

## **PMSummerColpEM Resource**

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**From:** Sebrosky, Joseph  
**Sent:** Monday, October 03, 2011 11:46 AM  
**To:** PMSummerColpEM Resource  
**Cc:** MONROE, AMY; GILES, JULIE M; Martin, Jody  
**Subject:** info: SCE&G draft slides for Summer mandatory hearing  
**Attachments:** Summer Safety Panel 2 Draft.pdf; SCEG Mandatory Hearing Overview Draft.pdf; Summer Draft Safety Panel 1.pdf; Summer Safety Panel 3 Draft.pdf

Attached to this email are draft slides from SCE&G for the Summer mandatory hearing. The staff and the applicant are exchanging the draft slides for the mandatory hearing in order to avoid duplication of material presented to the Commission during the hearing.

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Office of New Reactors  
AP1000 Projects Branch 1  
301-415-1132

**Hearing Identifier:** VCSummer\_COL\_Public  
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**Subject:** info: SCE&G draft slides for Summer mandatory hearing  
**Sent Date:** 10/3/2011 11:45:51 AM  
**Received Date:** 10/3/2011 11:46:01 AM  
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MESSAGE	378	10/3/2011 11:46:01 AM
Summer Safety Panel 2 Draft.pdf		738401
SCEG Mandatory Hearing Overview Draft.pdf		2298456
Summer Draft Safety Panel 1.pdf		477207
Summer Safety Panel 3 Draft.pdf		639614

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**Priority:** Standard

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**Recipients Received:**

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South Carolina Electric & Gas Company  
Virgil C. Summer Nuclear Station Units 2 and 3  
Combined Licenses

Mandatory Hearing  
October 12, 2011

Safety – Panel 2

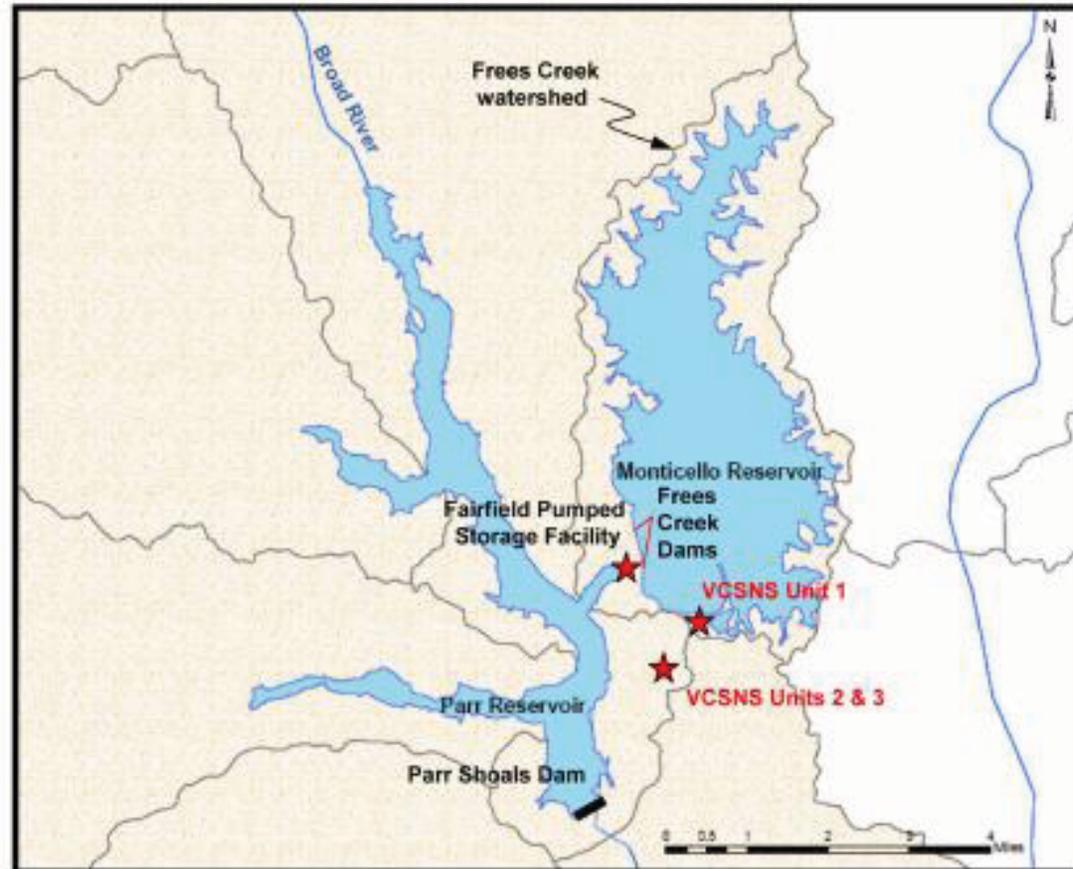
Amy Monroe (SCE&G)  
Robert Whorton (SCE&G)  
Steve Summer (SCE&G)

