RAS 12736

Cumulative Impacts

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Grand Gulf ESP

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Template=SECY-027

SECY-02

Background

- Identified and described by CEQ in 40 CFR Part 1508.7
- Defined as incremental impact of Federal action under review, plus other past, present, and future Federal or non-Federal actions
  - Aggregated small impacts from variety of sources may have detectable or destabilizing effects on resources
  - Future changes in resource condition may increase importance of small impact from proposed action

Operational Rules

- Issues considered cumulatively included all issues analyzed for site impact and site suitability
  - Construction
  - Operation
  - Fuel Cycle
  - Transportation
  - Decommissioning
- Only issue not analyzed in detail for cumulative effects was design basis accidents
  - Extremely unlikely to occur both at GGNS Unit 1 and proposed site
  - Regulatory guidance applies to individual reactors (not collections of reactors)
- Spatial and temporal context were appropriate to each issue
  - Included continued operation of Grand Gulf Nuclear Station Unit 1
  - Temporal horizon covered operation and decommissioning of proposed new facility

Land Use

- Context:
  - Counties around proposed new facility and transmission system
  - GGNS Unit 1
  - Existing and expected changes in land use for 40 years
- Parameters:
  - Land conversion for new workers and related population growth
  - Offsite land use changes from new transmission system to accommodate the total new facility generating capacity
- Conclusions:
  - Small impacts from land conversion - growth accommodated by other counties
  - Impacts from transmission system land use conversion Not Resolved - no information on expanded/alternative right-of-way

Air Quality (1)

- Context:
  - Regional air quality
  - Pollutant emissions from GGNS Unit 1
  - Transmission system
- Parameters:
  - Construction emissions
  - Pollutant emissions during operation
  - Cooling tower heat, water vapor, and drift plumes from the new facility

Air Quality (2)

- Conclusions:
  - Small impact of construction emissions - limited duration within an attainment area
  - Small impact of operational pollutant emissions - same magnitude as existing GGNS Unit 1, occurs within an attainment area
  - Small impact of plumes - same magnitude as existing GGNS Unit 1

Water Use and Quality (1)

- Context:
  - Existing GGNS Unit 1 operation
  - Projected regional population growth for 40 years
- Parameters:
  - Surface water use
  - Groundwater use
  - Surface water quality
  - Groundwater quality

Water Use and Quality (2)

- Conclusions:
  - Small impacts for surface water use - onsite streams entirely within site; Mississippi River flow is very large relative to use; flow is regulated and shoreline managed by US Army Corps of Engineers
  - Impacts on groundwater use Not Resolved - effects of drawdown of Catahoula aquifer (defined by U.S. EPA as a sole source aquifer warranting protection) on domestic water users not quantifiable given existing data
  - Impacts on surface water quality Not Resolved - chemical discharges from the proposed new facility have not been fully quantified
  - Impacts on groundwater quality Not Resolved - Effects of aquifer drawdown on Catahoula aquifer water quality not quantifiable given existing data

Terrestrial Ecosystems (1)

- Context:
  - Region surrounding GGNS
  - Transmission rights-of-way
  - Other federal and state actions in region
  - GGNS Unit 1 operations
- Parameters:
  - Collective impacts to habitats, plants and wildlife, and threatened and endangered species from onsite facility construction plus offsite transmission system improvements
  - Collective impacts to habitats, plants and wildlife, and threatened and endangered species from transmission line operation, right-of-way maintenance, and cooling tower operation

Terrestrial Ecosystems (2)

- Conclusions:
  - Impacts on habitats and species from construction Not Resolved - lack of information on changes to existing transmission rights-of-way to accommodate full generating capacity of new facility
  - Small impacts on habitat and species from operation - same order of magnitude as existing GGNS Unit 1

Aquatic Ecosystems (1)

- Context:
  - Region surrounding GGNS
  - Transmission rights-of-way
  - Other federal and state actions in region
  - GGNS Unit 1 operations
- Parameters:
  - Collective impacts to habitats, plants and wildlife, and threatened and endangered species from onsite facility construction plus offsite transmission system improvements
  - Collective impacts to important aquatic species and habitats, including threatened and endangered species, from impingement and entrainment; and the amount, temperature, and chemical composition of discharge water

Aquatic Ecosystems (2)

- Conclusions:
  - Small impacts on habitats and species from construction
    - impacts small size and temporary in nature
    - wetland protection requirements will be met
  - Small impacts on habitat and species from operation
    - existing GGNS Unit 1 does not take water directly from Mississippi River
    - combined discharge plumes small relative to size of river
    - chemical discharges would be regulated by MDEQ under NPDES permit
      - requires cumulative analysis
      - permit limits set to ensure protection of aquatic species

Socioeconomics (1)

