

9.0 Comparison of the Impacts of the Proposed and Alternative Sites

The need to compare the proposed Grand Gulf early site permit (ESP) site with alternative sites arises from the requirement in Section 102(2)(C)(iii) of the National Environmental Policy Act of 1969 (NEPA) (42 USC 4332(2)(C)(iii)) that environmental impact statements include an analysis of alternatives to the proposed action. The U.S. Nuclear Regulatory Commission (NRC) criteria to be employed in assessing whether a proposed ESP site is to be rejected in favor of an alternative site is based on whether the alternative site is “obviously superior” to the site proposed by the applicant (*Public Service Co. of New Hampshire* 1977). An alternative site is “obviously superior” to the proposed site if it is “clearly and substantially” superior to the proposed site (*Rochester Gas & Electric Corp.* 1978).

The standard of “obviously superior” “...is designed to guarantee that a proposed site will not be rejected in favor of an alternate unless, on the basis of appropriate study, the Commission can be confident that such action is called for” (*New England Coalition on Nuclear Pollution* 1978). The “obviously superior” test is appropriate for two reasons. First, the analysis performed by NRC in evaluating alternative ESP sites is necessarily imprecise. Key factors considered in the alternative site analysis, such as population distribution and density, hydrology, air quality, aquatic and terrestrial ecological resources, aesthetics, land use, and socioeconomics are difficult to quantify in common metrics. Given this difficulty, any evaluation of a particular site must necessarily have a wide range of uncertainty. Second, the applicant’s proposed ESP site has been analyzed in detail, with the expectation that most adverse environmental impacts associated with the site have been identified. By design, the alternative sites have not undergone a comparable level of detailed study. For these reasons, a proposed ESP site may not be rejected in favor of an alternative site when the alternative is “marginally better” than the proposed site, but only when it is “obviously superior” (*Rochester Gas & Electric Corp.* 1978). NEPA does not require that a nuclear plant be constructed on the single best site for environmental purposes. Rather, “...all that NEPA requires is that alternative sites be considered and that the effects on the environment of building the plant at the alternative sites be carefully studied and factored into the ultimate decision” (*New England Coalition on Nuclear Pollution* 1978).

The NRC staff’s review of alternative sites consists of a two-part sequential test for whether a site is “obviously superior” to the proposed site (NRC 2000). The first part of the test determines whether there are “environmentally preferred”^(a) sites among the candidate ESP

(a) An “environmentally preferred” alternative site is one for which the environmental impacts are sufficiently less than for the proposed site so that environmental preference for the alternative site can be established (NRC 2000).

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sites. The staff considers whether the ESP applicant has (1) reasonably identified alternative sites, (2) evaluated the likely environmental impacts of construction and operation at these sites, and (3) used a logical means of comparing sites that led to the applicant's selection of the proposed site. Based on the NRC staff's independent review, the staff then determines whether any of the alternative sites are environmentally preferable to the applicant's proposed ESP site.

If the staff determines that one or more alternative ESP sites are environmentally preferable, then it would compare the estimated costs (environmental, economic, and time) of constructing the proposed nuclear power plant at the proposed site and at the environmentally preferable site or sites (NRC 2000). To find an obviously superior alternative site, the staff must determine that (1) one or more important aspects, either singly or in combination, of a reasonably available alternative site are obviously superior to the corresponding aspects of the applicant's proposed site, and (2) the alternative site does not have offsetting deficiencies in other important areas.

9.1 Comparison of the Proposed Site with the Alternatives

The staff reviewed the environmental report submitted by System Energy Resources, Inc. (SERI) (SERI 2005) and supporting documentation and conducted site visits at the proposed Grand Gulf ESP site and the three alternative sites. The staff found that SERI had reasonably identified alternative sites, evaluated the environmental impacts of construction and operation, and used a logical means of comparing sites. The following section summarizes the staff's independent assessment of the proposed and alternative sites.

The staff's characterization of the expected environmental impacts of constructing and operating one or more new nuclear unit(s) at the Grand Gulf ESP site and alternative sites within the bounds of SERI's plant parameter envelope are summarized in Tables 9-1 and 9-2. Explanations for the particular characterizations are in Chapters 4 and 5 for the Grand Gulf ESP site, Section 8.5.1 for the River Bend site, Section 8.5.2 for the Pilgrim site, and Section 8.4.3 for the James A. FitzPatrick site. For those impacts to environmental resources for which the staff was unable to reach a single significance level in Chapters 4 and 5 for the Grand Gulf ESP site due to insufficient information, it is necessary to identify the most likely level of impact for the purposes of comparison to alternative sites. In the following analysis, the staff indicated a likely impact level for these unresolved issues based on professional judgement, experience, and consideration of controls likely to be imposed under required Federal, State, or local permits that would not be acquired until an application for a construction permit or combined license is underway. These considerations and assumptions were similarly applied at each of the alternative sites to provide a common basis for comparison. These impact levels are, therefore, best estimates of impacts that the staff used for its "obviously superior" determination. No new data were collected.