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# Topics

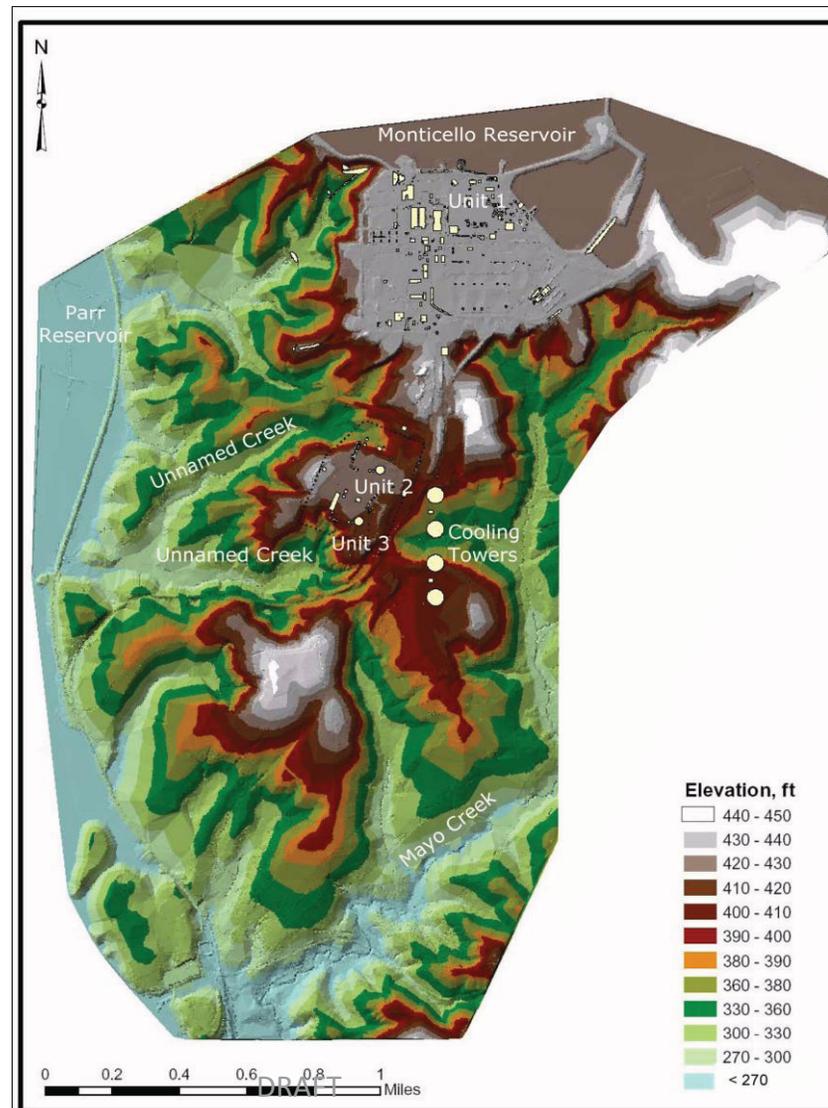
- Hydrology
- Seismic Margin Analysis
- Ground Motion Response Spectra (GMRS)
- Site Foundation Characteristics
- Waterproof Membrane
- Other External Events

