

5.0 CONCLUSIONS AND RECOMMENDATIONS

5.1 SUMMARY OF THE STAFF'S ENVIRONMENTAL ANALYSIS

The conclusions presented are those of the environmental staff of the FERC. A typical Coast Guard LOR will address the suitability of the Pascagoula Bar, Horn Island Pass, Lower Pascagoula, and Bayou Casotte Channels for LNG ship transportation. Likewise, the COE will present its own conclusions and recommendations in the dredging, dredged material placement, and wetland permits it may issue pursuant to section 10 of the River and Harbors Act, section 103 of the MPRSA, and section 404 of the CWA. The EPA has the authority to review and veto the COE decisions on the section 103 and 404 permits.

We (the Commission's staff) have determined that construction and operation of the LNG Clean Energy Project would result in limited adverse environmental impacts. If the proposed project is found to be in the public interest and is constructed and operated in accordance with recommended mitigation measures, it would be an environmentally acceptable action. Our conclusion is based on information provided by Gulf LNG and data developed from data requests; field investigations by Commission staff; literature research; alternatives analysis; comments from federal, state, and local agencies; and input from public groups and individual citizens.

If the Coast Guard issues an LOR finding the waterway suitable for LNG marine traffic, the arrival, transit, cargo transfer, and departure of LNG ships would be required to adhere to the procedures of an *LNG Vessel Transit Management Plan* to be developed by the Coast Guard Sector Mobile and the Coast Guard District Eight Commander. In addition, Gulf LNG would develop Operations and Emergency Manuals in consultation with the Coast Guard. These procedures would be developed to ensure the safety and security of all operations associated with LNG ship transit and unloading.

As part of our review, we developed measures that we believe would appropriately and reasonably avoid, minimize, or mitigate for environmental impacts resulting from construction and operation of the proposed project. We are, therefore, recommending that our mitigation measures be attached as conditions to any authorization issued by the Commission.

5.1.1 Geology

Construction and operation of the proposed LNG Clean Energy Project would have minimal impacts on geologic resources. The project is not expected to have an impact on mining activities or interfere with petroleum production in the area and there are no significant paleontological resources in the area that would be affected by the project. Because no shallow bedrock is present in the project area, blasting would not be necessary during construction.

The potential for geologic hazards to significantly affect construction or operation of the proposed project is low. Because the site of the proposed LNG terminal is in an area of low seismic risk, earthquakes, surface faulting, and soil liquefaction are not anticipated to have a significant impact on the proposed project facilities. The risk of damage resulting from other geologic hazards (i.e., subsidence, slope instability, and inadequate load-bearing capacity of soils) would be avoided or reduced by specific engineering design criteria, ground modification and other construction techniques, and operating procedures implemented by Gulf LNG. Conditions necessary for the development of karst terrain, landslides, avalanches, and volcanism are not present in the project area.

Storm surge, the abnormal rise in sea level due to the wind and pressure forces associated with hurricanes and other tropical storms, is often the most significant cause of damage to facilities and

property in low-lying coastal areas. Gulf LNG assessed two models for evaluating future hurricane surge events (the FEMA Flood Insurance Study Model and the COE's SLOSH Model). After comparing the actual storm surge data along the Mississippi coast caused by Hurricane Katrina in August 2005 with the FEMA and COE model predictions, Gulf LNG determined that the SLOSH Model for a Category 4 hurricane would provide the most appropriate results to use as a design basis for the LNG Clean Energy Project. In order to mitigate the potential hazards associated with storm-induced flooding and waves, Gulf LNG would construct a dike wall 45 feet wide and 27 feet high to surround the entire 33.3-acre LNG terminal site. The jetty platform and pipe trestle would be constructed at an elevation above the Category 4 storm significant wave crest elevation of 33.1 feet AMSL.

To minimize potential impacts associated with shoreline erosion, Gulf LNG would install an area of rock or concrete units on the slope parallel to the shoreline to minimize scour potential within the berth area from LNG ship propeller wash. During the transit along the navigation channels, LNG ships would be operating at low speeds and would not create wakes that would increase the potential for shoreline erosion in the project area. In addition, because the project is located at the southernmost end of the existing land mass, LNG ships calling at the terminal would not pass reaches of the Bayou Casotte shoreline subject to erosion. The potential for shoreline erosion at Horn Island Pass associated with LNG ships would be similar to, or less than (due to their lower speeds and higher under-keel clearance), other large vessels using the area.

5.1.2 Soils and Sediments

Soils

Soils at the proposed LNG terminal site and along the proposed natural gas sendout pipeline are variable with surface textures ranging from sandy clay loams to loamy sands. The LNG terminal site was utilized for placement of dredged material beginning sometime after 1952, when the site was entirely submerged beneath the Mississippi Sound, until as recently as the 1970s. The construction of the LNG terminal facilities would involve removing the existing surface soils to expose the most stable subsoils. Fill would be used to raise the surface grade where the LNG terminal would be constructed, with the exception of the tank storage area, which would be lower in elevation for secondary containment purposes. Additional soil amendments would also be used to re-engineer the soils at the site to provide a stable land surface for construction. These activities would not have a significant impact on soils at the LNG terminal site because these soils were already impacted by previous dredged material placement activities. Because the soils within the LNG terminal would be permanently converted to an industrial use following construction, mitigation of compaction impacts on soils at the terminal would not be necessary.

Pipeline construction such as clearing, grading, trench excavation, backfilling, and the movement of heavy construction equipment along the construction right-of-way may result in adverse impacts on soil resources. Clearing activities remove the protective cover and expose the soil to the effects of wind, sun, and precipitation. This exposure can lead to the transport of sediment to sensitive areas. Grading and equipment traffic have the potential to compact soil, reducing porosity and infiltration rates, which could cause increased runoff potential or difficulty in revegetating. Trench excavation and backfilling could lead to a mixing of the soil layers, bringing potentially less productive subsoil to the surface or introducing rocks from deeper horizons to the soil surface. The soils could also potentially be impacted due to contamination from spills or leaks of fuels, lubricants, and coolants from construction equipment.

Gulf LNG has adopted our Plan to establish a baseline for minimizing the potential for erosion as a result of water or wind action and to aid in reestablishing vegetation after construction. In addition to our Plan, Gulf LNG would develop a site-specific SWPPP as a requirement of the general permit for

construction stormwater discharges. The SWPPP would incorporate BMPs as specified in our Plan, as well as guidance developed for erosion control and stormwater management in the State of Mississippi. Gulf LNG would finalize its SWPPP for construction in consultation with the MDEQ and other applicable resource agencies.

Gulf LNG would also develop an Industrial SWPPP as a requirement of coverage under the NPDES Industrial Stormwater General Permit. The Industrial SWPPP would, in part, identify areas with a high potential for soil erosion and specify prevention measures to limit erosion. This plan would be updated on an as-needed basis at least annually in accordance with the terms of the general permit. Gulf LNG would finalize its Industrial SWPPP for operations in consultation with the MDEQ and other applicable resource agencies.

Gulf LNG has developed an SPCC Plan to address hazardous material and petroleum spills during construction of both the onshore and offshore project facilities. The SPCC Plan describes preventative measures to minimize the likelihood of spills and leaks and mitigative measures to minimize impacts should a spill occur. Gulf LNG would develop a separate SPCC Plan after construction of the project to identify similar preventative measures that would be employed during operation of the LNG terminal and associated facilities.

Sediments

Construction of the LNG terminal would require the dredging of about 2.96 million yd³ of sediment to accommodate the marine facilities associated with the proposed project. Gulf LNG proposes to place the dredged material associated with construction in the EPA-designated ODMDS. Gulf LNG anticipates that the ship berth and maneuvering area would require periodic maintenance dredging. Based on estimated shoaling rates in the area, Gulf LNG estimates that between 115,000 to 180,000 yd³ of material would need to be removed from the ship berth and maneuvering area every 3 years. The ship berth and maneuvering area would be owned by the JCPA after it is constructed and the JCPA would be responsible for the maintenance dredging. The BCDMMS is the proposed placement area for dredged material generated during maintenance dredging.

After receiving approval of its SAP from the COE and the EPA, Gulf LNG conducted sampling and analysis of the sediments contained within the proposed dredge area following standard guidelines for assessing dredged materials. The sediments that would be dredged for the marine facilities consist primarily of clays and silts. The relatively high average value for percent fines measured for the proposed dredged materials suggests that the sediment is likely to be resuspended during dredging (resulting in elevated TSS concentrations), and may produce elevated levels of TSS at the offshore dredged material placement site. However, the local background TSS conditions in the Mississippi Sound are generally high and the added TSS levels resulting from the dredging proposed by Gulf LNG would not likely have a significant impact on water quality or aquatic organisms present within the dredging footprint or nearby waters. Gulf LNG would also be required to conduct water quality monitoring as a condition of its section 401 Water Quality Certificate. Based on the results of water quality monitoring, Gulf LNG could adjust the rate of dredging to reduce impacts resulting from elevated TSS levels. At the dredged material placement site, use of bottom dumping barges or scows would minimize resuspension of sediments because dredged material placement would occur rapidly.

None of the organic contaminants (i.e., PAHs, PCBs, or organo-pesticides) analyzed were identified above detection limits in any of the sediment samples taken from the proposed dredge area. Except for aluminum, iron, and manganese, the proposed dredged materials contain generally low to very low concentrations of the 17 metals that were analyzed. As indicated in its agency-approved SAP, Gulf LNG compared the results of the chemical characterization of the sediment cores with sediment quality

screening parameters. The sediment quality parameters approved in the SAP were the ERL values published in Long et al. (1995) and the PEL parameters published by the Florida Department of Environmental Quality (1994). Arsenic concentrations in three of the sediment samples were slightly above the ERL values. The remaining constituents were all substantially below both the ERL and PEL values, suggesting limited, if any impacts, would result from disturbance of the sediments during dredging activities.

To estimate the possible release of chemical constituents to the water column during dredging operations and dredged material placement, Gulf LNG conducted elutriate testing of the sediments. None of the organic compounds analyzed were identified above their detection limits in any of the elutriate samples. No metals were detected at concentrations above water quality standards; however, detection limits for two metals (copper and silver) and cyanide were higher than the standards. Although it is possible that these contaminants could be released at concentrations exceeding the water quality standards, elutriate tests provide conservative estimates of potential water quality impacts because the tests simulate a greater level of mixing and aeration than actually created by mechanical dredging. Furthermore, the results of bioassay and bioaccumulation testing indicated that the sediments would not have any adverse effects on the test species and would be suitable for offshore placement.

