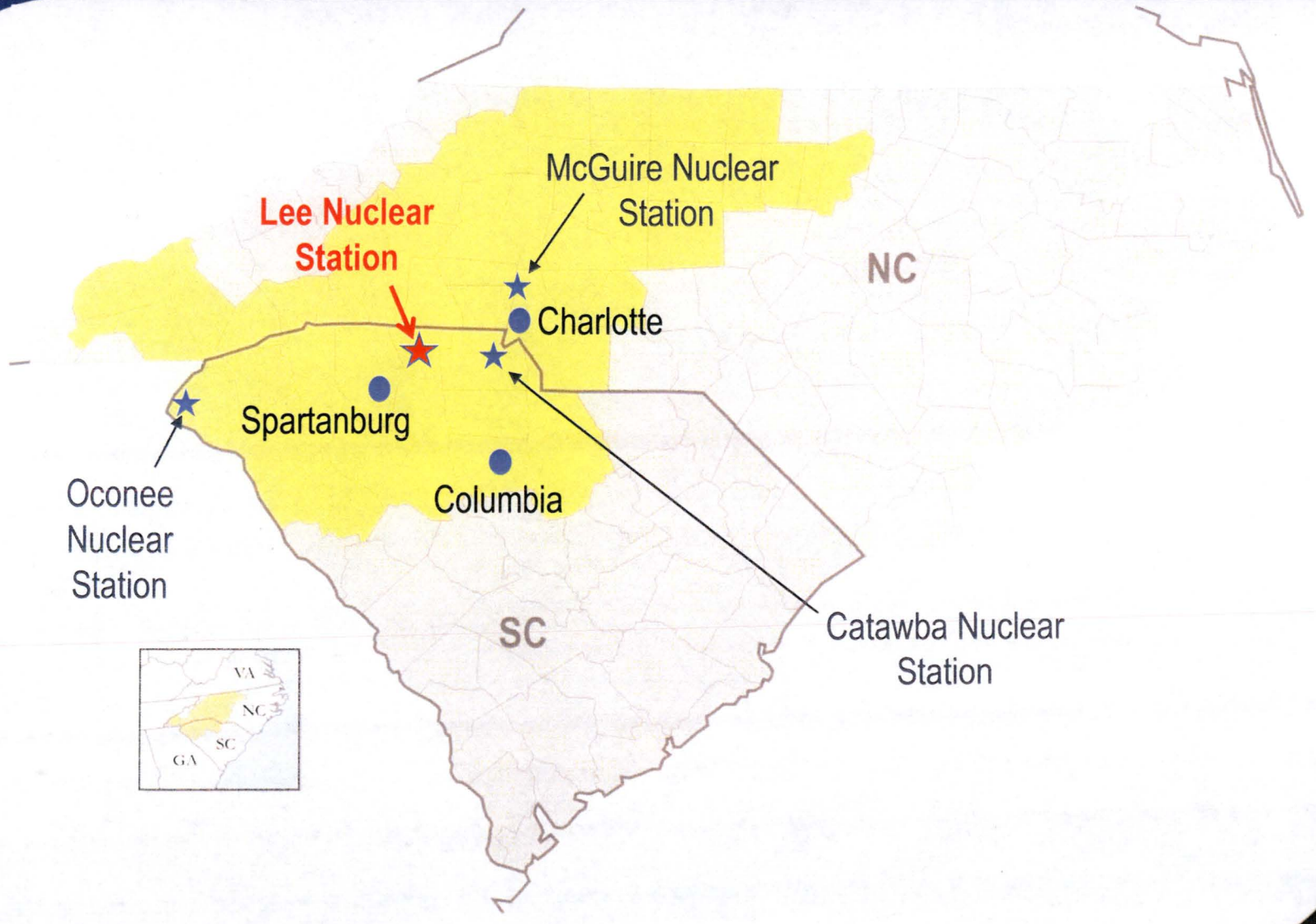
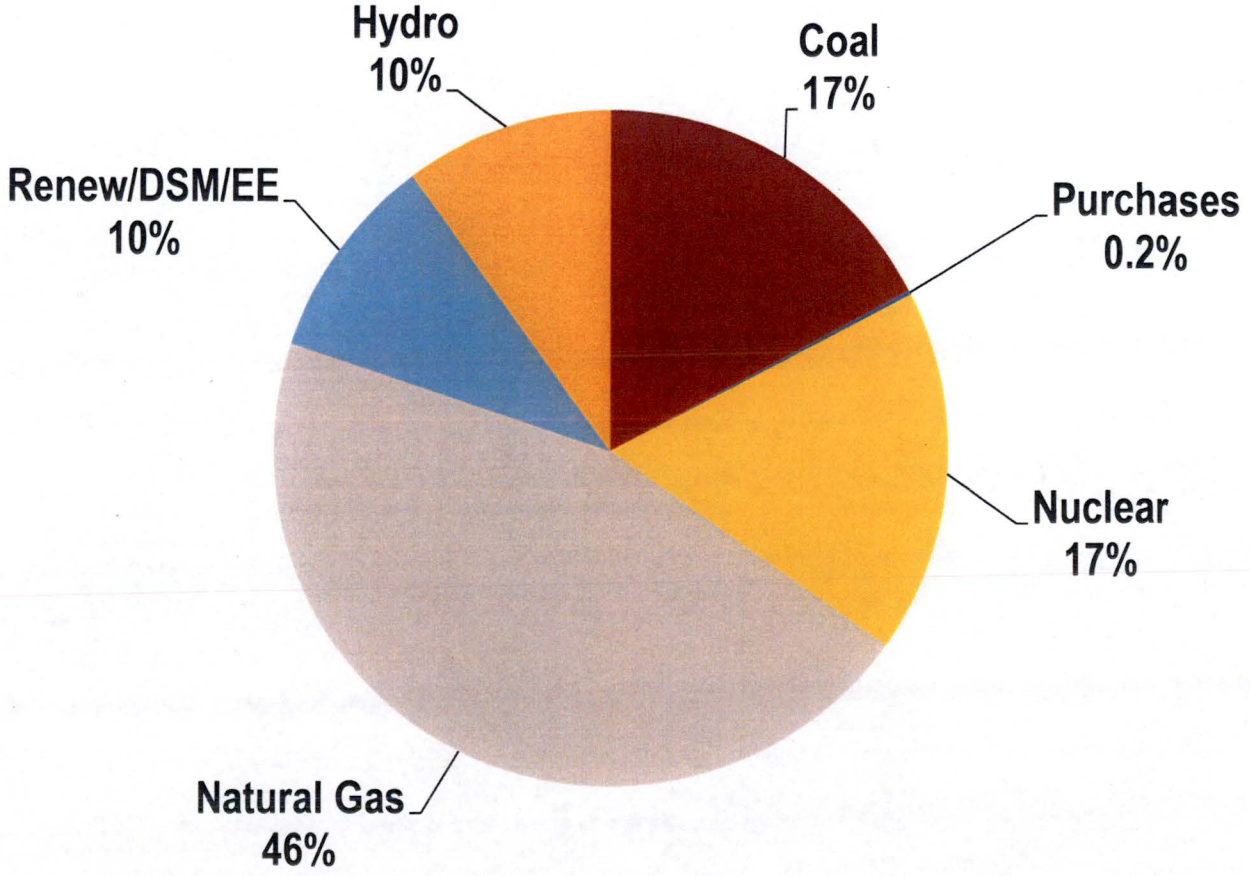
Duke Energy Carolinas Nuclear Fleet



2038 DEC Capacity by Fuel Type - Base IRP



Lee Site Background

Site partially developed for Cherokee Nuclear

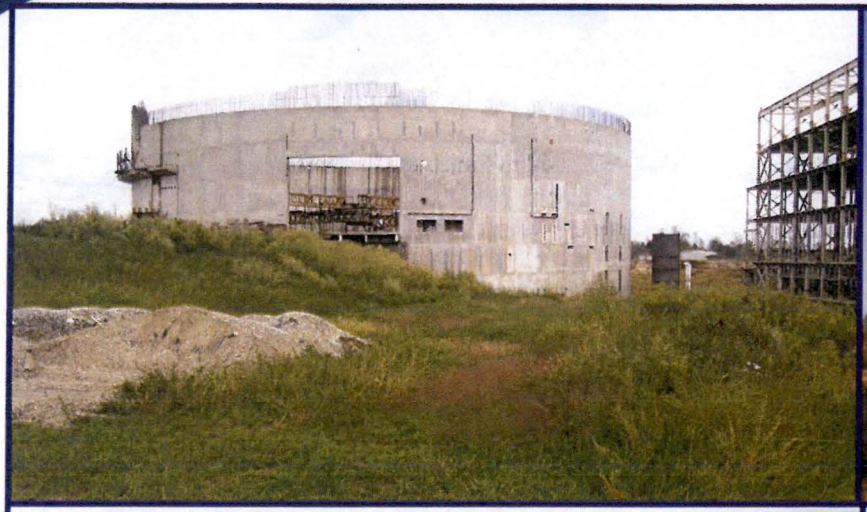
Construction Activities

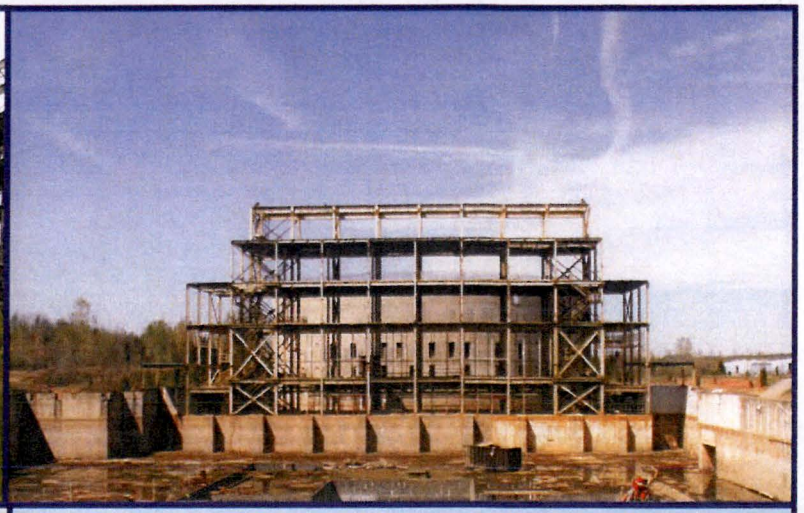
- Nuclear service water pond (Pond B)
- Cooling water sedimentation basin (Pond A)
- Excavation of power block
- Partial construction of Unit 1 containment

Permits Previously Issued

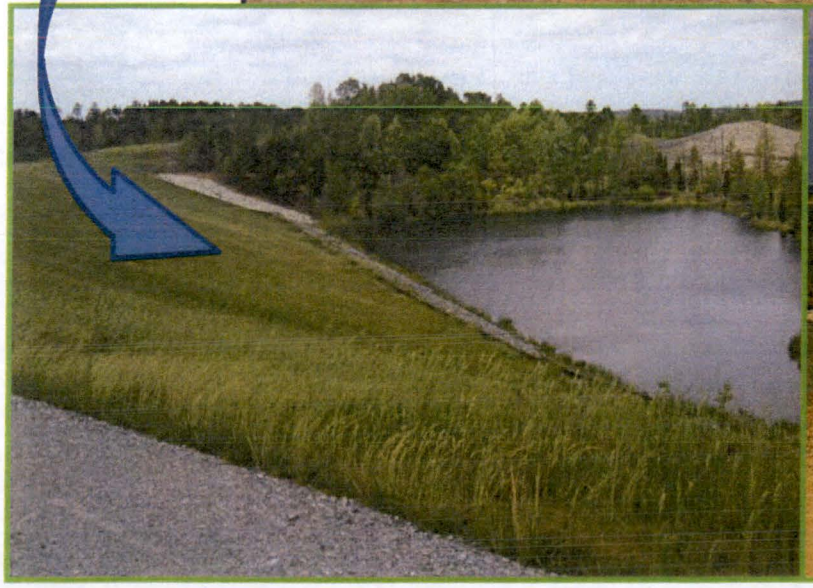
- Environmental Impact Statement
- Construction Permit
- 404 Permit
- NPDES Permit

