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Vogtle ESP Mandatory Hearing

March 23-25, 2009

NRC Staff Presentation Topic #4

Environmental Impact of Alternatives

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Basis for Analysis of Alternatives

- § 102(2)(C)(iii) of NEPA requires that an EIS address alternatives to the proposed action.
- 10 CFR 51 App. A(5) calls for presentation of alternatives in an NRC EIS in a comparative form. All reasonable alternatives are to be identified.
- 10 CFR 51.50(b)(1) calls for an ESP ER to include an evaluation of alternative sites to determine whether there is an obviously superior alternative site.
- Ch. 9 of Reg Guide 4.2 Rev. 2 calls for an ER to include an analysis of energy and site alternatives.
- ESRPs 9.2, 9.3, and 9.4 provide staff guidance for review of energy, site and system alternatives.

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Categories of Alternatives Considered in the EIS

- Energy Alternatives
- Alternative Sites
- System Design Alternatives

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Energy Alternatives

- Commission informed applicants in a June 2003 letter that an ESP application need not include an assessment of alternative energy sources.
- Southern included an analysis of energy alternatives in its ER.
- Analysis of energy alternatives requiring and not requiring new generating capacity is included in the EIS.
- EIS uses a target value of 2234 MWe of baseload power, which is consistent with the ER.

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Energy Alternatives Not Requiring New Generation

- Purchase needed power from others
  - EIS Ch. 8 need for power analysis concluded that Georgia Power Corp. (GPC) cannot expect to satisfy demand load by additional power purchases.
  - Analysis reflected GPC's IRP approved by the Georgia Public Service Commission (GPSC) in July 2007.
- Reactivation of retired plants
  - Reactivation would be costly because of the refurbishment cost to meet current environmental requirements.
- Extend operating life of existing plants
  - Only GPC plants slated for retirement are two 35 year old coal plants (combined 517 MWe) near downtown Atlanta. Extending operating life would be costly.

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Energy Alternatives Not Requiring New Generation

- Conservation and demand side management programs
  - GPC's 2007 IRP approved by the GPSC accounted for demand side management programs.
- Staff conclusion: options not requiring new generation are not reasonable alternatives to a new baseload nuclear power plant.

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Energy Alternatives Requiring New Generating Capacity

- Principal options considered were new coal and natural gas fired combined cycle generation at the Vogtle site.
- Other options considered were oil, wind, solar, hydro, geothermal, wood, solid waste, biomass, fuel cells, and a combination of energy options.

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Staff Impact Characterizations

- SMALL – Environmental effects are not detectable or are so minor that they will neither destabilize nor noticeably alter any important attribute of the resource.
- MODERATE – Environmental effects are sufficient to alter noticeably, but not to destabilize, important attributes of the resource
- LARGE – Environmental effects are clearly noticeable and are sufficient to destabilize important attributes of the resource.

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Staff Impact Characterizations for Coal-Fired Power Generation

Impact Category	Impact
Air Quality	MODERATE
Waste Management	MODERATE
Human Health	SMALL
Land Use	MODERATE
Ecology	MODERATE
Water Use and Quality	SMALL
Socioeconomics	LARGE Beneficial to MODERATE Adverse
Historic and Cultural Resources	MODERATE
Environmental Justice	SMALL to MODERATE

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Staff Impact Characterizations for Natural Gas-Fired Generation

Impact Category	Impact
Air Quality	SMALL to MODERATE
Waste Management	SMALL
Human Health	SMALL
Land Use	MODERATE
Ecology	SMALL to MODERATE
Water Use and Quality	SMALL
Socioeconomics	MODERATE Beneficial to MODERATE Adverse
Historic and Cultural Resources	MODERATE
Environmental Justice	SMALL

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Other Generation Alternatives

- Oil – expensive
- Wind – small resource and low capacity factor
- Solar – suitable for water heating or photovoltaic but not for baseload, low capacity factor
- Hydropower – relatively small resource and high impacts
- Geothermal – no suitable eastern resource
- Wood – plants too small (~40 MWe)
- Municipal Solid Waste – plants too small
- Biomass – plants too small
- Fuel Cells – not economically or technologically competitive

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Staff Conclusion Regarding Other Generation Alternatives

- Individually, other generation options are not reasonable alternatives to a new baseload nuclear power plant.