5.1.3 Water Resources

Groundwater

Water table elevations in the project area are expected to be near mean sea level. The project would not affect any EPA-designated Sole Source Aquifers. There are two private wells located within 150 feet of the construction right-of-way for the natural gas sendout pipeline. One of the wells, located approximately 5 feet from the construction right-of-way near MP 1.5, is owned by Chevron and is designated as “unused.” The second well is located approximately 150 feet from the proposed pipeline construction right-of-way near MP 4.0 and is designated for domestic use by the Port of Pascagoula. To ensure that potential impacts on water supply wells are minimized during construction, Gulf LNG would identify and mark, as appropriate, any undocumented water wells and confirm the locations of existing, documented wells before construction. In addition, we have recommended that Gulf LNG conduct pre- and post-construction monitoring of in-use wells within 150 feet of the construction work area and replace any potable water supply system that is damaged during construction that cannot be repaired to its former capacity and quality.

If areas of potential groundwater contamination are discovered during the course of construction, Gulf LNG would contact personnel in the MDEQ Groundwater Assessment and Remediation Division and would follow the procedures contained in the MDEQ’s document, *Brownfield Risk Evaluation Procedures*.

Surface Water

Activities associated with the project that could affect surface water resources include construction of the marine facilities and associated dredging, dredged material placement, pipeline waterbody crossings, excess SCV water discharge, hydrostatic testing, stormwater runoff, bank erosion, and accidental spills or leaks of hazardous materials. Because the LNG ships would be fully loaded with LNG when transiting to and arriving at the proposed terminal, no ballast water would be discharged into the Mississippi Sound. However, as the LNG cargo is unloaded, ballast water would be taken on to maintain trim and stability. LNG ships would also use water to cool engines during offloading of LNG at the proposed terminal.

Dredging and dredged material placement would result in a temporary increase in suspended solids in the waters of the Mississippi Sound. However, because of the relatively turbid conditions already present in the Mississippi Sound, the added TSS levels resulting from the proposed dredging would not likely have a significant impact on surrounding water quality. To minimize impacts associated with dredging, Gulf LNG would monitor dredging operations for adverse effects with established contingencies to reduce impacts should they be observed, suspend operations during severe weather, and avoid actively dewatering barges prior to overboard flow of excess water. As previously discussed, Gulf LNG would also be required to conduct water quality monitoring as a condition of its section 401 Water Quality Certification. Based on the results of water quality monitoring, Gulf LNG could adjust the rate of dredging to reduce impacts resulting from elevated TSS levels.

The 5.0-mile-long natural gas sendout pipeline would cross two minor waterbodies. Both of these waterbodies are manmade canals. The first would be crossed using HDD techniques, which would avoid disturbance of the canal. Because drilling mud could inadvertently be released during HDD operations, we have recommended that Gulf LNG prepare a HDD Plan to minimize impacts associated with an inadvertent release of drilling mud. The second waterbody would be crossed using open-cut construction methods. The impacts of the open-cut construction method on the canal would be localized and short term. To minimize impacts on this waterbody, Gulf LNG would adhere to the measures contained in our Procedures.

Gulf LNG proposes to discharge SCV combustion and NO_x emissions control water directly to the Mississippi Sound under an NPDES permit following pH adjustment. To minimize potential water quality impacts associated with the discharge to the Mississippi Sound, water from the SCV neutralization tank would be routed through a submerged high velocity outlet located within the ship berthing area. The outlet would be submerged to take advantage of the buoyancy of the discharge relative to that of the receiving water. Discharging at depth (i.e., 20 feet below the water surface) would enhance the natural mixing and dilution of the effluent as it rises through the water column. Depending on final design, the jet mixing zone would extend from about 5 to 20 feet from the point of discharge. Through proper management of excess SCV water, we believe that potential impacts on receiving waters would be minimized.

Bank erosion could reduce bank stability and result in increased turbidity and suspended sediments in the waters surrounding the proposed LNG terminal site. However, the location of the proposed marine facilities on the Mississippi Sound southeast of the mouth of Bayou Casotte Harbor would not result in significantly modified flow velocities or wave action that could promote increased erosion of the channel banks. Additionally, the movement of large vessels, such as LNG carriers or crude oil tankers, has the potential to result in bank erosion and associated turbidity through creation of waves or wakes caused by propeller wash. As discussed in section 5.1.1, the design of the marine facilities includes an area of rock or concrete units on the slope parallel to the shoreline to minimize scour/erosion potential within the berth area from LNG ship propeller wash. Given these factors, potential effects to water quality from bank erosion would be minimal.

Gulf LNG would conduct hydrostatic testing activities in accordance with our Procedures as well as all applicable permits, including NPDES discharge permits. To minimize effects of stormwater runoff during construction of the project, Gulf LNG would implement measures outlined in our Plan and its site-specific SWPPP.

As previously discussed, Gulf LNG would minimize potential impacts associated with spills or leaks of hazardous materials during construction and operation by implementing its SPCC Plans. The LNG terminal was designed to account for an accidental spill of LNG during operation of the facility and to prevent any LNG from entering Bayou Casotte Harbor. In the unlikely event that LNG is spilled into

the water either from the LNG terminal itself or from a ship during transit to the LNG terminal, the cryogenic liquid would vaporize rapidly upon contact with the warm air and water. Being less dense than water, LNG would float on the surface prior to vaporizing. Because LNG is not soluble in water and would completely vaporize shortly after being spilled, the LNG could not mix with or contaminate the water.

5.1.4 Wetlands and Vegetation

Construction of the LNG Clean Energy Project would affect approximately 20.0 acres of wetlands. Construction of the LNG terminal facilities would result in temporary impacts on 5.8 acres of wetlands. Permanent wetland impacts associated with the LNG terminal facilities (including the proposed access road) would include the permanent loss of 4.9 acres of emergent wetlands (coastal brackish marsh). Construction of the pipeline facilities would temporarily affect 14.1 acres of wetlands. Operation of the proposed pipeline facilities would result in the permanent conversion of less than 2.6 acres of forested wetlands to emergent wetlands within the permanently maintained right-of-way. We have recommended that Gulf LNG file a site-specific plan depicting the location of the proposed contractor yard and staging area located 0.3 mile west of MP 2.0 in relation to the wetlands located within the boundaries of the site.

In general, wetland impacts would be minimized by avoidance, mitigation of impacts, and compensation in accordance with federal, state, and local regulations. By modifying the LNG terminal design and layout, Gulf LNG was able to reduce the total area of wetlands impacted by the LNG terminal site. Gulf LNG would mitigate construction-related impacts by implementing our Procedures and by complying with the MDMR/COE's section 404 and MDEQ's section 401 permit conditions. Gulf LNG has developed a draft Mitigation Plan in consultation with the COE, MDMR, NMFS, and other applicable agencies. The plan includes details on Gulf LNG's proposal to convert an area of existing upland to coastal brackish marsh to compensate for permanent wetland impacts associated with the development of the LNG terminal and access road. The Mitigation Plan also identifies criteria that would be used to determine the success of the restoration effort. We have recommended that Gulf LNG continue to consult with the COE, MDMR, NMFS, and other applicable agencies to finalize its Mitigation Plan.

The vegetative communities present on the LNG terminal site can be characterized as scrub-shrub uplands and intertidal mudflats. Although operation of the LNG terminal facilities would permanently remove native vegetation, these impacts are not expected to be significant on a regional scale because areas with similar vegetation characteristics are found on surrounding lands.

Construction of the sendout pipeline and associated aboveground facilities would affect about 68.3 acres of upland vegetation, most of which consists of open uplands and/or industrial uses. Operation of the proposed pipeline facilities would require about 26.1 acres of vegetation be converted to permanently maintained pipeline right-of-way (24.9 acres) and aboveground facilities (1.2 acres). To minimize impacts on vegetation, Gulf LNG has routed the proposed natural gas sendout pipeline so that it would be collocated with existing facilities to the maximum extent possible. Approximately 72 percent of the proposed sendout pipeline would parallel existing pipeline or road rights-of-way. In addition, Gulf LNG would restore the construction right-of-way in accordance with our Plan and Procedures.

5.1.5 Wildlife and Aquatic Resources

The impact of construction and operation of the proposed project on terrestrial wildlife and wildlife habitats would vary depending on the timing of construction and types of construction techniques used, as well as on the requirements of each species and the habitat present where various project components would be constructed. Some smaller, less mobile wildlife, such as small mammals,

amphibians and reptiles, could be stressed, injured, or killed by construction activities. Other wildlife, such as birds and larger mammals, would likely leave the immediate area when construction activities approach and move to similar habitats nearby. These moves may increase competition for limited resources between individuals in nearby habitats for a short period after construction. In general, impacts on terrestrial wildlife would be short term and minimal because much of the area affected by construction would be allowed to revert to the preconstruction habitat type following construction. Wildlife habitat would be permanently altered due to construction of the LNG terminal. To minimize impacts on migratory birds, we have recommended that Gulf LNG develop a lighting plan consistent with the lighting guidelines developed by the FWS for siting, construction, operation, and decommissioning of communication towers. We have also recommended that Gulf LNG consult with the Grand Bay Reserve biologist to determine the need for developing site-specific measures that would avoid or minimize impacts on unique, rare, and imperiled species within the reserve.

Dredging of the ship berth and maneuvering area for the LNG Clean Energy Project would result in the permanent conversion of 61.3 acres of shallow, primarily sandy softbottom habitats to deeper, silty-sand softbottom habitats. Many of the aquatic species that currently inhabit shallow water habitat in the project area also inhabit the deeper water of the adjacent Bayou Casotte Channel. Although dredging activity would take the current benthic population of organisms living within the sediments, these species recolonize quickly, and are not likely to be negatively affected by the alteration in habitat. Aquatic species that prefer the shallow water habitat would experience a loss of habitat due to dredging; however, the large amount of similar habitat in the vicinity of the project area would provide ample habitat for individuals displaced by construction activities. Construction and maintenance dredging for the proposed marine facilities would result in temporary increases in turbidity, which could have impacts on aquatic resources. These impacts would be mostly temporary and localized, and mitigation measures would be implemented as required to reduce turbidity.

