9.4 ALTERNATIVE PLANT AND TRANSMISSION SYSTEMS

The information for this section is provided in the ESP Application Part 3 – Environmental Report, Section 9.4, and the associated alternatives analysis is not fully resolved in NUREG-1817; the following supplemental information is provided.

9.4.1 HEAT DISSIPATION SYSTEMS

NUREG-1817, Subsection 8.3.1 contains the following statement: "Based on the NRC staff's independent review, the staff concludes that wet mechanical draft cooling towers and wet natural draft cooling towers are suitable for the site. The specific cooling system design for one or more new nuclear units or units at the Grand Gulf ESP site has not been selected; therefore, system design alternatives would be discussed at the CP or COL stage if an application were submitted to build a new plant at the site."

Insert A

Revise

~~The selected cooling system design, as discussed in Sections 3.4 and 5.3, provides the normal heat sink through the use of a natural draft cooling tower in combination with a mechanical draft cooling tower.~~ Although the final selection of the cooling system was not made at the time of the ESP, the conclusions made by the NRC staff resolved that wet natural draft and wet mechanical draft cooling towers are suitable for the Unit 3 site. A review of new technology revealed no new and significant information that would change the determination made in ESP ER Subsection 9.4.1 that there are no environmentally preferable alternatives to wet cooling towers for the Unit 3 normal heat sink.

Insert B

9.4.2 CIRCULATING WATER SYSTEMS

The circulating water system is a closed-loop design that will use a natural draft cooling tower in combination with a mechanical draft cooling tower to provide heat dissipation. The following NUREG-1817 subsections resolved the issues dealing with the circulating water system.

NUREG-1817, Subsection 8.3.2.1, "Intake Systems" states with regard to riverbed structure intake or diversionary channel intake alternatives: "The staff found no basis to suggest that these two water intake alternatives would be environmentally preferable to SERI's proposed intake system." The proposed Unit 3 intake structure is described in Subsection 3.4.2.1. There is no new and significant information that would change the intake selected.

NUREG-1817, Subsection 8.3.2.2, "Discharge Systems" states: "The staff found no basis to suggest that the two discharge alternatives would be environmentally preferable to SERI's proposed discharge system." There is no new and significant information that would change the discharge selected.

The Unit 3 makeup water will be supplied by the Mississippi River. NUREG-1817, Subsection 8.3.2.3, "Water Supply" states: "The staff did not identify any other environmentally preferable water supply." There is no new and significant information that would change the water supply selected.

In the Atomic Safety and Licensing Board decision authorizing the issuance of the Grand Gulf Early Site Permit, ASLBP No. 04-823-03-ESP, dated January 26, 2007, the Board stated that "In regards to design alternatives, the Board finds that the NRC Staff's conclusion that all of the proposed alternatives – except the wet natural draft and wet mechanical draft cooling towers – are not suitable for the Grand Gulf site, and its conclusion that dry cooling technology has some detrimental effects on electricity production was reasonable. Because a specific cooling system design has not been selected for the Grand Gulf site, the Board notes that the system design alternatives must be discussed at the COL stage."

The wet cooling tower alternatives that were evaluated for Unit 3 are discussed below. The environmental impacts (e.g., salt deposition, fogging, icing, aesthetics, avian mortality, etc.) for each of the wet cooling tower alternatives are generally consistent with those evaluated in NUREG-1817 Subsection 8.3.1, except as noted.

9.4.1.1 Selected Cooling Tower Design

The selected cooling system design, as discussed in Section 3.4 and in FSAR Section 10.4.5, provides a normal heat sink through the use of a single natural draft cooling tower in combination with a round multi-cell mechanical draft cooling tower. This combination of natural draft and round mechanical draft towers provides the required heat removal capability in the smallest area.

9.4.1.2 Single natural draft cooling tower

A single natural draft cooling tower that could support the heat load requirements for Unit 3 would be the largest cooling tower designed and built in the world; such a design has yet to be proven. This cooling tower would have a height of about 750 feet and a basin diameter of about 510 feet. In addition, because of the required height, this cooling tower would need to be located a sufficient distance from other power block structures to meet safety requirements, resulting in added cost for an extensive piping system. This cooling tower would be approximately 200 ft. higher than the existing Unit 1 cooling tower, making it, and its plume, visible from greater distances from the site, and the added height may create the potential for additional avian mortality impacts. Preliminary estimates indicate a single tower of this scale would cost over 50% greater than the estimated cost of the selected cooling tower arrangement. Due to the siting constraints for this design, the unproven design, the additional aesthetic environmental impacts considerations, and the expected high cost the single natural draft cooling tower was not selected for GGNS Unit 3.

9.4.1.3 Two natural draft cooling towers

The two natural draft cooling towers would each have a height of about 475 feet and a basin diameter of about 330 feet. The cooling towers would need to have a separation distance of at least 500 feet to avoid interference of the inlet air flow for each tower. The two natural draft cooling towers would require a larger land area than that of either the single natural draft cooling tower or the area required for the selected option described above and in Section 3.4. Due to the larger land area required, the two natural draft cooling towers would require a location further away from the power block area than that for the selected option, which would result in added cost for an extensive piping system between the towers and the plant area. Because of the larger land area required, siting constraints related to the additional piping system, and the estimated high cost of the two natural draft cooling towers, this alternative was not selected.

9.4.1.4 Mechanical Draft Cooling Towers

Linear mechanical draft cooling towers (MDCT) have the largest footprint of any of the cooling tower alternatives considered. Assuming the use of two MDCTs, each of two required linear MDCTs would require approximately 20 cells.

Three round MDCTs with a diameter of approximately 300 ft would be required to remove the station’s heat load. The three cooling towers could be arranged in a delta or linear configuration with a required separation between each tower of approximately 500 ft center to center, resulting in a footprint too large for the selected area.

As with the other options considered, the larger land area required for the MDCT options would require a location further away from the power block area than that for the selected option, which would result in significant added cost for an extensive piping system between the towers and the plant area. In addition, the operational costs for parasitic losses (cost of electricity for fan motor operation) and maintenance would more than offset the initial capital cost savings of the cooling tower purchase. Due to environmental impact considerations of the larger land area required and siting constraints related to the additional piping, MDCTs were not selected for GGNS Unit 3.

Overall, based on the above evaluation, the use of a single natural draft cooling tower, two natural draft cooling towers, or MDCTs are not considered to be environmentally preferable alternatives to the use of the selected cooling tower design. Because no environmentally preferable alternative was identified, there was no need to consider economic factors.