Site Cleanup





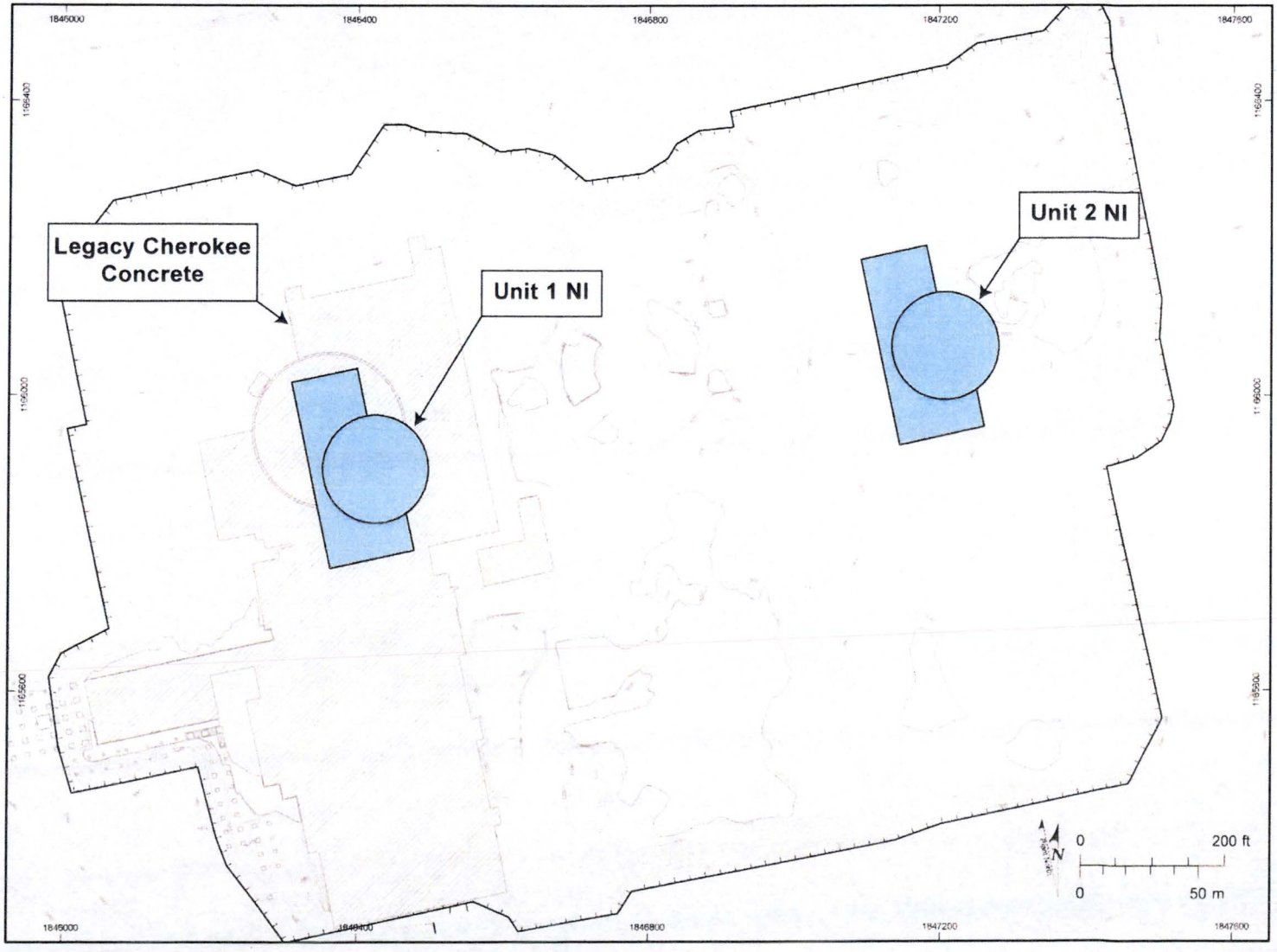
Site Cleanup



COLA Investigation

Existing Lee Unit 2
Excavation Cleanup

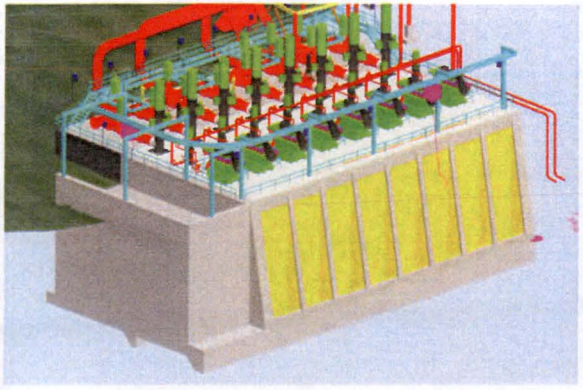
Lee Nuclear Foundation Support



Engineering and Construction Planning

Site Specific SSCs Design (70% Complete)

- Circulating Water System (CWS)
- Storm Drain System (DRS)
- Potable Water System (PWS)
- Raw Water System (RWS)
- Liquid Radwaste System (WLS)
- Waste Water System (WWS)
- Offsite Retail Power System (ZRS)



River Water Intake Structure (RWS)

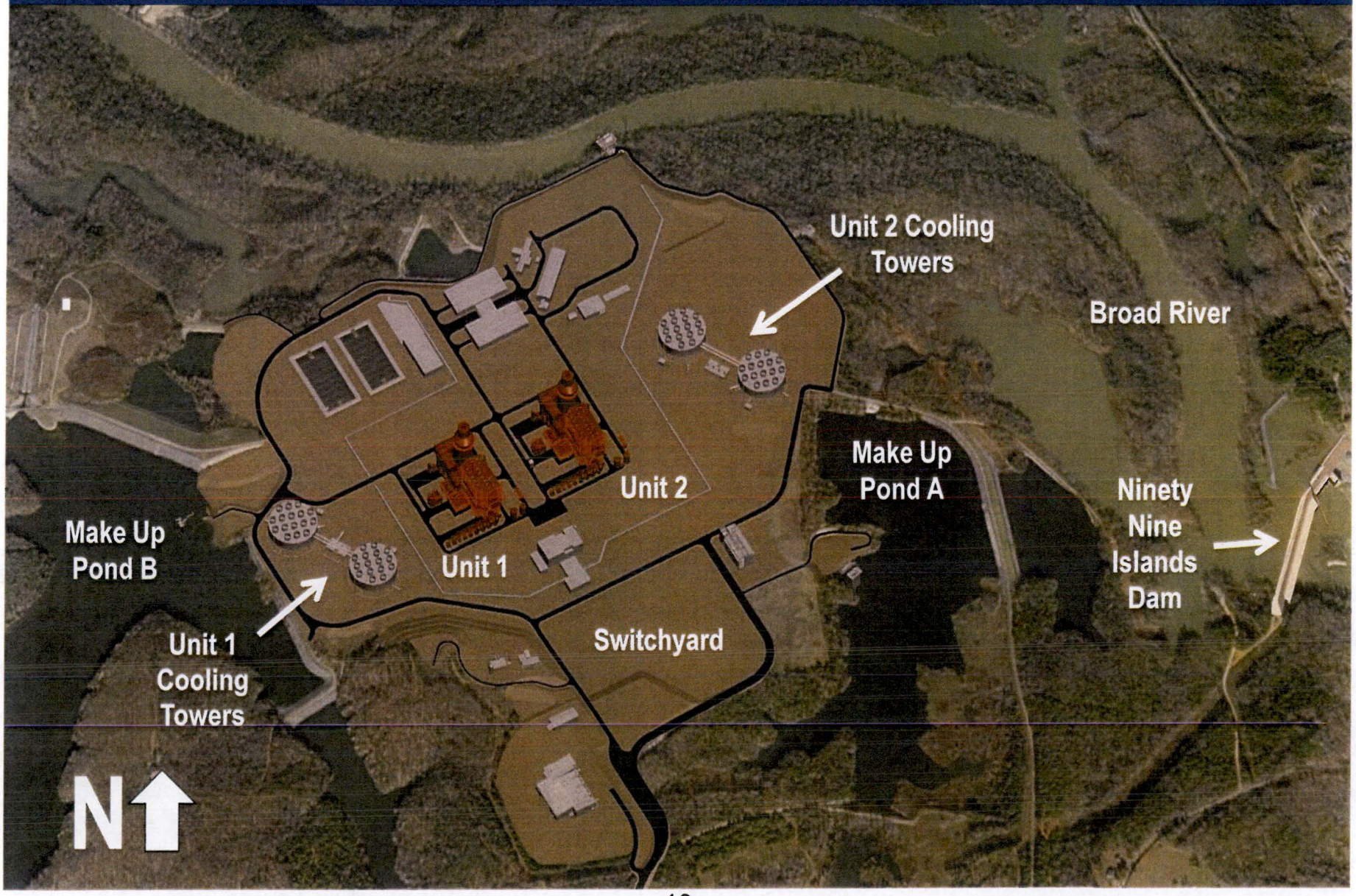
Infrastructure Design (90% Complete)

- Commercial Buildings
- Water and Sewer
- Rail and Road Improvements
- Make-Up Pond C Dam

