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MEMORANDUM

TO: Mark Prescott

FROM: Dave Landry

SUBJECT: Response to Question No. 5 of USCG letter dated August 26, 2005

DATE: September 19, 2005

Question No. 5:

With regard to pipeline construction activities please provide information concerning resuspension of contaminated sediments:

a. *Provide the most recent report or study used to estimate sediment contamination in the pipeline laying area.*
b. *Provide a list of contaminants and the amount of contamination that may be resuspended (per acre or length of pipeline) as a result of burying the pipelines in gulf sturgeon critical habitat.*
c. *Identify construction practices to minimize impacts to benthic resources, such as lay barge anchoring restrictions, location of horizontal directional drill exit pit, HDD or other pipeline construction restrictions or methods (including alternate trenching methods to reduce sediment disturbance and resuspensions).*
d. *Proposed mitigation of unavoidable impacts.*

Response:

Before addressing issues identified with this question, we wish to direct your attention to several previously submitted responses to similar questions. These responses have been attached for your reference and are provided below:

1. The original February 2004 Application, Volume 2 of 23, Appendix B "Detailed Description of Project". Section B.G.4., pages B-49 through B-56 discusses the offshore pipelines construction methodology and pipeline lowering techniques.
2. The "Pipeline Alternative Analysis" submitted to the USCG on October 15, 2004. Pages 32 through 40 address the affect of pipeline installation on offshore and near shore marine resources including the HDD exit hole.

3. The October 15, 2004 FME response to Comment No. 51 of the USCG letter dated September 3, 2004 regarding sediment quality.
4. The October 15, 2004 FME response to Comment No. 52 of the USCG letter dated September 3, 2004 regarding sediment resuspension estimates.
5. The December 17, 2004 FME response to Comment No. 54 of the USCG letter dated November 17, 2004 regarding HDD. Since that response, FME has completed the geotechnical investigation along the HDD shore entry route into the Coden, Alabama area. That report was forwarded to the USCG and FERC on August 24th, 2005.
6. The December 13, 2004 FME response to Comment No. 65 of the USCG letter dated November 17, 2004 regarding geotechnical characterization and sediment studies.

To respond to Question No. 5 of your letter dated August 26, 2005, the following items have been addressed:

a. FME has located a 1999 U.S. EPA report titled "The Ecological Condition of Estuaries in the Gulf of Mexico" that provides general information on the contamination of U.S. Gulf Coast estuaries. There were no specific references in this document to significant sediment contamination in Alabama estuarine systems or in Bayou La Batre and Coden, Alabama in particular (USEPA, 1999). In addition, FME's response dated October 15, 2004 to the USCG Comment No. 51 of the letter dated September 3, 2004 provides additional information on the potential for sediment contamination in offshore Gulf of Mexico waters. Based on these studies, the sediments in offshore and inshore waters along the MPEH™ pipeline routes are not expected to exhibit significant levels of contamination (see Attachment No. 3).

   FME plans to perform a drop-core geotechnical survey once a Deepwater Port (DWP) License has been issued. This survey will include sediment sampling and chemical composition analysis. Results of this survey and analysis will be used to finalize the pipeline design and assure pipeline stability. It will also be used to identify the optimum pipeline lowering techniques as well as to identify any possible areas to be avoided due to contamination.

b. EPA's Gulf Sturgeon Critical Habitat, as defined in the Federal Register, Volume 67, No. 109 of June 6, 2002, extends from Lake Pontchartrain and the Pearl River system in Louisiana and Mississippi east to the Suwannee River in Florida. The proposed MPEH™ pipeline route will enter Gulf Sturgeon Critical Habitat area one nautical mile south of Dauphin Island, Alabama and continue through the habitat for approximately 6.2 miles (See Figure 1). It should be noted that the pipeline route passes in close proximity to the established sediment disposal areas also located within the Gulf Sturgeon Critical Habitat before entering the Bayou LaBatre channel, which is maintained through dredging. The near shore waters surrounding Bayou LaBatre and Coden, Alabama are not designated as Gulf Sturgeon Critical Habitat.

Contaminated sediments have been identified in areas near existing offshore platforms, three of which have been chosen as either origination or connection points for the proposed project pipelines (MP 299, MP 298, and SP 55). These platforms are located in areas outside of the designated Gulf Sturgeon Critical Habitat, and would not create any adverse impacts to that area. For the majority of the proposed Main Pass Energy Hub™ (MPEH™) pipeline route, pipelines would be situated in open waters, away from platforms. FME is not aware of any previously identified areas of contaminated sediments along the proposed pipeline routes. Should a DWP License be issued, any existing areas will be identified during the geotechnical survey that is discussed in part a. of this response.

c. To attain the best methods for reducing turbidity and impacts to benthic organisms, construction methods will be developed on a site-specific basis based on soil conditions revealed in the drop-core geotechnical sampling report. Several techniques which may be available to reduce turbidity and impacts to the benthic community are listed below:

- Jetting
- Turbidity Curtain
- Bucket Dredging

These methods are described in detail in Section B.G.4 of the original February 2004 Application and in Pages 34 through 42 of the "Pipeline Alternative Analysis," and have been provided as Attachments 1 and 2. Although these designs have proven effective in reducing turbidity, bucket dredging appears to be the most feasible method of turbidity control in the shallow waters included in the designated Gulf Sturgeon Critical Habitat along the MPEH™ pipeline route.

Other construction practices which may be available to implement are listed below:

- Use of dynamic positioning (anchorless) along the deeper water routes (e.g. SP 55).
- Use of DGPS (Differential Global Positioning System) equipment on the lay barge and anchor handling vessels to graphically identify in real-time any archaeological, cultural, or benthic resource areas that must be avoided.
- At the HDD exit hole, FME would employ sheet-pile and/or turbidity curtains to contain the excavated material and associated turbidity. This is also described in detail in the October 15, 2004 "Pipeline Alternative Analysis" Report (see Attachment 2).