Table 9-1. Comparison of the Construction Impacts at the Proposed and Alternative Early Site Permit Sites

Impact Area Category	Grand Gulf	River Bend	Pilgrim	FitzPatrick
Land use	–	–	–	–
Site and vicinity	*Unresolved, likely to be SMALL	SMALL	SMALL	SMALL
Power transmission line rights-of-way and offsite areas	*Unresolved, likely to be SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE
Air quality	SMALL	SMALL	SMALL	SMALL
Water-related	–	–	–	–
Water use	*Unresolved, likely to be SMALL	SMALL	SMALL	SMALL
Water quality	*Unresolved, likely to be SMALL	SMALL	SMALL	SMALL
Ecological	–	–	–	–
Terrestrial ecosystems	*Unresolved, likely to be MODERATE	MODERATE	SMALL	MODERATE to LARGE
Aquatic ecosystems	SMALL	SMALL	SMALL	SMALL
Threatened and endangered species	SMALL	SMALL to MODERATE	MODERATE to LARGE	SMALL
Socioeconomic	–	–	–	–
Physical impacts	SMALL	SMALL	SMALL	SMALL
Demography	LARGE	SMALL	SMALL	SMALL
Social and economic	LARGE Beneficial	LARGE Beneficial to SMALL Beneficial	MODERATE Beneficial to MODERATE Adverse	MODERATE Beneficial to SMALL Beneficial
Infrastructure and community services	MODERATE	SMALL to MODERATE ^(a)	MODERATE ^(b)	SMALL to MODERATE ^(c)
Historic and cultural resources	SMALL	SMALL	SMALL	SMALL
Environmental justice	LARGE Beneficial	SMALL	SMALL	SMALL
Nonradiological health	SMALL	SMALL	SMALL	SMALL
Radiological health	SMALL	SMALL	SMALL	SMALL

(a) Most of the adverse impact would be related to effects on transportation.
 (b) Most of the adverse impact would be related to effects on transportation and housing.
 (c) Most of the adverse impact would be related to effects on transportation near the facility.
 * Impact level estimated for the purposes of comparison

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Table 9-2. Comparison of the Operational Impacts at the Proposed and Alternative Early Site Permit Sites

Impact Area Category	Grand Gulf	River Bend	Pilgrim	FitzPatrick
Land use	–	–	–	–
Site and vicinity	SMALL	SMALL	SMALL	SMALL
Power transmission line rights-of-way and offsite areas	SMALL	SMALL	SMALL	SMALL
Air quality	SMALL	SMALL	SMALL	SMALL
Water-related	–	–	–	–
Water use	*Unresolved, likely to be SMALL	SMALL	SMALL	SMALL
Water quality	*Unresolved, likely to be SMALL	SMALL	SMALL	SMALL
Ecological	–	–	–	–
Terrestrial ecosystems ^(a)	SMALL	SMALL	SMALL to MODERATE	SMALL
Aquatic ecosystems	SMALL	SMALL	SMALL to MODERATE	SMALL
Threatened and endangered species	SMALL	SMALL	SMALL to MODERATE	SMALL
Socioeconomic	–	–	–	–
Physical impacts	SMALL	SMALL	SMALL to MODERATE	SMALL
Demography	LARGE	SMALL	SMALL	SMALL
Social and economic	LARGE Beneficial	LARGE Beneficial to SMALL Beneficial	MODERATE Beneficial to MODERATE Adverse	MODERATE Beneficial to SMALL Beneficial
Infrastructure and community services	MODERATE	SMALL to MODERATE	MODERATE ^(b)	SMALL
Historic and cultural resources	SMALL	SMALL	SMALL	SMALL
Environmental justice	LARGE Beneficial	SMALL	SMALL	SMALL
Nonradiological health^(a)	SMALL	SMALL	SMALL	SMALL
Radiological health	SMALL	SMALL	SMALL	SMALL
Impact of postulated accidents	SMALL for LWR designs; unresolved for gas-cooled reactors	SMALL	SMALL	SMALL

(a) Electromagnetic field health effects are indeterminate.
(b) Most of the adverse impact would be related to effects on transportation and housing.
* Impact level estimated for the purposes of comparison

Some environmental impacts considered for the Grand Gulf ESP site and for the alternative sites are generic for all sites and, therefore, do not influence the comparison of impacts between the Grand Gulf ESP site and the alternative sites. The generic environmental impacts common to all sites are air quality, nonradiological and radiological health impacts, and environmental impacts from postulated accidents and hydrologic alterations. Generic impacts are discussed in Section 8.5.4.