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Combination of Energy Sources

- Staff assumed this representative combination of alternative energy sources:
  - Natural gas combined cycle (1590 MW)
  - Wind energy (60 MW)
  - Biomass and solid waste (100 MW)
  - Hydropower (60 MW)
  - Conservation (424 MW)

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Staff Impact Characterizations for a Combination of Power Sources

Impact Category	Impact
Air Quality	SMALL to MODERATE
Waste Management	SMALL to MODERATE
Human Health	SMALL
Land Use	MODERATE
Ecology	SMALL to MODERATE
Water Use and Quality	SMALL
Socioeconomics	MODERATE Beneficial to MODERATE Adverse
Historic and Cultural Resources	MODERATE
Environmental Justice	SMALL

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Staff Impact Characterizations for Construction and Operation of New Nuclear, Coal, and Natural Gas Generating Units, and a Combination of Alternatives

Impact Category	Nuclear	Coal	Natural Gas	Combination of Alternatives
Air Quality	SMALL	MODERATE	SMALL TO MODERATE	SMALL to MODERATE
Waste Management	SMALL	MODERATE	SMALL	SMALL to MODERATE
Human Health	SMALL	SMALL	SMALL	SMALL
Land Use	SMALL to MODERATE	MODERATE	MODERATE	MODERATE
Ecology	SMALL to MODERATE	MODERATE	SMALL to MODERATE	SMALL to MODERATE
Water Use and Quality	SMALL	SMALL	SMALL	SMALL
Socioeconomics	LARGE Beneficial to MODERATE Adverse	LARGE Beneficial to MODERATE Adverse	MODERATE Beneficial to MODERATE Adverse	MODERATE Beneficial to MODERATE Adverse
Historic and Cultural Resources	MODERATE	MODERATE	MODERATE	MODERATE
Environmental Justice	SMALL	SMALL to MODERATE	SMALL	SMALL

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Staff Conclusion Regarding Energy Alternatives Requiring New Generating Capacity

- From an environmental perspective, none of the viable energy alternatives for generating 2234 MWe of baseload power is clearly preferable to construction of a new nuclear power plant.

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Southern's Site Selection Process

- Define region of interest (ROI)
  - Southern selected its principal service area (Alabama, Georgia, and Mississippi) as its ROI.
- Identification of potential sites
  - Southern determined that the advantages (e.g., existing infrastructure) of co-locating new nuclear generating units with an existing power plant owned by Southern outweighed the potential advantages of other possible siting alternatives.
  - Southern identified 12 existing generation sites in its ROI with available land for expansion and available cooling water as well as 1 greenfield site.

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Southern's Site Selection Process

- Identification of candidate sites
  - Southern eliminated potential sites with coal fired power plants because they did not offer as many advantages as nuclear sites.
    - Known environmental impact and suitability conditions at existing nuclear sites
    - Existing nuclear sites had previously been screened as part of an alternative site analysis and been found acceptable by NRC
    - Local support
    - Local experienced personnel
  - Resulting candidate sites were Southern's Farley, Hatch, and Vogtle nuclear sites and the Barton greenfield site.

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Southern's Site Selection Process

- Identification of proposed site
  - Southern screened candidate sites using land use, air quality, water quality, ecology, socioeconomics, cultural resources, and environmental justice criteria.
  - Final screening resulted in the Vogtle site as the proposed ESP site.

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Staff Conclusions Regarding Site Selection

- Southern used a logical process to identify potential and candidate sites and the proposed site.
- Southern's candidate sites all appear to be potentially licensable sites for new nuclear generation.
- Southern's site selection process was reasonable and resulted in candidate sites that are among the best that could reasonably be found in its ROI.

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Staff's Characterization of Construction Impacts at the Candidate ESP Sites

Impact Area Category	Vogtle	Farley	Hatch	Barton
Land Use				
Site and vicinity	SMALL	SMALL	SMALL	MODERATE
Transmission lines	MODERATE	MODERATE	SMALL to MODERATE	MODERATE
Air Quality	SMALL	SMALL	SMALL	SMALL
Water-Related				
Water use	SMALL	SMALL	SMALL	SMALL
Water quality	SMALL	SMALL	SMALL	SMALL
Ecological				
Terrestrial ecosystems	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	MODERATE
Aquatic ecosystems	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE
Threatened and endangered species	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL to MODERATE

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Staff's Characterization of Construction Impacts at the Candidate ESP Sites (cont'd)

