2.0 DESCRIPTION OF THE PROPOSED ACTION

The FERC is the federal agency responsible for authorizing applications to construct and operate onshore LNG import and interstate natural gas transmission facilities. The Coast Guard is the federal agency responsible for determining the suitability of the waterway for LNG marine traffic. The Coast Guard is also the federal agency responsible issuing a LOR regarding the suitability of the waterway for LNG marine traffic.

The proposed action before the FERC is to consider issuing to Bayou Casotte Energy a Section 3 authorization for the LNG import facilities. The proposed action before the Coast Guard, as required by their regulations in 33 CFR 127.009, is to consider issuing Bayou Casotte Energy a LOR finding the waterway suitable for LNG marine traffic associated with the proposed Casotte Landing Project with conditions. The conditions include:

1) establishment of a moving safety zone during LNG vessels' transit of the waterway, including requirements for daylight transit and one way LNG marine traffic on the waterway, as well as another safety zone around the LNG facility while the LNG vessels are moored;
2) an annual review of the facility's WSA by the applicant to evaluate if any conditions in the waterway have changed that would require issuance of a new LOR, with submittal of such annual reviews to the COTP for consideration and issuance of a new LOR, if required;
3) LNG marine traffic must navigate the waterway from the outer sea buoy to the berthing with harbor pilots onboard;
4) that tug assistance be provided as deemed necessary by the Pascagoula pilots;
5) that all LNG marine traffic make a SECURITE broadcast prior to crossing the Gulf Intracoastal Waterway;
6) implementation of a Coast Guard approved *LNG Vessel Transit Management Plan*; and
7) that adequate Coast Guard resources be available to implement the security measures described above.

The Coast Guard, with input from the Area Maritime Security Committee (AMSC), has completed an initial review of Casotte Landing's WSA in accordance with the guidance in Coast Guard 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. The WSA itself is designated Sensitive Security Information as defined in Title 49 CFR Part 1520. Because any unauthorized disclosure of these details would be employed to circumvent the proposed security measures, they are not releasable to the public.

As a result of this review, the Coast Guard preliminarily advised the FERC by letter of April 1, 2006, and modified in a letter of September 5, 2006, that the Pascagoula Bar, Horn Island Pass, Lower Pascagoula and Bayou Casotte Channels can accommodate the LNG marine traffic associated with the project, depending on the evaluation of certain conditions listed above (see Appendix G).

2.1 PROPOSED FACILITIES

Bayou Casotte Energy proposes to construct and operate a new LNG import, storage, and vaporization terminal on the eastern shoreline of Bayou Casotte. The proposed LNG terminal would be located adjacent to Chevron's existing Pascagoula Refinery in Pascagoula, Jackson County, Mississippi. In addition, Bayou Casotte Energy proposes to construct up to five connections to existing natural gas pipeline transmission systems located in the vicinity of the proposed LNG terminal. The proposed Project would allow LNG to be imported from areas with natural gas reserves throughout the world to the LNG terminal via ocean-going LNG carriers. At the proposed LNG terminal, LNG would be unloaded, stored, and regasified for delivery via pipeline. The proposed pipeline interconnects would allow natural gas from the LNG terminal to be sent to markets throughout Mississippi and the southeast United States via pipeline interconnects with a number of existing intrastate and interstate pipeline systems. Figure 2.1-1 illustrates the general location of the proposed Project. The following section describes the proposed LNG terminal, the LNG carriers that would supply the terminal, and the pipeline facilities.

2.1.1 LNG Terminal

The proposed LNG terminal would include a double-berth slip capable of accommodating an LNG carrier and a crude oil tanker, unloading facilities (marine terminal), three LNG storage tanks, vapor handling equipment, six intermediate fluid vaporizers and related LNG regasification systems, and various utilities and support facilities. The terminal would be located on property adjacent to the Chevron Pascagoula Refinery (Refinery). A layout of the proposed facilities is depicted in Figure 2.1.1-1.

The proposed LNG terminal would include an unloading slip approximately 900 feet wide by 1,450 to 2,150 feet long (length varies due to an angled alignment) that would be constructed by dredging the western portion of the 259.4-acre site to a depth of 42 feet below mean lower low water (MLLW). Construction of the unloading slip off of Bayou Casotte would provide a protected double-berth for the offloading of LNG carriers and crude oil vessels (nonjurisdictional). The 60-degree angled design of the unloading slip would avoid the need for additional dredging of a turning basin, which would otherwise be required at the entrance of the slip to allow for ship maneuvering.

The proposed terminal slip would consist of one berth designed for port mooring to receive and unload LNG carriers ranging from 125,000-m^3 to 200,000-m^3 capacity. The nonjurisdictional crude slip would be designed for starboard mooring of crude vessels ranging from 96,000 to 155,000 deadweight tonnage (DWT). The LNG carrier berth would include a single-level unloading platform consisting of reinforced concrete deck and beams supported on piles. The berth would be designed to support the three LNG unloading arms and a vapor return arm, plus associated valves and piping, a gangway tower, firewater monitors, anemometer, and firewater monitor pumps. In addition, the slip would include a berth to accommodate the docking of up to three tugs.

The design of each berth includes two to three breasting dolphins that would accommodate lateral loads from moored vessels in the berth and protect the unloading platform. Each breasting dolphin would be constructed of reinforced concrete structures on piles and fitted with a remotely operated quick-release triple mooring hook and an energy-absorbing fender. Side slopes within the berth would be constructed at a 5:1 slope and covered with rock riprap overlaid on geotextile fabric for scour protection.

Six mooring dolphins, comprised of reinforced concrete structures on piles, would be installed at each berth. The breasting and mooring dolphins would be connected to the unloading platform by steel truss walkways. The berth would be supplied with electrical power for equipment and lighting systems,

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Figure 2.1-1 Proposed Casotte Landing Project
General Project Location

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Figure 2.1.1-1 Proposed Casotte Landing Project LNG Terminal Site Layout Ship Berth and Unloading Facilities

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potable water, communications and instrument cabling, and nitrogen for purging the LNG unloading arms. Steel trusses and girders would support piping and cabling.

Individual trestles extending from the top of the beam to the edge of the unloading platform would support electrical cables and piping for the LNG, firewater, and other utilities, and would include a 12-foot-wide vehicle roadway. The trestle would be a concrete structure supported on piles. Pipe racks, utility piping, and electrical cable trays would be supported off the deck, and light poles would be installed on the end of the pile caps to provide area and hazard lighting.

Spill collection troughs would be positioned beneath the LNG unloading line that would drain to a spill impoundment sump in the event of LNG spillage. The unloading platform would be curbed to confine LNG spillage and its surface sloped to a collection point. Drainage from the collection point would flow to the spill impoundment sump by means of the piping collection troughs. Any spilled LNG would be covered by high expansion foam and allowed to evaporate. No active recovery of spilled LNG would take place.

LNG would be transferred from LNG carriers to the onshore LNG storage tanks using onboard pumps. The berth would include a total of four manifold 16-inch-diameter unloading arms plus one 16-inch-diameter vapor return arm. This configuration would transfer LNG at a rate of 15,000 m^3/hour. The vapor return line would be used to return tank vapors generated during the unloading operation. The natural gas vapor would be returned to the carrier tanks to maintain pressure. One of the four unloading arms would be a hybrid arm suitable for either liquid or vapor service. This hybrid arm would be available for vapor service in the event the dedicated vapor arm is unavailable.

Following ship berthing and connection of the liquid and vapor loading arms, LNG transfer to the LNG storage tanks would occur through two 32-inch-diameter, vacuum-insulated, double-wall pipes. During periods when there is no unloading operation (in holding mode), LNG would be continuously circulated through the transfer lines to maintain the lines at cryogenic temperature. Maintaining the transfer lines at cryogenic temperatures prevents thermal shock to the piping and the generation of excessive vapor upon initiation of the next unloading operation.

2.1.1.1 LNG Storage Tanks

The LNG would be stored in three insulated, full-containment tanks, each sized to store a working capacity of 160,000 m^3 of LNG at a design temperature of –270.4 °F and a design operating pressure of 4.12 pounds per square inch gauge (psig). Figure 2.1.1-2 depicts the conceptual design of the proposed storage tanks. Each tank would consist of a primary inner container of nine percent nickel steel, a secondary outer container of pre-stressed concrete, a reinforced concrete domed roof, and an aluminum insulated support deck suspended from the outer container roof over the inner container. The storage tanks would be designed and constructed so that both the inner primary and the outer secondary containers are completely self-supporting and capable of independently containing the stored LNG. The outside diameter of the outer tank would be approximately 269 feet and the height to the top of the dome would be approximately 166 feet above grade.

The space between the walls of the inner container and the outer container would be insulated with expanded perlite. Similarly, the aluminum support deck suspended from the concrete roof would be insulated with cellular glass. The cellular glass insulation under the inner container's base would be capable of supporting the weight of the inner container and the LNG. These insulation materials would allow the LNG to be stored at a temperature of -270 °F while maintaining the outer container surface near ambient temperature.

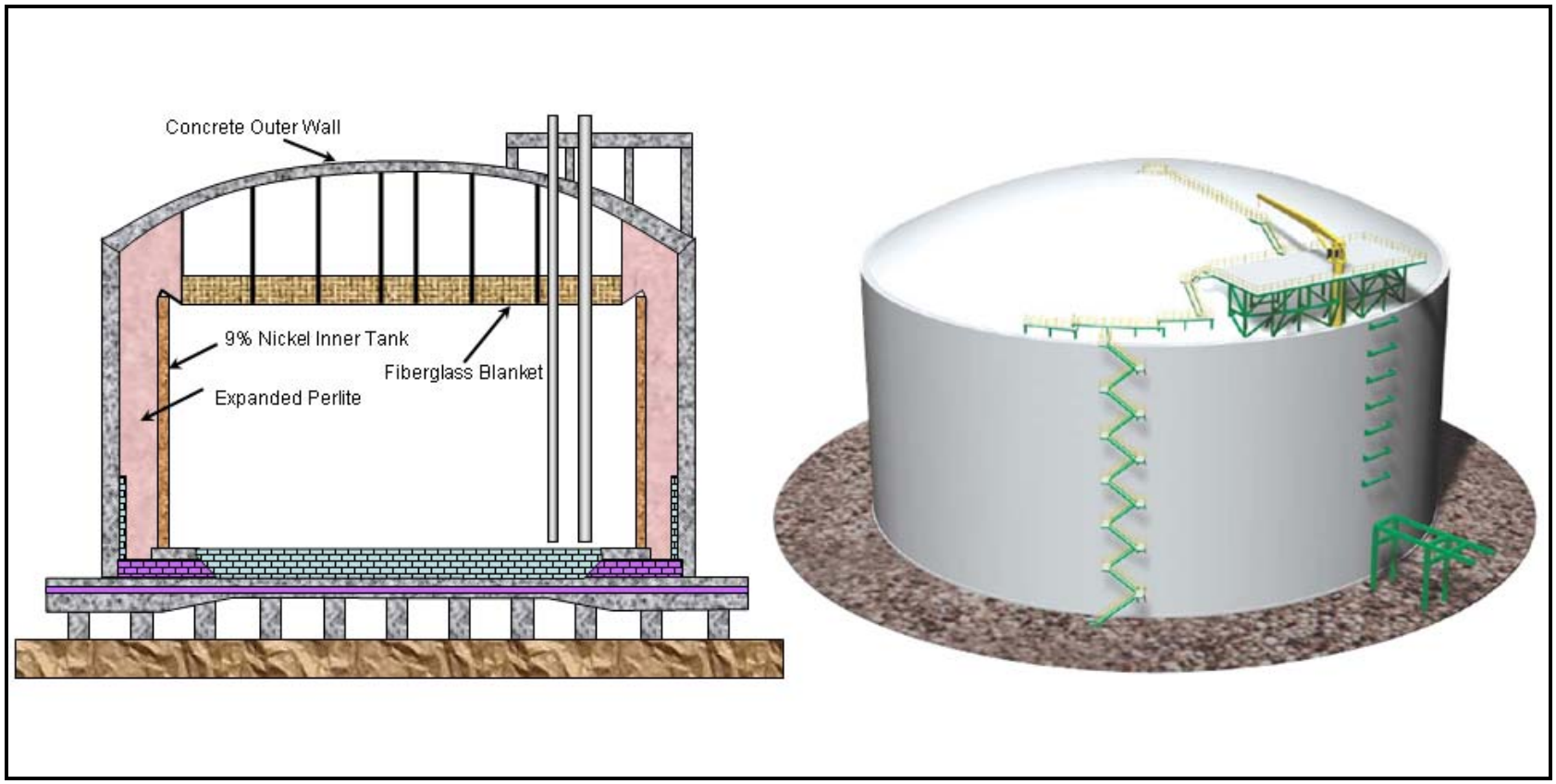

Figure 2.1.1-2
Proposed Casotte Landing Project
Conceptual Design of the LNG Storage Tanks

The outer concrete container would be lined on the inside with carbon steel plates. This carbon steel liner would serve as a barrier to keep atmospheric moisture from reaching the insulation inside the outer container. Under normal operating conditions the inner primary container would contain the cryogenic liquid. However, the outer container would also be capable of containing the cryogenic liquid as well as the vapors resulting from accidental product release from the inner container. The vapor pressure from the LNG would be equalized between the two containers through ports in the suspended insulation deck, with all vapors fully contained by the outer container. The internal design pressure of the outer container would be 4.12 psig.