# Major Surface Water Hydrologic Features

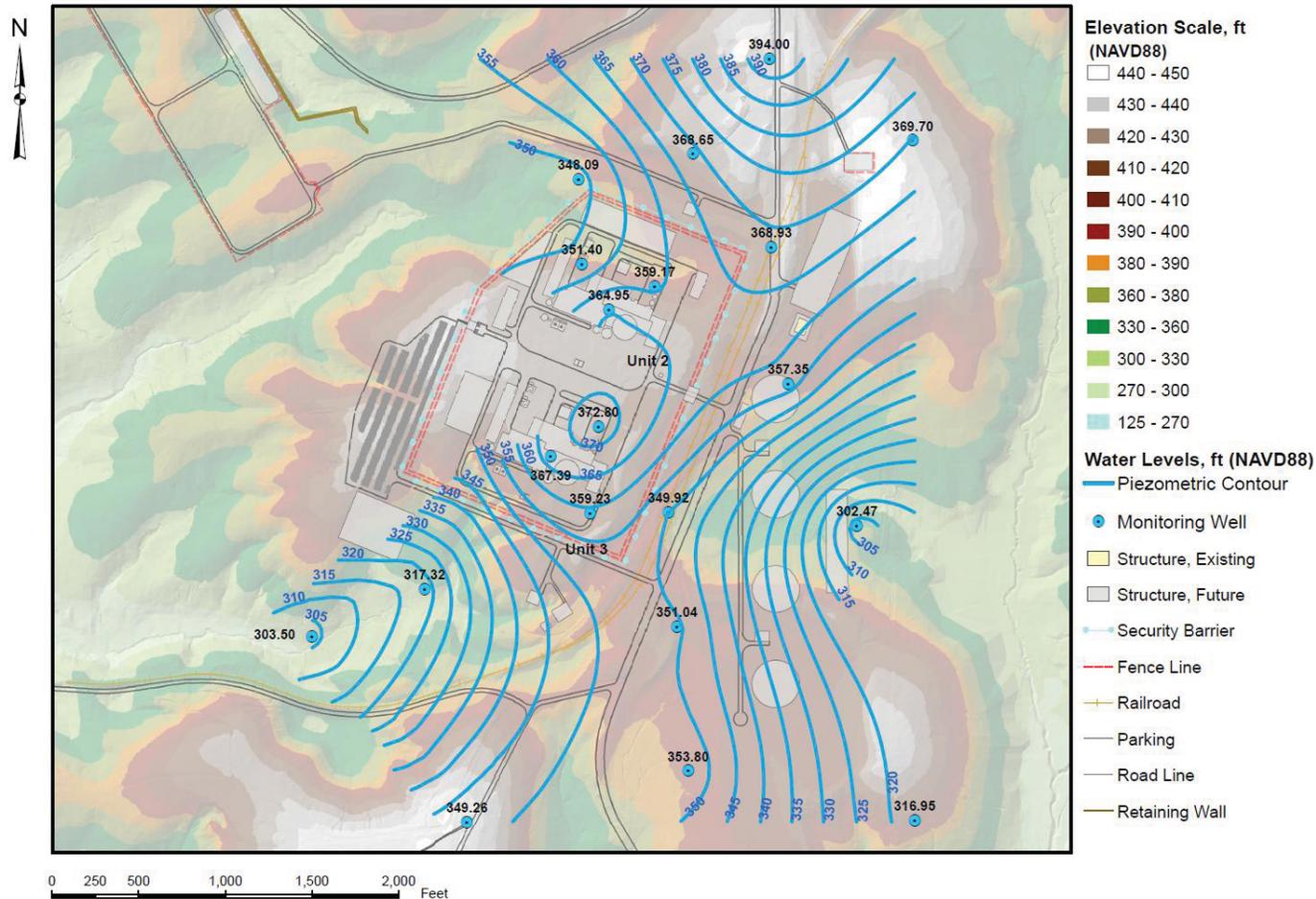


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# Site Topography



# Major Ground Water Hydrologic Features



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# Seismic Margin

- The site-specific Seismic Margin Analysis is addressed in FSAR Section 19.55.6.3
  - The site seismic demand based on the site-specific GMRS is enveloped by a seismic demand which combines both the Certified Seismic Design Response Spectra (CSDRS) and Hard Rock High Frequency (HRHF) design response spectra as defined by the Tier 1 criteria for Safe Shutdown Earthquake (SSE)
  - Therefore, the Seismic Margin Assessment analysis in the AP1000 Design Control Document (DCD) is applicable to the V.C. Summer site

# Seismic Margin

- High Confidence, Low Probability of Failures (HCLPF)
  - The V.C. Summer Nuclear Island (NI) is founded on hard (sound) rock which eliminates any potential for site specific effects such as seismically induced liquefaction settlements, slope stability, foundation failure or relative displacements which would lower the HCLPF values calculated for the certified design
  - For non-safety related structures and foundations adjacent to the NI, these site specific effects are evaluated in FSAR Section 2.5.4 and shown to have no effect on the NI; therefore, having no potential to lower the HCLPF values calculated for the certified design

# GMRS

- The V.C. Summer GMRS compared to AP1000 CSDRS showed exceedances at certain frequency ranges
  - The horizontal GMRS exceeds the CSDRS at about 15 to 80 hertz
  - The vertical GMRS exceeds the CSDRS at about 20 to 80 hertz
- These high frequency exceedances are within those of the HRHF spectra
- The high frequency exceedances were evaluated as acceptable in the DCD

# Site Foundation Characteristics

- The V. C. Summer site is underlain by competent (hard) bedrock, defined in RG 1.208 as material with shear wave velocity ( $V_s$ ) of about 2.8 km/sec (9200 ft/sec)
- The Nuclear Island (NI) will be constructed on the hard bedrock, using a layer of high compressive strength fill concrete to establish the required design elevation of the NI foundation
- We have available today some samples of the rock, which are basically granite type materials

# Site Foundation Characteristics

- The non-safety related power block structures (Turbine, Annex, and Radwaste Buildings) located adjacent to the NI will be founded on an imported (granular) engineered backfill, after removing native soil materials down to rock
- Use of engineered backfill for these structures minimizes any potential for site specific effects such as seismically induced liquefaction, settlements, slope stability or relative displacements

# External Events

- Other external events are evaluated in FSAR Section 19.58, including the following:
  - High winds (i.e., tornado, hurricane, extratropical cyclones)
  - External flooding
  - Transportation and nearby facility accidents (i.e., aviation, marine, pipeline, railroad, truck)
  - Additional events at nearby facilities (i.e., explosions, flammable vapor clouds, toxic chemicals)
  - External fires (i.e., wildfire surrounding the site)
- The V.C. Summer site is bounded by the evaluation of these external events in the AP1000 DCD

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South Carolina Electric & Gas Company  
Virgil C. Summer Nuclear Station Units 2 and 3  
Combined Operating License  
Mandatory Hearing

