RAS 12723

U.S. NUCLEAR REGULATORY COMMISSION
In the Matter of System Energy Resources
Docket No. 52-009-ESP Official Exhibit No. Staff 3
OFFERED by: Applicant/Licensee Intervenor
NRC Staff Other
IDENTIFIED on 11/19/18 Witness/Panel
Action Taken: ADMITTED REJECTED WITHDRAWN
Reporter/Clerk DW

NRC STAFF EXHIBIT 3

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Exclusion Area Authority and Control	Safety	
All Geographic and Demographic Factors	Safety	
Identification of Potential Hazards in Site Vicinity	Safety	
Evaluation of Potential Accidents	Safety	
Regional and Local Climatology	Safety	
Onsite Meteorological Measurements Program	Safety	
Local Meteorological Conditions that could Impact Plant Design	Safety	
Short-Term Atmospheric Dispersion Characteristics	Safety	
Long-Term Atmospheric Dispersion Characteristics	Safety	
Site Flooding due to Local Intense Precipitation	Safety	
Site Flooding due to Probable Maximum Flood on Streams and Rivers	Safety	
Site Flooding due to Potential Dam Failures Induced by Seismic Forces	Safety	
Site Flooding due to Probable Maximum Surge and Seiche	Safety	

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RULEMAKINGS AND
ADJUDICATIONS STAFF

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Site Flooding due to Probable Maximum Tsunami	Safety	
Site Flooding due to Channel Diversions	Safety	
Site Flooding due to Ice Jam on the Mississippi River	Safety	
Low Water Considerations	Safety	
Accidental Releases of Liquid Effluents to Ground and Surface Waters	Safety	
Site Acceptability from a Geologic and Seismologic Standpoint	Safety	
Stability of Subsurface Materials and Foundations	Safety	
Stability of Slopes in the Vicinity of the Site	Safety	
Aircraft Hazards	Safety	
Radioactive Effluent Dose Consequences from Normal Operation	Safety	
Site-Specific Impediments to the Development of an Acceptable Emergency Plan	Safety	

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Select Major Features of the Emergency Plan: • Emergency Planning Zones • Assignment of Responsibility • Onsite Emergency Organization • Emergency Response Support and Resources • Emergency Classification System • Notification Methods and Procedures • Emergency Communication • Public Education and Information • Accident Assessment • Protective Response • Radiological Exposure Control Medical and Public Health Support • Radiological Emergency Response Training	Safety	Resolved insofar as the Applicant described the essential elements for advanced planning. For emergency communication, protective response, and radiological exposure control, the Staff may need to make additional determinations at the CP or COL stage. The Staff will review the complete and integrated emergency plans submitted in any COL application referencing a Grand Gulf ESP to determine whether they comply with applicable requirements, including those in 10 CFR 50.47, "Emergency Plans."

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Site Characteristics related to the Development of Adequate Security Systems	Safety	
Selection of Design Basis Accidents	Safety	
Design-Specific (Assumed) χ/Q Values	Safety	
Site-Specific χ/Q Values	Safety	
Source Terms and Radiological Consequence Evaluations	Safety	
The QA design control measures described in Enercon's QAPPD and other Enercon procedures and documents are equivalent in substance to the requirements of Appendix B to 10 C.F.R. Part 50 for the following related to the ESP application as applicable: • Design Control • Procurement Document Control • Instructions, Procedures, and Drawings • Document Control	Safety	

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
• Control of Purchased Material, Equipment, and Services • Identification and Control of Materials, Parts, and Components • Control of Special Processes • Inspection • Test Control • Control of Measuring and Test Equipment • Handling, Storage, and Shipping • Inspection, Test, and Operating Status • Nonconforming Materials, Parts, or Components • Corrective Action • Quality Assurance Records • Audits		

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Construction Impacts on Air Quality: • Impacts of construction activities on air quality	Environmental	• Dust from construction activities would be mitigated to the extent possible. • Construction equipment burning gasoline or diesel fuel would be inspected and maintained to prevent excessive exhaust emissions. SERI states (SERI 2005) that equipment that does not meet air quality regulations and permits in place at the time of construction would be repaired or replaced. • SERI stated (SERI 2005) that open burning would be conducted in a burn pit using technology to increase combustion efficiency and reduce smoke level in compliance with applicable air-permit requirements established by the Mississippi Department of Environmental Quality (MDEQ). Procedures would be established to prevent brush and forest fires initiated by open burning.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	***Safety / Environmental***	***Assumptions / Comments***
• Impacts of increased traffic during construction on air quality		• It is unlikely that air quality would be degraded sufficiently to be noticeable beyond the immediate vicinity of Grand Gulf Road and State Highway 18 and U.S. Highway 61. • Air quality in Mississippi and nearby counties in Louisiana is consistent with all Standards.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Construction Impacts on Water: • Impacts of hydrological alterations resulting from construction activity	Environmental	• Any increase in runoff intensity resulting from the increase in the impervious surface area would be mitigated using standard engineering storm water management practices pursuant to the site's NPDES storm water management program. • The construction of the shoreline intake and discharge structures along the Mississippi River would likely involve some temporary structures for protection from the flow of the river. However, these structures would not extend significantly into the river and would have minimal impact on the river's flow pattern adjacent to the shoreline. • Based on the character of the shallow groundwater system, the Staff concluded that any impacts on the groundwater flow pattern would be localized and any change would be unlikely to extend beyond the site boundary.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Construction Impacts on Ecology:	Environmental	
• Loss of onsite habitat		None
• Impacts of onsite equipment staging and borrow areas on wildlife habitat		• With the assumption that temporary construction areas in forest habitat would be reforested/restored, the impacts, being temporary in nature, would also be SMALL and additional mitigation would not be warranted.
• Overall impacts of construction activities on aquatic ecological resources		• Construction activities would be restricted to periods when river water level was low. • The exposed areas are expected to be sandy, based on information obtained during construction of GGNS Unit 1. • Very little turbidity and siltation is expected from construction activities at the shoreline through the use of standard construction practices (SERI 2005). • Dredging operations would be in compliance with ACE and MDEQ requirements so that long-term water