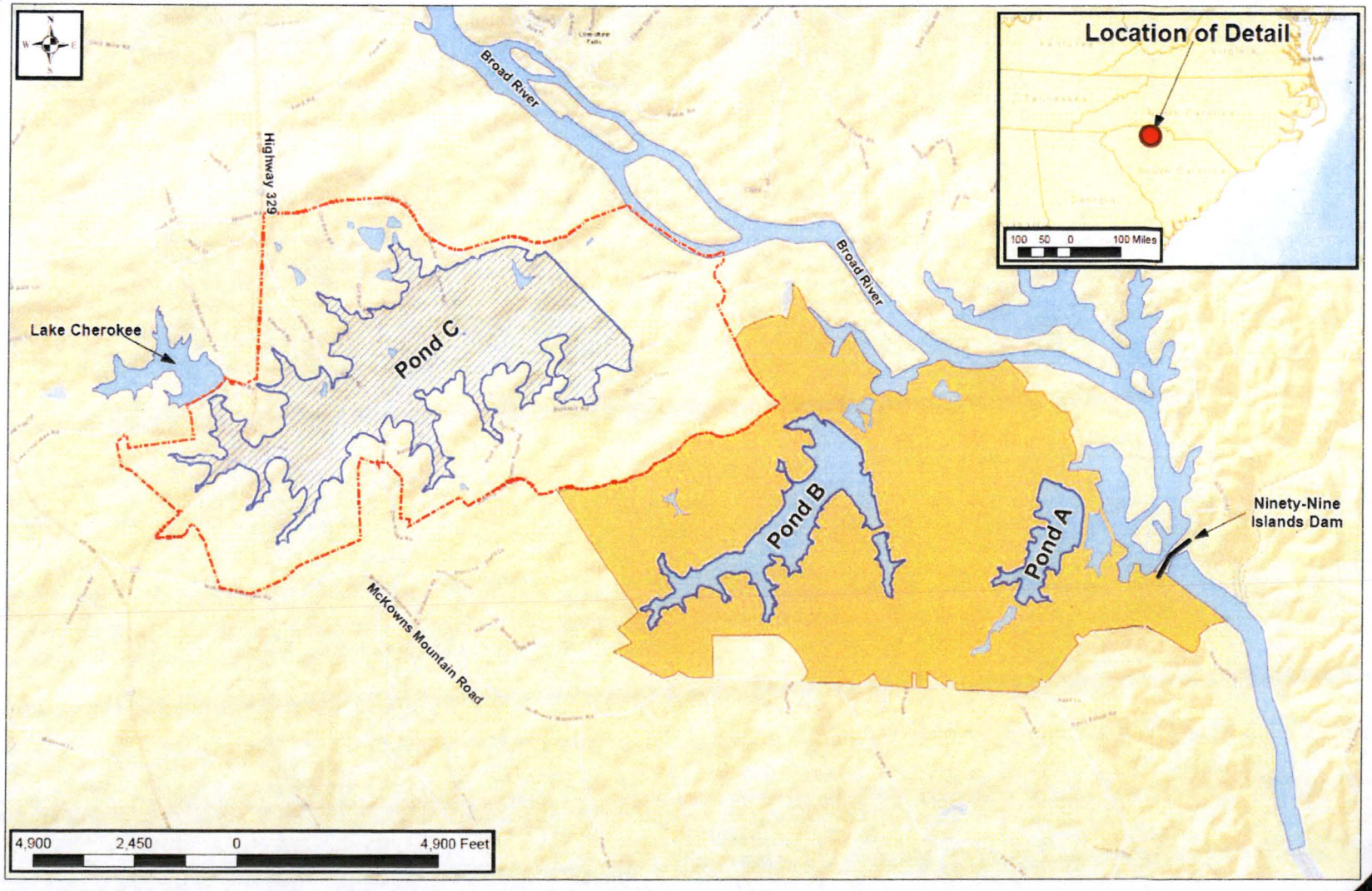
Site Construction Plan (70% Complete)

- Site Construction Schedule
- Construction Staffing & Training
- Temporary Buildings
- Assembly Pads, Areas & Modules
- Laydown & Staging Areas
- Excavation/Backfill
- Heavy Lift Crane
- Batch Plant Concrete Qualification

Lee Site Layout



Lee Nuclear and Make-Up Pond C Sites



Lee COLA Safety Content – Exemptions

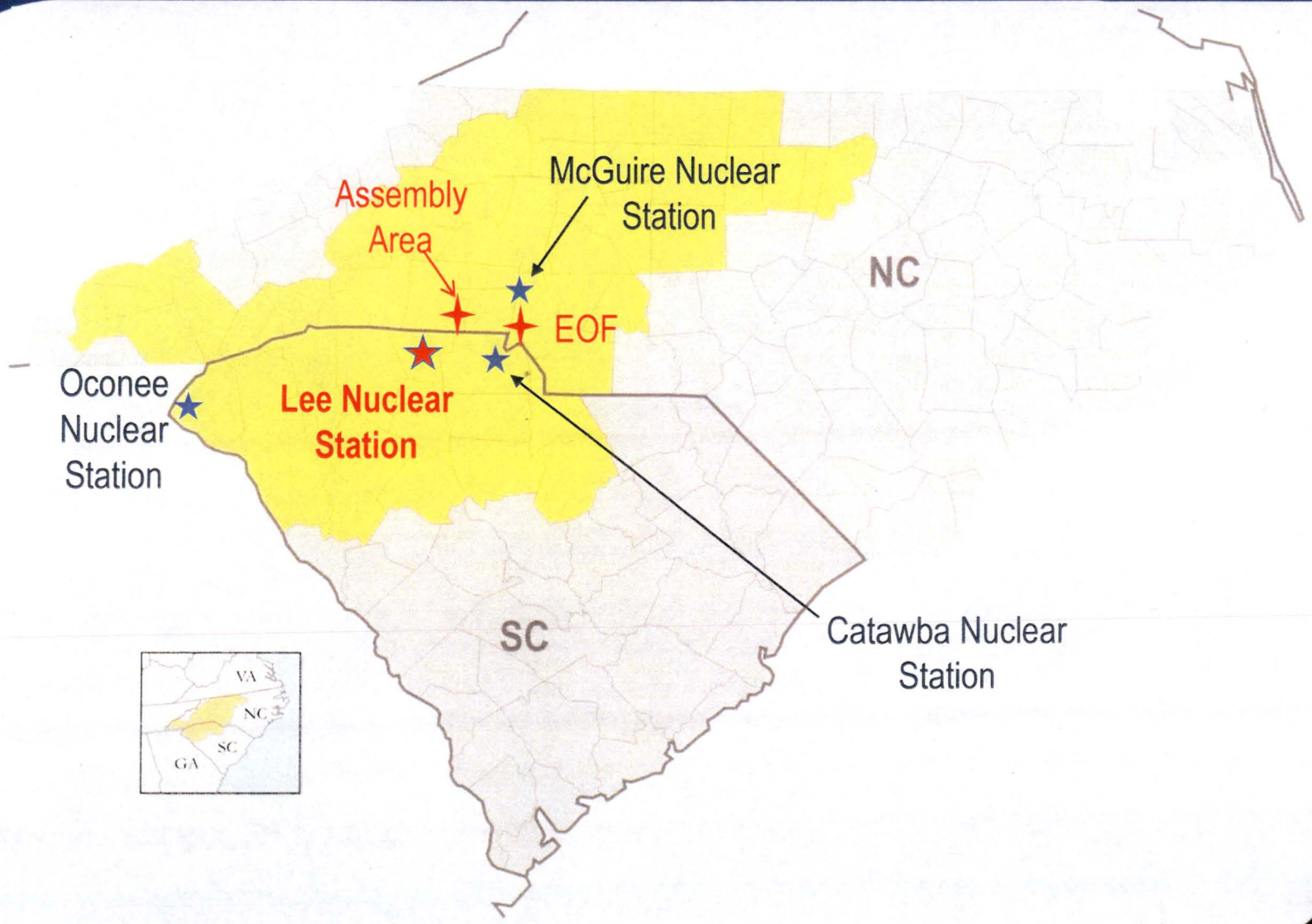
- Standard (Reference COL)
  - DCD Numbering and Organization
  - Special Nuclear Material Control and Accountability (MC&A) Program Description (Consistent with Part 50 requirements)
- Lee COLA
  - Condensate Return Design Change
  - Main Control Room Dose
  - Main Control Room Heatup
  - Combustible Gas Control in Containment
  - Source Range Neutron Flux Doubling Block Permissive

Site Specific Seismic Evaluation

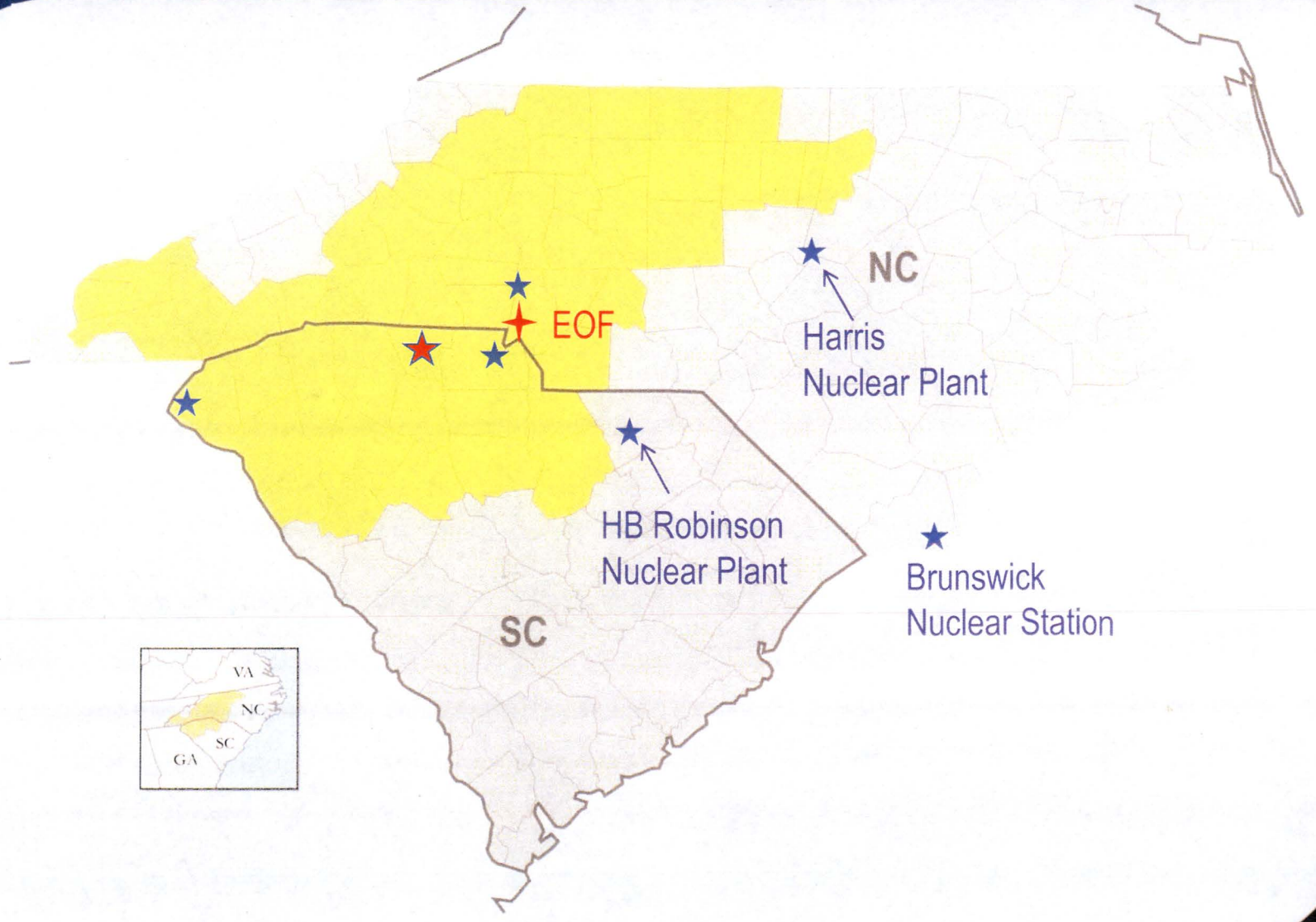
Evaluation per **AP1000** DCD

- Structures
- Major Equipment
- Piping Systems and Supports
- Equipment Qualification