Introduction and Overview  
October 12, 2011

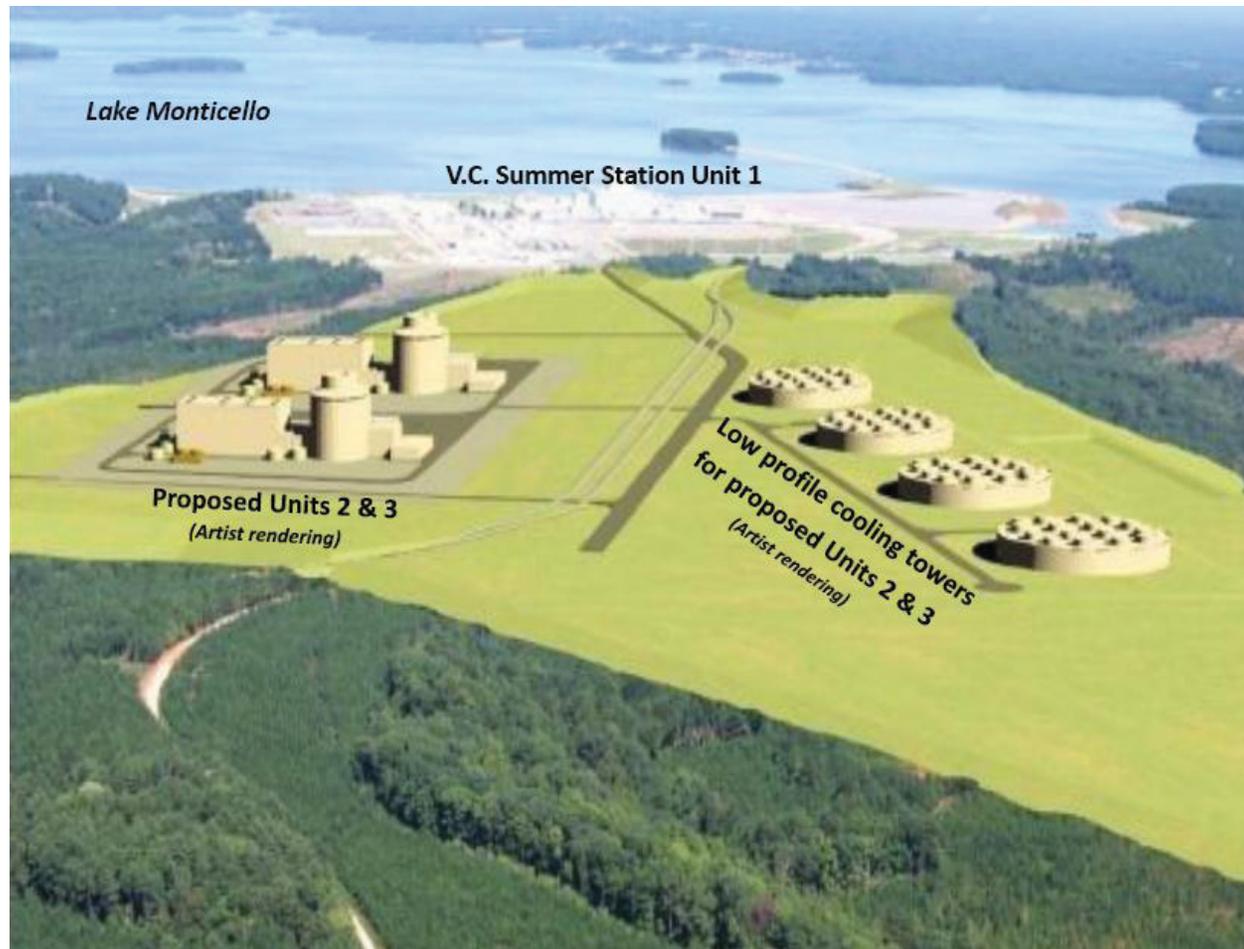
Stephen Byrne (SCE&G)

Alfred Paglia (SCE&G)

Amy Monroe (SCE&G)

April Rice (SCE&G)

# VCSNS Site



# VCSNS Site Location



# VCSNS Site Development



# VCSNS Site Development



# VCSNS Site Development



# VCSNS Site Development



November 2009

# VCSNS Site Development



# VCSNS Site Development



# VCSNS Site Development



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# Application Content

- Combined License Application (“COLA”) for 2 Units Submitted March 2008
  - Meets content requirements of Part 52, Subpart C “Combined Licenses”
  - Incorporated By Reference the AP1000 DCD Amendment
  - First Subsequent (S)-COLA
- NRC Guidance Utilized
  - Regulatory Guide 1.206
  - NUREG-0800 (generally updated for Part 52)
  - NUREG-1555
- Other Industry Documents Promoting Standardization
  - Nuclear Energy Institute (NEI) templates

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# COLA Submittal

- Incorporates by Reference the AP1000 DCD, Revision 19
- 17 distinct parts to the application
  - 10 containing primarily standard AP1000 information, while 5 of these parts contain program information that have essentially identical content to that of the R-COLA
- Subsequent COLA (S-COLA)

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# COLA Safety Content

- Compliance with 10 CFR Part 52 Requirements
  - 52.73, 52.77, 52.79 and 52.80
- Compliance with 10 CFR 50.33
- Compliance with 10 CFR Part 52, Appendix D
- Utilized NRC Guidance – Regulatory Guide 1.206 and NUREG-0800

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# COLA Safety Content - Departures

- Standard
  - FSAR Numbering and Organization (administrative)
  - Voltage Regulating Transformer Design
- Site specific
  - FSAR Numbering and Organization for Chapter 2 (administrative)
  - Emergency Facility Locations
  - Wet-bulb Departure

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# COLA Safety Content – Exemptions

- Standard
  - DCD Numbering and Organization
  - MC&A Program Description (Consistent with requirements of Part 50 licensee)
- Site specific
  - Wet-bulb Exemption from DCD Site parameter (Maximum Safety Non-coincident Wet Bulb Temperature)

