1.0 INTRODUCTION

1.1 The Proposed Project

This Environmental Report (ER) supports the application, of which it is a part, by System Energy Resources, Inc. (SERI), for an Early Site Permit (ESP) for possible future siting of a new nuclear power plant or plants on the existing Grand Gulf Nuclear Station (GGNS) site[1][2].

At the time of this application, SERI's general intention is that a new facility be a merchant nuclear plant, providing electrical energy to the competitive marketplace. This new marketplace was created by the Energy Policy Act of 1992 and subsequent actions by the Federal Energy Regulatory Commission (FERC) in establishing open transmission requirements for electrical energy providers. A new facility on the ESP Site would be expected to provide energy to the grid in a base-loaded manner.[3]

This Environmental Report (ER) has been prepared to meet the requirements of 10 CFR 52, Subpart A, for an Early Site Permit. 10 CFR 52.17(a)(2) requires a complete environmental report as required by 10 CFR 51.45 and 51.50, however, the environmental report must focus on the environmental effects of construction and operation of a reactor, or reactors, which have characteristics that fall within the postulated site parameters, and further the report need not include an assessment of the benefits (for example, need for power) of a action, but must include an evaluation of alternative sites to determine whether there is any obviously superior alternative to the site proposed. This report, Part 3 of the Application for an ESP, satisfies that requirement, and addresses the environmental suitability of the GGNS ESP Site, and the anticipated environmental impacts as a result of the potential future addition of one or more reactors on the existing GGNS site.

In order to evaluate the GGNS site for environmental impacts and its suitability or acceptability for possible siting of a new nuclear reactor or reactors as required by 10 CFR 52 for an Early Site Permit, it is necessary to discuss "construction and operation" of said reactor or reactors. This report may make reference to a new facility (reactor or reactors) using such terms as a project, proposed new facility, proposed facility, proposed plant, reactor or reactors to be constructed, the proposed project, ESP Facility, etc., all of which refer to a reactor or reactors, defined by the parameters in the Plant Parameters Envelope of Section 3.0 of this document. However, by this application SERI is making no commitment to the actual construction of a plant of any type on the GGNS site; rather, SERI seeks only to obtain an Early Site Permit, as

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[1] For the purposes of this Early Site Permit application, that portion of the Grand Gulf Nuclear Station site which is proposed and evaluated herein, for an Early Site Permit, may be referred to as the GGNS ESP Site or the ESP Site. The location of the site evaluated and a facility is wholly contained with the property boundary of the existing GGNS site.

[2] System Energy Resources, Inc., South Mississippi Electric Power Association (SMEPA), and Entergy Mississippi, Inc., own the GGNS site property.

[3] While the Applicant intends that a nuclear facility be operated in the open market, it is recognized that numerous commercial and regulatory issues must be addressed and resolved with state and federal agencies. The resolution of these issues would logically precede any final determination as to whether or not the facility would operate on a regulated or unregulated basis.

allowed by 10 CFR 52, Subpart A, for the potential future construction of a reactor or reactors on the site.

The GGNS site was selected for an ESP application based on an in-depth review of potential sites (Section 9.3). Criteria such as seismic characteristics, demographics, emergency planning, exclusion area, transmission access, and water availability were used in this site-selection analysis. The GGNS site meets the desired characteristics necessary to support the construction of a new nuclear plant or plants.

The Grand Gulf Nuclear Station site is located in Claiborne County in southwestern Mississippi. The plant site is on the east side of the Mississippi River about 25 miles south of Vicksburg, Mississippi, 6 miles northwest of Port Gibson, Mississippi, and 37 miles north-northeast of Natchez, Mississippi. The Grand Gulf Military Park borders a portion of the north side of the property, and the community of Grand Gulf is approximately 1-1/2 miles to the north. (Reference 2) The Universal Transverse Mercator grid coordinates for the proposed reactor(s) location for the new nuclear power plant unit(s) are approximately N3,542,873 meters, and E684,021 meters.