TABLE (3)(*i*)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		quality is not degraded. • Any water-quality impacts on the Mississippi River during construction of a new facility would be similar to the impact during the construction of GGNS Unit 1. • Construction of the pipeline connecting the power block to the cooling tower area would need to cross a small existing wetland. This would require approval from the ACE, and all work would be performed in accordance with the permit. • NRC expects that SERI would work with the appropriate Federal and State agencies and the transmission line owner, Entergy Mississippi, Inc., to develop and implement plans for widening the transmission line rights-of-way that would have minimal impacts on the aquatic ecosystems. • NRC expects that SERI would work with the appropriate State agencies and the transmission line owner, Entergy Mississippi, Inc., to develop and implement plans for the possible

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		widening of the transmission line rights-of-way that would have minimal impacts on Bayou Pierre and the crystal darter. • Appropriate construction mitigation would include instituting best management practices for erosion control into the Mississippi and Big Black rivers, Bayou Pierre, and other potentially affected streams.
• Impacts of construction at the Grand Gulf ESP site on terrestrial and aquatic Federally listed species		• Because wetlands would be minimally affected by construction at the Grand Gulf ESP site (see Section 4.4.1.1), impacts on alligators would be considered negligible. • Before beginning construction activities on the Grand Gulf site, especially those occurring in the bottomlands (e.g., construction of pipeline and intake structures), the adjacent Mississippi River shoreline should be surveyed for potential nest trees (dominant living pine [*Pinus* spp.] or bald cypress [*Taxodium*

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		distichum]) and nesting eagles during the reproductive season (September to January). • Thus, in the event that the Franklin

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		transmission line right-of-way is expanded, the USFS Homochitto National Forest in Meadville, Mississippi, should be contacted to ascertain the proximity of red-cockaded woodpeckers prior to any forest clearing. • Thus, a total of 6 percent of the bottomland forested wetland currently available onsite would be disturbed. This disturbance would widen a band of currently developed land that stretches from the base of the Loess Bluffs to the Mississippi River (Figure 2-5), but would not result in any further fragmentation of bottomland hardwood forest. This would not be expected to pose a barrier to potential bear movements in the bottomlands

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		along the river. • The preponderance of habitat used by bears would be expected to occur in bottomland forested wetland, where there would be relatively minor habitat destruction and no additional fragmentation. Thus, impacts on the Louisiana black bear from construction at the Grand Gulf ESP site are expected to be minor, as long as this does not result in the mortality of individual bears. Prior to disturbance of any bottomland forested wetland or upland hardwood forest, a bear survey should be conducted to determine use of the area. If denning bears are present, construction activities should be prohibited during the denning season (from December through April) in order to avoid destruction of bears and possible abandonment of cubs. Further, actual den sites/trees or candidate trees (bald cypress [*Taxodium distichum*] and tupelo gum [*Nyssa* sp.]) with visible cavities,

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		having a diameter at breast height of 0.9 m (3 ft) and occurring along river, lakes, streams, bayous, sloughs, or other water bodies in occupied habitat should not be harvested (FWS 2004e). If these measures are undertaken, mortality of individual bears would be considered unlikely. • Noise levels would increase from land-clearing equipment during construction at the Grand Gulf ESP site. Consequently, if bears are present, construction activities in the vicinity of a den tree should be limited during the denning season (December through April) (FWS 2004e). • The Franklin transmission line right-of-way crosses the Bayou Pierre. In the event the transmission line rights-of-way need to be widened, NRC expects that SERI would work with the appropriate Federal and State agencies and the transmission line owner, Entergy Mississippi, Inc., to develop and implement plans that

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		would have minimal impacts on the bayou darter. • Construction of the proposed intake and discharge structures would temporarily change the nearby river bank environment, and increase turbidity downstream of the in-river activities; however, this is likely to be localized and temporary and could be minimized by use of best management practices (Section 4.4.2). Impacts on the (fat pocketbook) mussel from construction activities cannot be evaluated without conducting surveys to determine if the mussels are using the shoreline where the proposed intake and discharge structures will be located. Any specimens found could be relocated. • During construction activities, sedimentation and turbidity would be controlled using standard construction practices. While these practices could limit the use of the region by adult pallid sturgeon in the immediate

