Alternative Site Selection Process

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Tom Moorer

- Professional Experience
  - Over 31 years experience in electric utility environmental management
  - 18 years experience in nuclear environmental management; extensive experience in water and wastewater, NEPA, and environmental permitting
  - NEPA experience includes development of Environmental Reports, coordination of Environmental Impact Statements for License Renewal for three SNC facilities
  - Extensive experience in selection and evaluation of generating plant sites (nuclear and fossil) and in evaluation of NEPA siting alternatives
  - Currently Nuclear Development Environmental Manager for Southern Nuclear

- Education
  - Auburn University BS Environmental Science 1979
  - University of Alabama - BS Civil/Environmental Engineering 1983
  - University of Alabama – Post Graduate work/Adjunct Professor – 1983-1985

Exhibit SNC000014

Environmental Impacts of Alternatives

- The analysis of alternatives is one of the basic elements of NEPA requiring the applicant to demonstrate that no "obviously superior alternative" to the proposed site exists (40 CFR 1502)
- Alternatives are discussed in Chapter 9 of the ER and FEIS and include:
  - No-Action Alternative
  - Energy Alternatives
  - Alternative Sites
- Guidance is provided in Section 9.2 of RegGuide 4.2 and in Section 9.3 of ESRP. RegGuide 4.7 also provides useful information on site evaluation parameters

Environmental Impacts of Alternatives

- Key element of SNC process is definition of “relevant service area” and “region of Interest” *(Ref. ESRP Section 8.1)*
- SNC uses the Relevant Service Area (RSA) to describe the geographic area where VEGP co-owners would sell electricity
- Region of Interest (ROI) refers to the geographic area evaluated by SNC for locating alternative energy sources and sites
- ROI is the area contiguous to Southern Company territory and includes Georgia, Alabama, Mississippi, and the Florida panhandle
- Traditionally, utilities could only locate alternative generation within their RSA (i.e., ROI and RSA were the same)

No-Action Alternative

- No-Action alternative
  - No-Action alternative is the non-issuance of the ESP and COL
  - Applicant would lose the benefits of ESP and COL and the associated generation
- This alternative does not avoid environmental impact, but simply shifts to impacts from another generation form
- Initially impact would occur as reduced generation margin, and would degrade quickly over time to impair the ability to serve the customer

Energy-Related Alternatives

- Energy-related alternatives can be divided into two groups:
  (1) Those that do not require new generating capacity
  (2) Those that do.

- The Alternatives analysis is predicated on selection of alternatives comparable to a 2234 MWe baseload plant

Non-Generation Energy Alternatives

- Alternatives not requiring generating capacity:
  - Purchased Power Agreements (PPAs)
  - Life Extension of existing plants
  - Demand-Side Management (DSM) including conservation
  - Combinations of these elements
- Impacts from non-generation alternatives are evaluated in Section 9.2 of the ER and in Section 9.2 of the FEIS

Exhibit SNC000001, Section 9

Alternatives Involving Generation

- Alternatives requiring generation include:
  - Wind
  - Solar
  - Hydro
  - Geothermal
  - Municipal Solid waste (MSW)
  - Petroleum liquids
  - Fuel cells
  - Pulverized coal
  - Integrated Gasification Combined Cycle (IGCC)
  - Natural Gas
  - Combinations of the above technologies

Exhibit SNC000001, section 9.2

Energy Alternatives Evaluation

- None of the non-generation alternatives alone, nor a combination of these alternatives provides a long-term option to meet the increasing demand forecast (~1.8 %/year). As such, the non-generation alternative is not viable
- For the generation alternatives, combinations of fuel types offer some promise and two combinations were considered in the SNC ER: (1) a CC gas-fired/wind combination, and (2)CC gas-fired/coal combination

Combinations of Energy Alternatives

- CC gas/wind combination was considered since wind alone does not have the capacity to replace 2234 MWe of baseload energy
  - Four 530 MWe gas plants and 120 MWe wind were combined for the evaluation
  - The environmental impacts of this alternative did not compare favorably to the VEGP Unit 3 and 4 nuclear project
- The coal/gas alternative also did not favorably compare, with coal having more impact than gas. As such, the coal wind combination was not evaluated
- Impacts from generation alternatives are evaluated in Section 9.2 of the ER and FEIS.