Some pipeline lowering techniques were considered but were eliminated because they did not meet the project requirements. These methods are listed below:

- Plowing: Due to the large size of the plow, this is limited to water depths greater than 30 feet which is deeper than the Gulf Sturgeon Critical Habitat.

- Cutter suction and hopper dredges: The relocation or transfer of spoil from dredge site to spoil disposal site is inefficient and will cause high turbidity during the transfer process.

d. According to the MPEH™ DEIS, impacts from construction of the pipelines are expected to be "minor, direct and short-term". Additionally, the DEIS states, "However, due to the ubiquitous nature of the region's benthic communities, populations of these species would be expected to recover quickly by recolonization from surrounding communities of similar organisms of all sizes" (MPEH™ DEIS, pg. 4-35). Should significant, unavoidable impacts be predicted as a result of offshore pipeline installation, FME remains available to discuss possible mitigation (e.g. wetland or oyster bed creation).

Attachments

1. The original February 2004 Application, Volume 2 of 23, Appendix B "Detailed Description of Project". Section B.G.4., pages B-49 through B-56
2. The "Pipeline Alternative Analysis" submitted to the USCG on October 15, 2004, Pages 32 through 40.
3. The October 15, 2004 FME response to Comment No. 51 of the USCG letter dated September 3, 2004.
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5. The December 17, 2004 FME response to Comment No. 54 of the USCG letter dated November 17, 2004.
6. The December 13, 2004 FME response to Comment No. 65 of the USCG letter dated November 17, 2004.

Figure

1. Gulf Sturgeon Critical Habitat Map

materials from a staging area to the lay vessel (Figure B-14). For each pipeline segment, the pipe-haul spread may consist of two or three 250-by-72-feet (76-by-22-meter) flat deck material barges handled individually by ocean-going tugs. The number of vessels will be dependent upon the distance from the staging area to the pipeline route. These vessels will be loaded with line pipe at the staging area and delivered to the lay vessel in a timely manner such that the sequence or timing of installation will not be impacted. Miscellaneous project materials will be delivered to the lay vessel on an 'as needed' basis by supply vessels.

The joints of line pipe to be installed offshore will be prepared in the following manner prior to shipment. The joints of pipe will be externally coated with fusion-bonded epoxy (FBE) to protect the steel from corrosion. Sacrificial anodes, used for cathodic protection, will be installed on a quantity of pipe joints to be determined by engineering calculations. Each joint of pipe will typically receive either concrete weight coating (to provide negative buoyancy if it is to be installed by normal pipelay operations), or it will receive an abrasion-resistant overlay (if it is to be installed by HDD methods.) The appropriate weight and thickness of the concrete will be determined based upon environmental conditions, pipe stability requirements and the diameter and wall thickness of the pipeline.

B.5.4 Offshore Pipeline Construction Methodology

The construction of the pipeline will include four phases. The first is pipeline installation on the seafloor between terminal points (landfall sites, platform risers, or subsea tie-ins), second is pipeline lowering and stabilization, third is construction of the terminal points (shoreline crossings, platform risers, or subsea tie-ins) and the fourth is the hydrotesting and commissioning the installed pipeline. The pipelines will be constructed with conventional pipeline installation vessels. The type of pipe lay vessel will be determined by the installation function (lay, bury, crossings, testing, etc.), length and diameter of pipeline and the water depth along the route of the pipeline.

Offshore Pipeline Lay Vessels

Shallow-Water Lay Barge (SWLB)

Water depths of 20 feet (6.1 meters) or less will normally require a SWLB. Although the vessels may draw only 6 or 7 feet (1.8 or 2.1 meters) of water, flotation canals are often dredged through the marshes and extremely shallow water to a flotation minimum depth of 8 feet (2.4 meters). Typical vessels are 45 to 75 feet (13.7 to 22.9 meters) wide by 150 to 300 feet (45.7 to 91.4 meters) long. This vessel may be held in position during the welding phase with spuds and/or anchors. Small tugboats assist with maintaining station and moving the vessel ahead as the joints are welded together. A vessel of this type will be used in the shallow and protected water areas on the northern end of the 36-inch (91.4-cm) pipeline, from west of Dauphin Island to offshore Coden and the marshland portion of the 12-inch (30.5-cm) NGL pipeline in the Mississippi River Delta area of Pass A Loutre.

The SWLB operation will be 12 or 24 hours per day, 7 days per week. The vessel will be manned with one or two 12-hour shifts per day. Generally, accommodations and messing are not provided on these vessels. Such services are provided on shore or in nearby moored quarters vessels.

Intermediate or Second-Generation Lay Barge (2GLB)

These vessels are typically 250 to 400 feet (76.2 to 121.9 meters) long, 72 to 120 feet (21.9 to 36.6 meters) wide with an operating draft of 8 to 20 feet (2.4 to 6.1 meters) of water (Figure B-15).

Figure B-15. Typical Lay Barge

They will manufacture the pipeline using 40-foot (12.2-meter) joints of pipe in the assembly line. Although some of these vessels have been converted to dynamic positioning, all of the vessels in this class can use eight to 12 anchors for station keeping and advancing along the proposed pipeline route. Two anchor handling tugboats (AHT) will tow the vessel to site and will remain with the lay barge through completion. The tugs will continually relocate the anchors as the vessel moves along the pipeline route. The individual joints of pipe will be assembled by means of a qualified welding procedure. Multiple welding stations will be utilized to complete the weld with further stations for non-destructive testing and application of anti-corrosion coating and field joint infill. A vessel of this type will be used for the 36-inch (91.4-cm) pipeline transition from the deep water lay vessel, 3GLB, to the SWLB near the 3-mile (4.8-km) line offshore Alabama, and the 12-inch (30.5-cm) NGL pipeline from MP 299 to a point near Southeastern Louisiana in about 15 feet (4.6 meters) water depth.

The lay barge operation will be 24 hours per day, 7 days per week. The vessel will be manned with two 12-hour shifts per day. On-board provisions will be provided for messing and accommodations for all construction personnel including inspection personnel and company representatives.