The property boundary shown on Figure 2.1-1 encompasses approximately 2100 acres of property that makes up the Grand Gulf Nuclear Station (GGNS) site. The site and its environs consist primarily of woodlands and farms. Within this area are two lakes, Gin Lake and Hamilton Lake. These lakes were once the channel of the Mississippi River and according to Reference 2 averaged about 8 to 10 feet in depth.

The western half of the plant site consists of materials deposited by the Mississippi River and extends eastward from the river about 0.8 mile. This area is generally at elevation 55 to 75 feet above mean sea level (msl). (Reference 2)

The eastern half of the plant site is rough and irregular with steep slopes and deep-cut stream valleys and drainage courses. Elevations in this portion of the plant site range from about 80 feet above msl to more than 200 feet above msl at the inland of the site. Elevations of about 400 feet above mean sea level occur on the hilltops east and northeast of the site. (Reference 2)

The original GGNS site arrangement was designed and evaluated (References 1 and 2) for two nuclear units and two turbine generator sets. Construction of the second unit was halted prior to its completion; however, the majority of the Unit 2 power block buildings were completed, along with the outer cylindrical concrete wall of the reactor containment, which is only partially complete. The switchyard was designed and constructed to accommodate two units; construction of the second unit was never completed, but the switchyard was essentially completed for the second unit. Figure 2.1-1 shows the building layout and site property boundary.

Construction of Grand Gulf Nuclear Station (GGNS) Unit 1 (and partial completion of Unit 2) resulted in alterations to the plant site. Approximately 465 acres of the 2,100-acre site were affected by construction (Reference 1); however, permanent structures and facilities occupy only about 169 acres (Table 2.2-1), not including the heavy haul road and plant service water supply and return pipeline right of way. Since GGNS Unit 1 is located in the loessial bluff portion of the site, most site preparation and construction activities were concentrated in this area.

Construction of a new facility on the site would result in additional alterations of the site; however, much of the new construction would be conducted in areas that were previously disturbed during construction of the existing facilities (Figures 2.1-1 and 2.4-3). Construction of

a new facility is estimated to require approximately 400 acres, distributed as shown in the areas indicated on Figure 2.2-1 and listed in Table 2.2-1.

A new facility could have a maximum reactor thermal power level of approximately 8,600 megawatts thermal (MWt)[4], with a maximum net electrical output of approximately 3,000 megawatts electric (MWe); final thermal power will be dependent on the reactor plant type selected for construction at the CP/COL phase. Waste heat would be dissipated by either a mechanical draft or natural draft cooling tower(s). Makeup water for the cooling tower(s) and other plant cooling and miscellaneous needs would be withdrawn from the Mississippi River through an intake structure.

No new transmission line rights-of-way are evaluated for a new facility at the GGNS ESP Site in this report; a new facility would be connected to the transmission system through the existing GGNS switchyard. When the specific facility design, the expected electrical output, the need for power, and primary market location(s) are established, the adequacy of the existing (at the time) T&D system to support the new facility can be determined. If, at that time, additional changes to the T&D system were warranted, the associated environmental impacts would be evaluated (see Section 3.7).

SERI (the Applicant) does not anticipate starting site preparation and construction activities prior to the expiration of the ESP permit, which is expected to be valid for twenty years after its issue. Facility construction activities are expected to occur over a five to six year period, and would begin after obtaining a combined license (COL) or construction permit (CP); commercial operation would then occur after construction activities have been completed (and an OL obtained, if a CP had previously been received) and startup testing is completed. The culmination of forty (40) years of commercial operation (nominal expected life of initial plant operating license) is expected to occur in 2070.

The power block of the new facility would be located in relatively close proximity to GGNS Unit 1 which is currently licensed for commercial operation through 2024, without life extension. With a twenty year life extension, GGNS Unit 1 could operate until 2044. Therefore, construction and operation of the new unit(s) could occur simultaneously with the commercial operation of GGNS Unit 1.