Exhibit SNC000001, section 9

Alternate Site Process – Regulatory Bases

- 10 CFR 52.17(a)(2) mandates that an analysis of alternatives to the proposed site be evaluated to verify that no "obviously superior site" to the proposed site exists
- Traditional method used for existing fleet has changed since there are now nuclear sites that can be used in the comparison
- NRC recognizes this in ESRP Section 9.3 (iii)(8)
- SNC included all existing nuclear facilities in the RSA/ROI in the ER Alternative site analysis.
- SNC Process driven by guidance in RegGuide 4.2 and ERSP
  - Section 9.2 of RegGuide 4.2
  - Section 9.3 of ESRP
- RegGuide 4.7 provided useful information regarding site selection parameters and criteria; EPRI Siting Guide was also useful

Alternate Site Selection Process

- SNC Alternate Site process consists of two primary steps:
  - (1) Identify all potential sites in ROI with existing units of 1000 MWe or greater, adequate land availability, and available cooling water and all large greenfield sites currently owned by Southern Company
  - (2) From this information, a potential site list was developed for further review

Alternate Site Selection Process

- Process began with identification of all sites within Southern Company ROI that provided baseload generation and all available greenfield and brownfield sites
- SNC process focuses on alternative sites that are reasonable with respect to being licensable and capable of being developed
- Screening criteria based on size were developed and this list was narrowed to baseload sites greater than 1000 MWe
- Additional screening criteria were applied including land availability, cooling water, transmission access, site geology, demographics, etc.
- Final list included 12 generating plants in Georgia and Alabama, and two greenfield sites