Gulf LNG has developed a draft Mitigation Plan and a Monitoring Plan in consultation with the COE, MDMR, NMFS, and other applicable agencies to address habitat alteration associated with dredging and dredge material placement activities as well as other impacts on aquatic species. Gulf LNG proposes to conduct beach seine and trawling studies and a Gulf sturgeon habitat assessment survey as part of its Monitoring Plan.

The EIS discusses potential impacts on shoreline and estuarine habitats if LNG were released from LNG ship cargo tanks while in transit. Because LNG would vaporize and is a cryogenic liquid, we conclude that the greatest threat to aquatic life from an LNG spill would be thermal stress.

Steel pipe piles would be installed as part of the construction of the marine facilities. In some cases, driving steel piles can generate intense underwater sound pressure waves that can adversely affect nearby marine organisms. Gulf LNG would implement measures to minimize the effects of pile driving activities and associated noise on aquatic species, including the use of a bubble curtain to distribute air bubbles around 100 percent of the perimeter of a pile over the full depth of the water column while it is being driven.

The proposed project would have an impact on habitat types that function as EFH. Species with EFH designated in the Mississippi Sound could potentially be impacted by loss/alteration of habitat, dredging, permanent loss of about 4.9 acres of intertidal wetland, entrainment of benthic invertebrates, and the temporary resuspension of sediments into the water column during construction. Although there would be permanent impacts on EFH as the result of project construction, Gulf LNG proposes to mitigate for losses of EFH by converting an area of existing upland to coastal brackish marsh to provide replacement of juvenile nursery, foraging habitat, and prey production for a number of important EFH species.

5.1.6 Threatened, Endangered, and Other Special Status Species

Consultations with the FWS and NMFS identified 15 federally listed endangered or threatened species that potentially occur in the vicinity of the LNG Clean Energy Project or the waters of the Gulf of Mexico. The 15 species include six mammals (sperm whale, blue whale, sei whale, fin whale, humpback whale, and North Atlantic right whale), two birds (bald eagle and brown pelican), five reptiles (hawksbill sea turtle, green sea turtle, Kemp's ridley sea turtle, leatherback sea turtle, and loggerhead sea turtle), and two fish (smalltooth sawfish and Gulf sturgeon). The portion of the Mississippi Sound affected by the project has also been designated as critical habitat for the Gulf sturgeon. We have determined that, with the exceptions listed below, these species would not be affected by the proposed project.

With implementation of the Strike Avoidance Procedures, whales would *not likely be adversely affected* by the project. Due to the high mobility of the bald eagles and the abundance of foraging habitat in the vicinity of the project area, bald eagles would *not likely be adversely affected* by the project. The brown pelican is highly mobile and suitable habitat within the Grand Bay National Estuarine Research Reserve would provide ample habitat for any displaced individuals; therefore, the brown pelican would *not likely be adversely affected* by the project. With the implementation of Gulf LNG's SPCC Plan, the Strike Avoidance Procedures, and special pile driving procedures, sea turtles would *not likely be adversely affected* by the proposed project. In a letter to the FERC staff dated April 28, 2006, the FWS concurred that the project is not likely to adversely affect bald eagles, brown pelicans, or any of the five species of sea turtles under the FWS' jurisdiction.

To minimize impacts on Gulf Sturgeon and its critical habitat, Gulf LNG would implement agency dredging requirements, concurrent scheduling of future maintenance dredging, and its SPCC Plans. In addition, Gulf LNG has agreed to perform a 3-year post-construction prey and habitat assessment survey of the ship berth and maneuvering area and adjacent areas following the protocols used in the 2005 habitat characterization study. Gulf LNG has incorporated these measures in its Mitigation and Monitoring Plans, which were developed in consultation with the NMFS and other applicable agencies. With the implementation of these measures, the Gulf sturgeon and its designated critical habitat would *not likely be adversely affected* by the LNG Clean Energy Project.

In addition to those species protected under the ESA, there are a number of other special status species that may occur in the project area. These species include those identified by the MNHP, marine mammals, and migratory birds. The only species the MNHP identified as having the potential to be affected by the project is the least tern. Because suitable nesting habitat is present in the proposed project area and least terns could utilize the habitat in subsequent years, we have recommended that Gulf LNG conduct surveys in areas of suitable least tern nesting habitat if construction begins during the least tern nesting season (April 1 through June 30) in those areas. We have also recommended that Gulf LNG avoid clearing woody vegetation during the peak nesting period for migratory birds.

Because consultations with the FWS and NMFS have not yet been completed, we have recommended that Gulf LNG not begin construction until these consultations are complete and Gulf LNG receives written notification from the Director of OEP that construction and/or implementation of conservation measures may begin. Additionally, we have recommended that, if construction does not begin within 1 year of issuance of FERC authorization, Gulf LNG consult with the appropriate offices of the FWS and NMFS to update the species list and to verify that previous consultations and determinations are still current.

5.1.7 Land Use, Recreation, and Visual Resources

The proposed LNG terminal would be located on a 33.3-acre site within the Port of Pascagoula in Jackson County, Mississippi. The land is owned by the State of Mississippi and leased to the JCPA for port operations. The site consists of created land that was once entirely submerged beneath the waters of Mississippi Sound. Construction of the marine facilities associated with the LNG terminal would require dredging about 61.3 acres outside of the property fence line; however, all construction activity for the marine facilities would occur from the water and would not require the use of additional lands. A road would need to be constructed and permanently maintained to provide access to the LNG terminal. The access road would permanently affect about 9.3 acres of land. LNG ships would access the proposed LNG terminal via existing shipping channels and would not affect existing land uses along the route.

Approximately 3.6 miles (72 percent) of the proposed natural gas sendout pipeline would parallel existing pipeline or road rights-of-way. The remaining 1.4 miles (28 percent) would be constructed on newly created right-of-way; however, 1.1 miles of this would be constructed adjacent to the existing dike associated with the BCDMMS and the proposed permanent access road associated with the LNG terminal. The aboveground facilities associated with the pipeline would consist of three interconnects/meter stations, a pig launcher, and a pig receiver. Construction of the proposed sendout pipeline and associated aboveground facilities would affect a total of about 82.4 acres of land. Of the 82.4 acres of land affected by construction of the pipeline facilities, about 24.9 acres would be retained as new permanent right-of-way and 1.2 acres would be retained for the aboveground facilities.

There are no existing or planned residential developments located within 0.5 mile of the proposed LNG terminal or the centerline of the LNG ship transit route. The closest residences are approximately 1.7 miles northwest of the proposed LNG terminal site. The residences in this area were severely damaged or destroyed by Hurricane Katrina. We assumed that these residences would be rebuilt and, therefore, continued to use them as the closest residences for the purposes of evaluating impacts associated with construction and operation of the LNG terminal. Temporary construction impacts on these residences could include inconvenience caused by noise generated during pile driving activities associated with the installation of the proposed facilities. Permanent impacts on residences associated with operation of the proposed LNG terminal include those on visual resources. No residences are located within 50 feet of the proposed sendout pipeline and associated construction work areas. The closest residences are located about 0.4 mile west of the proposed pipeline facilities in the City of Pascagoula. The proposed project would not conflict with any approved residential or commercial development plans.

The proposed LNG terminal would be located within the Port of Pascagoula on land owned by the State of Mississippi and leased to the JCPA for port operations. In addition to the Port of Pascagoula, two other special interest areas have been identified in the project area. The sendout pipeline route would pass through about 0.5 mile of the Grand Bay Reserve. As previously discussed, we have recommended that Gulf LNG consult with the Grand Bay Reserve biologist to determine the need for developing site-specific measures that would avoid or minimize impacts on unique, rare, and imperiled species within the reserve. The transportation of dredged material to the ODMDS through the Horn Island Pass as well as LNG marine traffic during operation of the project could have indirect impacts on the Gulf Islands National Seashore. Gulf LNG has initiated consultation with the National Park Service regarding any potential concerns regarding construction and operation of the LNG Clean Energy Project. There are no developed recreation sites located on or adjacent to the LNG terminal site.

Operation of the LNG Clean Energy Project would affect recreational boating and fishing in the Mississippi Sound during the arrival, unloading, and departure of LNG ships. Gulf LNG anticipates that approximately 150 ships would unload at the LNG terminal each year. Docks in the Port of Pascagoula

currently accommodate commercial ships, including oil tankers. As a result, marine traffic associated with the project would not introduce any significant new type of impacts on recreational boating or fishing. In addition, because small vessel traffic, including recreational boats, can operate outside the confines of the navigation channels and remain clear of the LNG ships, they would not be adversely affected by the additional marine traffic. However, while in transit or docked, LNG ships would have a security zone enforced around them. Other vessels, including recreational boats, would be prohibited within the security zone during the arrival of LNG ships. These effects would be temporary while the boat is in transit or moored at the ship unloading facility.

The most prominent visual feature of the proposed LNG terminal would be the two LNG storage tanks. Each tank would be about 170 feet above the current grade and 258 feet in diameter. The LNG storage tanks would be visible from commercial and recreational boating traffic on the Mississippi Sound, industrial properties located to the north of the project site, and residential areas to the northwest along Beach Boulevard. The addition of the new industrial development at the proposed terminal site would be consistent with existing land uses in the area. Therefore, while the facility would be visible and permanently impact visual resources in the area, the overall aesthetic effect would be minor.

Given their relatively high freeboard, LNG ships tend to have a distinctive appearance compared with other large transport ships. Given their size and route of travel, the LNG ships would be visible from several locations throughout the project area. Generally, the LNG marine traffic would be similar to existing marine traffic and not substantially change the visual character of the area.

The aboveground facilities associated with the sendout pipeline would be collocated with other proposed or existing facilities and would not have a significant impact on visual resources.