3rd Generation Lay Vessel (3GLV)

These vessels are typically over 500 feet (152.4 meters) long and over 120 feet (36.6 meters) wide with an operating draft in excess of 40 feet (12.2 meters). Vessels in this class may be semisubmersible barge shape or ship shape configuration. They will receive 40-foot (12.2-meter) joints of pipe on board, pre-assemble two joints into 80-foot (24.4-meter) joints in a double jointing station and assemble the pipe in the firing line using the 80-foot (24.4-meter) joints of pipe. Although some of these vessels have dynamic positioning, all of the vessels in this class use 12 to 14 anchors for station keeping and advancing along the proposed pipeline route. Some vessels are self-propelled, but in most cases, two or three AHT will tow the vessel to site and will remain with the lay vessel through project completion. The tugs will continually relocate the anchors as the vessel moves along the pipeline route. The individual joints of pipe will be assembled by means of an automatic welding procedure. Multiple welding stations will be utilized to complete the weld with further stations for non-destructive testing and application of anti-corrosion coating and field joint infill. This type of vessel will install the 36-inch (91.4-cm) pipeline from MP 299 north to the 40-feet (12.2-meter) contour near the Alabama 3-mile (4.8-km) line. It could install the 20-inch (50.8-cm) pipeline from MP 299 to SP55.

The lay vessel operation will be 24 hours per day, 7 days per week. The vessel will be manned with two 12-hour shifts per day. On-board provisions will be provided for messing and accommodations for all construction personnel including inspection personnel and company representatives.

Pipe Assembly Procedure

The actual assembly of the pipeline for all of the lay vessels will be accomplished in the same fashion using an assembly-line procedure on-board the vessel as described below:

"Ready" Rack. As each 40-foot (12.2-meter) joint of pipe is lifted onto the lay barge from a transportation vessel alongside the lay barge, the pipe section will be placed onto a ready rack for cleanliness and visual inspection and for end-bevel preparation prior to welding.

Line-up Station and Bead Stall. This station will be positioned near the bow of the barge and will be the location where each 40-foot (12.2-meter) joint of pipe is initially staged for welding. A mechanical apparatus, called a line-up clamp, will be used between two adjoining pieces of pipe to ensure the joints are properly aligned and ready for welding. Once the proper alignment is achieved, the first weld passes will be applied and the internal line-up clamp will be removed.

Welding stations. Aft of the bead stall, three or four welding stations are usually positioned approximately 40 feet (12.2 meters) apart. Each station will perform a number of successive weld passes until the weld is complete. This increases the efficiency of the operation and results in a timely installation process.

Non-Destructive Examination (NDE) Station. Once welding is completed, NDE will be performed on the weld, typically in the form of radiographic (X-ray) or ultrasonic testing (UT), to ensure the integrity of the weld. Any unacceptable defects will be removed and the field joint will then be re-welded and re-examined to verify the integrity of that individual weld.

Corrosion Coating Station. At the subsequent station, the completed girth weld will be sandblasted and readied for the application of FBE corrosion coating at the welded joint.

Foam in-fill Station. Concrete weight coating will have been applied to the pipe joints at an onshore coating yard. This weight coating is necessary to provide adequate weight to the pipeline to assure negative buoyancy for its service life. During the application of the concrete weight coating, approximately 6 to 12 inches (15.2 to 30.5 cm) of the concrete will be removed from each end. This is referred to as the "cut-back." To protect the corrosion coating applied to the girth weld during the installation process and during the lowering operations, the area without concrete will be wrapped with form material and the void will be filled with an infill compound, which is typically a two-part epoxy foam. The infill material will then harden to provide a uniform external surface that protects the corrosion coating from damage.

Once each station completes its required tasks, the barge will be moved ahead approximately 80 feet (24.4 meters) and the process will begin again. This gives the appearance the pipeline is being laid, when in reality the barge is moving from beneath the pipeline.

Abandonment and Recovery Operations. The lay barge is equipped with an abandonment and recovery (A&R) winch. As the name implies, this winch is used to lower the free end of the pipeline to the seafloor upon completion of pipe lay or whenever weather conditions prohibit the safe operation of the vessel. The pull head is capable of withstanding the force exerted on the pipeline during the temporary abandonment and recovery procedures. The pull-head design is also fabricated with several valves, thereby allowing the pipeline to be flooded for hydrostatic testing or to provide on-bottom stability in the event of severe weather and to allow the line to be de-watered prior to pickup for continued laying.

Pipeline Lowering

The term pipeline lowering refers to a variety of processes used to insure that the pipeline has been installed below the natural bottom of the seabed. The methods for lowering and protection of the pipeline are broken into three distinct groups: specifically pre-lay trenching, post-lay trenching, which includes diver hand excavation near crossings of existing utilities, and post-lay protection of a pipeline. This latter method involves covering the pipe with an armor protection, such as rock or concrete mattresses, when it is difficult or impractical to lower the pipe to the design depth below seabed.

- **Federal Waters:** The MMS requirements for lowering a pipeline in federal waters are a minimum 3 feet (0.9 meters), top of pipe, below the sea floor in water depths 200 feet (61 meters) or less. Lowering is not required in water depths greater than 200 feet (61 meters). Exceptions to MMS requirements are fairways, anchorages, communication cables, or pipelines crossings. Bury in fairways and anchorage areas may be required by local USCG and/or USACE rules and regulations. Communication cables and pipeline crossings may not require lowering, but, will require proper spacing between the lines and an armor protection covering.
- **State Waters:** Generally, the pipe must have a minimum 3 feet (0.9 meters) of cover, but, in some cases, a minimum 4 feet (1.2 meters) top of pipe is required. Fairways and waterways and channels may require special burial requirements.

Based on typical marine sediments in the GOM, the bottom conditions along the proposed pipeline route are predominantly mud, sand, and silt with areas of clay. Thorough geophysical and geotechnical surveys will be required to determine a more precise structure and composition of these bottom conditions. This information is essential to making a final determination of the lowering methodology.

In some cases, especially in shallow waters, the sea bottom may be prepared for pipeline installation prior to the actual laying process. In this area of the GOM, the preferred method of pipeline pre-lay lowering includes bucket-dredging a trench for the pipe. The preferred methods for pipeline post-lay lowering are jetting and plowing.