To enhance the safety of the tank, all connections to the tank would be made through the tank roof so that a failure of a line would not create a leak in the tank. LNG would be unloaded from the tank through connections in the top that would have inlets at various levels within the storage tank. Each tank would be equipped with three fully submerged in-tank pumps, each sized to transfer LNG to the vaporizers at a rate of 4,211 gallons per minute (gpm). The LNG in-tank pumps would be mounted within columns that extend from the bottom of the tanks through the outer tank roof.

2.1.1.2 Vapor Handling System

During normal operations, a small amount of LNG within the storage tanks would vaporize primarily due to heat inputs from ambient conditions and in-tank pumps, as well as barometric pressure changes. In order to avoid natural gas releases to the atmosphere, the vapor handling system would collect and transfer gas originating from the storage tanks. This boil-off gas (BOG) would either be transferred back to the LNG carriers or sent out through the natural gas pipeline interconnects.

During LNG carrier unloading operations, a portion of the BOG would be returned to the carrier by a ship vapor return (SVR) blower to compensate for the volume of liquid pumped out to maintain the carrier's tank pressure. BOG that is not returned to the carrier would be compressed, condensed by direct contact with LNG, and then combined with the sendout natural gas. A total of two identical reciprocating BOG compressors would be provided. One of the compressors would serve as a backup. The compressors would be sized for the maximum vapor release rate that occurs during carrier unloading. The redundant BOG vapor handling system prevents BOG from being released to the atmosphere during both unloading and normal holding operations.

2.1.1.3 Vaporization System

LNG can be returned to a gaseous state through warming. The vaporization system is a critical operation with several available technologies. The close proximity between the proposed terminal site and the Refinery was chosen to take advantage of synergies between the two facilities (waste heat from refinery operations and the need for heat to vaporize the LNG).

LNG vaporization would be accomplished by heat exchange utilizing a closed-loop circulation solution of an intermediate fluid vaporizer (IFV). Each IFV is a vertical shell and tube exchanger with LNG on the tube side and a 25 percent by weight propylene glycol (PG) solution on the shell side as the intermediate fluid. The PG solution is pumped in a closed loop by glycol circulation pumps (five operating plus one installed spare). The circulating PG is heated by direct cross exchange with cooling water from the Refinery in 12 plate and frame heat exchangers (10 operating plus two installed spares) located at the LNG Terminal. The cold water from these exchangers is returned to the Refinery cooling tower(s). Two separate piping systems would be constructed to circulate cooling water from the Refinery to the glycol/water exchangers. The main water loop would use six pumps (five operating plus one installed spare) to circulate water from the Refinery Cooling Tower 1 (CT1). Each circulation pump

would have a capacity of 13,800 gpm. The second water loop would use three pumps to circulate water from the Refinery Cooling Tower 2 (CT2). The CT2 loop would be used as a back-up to the CT1 loop.

As a potential back-up to the heating provided by the refinery cooling water system, two natural gas fired process heaters would supplement or replace a portion of the heat normally provided by the heat exchange system with up to 560 million British thermal units per hour (MMBTU/hr) (combined). The process heaters would warm the intermediate fluid normally utilized in the IFVs during periods when the refinery cooling water system is unavailable or inadequate (for example, full or partial refinery outage or winter months with colder supply water). The process heaters would support a backup throughput rate of 0.9 BSCFD. The same PG solution would be used to circulate hot PG to the NGL plant reboilers (70 MMBTU/hr). A discussion of vaporization alternatives is included as Section 3.5.2.

As a safety precaution, the sendout pumps and vaporizers would be installed within curbed spill containment areas that would drain to the process area sump.

2.1.1.4 Utilities and Support Facilities

The proposed terminal would be independent of the Refinery for all utilities except for potable water and the circulation water that would be used as the primary heat source for LNG vaporization. Primary electric power would be supplied by Mississippi Power Company (MPC) via their transmission voltage system. Other utilities would be provided by Jackson County or the local municipality. The following sections provide details about each of the varied utility streams that would be required for the proposed terminal operations.

Electrical System

The source of power for the proposed terminal would be the transmission voltage system of MPC. Two transmission lines are planned for this supply. Depending on the availability of power and right-of-way, the transmission lines would be of single circuit or double circuit design. Overhead transmission lines would likely be on single structures for increased reliability. The transmission lines would be of a radial design and terminate at a breaker at the proposed terminal for each transmission circuit.

Nitrogen System

Bayou Casotte Energy would use nitrogen for purging of all the loading arms after unloading LNG carriers and for purging of the flare system. Nitrogen would also be supplied to the various terminal utility stations for the purpose of purging both the piping and flare systems. The terminal flare system would require about 1,700 standard cubic feet per hour (SCFH) of nitrogen for purging on a continual basis. A nitrogen generation plant would be provided for onsite storage capacity to reduce the peak requirements.

Buildings

The proposed LNG terminal would include the following service buildings:

- Terminal Control Center, administration, warehouse, shop, and security building – a two-story building with approximately 26,400 square feet to house the control centers for the marine facilities and terminal. Administrative personnel, security personnel, the warehouse, and the shop would also be housed in this building. The building would be equipped with smoke detection and fire alarm systems. An automatic sprinkler protection system would be

located in all areas with the exception of the control room. The control room and associated equipment room would be provided with a "clean-agent" type gaseous suppression system;

- LNG Jetty Control Building – one 420-square-foot building at the marine berth to house the jetty control room. The building is anchored to the foundation of the jetty structure and contains a control room, an air-lock, and a toilet room;
- BOG Compressor Enclosure – 7,200 square-foot building which would house the BOG compressor, a 10-ton electric bridge crane, a hoist, and a trolley;
- Firewater Pump Houses – two 600 square-foot buildings located at the terminal and on Refinery property that would contain the firewater pumps;
- Instrument Air/Plant Air Shelter – a 3,025 square-foot building would house the air plants;
- Nitrogen Membrane Package Shelter – a 1,485 square-foot building would protect the nitrogen generation equipment;
- Essential Services Generator Shelter – an essential generator would be housed in a 1,485 square-foot building;
- Terminal Main Gate Guard House – a 150 square-foot building in which the security guard would be stationed; and
- Terminal Foam Houses – five 126 square-foot buildings would contain the fire fighting system.

Service and Potable Water System

Service water would be provided by the Jackson County water system, which is supplied by surface waters and piped at a pressure that is suitable for distribution. County water is treated for pH control and run through clarifiers to reduce turbidity at the Kreole Pumping station operated by Jackson County. County water is not considered to be potable. Service water would be provided to the utility stations and the fire water pond.

Potable water would be supplied from the Refinery potable water supply at a pressure that is suitable for distribution. Two wells (north and south tank field) are used to provide potable water to the Refinery. At the boiler plant, this water is chlorinated and treated with a food grade phosphate to coat the lines. Potable water would be used in all kitchens, wash areas, rest rooms, and safety and eye wash stations. Potable water would not be connected to any process system and would be transported by a water line wholly on Chevron-controlled property.

Domestic and Process Waste Treatment System

Wastewater would be captured and treated on-site at a wastewater treatment facility to be installed in the terminal area. Sanitary lift stations would be located near the Administrative/Control Building and the LNG Jetty Control Building. Wastewater discharged from the oil-water separator would be pumped to the treatment package via the lift station for further treatment and final discharge. Solid wastes (sludge) and recovered oil would be trucked off-site for disposal. A peak rate of 675 gallons per day would be anticipated. These waste streams would be treated and released in accordance with the NPDES permit as administered by the MDEQ.

Stormwater Handling and Pollution Prevention

Stormwater would be collected in surface ditches alongside the roads and hurricane levee, and routed to catch basins located throughout the terminal site. Storm water collected inside of the hurricane levee would be pumped over the levee to the storm sewer systems outside of the levee. Underground sewer pipes would be used to connect catch basins outside of the levee. Stormwater would ultimately be discharged to Bayou Casotte via two new outfalls located on the north and south side of the process area.

Diesel Fuel System

Diesel would be required for the firewater pumps and the emergency generator. The diesel fuel would be delivered by trucks and stored in day tanks. Three 600-gallon tanks would be required for the firewater pumps and one 7,450-gallon tank would be required for the emergency generator. The day tanks for each firewater pump would be sized for a 24-hour fuel supply.

Natural Gas Sendout Meter Stations

As described further in Section 2.1.3, the LNG terminal would also include facilities associated with the natural gas pipeline interconnects (for example, meter and regulating equipment and block valves).

2.1.2 LNG Carriers

LNG would be shipped to the Casotte Landing Project from a variety of sources around the world, possibly including Angola, Nigeria, and Venezuela. At this time, Bayou Casotte Energy has not confirmed the source(s) of LNG supplies nor the LNG vessels that would be used. Vessels from these ports most likely would transit the Caribbean and Yucatan Channel to access the Gulf of Mexico.

The LNG marine traffic would travel from the Gulf of Mexico to the Horn Island (HI) Buoy prior to entering the 5.1-nautical mile (NM)-long, Pascagoula Bar Channel. From the Pascagoula Bar Channel the LNG marine traffic would transit into the Horn Island Pass Channel, which is 1.1 NM long. The Horn Island Pass Channel terminates into lower Pascagoula Channel, which is 3.8 NM. From the lower Pascagoula Channel, LNG marine traffic would proceed into Bayou Casotte Channel. The distance to the proposed terminal along this channel is 2.6 NM from the entry point of the Bayou Casotte Channel. The Pascagoula Bar Pilots (Pilots) are responsible for scheduling carrier movements, monitoring weather conditions, establishing working conditions, and declaring channel closures based on inclement weather. Figure 2.1.2-1 illustrates the route that LNG marine traffic would traverse to access the proposed LNG terminal. The carriers that transport LNG are specially designed and constructed to transport LNG for long distances. LNG carrier construction is highly regulated and consists of a combination of conventional ship design and equipment, with specialized materials and systems designed to safely contain liquids stored at temperatures of -260°F.

The following section presents a brief overview of the main design and safety features of a typical LNG carrier that might transport LNG to the proposed terminal.

Profile

LNG carriers have a distinctive appearance compared with other transport ships. An LNG carrier has a high freeboard (the portion of the ship above water) when compared with vessels such as an oil

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Figure 2.1.2-1 Proposed Casotte Landing Project Navigation Routes to the Port of Pascagoula

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tanker, because of the comparatively low density of the cargo. Because of the high freeboard, wind velocity can adversely affect the maneuverability of the carrier, particularly at slow speeds, such as during docking.

All LNG carriers are constructed with double hulls while most other liquid transport ships presently in use have single-hull construction. Double-hull construction increases the structural integrity of the hull system and provides protection for the cargo tanks in case of an accident. The space between the inner and outer hulls is used for water ballast. The International Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk (Gas Tanker Code) and Coast Guard regulations require that LNG carriers meet a Type IIG standard of subdivision, damage stability, and cargo tank location.

The Type IIG design ensures the LNG carrier would withstand flooding of any two adjacent compartments without any adverse effect upon the stability of the carrier. Type IIG design also requires that the cargo tanks must be a minimum of 30 inches from the outer hull and a minimum distance above the bottom of the carrier equal to the beam of the carrier divided by 15, or 6.5 feet, whichever is less. This distance is intended to prevent damage to the cargo tanks in case of low energy-type accidents that might occur in harbors and during docking. Most large LNG carriers have a distance of 10 to 15 feet between the outer hull and cargo tank.

Hull System

Containment Systems

An LNG containment system on LNG carriers consists principally of the cargo tank (sometimes called a primary barrier), the secondary barrier, and insulation. The containment system also includes cargo monitoring and control and safety systems.

Three basic tank designs have been developed for LNG cargo containment: prismatic free-standing, spherical, and membrane. The earliest form of LNG containment is the prismatic free-standing tank. It consists of an aluminum alloy or nine percent nickel steel, self-supporting tank that is supported and restrained by the hull structure. Insulation consists of reinforced polyurethane foam on the bottom and the sides, with fiberglass on the top. The spherical tank design, also known as the Moss design, uses an unstiffened, spherical, aluminum alloy tank that is supported at its equator by a vertical cylindrical skirt, with the bottom of the skirt integrally welded to the carrier's structure. This free-standing tank is insulated with multi-layer close-cell polyurethane panels. In the membrane containment system, the carrier's hull constitutes the outer tank wall, with an inner tank membrane separated by insulation. Two forms of membrane are commonly used: the Technigaz membrane using stainless steel and the Gas-Transport membrane using Invar.