The environmental impact areas shown in Tables 9-1 and 9-2 have been evaluated using the NRC's three-level standard of significance – SMALL, MODERATE, or LARGE – based on the Council on Environmental Quality guidelines and set forth in the footnotes to Table B-1 of Title 10 of the Code of Federal Regulations (CFR) Part 51, Subpart A, Appendix B:

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.

The staff determined the impact level from construction for most of the environmental issues at the sites would be SMALL (see Table 9-1). Construction of transmission corridors for a new ESP facility at the Pilgrim and FitzPatrick sites would have SMALL to MODERATE impacts. For terrestrial ecology and threatened and endangered species, there are factors related to a site that could cause the impact level to increase from SMALL to MODERATE and, in the case of FitzPatrick, to LARGE because of probable impacts to forests and wetlands and associated protected species at that site. In addition, socioeconomic and environmental justice impacts range from SMALL to MODERATE adverse impacts in some aspects, and up to LARGE beneficial impacts in other aspects, such as social and economic benefits because of tax revenue. These are explained more fully in Chapter 4 for the Grand Gulf ESP site and in Chapter 8 for the alternative sites.

Similarly, the staff determined that the impact level from operations for most of the environmental issues at most of the sites would be SMALL (see Table 9-2). Exceptions are aquatic and terrestrial ecosystems and threatened and endangered species at the Pilgrim site, arising from potential impacts on the redbelly turtle. Additionally, social and economic impacts in socioeconomics at the alternative sites include LARGE to SMALL beneficial impacts principally due to added tax revenue and beneficial impacts on the local economy. Impacts at the Grand Gulf ESP site would be LARGE and beneficial. Impacts on infrastructure and community services would be MODERATE adverse at the Grand Gulf ESP site and SMALL to MODERATE adverse at the alternative sites. Environmental justice impacts would be SMALL at

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the alternative sites, but up to LARGE and beneficial at the Grand Gulf ESP site. These are explained more fully in Chapter 5 for the Grand Gulf ESP site and in Chapter 8 for the alternative sites.

9.2 Environmentally Preferable Sites

This section discusses whether any of the three alternative sites are environmentally preferable to the Grand Gulf ESP site. As noted in the introduction to this chapter, an “environmentally preferred” alternative site is a site for which the environmental impacts are sufficiently less than for the proposed site such that environmental preference for the alternative site can be established. The issue of environmental preferability is discussed in Section 9.2.1 for construction-related impacts and in Section 9.2.2 for operation-related impacts.

9.2.1 Construction

As shown in Table 9-1, the environmental impacts of construction at the Grand Gulf ESP site are characterized by the staff as SMALL for most impact categories. The exceptions include: demographic impacts, which could be LARGE; the impacts on terrestrial ecosystems and infrastructure and community services, which may involve moderate impacts; and social and economic impacts, which would have LARGE beneficial impacts, largely due to the impact of tax revenue.

At the three alternative ESP sites, the construction-related impacts are also predominately characterized as SMALL. The exceptions are that (1) impacts on terrestrial ecosystems are characterized as MODERATE at the River Bend site, SMALL to MODERATE at the Pilgrim site, and as MODERATE to LARGE at the FitzPatrick site, (2) impacts on threatened and endangered species are characterized as SMALL to MODERATE at the River Bend site, SMALL at the FitzPatrick site, and MODERATE to LARGE at the Pilgrim site, and (3) impacts on infrastructure and community services are characterized as SMALL to MODERATE or MODERATE at the three alternative sites. The economy in the vicinity of the Pilgrim site could also be negatively affected. The Grand Gulf ESP site and three alternative sites would also have various beneficial impacts for the social and economic subcategories of economy and taxes.

While there are some differences in the environmental impacts of construction at the proposed and alternative ESP sites, the staff concludes that none of these differences is sufficient to determine that any of the alternative sites is environmentally preferable to the Grand Gulf ESP site.

9.2.2 Operations

As shown in Table 9-2, the environmental impacts of operations at the Grand Gulf ESP site are characterized by the staff as SMALL for most impact categories. Demographic impacts at the Grand Gulf ESP site could be LARGE. Potential impacts on infrastructure and community services could be MODERATE. Potential social and economic impacts and environmental justice impacts could be LARGE and beneficial, depending in large part on local capture of tax revenues.

At the three alternative ESP sites, the operations-related impacts are also predominately characterized as SMALL. The primary exception is the Pilgrim site, where ecological impacts are characterized as SMALL to MODERATE, and the possibility of a MODERATE adverse impact on local infrastructure and community services and on social and economic components exists. Effects on social and economic components at the River Bend and FitzPatrick sites range from LARGE to SMALL beneficial, based on tax capture.