Duke Energy Carolinas Common EOF

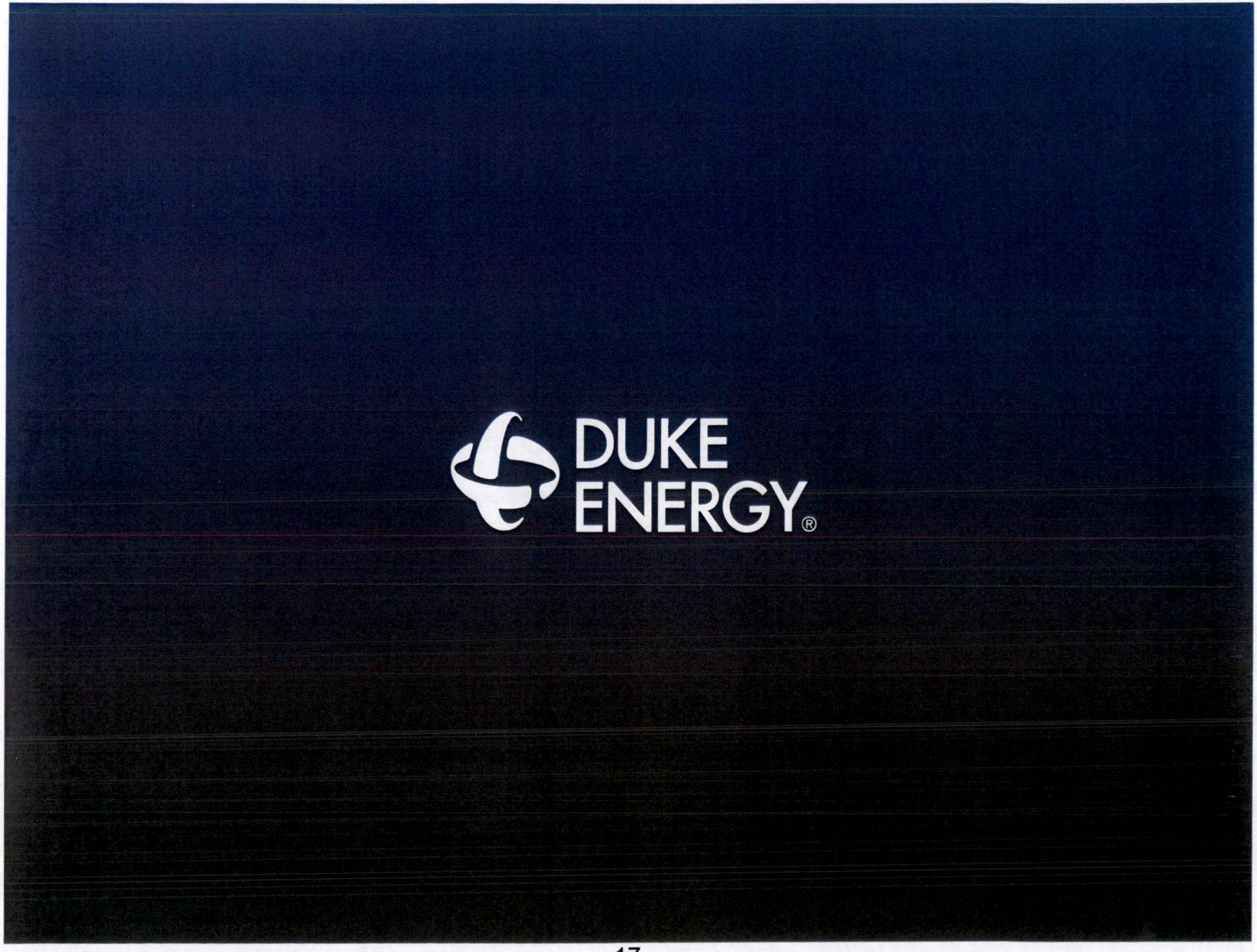


Duke Energy Fleet License Amendment Request
Common EOF



Environmental

- ER and FEIS – SMALL or MODERATE impacts
- SCDHEC issued NPDES Operating Permit in July 2013
  - Water Management Plan
  - Alternate water withdrawal requirements – EPA concurred
- SCDHEC issued 401 Water Quality Certification in January 2014
- US Army Corps of Engineers 404 Permit issued September 2015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Protecting People and the Environment

Combined License Application Review William States Lee III Units 1 and 2

Overview Panel

October 5, 2016

Overview of Staff Review

- Lee COL Application and Contents
- AP1000 Design Certification
- Lee COL Overview – Safety
- Lee COL Overview – Environmental
- Summary of Staff Findings

Lee 1 and 2 COL Application

- In December 2007, Duke Energy Carolinas, LLC (DEC) submitted the application
- DEC would be licensed to construct and operate Lee Units 1 and 2

Lee 1 and 2 COL Application

- Incorporates by reference the AP1000 DCD, Revision 19
  - NUREG-1793 and supplements
- Plant-specific information
- COL Information Items
- Departures from AP1000 DCD

Lee 1 and 2 COL Overview: Safety Review

- ACRS Review, 10 CFR 52.87
  - Subcommittee – 10/2015
  - Full Committee – 12/2015
  - ACRS Report – 12/14/2015
  - Supported License issuance
- FSER issued August 1, 2016

Required Findings

- **Findings – 10 CFR 52.97**
  1. **Applicable standards and requirements of the AEA and the Commission's regulations have been met**
  2. **Required notifications to other agencies or bodies have been duly made**

Required Findings

3. Reasonable assurance that the facility will be constructed and will operate in conformity with the license, the AEA, and NRC regulations
4. Applicant is technically and financially qualified to engage in the activities authorized

Required Findings

5. Issuance of the licenses will not be inimical to the common defense and security or to the health and safety of the public
6. Findings required by Subpart A of 10 CFR Part 51 have been made

Lee 1 and 2 COL Overview: Environmental Review

- EIS completed in accordance with:
  - NEPA of 1969
  - 10 CFR Part 51
- U.S. Army Corps of Engineers was a cooperating agency

Lee 1 and 2 COL Overview: Environmental Review

- Staff follows a systematic approach to evaluate impacts:
  - Solicit and reconcile scoping comments
  - Conduct technical review

Lee 1 and 2 COL Overview: Environmental Review

- Issue draft EIS for public/stakeholder comment
- Consider and respond to comments in preparing final EIS

Lee 1 and 2 COL Overview: Environmental Review

- Stakeholder involvement is a key aspect of the process
- Final EIS published December 20, 2013, as NUREG-2111

Record of Decision

- States the decision
- Identifies alternatives considered
- Discusses preferences among alternatives
- States whether the Commission has taken all practicable measures to avoid or minimize environmental harm

Required Findings

- **Findings – 10 CFR 51.107(a)**

  1. **Requirements of Section 102(2)(A),(C), and (E) of NEPA and the regulations in 10 CFR Part 51, Subpart A, have been met**

Required Findings

2. **After considering the final balance among conflicting factors in the record of the proceeding, the appropriate action is issuance of the COLs**

Required Findings

3. **After weighing the environmental, economic, technical, and other benefits against environmental and other costs, and considering reasonable alternatives, the COLs should be issued**

Required Findings

4. **The staff's National Environmental Policy Act (NEPA) review has been adequate**

Overview of Panel Presentations

Panel	Issues Discussed
Safety (FSER)	• Site Foundation Response Spectra • Emergency Operations Facility
Environmental (Final EIS)	• Make-Up Pond C

Acronyms

- ACRS – Advisory Committee on Reactor Safeguards
- AEA – Atomic Energy Act
- CFR – Code of Federal Regulations
- COL – Combined License

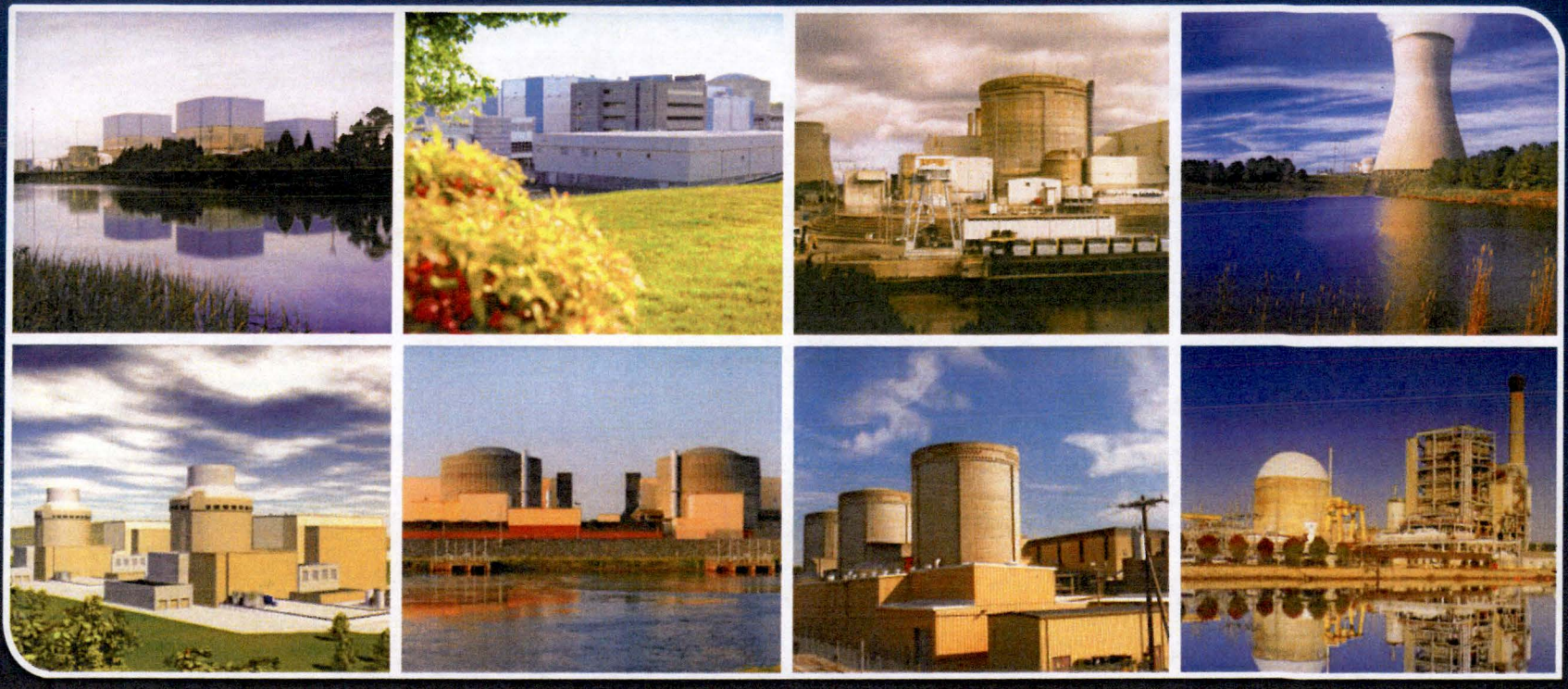
Acronyms

- **DCD – Design Certification Document**
- **DEC – Duke Energy Carolinas, LLC**
- **EIS – Environmental Impact Statement**

Acronyms

- **FSER – Final Safety Evaluation Report**
- **NEPA – National Environmental Policy Act**