LNG tankers are of the double-hulled design regardless of the containment system used. Double bottom and double sides are provided for the full length of the cargo area and arranged as ballast tanks, independent of the cargo tanks. The double-hulled design provides greatly increased reliability of cargo containment in the event of grounding and collisions. Further, the segregated ballast tanks prevent ballast water from mixing with any residue in the cargo tanks.

Pressure/Temperature Control

A basic goal of all LNG containment systems is to maintain the LNG cargo at or above atmospheric pressure at the boiling temperature of the LNG (about -260 °F). This is accomplished using "auto-refrigeration," that results from the constant heat flow into the tank and the removal of the

associated boil off vapor. The boil off vapor ranges from 0.25 to 0.15 percent (by volume) per day and is used to supplement the bunker fuel in the carrier's boilers. As a result, many existing LNG carriers have reduced emissions when compared with conventional oil-fired carriers. However, many of the newer LNG carriers that are currently proposed or under construction would have re-liquefaction capabilities, and thus, none of the LNG cargo would be consumed by the carrier's propulsion system. LNG cargo tanks are kept under a gas atmosphere at all times so that oxygen is never allowed into the system.

Ballast Tanks

Sufficient ballast water capacity must be provided to permit the carrier to return to the loading port safely under various sea conditions. LNG cargo tanks are not used as ballast tanks because these tanks must contain a minimal amount of LNG to remain at cryogenic temperatures. Consequently, LNG carriers must be designed to provide adequate ballast capacity in other locations.

Ballast water tanks of the LNG carriers are arranged within the LNG carrier's double hull. It is essential that ballast water not leak into the LNG containment system. To reduce the potential for leakage, the ballast tanks, cofferdams, and void spaces are typically coated to reduce corrosion. LNG carriers are also periodically inspected to examine the coating and to renew it as necessary.

A ballast control system, which permits simultaneous ballasting during cargo transfer operations, is also incorporated into each LNG carrier. This allows the LNG carrier to maintain a near constant draft during all phases of its operation to enhance performance. Under normal operating conditions, ballast water would be taken onto the carrier during LNG off-loading at the marine terminal. A typical LNG carrier would take on about 11 to 14 million gallons of ballast water during the offloading operations. Ballast water would not be discharged into the Bayou Casotte area during unloading operations. Further, the Coast Guard has developed responses to exotic/invasive organisms associated with ballast water from foreign vessels. The Coast Guard Office of Operating and Environmental Standards has developed *Mandatory Practices For All Vessels with Ballast Tanks on All Waters of the United States*. The mandatory practices include requirements to rinse anchors and anchor chains during retrieval to remove organisms and sediments at their place of origin, remove fouling organisms from hull, piping, and tanks on a regular basis, and dispose of any removed substances in accordance with local, state, and federal regulations (see Section 4.5.1.4).

Carrier Safety Systems

Any LNG carriers used in association with the proposed Project would have to comply with all federal and international standards regarding LNG shipping. As such, ships that transport LNG to the terminal would be fitted with cargo monitoring and control systems. These systems would automatically monitor key cargo parameters while the ship is at sea and during the remote-control phase of cargo operations at the unloading terminal.

The system includes provisions for pressure monitoring and control, temperature monitoring of the cargo tanks and surrounding ballast tanks, emergency shutdown of cargo pumps and closing of critical valves, monitoring of tank cargo levels, and gas and fire detection.

The LNG carriers that transport LNG to the terminal would be fitted with many navigation and communication systems, including:

- automatic radar plotting aids (ARPA);
- digital global positioning system (DGPS);

- Automatic identification of ships (AIS);
- echo depth finders; and
- satellite communications.

All LNG carriers also have redundant, independent steering control systems that are operable from the bridge or steering gear room to maintain rudder movement in case of a steering system failure.

Fire Protection

All LNG carriers arriving at the proposed terminal would be constructed according to structural fire protection standards contained in the *International Convention for the Safety of Life at Sea* (SOLAS). This would be done under the review and approval of the Coast Guard.

LNG carriers using the terminal would also be fitted with active fire protection systems that meet or exceed design parameters in Coast Guard regulations and international standards, such as the Gas Tanker Code and SOLAS, including:

- a water spray (deluge) system that covers the accommodation house and Cargo Control Room, and all main cargo control valves;
- a traditional firewater system that provides water to fire monitors on deck and to fire stations found throughout the carrier;
- a dry powder extinguishing system for LNG fires; and
- a carbon dioxide system for protecting the machinery, ballast pump room, emergency generators, and cargo compressors.

Crew Qualifications and Training

All officers and crews of the LNG carriers using the terminal would comply with the *International Convention Standards of Training, Certification and Watch Keeping for Seafarers.* Key members of the crew must have specific training in the handling of LNG and the use of the safety equipment. Officers must receive simulator training in the handling of the carrier and the cargo systems specific to the conditions at the Project site. In addition, a local pilot would board each carrier and guide it through Bayou Casotte.

Carrier Selection

The specific identity of LNG carriers that would unload at the terminal would depend on the commercial terms of the LNG purchase agreement(s). Although the Bayou Casotte channel is currently only sufficient for LNG carriers with a maximum capacity of approximately 160,000 m^3, the proposed Project has been designed to accommodate LNG carriers with capacities ranging from 125,000 to 200,000 m^3 (should the channel be expanded in the future). Assuming that the typical LNG carriers visiting the terminal would have a capacity of 145,000 m^3, approximately 170 shipments would be expected each year. Typical vessels of this size would be approximately 950 feet in length, and have a beam (width) of 145 feet and a draft of 38 feet. Vessels using the terminal would comply with the Coast Guard regulations for LNG carriers. This compliance would be demonstrated by the operator of the LNG carrier having proper certificates authorizing the transport of LNG as follows:

- U.S. Flag LNG Carrier – The Coast Guard Certificate of Inspection must be valid and endorsed for the carrier to transport LNG (46 CFR 154, 1979); and
- Foreign Flag LNG Carrier – The carrier must have a valid Certificate of Compliance issued by the Coast Guard. The certificate is issued after the carrier has proved that it complies with the Coast Guard regulations and after it has been satisfactorily inspected by a Coast Guard Marine Safety Office (46 CFR 154, 1979).

Both U.S. and foreign flag carriers must be inspected annually by the Coast Guard and the flag state. A Coast Guard Certificate of Inspection is required every two years. It is anticipated that Coast Guard officers from Sector Mobile, Alabama may board inbound LNG carriers prior to entry into Bayou Casotte Harbor for inspection, verification of documentation, and a safety check. Bayou Casotte Energy would continually monitor carrier operations to ensure that the operations are according to their established procedures and to ensure that the carriers are maintained to all standards. Based on discussions with the Pilots, Bayou Casotte Energy anticipates that movement of LNG carriers in the shipping channel would be limited to daylight hours.

2.1.3 Pipeline Interconnects and Associated Aboveground Facilities

The Casotte Landing Project would include construction and operation of five short, underground natural gas pipeline interconnects with associated aboveground facilities.

Five natural gas pipelines are available for connection at two meter stations on the Refinery property. These include the Chandeleur (12-inch-diameter and 16-inch-diameter), Destin (16-inch-diameter), Gulf South (12-inch-diameter), and Gulfstream (36-inch-diameter) pipeline systems. The close proximity of interstate natural gas pipelines minimizes the need to establish new pipeline rights-of-way. The pipeline interconnect system would consist of a 36-inch-diameter spur line traversing north along Ranson Road, then east to the 36-inch-diameter Gulfstream pipeline, where it would tie in via a meter station at pipeline milepost (MP) 1.5. This spur would pass adjacent to the 12-inch-diameter Gulf South pipeline, the 36-inch-diameter Destin pipeline, the 16-inch-diameter Chandeleur pipeline, and the 12-inch-diameter Chandeleur pipeline where the lateral pipeline interconnects would be made at a meter station located just east of the proposed LNG terminal at MP 0.5 (see Figure 2.1.3-1).

For each of the proposed pipeline interconnects, a custody transfer meter, owned and maintained by the respective pipeline owner, would be located at the tie-in points. Since the length of each interconnect is relatively short, block valves would be located at the line origin and termination points.

Table 2.1.3-1 lists the aboveground facilities associated with the proposed pipeline interconnects.

Meter runs, consisting of a custody-transfer flow meter, pressure regulator, isolation block valves, and all associated instrumentation and controls, would be installed at each interconnect to measure the flow of natural gas from the Casotte Landing Project pipeline system to the existing pipelines. Metering equipment would be located within a fenced and gated site at the terminus of each interconnect.

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Figure 2.1.3-1 Proposed Casotte Landing Project
Pipeline Interconnect System

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TABLE 2.1.3-1 Aboveground Facilities Associated with the Proposed Casotte Landing Project		
Facility	**Milepost**	**Associated and/or Collocated Facility [a]**
INTERCONNECTS		
Chandeleur Interconnect (12-inch)	MP 0.5	Meter station / Interconnect piping
Chandeleur Interconnect (16-inch)	MP 0.5	Meter station / Interconnect piping
Destin Interconnect	MP 0.5	Meter station / Interconnect piping
Gulf South Interconnect	MP 0.5	Meter station / Interconnect piping
Gulfstream Interconnect	MP 1.5	Meter station / Interconnect piping
NONJURISDICTIONAL FACILITIES		
NGL Pipeline	MP 4.3	Meter station / Interconnect piping
Circulation Water System		
Cooling Tower 1	MP 0.0 to MP 0.5	System piping
Cooling Tower 2	MP 0.4 to MP 0.5	System piping

[a] Lateral pipelines and interconnect piping are discussed in Section 2.4.

2.2 NONJURISDICTIONAL FACILITIES

In addition to the proposed facilities discussed in Section 2.1, the Casotte Landing Project would involve a number of other integrally related facilities. These facilities include pipelines, electric transmission lines, an electric substation, and a water circulation system that are not regulated by the FERC. The relocation of two crude berths would also be required to maintain shipping capacity to the Refinery and to take advantage of the dual berth design of the proposed marine terminal.

Refinery Berth 7, currently located adjacent to the proposed marine terminal, receives shipments of crude oil and exports refined products. Refinery Berth 7 would occupy the northern berth of the proposed slip. Refinery Berth 6 would be located south within the existing channel. The relocation of Refinery Berth 6 alleviates congestion at the petroleum-coke dock. Impacts from the relocation of these two refinery berths are included with the impacts from the proposed Project.

In order to provide power to the proposed terminal, a nonjurisdictional main electrical substation and four smaller substations would be constructed on site. The main electrical substation would be connected to the existing electric transmission grid by approximately two circuit miles of new rights-of-way. The timing and final routing and design information from MPC is not available at this time; however, the probable routing of the lines would follow Highway 611 from a point southwest of MPC's Chevron Cogen 115-kV substation south approximately one-half mile, then west approximately one-half mile to a new 560-foot by 300-foot 115-kV substation at the proposed terminal site.

The primary heat for the proposed Project's glycol-water intermediate fluid would be provided by waste heat that is currently removed by the Refinery's cooling towers. This approach would generate multiple benefits, including fuel and water conservation and reduction of air emissions. Warm water from the inlet of Cooling Towers 1 (primary supply) and 2 (secondary supply) would be pumped to the proposed terminal, cooled by thermal exchange with the glycol-water intermediate fluid, and then pumped back to the Refinery's cooling water towers through a closed-loop piping system. Waste heat

would be supplied to the proposed terminal via a 48-inch pipe from Cooling Tower 1, and via a 42-inch pipe from Cooling Tower 2. Under normal operations, Cooling Tower 1 would provide all of the heat needed for the proposed LNG facility. However, an additional tie in will be made at Cooling Tower 2 to supply a portion of the heat necessary for vaporization of LNG in the event water from Cooling Tower 1 is unavailable or inadequate to provide the required heating (such as during cold weather). Four parallel pipe runs (the two supply lines plus their similar-sized return lines) would be aboveground on concrete sleepers within the proposed terminal site and underground where they cross East Hardee Road and within the Refinery. The water pipes would parallel the Refinery's existing hurricane levee and East Hardee Road within the proposed terminal. No additional clearing would be necessary outside the proposed terminal site for construction.

Bayou Casotte Energy would use an NGL extraction system to ensure the natural gas from the proposed terminal is compatible with the interstate system (heat content or BTU content). NGL extraction reduces the BTU content by removing a portion of the hotter-burning NGLs (for example, propane and ethane) from the original LNG. The extraction system would be located within the proposed terminal site.