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# Environmental Report Content

- Prepared using NUREG 1555
- Two revisions to the ER submitted
- Table 1.3-1 delineates 10 CFR 51 requirements
- Utilized previous environmental studies
  - Unit 1 License Renewal data
  - Unit 1 monitoring data

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# Environmental Report Content

- Chapter 1 Introduction
- Chapter 2 Environmental Description
- Chapter 3 Plant Description
- Chapter 4 Impacts of Construction
- Chapter 5 Impacts of Station Operation
- Chapter 6 Environmental Measurements and Monitoring Programs

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# Environmental Report Content

- Chapter 7 Environmental Aspects of Postulated Accidents
- Chapter 8 Need for Power
- Chapter 9 Proposed Action Alternatives
- Chapter 10 Environmental Consequences of the Proposed Action
- Appendix A Agency Letters

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# Resource Areas

- Cultural Resources
- Aquatic and Terrestrial Ecology
- Water Use
- Land Use
- Socioeconomics/Environmental Justice
- Radiation Protection
- Alternatives
- Cost/Benefit

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# Key Agency Interfaces

## SCDHEC

- **Stormwater Permits for land disturbance**
- **Batch Plant Air permit**
- **Construction Permit for Water/ Wastewater**
- **NPDES Permit For Water/Wastewater**
- **401 Water Quality Certification**

## OTHER AGENCIES

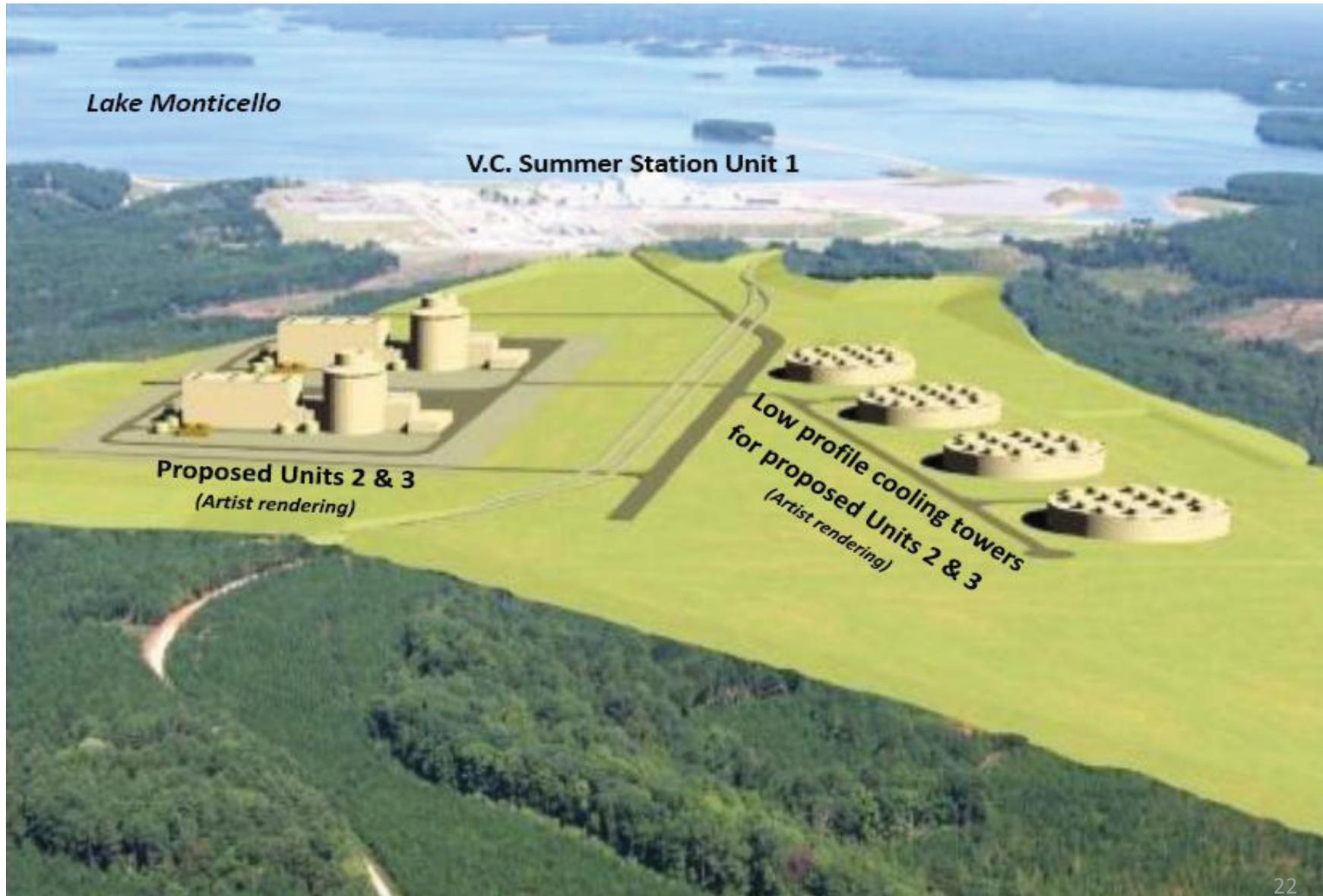
- **SCDOT Road Modification Permit**
- **Norfolk Southern Railroad Modification Permit**
- **SHPO/COE MOU**
- **SC Public Service Commission (CPCN)**
- **DOE (spent fuel contract)**
- **FERC License Amendment**
- **USACE 404 Wetlands Permit**
- **SCDNR, USFWS, NMFS**