EXHIBIT DEC-006



Lee Nuclear Station – Safety Panel

John Thrasher – Larry Taylor – Bob Kitchen

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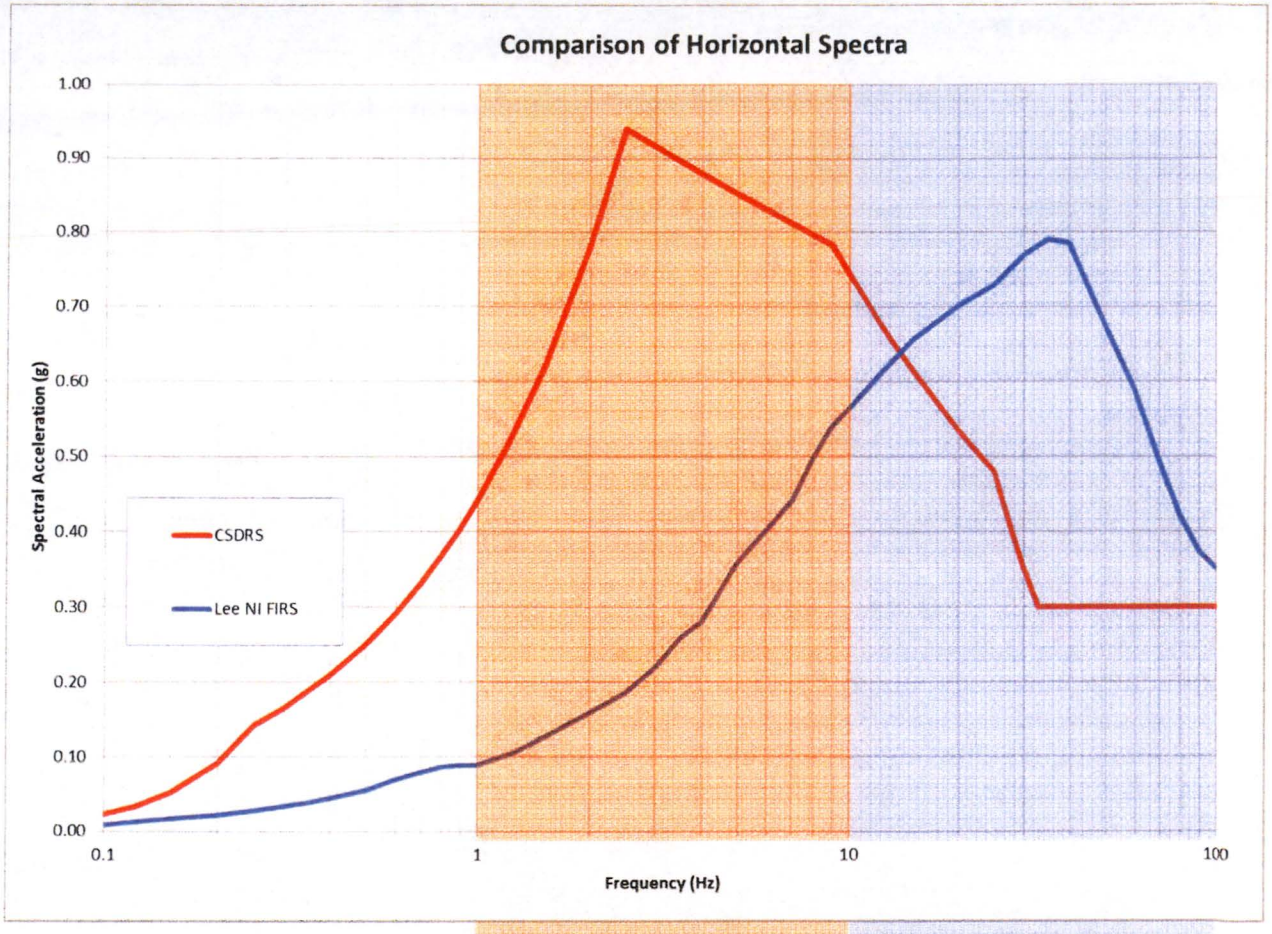
Seismic Evaluation

- **AP1000** Standard Plant seismic design basis
  - Certified Seismic Design Response Spectra (CSDRS)
- **AP1000** Design Control Document allows qualification of a site where site spectra exceed CSDRS
  - Comparison of site spectra to Hard Rock High Frequency (HRHF) spectra or
  - Evaluation using same methodology used to qualify **AP1000** Standard Plant for HRHF spectra

Site Horizontal Spectra



Low Frequency: high displacements lead to high building and equipment forces and moments

High Frequency: low displacements lead to small non-damaging building and equipment forces and moments

Evaluation Methodology to Qualify Site

Evaluation per **AP1000** DCD →

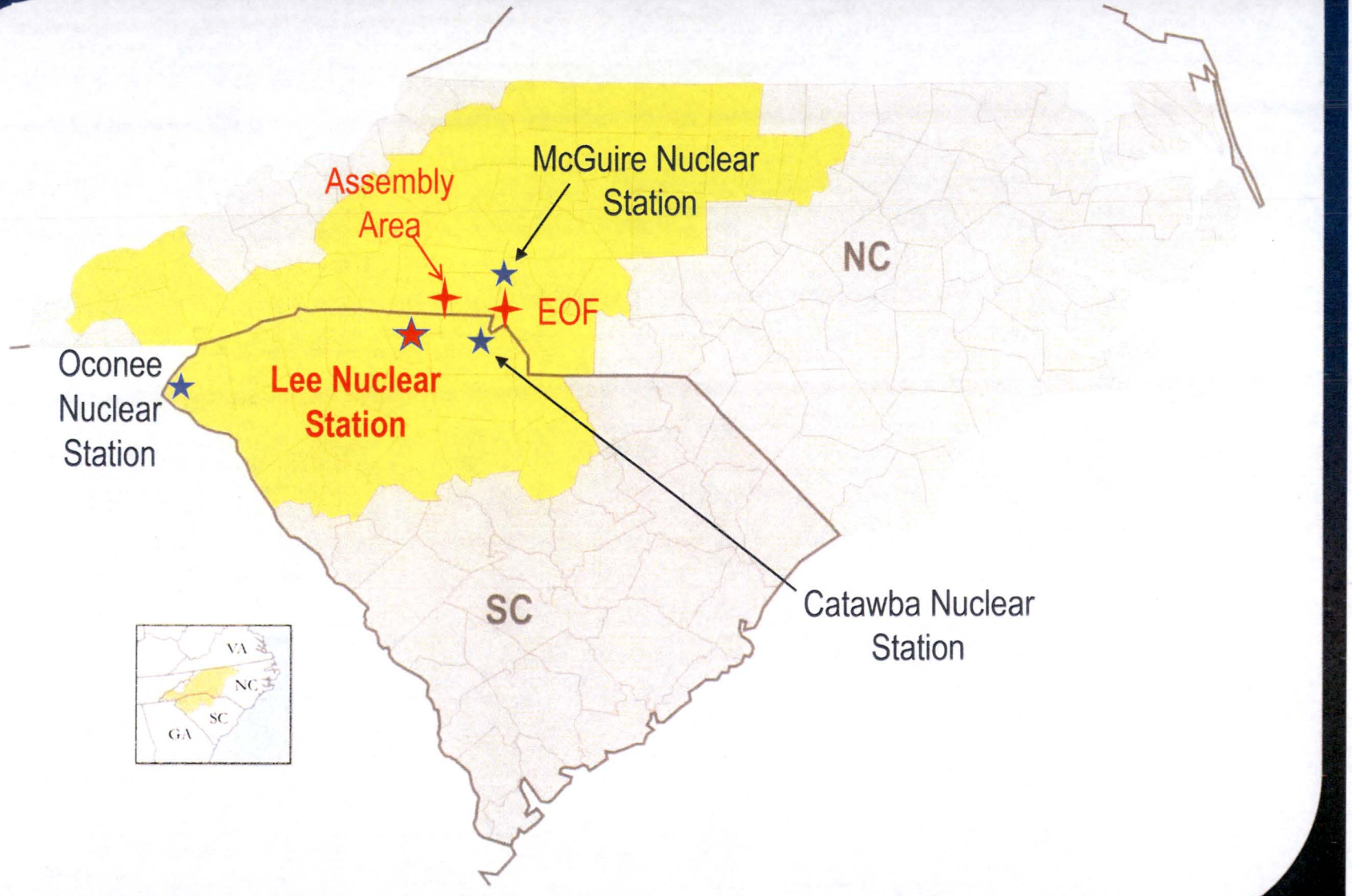
- Structures
- Major Equipment
- Piping Systems and Supports
- Equipment Qualification

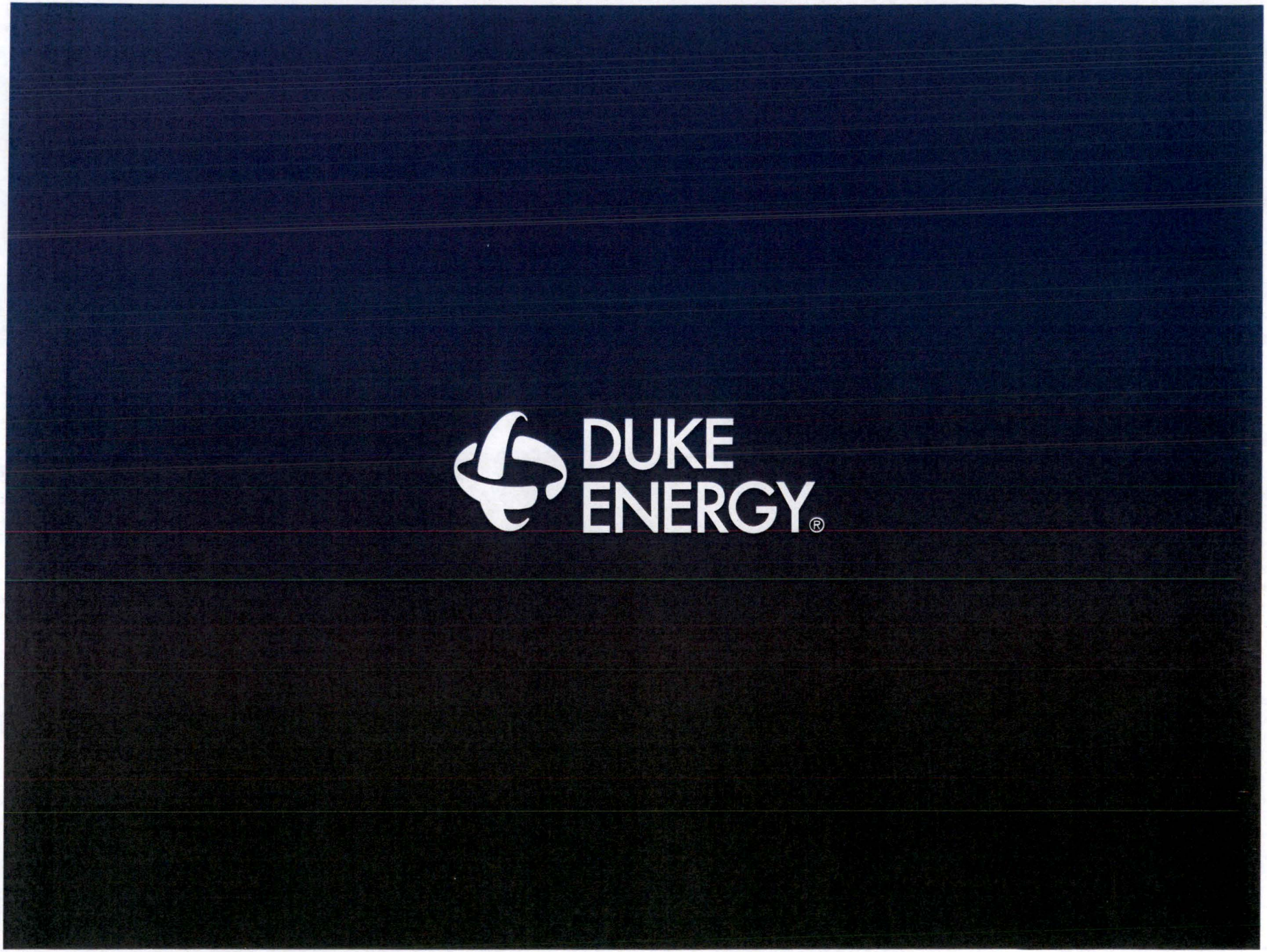
In conclusion, the Lee site is qualified for deployment of the **AP1000** Standard Plant.