Pre-Pipeline Lowering Method – Dredging

The excavation or preparation of a trench prior to installation of the pipeline, or pre-lay lowering, is addressed in this section. The factors that must be reviewed when planning the pipeline lowering operation, include:

- Review of geophysical, geotechnical, oceanographic and meteorological data;
- Review of environmental and regulatory requirements; and
- Selection of the most suitable equipment to perform the work.

When employing bucket-dredging methods, a pipe trench will be dredged when water depths range between approximately 8 and 20 feet (2.4 to 6.1 meters). Water depths less than 8 feet (2.4 meters) may require additional dredging, typically referred to as a flotation trench, that will allow installation vessels to access the worksite by floating directly over the pipeline.

The dredges anticipated for use on this project maintain their position with two or three spuds assisted by a push boat. A crane with sufficient boom length to side-cast the spoil away from the trench centerline (providing less opportunity for inadvertent trench in-fill) is mounted on the dredge barge. The dredged material is placed or side-cast alongside the ditch where the spoil may be retrieved and placed back into the trench (backfill) after pipeline installation. Prior to laying the pipeline, a dredge will sweep the pipeline route immediately in front of the lay barge to check for locations where the walls of the dredged trench may have sloughed into the ditch.

Spoil mounds that may constitute a hazard to navigation will be marked with signs and lights on temporary timber piling. The piling will be maintained until the spoil has been returned to the pipeline trench from which it was removed. At such time, the temporary piling and signs will be removed.

The primary advantage for this type of lowering is that the pipeline will be protected below natural bottom, thereby providing immediate safety for marine traffic in the vicinity.

Post-Pipeline Lowering Method(s)

In most cases in the GOM and adjacent inland waters, the excavation or preparation of a trench is performed after the pipeline has been installed. The two common methods are the plow or jetting equipment. To plan the lowering operation the following preparation should be made:

- Review of geophysical, geotechnical, oceanographic and meteorological data;
- Review of environmental and regulatory requirements; and
- Selection of the most suitable equipment to perform the work.

Post-lay Lowering – Jetting

The specialized marine equipment necessary for pipeline jetting of this type is considered conventional in the GOM. The vessel will be approximately the same dimensions as those expected for the 2GLB pipe lay vessel. The vessel will use eight to twelve anchors for station keeping and advancing along the pre-laid pipeline. Two AHT will tow the vessel to site and will remain with the barge through completion. The tugs will continually relocate the anchors as the vessel advances (Figure B-16).

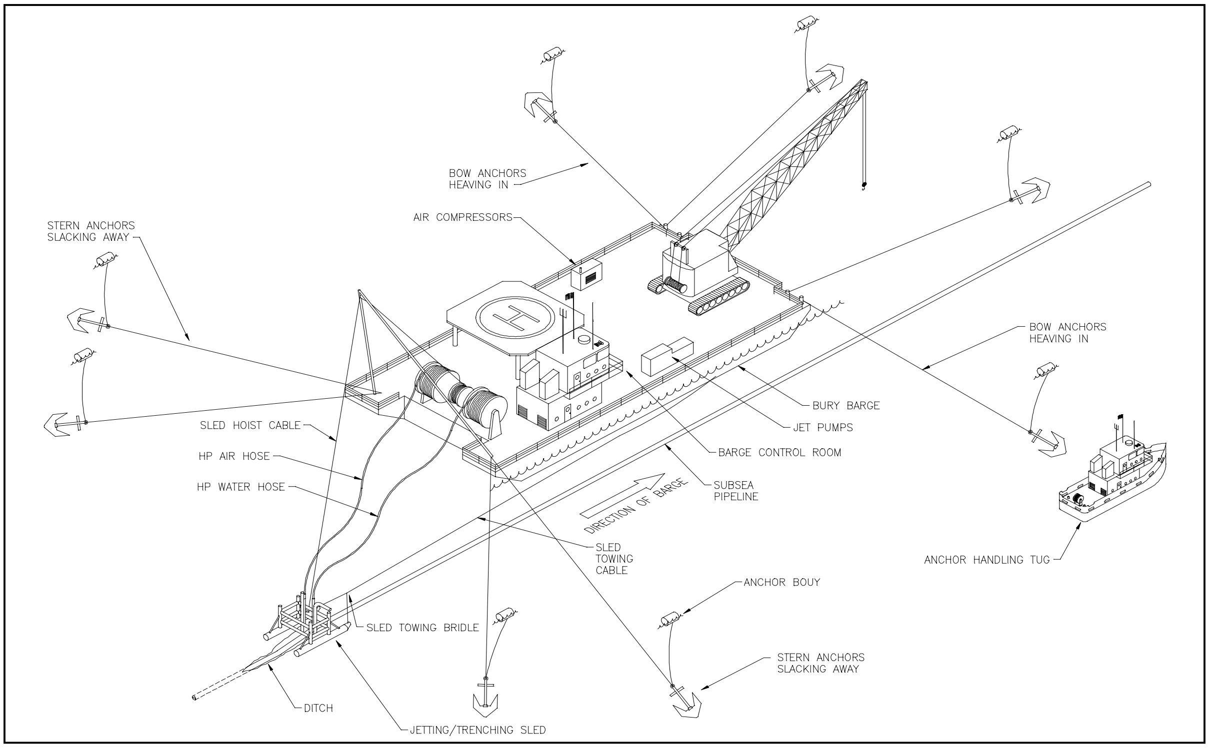

Figure B-16. Typical Jetting Operation

The jet barge will be equipped with hydraulic pumps to provide high-pressure water to a sub sea (jet) sled. The pipeline lowering will be initiated by setting the jet sled in position straddling the pipeline. The high-pressure water will apply cutting action and liquefy the soil beneath the pipeline through jetting nozzles installed in the jet sled legs. The soil will be lifted from beneath the pipeline (air lifts or water eductors) as the barge pulling the sled advances allowing the pipeline to be gently lowered into the newly cut ditch. Multiple passes can be performed to accomplish the desired depth of lowering. This method is limited to utilization in sedimentary soils.