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# Environmental Conclusions

- Impacts of the project are small except:
  - Localized traffic during construction (moderate to large)
  - Transmission line construction (moderate)
- Benefits include:
  - Fuel diversity and emissions avoidance
  - Socioeconomic: jobs, local spending and taxes (small to large)

# VCSNS Site



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South Carolina Electric & Gas Company  
Virgil C. Summer Nuclear Station Units 2 and 3  
Combined Licenses

Mandatory Hearing  
October 12, 2011

Safety – Panel 1

Amy Monroe (SCE&G)  
Mark Stella (Westinghouse)

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# Topics

- Chapter 1 - Introduction and Interfaces
- Chapter 2 - Site Characteristics
  - Maximum Safety Wet Bulb (Noncoincident) Air Temperature
  - Geography and Demography
  - Nearby Industrial, Transportation, and Military Facilities

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# Introduction and Interfaces

- Chapter 1 - Introduction and Interfaces
  - Utilized the guidance of Regulatory Guide 1.206 to inform format and content
  - Included information that was both standard and site specific
  - Identifies how COL Items are addressed within the application
  - Identifies departures
  - Details compliance with Regulatory Guides

# Site Characteristics

- The NRC regulations (10 C.F.R. 52.79(d)(1); 10 C.F.R. Part 52, Appendix D, Section IV.A.2.d) require an applicant to provide information to demonstrate that the site characteristics fall within the site parameters specified in the design certification
  - “Site Characteristics” are the actual physical, environmental and demographic features of a site
  - “Site Parameters” are the postulated physical, environmental and demographic features of an assumed site, and are specified in a standard design certification

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# Site Characteristics

- Site Characteristics are addressed in FSAR Chapter 2
  - Section 2.0 (Site Characteristics)
  - Section 2.1 (Geography and Demography)
  - Section 2.2 (Nearby Industrial, Transportation, and Military Facilities)
  - Section 2.3 (Meteorology)
  - Section 2.4 (Hydrologic Engineering)
  - Section 2.5 (Geology, Seismology, and Geotechnical Engineering)

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# Site Characteristics

- Site Parameters are provided in the AP1000 Design Control Document (DCD), Tier 1, Chapter 5 and Table 5.0-1, and Tier 2, Table 2-1
- FSAR Table 2.0-201 provides a comparison of the AP1000 DCD Site Parameters with the V.C. Summer Site Characteristics

# Site Characteristics

- The following parameters are addressed in FSAR Table 2.0-201:
  - Air Temperature
  - Wind Speed
  - Seismic
  - Soil
  - Missiles
  - Flood Level
  - Groundwater Level
  - Plant Grade Elevation
  - Precipitation
  - Atmospheric Dispersion Values
  - Population Distribution

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# Site Characteristics

- With one exception, the V.C. Summer Site Characteristics fall within the AP1000 Site Parameters
  - The one exception is for the Maximum Safety Wet Bulb (Noncoincident) Air Temperature

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## Maximum Safety Wet Bulb (Noncoincident) Air Temperature

- DCD Site Parameter Value is 86.1°F
  - DCD, Tier 1, Table 5.0-1
  - DCD, Tier 2, Table 2-1
- V.C. Summer Site Characteristic Value is 87.3°F
  - 100-year return value derived through linear regression (FSAR Section 2.3.1.5)
  - Greater than Site Parameter by 1.2°F

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## Maximum Safety Wet Bulb (Noncoincident) Air Temperature

- Departure – VCS DEP 2.0-1
  - Evaluated in COLA Part 7, Section A
- Exemption from 10 C.F.R. Part 52, Appendix D, Section IV.A.2.d
  - Evaluated in COLA Part 7, Section B

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## Maximum Safety Wet Bulb (Noncoincident) Air Temperature