The LNG Clean Energy Project, including the LNG marine traffic in the waterways, is subject to a federal Coastal Zone Consistency Review because it would: 1) involve activities within the coastal zone of Mississippi, and 2) require several federal permits and approvals. Mississippi has an approved CMP administered by the MDMR. The coastal area in Mississippi is defined as Hancock, Harrison, and Jackson Counties. Because all of the facilities associated with the LNG Clean Energy Project would be located within Jackson County, Gulf LNG is responsible for documenting that the project is consistent with the Mississippi CMP. Gulf LNG needs to demonstrate consistency with the Mississippi CMP and obtain concurrence of consistency from the MDMR prior to the FERC approving the start of any construction.

Gulf LNG conducted a search of federal and state environmental databases to identify hazardous waste sites and areas of known contamination in the vicinity of the proposed project facilities. No known sites were identified directly on the LNG terminal site or along the centerline of the proposed sendout pipeline route.

5.1.8 Socioeconomics

Project area population impacts are expected to be short term and relatively minor. Gulf LNG expects to employ predominantly local workers during construction of the project, which is expected to take 38 months. Gulf LNG estimates that about 64 percent of the construction workforce would consist of local hires and that the workers would commute to work from the local four-county area. During construction, Gulf LNG estimates an average workforce of 259 and a peak workforce of 556 occurring in month 25. During peak construction, a short-term influx of about 200 non-local workers is anticipated. Adequate housing would be available locally or within a reasonable commuting distance. Operation of the proposed LNG Clean Energy Project would require about 50 permanent positions.

The Hurricane Katrina reconstruction effort is anticipated to draw heavily from out-of-state workers, with the initial construction efforts focused on rebuilding residential areas. Major activities associated with residential reconstruction are expected to be completed by 2010. Due to the specialized construction requirements of the project, it is anticipated that the majority of workers hired by Gulf LNG would comprise a different sector of the construction workforce than those employed in the reconstruction effort. Therefore, construction employment for the proposed project should not conflict with hurricane reconstruction efforts.

The project would have a beneficial impact on the local economy through expenditures for wages, purchase of materials, and taxes. During the proposed 38-month construction period, Gulf LNG estimates that the total project payroll would amount to about \$54,400,000, or an average of about \$1,400,000 per month. Of this total, two-thirds is expected to go to persons living in Jackson County. During operation, annual ad valorem taxes, lease fees, and port fees are anticipated to be \$14,809,000.

We have not identified any human health or environmental effects that would be borne disproportionately by any minority or low-income group that are high and adverse.

5.1.9 Transportation and Traffic

Access to the project site would be from State Highway 611, which extends south from U.S. Highway 90 and ends about 1 mile north of the site. When project activities are initiated, a permanent access road would be constructed connecting State Highway 611 with the LNG terminal site. During peak construction, the proposed project would result in a 13.5 percent and 17.4 percent increase in traffic on the 4-lane and 2-lane portions of State Highway 611, respectively. To alleviate potential traffic congestion, Gulf LNG would schedule deliveries of construction materials so that they avoid peak traffic periods when possible. In addition, Gulf LNG is planning to have off-site construction parking at its proposed contractor yard and support area on the Port of Pascagoula property. Workers would be ferried from the off-site parking area to the project site via tugs and other small boats already engaged in activities related to the project. If necessary, Gulf LNG would schedule work hours to correspond with times of low traffic flow to further mitigate traffic congestion. We have recommended that Gulf LNG file the outcome of consultations with the MDOT and Jackson County regarding the need for traffic mitigation measures. The proposed project would not have a significant impact on traffic during operation.

During construction of the project, steel and pre-cast concrete structural elements and load-out materials would be delivered to the construction site by barge, likely via the GIWW. The Pascagoula Pilots see the heavy tow traffic on the GIWW as one of the largest transportation concerns during the construction phase of the project. Increases in tow traffic in the GIWW as a result of the project would be between 5 and 10 barges per week throughout construction.

About 150 LNG ships are expected to call at the proposed LNG terminal each year. Anticipated impacts on traffic are based on the assumption that the Coast Guard would establish a security zone for ships in transit to the LNG terminal. The exact size of the security zone has not been determined; however, assuming the security zone would extend 2 miles ahead and 1 mile behind the ship, the maximum delay expected due to the transit of an LNG vessel would be 1.5 hours. The realistic maximum delay an LNG ship transiting the channel could pose on a vessel transiting the GIWW would be about 30 minutes. As a result, the LNG marine traffic associated with the LNG Clean Energy Project would not have a significant impact on marine traffic. In a letter dated March 7, 2006, the Coast Guard made a preliminary determination that the Pascagoula Bar, Horn Island Pass, Lower Pascagoula, and Bayou Casotte Channels may be suitable for the marine traffic associated with the LNG Clean Energy Project.

5.1.10 Cultural Resources

Gulf LNG's literature review and site file check revealed no NRHP-eligible properties or previously identified archaeological sites within the project area, including the contractor yards and support areas and the ODMDS. Based on consultations with the Mississippi SHPO, a cultural resources survey of the proposed project area was not required. In consultation with the Mississippi SHPO, we have determined that there would be no impact on any properties listed or eligible for listing in the NRHP for the proposed project; therefore, no mitigation would be required.

The LNG ships would transit along the waterway from the territorial seas to the berthing facility, passing through the Horn Island Pass. In the unlikely event of an LNG spill, the physical properties of LNG would limit any potential impacts on cultural resources on either Horn or Petit Bois Island.

As part of its application, Gulf LNG provided its *Plan and Procedures Addressing Unanticipated Discoveries of Cultural Resources and Human Remains* to be used in the event that cultural resources or human remains are discovered during construction. The plan describes the procedures that would be undertaken in the event previously unidentified cultural resources or human remains are encountered during construction. In a letter dated July 13, 2005, the Mississippi SHPO found the plan to be adequate and satisfactory.

Gulf LNG contacted four Native American tribes (the Tunica-Biloxi Tribe, the Jena Band of Choctaw, the Mississippi Band of Choctaw Indians, and the Choctaw Nation of Oklahoma) whose traditional territories would be directly affected by the proposed project or who had been identified by the Mississippi SHPO or other knowledgeable parties as having a potential interest in cultural resources impacts. To date, none of the tribes have requested any information regarding the proposed project.

5.1.11 Air Quality and Noise

Air Quality

The emissions from construction activities associated with the project would include PM_{2.5}, PM₁₀, NO_x, CO, SO_x, and VOCs. The primary air pollutants emitted during the construction period would be NO_x (includes NO₂), CO, SO_x (includes SO₂), and PM₁₀/PM_{2.5} generated by the construction equipment. The emissions from the construction process would increase the pollutant concentrations in the vicinity of the project; however, their effect on ambient air quality would vary with time due to the construction schedule, the mobility of the sources, and the variety of emission sources. Construction emissions of NO_x, CO, SO_x, and VOCs per year would be below the proposed total operating emissions per year, which were modeled. The results of the modeling indicate that there would not be a significant impact on air quality in the vicinity of the project. Since the construction emissions would be below the operating emissions for these pollutants and the modeling results indicate that there would not be a significant impact, construction activities are not expected to have a significant impact on air quality in the vicinity of the project with respect to NO_x, CO, SO_x, and VOCs.

PM₁₀/PM_{2.5} would be the primary pollutant of concern during construction. Most of the predicted PM₁₀ emissions are associated with fugitive dust produced during construction of the LNG terminal facilities and associated pipeline. Fugitive dust could have an impact in the immediate vicinity of construction activity and would cease once construction in a particular area is complete. Measures Gulf LNG would implement to reduce dust emissions include applying water, using BMPs, and scheduling construction operations to avoid concurrent operations by larger emission sources when feasible. We have recommended that Gulf LNG include these measures and additional mitigation measures to further reduce emissions in a Fugitive Dust Control Plan.

The primary source of emissions associated with the LNG terminal itself would be the SCVs. Gulf LNG would minimize air emissions from the proposed stationary sources through the use of clean fuel (natural gas and low sulfur diesel oil), the employment of BMPs for operation and maintenance procedures, and limiting annual hours of operation from the diesel-fired units.

In order to provide a thorough evaluation of the potential impacts on air quality in the vicinity of the proposed project, Gulf LNG conducted a quantitative assessment of project air emissions. The assessment included air dispersion modeling analyses to predict off-site (i.e., ambient) concentrations in the vicinity of the project for PM₁₀, SO₂, NO₂, and CO resulting from the proposed emissions associated with operation of the project for comparison to appropriate federal air quality standards. When the predicted impacts are added to available monitored background concentrations in the vicinity of the proposed project, none of the impacts would exceed the NAAQS. Further, the results of the modeling demonstrated that the project would not significantly impact the existing air quality at the Breton NWR (a federal Class I area).

During operation of the LNG Clean Energy Project, air emissions from LNG ships and other project-related vessels would occur along the entire waterway from the territorial seas to the ship berth. The emissions to any one localized area during ship transit would be temporary and transient and would be occurring at distances allowing for considerable dispersion before reaching any sensitive receptors; therefore, air emissions from ship transit are not expected to result in a significant impact on air quality.

No operational emissions from the sendout pipeline would be regulated by the MDEQ or EPA air quality regulations. Operational emissions would be limited to blowdown emissions that would occur during emergency situations and fugitive emissions during operation. Blowdowns would rarely occur and fugitive emissions would be negligible due to the small amount of natural gas emitted and the small fraction of VOCs contained in the natural gas. Therefore, these emissions would not have a significant effect on air quality.

Noise

Noise would be generated during construction of the pipeline and during construction and operation of the LNG terminal. In most areas, the increase in noise during construction would be localized, temporary, and limited primarily to daylight hours. Noise associated with dredging operations, however, could occur up to 24 hours a day, 7 days per week for a period of at least 9 months. Increases in noise levels during construction of the sendout pipeline would be limited to areas close to the construction activity and would have no impacts on residential areas.

The nearest NSA is located in the City of Pascagoula, about 1.7 miles to the northwest of the LNG terminal site. Gulf LNG performed computer modeling in order to calculate noise levels that would be generated by operation of the proposed LNG terminal. The results of the noise impact analysis indicate that the noise attributable to the project would be lower than the FERC sound level requirement of 55 dBA L_{dn} at the nearest NSA. The actual noise generated during operation of the LNG terminal may be different from those obtained from modeling. Therefore, we have recommended that Gulf LNG make all reasonable efforts to assure its predicted noise levels from the LNG terminal are not exceeded at the NSA; conduct noise surveys to confirm that compliance with our standard has been achieved; and file the results of the survey with the Secretary no later than 60 days after placing the LNG terminal in service.