The NGL extraction system would require a 12-inch-diameter pipeline interconnect to transport the NGL to the Tri-States NGL pipeline. The proposed NGL interconnect would parallel the proposed Gulfstream interconnect spur, then turn north to parallel the existing Gulfstream pipeline within its existing right-of-way. North of Longstreet Road, the NGL interconnect would continue west along the MPC right-of-way to the proposed tie in with the Tri-States NGL line via a meter station located at MP 4.3. Impacts related to the clearing of the right-of-way are addressed as part of the Gulfstream interconnect, and clearing of additional right-of-way would not be necessary for the construction of the NGL interconnect. A permanent right-of-way containing non-woody vegetation would be maintained above the pipeline to allow for future inspection and maintenance.

Based on our review of information on the nonjurisdictional facilities provided by Bayou Casotte Energy, as well as reconnaissance of the general location where these facilities would be sited, we believe environmental impact associated with these nonjurisdictional facilities would be minimal. However, to ensure that potential issues are adequately addressed, **we recommend that:**

- **Bayou Casotte Energy file with the Commission prior to construction the following information on nonjurisdictional facilities, including the MPC transmission lines and substation, the Refinery berth relocations, and the NGL extraction and pipeline system:**

    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 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.**

2.3 LAND REQUIREMENTS

Table 2.3-1 summarizes the land requirements for the facilities associated with the Casotte Landing Project. A detailed discussion of land requirements is presented in Section 4.7.

TABLE 2.3-1
Summary of Land Requirements Associated with the Casotte Landing Project Pipeline

Facility	Land Affected During Construction (acres)	Land Affected During Operation (acres)
LNG Terminal		
Wetlands	119.3	119.3
Open Water	25.1	25.1
Roads	0.0	0.0
Commercial/Industrial Space	115.0	115.0
LNG Terminal Subtotal[a]	259.4	259.4
Pipeline and Associated Aboveground Facilities		
Pipeline Right-of-Way[b] & Lateral Pipelines[c]	14.6	6.1
Meter Station (Interconnect Laterals)	1.5	0.9
Meter Station (Interconnect Spur)	1.3	0.9
Additional Temporary Workspaces	0.0	0.0
Roads	0.0	0.0
Pipeline and Associated Aboveground Facilities Subtotal	17.4	7.9
Nonjurisdictional Pipeline and Facilities		
Circulation Water Systems	7.9	0.0
NGL Pipeline	27.1	0.2
Meter Station (NGL Interconnect Pipeline)	1.2	0.7
Mississippi Power Transmission Line	0.0	0.0
Nonjurisdictional Pipeline and Facilities Subtotal	36.2	0.9
Nonjurisdictional Pipeline and Facilities Subtotal		
Total	**313.0**	**268.2**

[a] Including the LNG storage tanks, buildings, process areas, utility area, boil-off gas compressor, meter skid, electrical substations, spill containment components, open space, and piping.

[b] Based on a 110-foot-wide construction right-of-way during collocation of pipelines and an 85-foot-wide construction right-of-way during single occurrence. During operation, all proposed pipelines would be within existing rights-of-way.

[c] Includes acreages of the Destin, Chandeleur (2), and Gulf South laterals. Based on an 85-foot-wide construction right-of-way. During operation, all proposed pipelines would be within existing rights-of-way.

2.3.1 LNG Terminal Facilities

The proposed LNG terminal would be located on a 259.4-acre site adjacent to Bayou Casotte. The majority of this parcel consists of previously disturbed and developed industrial areas, which include 119.3 acres of wetlands, 115.0 acres of existing industrial space, and 25.1 acres of open water (see Table 2.3-1).

Existing access roads would be sufficient for proposed terminal operations, and no modification or addition of existing roadways would be needed.

2.3.2 Pipeline and Associated Aboveground Facilities

Construction of the pipeline interconnect facilities would disturb a total of about 17.4 acres of land. Of this total, 14.6 acres would be disturbed by the pipeline construction rights-of-way. Bayou Casotte Energy proposes to use a 150-foot-wide right-of-way for construction of the Gulfstream interconnect spur where it is collocated with the nonjurisdictional NGL pipeline. Where only one pipeline is located, a right-of-way width of 100 feet would be used (see Figures 2.3.2-1 through 2.3.2-4). An additional 1.5 acres would be disturbed by the four lateral pipelines. Approximately 17.4 acres would be required for construction with 6.1 acres for operation of the proposed pipeline interconnects. Following construction, areas of temporary workspace, and areas outside the existing permanent right-of-way would be allowed to revert to pre-construction conditions.

2.4 CONSTRUCTION PROCEDURES

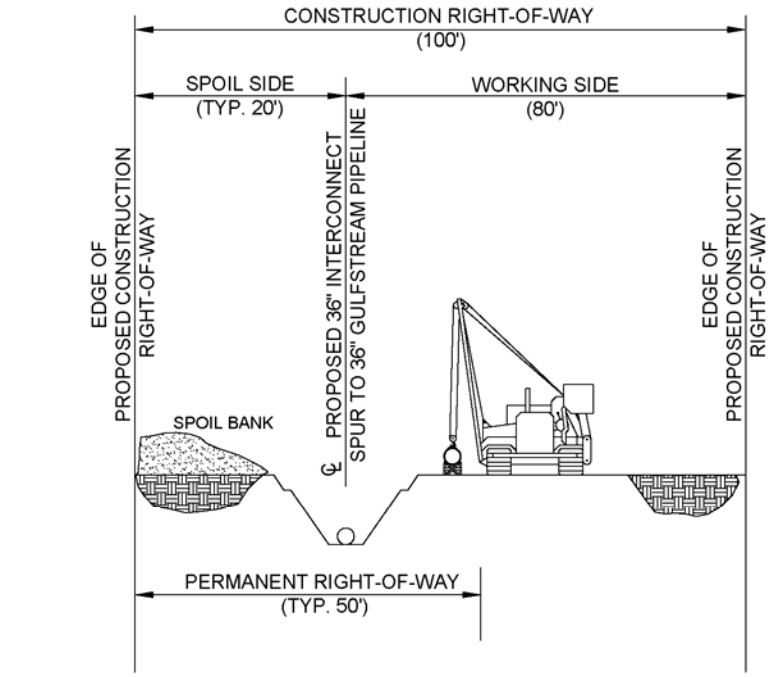
This section describes the general procedures proposed by Bayou Casotte Energy for construction of the proposed LNG terminal and pipeline interconnect facilities. Refer to Section 4.0 for more detailed discussions of proposed construction and restoration procedures as well as additional measures that we have recommended to mitigate potential environmental impacts.

The proposed LNG terminal and natural gas pipeline interconnects would be designed, constructed, operated, and maintained in accordance with federal safety standards that are intended to ensure adequate protection for the public and to prevent LNG and natural gas pipeline accidents or failures.

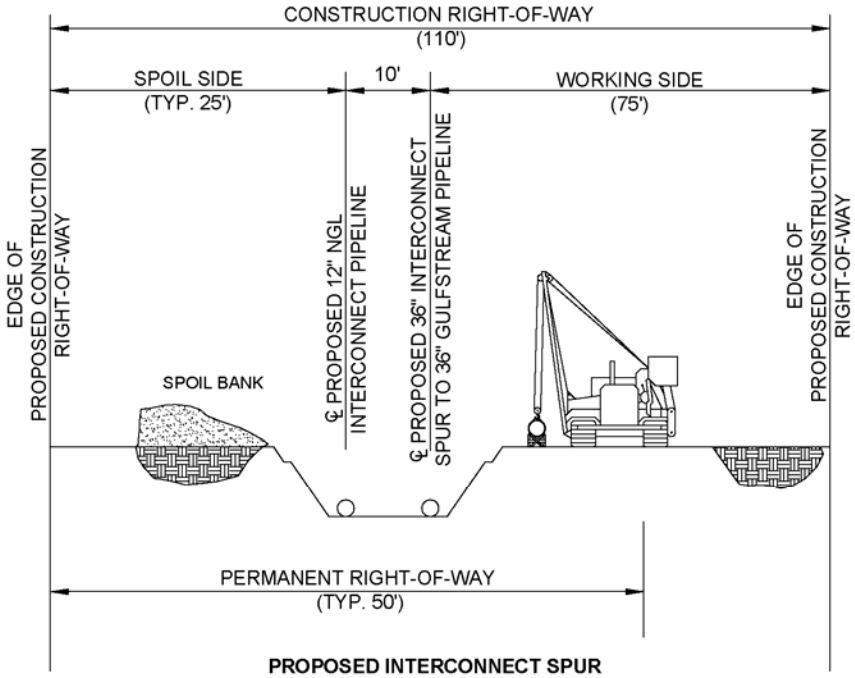
Under the provisions of the Natural Gas Pipeline Safety Act of 1968, as amended, Bayou Casotte Energy would design, construct, operate, and maintain the LNG terminal facilities in accordance with the DOT's *Liquefied Natural Gas Facilities: Federal Safety Standards* (49 CFR 193). The facilities would also meet the National Fire Protection Association (NFPA) *Standards for the Production, Storage, and Handling of LNG* (NFPA 59A). These standards specify siting, design, construction, equipment, and fire protection requirements for new LNG facilities. The carrier unloading facilities and any appurtenances located between the LNG carriers and the last valve immediately before the LNG storage tank would comply with applicable sections of the Coast Guard regulations in *Waterfront Facilities Handling Liquefied Natural Gas* (33 CFR 127) and Executive Order 10173. Process piping from tank top to grade would be installed in accordance with applicable American National Standards Institute (ANSI), American Society of Mechanical Engineers (ASME), and API standards.

The proposed pipeline facilities would be designed, constructed, operated, and maintained in accordance with DOT regulations in *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards* (49 CFR 192). Among other design standards these regulations specify pipeline material selection; minimum design requirements; protection from internal, external, and atmospheric corrosion; and qualification procedures for welders and operations personnel. In addition, Bayou Casotte Energy would comply with the siting and maintenance requirements in 18 CFR 380.15 and other applicable federal and state regulations.

In order to control and minimize runoff from the terminal site to Bayou Casotte during construction, Bayou Casotte Energy would implement it's Upland Erosion Control, Revegetation, and Maintenance Plan (Bayou Casotte Energy's Plan), as modified in this EIS (see Section 4.2.1). To minimize the potential for impacts to water quality, open-cut crossings would be accomplished in accordance with Bayou Casotte Energy's Wetland and Waterbody Construction and Mitigation Procedures (Bayou Casotte Energy's Procedures), as modified in this EIS (see Section 4.3.3). Bayou Casotte Energy's Plan and Procedures are included in Appendix B.



PROPOSED INTERCONNECT SPUR
MILE POST (0 TO 0.2)



PROPOSED INTERCONNECT SPUR
MILE POST (0.2 TO 0.5)
AND (0.8 TO 1.5)

Figure 2.3.2-1
Proposed Casotte Landing Project
Typical Pipeline Construction Right-of-Way Cross Sections