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		vicinity of the site, the impact would be minor and temporary, if at all. The timing for construction is also not likely to affect any spawning or use of the region by juvenile pallid sturgeon because of the size of the river, the location of shoreline activities, and the limited in-river activities associated with the construction of the intake and discharge structures. • The conclusion of SMALL impacts by the NRC Staff is predicated on certain assumptions made by the Staff. These include the current occurrence of Federally listed threatened and endangered species and critical habitat in the project area, the current listing status of such species, and the current designation of critical habitat.
Construction Impacts on Socioeconomics: • Overall physical impacts (socioeconomic) of construction on workers and local public, buildings, roads, and aesthetics	Environmental	• However, during construction activities, the employees working the day shift at GGNS Unit 1 could be subjected to noise, dust, and gaseous pollutants associated with

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		construction events. These activities would be performed in compliance with local, State, and Federal regulations, and site-specific permit conditions. • Because people are more sensitive to changes in noise levels at night, any blasting, along with other excessively loud construction activities, would be conducted during daytime hours. • Noise levels during construction at the site boundaries are expected to be below the regulatory guidance of 65 dBA stated in NUREG-1555 (NRC 2000). A construction noise abatement and protection program would provide required mitigative measures for noise. On a short-term basis, noise may exceed this guidance; however, it is expected that noise from construction equipment would have no discernible impacts on the local noise level. All equipment would be operated in accordance with local, State, and Federal noise requirements.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		• SERI states that a restriction on noise-related activities (for example, blasting) to daylight hours could also be incorporated into activity planning (SERI 2005). • However, construction would be conducted in accordance with all Federal, State, and local regulations that govern construction activities and emissions from construction vehicles. • Specific mitigation measures to control fugitive dust would be identified in a dust control plan or similar document, prepared prior to project construction. • Other mitigation measures would include temporary storm water management and erosion and sediment control strategies. • Water turbidity could temporarily increase in the immediate construction area during construction and localized dredging. Measures to control turbidity include permit conditions, use of best management practices, and, if necessary, installing

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		a barrier (for example, silt curtain) to prevent the migration of a turbid water plume into Hamilton and Gin Lakes (SERI 2005). • The Staff concludes that the overall physical impacts of construction on workers and the local public, buildings, roads, and aesthetics would be SMALL as long as the mitigative actions, such as noise, dust, and traffic control and possible management measures identified by SERI are undertaken. • The conclusion of SMALL impacts by the NRC Staff is predicated on certain assumptions made by the Staff. These include no building of new roads or the former railroad line into the site, and carrying out mitigative actions to reduce physical impacts, such as limiting in-water activity, implementing measures to control noise, dust, and traffic, and other possible management measures identified by SERI.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
• Impacts of construction on increases in population		• The Staff assumed that 50 percent of the construction workers would be expected to come from within the region and the number of construction workers who might relocate to the region would be a small percentage of the larger communities' population base, the Staff concludes that the likely outcome is the impacts of construction on increases in population within most of the region would be SMALL, and additional mitigation would not be warranted. However, the possibility of a LARGE demographic impact in Claiborne County cannot be excluded. The range of impacts estimated by the NRC Staff is predicated on certain assumptions made by the Staff. These include that not more than 3150 construction workers would be employed at the Grand Gulf ESP site; not less than 50 percent of the construction workers would come from the region within 80 km (50 mi) of the Grand Gulf ESP site; and any

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		new workers would choose to live in the larger cities within the region, such as Vicksburg and Jackson, rather than in smaller communities that have less available housing, such as Port Gibson and Fayette.
• Impacts of construction on the regional economy		• The conclusion of beneficial moderate impacts in Warren County and small impacts elsewhere by the NRC Staff is predicated on certain assumptions made by the Staff. These include not more than 3150 construction workers would be employed at the Grand Gulf ESP site; not less than 50 percent of the construction workers would come from the region within 80 km (50 mi) of the Grand Gulf ESP site; and any new workers would choose to live in the larger cities within the region, such as Vicksburg and Jackson, rather than in smaller communities that have less available housing, such as Port Gibson and Fayette. • The conclusion of LARGE beneficial

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		(tax) impacts by the NRC was predicated on certain assumptions made by the Staff; these include: that there would be no more than 3150 new construction workers at the Grand Gulf ESP site, that no less than 50 percent of these workers would come from the 80-km (50-mi) region surrounding the site, that new workers would tend to live in the larger communities in the region, and that there are no significant changes in Mississippi tax law, especially the terms and conditions for taxability of real property.
• Offsite impacts of construction on transportation		• U.S. Highway 61 is expected to accommodate the increased traffic created by construction workers headed to the Grand Gulf ESP site (SERI 2004a). New road construction beyond this should not be necessary.
• Overall impacts of construction on recreation		None • If, as expected, many of the