Conceptual provisions included in the arrangement of a new facility, to minimize impact on GGNS Unit 1, include:

- The location of the new power block area and other construction areas would be chosen so as not to adversely impact the operation of GGNS Unit 1.
- The grade elevation of the yard for the new facilities would be such that runoff during periods of maximum rainfall would not create flooding concerns for GGNS Unit 1.

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[4] The maximum thermal power of 4,300 MWt per unit is based on approximately a 10% uprate of the ABWR LWR considered in the development of the PPE. This value (4,300 MWt) was used for the purposes of determination of environmental impacts from the uranium fuel cycle in Sections 3.8, 5.7 and 7.4 of this report. Reactor thermal power used in the determination of accident dose at the EAB and LPZ boundaries, as reported in Section 7.1, is based on the design thermal power for the reactor types evaluated, which is less than the maximum thermal power given here.

- The location of a new cooling tower or tower(s) would be selected considering fogging and icing, etc.
- The raw makeup water for the normal heat sink cooling tower(s) and other raw makeup water needs (e.g., for the service water cooling system, demineralized water makeup, etc.) would be taken from the Mississippi River as surface water via an intake structure. GGNS Unit 1 utilizes a radial well system located at the shoreline of the Mississippi river. Removing surface water from the Mississippi River via an intake structure would not adversely impact the operation of the GGNS Unit 1 radial wells.

Power block equipment, systems or structures would not be shared between a new facility and GGNS Unit 1. The existing GGNS Unit 2 switchyard would be utilized to connect the electrical output of a new facility to the existing transmission system. Other non-power-generation equipment, systems and structures may be shared between a new facility and GGNS Unit 1. Possible examples of shared resources include access roads, parking lots, warehouses, engineering support buildings, sanitary water and sewage treatment facilities, etc.

System Energy Resources, Inc. (SERI) owns the Grand Gulf site property (~2100 acres) with the following clarifications:

- The property associated with the existing Grand Gulf Nuclear Station power plant and support facilities (~104 acres) has subdivided ownership interests.
  - South Mississippi Electric Power Association (SMEPA), a Mississippi corporation, maintains a 10% undivided ownership interest in the property associated with the existing Grand Gulf Nuclear Station power plant and support facilities.
  - SERI's 90% ownership interest in the existing Grand Gulf Nuclear Station power plant and support facilities has been further subdivided. SERI has a sale/leaseback agreement in which SERI maintains 77.23% ownership. The remaining 12.77% interest is owned by equity investors: Textron Financial Corporation and Resources Capital Management Corporation, and is leased back to SERI. Title to the property reverts back to SERI on termination of the sale/leaseback agreement.
- Entergy Mississippi, Inc. (formerly named Mississippi Power & Light) owns the switchyard and transmission lines.
- SMEPA also holds certain easement rights associated with the Grand Gulf site property.

SERI has the exclusive rights to develop the Grand Gulf site property outside the existing power plant and support facilities. SERI has the authority to enter into emergency planning agreements with government institutions as included in this ESP application.

Entergy Operations, Inc. (EOI) is licensed to operate the existing Grand Gulf Nuclear Station power plant facility. EOI does not have an ownership interest in the Grand Gulf site property. Entergy Nuclear Potomac Company (ENPC) was authorized by SERI to prepare this ESP application. ENPC does not have an ownership interest in the Grand Gulf Nuclear Station site property.

SERI, EOI, ENPC, and Entergy Mississippi, are wholly owned subsidiaries of Entergy Corporation, a registered public utility holding company.

1.1.1 References

1. Mississippi Power and Light Company, Grand Gulf Nuclear Station Units 1 and 2, Final Environmental Report (FER), as amended through Amendment No. 8.
2. Grand Gulf Nuclear Station Updated Final Safety Analysis Report, UFSAR.