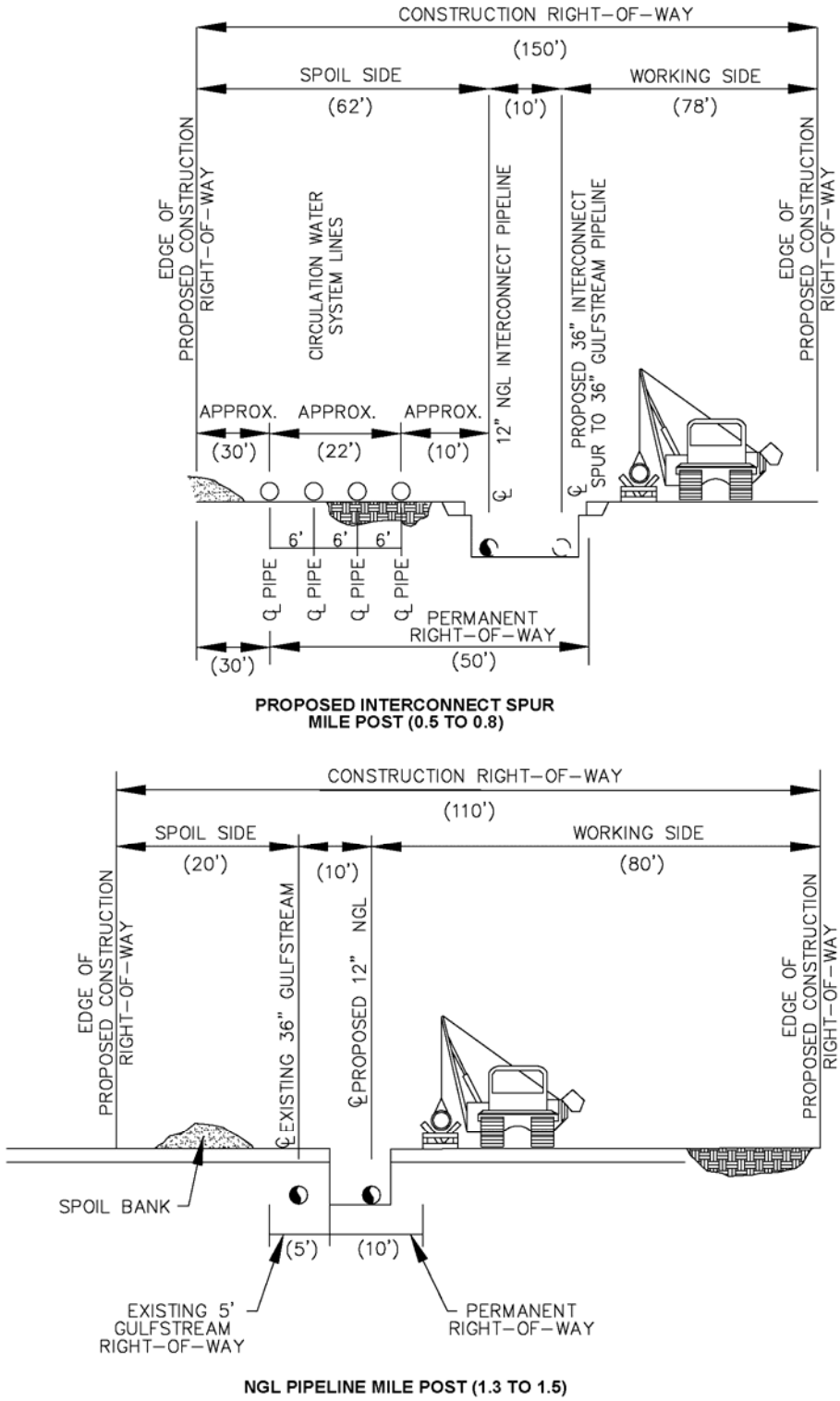


Figure 2.3.2-2
Proposed Casotte Landing Project
Typical Pipeline Construction Right-of-Way Cross Sections

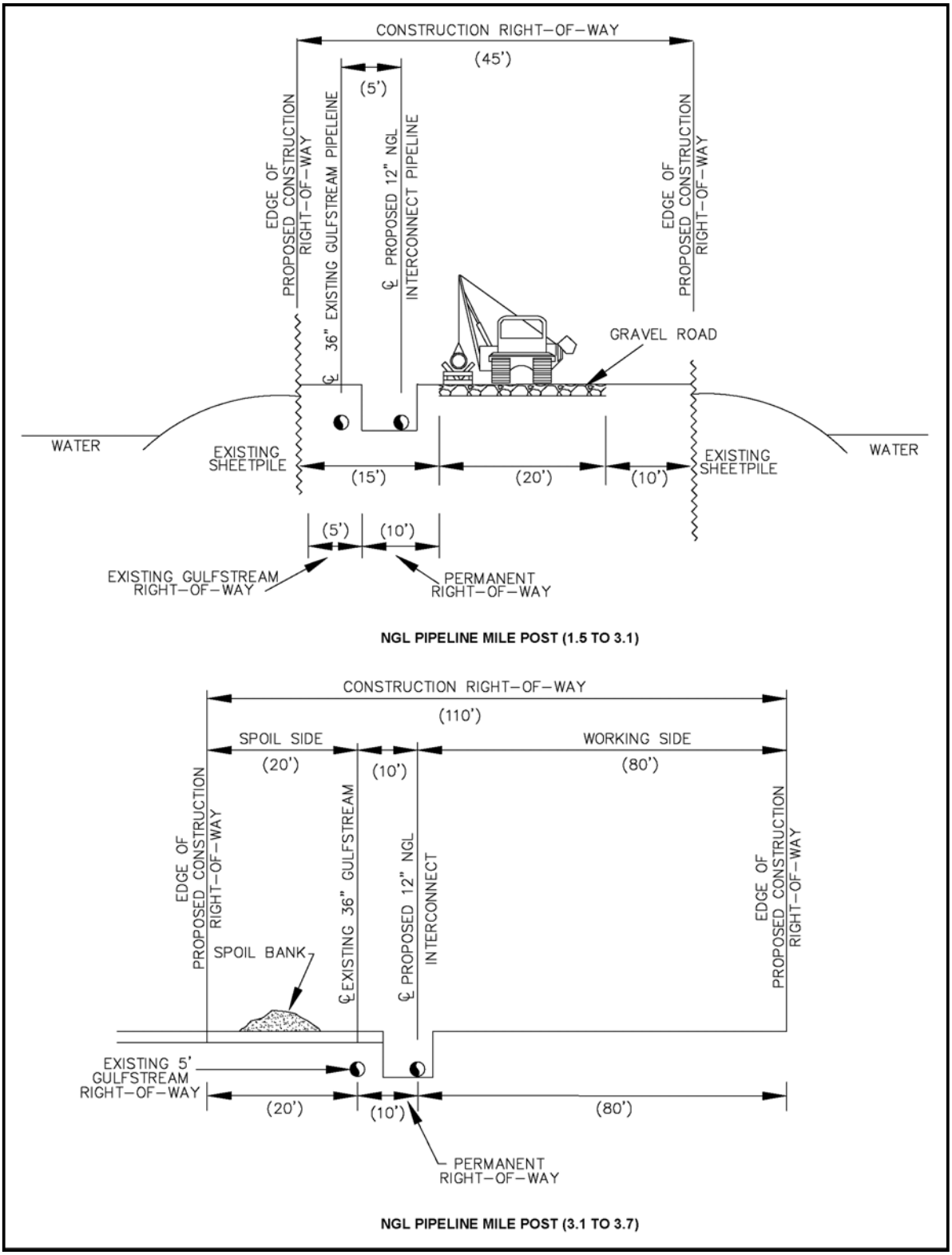


Figure 2.3.2-3
Proposed Casotte Landing Project
Typical Pipeline Construction Right-of-Way Cross Sections

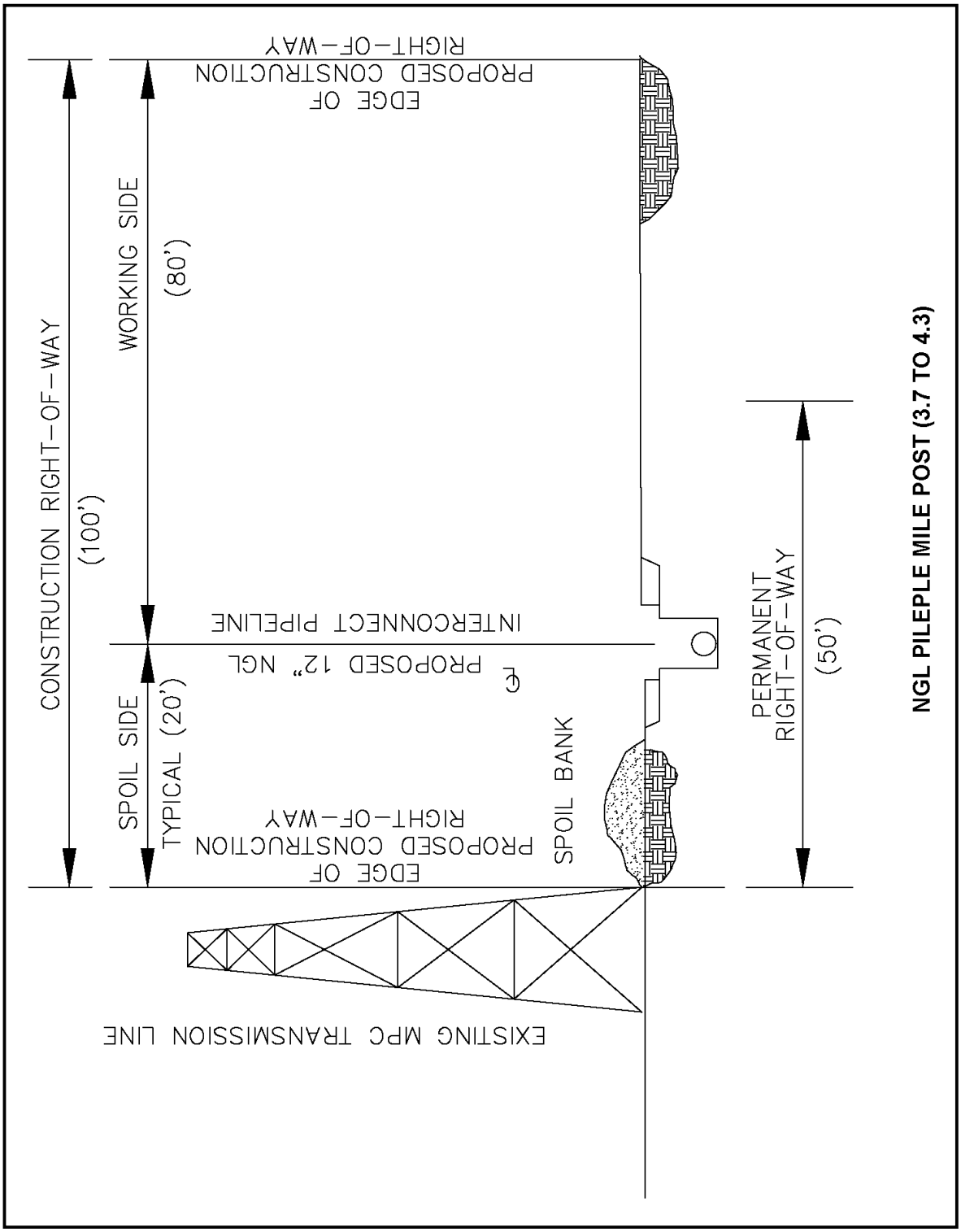


Figure 2.3.2-4
Proposed Casotte Landing Project
Typical Pipeline Construction Right-of-Way Cross Sections

Bayou Casotte Energy has prepared a Stormwater Pollution Prevention Plan (SWPPP) that identifies potential sources of pollution and the Best Management Practices (BMP) to use to prevent and monitor potential impacts during construction (see Appendix C). In addition, Bayou Casotte Energy has prepared a Spill Prevention, Containment and Countermeasure Plan (SPCC Plan) for both the LNG terminal and pipeline interconnect portions of the Project to protect against the possibility of an inadvertent spill of hazardous materials during construction. The SPCC Plan addresses potential spills of fuels, lubricants, and other hazardous materials and describes spill prevention practices, spill handling and emergency notification procedures, and training requirements (see Appendix D).

2.4.1 LNG Terminal Facilities

2.4.1.1 Site Preparation

Site preparation for the proposed LNG terminal (marine and storage facilities) would include general site stripping and cutting/filling to finished grade elevation, excavation and dredging of the slip, and construction of the perimeter levee around the LNG storage tanks. The perimeter hurricane levee would be constructed using the excavated material from the site. Bayou Casotte Energy would install temporary erosion and sediment controls at the outset of land disturbance activities, and maintain these controls until the completion of construction activities and the installation of permanent erosion control measures.

Excavation - Stripping and Cutting

Bayou Casotte Energy would strip and excavate high areas to level the site to a finished grade elevation of approximately 10 feet National Geodetic Vertical Datum (NGVD). The stripped and excavated material would be used onsite for the creation of the hurricane levee, ditches, and berms.

Excavation and Dredging of the Marine Terminal

Construction of the new marine terminal would require excavation and dredging at the proposed LNG terminal site for the slip along Bayou Casotte. Construction of the slip would begin by excavating the top 14 feet of overburden down to or near the water table. The total quantity of dry materials that would be excavated from the slip is estimated to be approximately 1.0 million cubic yards (mcy). This material would be used for fill, site leveling, and construction of the hurricane levee at the terminal site.

Following excavation of the dry materials, dredging would begin from the edge of the Bayou Casotte into the slip area and then proceed inland. The total dredged volume at the marine terminal would be approximately 3.5 mcy and would extend to a depth of 46 feet below MLLW, which encompasses a 42 foot design depth, 2 feet of advanced maintenance, and an additional 2 feet of over depth (consistent with COE standards for dredged channels within this waterway system).

Annual maintenance dredging of the marine slip would be required to ensure that the LNG carriers and crude tankers would continue to access the proposed terminal facilities. It is estimated that 250,000 yd^3 of material would be removed annually for maintenance dredging.

Since late 2005, Bayou Casotte Energy has been working with the regulatory and resource agencies to identify a site where it would place the materials dredged from the marine terminal. In its Section 103 evaluation included in its Joint Permit application to the COE, Bayou Casotte Energy listed the preferred placement option for the dredge material as a combination of placement at the EPA's Pascagoula Ocean Dredged Material Disposal Site (ODMDS), located offshore in the Gulf of Mexico south of Horn Island; and approved and available federal and state coastal or offshore beneficial use (BU)

project sites. Currently, no BU project sites are available for the placement of dredged materials; therefore, the Pascagoula ODMDS site remains the proposed location for dredged materials placement during initial construction of the proposed marine terminal and for maintenance dredged materials. However, final Agency approvals have not yet been obtained. See Appendix E for the text of Bayou Casotte Energy's Section 103 evaluation and Dredged Material Management Plan (DMMP).