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
• Impacts of construction workers on housing		in-migrating construction workforce live in larger towns and cities of the region, then the impacts on housing would be small.
• Impacts of construction on the regional infrastructure and community services		• The conclusion of MODERATE impacts by the NRC was predicated on certain assumptions made by the Staff; these include: that there would be no more than 3150 new construction workers at the Grand Gulf ESP site, that no less than 50 percent of these workers would come from the 80-km (50-mi) region surrounding the site, that new workers would tend to live in the larger communities in the region (but could still result in a significant relative increase of population in Claiborne County), and that the state would provide some financial help if the school system were seriously affected by in-migration.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Construction Impacts on Historic and Cultural Resources: • Impacts of construction activities on historic and cultural resources	Environmental	• The conclusion of SMALL impacts by the NRC Staff is predicated on certain assumptions made by the Staff. These include the commitment made by SERI to develop procedures to provide immediate reaction and notification in the event of inadvertent discovery of cultural resources and to conduct surveys prior to construction of new transmission lines and areas identified in Figure 4-1.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Construction Impacts on Nonradiological Health: • Nonradiological health impacts of construction on construction workers, workers at the GGNS Unit 1 facility and the local population	Environmental	• Operational controls would be imposed to mitigate dust, such as wetting unpaved roads and construction areas. Cleared areas would be mulched or seeded to reduce wind-blown dust. The concrete facility would be equipped with dust-control systems to minimize releases of concrete dust (SERI 2005). To prevent excessive exhaust emissions, construction equipment that uses gasoline or diesel fuel would be inspected and repaired or replaced routinely. • The Staff assumes adherence to NRC, OSHA, and State safety standards, practices, and procedures during construction activities. • For those Unit 1 workers who will be outside, training and noise protection would be provided. If it is necessary to do any blasting, the activity would be performed during the day to be less distracting to the local

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Construction Impacts on Radiological Health: • Impact of radiological exposures to site preparation and construction workers	Environmental	• The annual site construction workforce dose is estimated to be 1.12 person-Sv (112 person-rem) (SERI 2005), based on an assumed construction workforce of 3150. • SERI considers that, on an annual basis, the dose to workers from gaseous effluents would be insignificant (approximately 0.001 person-Sv or 0.1 person-rem) with respect to the dose from direct radiation and that this dose would be accounted for in the protected-area-fence TLD readings. This is based on an assumed construction workforce of 3150 persons and an occupational exposure period of 2080 hours per year. • Assuming the location of the proposed new nuclear unit or units does not change, the Staff concludes that the impact of radiological exposures to site preparation and construction workers would be

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Operation Impacts on Land-Use:	Environmental	
• Land-use impacts in the vicinity of the ESP site due to operations		• A conservative estimate of the expected increase in population related to new personnel being employed at the ESP site would be 2320 persons. This assumes that all facility-related employment associated with the ESP site would relocate to the impact region (within 80 km (50 mi)) of the ESP site. • The Staff assumed that new cooling towers would produce salt concentrations similar to cooling towers at existing nuclear power plants.
• Land-use impacts in the transmission line rights-of-way and offsite areas from ESP facility operations		• Maintenance of the transmission lines is expected to be accomplished using standard industry practices and following applicable laws and regulations.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Operation Impacts on Air Quality:	Environmental	
• Impacts of cooling towers on air quality		• Cooling towers associated with the new nuclear unit or units would be similar to cooling towers at existing nuclear plant sites, including the GGNS.
• Impacts of atmospheric releases other than cooling system releases on air quality		None
• Impacts of transmission line operation on air quality		None

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Operation Impacts on Water: • Impacts of hydrological alterations resulting from operation	Environmental	• Any increase in runoff intensity resulting from the increase in the impervious surface area would be mitigated using standard engineering storm water management practices pursuant to the site's NPDES storm water management program. • Based on the character of the shallow groundwater system, the Staff concluded that any impacts on the groundwater flow pattern would be localized and any change would be unlikely to extend beyond the site boundary.
Operation Impacts on Ecological Resources: • Terrestrial ecological impacts of operation of a new generation facility at the Grand Gulf ESP site including the associated heat-dissipation system, transmission lines, and right-of-way maintenance	Environmental	• It is assumed that new cooling towers would produce salt concentrations similar to cooling towers at existing nuclear power plants. • It is assumed that any transmission line improvements, such as the addition of new lines and pole support

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		structures, for example, would be sited within the existing transmission line rights-of-way to the greatest extent possible and that no new rights-of-way would be required (Section 4.4.1.2). • The Staff assumes that the same vegetation management practices currently employed by Entergy Mississippi, Inc. for the existing GGNS Unit 1 facility transmission line rights-of-way (such as, bushhogging on an as-needed basis as discussed in Section 2.7.1.1) would be applied to any expanded rights-of-way associated with the Grand Gulf ESP facility. • It is assumed existing roads providing access to the current transmission line rights-of-way would be sufficient for use in any expanded right-of-way and that no new roads would be required.
• Impacts of operation on aquatic ecosystems		• The maintenance procedures

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		currently being used (primarily bushhogging performed on an as-needed basis) would likely continue (41 FR 24062). • If widening the existing rights-of-way is needed, NRC expects that an applicant for a CP or COL referencing the Grand Gulf ESP would work with the appropriate Federal and State agencies and the transmission line owner, Entergy Mississippi, Inc., to develop and implement the plans for rights-of-way maintenance that would have minimal impacts on the aquatic ecosystems. • NRC expects that SERI would work with the appropriate State agencies and the transmission line owner, Entergy Mississippi, Inc., to develop and implement plans for maintenance of the transmission line rights-of-way that would have minimal impacts on Bayou Pierre and the crystal darter.
• Impacts of operation on terrestrial and aquatic		• The NRC expects that an applicant