Emergency Operations Facility (EOF)

- NRC Commission approval required to locate EOF greater than 25 miles from the Lee site
- A Near Site Assembly Area is provided at a Duke Energy facility approximately 15 miles from the Lee site in Kings Mountain, NC
- Proposed License Condition to demonstrate integrated capability and functionality to respond to emergency events at Lee site and one additional nuclear site prior to fuel load

Duke Energy Carolinas Nuclear Fleet

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Protecting People and the Environment

Combined License Application Review William States Lee III Units 1 and 2

Safety Panel

October 5, 2016

Panelists

- **Brian Hughes – Senior Project Manager**
- **Robert Roche-Rivera – Structural Engineer**
- **Kenneth Thomas – Emergency Preparedness Specialist**

Safety Panel Topics

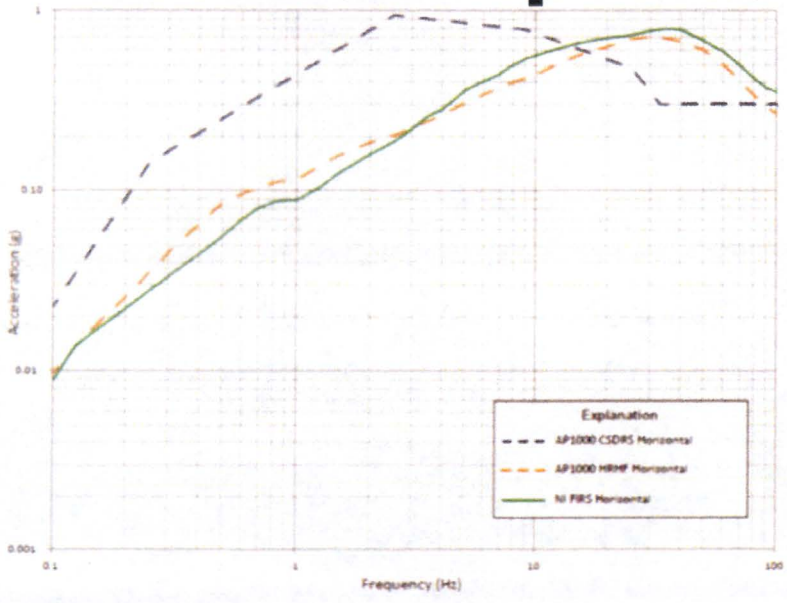
- **Site Foundation Response Spectra**
- **Emergency Operations Facility**

Lee Site Foundation Response Spectra (WLS DEP 2.0-1)

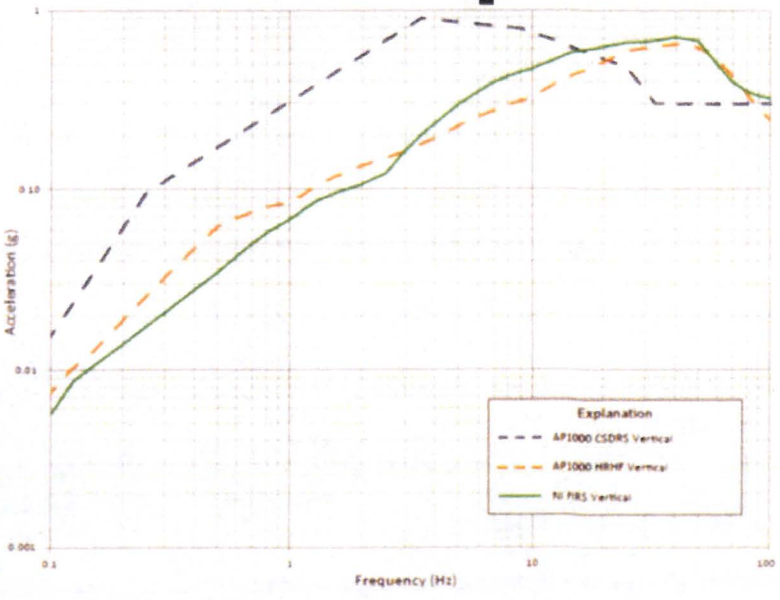
Robert Roche-Rivera – Structural Engineer

Lee Site Foundation Response Spectra

Horizontal Spectra



Vertical Spectra



Lee Site Foundation Response Spectra

- Exceeded the AP1000 CSDRS and HRHF spectra in the high frequency range.
- Required site-specific seismic evaluations of SSCs per the AP1000 DCD.

Site-Specific Evaluation; ISRS Comparison

- Site-specific evaluation was performed to demonstrate the high frequency exceedance is non-damaging.
- ISRS at DCD defined locations showed small exceedances.

Evaluations of SSCs to Address ISRS Exceedances

- NI SC-I and adjacent SC-II structures
- Primary components
- Piping systems
- Electro-mechanical equipment

Site-Specific Evaluation Bounded by AP1000 Design:

- Site-specific forces on NI SC-I structures are bounded by AP1000 forces.
- No physical interaction occurs between NI SC-I and adjacent SC-II structures.

Site-Specific Evaluation Bounded by AP1000 Design:

- Site-specific forces and stresses on primary components and piping systems are bounded by AP1000 forces and stresses, respectively.

Site-Specific Evaluation Bounded by AP1000 Design:

- Site-specific RRS for representative high frequency sensitive equipment are bounded by the AP1000 TRS.
- All future TRS will envelope the site-specific RRS.

Emergency Operations Facility (EOF)

Kenneth Thomas – Emergency Preparedness Specialist

Emergency Operations Facility (EOF)

- DEC request to use the existing corporate EOF in Charlotte, NC – greater than 25 miles from the Lee site
- 10 CFR Part 50, Appendix E, Section IV.E.8.b

Existing Corporate EOF

- Currently serves as the EOF for the McGuire (MNS), Catawba (CNS), and Oconee (ONS) Nuclear Stations
- MNS and CNS – since 1987
- All three sites – since 2005
  - SRM for SECY-05-0172

Evaluation Assessed the EOF's Capability

- Obtain and display plant data and radiological information
- Analyze plant technical information

Evaluation Assessed the EOF's Capability

- Provide technical briefings to Federal, State and local authorities responding to radiological emergencies
- Determine recommended public protective actions

ITAAC and License Condition

- Exercise required for Lee and one other site within the DEC fleet that demonstrates the EOF's capabilities to respond.
- Regulations in 10 CFR 50.47(b)(8) and Appendix E to Part 50 will be met.

Recommendation

- **The staff recommends that the location for the EOF be approved.**
- **ACRS December 14, 2015 letter recommended approval.**

Acronyms

- **ACRS – Advisory Committee on Reactor Safeguards**
- **CFR – Code of Federal Regulations**
- **CSDRS – Certified Seismic Design Response Spectra**

Acronyms

- **HRHF – Hard Rock High Frequency**
- **ISRS – In-Structure Response Spectra**
- **ITAAC – Inspections, Tests, Analyses, and Acceptance Criteria**

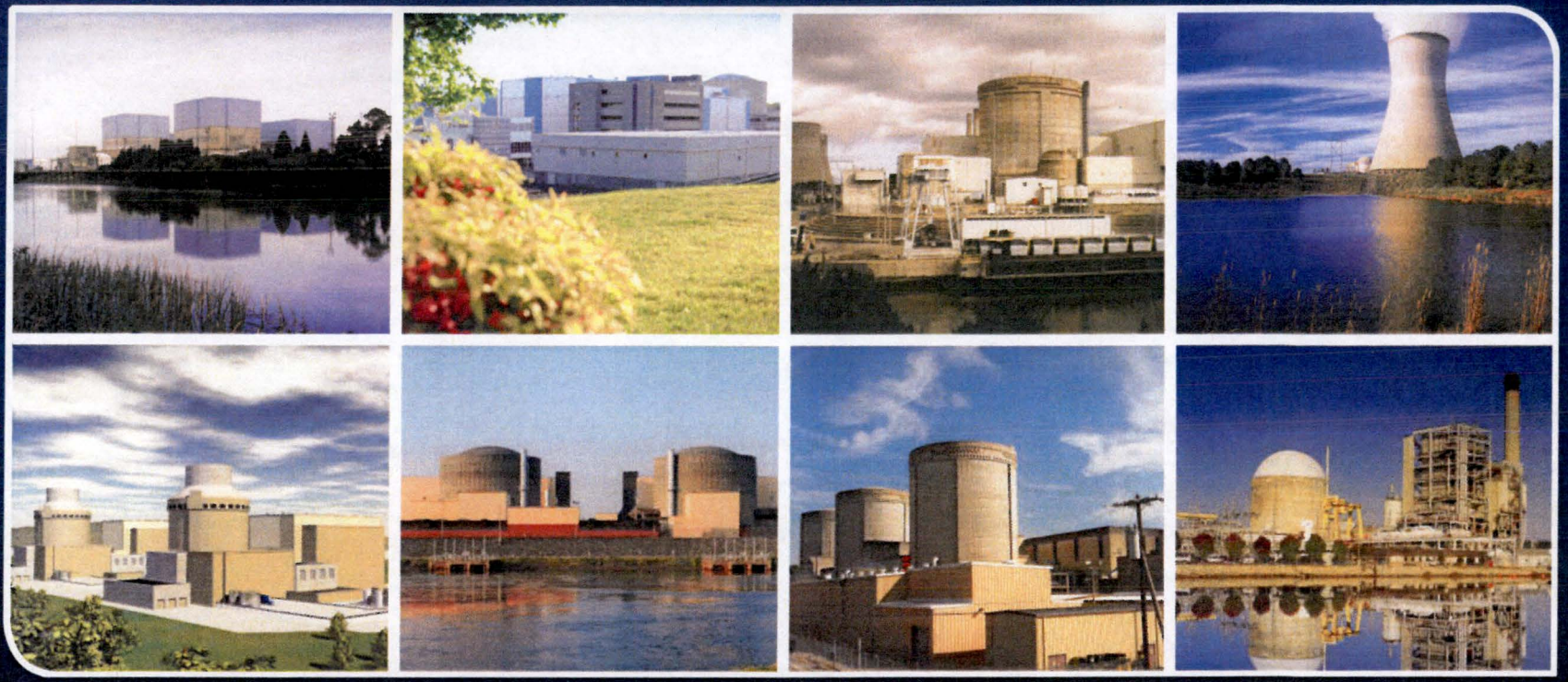
Acronyms

- **NI – Nuclear Island**
- **RRS – Required Response Spectra**
- **SC-I – Seismic Category I**
- **SC-II – Seismic Category II**
- **SRM – Staff Requirements Memorandum**