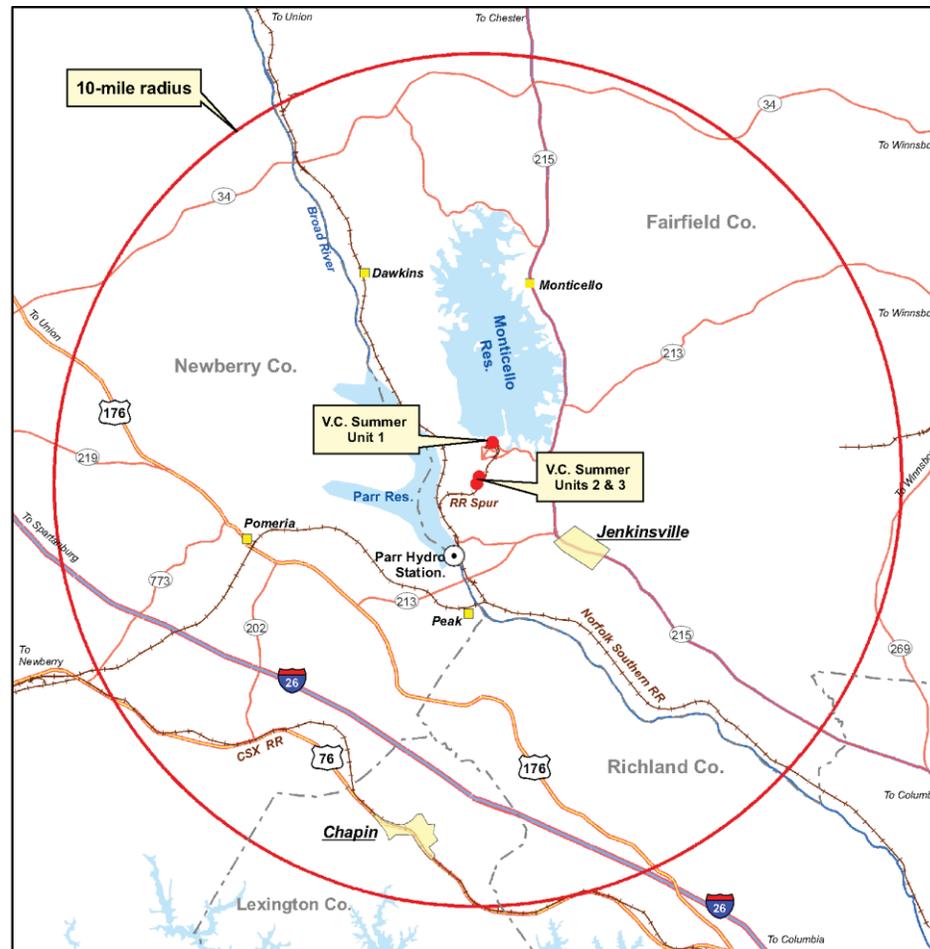
- Analyzed the maximum safety wet bulb (noncoincident) air temperature at a bounding value of 87.4°F
- Evaluations to support departure and exemption requests:
  - Containment Pressure Design Limit Evaluation
  - In-Containment Refueling Water Storage Tank (IRWST) Temperature Control with Normal Residual Heat Removal System
  - Component Cooling Water System Maximum Temperature <100°F During Power Operation
  - Nuclear Island Nonradioactive Ventilation System Capability

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## Maximum Safety Wet Bulb (Noncoincident) Air Temperature

- Concluded that the higher maximum safety wet bulb (noncoincident) air temperature will not adversely affect any safety-related structures, systems, or components, their functional capabilities or analysis methods as presented in the DCD

# Geography and Demography



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# Nearby Industrial, Transportation, and Military Facilities

- SCE&G Facilities (VCSNS Unit 1, Fairfield Pumped Storage, Parr Hydroelectric Plant, Parr Combustion Turbines)
- Pipeline
- Railway

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South Carolina Electric & Gas Company  
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Combined Licenses

Mandatory Hearing  
October 12, 2011

Safety – Panel 3

Amy Monroe (SCE&G)  
Robert Williamson (SCE&G)  
Jamie LaBorde (SCE&G)  
Tim Schmidt (SCE&G)

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# Topics

- Emergency Planning
- Toxic Gas
- Offsite Power System

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# Emergency Planning

- 10 C.F.R. 52.79(a)(21) requires a COLA to include an emergency plan
- The Radiological Emergency Plan is provided as Part 5 of the COLA
  - Establishes the concepts, evaluation and assessment criteria, and protective actions that are necessary in order to limit and mitigate the consequences of potential or actual radiological emergencies
  - Single plan for Units 1, 2, and 3