While there are some differences in the environmental impacts of operation at the proposed and alternative ESP sites, the staff concludes that none of these differences is sufficient to determine that any of the alternative sites is environmentally preferable to the Grand Gulf ESP site.

9.3 Obviously Superior Sites

None of the alternative sites was determined to be environmentally preferable to the Grand Gulf ESP site. Therefore, none of the alternative sites is obviously superior to the Grand Gulf ESP site.

9.4 Comparison with the No-Action Alternative

The no-action alternative refers to a scenario in which NRC denies the ESP request. Denial of the ESP application would prevent early resolution of safety and environmental issues for the site. These issues would have to be addressed during a future licensing action (ESP, construction permit, or combined license), should an applicant decide to pursue construction and operation activities for a nuclear facility at the site at a later time.

In the event that NRC denies the ESP application, SERI could follow any of several paths to satisfy its electric power needs including (1) seeking an ESP construction permit or combined license for a different location, (2) seeking a construction permit or combined license at the same location if the basis for ESP denial was reconciled, (3) purchasing power from other electricity providers, (4) establishing conservation and demand-side management programs,

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(5) constructing new generation facilities other than nuclear at the Grand Gulf ESP site, (6) constructing new generation facilities at other locations, (7) delaying retirement of existing Entergy generating facilities, or (8) reactivating previously retired Entergy generating facilities. The preceding paths could be pursued individually or in combination. Each of the paths would have associated environmental impacts.

No significant environmental impacts would be avoided by the no-action alternative because no such impacts are caused by a site-suitability determination.

9.5 References

Public Service Company of New Hampshire. (Seabrook Station, Units 1 and 2) CLI-77-8, 5 NRC 503, 516 (1977).

10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

National Environmental Policy Act of 1969, as amended (NEPA). 42 USC 4321, et seq.

New England Coalition on Nuclear Pollution. 1978. *New England Coalition on Nuclear Pollution v. NRC*, 582 F.2d 87 (1st Circuit 1978).

Rochester Gas & Electric Corp. 1978. (Sterling Power Project Nuclear Unit No. 1), ALAB-502, 8 NRC 383, 397 (1978), *affirmed*, CLI-80-23, 11 NRC 731 (1980).

System Energy Resources, Inc. (SERI). 2005. *Grand Gulf Site Early Site Permit Application*. Revision 2, Jackson, Mississippi. Available at <http://www.nrc.gov/reading-rm/adams.html>, Accession No. ML052780449.

U.S. Nuclear Regulatory Commission (NRC). 2000. *Standard Review Plans for Environmental Reviews for Nuclear Power Plants*. NUREG-1555, Office of Nuclear Reactor Regulation, Washington, D.C. Available at <http://www.nrc.gov/reading-rm/doc-collections/nuregs/staff/sr1555/>.

10.0 Conclusions and Recommendations

By letter dated October 16, 2003, System Energy Resources, Inc. (SERI), submitted an application to the U.S. Nuclear Regulatory Commission (NRC) for an early site permit (ESP) for property co-located with the existing Grand Gulf Nuclear Station (GGNS) near Port Gibson, Mississippi (SERI 2005). The proposed Grand Gulf ESP site is located in Claiborne County, Mississippi, approximately 40 km (25 mi) south of Vicksburg, Mississippi, 10 km (6 mi) northwest of Port Gibson, Mississippi, and 60 km (37 mi) north-northeast of Natchez, Mississippi. The Grand Gulf ESP site will include one or more nuclear power facilities to be sited adjacent to the existing GGNS Unit 1.

An ESP is a Commission approval of a location for siting for one or more nuclear power facilities, and is separate from the filing of an application for a construction permit (CP) or combined license (COL) for such a facility. An ESP application may refer to a reactor or reactor characteristics or plant parameter envelope, which is a set of postulated design parameters that bound the characteristics of a reactor or reactors that might be built at a selected site. Alternatively, an ESP may refer to a detailed reactor design. The ESP is not a license to build a nuclear power plant; rather, the application for an ESP initiates a process undertaken to assess whether a proposed site is suitable should the applicant decide to pursue a CP or COL.

Section 102 of the National Environmental Policy Act of 1969 (NEPA) (42 USC 4321 et seq.) directs that an environmental impact statement (EIS) be prepared for major Federal actions that significantly affect the quality of the human environment. Subpart A of Title 10 of the Code of Federal Regulations (CFR) Part 52 contains the NRC regulations related to ESPs. The NRC implemented Section 102 of NEPA in 10 CFR Part 51. As set forth in 10 CFR 52.18, the Commission determined that an EIS will be prepared during the review of an application for an ESP. The purpose of SERI's requested action, issuance of the ESP, is for the NRC to determine whether the Grand Gulf ESP site is suitable for one or more new nuclear units by resolving certain safety and environmental issues before SERI incurs the substantial additional time and expense of designing and seeking approval to construct such facilities at the site. Under the provisions of 10 CFR 52.21, an ESP is described as a "partial construction permit." An applicant for a CP or COL for a nuclear power plant or plants to be located at the site for which an ESP was issued can reference the ESP, thus reducing the need to review siting issues at that stage of the licensing process. However, issuance of a CP or COL to construct and operate a nuclear power plant is a major Federal action that requires its own environmental impact statement in accordance with 10 CFR 51.20(b).