Alternate Site Selection Process

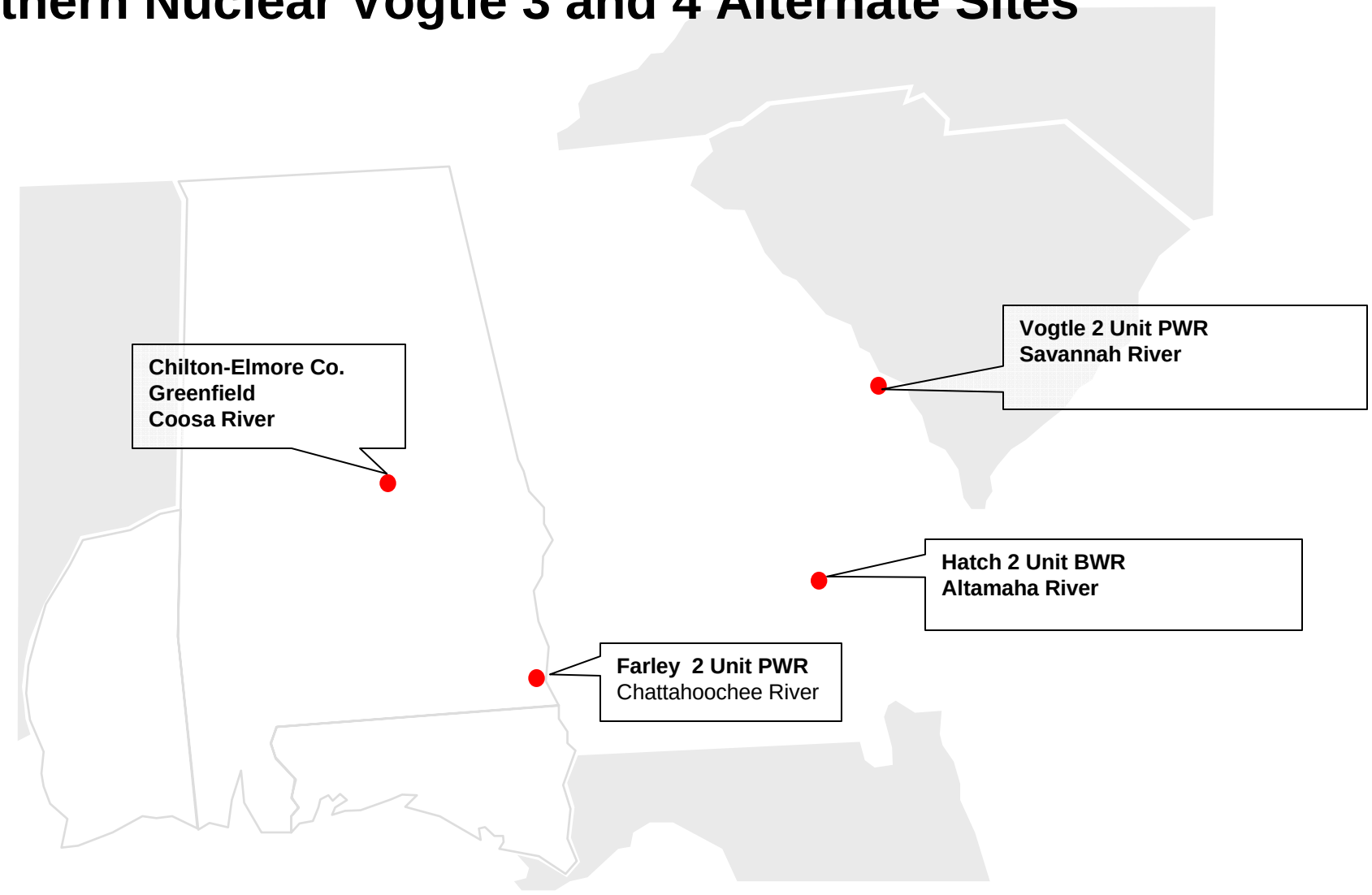
- Georgia Sites:
  - Plant Bowen (coal)
  - Plant Branch (coal)
  - Plant Hammond (coal)
  - Plant Scherer (coal)
  - Plant Hatch (nuclear)
  - Plant Vogtle (nuclear)
  - Savannah River Site (SRS) was identified on initial list but was removed because it is not part of RSA or ROI

Alternate Site Selection Process

- Alabama sites included:
  - Plant Barry (coal)
  - Plant Gaston (coal)
  - Plant Greene County (coal)
  - Plant Gorgas (coal)
  - Plant Miller (coal)
  - Plant Farley (nuclear)
  - Chilton Elmore (aka Barton) (greenfield nuclear)
  - Dallas County (greenfield nuclear)
  - TVA's Browns Ferry and Bellefonte were identified as being in Alabama but were not included since they are not in GPC RSA or Southern Company ROI

Southern Company Generation Sites

Southern Nuclear Vogtle 3 and 4 Alternate Sites



Alternate Site Selection Process

- All nuclear sites were included since these sites have years of construction and operating experience
- SNC also confirmed that co-location with an existing nuclear site offered distinct advantages including:
  - Existing infrastructure and support facilities
  - Impacts of existing facility are known and impacts of new facility should be comparable
  - Site physical criteria, e.g., geologic/seismic suitability, emergency planning have been characterized and are known
  - Transmission is generally available
  - Existing nuclear sites have local support and experienced personnel

Alternate Site Selection Process

- For the reasons discussed in the previous slide, existing nuclear sites have demonstrable advantages over existing coal or other generation-type sites
- Southern company has three existing nuclear sites within the RSA and two potential greenfield sites
- SNC selected four candidate sites:
  - Joseph M. Farley Plant near Dothan AL
  - Edwin I. Hatch Plant near Vidalia, Georgia
  - Vogtle Electric Generating Plant near Waynesboro, GA
  - Chilton-Elmore (aka Barton) site near Clanton, AL