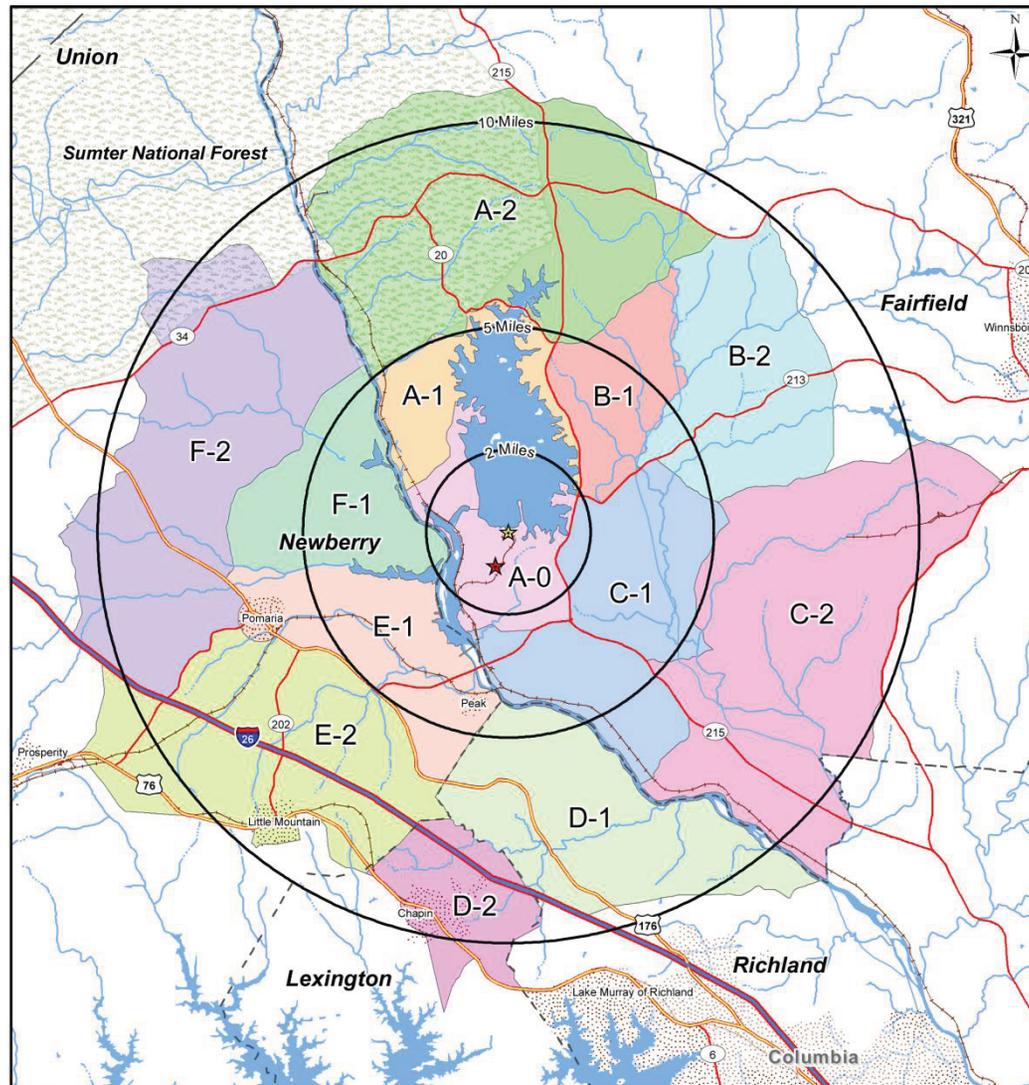
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# Emergency Planning

- Emergency Plan Content
  - Part 1 – Introduction
  - Part 2 – Planning Standards and Criteria
  - Annex 1 – Unit 1
  - Annex 2 – Unit 2
  - Annex 3 – Unit 3
  - Appendices, including:
    - Letters of Agreement
    - Procedure Cross-Reference to the Emergency Plan
    - Evacuation Time Estimate Study
    - Regulatory Requirements Cross Reference Document

# Emergency Planning

- 10-Mile Emergency Planning Zone (Emergency Plan, Figure 1-3)



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# Emergency Planning

- Emergency Planning Milestones
  - Full participation exercise conducted within 2 years of scheduled date for initial loading of fuel
  - Onsite exercise conducted within 1 year before the scheduled date for initial loading of fuel
  - Detailed implementing procedures for Emergency Plan submitted at least 180 days prior to scheduled date for initial loading of fuel
  - Emergency Response Data System (ERDS) implementation program submitted at least 180 days prior to scheduled date for initial loading of fuel

# Toxic Gas

- Accidents involving the release of toxic chemicals from onsite storage facilities and nearby mobile and stationary sources are considered in FSAR Section 2.2.3.1.3.
- Areal Locations of Hazardous Atmospheres (ALOHA) air dispersion model was used to predict the concentrations of toxic chemical clouds as they disperse downwind
  - Exception was fuel oil, which was analyzed using the Toxic Dispersion Model (TOXDISP)
  - ALOHA used to determine the maximum distance a cloud can travel before it disperses enough to fall below the Immediately Dangerous to Life and Health (IDLH) concentration
  - ALOHA used to predict concentration in control room following a chemical release to ensure that, under worst-case scenarios, control room operators will have sufficient time to take appropriate action
- Evaluation concluded that the formation of a toxic vapor cloud following an accidental release of the analyzed hazardous materials would not adversely affect the safe operation or shutdown of new units

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## Chapter 9 - Auxiliary Systems

- Service Water System Cooling Towers
- Raw Water System has no safety related function and failure of the system will not affect the ability of a safety system to perform its function.

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# Design Considerations

- Meets regulatory requirement (10CFR20.1406) and guidance (RG 4.21)
- Incorporated industry OE and lessons learned into the WWS design
  - HDPE utilized versus carbon steel, ductile iron or fiberglass
  - No pumps, valves or vacuum breakers along the line
  - Blowdown flow is via gravity

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# Construction Considerations

- Construction requirements ensure long-term integrity
  - Qualified welders and processes
  - Proven installation techniques based on operating experience
  - Weld inspections
  - Hydrostatic testing
- Expect long life with HDPE
  - Over 40 years industry experience with HDPE
  - Over 10 years experience in Nuclear HDPE applications

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# Off-site Power

- 12 overhead transmission lines connect the new 230 kv switchyard to other substations
- Switchyard is robust
- Failure Analysis performed
- Grid Stability Study performed
  - Includes the Westinghouse interface requirement for maintaining Reactor Coolant Pump voltage for 3 seconds after a turbine trip



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# Off-site Power

- Standard Departure (STD DEP 8.3-1)
  - The DCD states that the Class 1E battery chargers and Class 1E voltage regulating transformers are designed to limit the input (ac) current to an acceptable value under faulted conditions on the output side
  - However, the AP1000 voltage regulating transformers do not have active components to limit current