Three primary issues—site safety, environmental impacts, and emergency planning—must be addressed in an ESP application. Likewise, in its review of the application, the NRC assesses the applicant's proposal in relation to these issues and determines if the application meets the

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requirements of the Atomic Energy Act of 1954 and NRC regulations. This EIS addresses the potential environmental impacts resulting from construction and operation of one or more new nuclear units at the proposed and alternative sites.

Upon acceptance of the SERI application, the NRC began the environmental review process described in 10 CFR Part 51 by publishing in the *Federal Register* a Notice of Intent to prepare an EIS and conduct scoping (68 FR 75656). The staff visited the Grand Gulf ESP site on July 29, 2003, January 21, 2004, and April 12 and 13, 2004 to gather information and become familiar with the site and its environs. The staff held a public scoping meeting on January 21, 2004, in Port Gibson, Mississippi to obtain public input on the scope of the environmental review. Subsequent to the site visit and the scoping meeting and in accordance with NEPA and 10 CFR Part 51, the staff evaluated the potential environmental impacts of constructing and operating one or more new nuclear units at the Grand Gulf ESP site.

Included in this EIS are (1) the results of the NRC staff's analyses, which consider and weigh the environmental effects of the proposed action (issuance of the ESP) and of constructing and operating one or more new nuclear units at the ESP site; (2) mitigation measures for reducing or avoiding adverse effects; (3) the environmental impacts of the alternatives; and (4) the staff's recommendation regarding the proposed action based on its environmental review.

During the preparation of this EIS, the staff reviewed the SERI environmental report; consulted with Federal, State, Tribal, and local agencies; and conducted an independent review of the issues following the guidance set forth in NRC's review standard RS-002, *Processing Applications for Early Site Permits* (NRC 2004). The review standard draws from the previously published NUREG-0800, *Standard Review Plan for the Review of Safety Analysis Reports for Nuclear Power Plants* (NRC 1987), and NUREG-1555, *Standard Review Plans for Environmental Reviews for Nuclear Power Plants*, Environmental Standard Review Plan (NRC 2000). In addition, the NRC considered public comments received during the scoping process and on the draft EIS. These comments and the staff's responses are provided in Appendix D and E of this EIS.

A 75-day comment period began on April 29, 2005 when the U.S. Environmental Protection Agency issued a Notice of Availability (70 FR 22308) of the draft EIS to allow members of the public to comment on the results of the NRC staff's review. During this comment period, a public meeting was held in Port Gibson, Mississippi on June 28, 2005. At the meeting, the staff described the results of the NRC environmental review, answered questions related to the review, and provided members of the public with information to assist them in formulating their comments.

Following the practice the staff used in the *Generic Environmental Impact Statement for License Renewal of Nuclear Plants* (NUREG-1437) (NRC 1996) and supplemental license renewal EISs, environmental issues are evaluated using the three-level standard of significance – SMALL, MODERATE, or LARGE – developed by NRC using guidelines from the Council on Environmental Quality (40 CFR 1508.27). The footnote to Table B-1 of 10 CFR Part 51, Subpart A, Appendix B, provides the following definitions of the three significance levels:

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.

Mitigation measures were considered for each environmental issue and are discussed in the appropriate sections. During its environmental review, the staff considered planned activities and actions that SERI indicates it would take should it decide to apply for a CP or COL. Key activities and actions considered by the staff in determining the level of impacts to a resource are discussed throughout the EIS and are listed in Appendix J.

NEPA requires that an EIS include information on:

- Any adverse environmental effects that cannot be avoided should the proposal be implemented
- Any irreversible and irretrievable commitments of resources that would be involved if the proposed action is implemented
- The relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity.

The NEPA information is provided in Sections 10.1 through 10.3.

10.1 Unavoidable Adverse Environmental Impacts

Section 102(2)(C)(ii) of NEPA (42 USC 4321 *et seq.*) requires that an EIS include information on any adverse environmental effects that cannot be avoided should the proposed action be implemented. Unavoidable adverse environmental impacts are those potential impacts of

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construction and operation of the proposed new unit(s) that cannot be avoided and for which no practical means of mitigation are available.