1.2 Status Of Reviews, Approvals, and Consultations

Construction and operation of a new facility at the GGNS ESP Site would require compliance with a number of environmental regulations and obtaining a number of associated permits and consultations. A search for regulations and permits required by Federal, State, regional, local, and affected Native American tribal agencies that would be applicable to the construction and operation of a new facility was conducted, and the results are presented in Table 1.2-1. The permits have not been applied for at this time; therefore, the columns for License/Permit No. and “Expiration Date” have been left blank.

TABLE 1.2-1

FEDERAL, STATE, AND LOCAL ENVIRONMENTAL AUTHORIZATIONS

Agency	Authority	Requirement	License / Permit No.	Expiration Date	Activity Covered
U.S. Nuclear Regulatory Agency (NRC)	10CFR52.17	Environmental Report		20 yrs from issue date	Approval of a site for one or more nuclear power facilities, with limited construction per 10 CFR 50.10(e)(1), if applicable
U.S. Fish and Wildlife Service	Threatened and Endangered Species Act	Consultation			Consultation concerning potential impacts to T&E species. See Appendix 2.4A
		Incidental Take Permit			Survey and possible collection of Federal Threatened and Endangered Species
	Migratory Bird Treaty Act	Consultation			Consultation concerning potential impacts to migratory birds
U.S. Army Corps of Engineers	Clean Water Act	Section 404 Permit			Aquatic resource alteration permit (Wetland filling, stream alteration)
	33CFR209	Dredge and Fill Discharge Permit			Permit for discharge of dredged spoils
U.S. Coast Guard	14 U.S.C. 81, 83, 85, 633/49 U.S.C. 1655(b)				Navigation markers - authorization to protect river navigation from hazards connected with temporary construction activities in the river.

TABLE 1.2-1 (Continued)

Agency	Authority	Requirement	License / Permit No.	Expiration Date	Activity Covered
Federal Aviation Administration	Federal Aviation Act	Permit			Permit for structures over 200 ft in height (construction cranes, cooling towers)
MCEQ	Regulation APC-S-2	Permit to construct Permit to operate			Permit regulation for the construction and/or operation of air emissions equipment
MCEQ	Regulation APC-S-4				Ambient air quality standards
MCEQ	Regulation APC-S-5	Permit			Mississippi regulations for the prevention of significant deterioration of air quality
MCEQ	Regulation APC-S-6	Permit			Air emissions operating permit regulations for the purposes of Title V of the Federal Clean Air Act
MCEQ	Regulation HW-1	Permit			Hazardous waste management regulations
MCEQ	Regulation LW-1	Permit			Surface water and ground water use and protection regulations
MCEQ	Regulation SW-2	Permit			Non-hazardous solid waste management regulations & criteria

TABLE 1.2-1 (Continued)

Agency	Authority	Requirement	License / Permit No.	Expiration Date	Activity Covered
MCEQ	Regulation UST-2	Permit			Underground storage tank regulations
MCEQ	Regulation WPC-1	NPDES Permit Storm water Permit			Wastewater regulations for NPDES permits, water quality based effluent limitations and water quality certification
MCEQ	Regulation WPC-2:				Water quality criteria for intrastate, interstate and coastal waters
MCEQ	Regulation WPC-3:	Certification			Regulations for the certification of municipal and domestic wastewater facility operators
MS Dept. Of Wildlife, Fisheries, and Parks	Natural Heritage Program	Scientific Collection Permit			Ecological Monitoring Programs
Public Service Commission	MS Code of 1972 SEC. 77-3-11	Certificate of Public Convenience and Necessity			Certificate that the present and future public convenience and necessity require or will require the operation of such equipment or facility.
LA Dept. Of Wildlife and Fisheries	Natural Heritage Program	Scientific Collection Permit			Ecological Monitoring Programs