- Context:
  - Variably sized region that includes all potential areas of workforce settlement
  - Existing GGNS Unit 1
  - 40-year operating and decommissioning horizon
  - Projected population growth from all sources
- Parameters:
  - Collective impacts on physical assets (roads, buildings, aesthetics)
  - Collective impacts on regional demography
  - Collective impacts on regional economics and taxes
  - Collective impacts on infrastructure (transportation systems, housing, recreation, public services, and education)

Socioeconomics (2)

- Conclusions:
  - Small impacts on physical systems and infrastructure under likely settlement scenario - increases are temporary and diffuse
    - Moderate impacts if more workers than expected settle in Claiborne and Jefferson Counties
  - Small impacts on demography under likely settlement scenario - increases are temporary and diffuse
    - Large impacts if more workers than expected settle in Claiborne County
  - Large beneficial impact on tax revenues - significant increase for Claiborne County
    - Moderate beneficial in Warren County
  - Moderate impact on infrastructure and community services - construction/expansion of existing infrastructure could be necessary

Historic and Cultural Resources

- Context:
  - Variably sized region that includes all potential areas of workforce settlement
  - Existing GGNS Unit 1
  - Transmission rights-of-way
- Parameters:
  - Impacts to historic and cultural resource values
- Conclusion:
  - Small impacts on resource - applicant committed to manage discovery and protection/mitigation process during construction

Environmental Justice (1)

- Context:
  - Variably sized region that includes all potential areas of workforce settlement
  - Existing GGNS Unit 1
  - 40-year operating and decommissioning horizon
  - Projected population growth from all sources
- Parameters:
  - Unusual resource dependencies, practices, or environmental pathways, pre-existing health conditions
  - Social and economic impacts
  - Infrastructure and community services

Environmental Justice (2)

- Conclusions:
  - Small impacts regarding dependencies and health - no unusual dependencies, practices, or vulnerabilities affecting minorities or low income groups
  - Large beneficial impacts from tax revenues - realized for Claiborne County
  - Moderate impacts on infrastructure and community services - if workers settle more heavily than expected in Claiborne County resulting in increased demands on infrastructure and services

Nonradiological Health

- Context:
  - Existing GGNS Unit 1 operation
- Parameters:
  - Microbial organisms
  - Occupational health
  - Noise and dust emissions
  - Effects of electromagnetic fields
- Conclusions:
  - Small impacts of microbial organisms - biocides used at GGNS Unit 1 towers; appropriate industrial hygiene practices would be used at proposed new facility towers
  - Small impacts on occupational health - nuclear industry accident rates are below national industry average
  - Small impacts of noise and dust - temporary and mitigated
  - Impacts of EMF are Not Resolved - lack of scientific and regulatory consensus

Radiological Impacts of Normal Operations

- Context:
  - Existing GGNS Unit 1 operation
  - Regulatory standards for protection of human health and environment
  - 80-km radius of Grand Gulf ESP site
- Parameters:
  - Dose to public and biota
  - Occupational dose
  - Radiological emissions
- Conclusions:
  - Small impacts for radiological dose to public and biota - combined dose for public, biota, and at site boundary (maximally exposed individual) within regulatory standards
  - Small impacts for occupational dose - within regulatory standards
  - Small impacts for radiological emissions - within limits set by NRC and State of Mississippi

Fuel Cycle

- Context:
  - All users of nuclear reactor fuel in the US
- Parameters:
  - Fuel use by light-water reactors
  - Fuel use by gas-cooled reactors
- Conclusions:
  - Small impacts for light-water reactors - usage small based on existing designs and likely improvements
  - Impacts for gas-cooled reactor designs Not Resolved - lack of information on fuel use for these designs

Fuel Transportation

- Context:
  - Existing GGNS Unit 1 operation
  - Life cycle of new facility
- Parameters:
  - Radiation dose to public from unirradiated fuel, spent fuel, and radiological waste from operation of light-water reactors
  - Radiation dose to public from unirradiated fuel, spent fuel, and radiological waste from operation of gas-cooled reactors
- Conclusions:
  - Small impacts for light-water reactors - all doses and health impacts within regulatory limits
  - Impacts for gas-cooled reactor designs Not Resolved - lack of information on fuel use for these designs

Decommissioning

- Context:
  - Existing GGNS Unit 1 operation
- Parameters:
  - Radiation dose to workers and public
  - Waste management
  - Water quality
  - Air quality
  - Ecological resources
  - Socioeconomics
- Conclusions:
  - Impacts from decommissioning are Not Resolved - lack of information regarding decommissioning for the proposed new facility

Environmental Summary

- Most impact areas were Small
- Socioeconomic and Environmental Justice have the potential for Large beneficial or Moderate adverse impacts
  - Mitigation may be warranted (e.g., assistance with infrastructure and public services in Claiborne County)
- Several impact areas were Not Resolved
  - Information was not available to resolve these issues and would have to be provided by an applicant referencing the ESP at the CP/COL stage
- For issues that were resolved, the staff will verify the continued applicability of assumptions at the CP/COL stage