If granted, the ESP will not authorize any activities by SERI that would have an environmental impact. This is because SERI did not include a site redress plan in its application as provided by 10 CFR 52.17(c) and 10 CFR 52.25 and thus would not be authorized to perform any of the activities provided by 10 CFR 50.10(e)(1). Consequently, there are no unavoidable adverse environmental impacts associated with implementing the proposed action: granting an ESP to SERI for the Grand Gulf ESP site. However, issuance of an ESP may lead to construction and operation of a new nuclear facility under a CP or COL, either of which would require their own environmental review in accordance with 10 CFR Part 51. Although definitive assessment of adverse environmental impacts from construction and operation of one or more new nuclear units at the Grand Gulf ESP site would be performed at the CP or COL stage for issues that were not resolved, a summary of the impacts based on the analyses presented in this EIS is given below.

10.1.1 Unavoidable Adverse Impacts During Construction

Chapter 4 discusses the impacts from construction in detail. The unavoidable adverse impacts related to construction are listed in Table 10-1 and summarized below. The primary unavoidable adverse environmental impacts during construction would be related to land use. All construction activities for a new nuclear facility, including ground-disturbing activities, would occur within the existing Grand Gulf site boundary. According to SERI, the area that would be affected as a result of permanent facilities is approximately 51 ha (125 ac). Much of this area was previously disturbed during construction of GGNS Unit 1. An additional 111 ha (275 ac) would be disturbed on a short-term basis as a result of temporary activities and facilities and laydown areas (SERI 2005). Additional land may be needed for transmission lines.

Impacts of construction on the terrestrial ecology of the site would be both short-term and long-term. Construction of a new nuclear facility would result in the removal of approximately 59 ha (145 ac) of upland hardwood forest and 43 ha (105 ac) of upland fields, with approximately 17 ha (43 ac) of forested habitat permanently lost. The Grand Gulf ESP site does not contain any old-growth timber, nor any unique or sensitive plants or communities. Therefore, construction activities would not noticeably reduce the local or regional diversity of plants or plant communities. Impacts associated with transmission line upgrades, including right-of-way expansion, are not known at this stage and would have to be evaluated at the CP/COL stage. There are no important animal species or habitats known on the Grand Gulf ESP site. No areas designated by the U.S. Fish and Wildlife Service as critical habitat for threatened or endangered species exist at or near the site; however, a number of terrestrial and aquatic threatened or endangered plants or animals are known to exist in the vicinity of the site, and preconstruction surveys would be required to ensure these species are protected. Loss of upland and lowland forest would be noticeable. Construction would not permanently affect any

Table 10-1. Unavoidable Adverse Environmental Impacts from Construction

Impact Category	Adverse Impacts Based on SERI's Proposal	Actions to Mitigate Impacts^(a)	Unavoidable Adverse Impacts
Land use	Yes	Comply with requirements of applicable Federal, State, and local permits	51 ha (125 ac) disturbed on a long-term basis; 111 ha (275 ac) additional land disturbed on a temporary basis
Hydrological and water use	Yes	Obtain a Clean Water Act 401 certification prior to site preparation activities; construction would use best management practices	Dewatering systems would depress the water table in the general vicinity, but the impacts would be localized and temporary. Some dredging and shoreline alterations
Ecological Terrestrial	Yes	Conduct survey for protected species prior to construction	Loss of wildlife habitat, wetland, and hardwood forest
Aquatic	Yes	Stabilize embankments; install silt fences	Lowered water quality onsite
Socioeconomic	Yes	Implement flexible construction shifts	Potential impacts on housing and educational institutions in Claiborne County
Radiological	Yes	Use as low as reasonably achievable (ALARA) principles	Dose to site preparation and construction workers
Atmospheric and meteorological	Yes	Implement actions to reduce fugitive dust	Equipment emissions and fugitive dust from operation of earth-moving equipment
Environmental justice	Yes	Not applicable - dependent on actions of the State	Dependent upon State tax allocations, adverse socioeconomic impacts could be disproportionate on local minority/low-income community

(a) Additional mitigation measures are presented in Section 4.10. SERI's commitments and the staff's assumptions regarding sources and levels of impact and mitigation are included in Appendix J.

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aquatic species, and the possibility of disturbance to the Federally threatened Louisiana black bear is considered to be negligible. Socioeconomic impacts of construction include an increase in traffic and potential strain on housing and educational institutions in Claiborne County.

Atmospheric and meteorological impacts include fugitive dust from construction activities that would be mitigated by dust control plans. Radiological doses to construction workers from GGNS Unit 1 are expected to be well below regulatory limits. Regarding environmental justice, the impacts are dependent on the allocation of tax revenues between the State and Claiborne County.