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Federally listed threatened and endangered species		for a CP or COL referencing the Grand Gulf ESP would work with the appropriate Federal and State agencies and the transmission line owner, Entergy Mississippi, Inc., to develop and implement plans for maintenance of the transmission line rights-of-way that would have minimal impacts on the Mississippi River and bayou darter. • The conclusion of SMALL impacts by the NRC Staff is predicated on certain assumptions made by the Staff. These include the current occurrence of Federally listed threatened and endangered species and critical habitat in the project area, the current listing status of such species, and the current designation of critical habitat.
Operation Impacts on Socioeconomics: • Physical impacts (socioeconomic) of operation	Environmental	• The noise levels would be controlled in accordance with applicable local regulations. Most equipment would be located inside structures, reducing the outdoor noise level.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		• The conclusion of SMALL impacts by the NRC Staff is predicated on certain assumptions made by the Staff. These include mitigative actions identified to reduce physical impacts such as: cooling tower plume control; compliance measures to control noise, dust, and other air pollutants; and traffic management identified by SERI are undertaken.
• Demographic impacts of operation		• Assuming an average family size of four, 2320 people could be expected to move to the region from other areas and would represent both a source of income to the community and a potential demand on community services, such as schools and police protection. • Assuming that the geographic distribution of new employees would be the same as for the existing unit, FEIS Table 5-4 shows the potential geographic distribution of new employees and the potential percentage increase for each

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
• Impact on the regional economy of operation		jurisdiction's population represented by facility-related population if facility operations started today. • The conclusion regarding the range of impacts by the NRC Staff is predicated on certain assumptions made by the Staff. These include that not more than 1160 new operations workers at the Grand Gulf ESP site, that not less than 50 percent of the operations workers would come from the region within 80 km (50 mi) of the Grand Gulf site, and that most of the new workers would choose to live in the larger cities of the region. • Based on the assumption that the new employees would come from outside the region, the regional governments would experience both outflows and inflows of monies as a result of the operation of the new unit or units. • The conclusion of LARGE beneficial impacts in Claiborne County is predicated on certain assumptions

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		made by the Staff. These include that not more than 1160 new operations workers would be employed at the Grand Gulf ESP site, that not less than 50 percent of the operations workers would come from the region within 80 km (50 mi) of the Grand Gulf site, that most of the new workers would choose to live in the larger cities of the region, and that there are no significant changes in the terms and conditions for taxability of real property under Mississippi tax law.
• Impacts on the regional infrastructure and community service		• The conclusion of MODERATE impacts by the NRC was predicated on certain assumptions made by the Staff; these include: that there would be no more than 1160 new operations workers at the Grand Gulf ESP site; that no less than 50 percent of these workers would come from the 80-km (50-mi) region surrounding the site; that new workers would tend to live in the larger communities in the region (but could still result in a significant

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
• Impacts of operational workforce on transportation		relative increase of population in Claiborne County); and that the state would provide some financial help if the school system were seriously affected by in-migration. • The conclusion of MODERATE impacts by the NRC was predicated on certain assumptions made by the Staff; these include: that there would be no more than 1160 new operations workers at the Grand Gulf ESP site; that no less than 50 percent of these workers would come from the 80-km (50-mi) region surrounding the site; that new workers would tend to live in the larger communities in the region (but could still result in a significant relative increase of population in Claiborne County); and that the state would provide some financial help if the school system were seriously affected by in-migration. • The conclusion of MODERATE impacts by the NRC was predicated

TABLE (3)(i)

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Issue	Safety / Environmental	Assumptions / Comments
• Impacts of operation on aesthetics and recreation		on certain assumptions made by the Staff; these include: that there would be no more than 1160 new operations workers at the Grand Gulf ESP site; that no less than 50 percent of these workers would come from the 80-km (50-mi) region surrounding the site; that new workers would tend to live in the larger communities in the region (but could still result in a significant relative increase of population in Claiborne County); and that the state would provide some financial help if the school system were seriously affected by in-migration.
• Impacts of operation on public services and infrastructure		• The conclusion of MODERATE impacts by the NRC was predicated on certain assumptions made by the Staff; these include: that there would be no more than 1160 new operations workers at the Grand Gulf ESP site; that no less than 50 percent of these workers would come from the 80-km (50-mi) region surrounding the site; that new workers would tend to live in

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		the larger communities in the region (but could still result in a significant relative increase of population in Claiborne County); and that the state would provide some financial help if the school system were seriously affected by in-migration.
Operation Impacts on Historic and Cultural Resources: • Impacts of operation on historic and cultural resources	Environmental	• The conclusion of SMALL impacts by the NRC Staff is predicated on the assumption that SERI will develop procedures regarding protection of historic and cultural resources that would be incorporated into the site-wide Excavation and Backfill Work Procedures, which will involve an immediate stop work order should archaeological, historical, or other cultural resources be uncovered during excavation.
Operation Impacts on Environmental Justice: • Operation impacts on minority and low-income populations	Environmental	• The conclusion of SMALL impacts by the NRC Staff is predicated on certain