The jet barge operation will be 24 hours per day, 7 days per week. The vessel will be manned with two 12-hour shifts per day. On-board provisions will be provided for messing and accommodations for all construction personnel including inspection personnel and company representatives.

Post-lay Lowering – Plowing

As previously stated, plowing is one means for lowering the pipeline below the seabed. Furthermore, a backfill plow may be used to return available spoil into the plowed trench, subject to availability of the equipment.

A towing vessel capable of lifting and positioning the plow and equipped with an eight- or twelve-point mooring system are typical requirements for a plowing vessel. Anchor positioning is controlled and monitored with navigation and positioning equipment located on both the plowing vessel and the anchor handling tugs.

The plowshares will be hinged such that they can be lowered over the pipeline and hydraulically closed to encapsulate the pipe (rollers allow safe movement along the coated pipeline). An umbilical connecting the plow to the towing vessel control room will allow monitoring and control of the plow functions. Adjustments can be made to the plowshare and moldboard positions from the control room. The moldboards are components of the plow that move spoil away from the trench; thereby allowing a level surface for the plow skids during subsequent lowering passes. Video monitors and instrument readouts will furnish the plowing operators information on the status of the plowing functions, such as angle and position of shares, position of moldboards, pulling forces and pressure exerted on the pipeline.

To facilitate setting the plow onto the pipeline, a transitional zone approximately 200 feet (61 meters) long may be required. This trench will be constructed by a shallow water dredge, allowing the plowshares to be positioned at the required first-pass depth, usually 4 to 5 feet (1.2 to 1.5 meters) below natural seabottom (Figure B-17).

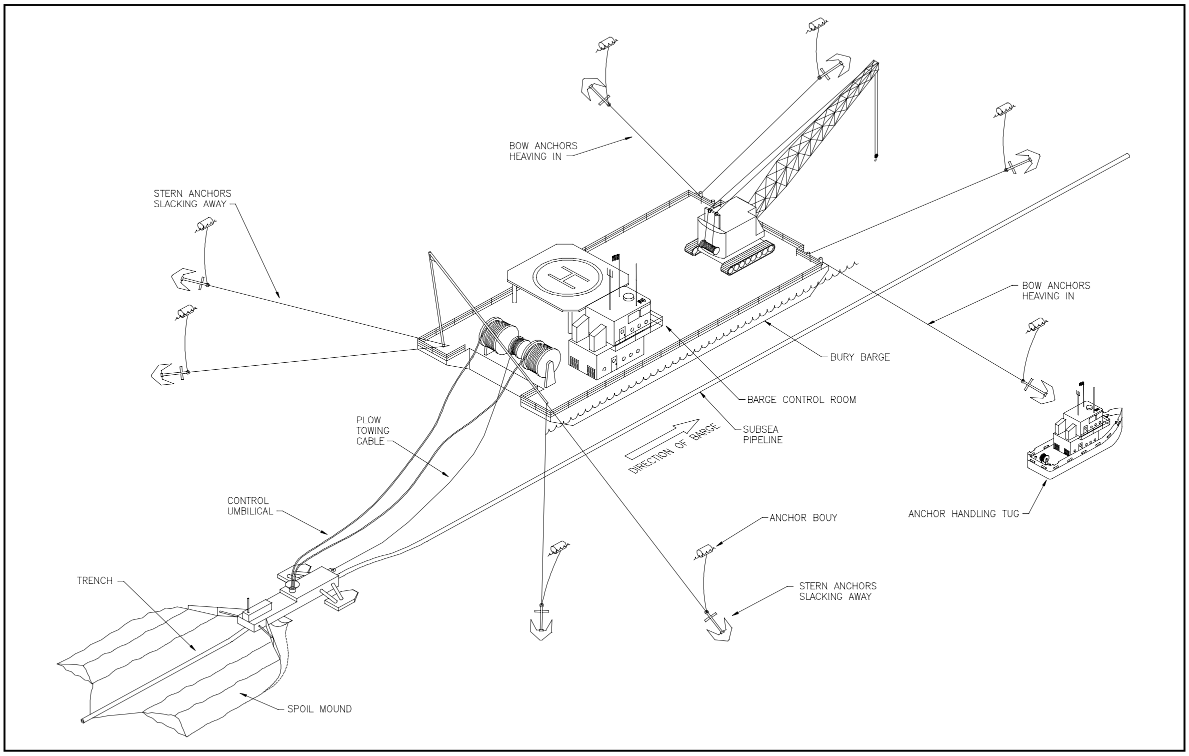

Figure B-17. Typical Post-lay Plow Operation

Once the plow is in place, the towing vessel will move along the pipeline (pulling in the bow anchor lines and releasing the stern anchor lines) to a pre-determined distance ahead of the plow. The plow tow cable will be secured and the towing vessel will commence the plowing operations. As the towing vessel moves itself forward by pulling and releasing anchor lines, the AHTs will begin the routine of moving the anchors ahead of the towing vessel. The spoil resulting from the plowing operation will be spread to both sides of the trench by the moldboards.

The type of sea bottom sediment will affect the depth of the trench and speed of the plow. The depth of cut is hydraulically controlled using the skid position on the natural bottom as a base line. If high-density sediments (soft rock, dense material, etc.) are encountered, the depth of the plowshares and/or speed of the plow may have to be reduced.

Plowing operations will be discontinued approximately 100 feet (30.5 meters) before any foreign utility, pipeline, cables, or other protected obstacles. Plowing operations will commence approximately 100 feet (30.5 meters) past the obstruction. This is to insure that no damage is inflicted on the foreign utility crossing.

Backfill Plow

Backfill plow operations will follow the trenching operations by returning the displaced spoil to the pipe trench. The backfill plow is a pipeline-guided tool equipped with reversed mold boards that move the displaced spoil back into the trench. The backfill plow will be placed in the pipe ditch on the pipeline and pulled along the pipeline by a towing vessel in much the same way as the plow. It will also be removed from the pipeline approximately 100 feet (30.5 meters) before any foreign crossing and reset on the pipeline approximately 100 feet (30.5 meters) past the foreign crossing.