10.1.2 Unavoidable Adverse Impacts During Operation

Chapter 5 provides a detailed discussion of the impacts from operation. The unavoidable adverse impacts related to operation are listed in Table 10-2 and summarized below. The unavoidable adverse impacts from operation for land use are small. Hydrological, water use, and water-quality impacts during operation are likely to be small resulting from very limited use of Mississippi River flow. Ecological impacts are also small for both ecosystems and threatened and endangered species because of the lack of key habitat at the site. Socioeconomic impacts are primarily increased demand for services in Claiborne County and Port Gibson, along with impacts on infrastructure and community services in this area. Meteorological and radiological impacts are expected to be negligible. Pollutants emitted during operations are considered insignificant.

10.2 Irreversible and Irretrievable Commitments of Resources

Section 102(2)(C)(v) of NEPA (42 USC 4321 *et seq.*) requires that an EIS include information on any irreversible and irretrievable commitments of resources that would occur should the proposed action be implemented. There will be no irreversible and irretrievable commitments of resources should the proposed action be implemented. If granted, the ESP will not authorize any activities by SERI that would have an environmental impact. SERI did not include a site redress plan in its application as provided by 10 CFR 52.17(c) and 10 CFR 52.25 and thus would not be authorized to perform any of the activities as provided by 10 CFR 50.10(e)(1). Because the proposed action therefore does not involve commitment of resources, a complete assessment of irreversible and irretrievable commitments of resources would be performed at the CP or COL stage if SERI is granted an ESP and later applies for a CP or COL. This issue is, therefore, not resolved.

Irretrievable commitments of resources during construction of the proposed new unit(s) generally would be similar to that of any major construction project. The actual commitment of construction resources (concrete, steel, and other building materials) would depend on the

reactor design selected at the CP or COL stage. Hazardous materials such as asbestos would not be used, if possible. If materials such as asbestos were used, it would be in accordance with safety regulations and practices. The actual estimate of construction materials would be performed at the CP or COL stage when the reactor design is selected.

Table 10-2. Unavoidable Adverse Environmental Impacts from Operation

Impact Category	Adverse Impacts Based on SERI's Proposal	Actions to Mitigate Impacts^(a)	Unavoidable Adverse Impacts
Land use	Yes	Follow local land management plans	Upgrade/modification of existing transmission corridors probably needed
Hydrological and water use	Yes	Comply with State discharge permit limits	Use of Mississippi River water
Ecological			
Terrestrial	Yes	Use best management practices	Wildlife collisions with structures
Aquatic	Yes	Use impingement/entrainment screens for intake; diffuser for thermal discharge	Losses of species in larval state
Socioeconomic	Yes	Implement flexible work hours and road improvements	Potential impacts on housing and educational institutions in Claiborne County; increased traffic
Radiological	Yes	Use as low as is reasonably achievable (ALARA) principles	Dose to workers, the public, and biota
Atmospheric and meteorological	Yes	Comply with State permit limits	Equipment emissions, cooling tower drift and electromagnetic field exposure
Environmental justice	Yes	Not applicable - dependant on actions of the State	Dependent upon State tax allocations, adverse socioeconomic impacts could be disproportionate on local minority/low-income community

(a) Additional mitigation measures are presented in Section 5.11. SERI's commitments and the staff's assumptions regarding sources and levels of impact and mitigation are included in Appendix J.

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The staff expects that the use of construction materials in the quantities associated with those expected for the new ESP unit or units, while irretrievable, would be of small consequence, with respect to the availability of such resources.

The main resource that would be irretrievably committed during operation of a new nuclear unit or units would be uranium. The availability of uranium ore and existing stockpiles of highly enriched uranium in the United States and Russia that could be processed into fuel is sufficient, so that the irreversible and irretrievable commitment would be of small consequence.

10.3 Relationship Between Short-Term Uses and Long-Term Productivity of the Human Environment

Section 102(2)(C)(iv) of NEPA (42 USC 4321 *et seq.*) requires that an EIS include information on the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity. There will be no short-term use of the environment should the proposed action be implemented because SERI is not authorized to perform any site preparation activities. The evaluation of the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity for the construction and operation of the ESP unit or units can only be performed by discussing the benefits of operating the unit. The benefit is the production of electricity. In accordance with 10 CFR 52.18, an EIS for an ESP does not need to include an assessment of the benefits of the proposed action. However, an assessment of the relationship between local short-term uses of the environment and the maintenance and enhancement of long-term productivity for the construction and operation of one or more new nuclear unit or units would be performed at the CP or COL stage should SERI be granted an ESP and later seek a CP or COL. This issue is, therefore, not resolved.