Impact Area Category	Vogtle	Farley	Hatch	Barton
Socioeconomic				
Physical impacts	SMALL	SMALL	SMALL	SMALL
Demography	MODERATE	MODERATE	MODERATE	SMALL
Economy	MODERATE Beneficial	MODERATE Beneficial	MODERATE Beneficial	SMALL Beneficial
Taxes	MODERATE Beneficial	MODERATE Beneficial	MODERATE Beneficial	MODERATE Beneficial
Infrastructure and community	MODERATE	MODERATE	MODERATE	MODERATE
Aesthetics	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	MODERATE
Historic and Cultural Resources	MODERATE	SMALL	SMALL	SMALL
Environmental Justice	SMALL	SMALL	SMALL	SMALL
Nonradiological Health	SMALL	SMALL	SMALL	SMALL
Radiological Health	SMALL	SMALL	SMALL	SMALL

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Staff's Characterization of Operational Impacts at the Candidate ESP Sites

Impact Area Category	Vogtle	Farley	Hatch	Barton
Land Use Site and vicinity Transmission lines	 SMALL SMALL	 SMALL SMALL	 SMALL SMALL	 SMALL SMALL
Air Quality	SMALL	SMALL	SMALL	SMALL
Water-Related Water use Water quality	 SMALL SMALL	 SMALL SMALL	 SMALL SMALL	 SMALL SMALL
Ecological Terrestrial ecosystems Aquatic ecosystems Threatened and endangered species	 SMALL SMALL SMALL	 SMALL SMALL SMALL	 SMALL SMALL SMALL	 SMALL SMALL SMALL

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Staff's Characterization of Operational Impacts at the Candidate ESP Sites (cont'd)

Impact Area Category	Vogtle	Farley	Hatch	Barton
Socioeconomic				
Physical impacts	SMALL	SMALL	SMALL	SMALL
Demography	SMALL	SMALL	SMALL	SMALL
Aesthetics	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE	MODERATE
Economy	MODERATE Beneficial	SMALL Beneficial	SMALL Beneficial	SMALL Beneficial
Taxes	LARGE Beneficial	LARGE Beneficial	LARGE Beneficial	MODERATE Beneficial
Infrastructure and community	SMALL	SMALL	SMALL	SMALL
Historic and Cultural Resources	SMALL	SMALL	SMALL	SMALL
Environmental Justice	SMALL	SMALL	SMALL	SMALL
Nonradiological Health	SMALL	SMALL	SMALL	SMALL
Radiological Health	SMALL	SMALL	SMALL	SMALL
Impact of Postulated Accidents	SMALL	SMALL	SMALL	SMALL

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Summary of Staff Impact Characterizations for Construction and Operation at the Candidate Sites and for the No-Action Alternative

Impact Category	Proposed Action	No-Action Alternative	Alternative Sites		
	ESP at Vogtle	Denial of ESP	Farley	Hatch	Barton
Land Use	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL to MODERATE	MODERATE
Ecology	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL to MODERATE	MODERATE
Water Use and Quality	SMALL	SMALL	SMALL	SMALL	SMALL
Air Quality	SMALL	SMALL	SMALL	SMALL	SMALL
Human Health	SMALL	SMALL	SMALL	SMALL	SMALL
Socioeconomic	SMALL to MODERATE	SMALL	SMALL to MODERATE	SMALL to MODERATE	SMALL to MODERATE

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Summary of Staff Impact Characterizations for Construction and Operation at the Candidate Sites, and for the No-Action Alternative (cont'd)

	Proposed Action	No-Action Alternative	Alternative Site Options		
Impact Category	**ESP at Vogtle**	**Denial of ESP**	**Farley**	**Hatch**	**Barton**
Historic and Cultural Resources	MODERATE	SMALL	SMALL	SMALL	SMALL
Environmental Justice	SMALL	SMALL	SMALL	SMALL	SMALL

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Staff Conclusion Regarding Site Selection

- While there are some differences between the staff's characterizations of environmental impacts at the proposed site and at the alternative ESP sites, none of the differences is sufficient for the staff to conclude that any of the alternative sites would be environmentally preferable to the proposed Vogtle ESP site.

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Plant Cooling Systems

- Wet Tower (proposed)
- Once-Through
  - Excessive water withdrawal makes site unsuitable
- Hybrid Wet/Dry Towers
  - Some advantages and some disadvantages
- Cooling Ponds
  - Impractical

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Conclusions

- The Staff determined that the impacts to water use, water quality, and aquatic ecosystems from the proposed wet cooling system were SMALL.
  - Any potential advantages of a hybrid wet/dry cooling system would be in these resource areas.
- The Staff concluded that, given the environmental disadvantages of the alternative cooling systems considered, they would not be environmentally preferable to the proposed wet cooling system.

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