Acronyms

- **SSC – Structure, System, and Component**
- **TRS – Test Response Spectra**

EXHIBIT DEC-007



Lee Nuclear Station – Environmental

Paul Snead – John Thrasher – Bob Kitchen

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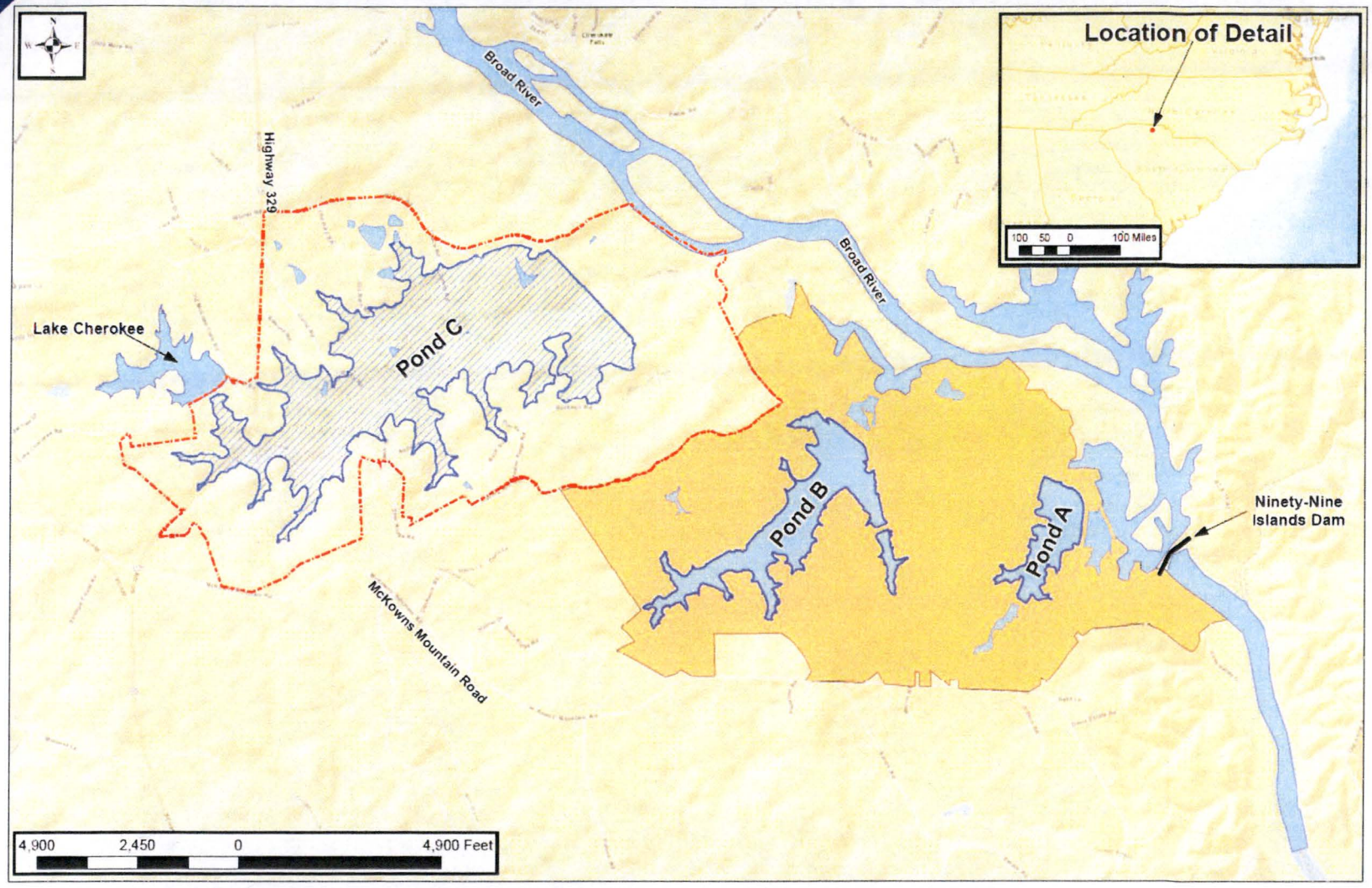
Summary of Environmental Review

- Environmental Report (ER) submitted December 2007 and supplemented September 2009
  - Thorough NRC staff audits of ER and alternative site analyses
  - Public outreach
  - Consultations with Federal, Tribal, State and Local Government entities
- FEIS published December 2013
- New & significant information reviews conducted

Lee Nuclear and Make-Up Pond C Sites



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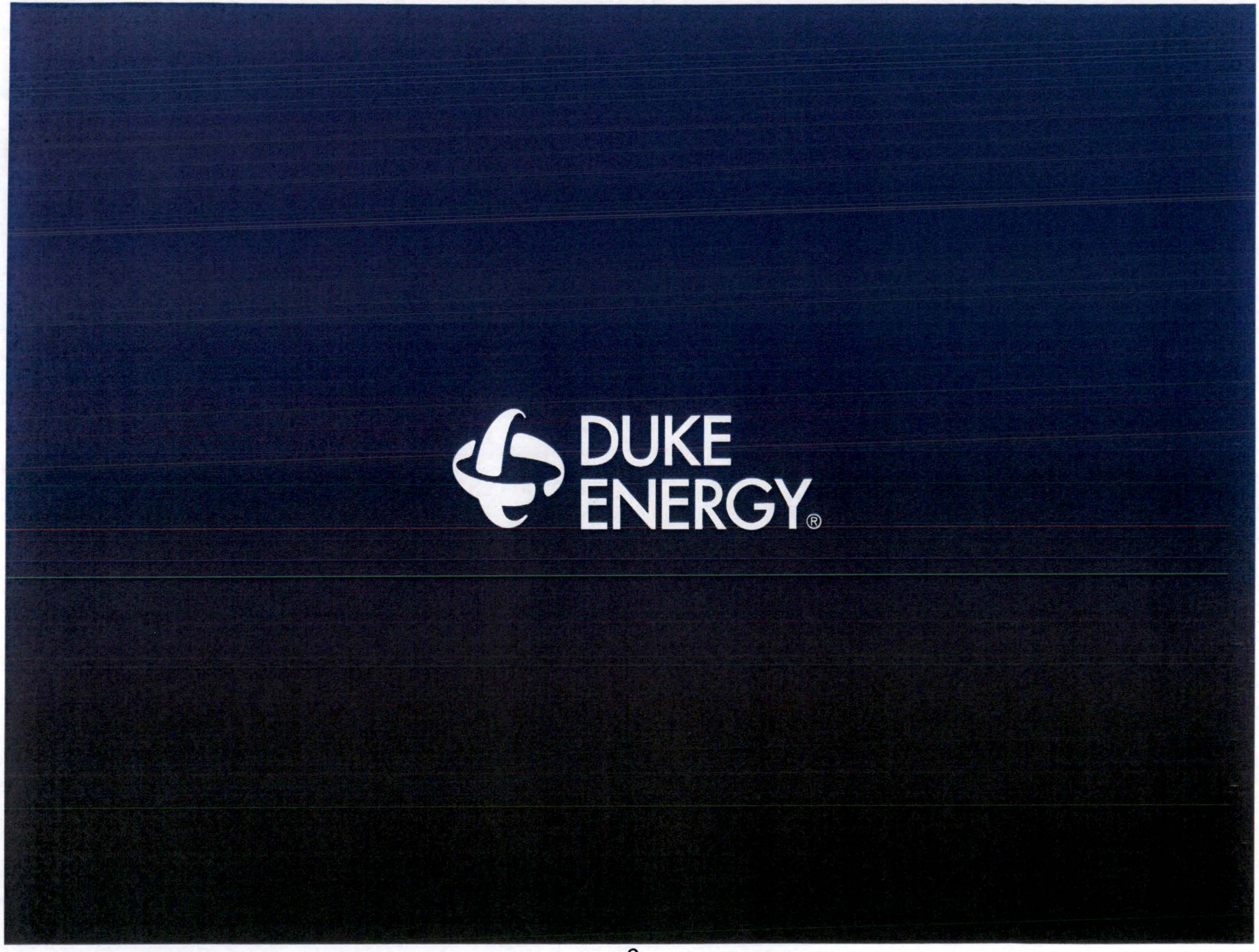
Water Management Plan

- Make-Up Pond C
  - Following drought in 2007/2008, Duke Energy planned for an off-site reservoir for supplemental cooling tower make-up water
  - Supplement to ER submitted September 2009
- NPDES Operating Permit
  - SCDHEC issued NPDES Permit July 2013
  - Permit establishes an alternative 316(b) requirement
    - More protective than the 5% proportional mean annual flow (MAF) requirements
    - Provided for 3.8-4.4% MAF withdrawal from Broad River

US Army Corps of Engineers Permitting

- USACE was cooperating agency with NRC in preparation of FEIS
- Compensatory Mitigation Plan developed to support permitting
- Mitigation Plan includes significant stream restoration project with USFS in Sumter National Forest
- 404 Permit issued by the Corps in September 2015 (memorializes Mitigation Plan)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Protecting People and the Environment

Combined License Application Review William States Lee III Units 1 and 2

Environmental Panel

October 5, 2016

Panelists

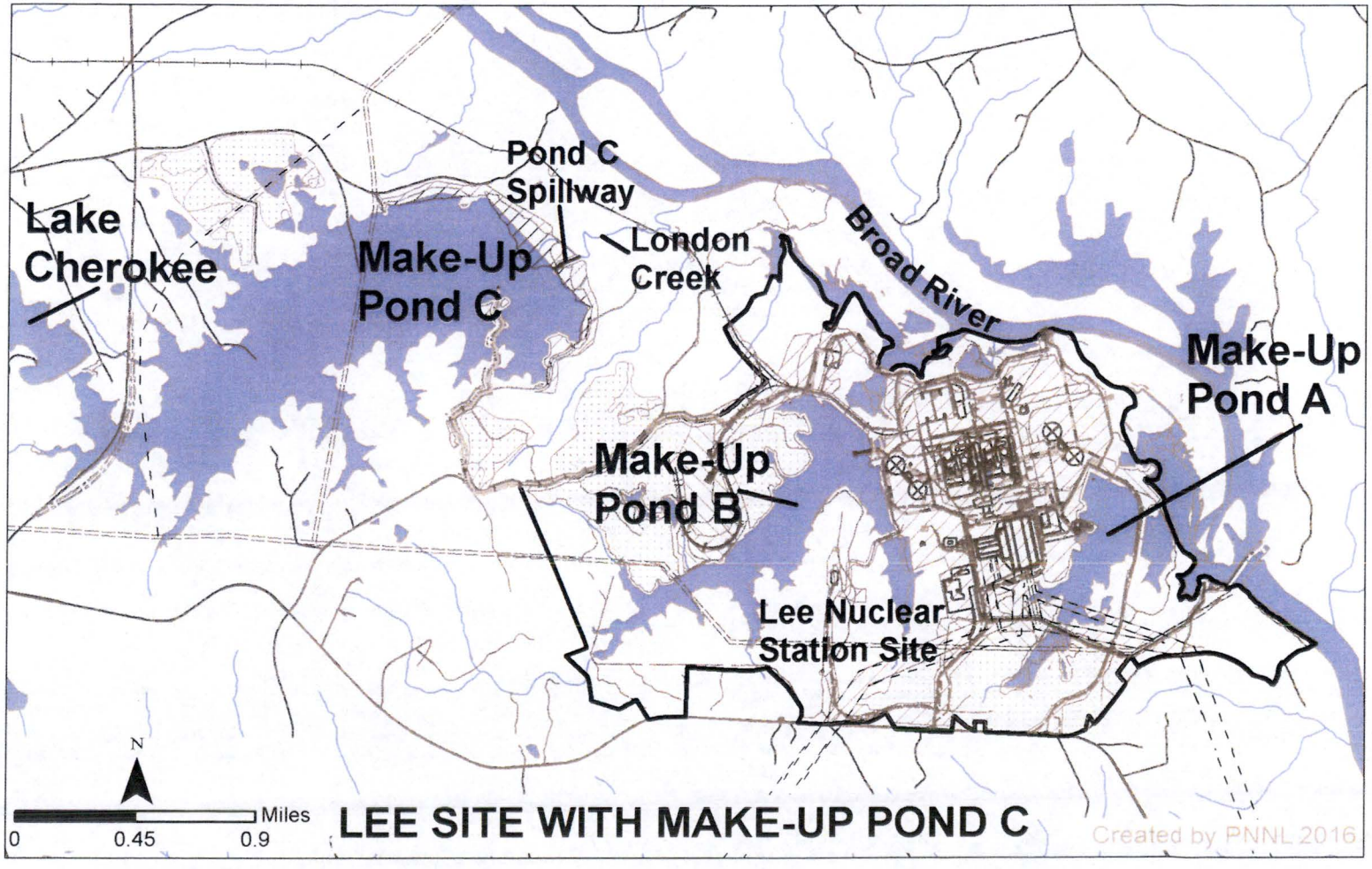
- **Patricia Vokoun, Lead Environmental Project Manager**
- **Lance Vail, Senior Research Engineer**