The backfilling operation is capable of only one pass with the backfill plow and the towing vessel. The maximum tow force is anticipated to be approximately 150 to 250 tons. The main monitoring and control of the backfill plow will be through an umbilical cable connecting instrumentation on the backfill plow with the towing vessel's control room. The control room will contain the survey and navigation equipment and the monitors for the plow input data, including backfill plow television cameras and profilers.

Pipeline Tie-in Methods

The methods available for connection or "tie-in" of adjoining sections of offshore marine pipelines involve one of several specialized procedures. The water depth, pipeline diameter, equipment required, and the materials necessary to complete the tie-in will influence the procedure chosen. The methods described below are best suited for this installation phase.

Line Pipe Recovery and Lay

This tie-in method provides a welded connection between sections of the pipeline system and minimizes overall installation time. This method requires a sufficient length of pipeline to have been installed on the seafloor to permit recovery onto the pipe lay vessel and is typically favored when transitioning from a HDD section to conventional offshore pipe lay. The method requires installation of additional pipe footage, or "tail," onto the HDD pipe string. Once recovered and on board the lay barge, the A&R cable will be disconnected, the pull head will be removed and conventional offshore pipe lay will commence.

Above-Water Welded Tie-In Method

This method is accomplished by lifting the ends of adjoining pipeline segments above the water surface, then preparing and welding those sections together. Sufficient lifting points along the pipeline sections are required to fully support and align the sections. The pipeline sections are lifted to the surface, the weld is completed and examined, the field joint is coated and the pipeline is lowered to the seafloor. This method can only be performed on two segments that have been installed with sufficient length to allow the lifting and tie-in configuration to be achieved.

Subsea Tie-In with Flanged Connection Method

This method is performed by welding flanges onto the ends of the pipeline section to be tied-in. Once the flanges have been installed and each segment is lying on natural bottom, the distance and angle between the adjacent sections is measured and a make-up spool is fabricated in accordance with the measurements taken. All welds are examined and coated prior to the subsea installation. The spool piece is then lowered to the seabed and divers complete the two bolted connections at the ends of the spool piece.

places as those of a new pipeline to Pascagoula. The TriStates pipeline to which the pipeline would ultimately be connected does not have adequate capacity to handle the peak MPEH™ liquid send-out requirements. Additionally, no NGL storage exists in the Pascagoula region, potentially creating bottlenecks for the sale and transportation of the product to end users. For these reasons, the conversion of the 20-inch (51-cm) Chandeleur Pipeline to an NGL pipeline to Pascagoula is not considered economically or operationally feasible and was not examined in detail as a reasonable alternative.

4.2.9 Use of Noble 12-Inch Pipeline from Main Pass Block 305

The Noble 12-inch (30-cm) pipeline from MP 305 is an active crude pipeline. For the transport of NGL in this line, the line would have to be converted for NGL use from the current use as a crude oil carrier. Additionally, the other users of the line would have to move their production to different pipelines, and this agreement may be difficult to obtain. Therefore, the line is considered commercially unavailable. Also, new pipelines would have to be built to connect MP 299 to the Noble pipeline and to continue from the Noble terminal in Venice, Louisiana, to the VESCO/Dynegy plant.

For these reasons, the Noble 12-inch (30-cm) pipeline from MP 305 is not considered economically feasible for use as an NGL pipeline to Venice and was not examined in detail as a reasonable alternative.

5 Alternatives Considered in Detail

Six pipeline alternatives were considered in detail: four natural gas pipelines and two NGL pipelines. Each alternative was evaluated to determine the effect it could have on environmental, geologic, and biological resources, as well as cultural, land use, socioeconomic, and noise conditions. Section 5.1 describes the evaluation criteria for the analyzed alternatives. Section 5.2 describes the common elements that all the pipeline alternatives share, to streamline the analysis of the natural gas pipeline alternatives (Section 5.3) and NGL pipeline alternatives (Section 5.4). Section 5.5 analyzes the no-action alternative.

5.1 Evaluation Criteria

The rationale for determining whether a particular pipeline alternative could significantly affect the following resources or conditions is provided in the criteria described below.

5.1.1 Marine Water Resources

Significant impacts on marine water quality are those that measurably threaten human health; result in persistent degradation of the environment; or cause an existing federal, state, or local water quality criterion or a federally recognized international criterion to be exceeded.

5.1.2 Biological Resources

The significance criteria of impacts on biological resources are based on: (1) the importance (i.e., legal, commercial, recreational, ecological, or scientific) of the resource; (2) the proportion of the resource that would be affected relative to its occurrence in the region; (3) the sensitivity of the resource; and (4) the magnitude and duration of the ecological ramifications.

Impacts on biological resources are considered significant if species or habitats of high concern are adversely affected over relatively large areas. Impacts are also considered significant if disturbances cause reductions in population size or changes in distribution of a species of high concern. Impacts on threatened or endangered species, if present, are discussed under each biological resource area.

5.1.3 Terrestrial and Nearshore Surface Waters

Significant impacts on onshore water quality are those that measurably threaten human health; result in persistent degradation of the environment; or cause an existing federal, state, or local water quality criterion or a federally recognized international criterion to be exceeded.

5.1.4 Beaches

Criteria for impacts on beaches are those that directly affect coastal barrier beach or barrier island ecosystems. Examples would be impacts from dredging on barrier beach geomorphology or recreational uses.

5.1.5 Cultural Resources

Criteria for impacts on cultural resources are those that directly impact historically designated sites or attributes within the project area. Examples are disruption or disturbance of shipwreck sites or archeologically sensitive locations.

5.1.6 Geologic Resources

Protection of unique geologic features, minimization of soil erosion, and siting of facilities in relation to mineral resources and potential geologic hazards are considered when evaluating potential impacts of a proposed action on geologic resources. Generally, impacts on geologic resources can be avoided or minimized through proper siting, foundation and structural engineering design, erosion control measures, and construction/operation techniques. Analysis of potential impacts on geologic resources typically includes the following steps:

- Identify and describe the geologic resources that could be impacted or could affect the proposed development;
- Examine the proposed action and the potential impacts or effects related to the resource;
- Assess the significance of potential impacts or effects; and
- Provide mitigation measures to minimize the potential impacts or effects, as necessary.