Noise generated by LNG ships along the waterway from the territorial seas to the LNG terminal would be similar to noise from other large ships using the waterway. Underwater noise would cause a local and temporary avoidance behavior in fish but would not result in significant adverse impacts.

Above-water noise associated with the LNG vessels would not result in significant impacts on environmental resources.

5.1.12 Reliability and Safety

We evaluated the safety of both the proposed facilities and the related LNG vessel transit through the Pascagoula Bar, Horn Island Pass, Lower Pascagoula, and Bayou Casotte Channels. As part of our evaluation, we performed a cryogenic design and technical review of the proposed terminal design and safety systems. Several areas of concern were noted with respect to the proposed facility, and we identified specific recommendations to be addressed by Gulf LNG prior to initial site construction, prior to construction after final design, prior to commissioning, or prior to commencement of service.

Thermal radiation and flammable vapor hazard distances were calculated for an accident or an attack on an LNG vessel. For 1-, 1.5-, 2.5-, 3.0-, and 3.9-meter-diameter holes in an LNG cargo tank, we estimated distances to range from 2,164 to 5,250 feet for a thermal radiation level of 1,600 Btu/ft²-hr, the level which is hazardous to unprotected persons located outdoors. Based on a 1-meter-diameter hole, an unignited release would result in an estimated pool radius of 421 feet. The unignited vapor cloud would extend to 9,776 feet to the LFL and 14,377 feet to one-half the LFL. Flammable vapor dispersion for larger holes was not performed because, realistically, the cloud would not even extend to the maximum distance for a 1-meter-diameter hole before encountering an ignition source. However, the evaluation of safety is more than an exercise in calculating the consequences of worst case scenarios. Rather, it is a determination of the acceptability of risk which considers the probability of events, the effect of mitigation, and the consequences of events. Based on the extensive operational experience of LNG shipping, the structural design of an LNG vessel, and the operational controls that may be imposed by the Coast Guard and the local pilots, the likelihood of a cargo containment failure and subsequent LNG spill from a vessel casualty (i.e., collision, grounding, or allision) is highly unlikely. For similar reasons, an accident involving the onshore LNG import terminal is unlikely to affect the public. As a result, the risk to the public from accidental causes should not be considered significant.

As part of our marine safety analysis, we considered how vessel security requirements for LNG ships calling on the proposed LNG terminal might affect other ship and boat traffic in the Pascagoula Bar, Horn Island Pass, Lower Pascagoula, and Bayou Casotte Channels. Based on the Coast Guard's long-standing experience in controlling the movements of dangerous cargo vessels and LNG vessels in other ports, potential impacts can be evaluated for several general security requirements: 1) moving safety zone for inbound and outbound LNG vessels; 2) security zone around a moored LNG vessel; and 3) other measures as deemed appropriate. If the Coast Guard issues an LOR finding the waterway suitable for LNG marine traffic, the moving safety zone, and the security zone at the terminal, may affect other commercial and recreational traffic using the waterway.

The extent of the impact on recreational boaters would depend on the number of boats in the project area during the two to three LNG vessel transits per week when LNG ships would call on the LNG terminal, and on several other variables such as the size of the possible Coast Guard-imposed moving safety and moored security zone and the width of the channel at the point where a boat encounters the LNG ship. To minimize potential impacts on other marine traffic, the Coast Guard may use a program of announcements to give advance notice of each moving safety zone schedule and could schedule the transit of LNG ships for times of day less likely to affect recreational boaters.

Unlike accidental causes, historical experience provides little guidance in estimating the probability of a terrorist attack on an LNG vessel or onshore storage facility. For an LNG import terminal proposal that would involve having a large volume of energy transported and stored, the perceived threat of a terrorist attack is a primary concern of the local population and requires that resources be directed to

mitigate possible attack paths. While the risks associated with the transportation of any hazardous cargo can never be entirely eliminated, they can be managed.

An issue that has developed for several LNG terminal projects is a concern that local communities would have to bear some of the costs of ensuring the security/emergency management of the LNG facility and the LNG vessel while in transit and unloading at the dock. The specific security/emergency management costs for the proposed project are not yet available. The final costs associated with security would be determined after the specific security needs and responsibilities have been established by the Coast Guard through consultations with other federal, state, and local agencies.

In accordance with 33 CFR Part 127.007, Gulf LNG submitted an LOI to the Coast Guard on December 3, 2004 conveying its intention to construct and operate an LNG import terminal at the proposed site. On December 29, 2005, Gulf LNG submitted its WSA to the Coast Guard WSA in accordance with the guidance in NVIC 05-05. The Coast Guard, with input from the Pascagoula AMSC, has completed an initial review of Gulf LNG's WSA in accordance with the guidance in NVIC 05-05. The WSA review focused on the navigation safety and maritime security risks posed by LNG marine traffic, and the measures needed to responsibly manage these security risks.

As a result of this review, the Coast Guard advised the FERC in its WSR letter dated March 7, 2006, that the Pascagoula Bar, Horn Island Pass, Lower Pascagoula, and Bayou Casotte Channels can accommodate the LNG marine traffic associated with the project. The letter stated that there is sufficient capability within the port community to responsibly manage the safety and security risks of this project. In a follow-up letter to the FERC dated September 5, 2006, the Coast Guard clarified that the March 7, 2006 letter gave a preliminary evaluation to meet the recommendations of NVIC 05-05. The September 5 letter also stated that any final determination of waterway suitability is contingent upon an evaluation of certain conditions, including those identified in section 2.0 of this EIS. With the completion of this final EIS, the Coast Guard will complete its review and issue an LOR to address the suitability of the waterways for LNG transport.

A typical LOR would address the suitability of navigation channels in the Port of Pascagoula for LNG ship transportation, it would not constitute a final authority to commence LNG operations. Issues related to the public impact of safety and security zones would be addressed later in the development of the Coast Guard's *LNG Vessel Transit Management Plan*. This plan would be developed in conjunction with state and local law enforcement and emergency response communities. In addition, the Coast Guard may establish a moving safety zone and moored vessel security zone under 33 CFR Part 165 for LNG vessels in transit and while docked. Only personnel or vessels authorized by the COTP are permitted within these zones.

Once these plans are finalized and the resources required to implement them have been identified, Gulf LNG will be able to more specifically discuss the funding of such resources. In order to better define how the potential burden on local communities would be addressed, we have recommended that Gulf LNG provide a Cost-Sharing Plan that identifies the mechanisms for funding project-specific security/emergency management costs that would be imposed on state agencies and local communities.

5.1.13 Alternatives

The EIS addresses alternatives to the proposed actions before both the FERC and the Coast Guard. The FERC must consider whether or not to approve the facilities proposed by Gulf LNG and to allow operation of the facilities.

The proposed action before the Coast Guard is to consider whether or not to issue Gulf LNG an LOR that finds the waterways suitable for LNG marine traffic. Alternatives considered by the Coast Guard consisted of: 1) issuing an LOR finding the waterways not suitable for LNG marine traffic; and 2) issuing a LOR finding the waterways suitable for LNG marine traffic with or without conditions. Issuing an LOR that finds the waterways unsuitable for LNG marine traffic would result in the project not being implemented, and the waterways would continue to be used as they currently are. The environmental impacts associated with implementation of the LNG Clean Energy Project would be eliminated. With this alternative, however, the project objectives would not be met and the region's increasing energy demands would not be met.

Issuing an LOR finding the waterways to be suitable for the project would allow construction of the project, if Gulf LNG received FERC authorization and other required permits and approvals. Based on the finding of the WSR, the Coast Guard would include conditions with this alternative to provide the appropriate level of safety and security and to manage risk in the waterways. Therefore, the alternative of issuing an LOR finding the waterways suitable for LNG marine traffic without conditions is not considered reasonable and was not addressed further.

We evaluated the alternatives of no action or postponed action, LNG terminal system alternatives, site alternatives, LNG terminal design and ship berth configuration alternatives, dredged material placement alternatives, and pipeline system and route alternatives. Additionally, vaporization technology and power system alternatives were examined. While the no action or postponed action alternative would eliminate the positive and negative environmental impacts identified in this EIS, the project objective would not be met of providing a new source of natural gas to national markets that could be accessed through the proposed interstate pipeline interconnections.

We considered existing, approved, and proposed LNG terminals, both onshore and offshore, as system alternatives. The existing and proposed onshore LNG import terminals on the East and West Coasts would not be viable alternatives to the LNG Clean Energy Project because they are not connected to, and could not reasonably access, existing interstate pipeline systems. All but one of the existing, approved, and proposed onshore LNG import terminals along the Gulf Coast access or would access existing interstate pipeline systems. These projects appear to be technically, economically, and environmentally reasonable systems for meeting a number of the objectives of the LNG Clean Energy Project. However, the FERC does not consider these projects as alternatives to one another. Rather, these facilities would all provide a mechanism for importing LNG, and each could help satisfy the increasing demand for natural gas. When considering the capacities, operational experience, and level of impacts associated with the various types of offshore LNG facilities, we do not consider these facilities to be environmentally preferable and practicable alternatives to the proposed project.

We also looked at alternative port sites and alternative sites within the Pascagoula area, none of which would provide significant environmental advantages over the proposed site. Two design concepts for development of the onshore portion of the LNG terminal and three design concepts for the ship berth design were evaluated. Out of the four alternative vaporization technologies considered, SCVs were selected as the most appropriate technology for the proposed project. Electricity would be provided from an existing public utility rather than through the construction of an on-site electrical power generation system.

Our alternatives analysis included the evaluation of two sendout pipeline route alternatives to the route proposed by Gulf LNG. Neither of these route alternatives would provide significant environmental advantages over the proposed pipeline route.

The alternatives analysis also considered options for placement of the 2.96 million yd³ of materials dredged during construction of the LNG terminal marine facilities. Based on a number of factors, including the grain size of the sediments to be dredged, the amount of space available at the placement area, and the need for long-term maintenance and monitoring, the ODMDS is the proposed dredged material placement alternative. The BCDMMS is proposed for the material associated with maintenance dredging during operation of the project.

