RAS 12737

U.S. NUCLEAR REGULATORY COMMISSION
In the Matter of System Energy Resources
Docket No. 52-009-ESP Official Exhibit No. Staff 17
OFFERED by: Applicant/Licensee Intervenor
NRC Staff Other
IDENTIFIED on 11/27/06 Witness/Panel
Action Taken: ADMITTED REJECTED WITHDRAWN
Reporter/Clerk ew

NRC STAFF EXHIBIT 17

Grand Gulf Early Site Permit

Hearing Issue G

Evaluation of Plant Parameter Envelope (PPE)

Safety Review

George Wunder
R. Brad Harvey
Stephen Klementowicz

Template=secy-027

SECY-02

Plant Parameter Envelope (PPE)

- Applicant bounds possible designs
- PPE developed using the industry procedure
- PPEs are custom for each site
- The Staff determined that the PPE values are not unreasonable

George Wunder

Plant Parameter Envelope

- Safety review focuses on operational needs
- Looks at same parameter from different perspective
- PPEs are necessarily site-specific

George Wunder

SSAR PPE Values Used In Meteorological Analyses

- NHS Cooling Tower Plume Impacts
  - Condenser / Heat Exchange Duty
  - Cooling Tower Height
- Long-Term Atmospheric Dispersion
  - Effluent Release Elevation (Normal)
- Short-Term Atmospheric Dispersion
  - Effluent Release Elevation (Post Accident)
  - Minimum Distance to Exclusion Area Boundary

R. Brad Harvey

RPE Values Used in Radiological Evaluation

- Maximum source term derived from reactor designs under consideration.

Grand Gulf Early Site Permit

Hearing Issue G
Evaluation of Plant Parameter Envelope (PPE)

Environmental Review

James Wilson

James V. Ramsdell, Jr.

Plant Parameter Envelope

SERI did not define a particular reactor design, choosing, rather, to provide a surrogate (the PPE) to provide bounds for assessing environmental impact and determining site suitability.

Because the SERI PPE values do not reflect a specific design, they were not reviewed by the Staff for correctness. However, the Staff determined that the PPE values were not unreasonable.

In cases where SERI provided insufficient information to apply the review guidance in the ESRP and RS-002, the Staff used its experience and judgment to adapt the review guidance and to develop assumptions necessary to evaluate impacts to certain environmental resources to account for the missing information.

Safety vs. Environmental Review

The safety and environmental reviews differ in some important respects:

The safety review, mandated by the Atomic Energy Act, is based on bounding analyses using adverse conditions, resulting in conservative estimates to ensure that safety design criteria and radiation protection regulations are met.

The environmental review, mandated by NEPA, is governed by the rule of reason and takes a "hard look" employing best-estimate methodology to evaluate reasonably foreseeable impacts.

Safety vs. Environmental Review

The safety and environmental reviews also have differing perspectives – the safety review evaluates the effects of the site/environment on the facility (for example, the potential for flooding of the facility by an adjacent water body); the NEPA review evaluates the impacts of the facility's construction and operation on the environment (for example, impacts on water quality or aquatic biota).

PPE – Environmental Review

The NEPA review considered the impacts of construction and operation for all environmental issues (full-scope review); the analyses necessary for this review consider all plant features and individual plant parameters.

The safety review analyzed the parameters necessary to make a siting decision (limited-scope review). The Staff did not evaluate the design of the facility; certain plant parameters did not have a bearing on the siting decision.

The list of plant parameters, treatment, and values for each review, was different, depending on the scope, analyses, and objectives necessary to complete the Staff's review.

James V. Ramsdell, Jr
Staff Scientist

- FEIS Contributions
  - Meteorology/Air Quality
  - Impacts of Postulated Accidents

Technical Expertise:

- Meteorology/Climatology
- Atmospheric Dispersion
- Consequence Assessment

Environmental Impact Factors

- Radiological Impacts
  - Reactor Power (Core Inventory)
  - Reactor Design (Release Path)
- Hydrology, Aquatic Ecology Impacts
  - Reactor Power (Heat Rejection)
  - Normal Heat Sink Design (Type, Intakes and Outfalls)
- Terrestrial Ecology, Land Use and Socioeconomic Impacts
  - Secondary Effects Related to Heat Rejection

Significant PPE Parameters

- Reactor Power =
  - 4300 MWt per unit
  - 8600 MWt for 2 unit facility
- Normal Heat Sink Cooling
  - Condenser Heat Exchange = 10.7×10^9 Btu/hr (~3140 MWt per unit, ~6300 MW for 2 unit facility)
  - Evaporation Rate = 39,000 gpm (~6200 MWt facility)
  - Blowdown Flow Rate = 39,000 gpm (~100 MWt facility)

Radiological Impact Analysis

- Normal Operations: Composite Source Term (ABWR, AP1000, +)
- Design Basis Accident: 4005 MWt ABWR, 3468 MWt AP1000, 3964 MWt ACR-700
- Severe Accident: 4300 MWt ABWR, 3400 MWt AP1000
- Spent Fuel Transportation Accident: 4300 MWt ABWR, 3400 MWt AP1000

FEIS LOCA IMPACTS

Reactor	Power (MWt)	EAB Dose (Sv)	LPZ Dose (Sv)
ABWR	4005	5.9×10^{-3}	5.4×10^{-2}
AP1000	3468	3.4×10^{-2}	2.2×10^{-2}
ACR-700	3964	8.8×10^{-3}	1.7×10^{-2}

Heat Rejection Impacts

- FEIS Analysis
  - Water Use Impacts Unresolved Except for Alternative Comparisons -- Limited Analysis Based on Maximum Makeup Flow of 85,000 gpm (PPE 78,000 gpm)
  - Water Quality Impacts Unresolved Except for Alternative Comparisons -- Limited Analysis Based on Maximum Makeup Discharge Flow of 52,900 gpm @ 100°F (PPE 39,000 gpm @ 100°F)
  - Aquatic Impacts – SMALL Because of Cooling Tower NHS

Conclusion

- PPE Values of Reactor Power and NHS Cooling System Flows Are Internally Consistent.
- Staff Analysis is Generally Based on PPE Maximum Values of Parameters Related to Reactor Power.
- Therefore, the Staff Analysis Supports the Maximum Reactor Power in the PPE.