Figure 2.4.1-1 illustrates the location of the Pascagoula ODMDS in relation to the proposed terminal site. See Section 3.0 for a more detailed description of the potential BU sites and other dredged material placement alternatives.

Based on the relatively long distance between the proposed LNG terminal site and the proposed dredged material placement area, mechanical dredging technology was selected over hydraulic dredging. The sediments would be removed using a clamshell dredge and would be placed in barges or scows for transport to the ODMDS. The bottoms of the barges or scows would be designed to open, thereby depositing the sediment in the placement area. The production rate of a mechanical dredging operation is dependent on a variety of factors, including sediment characteristics, bucket size, and the efficiency of exchanging the barges/scows. Dredging activities would occur on a 24-hour basis, seven days per week and would require about six months to complete. In addition, Bayou Casotte Energy would coordinate its dredging activities with the Coast Guard, the Pilots, and the COE to minimize shipping impacts.

Hurricane Levee

An earthen hurricane levee would surround the proposed LNG storage tanks and process area. The hurricane level would function as protection for the facility from hurricane storm surge, as well as provide secondary containment for the three proposed LNG storage tanks. The hurricane levee would have a finished top elevation approximately 14 feet above grade (22.8 feet NGVD). The walls would be sloped at approximately 2H:1V. Design engineering determining the volume of excavated material from the proposed marine berth and terminal site to construct the hurricane levee is currently in process.

2.4.1.2 Material and Equipment Delivery

Construction of the proposed LNG terminal would require many types of equipment and materials. Tagged equipment, instrumentation, and valves would be procured during the engineering phase of the Project and shipped to the site to meet requirements specified by the construction schedule.

Additional items that would be shipped include piling, piping, structural steel, and electrical components.

Fabrication shops and assembly areas would be used to fabricate structural steel components and other prefabricated units, as well as skid-mounted process equipment modules. These items would be delivered to the site in accordance with the construction schedule. A concrete batch plant would be located at the proposed terminal site to provide concrete for construction needs.

Material and equipment requiring marine transport would be delivered to an appropriate existing local port (Pascagoula, Mobile, or New Orleans). The material and equipment would be unloaded if final transportation to the site is by road, or transferred onto barges if the equipment or material is delivered to the terminal site using marine transport. Unloading construction materials and equipment at the proposed LNG terminal site would be accomplished by the most suitable means, either by crane or forklifts.

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Figure 2.4.1-1 Proposed Casotte Landing Project
Dredged Material Placement Location

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2.4.1.3 Marine Facilities

The marine terminal would consist of an unloading slip with two berths to allow docking of an LNG carrier and a crude tanker simultaneously. Installation of waterside facilities would begin following excavation and dredging of the slip using a conventional heavy-lift derrick barge, which is typical of similar construction activities along waterways in the region. Supply barges would deliver materials to the crane barge and also would be used to store the materials until needed for construction. The crane barges would be used to lift beams and other materials into place. A barge-mounted heavy-lift crawler crane would be used for lifting piles into place so that they can be driven. Appropriately sized tugs and crew boats would be used, as required.

Construction of the unloading berth would generally follow the sequence described below.

Prefabrication of Process Area and Marine Berth Components

Prefabrication of the main components for the process area and marine berth would involve the piles for the waterside facilities and supporting foundations. Piles for the supporting foundations would be either pre-cast type or pipe piles. All piles would be manufactured off site. Prefabricated piles would also be used to support the foundation of berth structures. A heavy lift derrick barge would be used to place the jackets in position, and the piles would be driven through the legs of the jacket. Bayou Casotte Energy currently plans to drive the steel pipe or concrete piles to design penetrations. The piles would range in length from 100 to 140 feet in length and 16 to 48 inches in diameter.

Berth and Unloading Facilities

The unloading platform, breasting and mooring dolphins, and access trestle would consist of reinforced concrete structures on piles. The dock pile caps and beams would be cast-in-place reinforced concrete structures, supported from the steel pipe piles with pile clamps, hangers, and soffit beams. The dock pile caps would be connected to the piles using a reinforced concrete plug extending into the pile top. The concrete deck slabs would then be installed using precast and cast-in-place reinforced concrete.

Dolphin pile caps would then be installed for the mooring and breasting dolphins of the berth. The mooring and breasting dolphin pile caps would include mooring hooks for spring lines to provide greater flexibility in mooring various types of vessels, and fenders suitable to safely restrain the carriers from wind, current, and other forces while berthed at the marine terminal.

The marine unloading and vapor return arms would then be lifted and set on the berth deck for installation. Once the arms are installed, the mezzanine platform, walkway and walkway supports, access trestles, structural steel supports, and remaining dock equipment (for example, firewater monitors and switchgear buildings) would be installed along with all related pipe work, electrical work, and instrumentation.

2.4.1.4 LNG Storage Facilities

Most of the major equipment related to the cryogenic systems for the proposed LNG terminal would require specialized materials and construction techniques. As a result, most, if not all, of the major facilities (including the LNG tanks and LNG unloading facilities) would be prefabricated offsite at specialty manufacturing and prefabrication sites.

Prefabrication of Tank Components

Prefabrication of the main tank components would include the following:

- nine percent nickel steel inner container shell and bottom plates;
- internal tank accessories, nozzles, and roof structure components;
- carbon-steel roof plates;
- piping, ladders, platforms, and other structural elements; and
- steel reinforcement for the foundation and outer concrete container and roof.

Tank Construction

The process of constructing the LNG tanks would generally proceed as follows:

- the tank area would be filled, consolidated, and graded to the required level for the piling operations to be undertaken;
- piles would be installed and prepared to connect the elevated slab;
- construction of the post-tensioned secondary outer concrete tank wall;
- construction of the steel dome roof and suspended decks;
- installation of the steel reinforcement and concrete covering of the steel dome roof;
- installation of the vapor barriers, the nine percent nickel steel secondary bottom, and the concrete leveling screed;
- installation of the nine percent nickel steel inner container annular and bottom plates;
- erection of the inner tank shell;
- installation of internal tank accessories, piping, roof platforms, and walkways;
- hydrostatic testing of the inner tanks and pneumatic testing of the outer tanks (see discussion below); and
- installation of the insulation systems between the inner and outer tanks.

The inner container of the LNG storage tanks would be hydrostatically tested in accordance with the requirements of API 620. The hydrotest water would be supplied only from an acceptable source, such as treated wastewater from the refinery or appropriately treated water from Bayou Casotte. This procedure would be approved by the Mississippi Department of Environmental Quality (MDEQ) before hydrotesting is conducted. Test water would be sampled and tested for suitability prior to use, in accordance with MDEQ requirements, procedures, and approvals. Approximately 28 million gallons of water would be required to test up to the required test level. Ideally, test water would be transferred between tanks and ultimately discharged into the Bayou Casotte Channel upon completion of the tests. Prior to discharge, the water would be tested again, in accordance with MDEQ requirements, procedures, and approvals to determine whether treatment is required and to establish an appropriate treatment method. Specific procedures would be developed for treating the water prior to discharge (for example, filtration, oil/water separators, clarifiers/ solids separators, activated carbon adsorption units, or chemical injection).

Each tank would also be pneumatically tested at a pressure of 1.25 times the design pressure for one hour in accordance with API 620. The pneumatic test would be performed using dry air compressors for pressurization.

Construction of Other Facilities

Construction of the foundations, pipe racks, and terminal buildings together with installation of major mechanical equipment, process and utility piping, and electrical and instrumentation would occur once tank construction is underway. These facilities would be completed and pre-commissioned in readiness for mechanical completion of the LNG tanks. Piping systems would be tested using hydrostatic or pneumatic testing. In general, cryogenic piping would be pneumatically tested with dry air or nitrogen at 1.1 times design pressure. Piping other than cryogenic piping would be hydrotested using clean water at 1.5 times design pressure. Testing would be performed in accordance with ASME B31.3.

As the construction of the process portion of the proposed LNG terminal progresses, work would commence on instrumentation and electrical loop testing and pre-commissioning activities, such that these activities would be completed concurrent with the completion of the tanks and ready for nitrogen purging.

Restoration

Areas of the proposed LNG terminal site that would be temporarily disturbed by construction of the proposed facilities would be stabilized with temporary erosion controls until construction is completed. Unless covered by equipment, gravel, or other covering, LNG terminal site areas would be seeded to establish revegetation in accordance with Bayou Casotte Energy's Plan, as modified in this EIS.

2.4.2 Pipeline Interconnects and Associated Aboveground Facilities

Construction of the proposed natural gas pipeline interconnects would primarily involve standard pipeline construction techniques described in Section 2.4.2.1. Special construction techniques would also be used when constructing the pipeline across wetlands, waterbodies, roads, and foreign pipelines. These special construction techniques are described in Section 2.4.2.2. Construction of the aboveground facilities associated with the pipeline is discussed in Section 2.4.2.3.

Pipeline construction workers would primarily use existing highways and roads that intersect the right-of-way for construction access. Bayou Casotte Energy does not anticipate that any new roads would be required during pipeline construction. However, some of the existing roads may require modifications or improvements to accommodate the weight and dimensions of construction equipment and materials. If any modifications or improvements would be required, Bayou Casotte Energy would be required to obtain the necessary approvals.

Bayou Casotte Energy has indicated that it would use a laydown area located within the proposed terminal site that would have road access.

2.4.2.1 General Pipeline Construction Techniques

Figure 2.4.2-1 shows the typical steps of cross-country pipeline construction. Standard pipeline construction proceeds in the manner of an outdoor assembly line composed of specific activities that make up the linear construction sequence. These operations collectively include survey and staking of the

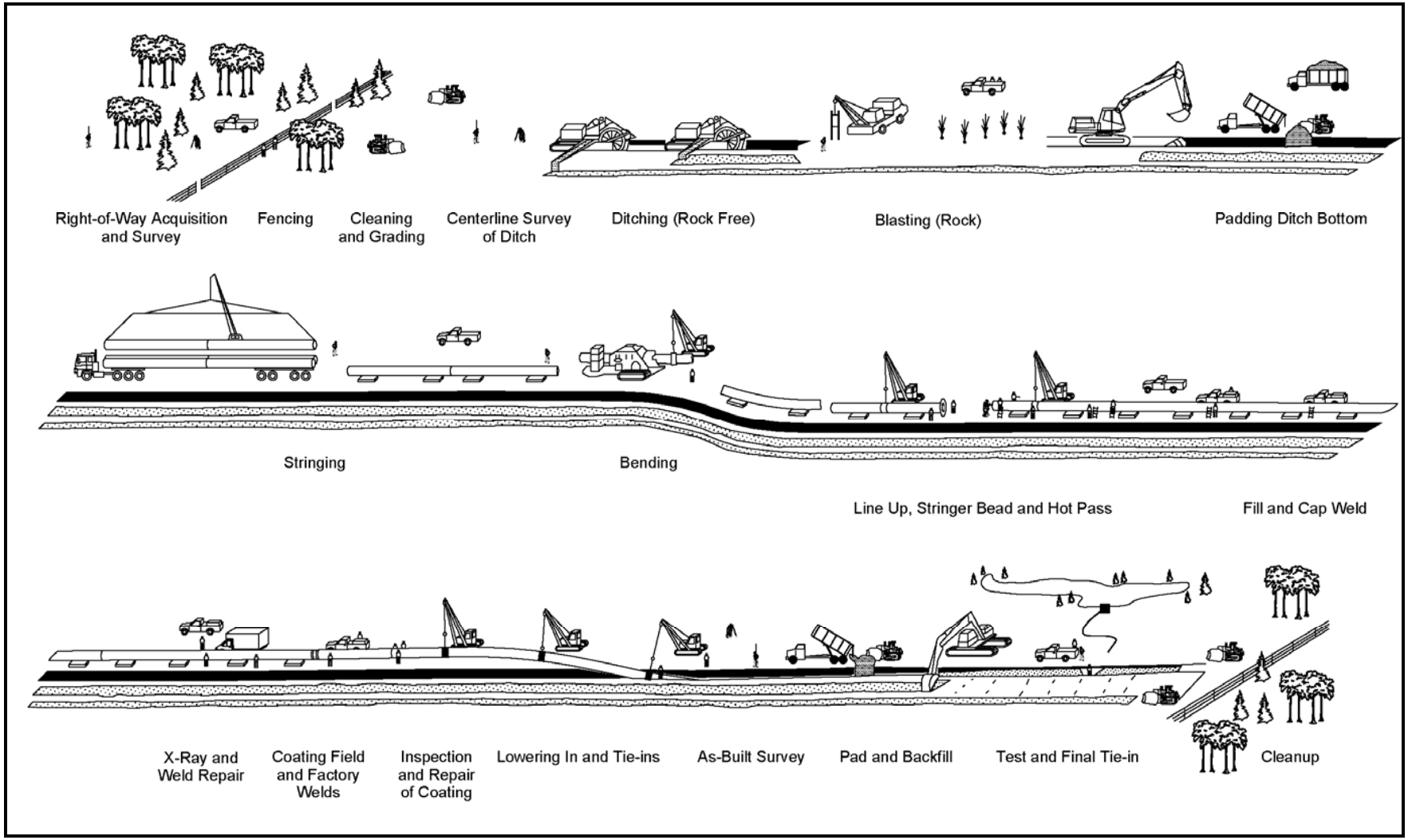

Figure 2.4.2-1
Proposed Casotte Landing Project
Typical Pipeline Construction Sequence

right-of-way, clearing and grading, trenching, pipe stringing and bending, welding and coating, lowering-in and backfilling, hydrostatic testing, and cleanup.