5.1.7 Socioeconomics

Criteria for impacts on socioeconomics are those that directly impact the proposed project area. Examples are changes to the population that might affect housing, to infrastructure (schools, police, and fire services), or to the economy of the region (i.e., new business or loss of business that affects employment). Socioeconomic impacts could be considered indirect effects on the environment.

5.1.8 Air Quality

The potential impacts on local and regional air quality conditions near proposed action are determined by increases in regulated pollutant emissions relative to existing conditions and ambient air quality. Specifically, the impact in National Ambient Air Quality Standards “attainment” or unclassifiable areas is considered significant if the net increases in pollutant emissions from the proposed action result in a significant increase in the ambient concentration of a regulated pollutant.

Federal Prevention of Significant Deterioration (PSD) regulations define air pollutant emissions as *significant* if: (1) a proposed major stationary source is within 6.2 miles (10 km) of any Class I area; and (2) regulated pollutant emissions would cause an increase in the 24-hour average concentration of 1 microgram per cubic meter or more of any regulated pollutant in the Class I area (40 Code of Federal Regulations [CFR] 52.21[b][23][iii]). However, as discussed later in this section, the proposed project is not defined as *major*; therefore, its ambient air impacts are, by definition, not significant.

PSD regulations also define ambient air increments, limiting the allowable increases to any area's baseline air contaminant concentrations, based on the area's designation as Class I, II, or III (40 CFR 52.21[c]). The pollutant-specific impacts resulting from direct and indirect emissions from stationary emission sources under this proposed action would be addressed through the United States Environmental Protection Agency's (EPA's) federal permitting requirements under PSD regulations (40 CFR 52).

EPA does not normally administer the Clean Air Act (CAA) in the Gulf of Mexico (GOM) west of longitude 87°30′. Typically, Minerals Management Service (MMS) is responsible for regulating "outer continental shelf (OCS) sources" in that area pursuant to the CAA, Part 328. However, deepwater ports are not "OCS sources." Therefore, EPA would be the regulatory authority. Estimates of pollutant emissions are summarized in the environmental report. The criteria used to consider whether effects on air quality are significant are emission levels above PSD thresholds.

5.1.9 Noise

Examples of noise impacts from the proposed action could include noise from vessels and construction equipment, which would be temporary in nature. Noise impact analyses typically evaluate potential changes to existing noise environments that result from implementing a proposed action. Potential changes in the noise environment can be beneficial (i.e., if they reduce the number of sensitive receptors exposed to unacceptable noise levels), negligible (i.e., if the total area exposed to unacceptable noise levels is essentially unchanged), or adverse (i.e., if they result in increased noise exposure to unacceptable noise levels).

5.2 Commonalities

All pipelines analyzed for transporting MPEH™ natural gas and NGL to shoreside facilities and distribution points share some elements during construction or operation that would affect resources and other conditions, regardless of where the individual pipeline footprints are located. To reduce redundancy related to the description of the various pipeline alternatives, commonalities are described below and apply to each alternative analyzed in Section 5.3 for natural gas pipelines and Section 5.4 for the NGL pipelines. Environmental impacts associated with each pipeline alternative route, including effects associated with these commonalities, are detailed in these sections.

5.2.1 Offshore Marine Resources

5.2.1.1 Water Resources

Where the proposed pipeline would be installed in water depths less than 200 feet (61 meters), MMS (2002) requires that the pipeline be buried at least 3 feet (0.91 meter) below the mudline (30 CFR 250.1003[a][1]) to prevent impacts on the pipeline from high currents and storms, anchors, and fishing gear, and to minimize interference with other OCS operations.

Pipelines would be buried by jet trenching (using a jet-sled trencher). Typically, a jetted trench has a V-shaped cross-section, ranging in width from approximately 30 feet (9.14 meters) at the trench top to 10 feet (3.05 meters) at the trench bottom (Gonzales et al. 2002). The greatest potential effect on surface waters would occur from suspension or deposition of sediments caused by trenching or jetting the pipeline. Trenching or jetting would suspend sediments in the water column for a period of time that depends on the size of the sediments. Coarser sediments would fall out and resettle quickly (hours), while finer sediments could remain suspended for longer periods of time (days). "It is estimated that about 5,000 m^3 (cubic meters) of sediment will be resuspended for each kilometer of pipeline trenched" (MMS 2001).

FME would employ special marine pipeline construction techniques to reduce effects on waterbodies. In certain locations, such as at the shoreline or inshore navigation areas, the pipeline would be placed by HDD. At the HDD exit hole, FME would use sheet-piled structures to contain the excavated material and turbidity curtains would surround the work site, if required. Best management practices (BMPs) would be used to reduce potential impacts on water quality.

Drilling fluids or "muds" may be used during the HDD. They would be circulated through the borehole during drilling/reaming operations to lubricate the bit and drill pipe, stabilize the hole, carry the cuttings away from the drill bit, and eventually reduce friction on the pipeline as it is pulled through the hole. Drilling fluids would consist of bentonite clay and fresh water, with no additives. The bentonite clays are benign and would not have any toxic effect on the environment. Turbidity barriers would be erected at the drill sites to contain and restrict any releases of drilling fluids, and to limit potential impacts on the immediate area.

Construction of the proposed offshore marine pipelines may begin after facility platforms are modified and new platforms are installed. Based on the proposed water depth and pipeline size, it is anticipated that the pipelines would be installed using several construction vessels and a number of support vessels.