10.4 Cumulative Impacts

The staff considered the potential cumulative impacts resulting from construction and operation of the proposed unit(s) in the context of past, present, and future actions at the Grand Gulf ESP site in Chapter 7 of this EIS. For each impact area, the staff determined that the potential cumulative impact resulting from construction and operation would be generally SMALL, and further mitigation would not be warranted. The geographical area over which past, present, and future actions could contribute to cumulative impacts is dependent on the type of action considered. Several impact issues were not resolved due to lack of necessary information. These issues have the potential for MODERATE or LARGE adverse impacts and, consequently, cumulative are not resolved and would have to be addressed in a future environmental impact statement, should an applicant for a CP or COL reference an ESP for the Grand Gulf ESP site.

10.5 Staff Conclusions and Recommendations

The staff's recommendation to the Commission related to the environmental impacts of the proposed action is that the ESP should be issued. The staff's evaluation of the safety and emergency preparedness aspects of the proposed action are documented in a separate safety evaluation report prepared in accordance with 10 CFR Part 52 (NRC 2005). This recommendation is based on (1) the environmental report submitted by SERI (2005); (2) consultation with Federal, State, Tribal, and local agencies; (3) the staff's independent review; (4) the staff's consideration of comments received from the public; (5) the assessments summarized in this EIS, including the potential mitigation measures identified in the environmental report and in this EIS; and (6) the staff's conclusion there are no environmentally preferable or obviously superior alternative sites.

A comparative summary showing the staff's estimate of the environmental significance of locating one or more new nuclear units at the Grand Gulf ESP site and at any of the alternative sites is shown in Table 10-3. The estimated environmental significance of the no-action alternative, or denial of the ESP application, is also shown. Table 10-3 shows that the significance of the environmental impacts of the construction and operation of one or more new nuclear units is generally SMALL for all impact categories at all sites, with the exception of certain ecological, socioeconomic, and environmental justice categories. The alternative sites may have environmental effects in at least some categories that reach MODERATE or LARGE significance. The staff concludes that none of the alternative sites assessed are obviously superior to the Grand Gulf ESP site.

The range of impacts estimated by the NRC staff for resolved issues is predicated on certain assumptions; these are identified in each section and in Appendix J. Should the Commission issue an ESP for the Grand Gulf ESP site, the staff will verify that the assumptions identified in Appendix I and Appendix J remain applicable. In addition, certain issues are not considered to be resolved because of a lack of information. A CP or COL applicant referencing an ESP for the Grand Gulf ESP site would need to provide the necessary information for these issues, if the proposed action ultimately would affect the resources associated with these issues.

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Table 10-3. Summary of Environmental Significance of Nuclear Power Plant Construction and Operation at the Grand Gulf Early Site Permit Site, at Alternative Sites, and for the No-Action Alternative

Impact Category	Proposed Action	No-Action Alternative	Alternative Site Options		
	ESP at Grand Gulf	Denial of ESP	River Bend	Pilgrim	FitzPatrick
Land use	Unresolved, likely to be SMALL for construction and SMALL for operation	SMALL	SMALL	SMALL to MODERATE	SMALL to MODERATE
Ecology	SMALL for operation and Unresolved, likely to be MODERATE for construction	SMALL	SMALL to MODERATE	SMALL to LARGE	SMALL to LARGE
Water use and quality	Unresolved, likely to be SMALL	SMALL	SMALL	SMALL	SMALL
Air quality	SMALL	SMALL	SMALL	SMALL	SMALL
Radiological and nonradiological health	SMALL	SMALL	SMALL	SMALL	SMALL
Socioeconomic	LARGE Beneficial	SMALL	LARGE Beneficial to MODERATE Adverse	MODERATE Beneficial to MODERATE Adverse	MODERATE Beneficial to MODERATE Adverse
Historic and cultural resources	SMALL	SMALL	SMALL	SMALL	SMALL
Environmental justice	LARGE Beneficial	SMALL	SMALL	SMALL	SMALL

10.6 References

10 CFR Part 50. Code of Federal Regulations, Title 10, *Energy*, Part 50, "Domestic Licensing of Production and Utilization Facilities."

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10 CFR Part 51. Code of Federal Regulations, Title 10, *Energy*, Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions."

10 CFR Part 52. Code of Federal Regulations, Title 10, *Energy*, Part 52, "Early Site Permits, Standard Design Certifications, and Combined Licenses for Nuclear Power Plants."

40 CFR Part 1508. Code of Federal Regulations, Title 40, *Protection of Environment*, Part 1508, "Terminology and Index."

68 FR 75656. December 31, 2003. "System Energy Resources, Inc., Grand Gulf Site; Notice of Intent to Prepare an Environmental Impact Statement and Conduct Scoping Process." *Federal Register*, U.S. Nuclear Regulatory Commission.

70 FR 22308. April 29, 2005. "Environmental Impact Statements; Notice of Availability." *Federal Register*, U.S. Environmental Protection Agency.

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| <http://www.nrc.gov/reactors/new-licensing/esp/grand-gulf.html>. Accession No. ML052860041.