In conclusion, we have determined that Gulf LNG's proposed project, as modified by our recommended mitigation measures, is the preferred alternative that can meet the project objectives. The preferred alternative for the Coast Guard is to issue an LOR finding the waterway suitable for LNG marine traffic, with certain conditions including: 1) establishment of a moving safety zone during LNG vessels' transit of the waterway, including the requirements for daylight transit and one-way LNG marine traffic on the waterway, and for another safety zone around the LNG facility when the LNG vessels are moored; 2) the submission by the applicant of an annual review of its WSA to evaluate if any conditions in the waterway have changed that would require issuance of a new LOR and submit the annual review to the COTP for his/her review and issuance of a new LOR if necessary; 3) the requirement that LNG vessels must navigate the waterway from the Horn Island Pass sea buoy (LLNR 320) to the berthing area with a Pascagoula Pilot on board and that tug assistance be provided as deemed necessary by the Pascagoula Pilots; 4) the requirement that prior to crossing the GIWW, all LNG traffic will be required to make a SECURITE broadcast; 5) implementation of a Coast Guard-approved *LNG Vessel Transit Management Plan*; and 6) availability of Coast Guard resources to implement the above security measures.

5.2 FERC STAFF'S RECOMMENDED MITIGATION

If the Commission approves the proposed LNG Clean Energy Project, we recommend that the Commission's authorizations include the measures recommended below. We believe these measures would further mitigate the environmental impacts associated with the construction and operation of the proposed project.

1. Gulf LNG shall follow the construction procedures and mitigation measures described in its application, supplemental filings (including responses to staff data requests), and as identified in the EIS, unless modified by the Order. Gulf LNG must:
 - a. request any modification to these procedures, measures, or conditions in a filing with the Secretary;
 - b. justify each modification relative to site-specific conditions;
 - c. explain how that modification provides an equal or greater level of environmental protection than the original measure; and
 - d. receive approval in writing from the Director of OEP **before using that modification.**
2. For pipeline facilities, the Director of OEP has delegated authority to take whatever steps are necessary to ensure the protection of all environmental resources during construction and operation of the LNG Clean Energy Project. This authority shall allow:
 - a. the modification of conditions of the Commission's Order; and
 - b. the design and implementation of any additional measures deemed necessary (including stop work authority) to assure continued compliance with the intent of the environmental conditions as well as the avoidance or mitigation of adverse environmental impact resulting from project construction and operation.

3. For LNG facilities, the Director of OEP has delegated authority to take all steps necessary to ensure the protection of life, health, property, and the environment during construction and operation of the project. This authority shall include:
 - a. stop-work authority and authority to cease operation; and
 - b. the design and implementation of any additional measures deemed necessary to assure continued compliance with the intent of the conditions of the Order.
4. **Prior to any construction**, Gulf LNG shall file an affirmative statement with the Secretary, certified by a senior company official, that all company personnel, EIs, and contractor personnel will be informed of the EI's authority and have been or will be trained on the implementation of the environmental mitigation measures appropriate to their jobs **before** becoming involved with construction and restoration activities.
5. The authorized facility locations shall be as shown in the EIS, as supplemented by filed alignment sheets, and shall include all of the staff's recommended facility locations. **As soon as they are available, and before the start of construction**, Gulf LNG shall file with the Secretary any revised detailed survey alignment maps/sheets at a scale not smaller than 1:6,000 with station positions for all facilities approved by the Order. All requests for modifications of environmental conditions of the Order or site-specific clearances must be written and must reference locations designated on these alignment maps/sheets.
6. Gulf LNG shall file with the Secretary detailed alignment maps/sheets and aerial photographs at a scale not smaller than 1:6,000 identifying all route realignments or facility relocations, and staging areas, pipe storage yards, new access roads, and other areas that would be used or disturbed and have not been previously identified in filings with the Secretary. Approval for each of these areas must be explicitly requested in writing. For each area, the request must include a description of the existing land use/cover type, and documentation of landowner approval, whether any cultural resources or federally listed threatened or endangered species would be affected, and whether any other environmentally sensitive areas are within or abutting the area. All areas shall be clearly identified on the maps/sheets/aerial photographs. Each area must be approved in writing by the Director of OEP **before construction in or near that area**.

This requirement does not apply to extra workspace allowed by the *Upland Erosion Control, Revegetation, and Maintenance Plan*, minor field realignments per landowner needs, and requirements which do not affect other landowners or sensitive environmental areas such as wetlands.

Examples of alterations requiring approval include all route realignments and facility location changes resulting from:

 - a. implementation of cultural resources mitigation measures;
 - b. implementation of endangered, threatened, or special concern species mitigation measures;
 - c. recommendations by state regulatory authorities; and
 - d. agreements with individual landowners that affect other landowners or could affect sensitive environmental areas.
7. **At least 60 days before construction begins**, Gulf LNG shall file an initial Implementation Plan with the Secretary for review and written approval by the Director of OEP describing how Gulf

LNG will implement the mitigation measures required by the Order. Gulf LNG must file revisions to the plan as schedules change. The plan shall identify:

- a. how Gulf LNG will incorporate these requirements into the contract bid documents, construction contracts (especially penalty clauses and specifications), and construction drawings so that the mitigation required at each site is clear to onsite construction and inspection personnel;
- b. the number of EIs assigned per spread, and how the company will ensure that sufficient personnel are available to implement the environmental mitigation;
- c. company personnel, including EIs and contractors, who will receive copies of the appropriate material;
- d. the training and instructions Gulf LNG will give to all personnel involved with construction and restoration (initial and refresher training as the project progresses and personnel change), with the opportunity for OEP staff to participate in the training session(s);
- e. the company personnel (if known) and specific portion of Gulf LNG's organization having responsibility for compliance;
- f. the procedures (including use of contract penalties) Gulf LNG will follow if noncompliance occurs; and
- g. for each discrete facility, a Gantt or PERT chart (or similar project scheduling diagram), and dates for:
 - (1) the completion of all required surveys and reports;
 - (2) the mitigation training of onsite personnel;
 - (3) the start of construction; and
 - (4) the start and completion of restoration.

8. Gulf LNG shall develop and implement an environmental complaint resolution procedure. The procedure shall provide landowners with clear and simple directions for identifying and resolving their environmental mitigation problems/concerns during construction of the project and restoration of the right-of-way. **Prior to construction of the pipeline**, Gulf LNG shall mail the complaint procedures to each landowner whose property would be crossed by the project.

- a. In its letter to affected landowners, Gulf LNG shall:
 - (1) provide a local contact that the landowners should call first with their concerns; the letter should indicate how soon a landowner should expect a response;
 - (2) instruct the landowners that, if they are not satisfied with the response, they should call Gulf LNG's Hotline; the letter should indicate how soon to expect a response; and
 - (3) instruct the landowners that, if they are still not satisfied with the response from Gulf LNG's Hotline, they should contact the Commission's Enforcement Hotline at (888) 889-8030.
- b. In addition, Gulf LNG shall include in its weekly status report a copy of a table that contains the following information for each problem/concern:
 - (1) the date of the call;
 - (2) the identification number from the certificated alignment sheets of the affected property;
 - (3) the description of the problem/concern; and

- (4) an explanation of how and when the problem was resolved, will be resolved, or why it has not been resolved.

9. Gulf LNG shall employ an EI. The EI shall be:

- a. responsible for monitoring and ensuring compliance with all mitigation measures required by the Order and other grants, permits, certificates, or other authorizing documents;
- b. responsible for evaluating the construction contractor's implementation of the environmental mitigation measures required in the contract (see condition 7 above) and any other authorizing document;
- c. empowered to order correction of acts that violate the environmental conditions of the Order, and any other authorizing document;
- d. responsible for documenting compliance with the environmental conditions of the Order, as well as any environmental conditions/permit requirements imposed by other federal, state, or local agencies; and
- e. responsible for maintaining status reports.

10. Gulf LNG shall file updated status reports prepared by the EI with the Secretary on a weekly basis **until all construction and restoration activities are complete**. On request, these status reports will also be provided to other federal and state agencies with permitting responsibilities. Status reports shall include:

- a. the current construction status of the project, work planned for the following reporting period, and any schedule changes for stream crossings or work in other environmentally sensitive areas;
- b. a listing of all problems encountered and each instance of noncompliance observed by the EI(s) during the reporting period (both for the conditions imposed by the Commission and any environmental conditions/permit requirements imposed by other federal, state, or local agencies);
- c. corrective actions implemented in response to all instances of noncompliance, and their cost;
- d. the effectiveness of all corrective actions implemented;
- e. a description of any landowner/resident complaints which may relate to compliance with the requirements of the Order, and the measures taken to satisfy their concerns; and
- f. copies of any correspondence received by Gulf LNG from other federal, state or local permitting agencies concerning instances of noncompliance, and Gulf LNG's response.

11. Gulf LNG must receive written authorization from the Director of OEP **before commencing service** of the project. Such authorization will only be granted following a determination that the LNG facility has been constructed in accordance with Commission approval and applicable standards, can be expected to operate safely as designed, and the rehabilitation and restoration of the right-of-way is proceeding satisfactorily.

12. **Within 30 days of placing the certificated facilities in service**, Gulf LNG shall file an affirmative statement with the Secretary, certified by a senior company official:

- a. that the facilities have been constructed in compliance with all applicable conditions, and that continuing activities will be consistent with all applicable conditions; or
- b. identifying which of the certificate conditions Gulf LNG has complied with or will comply with. This statement shall also identify any areas affected by the project where

compliance measures were not properly implemented, if not previously identified in filed status reports, and the reason for noncompliance.

13. **Before construction**, Gulf LNG shall file with the Commission the following information on nonjurisdictional facilities, including the Mississippi Power Company electric transmission facilities and the Port of Pascagoula water supply pipeline:
 - a. final routing and design information, including a map depicting the location of the facilities;
 - b. documentation of consultations with the appropriate agencies and the status of federal, state, or local permits or approvals required for their construction; and
 - c. status and copies of agency clearances (or copies of any surveys and reports prepared) for wetlands, threatened and endangered species, and cultural resources. (*EIS Section 2.2*)
14. Gulf LNG shall file with the Commission the following information for the off-site waterfront fabrication and load-out facility:
 - a. a map depicting the location of the facility;
 - b. documentation of landowner approval; and
 - c. status or copies of any surveys and reports prepared for wetlands, threatened and endangered species, and cultural resources.