Background

- Initially proposed a two-pond off-stream water storage system (existing Make-Up Ponds A and B)
- 95% Operational water requirements met from Ninety-Nine Islands Reservoir through intake into Make-Up Pond A

NRC Initial Review

- EIS review team looked at the Lee Units 1 and 2 COLA water data
- Missing 2007-2008 drought years
- Low water flows at certain times would have resulted in impacts to aquatic biota and water users


Lake
Cherokee
Make-Up
Pond C
Pond C
Spillway
London
Creek
Broad River
Make-Up
Pond A
Make-Up
Pond B
Lee Nuclear
Station Site
N
Miles
0
0.45
0.9
LEE SITE WITH MAKE-UP POND C
Created by PNNL 2016

Water Storage Alternatives

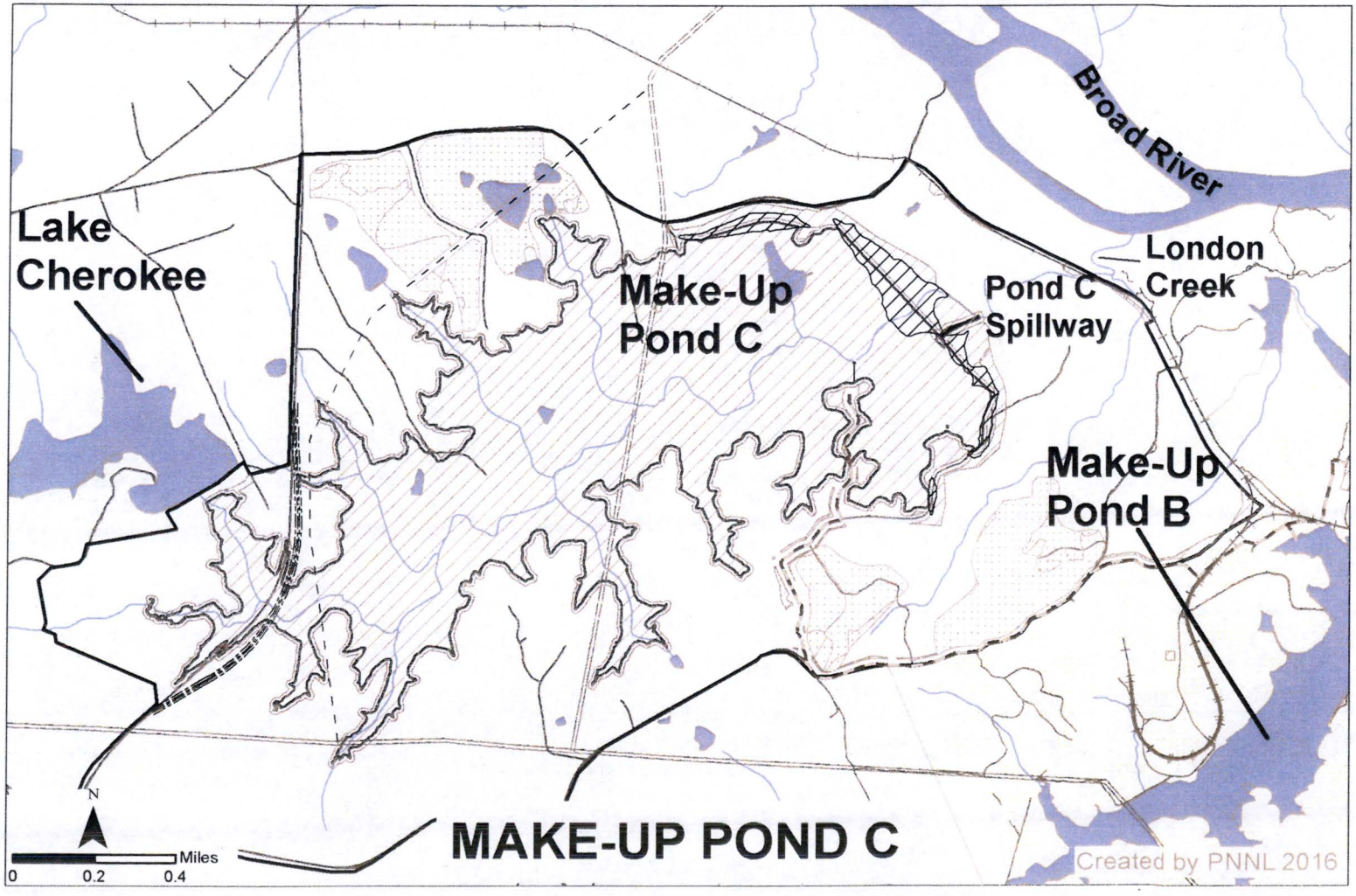
- Developed daily water budget model to evaluate range of scenarios and design options
- Evaluated water storage options, other pond locations, and other cooling system designs
- Hybrid cooling merited further investigation

Water Storage Options

- **Detailed Alternative Systems analysis completed to investigate other cooling technologies**
- **Supplemental audit of cooling system and energy alternatives**
- **Conclusion: Make-Up Pond C needed**

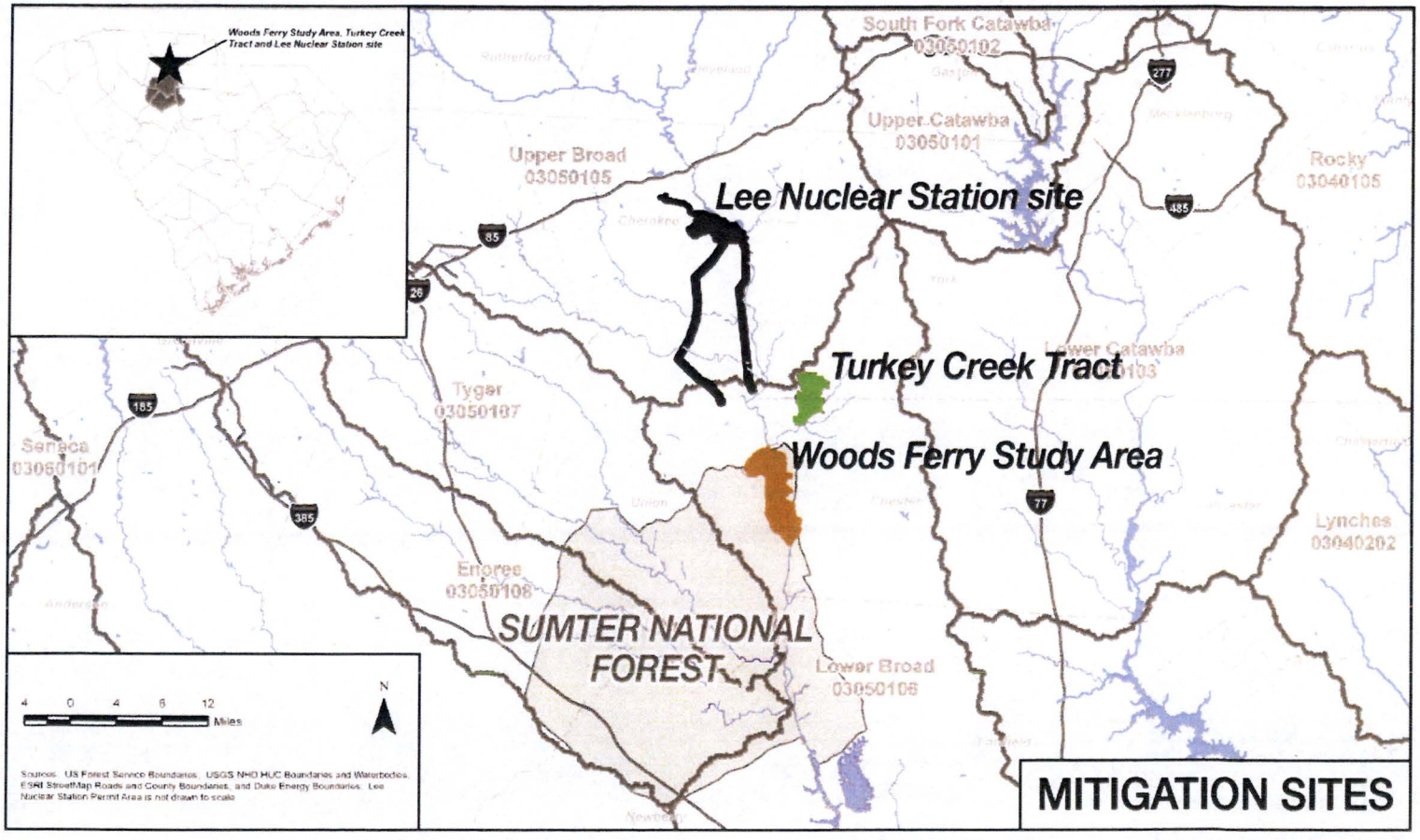
Impacts from Make-Up Pond C

- Disturbance of ~1,100 acres to build the reservoir and buffer
- Alter terrestrial and aquatic habitats and wildlife resources
- Substantial habitat loss and wildlife mortality, disturbance, and displacement


Broad River
Lake
Cherokee
Make-Up
Pond C
Pond C
Spillway
London
Creek
Make-Up
Pond B
N
Miles
0
0.2
0.4
MAKE-UP POND C
Created by PNNL 2016

Details of Impacts

- **Alter the functionality of the London Creek corridor as a wildlife travel corridor**
- **Replace an existing creek system with a deep water lake habitat**
- **Construction of Make-Up Pond C would have MODERATE aquatic and terrestrial impacts**


Woods Ferry Study Area, Turkey Creek Tract and Lee Nuclear Station site
South Fork Catawba 03050102
Upper Catawba 03050101
Upper Broad 03050105
Rocky 03040105
Lee Nuclear Station site
Turkey Creek Tract
Woods Ferry Study Area
Tyger 03050107
Seneca 03060101
Enoree 03050108
SUMTER NATIONAL FOREST
Lower Broad 03050106
Lynches 03040202
4 0 4 6 12
Miles
N
Sources: US Forest Service Boundaries; USGS NHD HUC Boundaries and Waterbodies; ESRI StreetMap Roads and County Boundaries; and Duke Energy Boundaries. Lee Nuclear Station Permit Area is not drawn to scale
MITIGATION SITES

Mitigation Partner processes

- Corps collaborated with Forest Service
- Forest Service Special Use Permit issuance to DEC anticipated
- Department of the Army Permit issued to DEC

Conclusions

- NRC hard look included additional
  - Scoping process and site visit
  - Audit and information needs
- NRC and Corps worked effectively
- NRC EIS enhanced consistency and efficiency in decision making