Alternate Site Selection Process

Superiority of existing sites within ROI

- SNC determined that co-locating at an existing nuclear facility outweighed the advantages of all other siting alternatives. Some of these advantages include:
  - Total number of sites is reduced
  - Potential for use of existing transmission corridors
  - Control of property is obtainable and additional land is not likely needed
  - Site has already been through NEPA process and has been through intense environmental screening
  - Site development and pre-construction costs are reduced
  - Existing site infrastructure minimizes construction and operational costs
- Greenfield site was originally a four unit nuclear site with PSAR complete in the 1970's, but was never developed

Alternate Site Review Process

- After the alternate sites were selected, SNC used guidance in RegGuide 4.2 and the ESRP to set up review criteria to compare the sites to determine if an "obviously superior site" existed
- RegGuide 4.2 indicates " the applicant is not expected to conduct detailed studies at alternative sites; only reconnaissance-type investigations need be constructed"
- The SNC process considered impacts from both construction and operations to determine a significance level of impact for each criteria or category.
- A single significance level of SMALL, MODERATE, or LARGE was assigned to each analysis consistent with criteria in 10 CFR 50, Appendix B, Table B-1.

Alternate Site Review Process

- Subject areas for evaluation include:
  - Land-use impacts
  - Air quality
  - Hydrology
  - Water use
  - Water Quality
  - Terrestrial resources
  - Aquatic resources
  - Socioeconomics
  - Physical impacts
  - Demography
  - Economy
  - Taxes
  - Transportation
  - Aesthetics/ recreation
  - Housing
  - Public Services
  - Education
  - Historic/ cultural resources
  - Environmental justice
- Analysis was conducted in each of the subject areas to reach a SMALL, MODERATE, or LARGE determination

Alternate Site Review Process

- Construction and Operational impacts are characterized and compared in ER Tables 9.3.2 and 9.3.3, FEIS tables 9.7 and 9.8.
- No “obviously superior” site exists and the ER confirms that Vogtle 3 and 4 site selection meets the NEPA process criteria for alternative site analysis.

Exhibit SNC000001, Tables 9.7 and 9.8

Alternative Plant Cooling Systems

Alternate heat dissipation systems

- ER and FEIS evaluated seven alternate heat dissipation systems
  - Once-through cooling
  - Mechanical-draft wet cooling towers
  - Natural-draft wet cooling towers
  - Wet/dry (hybrid) cooling towers
  - Dry cooling towers
  - Cooling ponds
  - Spray canals

Exhibit SNC000001, section 9.4

Alternative Cooling Systems

- Mechanical draft cooling towers
  - Modeled using the SACTI code
    - Ground-level fog production confirmed greater than natural draft
    - Solids deposition (drift) also greater than natural draft
    - Slightly less expensive than natural draft
    - Other impacts relatively equal
  - Decision made to use natural draft driven by environmental factors and experience with Unit 1 and 2 natural draft towers

Exhibit SNC000001, ER section 9.4

Alternative Cooling Systems

Wet/Dry (hybrid) cooling towers

- primarily used where plume abatement is needed for aesthetic reasons or where fogging/icing is problematic
- Similar to dry cooling in many ways
  - Additional land required
  - Loss in efficiency compared to wet cooling results in higher power requirements,
  - Noise levels are increased
  - Water use reduced by 1/3 – to 1/2
  - Increased power need would result in additional environmental impacts associated with that power production
- Not considered environmentally preferable to natural draft wet cooling towers

Alternative Cooling Systems

- Once-through cooling, cooling ponds, and spray ponds were also evaluated and resulted in substantial additional environmental impact over wet natural draft towers
- Only wet mechanical draft and wet natural draft cooling towers were considered to be suitable alternatives
- Wet natural draft towers were chosen for Vogtle Units 3 and 4


Questions?