Survey and Staking

Before construction, Bayou Casotte Energy crews would survey and stake the centerline and exterior boundaries of the construction right-of-way. Drainage centerlines and elevations, road and railroad crossings, and any temporary extra workspaces (laydown areas or at stream crossings) would also be staked. The exterior boundary stakes would mark the limit of approved disturbance areas and would be maintained throughout the construction period. Utility lines would be located and marked to prevent accidental damage during pipeline construction. Bayou Casotte Energy would notify affected landowners, regulatory agencies, water development districts, and flood control districts before surveying and staking of the proposed route.

Clearing and Grading

Bayou Casotte Energy would clear the right-of-way of large obstacles such as trees, brush, and logs. Timber would be removed when necessary for construction purposes. Timber and other vegetative debris may be chipped for use as erosion-control mulch, burned, or otherwise disposed in accordance with applicable state and local regulations and landowner crossing agreements. Burning, if necessary, would be conducted in such a manner as to minimize the fire hazard and prevent heat damage to surrounding vegetation. The right-of-way would then be graded where necessary to create a reasonably level working surface to allow safe passage of construction equipment and materials. Bayou Casotte Energy would install temporary erosion control measures at this time.

Trenching

A rotary trenching machine, track-mounted backhoe, or similar equipment would be used to excavate a trench to a sufficient depth to provide a minimum 3-foot depth of cover. Due to the absence of consolidated bedrock near the surface, Bayou Casotte Energy does not anticipate the need for blasting. Depending on soil conditions, the top of the trench would typically be 18 feet wide and the bottom of the trench would typically be at least 12 inches wider than the diameter of the pipe, or a minimum of 4 feet wide. In unstable and saturated soils, the trench would be wider.

Spoil material excavated during trenching operations would be temporarily piled to one side of the right-of-way adjacent to the trench. Where the pipeline route is adjacent to an existing pipeline, the subsoil spoil would be placed on the same side of the trench as, but not directly over, the existing pipeline to keep working equipment off of the operating pipeline. In these collocated sections, the topsoil would be stockpiled on the working side of the right-of-way, outside the construction equipment lane (see Figure 2.3.2-1).

Pipe Stringing and Bending

Either before or after trenching, sections of externally coated pipe (also referred to as joints) would be shipped to the pipe yard and then transported to the right-of-way by truck and placed or "strung" along the excavated trench in a single, continuous line, easily accessible to the construction personnel on the working side of the trench, opposite the spoil side.

The pipe would be delivered to the construction right-of-way in straight joints. Some bending of the pipe would be required to allow the pipeline to follow natural grade changes and direction changes of

the right-of-way. Selected joints would be bent in the field by track-mounted hydraulic bending machines as necessary before welding.

Welding and Coating

After stringing and bending are complete, pipe sections would be placed on temporary supports adjacent to the trench. The ends would be aligned and welded together using multiple passes for a full penetration weld. Only qualified welders would be permitted to perform the welding. Welders and welding procedures would be qualified according to applicable ANSI, ASME, and API Standards.

To ensure that the assembled pipe meets or exceeds the design strength requirements, Bayou Casotte Energy would inspect all welds, both visually and radiographically (i.e., x-ray), and would make any necessary repairs. Following weld inspection, the previously uncoated ends of the pipe at the welds would be epoxy coated. The coating on the completed pipe section would be inspected and any damaged areas repaired.

Lowering-in and Backfilling

After welding and coating are completed, the pipe would be lowered into the trench by side-boom tractors. Before lowering the pipe, the trench would be inspected to ensure that it is free of rocks and other debris that would damage the pipe or the coating. In addition, the pipe and trench would be inspected to ensure that the configurations of the pipe and trench configurations are compatible.

Bladed equipment or a specially designed backfilling machine would be used to backfill the trench. No construction debris, including wooden supports, welding rods, containers, brush, trees, or refuse of any kind, would be permitted in the backfill. If rocks or other materials that would damage the pipe or coating are present in the backfill, a padding machine would be used to separate the rock from the backfill. In some instances, clean fill or additional protective coating such as rock shield would be placed around the pipe before backfilling.

Segregated topsoil, where applicable, would be replaced after backfilling the trench with subsoil. Following backfilling, a small crown of material would be left to account for any future soil settling that might occur.

Hydrostatic Testing

After backfilling, Bayou Casotte Energy would hydrostatically test the pipeline in accordance with DOT regulations to ensure that the system is capable of operating at the design pressure. The testing process involves filling a segment of the pipeline with water and maintaining a prescribed pressure for a specified amount of time. If a leak or break in the line were to occur during testing, Bayou Casotte Energy would repair and retest that section of pipe until DOT specifications are met.

Bayou Casotte Energy estimates that approximately 450,000 gallons would be required to hydrostatically test the pipeline interconnects. The hydrotest water would be supplied only from an acceptable source, such as treated wastewater from the refinery or appropriately treated water from Bayou Casotte. This procedure would be approved by the MDEQ before hydrotesting is conducted. Test water would be sampled and tested for suitability prior to use, in accordance with MDEQ requirements, procedures, and approvals. Any leaks that are detected would be repaired and the pipeline segment retested.

Cleanup and Restoration

After the pipeline interconnects have been installed, backfilled, and successfully tested, the right-of-way, temporary extra workspaces, and other disturbed areas would be permanently restored. Also, scrub-shrub and emergent wetlands would be restored to original contours and hydrological patterns, open space would be re-seeded according to NRCS recommendations, commercial/industrial land would be restored to pre-construction elevations, and the original surface cover would be restored.

The restored construction right-of-way would be revegetated in accordance with Bayou Casotte Energy's Plan (and requested variances, should they be approved), other permit requirements, and site-specific landowner requests. Turf, ornamental shrubs, and other landscaping material would be restored in accordance with landowner agreements.

2.4.2.2 Special Pipeline Construction Techniques

Construction across wetlands, waterbodies, roads, and foreign pipelines may require special construction techniques. These techniques are described below.

Wetland Crossings

Construction of pipeline interconnects across wetlands would be in accordance with Bayou Casotte Energy's Procedures, as modified in this EIS (see Section 4.3). During crossing of unsaturated wetlands (wetlands without standing water or saturated soils), construction would primarily be similar to the upland construction described above. Bayou Casotte Energy has requested the use of wetland construction rights-of-way that exceed 75-feet in width. As described in Section 4.4.4.2, we have denied this blanket request. Any proposed expansion of the construction right-of-way associated with waterbodies or wetlands must first be approved in writing by the Commission on a site-specific basis prior to construction.

Woody vegetation would be cut off at ground level and removed from the wetlands leaving the root systems intact. Temporary erosion control devices would be installed as necessary immediately after initial disturbance of wetlands or adjacent upland areas to prevent sediment flow into wetlands, and would be maintained until revegetation is complete. Timber mats or terra mats would be used where necessary to stabilize the right-of-way for equipment, minimize rutting, and prevent the mixing of topsoil and subsoil. The pulling of stumps would not be permitted except in the area of the pipeline trench and in other areas where their removal is necessary for safety reasons.

In accordance with Bayou Casotte Energy's Procedures (as modified in this EIS), topsoil would be stripped over the trench line to a maximum depth of 12 inches in unsaturated soils and placed in a separate spoil pile. Following installation of the pipe, the trench would be backfilled and the topsoil replaced. Trench plugs would be installed as necessary to maintain wetland hydrology. The natural contours of the wetland would be restored, any required permanent erosion control measures would be installed, and the area would be temporarily stabilized with appropriate vegetation to protect the wetland soil from erosion. Materials such as timber mats placed in wetlands during construction would be removed during final cleanup.

Waterbody Crossings

Bayou Casotte Energy proposes to install the proposed pipeline interconnects across two shallow artificial canals and the nonjurisdictional NGL pipeline across six waterbodies using open-cut crossing methods in accordance with Bayou Casotte Energy's Procedures, as modified in this EIS (see

Section 4.3.2.2). The open-cut construction method involves excavation of the pipeline trench across the waterbody, installation of the pipeline, and backfilling of the trench with native material with no effort to isolate flow from construction activities. Excavation and backfilling of the trench would be accomplished using backhoes or other excavation equipment operating from one or both banks of the waterbody. Bayou Casotte Energy would construct the pipeline across the waterbodies in accordance with applicable permits. Bayou Casotte Energy's Procedures, as modified in this EIS, include requirements for preconstruction planning, environmental inspection, specific construction methods, sediment and erosion control, restoration, and post-construction maintenance. Intermittent streams that are dry at the time of crossing would be crossed using the conventional upland construction techniques described above.

Road and Railroad Crossings

The proposed interconnect spur and NGL pipeline would cross several roadways and a railroad. Generally, a conventional bore would be required to install the pipeline under primary roadways and railroads. This method would not result in any impacts on the road or railroad and would avoid traffic-related disruptions. During an open cut crossing of a roadway, Bayou Casotte Energy would keep at least one lane of traffic open during construction. During the brief period when the road would be completely cut, steel plates would be available on-site to cover the open area to allow passage by emergency vehicles. Access would be maintained except for the limited periods required for installing the pipeline.

Smaller, unpaved roads would be open cut where permitted by local authorities. The proposed pipelines would be buried to a depth of at least 5 feet below road surfaces and two to three feet below railroad crossings, depending on the strata. Pipelines would be designed to withstand anticipated external loadings and casings would be installed only where specifically required by permitting authorities. After construction, these roads and driveways would be restored.

2.4.2.3 Associated Aboveground Facilities

Interconnect Sites

During installation of the interconnect sites, construction activities and storage of construction materials and equipment would be confined to the pipeline construction right-of-way or approved temporary workspace. Bayou Casotte Energy would dispose of debris and waste generated during the construction and all disturbed surface areas would be restored.

Bayou Casotte Energy would excavate as necessary to accommodate the new reinforced concrete foundations for the new metering equipment, heaters, and buildings. Forms would be set, rebar installed, and the concrete poured and cured in accordance with applicable standards. Backfill would be compacted in place, and excess soil would be used elsewhere or distributed around the site to improve grade.

Metering equipment would be delivered to the site by truck and unloaded using cranes, front-end loaders, or both. The metering equipment would be positioned on the foundations, leveled, grouted where necessary, and secured with anchor bolts.

After installation, all meter station equipment would be hydrostatically tested, and all controls and safety equipment and systems, including emergency shutdown, relief valves, and gas and fire detection equipment, would be checked and tested, before being placed in service.

Pig Launcher and Receiver

Since the interconnect sections are relatively short in length, no pigging facilities would be constructed in association with the proposed Project. Bayou Casotte Energy proposes to meet its DOT requirements for integrity management by hydrostatically testing the pipeline interconnects. The metering facilities would be constructed large enough to accommodate the installation of in-line inspection tools, referred to in the pipeline industry as pigs, if required in the future.

Mainline Block Valves

Block valves would be installed at the pipeline origination within the LNG terminal and within each interconnect site pipeline terminus. Bayou Casotte Energy would install these facilities using the same standards and requirements established for construction of its proposed interconnect sites and pipeline.

2.5 CONSTRUCTION SCHEDULE

No work would begin until all required permits and approvals are in place. Bayou Casotte Energy indicates that it may require at least 35 months to construct the proposed facilities. Construction and testing of the LNG tanks would require the most time. Construction of the pipeline and associated aboveground facilities would occur during the last six months of construction of the LNG terminal facilities. Bayou Casotte Energy hopes to be in-service during 2010.

2.6 ENVIRONMENTAL COMPLIANCE INSPECTION AND MITIGATION MONITORING

In preparing construction drawings and specifications for the proposed Project, Bayou Casotte Energy would incorporate mitigation measures identified in its application as well as requirements of federal, state, and local agencies. Contractors would also be provided copies of applicable environmental permits.