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		assumptions made by the Staff. These include that there will not be any significant demographic changes before additional units are added to the Grand Gulf site and that there are no significant resource dependencies or pre-existing conditions among the minority and low-income population that have not been identified.
• Operation impacts on health of minority and low-income populations		• The conclusion of SMALL impacts by the NRC Staff is predicated on certain assumptions made by the Staff. These include that there will not be any significant demographic changes before any additional units are added to the Grand Gulf site, that regional populations of minority and low-income populations will remain in the same geographic locations, and that there are no significant resource dependencies or pre-existing conditions among the minority and low-income population that have not been identified.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
• Socioeconomic impacts on minority and low-income populations		• The conclusion of LARGE beneficial impacts is predicated on certain assumptions made by the NRC Staff. These include: not more than 1160 new operations workers would be employed at the Grand Gulf ESP site; not less than 50 percent of the operations workers would come from the region within 80 km (50 mi) of the Grand Gulf site; most of the new workers would choose to live in the larger cities of the region; there are no significant changes in the terms and conditions for taxability of real property under Mississippi tax law; and regional populations of minority and low-income populations will remain in the same geographic locations.
Operation Impacts on Nonradiological Health: • Nonradiological health impacts except acute and chronic impacts of EMFs	Environmental	• The Staff assumes adherence to NRC, OSHA, and State safety standards, practices, and procedures for operation of new nuclear units.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Operation Impacts on Radiological Health:	Environmental	
• Impact of radiological exposures on members of the public from routine operational releases		None
• Impact of radiological exposures to workers during operations		None
• Radiological impacts to biota from routine operation		None
Operation Impacts on Postulated Accidents:	Environmental	
• Impacts of design basis accidents for advanced light water reactors		None
• Impacts of severe accidents for advanced light water reactors		None
Fuel Cycle, Transportation, and Decommissioning:	Environmental	
• Impacts of the uranium fuel cycle for light water reactors		• The values in Table S–3 were calculated from industry averages for the performance of each type of facility or operation within the fuel cycle. Recognizing that this approach

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		meant that there would be a range of reasonable values for each estimate, the Staff followed the policy of choosing the assumptions or factors to be applied so that the calculated values would not be underestimated. • Scaling from Table S–3, of the total annual water use of 1.72×10^8 m^3 (4.55×10^{10} gal), about 1.7×10^8 m^3 (4.44×10^{10} gal) are required for the removal of waste heat, assuming that these plants use once-through cooling. • The maximum consumptive water use (assuming that all plants supplying electrical energy to the nuclear fuel cycle use cooling towers) would be about 6 percent of the 1000-MW(e) LWR scaled model using cooling towers. • For radon releases from stabilized tailings, the Staff assumed that the scaled model would result in an emission of 1.5×10^{11} Bq (4 Ci) per site year; i.e., four times the GEIS estimate for the reference reactor

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
• Impacts of transportation of fuel and radioactive waste to and from advanced light water reactors		year. • The estimated 100-year environmental dose commitment from mining, milling, and tailings prior to stabilization for each site year (assuming the 1000-MW(e) LWR scaled model) would be approximately 37 person-Sv (3700 person-rem) to the whole body. • It has been assumed that all of the gaseous and volatile radionuclides contained in the spent fuel are released to the atmosphere before the disposal of the waste. • Because the GT-MHR was assumed to ship about one-third less spent fuel on a MTU basis, SERI (2005a) determined that the actinide inventory per shipment would be about one-half of that in the reference LWR shipment. • The PBMR is assumed to ship the same amount of spent fuel in a spent fuel shipping cask as the reference LWR so there is about a 60 percent

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		increase in per-shipment actinide inventories from PBMR spent fuel shipments relative to the reference LWR. • In all cases, it was assumed that the dose rate emitted from the shipping containers is 0.1 mSv/hr (10 mrem/hr) at 2 m (6.6 ft) from the side of the transport vehicle, the maximum dose rate allowed by U.S. Department of Transportation regulations. • The analysis assumed that crew member doses are limited to 0.02 Sv (2 rem) per year, which is the DOE administrative control level (DOE 2002). • DOE (2002) assumed that inspectors would be exposed for 1 hour at a distance of 1 m (3.3 ft) from the shipping containers. The dose rate at 1 m (3.3 ft) is about 0.14 mSv/hr (14 mrem/hr), so the dose per shipment is about 0.14 Sv (14 mrem). • Based on this conservative value, the annual doses to vehicle inspectors were calculated to be in the range of

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		9 to 18 mSv/yr (900 to 1800 mrem/yr), assuming the same person inspects all shipments of fuel and waste to and from the advanced reactor sites. • Resident. The analysis assumed that a resident lives 30 m (100 ft) from the point where a shipment would pass and would be exposed to all shipments along a particular route. • Individual stuck in traffic. This scenario addresses potential traffic interruptions that could lead to a person being exposed to a loaded shipment for one hour at a distance of 1.2 m (4 ft). The analysis assumed this exposure scenario would occur only one time to any individual. • Person at a truck service station. This scenario estimates doses to an employee at a service station where all truck shipments to/from the advanced reactors would stop. DOE (2002) assumed this person is exposed for 49 minutes at a distance of 16 m (52 ft) from the loaded