This information shall be filed with the Secretary for the review and written approval of the Director of OEP **before construction**. Gulf LNG shall also provide the status or copies of agency clearances for wetlands, threatened and endangered species, and cultural resources. (*EIS Section 2.4.1.3*)

15. Gulf LNG shall prepare a HDD Plan that describes how the drilling operations would be conducted and monitored to minimize the potential for inadvertent drilling mud releases as well as procedures for cleanup of drilling mud releases and for sealing the hole if a drill cannot be completed. The HDD Plan shall be filed with the Secretary for the review and written approval of the Director of OEP **before construction**. (*EIS Section 2.4.2.2*)
16. **Before construction**, Gulf LNG shall conduct, with the well owner's permission, pre- and post-construction monitoring of well yield and water quality for in-use wells within 150 feet of the construction work area. **Within 30 days of placing the facilities in service**, Gulf LNG shall file a report with the Secretary discussing whether any complaints were received concerning well yield or water quality and how each was resolved. (*EIS Section 4.3.1.4*)
17. Gulf LNG shall replace any potable water supply system that it damages during construction and cannot repair to its former capacity and quality. **Within 1 year of completion of construction**, Gulf LNG shall file a report with the Secretary identifying all potable water supply systems damaged by construction and how they were repaired. (*EIS Section 4.3.1.4*)
18. Gulf LNG shall file a site-specific plan depicting the location of the proposed contractor yard and staging area located 0.3 mile west of milepost 2.0 in relation to the wetlands located within the boundaries of the site. The site-specific plan should show how Gulf LNG would maintain a 50-foot setback from the wetlands or, if a 50-foot setback cannot be maintained, should include a request with justification for a variance from section VI.B.1.a of our *Wetland and Waterbody Construction and Mitigation Procedures*. The site-specific plan shall be filed with the Secretary

for the review and written approval of the Director of OEP **before construction**. (EIS Section 4.4.2)

19. Gulf LNG shall continue to consult with the COE, MDMR, NMFS, and other applicable agencies to finalize its Mitigation Plan. The final Mitigation Plan shall also specify that the annual report presenting data on the wetland restoration area be filed with the FERC, COE, MDMR, and NMFS. Gulf LNG shall file the final Mitigation Plan with the Secretary **before construction**. (EIS Section 4.4.3)
20. Gulf LNG shall consult with the Grand Bay Reserve biologist to determine the need for developing site-specific measures that would avoid or minimize impacts on unique, rare, and imperiled species within the reserve. Additionally, Gulf LNG shall consult with the biologist to assess the potential for hazards or conflicts between construction activities and scheduled seasonal burns on the reserve. Results of consultations shall be filed with the Secretary **before beginning construction of the pipeline within the reserve**. (EIS Section 4.6.1.1)
21. Gulf LNG shall develop a lighting plan consistent with the lighting guidelines developed by the FWS for siting, construction, operation, and decommissioning of communication towers, to the extent that those guidelines are consistent with applicable safety regulations and requirements. Gulf LNG shall file the lighting plan with the Secretary for the review and written approval of the Director of OEP **before construction**. (EIS Section 4.6.1.2)
22. Gulf LNG shall conduct surveys in areas of suitable least tern nesting habitat if construction begins during the least tern nesting season (April 1 through June 30) in those areas. Results of the surveys, along with agency comments and concurrence, shall be filed with the Secretary for the review and written approval of the Director of OEP **before construction**. (EIS Section 4.7.2)
23. Gulf LNG shall avoid clearing woody vegetation during the peak nesting period for migratory birds (April 1 through June 30). If vegetation clearing must be conducted during this time, Gulf LNG shall survey for all migratory bird nests **no more than 3 weeks before commencing work at the LNG terminal and along the sendout pipeline route**. If an active migratory bird nest is found, Gulf LNG shall consult with the FWS to identify the most appropriate measures that should be taken to avoid or minimize impacts. (EIS Section 4.7.2)
24. Gulf LNG shall not begin construction activities at the LNG terminal and along the sendout pipeline route **until**:
 - a. the FERC completes any necessary consultations with the FWS and NMFS; and
 - b. Gulf LNG receives written notification from the Director of OEP that construction and/or implementation of conservation measures may begin.

If construction has not begun **within 1 year** from the date of issuance of the FERC approval of the project, Gulf LNG shall consult with the appropriate offices of the FWS and NMFS to update the species list and to verify that previous consultations and determinations of effect are still current. Documentation of these consultations, and the need for additional surveys and survey reports (if required), and FWS or NMFS comments on the surveys and survey reports and their conclusions, shall be filed with the Secretary **before beginning construction**. (EIS Section 4.7.3)

25. Gulf LNG shall file documentation of concurrence from the MDMR that the project is consistent with the Mississippi Coastal Management Plan with the Secretary **before construction**. (EIS Section 4.8.5)

26. Gulf LNG shall file the outcome of the consultations with the Mississippi Department of Transportation and Jackson County regarding the need for traffic mitigation measures with the Secretary **before construction**. (*EIS Section 4.10.1*)
27. Gulf LNG shall prepare a Fugitive Dust Control Plan that specifies the following:
 - a. the precautions that would be taken to minimize fugitive dust emissions from construction activities and when/how the measures would be applied;
 - b. the individuals with authority to determine if/when water needs to be reapplied for dust control; and
 - c. the individuals with authority to stop work if the contractor does not comply with dust control measures.

This plan shall be filed with the Secretary for the review and written approval of the Director of OEP **before construction**. (*EIS Section 4.12.1.4*)

28. Gulf LNG shall make all reasonable efforts to ensure its predicted noise levels from the LNG terminal are not exceeded at the noise-sensitive area and file noise surveys with the Secretary **no later than 60 days** after placing the LNG terminal in service. However, if the noise attributable to the operation of the LNG terminal exceeds 55 decibels on the A-weighted scale day-night sound level at a noise-sensitive area, Gulf LNG shall file a report on what changes are needed and shall install additional noise controls to meet the level **within 1 year** of the in-service date. Gulf LNG shall confirm compliance with these requirements by filing a second noise survey with the Secretary **no later than 60 days** after it installs the additional noise controls. (*EIS Section 4.12.2.3*)
29. Gulf LNG shall **annually** review its Waterway Suitability Assessment relating to LNG marine traffic for the project; update the assessment to reflect changing conditions which may impact the suitability of the waterway for LNG marine traffic; provide the updated assessment to the cognizant Captain of the Port (COTP)/Federal Maritime Security Coordinator (FMSC) for review and validation and, if appropriate, further action by the COTP/FMSC relating to LNG marine traffic; and provide a copy to FERC staff. (*EIS Section 4.13.5.2*)
30. **Prior to accepting** ships greater than 140,000 cubic meters in capacity, Gulf LNG shall provide the necessary information to demonstrate that the transient hazard areas identified in the final EIS are applicable. Gulf LNG shall file this information with the Secretary for review and written approval of the Director of OEP. This information shall also be provided to the Coast Guard. (*EIS Section 4.13.5.4*)

Recommendation numbers 31 through 65 shall apply to the LNG terminal design and construction details. Information pertaining to these specific recommendations shall be filed with the Secretary for review and approval by the Director of OEP either: prior to initial site preparation; prior to construction of final design; prior to commissioning; or prior to commencement of service as indicated by each specific recommendation. Items relating to Resource Report 13-Engineering and Design Material and security should be submitted as critical energy infrastructure information pursuant to 18 CFR Parts 388.112 and PL01-1. Information pertaining to items such as: off-site emergency response; procedures for public notification and evacuation; and construction and operating reporting requirements would be subject to public disclosure. Gulf LNG shall file this information a minimum of 30 days before approval to proceed is required.

31. Complete plan drawings and a list of the hazard detection equipment shall be filed **prior to initial site preparation**. The list shall include the instrument tag number, type and location, alarm locations, and shutdown functions of the proposed hazard detection equipment. Plan drawings shall clearly show the location of all detection equipment. *(EIS Section 4.13.2)*
32. A technical review addressing the following information for the proposed facility shall be filed prior to initial site preparation:
 - a. Identification of all combustion/ventilation air intake equipment and the distances to any possible hydrocarbon release (LNG, flammable refrigerants, flammable liquids, and flammable gases); and
 - b. A demonstration that these areas are adequately covered by hazard detection devices, including a description of how these devices would isolate or shutdown any combustion equipment whose continued operation could add to or sustain an emergency. *(EIS Section 4.13.2)*
33. Complete plan drawings and a list of the fixed and wheeled dry-chemical, fire extinguishing, and high expansion foam hazard control equipment shall be filed **prior to initial site preparation**. The list shall include the equipment tag number, type, size, equipment covered, and automatic and manual remote signals initiating discharge of the units. Plan drawings shall clearly show the planned location of all fixed and wheeled extinguishers. *(EIS Section 4.13.2)*
34. Facility plans showing the proposed location of, and area covered by, each monitor, hydrant, deluge system, hose, and sprinkler, as well as piping and instrumentation diagrams, of the fire water system shall be filed **prior to initial site preparation**. *(EIS Section 4.13.2)*
35. A copy of the hazard design review and list of recommendations that are to be incorporated in the final facility design shall be filed **prior to initial site preparation**. *(EIS Section 4.13.2)*
36. Drawings of the storage tank piping support structure and support of horizontal piping at grade shall be filed **prior to initial site preparation**. *(EIS Section 4.13.2)*
37. Procedures shall be developed for off-site contractors' responsibilities, restrictions, limitations and supervision of these contractors by Gulf LNG staff, **prior to initial site preparation**. *(EIS Section 4.13.2)*
38. Gulf LNG shall develop an Emergency Response Plan (including evacuation) and coordinate procedures with the Coast Guard, state, county, and local emergency planning groups; fire departments; state and local law enforcement; and appropriate federal agencies. This plan shall include at a minimum:
 - a. designated contacts with state and local emergency response agencies;
 - b. scalable procedures for the prompt notification of appropriate local officials and emergency response agencies based on the level and severity of potential incidents;
 - c. procedures for notifying residents and recreational users within areas of potential hazard;
 - d. evacuation routes/methods for residents and other public use areas that are within any transient hazard areas along the route of the LNG vessel transit;
 - e. locations of permanent sirens and other warning devices; and

- f. an “emergency coordinator” on each LNG vessel to activate sirens and other warning devices.