Bayou Casotte Energy would employ Environmental Inspectors (EI) on each construction spread, who would be responsible for quality assurance and compliance with mitigation measures, other applicable regulatory requirements, and company specifications. The EIs would report directly to the Chief Environmental Inspector and would have stop-work authority. The EI's duties as described in Bayou Casotte Energy's Plan and Procedures, as modified in this EIS, would include ensuring compliance with environmental conditions attached to any FERC authorization and to other permits or authorizations and to Bayou Casotte Energy's environmental designs and specifications.

In addition, the FERC staff would conduct periodic inspections to monitor the Project for compliance with the Commission's environmental conditions.

2.7 OPERATION AND MAINTENANCE PROCEDURES

2.7.1 LNG Terminal Facilities

Bayou Casotte Energy would operate and maintain its facilities in compliance with 49 CFR 193.2503 and 193.2605 and Sections 11.3.1 and 11.5.2 of NFPA 59A, 33 CFR 127, and other applicable federal and state regulations. Before construction, Bayou Casotte Energy would prepare and submit for approval operation and maintenance manuals that address specific procedures for the safe operation and maintenance of the LNG storage and processing facilities. Bayou Casotte Energy would also prepare an operations manual that addresses specific procedures for the safe operation of the carrier unloading

facilities in accordance with 33 CFR 127.305. Operating procedures would address normal operations as well as safe startup, shutdown, and emergency conditions.

All operations and maintenance personnel at the proposed LNG terminal would be trained to properly and safely perform their assignments. The terminal operators would be trained in LNG safety, cryogenic operations, and the proper operation of respective terminal control equipment. The operators would meet all the training requirements of the Coast Guard and other applicable regulatory entities.

Bayou Casotte Energy would maintain a full-time maintenance staff to perform routine maintenance and minor overhauls at the LNG terminal. Major overhauls and major maintenance activities would be handled by trained and qualified contract personnel. All maintenance activities, including scheduled preventive and predictive maintenance and unscheduled maintenance, would be managed through implementation of Bayou Casotte Energy's comprehensive Maintenance Management System. This system would maintain the Project while optimizing operational expenses. Necessary maintenance of the unloading slip would include the dredging of sediments that have accumulated within it. Bayou Casotte Energy anticipates that the unloading slip would need to be dredged every one to three years, depending on local sedimentation rates. According to preliminary modeling, maintenance dredging would include a volume of up to 250,000 m^3 per year. Agency consultation regarding placement of the dredged material is ongoing but is proposed for a combination of the Ocean Dredged Material Disposal Site (OSMDS) south of Horn Island and federal and state Beneficial Use project sites.

2.7.2 LNG Carriers

Although LNG vessels and their operation are directly related to the use of the proposed import terminal, they are not subject to the Section 3 authorization sought in this application. The LNG carriers arriving at the Casotte Landing LNG Terminal must comply with all federal and international standards regarding LNG shipping. A detailed discussion of design and safety features of LNG carriers is presented in Sections 2.1.2 and 4.12.5.

2.7.3 Pipeline Interconnects and Associated Aboveground Facilities

The pipeline interconnect facilities would be operated and maintained in accordance with 49 CFR 192, *Transportation of Natural and Other Gases by Pipeline: Minimum Federal Safety Standards*, as required by the DOT. Section 4.12.7 presents a discussion of the DOT's safety regulations and requirements for natural gas pipelines and describes how Bayou Casotte Energy would meet these requirements.

2.8 SAFETY CONTROLS

2.8.1 LNG Terminal Facilities

The proposed LNG terminal facilities would be sited, designed, constructed, operated, and maintained in compliance with federal safety standards. Federal siting and design requirements for LNG facilities are summarized in Table 2.8.1-1.

2.8.1.1 Spill Containment

The LNG impoundment systems for the terminal facilities would be designed and constructed to comply with DOT regulations (49 CFR 193, Sections 193.2149 through 193.2185). These regulations

require that each LNG container and each LNG transfer system be provided with a means of secondary containment that has been sized to hold the quantity of LNG that would result as a result of the design spill that is appropriate for the area and LNG equipment. The design spills are defined in NFPA 59A.

TABLE 2.8.1-1
Federal Siting and Design Requirements for LNG Facilities

Federal Citation	Requirement
Thermal Radiation Protection (49 CFR 193.2057 and Section 2.2.3.2 of NFPA 59A)	Ensure that certain public land uses and structures outside the LNG facility boundaries are protected in the event of a LNG fire.
Flammable Vapor-Gas Dispersion Protection (49 CFR 193.2059 and Sections 2.2.3.3 and 2.2.3.4 of NFPA 59A)	Prevent a flammable vapor cloud associated with a LNG spill from reaching a property line that can be built upon.
Wind Forces (49 CFR 193.2067)	All facilities must be designed to withstand wind forces of not less than 150 miles per hour without the loss of structural integrity.
Impounded Liquid (Section 2.2.3.8 of NFPA 59A)	Liquids in spill impoundment basins cannot be closer than 50 feet from a property line that can be built upon or a navigable waterway.
Container Spacing (Section 2.2.4.1 of NFPA 59A)	LNG containers with capacities greater than 70,000 gallons must be located a minimum distance of 0.7 times the container diameter from the property line or buildings.
Vaporizer Spacing (Section 2.2.5.2 of NFPA 59A)	The integral heated vaporizers must be located at least 100 feet from a property line that can be built upon and at least 50 feet from other select structures and equipment.
Process Equipment Spacing (Section 2.2.6.1 of NFPA 59A)	Process equipment containing LNG or flammable gases must be located at least 50 feet from sources of ignition, a property line that can be built upon, control rooms, offices, shops, and other occupied structures.
Marine Transfer Spacing (33 CFR 127.105)	Each LNG unloading flange must be located at least 985 feet from any bridge crossing a navigable waterway.

The LNG storage tanks would use a full-containment design, consisting of an inner nine percent nickel steel tank surrounded by a secondary outer concrete tank. The outer tank would be sized to contain 100 percent of the full design volume of the tank in the event that there is a complete failure of the inner tank.

LNG spilled from the secondary containment of the tanks (the piping), along with any other spills in the process area, would be directed to the main (process) impoundment basin through the use of spill pads and containment troughs. Any spill from the unloading arms, or occurring in the dock area, would drain into the jetty impoundment basin. In accordance with the requirements of NFPA 59A, each basin would be able to contain a 10-minute spill resulting from any single leakage source leading to it at the maximum unrestricted flow rate.

2.8.1.2 Hazard Detection System

Hazard detectors would be installed consisting of flame detectors, hazardous gas detectors, low and high temperature detectors, and smoke detectors. The hazard detection system is designed to provide operating personnel early detection of released flammable liquids and fires, to show the specific location of the release or fire, to initiate automatic equipment shutdowns, and to initiate the pre-programmed fire control systems.

2.8.1.3 Hazard Control System

A variety of fire suppression agents would be employed for fighting fires within the LNG terminal. The type of agent used in a specific situation would depend on the characteristics of a particular event and on the relative effectiveness of the various agents on that particular type of fire relative to either a specific unit of the plant design or operation. The types of fire suppression agents to be employed include:

- fixed water spray or deluge systems;
- fixed high expansion foam systems;
- fixed dry chemical extinguishing systems;
- clean agent extinguishing system release;
- aqueous film forming foam; and
- fire protection in buildings, generally consisting of smoke, fire, and gas detectors and portable fire extinguishers.

The LNG terminal would be equipped with separate but integrated facility safety and control systems, consisting of a Safety Instrumented System (SIS), Fire and Gas Detection and Alarm System (F&GDAS), Human Machine Interface (HMI), Process Control System (PCS), and closed circuit TV system. The safety and control would notify personnel, both visibly and audibly, of a hazard at the facilities. The alarms will have both different colors and different sounds according to the hazard they represent. The SIS subsystem would allow for the safe shutdown and isolation of individual equipment items, and sections of the plant, depending on the particular incident. The F&GDAS subsystem would provide for plant-wide detection and protection from fire and hazardous gas leaks. Each end device (fire and gas detectors, suppressant release, and manual call points) will have individual indications as part of the F&GDAS Visual Display Units and operator interface.

2.8.1.4 Firewater System

The Terminal's fire protection system would include aqueous film forming foam (AFFF) monitors and/or foam hose reel stations, dry chemical extinguishing systems, and 100-percent redundant fire protection water and foam supply systems. The firewater system would be powered by a combination of electric motors and emergency diesel-driven engines. The firewater supply would be from a fire water pond that serves both the Terminal and the Refinery. The fire protection system would comply with NFPA 59A and 49 CFR 193.

Fresh water obtained from the municipal water system would be stored in an on-site fire water pond with a capacity to provide 24 hours of continuous pumping. The Terminal fire water system would be supplied by four dedicated 50 percent fire water pumps, with one of the two primary fire water pumps being electrically powered and the other being diesel driven. The two back-up fire water pumps would both be diesel driven. The fire water pumps would be capable of pumping 3,500 gpm each, at a discharge pressure of 175 psig. The fire water pond would be designed in accordance with NFPA 22 and API 620; the fire water pumps would be installed in accordance with NFPA 20. The fire water distribution system of the adjacent Refinery would serve as a secondary source of water in the event that it is needed.

2.8.1.5 Fail-Safe Shutdown

The LNG terminal would have an emergency shutdown system through the SIS and the Fire and Gas Panel to allow for the safe termination of operations in the event of an operational problem. These systems would be equipped with automated shutdown devices to eliminate the need for manual intervention in the event of an emergency. The system would allow for either the shutdown of individual sections of the LNG terminal or the entire terminal depending on the particular incident. Sections of the LNG terminal that would be shut down individually would include the ship unloading operation or individual pieces of equipment. Alarms would be installed in the control room to notify operating personnel if a potentially hazardous condition is detected by the field hazard instrumentation.

2.8.1.6 Security System

Bayou Casotte Energy would install security provisions at the LNG terminal which could include:

- a security fence around the LNG terminal property;
- a curved road at the primary entrance to the LNG terminal to limit the speed of approaching vehicles;
- a security gate for vehicles and pedestrians to access the LNG terminal;
- a continuously staffed guardhouse at the main entrance to the LNG terminal;
- continuous surveillance of the LNG terminal interior and terminal perimeter by strategically placed CCTVs that would be monitored from the plant's control room;
- safety and security training of all LNG terminal personnel; and
- preparation of a security procedures and response manual in coordination with applicable federal, state, and local requirements.

2.8.2 LNG Carriers

The LNG carriers used to import LNG to the United States would be constructed and operated in accordance with the International Maritime Organization's (IMO) *Code for the Construction and Equipment of Ships Carrying Liquefied Gases in Bulk*, SOLAS, as well as 46 CFR 154, which contains the United States regulations for implementing the International Gas Code. United States flag LNG carriers would be required to have a valid Coast Guard Certificate of Inspection; foreign flag LNG carriers would be required to possess a valid IMO Certificate of Fitness and a Coast Guard Certificate of Compliance. Both United States and foreign flag carriers must be inspected annually by the Coast Guard and the flag state. A Coast Guard Certificate of Inspection is required every two years. Further discussion of LNG carrier safety standards is included in Section 4.12.5.

2.8.3 Pipeline and Associated Aboveground Facilities

The pipeline and aboveground facilities associated with the Casotte Landing Project would be designed, constructed, operated, and maintained in accordance with DOT's *Transportation of Natural and Other Gas By Pipeline: Minimum Federal Safety Standards* in 49 CFR 192. These safety standards are discussed in Section 4.12.7.

2.8.3.1 Corrosion Protection and Detection System

A cathodic protection system would be installed to prevent or minimize corrosion and to mitigate alternating current interference from the overhead electric transmission lines.

2.8.3.2 Emergency Response Procedures

Pipeline system emergencies can include gas leaks, fires or explosions, and/or damage to the pipeline and aboveground facilities. In accordance with DOT regulations, Bayou Casotte Energy would develop an emergency response plan to address procedures to be followed in the event of an emergency along the pipeline. This plan would include training of employees on emergency procedures; establishing liaisons with appropriate fire, police, and other community officials; and informing the public on how to identify and report an emergency condition on the pipeline route.

2.9 FUTURE PLANS AND ABANDONMENT

Bayou Casotte Energy currently has no plans for future expansion of the facilities proposed in this application.

The proposed Casotte Landing Project is designed for a 25- to 30-year life span. Decommissioning plans for the Project would be developed and are a component of the constructability design for the facility. Primary decommissioning involves the removal of all aboveground structures. Certain facilities below ground may be left in place after proper abandonment, if their removal would create adverse disturbance or impacts. All material that would not be reused/renovated would be properly disposed of in accordance with applicable regulations. Alternative decommissioning options would also be reviewed to determine the potential for reuse/recycle of equipment and renovation of the site for potential recreational, governmental, or industrial purposes.