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		shipping container. • Each shipment is assumed to consist of a single shipping cask loaded on a modified trailer. • For purposes of this Chapter 6 analysis, their design was assumed to be the same as those used for the existing LWRs. • The per-shipment dose estimates are independent of reactor technology because they were calculated based on an assumed external radiation dose rate emitted from the cask, which was fixed at the regulatory maximum limit for the advanced reactor designs (i.e., 0.1 mSv/hr (10 mrem/hr) at 2 m). • Two key reasons for the higher population doses relative to Table S–4 are the higher number of spent fuel shipments estimated for some of the reactor technologies and the longer shipping distances assumed for the analyses (i.e., to a possible repository in Nevada) than were used

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		in WASH-1238. • It was assumed in this Chapter 6 analysis that the shipping cask capacities are 0.5 MTU/shipment, roughly equivalent to one PWR or two BWR spent fuel assemblies per shipment. • Other conservative assumptions in the Staff's calculation include: 1) Use of the regulatory maximum dose rate (0.1 mSv/hr or 10 mrem/hr at 2 m) in the RADTRAN 5 calculations. The shipping casks assumed in the EIS prepared in support of the application for a geologic repository at the proposed Yucca Mountain site (DOE 2002) were designed to transport spent fuel that has cooled for five years. In reality, most spent fuel will have cooled for much longer than five years before it is shipped to a possible geologic repository. Sprung et al. (2000) developed a probabilistic distribution of dose rates based on fuel cooling times that indicates that approximately

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		three-fourths of the spent fuel to be transported to a possible geologic repository will have dose rates less than half of the regulatory limit. Consequently, the estimated population doses in Table 6-7 could be divided in half if more realistic dose rate projections are used. 2) Use of 30 minutes as the average time at a truck stop in the calculations. Many stops made for actual spent fuel shipments are short-duration stops (e.g., 10 minutes) for brief visual inspections of the cargo (e.g., checking the cask tie-downs). These stops typically occur in minimally populated areas, such as an overpass or freeway ramp in an unpopulated area. Furthermore, empirical data provided in Griego et al. (1996) indicate that a 30-minute stop is toward the high end of the stop-time distribution. Average stop times observed by Griego et al. (1996) are on the order of 18 minutes. Based on these observations, it was

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		concluded that the stop model assumptions used in this study overestimate public doses at stops by at least a factor of two. Consequently, the doses to onlookers given in Table 6-7 could be reduced by a factor of two to reflect more realistic truck shipping conditions. • The assumed transport of spent fuel originated from the Maine Yankee Nuclear Plant (a distance further than the Grand Gulf ESP site) and terminated at a disposal facility assumed to be at Yucca Mountain, Nevada. • The advanced BWR spent fuel transportation risks were calculated assuming the entire cobalt-60 inventory is in the form of crud. • The Staff assumed that shipping casks for advanced reactor spent fuels will provide equivalent mechanical and thermal protection of the spent fuel cargo. • As was done for routine exposures, the Staff assumed that the numbers

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		of shipments of spent fuel per year are equivalent to the annual discharge quantities. • This assumes that the fuel materials and containment systems (i.e., cladding, fuel coatings) behave similarly to current LWR fuel under applied mechanical and thermal conditions. • Doses for the River Bend alternative site can be assumed to be bounded by the values for the proposed Grand Gulf ESP site because differences in route characteristics are minimal. • The number of shipments per 1100 MW(e) was calculated assuming the WASH-1238 average waste shipment capacity of 2.34 m^3 per shipment (108 m^3/yr divided by 46 shipments/yr). • However, the GT-MHR and PBMR information in INEEL (2003) assumed that the applicant would ship wastes using two different packaging systems: one that hauls 28 m^3 per shipment (1000 ft^3 per shipment) and one that hauls 5.7 m^3 per shipment

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		(200 ft^3 per shipment).
Cumulative Impacts of Construction and Operation on Air Quality: • Cumulative impacts of construction and operation of a new facility at the Grand Gulf ESP site on air quality	Environmental	None
Cumulative Impacts of Construction and Operation on Water Use and Quality: • Cumulative impacts of surface water use	Environmental	None
Cumulative Impacts of Operation on Terrestrial Resources: • Cumulative impacts of cooling tower operation on wildlife and wildlife habitat • Cumulative impacts of transmission line operation and maintenance on wildlife and wildlife habitat • Cumulative impacts of operation on terrestrial ecological resources	Environmental	None None None

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
Cumulative Impacts of Construction and Operation on Aquatic Resources:	Environmental	
• Contribution of construction to cumulative losses of aquatic organisms		None
• Contribution of construction, operation, and decommissioning to cumulative impacts on aquatic ecological resources		None
Cumulative Impacts of Construction and Operation on Socioeconomics, Historic and Cultural Resources, and Environmental Justice:	Environmental	
• Cumulative socioeconomic impacts of construction and operation		• The Staff concludes that construction impacts would generally be SMALL, but there are exceptions if more workers than expected settle in Claiborne County and Jefferson County, in which case a MODERATE impact level may be reached for the impacts on roads, housing, and some public services.