The Emergency Response Plan shall be filed with the Secretary for review and written approval by the Director of OEP **prior to initial site preparation**. Gulf LNG shall notify FERC staff of all planning meetings in advance and shall report progress on the development of its Emergency Response Plan at **3-month intervals**. (*EIS Section 4.13.5*)

39. The Emergency Response Plan shall include a Cost-Sharing Plan identifying the mechanisms for funding all project-specific security/emergency management costs that would be imposed on state and local agencies. In addition to the funding of direct transit-related security/emergency management costs, this comprehensive plan shall include funding mechanisms for the capital costs associated with any necessary security/emergency management equipment and personnel base. The Cost-Sharing Plan shall be filed with the Secretary for review and written approval by the Director of OEP **prior to initial site preparation**. (*EIS Section 4.13.5*)
40. The **final design** of the hazard detection equipment shall identify manufacturer and model. (*EIS Section 4.13.2*)
41. The **final design** of the fixed and wheeled dry-chemical, fire extinguishing, and high expansion foam hazard control equipment shall identify manufacturer and model. (*EIS Section 4.13.2*)
42. The **final design** shall include detailed drawings of the spill control system to be applied to the LNG tank roof. (*EIS Section 4.13.2*)
43. The **final design** shall include details of the LNG tank tilt settlement and differential settlement limits between each LNG tank and piping and procedures to be implemented in the event that limits are exceeded. (*EIS Section 4.13.2*)
44. The **final design** shall include details of the pipe supports and restraints designed to prevent damage to piping systems and equipment in the event of a storm surge anticipated for a Category 4 hurricane. (*EIS Section 4.13.2*)
45. The **final design** shall include details of the boil-off gas flow measurement system provided for each tank. (*EIS Section 4.13.2*)
46. The **final design** shall include P&IDs and drawings of the meter station. (*EIS Section 4.13.2*)
47. The **final design** shall include a fire protection evaluation carried out in accordance with the requirements of National Fire Protection Association 59A, chapter 9.1.2. (*EIS Section 4.13.2*)
48. The **final design** shall include details of the shutdown logic, including cause and effect matrices for alarms and shutdowns. (*EIS Section 4.13.2*)
49. The **final design** shall include emergency shutdown of equipment and systems activated by hazard detection devices for flammable gas, fire, and cryogenic spills, when applicable. (*EIS Section 4.13.2*)
50. The **final design** shall include details of the air gaps to be installed downstream of all seals or isolations installed at the interface between a flammable fluid system and an electrical conduit or

wiring system. Each air gap shall vent to a safe location and be equipped with a leak detection device that: shall continuously monitor for the presence of a flammable fluid; shall alarm the hazardous condition; and shall shutdown the appropriate systems. *(EIS Section 4.13.2)*

51. The **final design** shall include a hazard and operability review of the completed design. A copy of the review and a list of the recommendations shall be filed. *(EIS Section 4.13.2)*
52. The P&IDs in the **final design** shall show and number all valves including drain, vent, main, and car sealed. *(EIS Section 4.13.2)*
53. The **final design** shall specify that the LNG tank carbon steel piping support plates and connections to piping supports shall be designed to ensure that corrosion protection is adequately provided and provisions for corrosion monitoring and maintenance of carbon steel attachments are to be included in the design and maintenance procedures. *(EIS Section 4.13.2)*
54. The **final design** shall include safeguards to be installed to protect aboveground firewater piping, including post indicator valves, from inadvertent damage. *(EIS Section 4.13.2)*
55. The **final design** shall specify that all hazard detection equipment shall include redundancy and fault detection and fault alarm monitoring in all potentially hazardous areas and enclosures. *(EIS Section 4.13.2)*
56. All valves including drain, vent, main, and car sealed valves shall be tagged in the field **during construction and prior to commissioning**. *(EIS Section 4.13.2)*
57. The design details and procedures to record and to prevent the tank fill rate from exceeding the maximum fill rate specified by the tank designer shall be filed **prior to commissioning**. *(EIS Section 4.13.2)*
58. A tabulated list of the proposed hand-held fire extinguishers shall be filed **prior to commissioning**. The list shall include the equipment number, type, size, number, and location. Plan drawings shall include the type, size, and number of all hand-held fire extinguishers. *(EIS Section 4.13.2)*
59. Operation and maintenance procedures and manuals, as well as safety procedure manuals, shall be filed **prior to commissioning**. *(EIS Section 4.13.2)*
60. The contingency plan for failure of the LNG tank outer containment shall be filed **prior to commissioning**. *(EIS Section 4.13.2)*
61. A copy of the criteria for horizontal and rotational movement of the inner vessel for use during and after cool down shall be filed **prior to commissioning**. *(EIS Section 4.13.2)*
62. The maintenance procedures to be filed **prior to commissioning** shall state that a foundation elevation survey of all LNG tanks shall be made on an annual basis. *(EIS Section 4.13.2)*
63. **Prior to commissioning**, Gulf LNG shall coordinate, as needed, with the Coast Guard to define the responsibilities of Gulf LNG's security staff in supplementing other security personnel and in protecting the LNG tankers and the terminal. *(EIS Section 4.13.5)*

64. The FERC staff shall be notified of any proposed revisions to the security plan and physical security of the facility **prior to commencement of service**. (*EIS Section 4.13.2*)
65. Progress on the construction of the LNG terminal shall be reported in **monthly** reports filed with the Secretary. Details shall include a summary of activities, projected schedule for completion, problems encountered, and remedial actions taken. Problems of significant magnitude shall be reported to the FERC **within 24 hours**. (*EIS Section 4.13.2*)

Recommendation numbers 66 through 69 shall apply throughout the life of the facility:

66. The facility shall be subject to regular FERC staff technical reviews and site inspections on at least an **annual basis** or more frequently as circumstances indicate. Prior to each FERC staff technical review and site inspection, the Company shall respond to a specific data request including information relating to possible design and operating conditions that may have been imposed by other agencies or organizations. Up-to-date detailed piping and instrumentation diagrams reflecting facility modifications and provision of other pertinent information not included in the semi-annual reports described below, including facility events that have taken place since the previously submitted annual report, shall be submitted. (*EIS Section 4.13.2*)
67. **Semi-annual** operational reports shall be filed with the Secretary to identify changes in facility design and operating conditions, abnormal operating experiences, activities (including ship arrivals, quantity and composition of imported LNG, vaporization quantities, boil-off/flash gas, etc.), plant modifications including future plans and progress thereof. Abnormalities shall include, but not be limited to: unloading/shipping problems, potential hazardous conditions from off-site vessels, storage tank stratification or rollover, geysering, storage tank pressure excursions, cold spots on the storage tanks, storage tank vibrations and/or vibrations in associated cryogenic piping, storage tank settlement, significant equipment or instrumentation malfunctions or failures, non-scheduled maintenance or repair (and reasons therefore), relative movement of storage tank inner vessels, vapor or liquid releases, fires involving natural gas and/or from other sources, negative pressure (vacuum) within a storage tank and higher than predicted boil-off rates. Adverse weather conditions and the effect on the facility also shall be reported. Reports shall be submitted **within 45 days** after each period ending **June 30 and December 31**. In addition to the above items, a section entitled "Significant plant modifications proposed for the next 12 months (dates)" also shall be included in the semi-annual operational reports. Such information would provide the FERC staff with early notice of anticipated future construction/maintenance projects at the LNG facility. (*EIS Section 4.13.2*)
68. In the event the temperature of any region of any secondary containment, including imbedded pipe supports, becomes less than the minimum specified operating temperature for the material, the Commission shall be notified **within 24 hours** and procedures for corrective action shall be specified. (*EIS Section 4.13.2*)
69. Significant non-scheduled events, including safety-related incidents (i.e., LNG or natural gas releases, fires, explosions, mechanical failures, unusual over pressurization, and major injuries) and security related incidents (i.e., attempts to enter site, suspicious activities) shall be reported to Commission staff **within 24 hours**. In the event an abnormality is of significant magnitude to threaten public or employee safety, cause significant property damage, or interrupt service, notification shall be made **immediately**, without unduly interfering with any necessary or appropriate emergency repair, alarm, or other emergency procedure. In all instances, notification shall be made to Commission staff **within 24 hours**. This notification practice shall be

incorporated into the LNG facility's emergency plan. Examples of reportable LNG-related incidents include:

- a. fire;
- b. explosion;
- c. estimated property damage of \$50,000 or more;
- d. death or personal injury necessitating in-patient hospitalization;
- e. free flow of LNG that results in pooling;
- f. unintended movement or abnormal loading by environmental causes, such as an earthquake, landslide, or flood, that impairs the serviceability, structural integrity, or reliability of an LNG facility that contains, controls, or processes gas or LNG;
- g. any crack or other material defect that impairs the structural integrity or reliability of an LNG facility that contains, controls, or processes gas or LNG;
- h. any malfunction or operating error that causes the pressure of a pipeline or LNG facility that contains or processes gas or LNG to rise above its maximum allowable operating pressure (or working pressure for LNG facilities) plus the build-up allowed for operation of pressure limiting or control devices;
- i. a leak in an LNG facility that contains or processes gas or LNG that constitutes an emergency;
- j. inner tank leakage, ineffective insulation, or frost heave that impairs the structural integrity of an LNG storage tank;
- k. any condition that could lead to a hazard and cause a 20 percent reduction in operating pressure or shutdown of operation of a pipeline or an LNG facility;
- l. safety-related incidents to LNG vessels occurring at or en route to and from the LNG facility; or
- m. an event that is significant in the judgment of the operator and/or management even though it did not meet the above criteria or the guidelines set forth in an LNG facility's incident management plan.

In the event of an incident, the Director of OEP has delegated authority to take whatever steps are necessary to ensure operational reliability and to protect human life, health, property or the environment, including authority to direct the LNG facility to cease operations. Following the initial company notification, Commission staff would determine the need for an on-site inspection by Commission staff, and the timing of an initial incident report (normally within 10 days) and follow-up reports. (*EIS Section 4.13.2*)