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		• In terms of beneficial effects, the impacts on regional economies would be MODERATE beneficial in Warren County and tax revenues benefit to Claiborne County would be beneficially LARGE under current Mississippi law, but would depend on how taxation of the new unit or units is resolved by the state of Mississippi.
• Cumulative impacts on historic and cultural resources		None
• Cumulative impacts on environmental justice		• If tax revenues dramatically increase, the residents of Claiborne County (who are disproportionately minority and low-income) would enjoy LARGE beneficial tax revenue impacts. However, if significant demands are placed on Claiborne County services as a result of more workers than expected settling in the county (without a corresponding increase in tax revenues), the socioeconomic impacts of reduced services or higher taxes would fall disproportionately on

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		the residents of the county. In that case, the environmental justice impacts would be MODERATE.
Cumulative Impacts of Construction and Operation on Nonradiological Health: • Cumulative impacts on nonradiological health	Environmental	None
Cumulative Impacts of Construction and Operation on Radiological Health: • Cumulative radiological impacts of operation for light water reactors	Environmental	None
Cumulative Impacts of Construction and Operation on Fuel Cycle, Transportation, and Decommissioning: • Cumulative fuel cycle impacts for light-water reactors • Cumulative impacts of transportation of fuel and waste to and from the Grand Gulf site for light water reactors	Environmental	None None
Alternatives: • Evaluation of power generation alternatives	Environmental	• Closed-cycle cooling with cooling

TABLE (3)(i)

RESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Assumptions / Comments
		towers is assumed for all thermal plants.
• Evaluation of alternative sites		None

NOTES:
1. Where the Staff's safety evaluation relied on information that was not currently supported by the SSAR, the Staff placed a condition in the ESP. Because conditions are binding, the Staff did not consider these to be assumptions.

TABLE (3)(ii)

UNRESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Comments
Construction Impacts on Land Use – Site & Vicinity: • Dredge spoils, borrow, and BMPs • Rail service	Environmental	
Construction Impacts on Land Use – Transmission Lines	Environmental	
Construction Impacts on Water Use	Environmental	
Construction Impacts on Water Quality	Environmental	
Construction Impacts on Terrestrial Ecology – Wildlife Habitat	Environmental	
Operation Impacts on Water Use	Environmental	
Operation Impacts on Water Quality • Surface water • Groundwater	Environmental	

TABLE (3)(ii)

UNRESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Comments
Operation Impacts on Nonradiological Health Impacts – EMFs: • Acute Effects of EMFs • Chronic Effects of EMFs	Environmental	
Operation Impacts on Design Basis Accidents – Gas-Cooled Reactors	Environmental	
Operation Impacts on Severe Accidents – Gas-Cooled Reactors	Environmental	
Uranium Fuel Cycle Impacts and Solid Waste Management – Gas-Cooled Reactors	Environmental	
Transportation of Unirradiated Fuel Impacts -- Gas-Cooled Reactors	Environmental	
Transportation of Spent Fuel Impacts -- Normal Conditions -- Gas-Cooled Reactors	Environmental	

TABLE (3)(ii)

UNRESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Comments
Transportation of Spent Fuel Impacts – Accident Risks: • Crud and activation products • Radionuclide inventory data for ACR-700 and IRIS advanced reactors • Gas-cooled reactors	Environmental	
Transportation of Radioactive Waste Impacts – Gas-Cooled Reactors	Environmental	
Decommissioning Impacts	Environmental	
Cumulative Impacts on Land Use – Transmission Lines	Environmental	
Cumulative Impacts on Water Use – Groundwater	Environmental	
Cumulative Impacts on Water Quality: • Surface Water • Groundwater	Environmental	
Cumulative Impacts on Terrestrial Ecology – Wildlife Habitat	Environmental	

TABLE (3)(ii)

UNRESOLVED SAFETY AND ENVIRONMENTAL ISSUES

Issue	Safety / Environmental	Comments
Cumulative Impacts on Nonradiological Health Impacts – EMFs	Environmental	
Cumulative Radiological Impacts of Normal Operations – Gas-Cooled Reactors	Environmental	
Cumulative Impacts of Uranium Fuel Cycle – Gas-Cooled Reactors	Environmental	
Cumulative Impacts of Transportation of Unirradiated Fuel, Spent Fuel, & Waste – Gas-Cooled Reactors	Environmental	
Cumulative Impacts of Decommissioning	Environmental	

NOTES:

1. There are no unresolved safety issues. However, during the course of its safety review, the Staff did identify certain design matters that any future applicant referencing the ESP shall address in the site-specific section of the Final Safety Analysis Report. In these cases, the Staff established a COL Action Item; a list of these COL Action Items is provided in Appendix A.2 to the FSER. These COL Action Items call for a set of design information to be provided by any future applicant referencing the ESP, but this list is not exhaustive; that is, they do not constitute the complete set of information that must be provided by any future applicant. A COL application referencing a Grand Gulf ESP would still need to meet the requirements of 10 CFR Part 52, Subpart C.