The crew on the primary vessel—a conventional lay barge—would weld pre-coated joints of pipe to the string, radiographically inspect the welds, apply joint coating, and install anodes. The pipe string would then move into the water from the rear of the barge as the barge moves forward. Another vessel would be the jetting/trenching barge that would cut the trenches and then cover the pipe in accordance with the requirements of 49 CFR 192.327(g) and 192.612(b)(3). Offshore pipeline construction vessels are typically 240 to 500 feet (73 to 152 meters) long (although nearshore and inshore vessels are smaller). Construction vessels may have eight to 12 anchors (MMS 1999). The spreads would be reset at approximately 2,000-foot (610-meter) intervals.

Vessels associated with the installation of the proposed marine pipelines would be equipped with spill containment and cleanup equipment to respond to small accidental releases of bunkers, lubricants, or other chemicals. In the event of a large spill, an emergency response would be mobilized.

5.2.1.2 Biological Resources

If not buried, pipelines installed in marine waters are colonized by a diverse array of microorganisms, algae, and sessile invertebrates, including barnacles, oysters, mussels, soft corals (bryozoans, hydroids, and octocorals), sponges, and hard corals. Organisms that attach and grow on the structures provide habitat and food for many mobile invertebrates and fish. It is expected that added structures would attract numerous species.

Turbidity Impacts on Fish Resources and Essential Fish Habitat

Turbidity refers to the insoluble, suspended particulates that impede the passage of light through water by scattering and absorbing light energy. This reduction in light penetration reduces the depth of the photic zone, which in turn reduces the depth at which primary productivity can occur. Turbidity adversely affects fish and fish food populations in at least four ways: (1) killing or reducing the rate of growth; (2) preventing the successful development of fish eggs and larvae; (3) modifying the migration patterns of the fish; and (4) reducing the abundance of available food (in part because of the reduction in primary production). The National Academy of Sciences recommended that the depth of light penetration should not be reduced by more than 10% (EPA 1976). Turbidity associated with the installation and modification of pipelines for repairs would temporarily cause fish to disperse from the area.

"It is estimated that about 5,000 m^3 of sediment will be resuspended for each kilometer of pipeline trenched" (MMS 2001). However, a typical jet sled apparatus is designed to minimize sediment dispersion from the trench footprint. It is anticipated that an increase in turbidity associated with the resuspension of sediments would cause most species of demersal and pelagic fish to avoid the construction areas. Resuspended sediments could also clog and obstruct filter-feeding mechanisms and gills of sedentary benthic organisms and demersal fish. Redeposition of suspended sediments can also smother demersal eggs and larvae (Federal Energy Regulatory Commission [FERC] and MMS 2001).

Sediment Displacement Impacts on Essential Fish Habitat

Sediment displacement would occur from temporary anchoring and jet trenching during the installation phase of the proposed marine pipeline. The areal extent of the seafloor disturbance from anchoring depends on water depth, wind, currents, chain length, and size of the anchor and chain (MMS 2002). The disturbed area would be larger if the anchors were dragged during barge movement. Anchor depressions can be as deep as 7 to 8 feet (2.1 to 2.4 meters; FERC and MMS 2001). The area affected by the anchor chain sweep is expected to be relatively extensive. The width of the trench could be from 10 to 30 feet (3 to 9.1 meters) at the surface (Alvarado 2003). The total temporary pipeline construction impacts would be contained within a corridor having a maximum width of approximately 1,100 feet (335.3 meters; Alvarado 2003).

Shallow Water Habitats

Sea turtles are known to use shallow water habitats for feeding or resting. Pipeline construction activities could affect sea turtles (MMS 2002).

Noise and Vessel Traffic Impacts

Increased noise levels and vessel traffic from marine pipeline installations could affect fish, sea turtles, marine mammals, and seabirds in the vicinity of construction activities.

Impacts from Installation Vessel Discharges

The only discharges that would occur during the installation of the proposed marine pipelines are the normal discharges from installation vessels, including domestic wastes (e.g., sanitary wastes and gray water), bilge water, and food scraps (MMS 2002). All such discharges would conform to the appropriate regulatory requirements.

Impacts of Hydrostatic and Integrity Testing

Testing of all newly constructed natural gas pipelines is required by 49 CFR 192, *Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards*. The testing medium is typically water.

The intake and discharge sites would likely be located at the proposed terminal. The sea water would be neutralized and then discharged in accordance with the terms of the National Pollutant Discharge Elimination System (NPDES) general permit governing operations of this type in the GOM, and with NPDES permits for work onshore (if required). Intake rates would be limited to 0.5 foot per second (ft/s; 0.15 meter per second [m/s]) to minimize impingement of larval and juvenile marine organisms, while a very small mesh would be used to filter the water to prevent entrainment. Discharge rates would be limited to approximately 2,000 gallons per minute (gpm; 7,570 liters per minute [L/m]).

During detailed design, a testing plan that identifies the number and locations of test sections would be developed. Before hydrostatic testing of offshore pipe segments, a “pig” may be pushed through the pipeline. The pig would be installed into the open end of the pipeline before completion of the final weld on the pipeline. A pig may be considered as a swab, fitted with neoprene sealing disks that attain a sufficient seal inside the pipeline to permit pressure behind the pig to propel it through the pipeline. Filtered sea water would be used to propel the pig and to fill the pipeline for the hydrostatic test.

A high-pressure pump would be used to pressurize the test section to design test pressure. The test pressure would be maintained for 8 hours (or 4 hours for testing fabricated units and for short, visible sections). After the testing is complete, the water in the pipeline would be discharged with a dewatering pig propelled through the pipeline with pressurized air, gas, or nitrogen. The water would be discharged to the location from where it was taken.

Test water intake and discharge would be in accordance with all applicable state and federal discharge regulations. Test water would be obtained only from appropriate and approved sources, would be screened to prevent entrainment of aquatic life, and would be withdrawn at a rate that would not draw down the source to an abnormal level. Every reasonable attempt would be made to discharge the water from offshore hydrostatic tests into the source from which it was obtained.

5.2.2 Nearshore and Terrestrial Resources

5.2.2.1 Surface Waters

Pipeline construction across waterbodies can result in short-term and long-term adverse environmental impacts on water quality if not mitigated properly. Short-term impacts from in-stream trenching can include an increase in the sediment load within the waterbody downstream of the crossing location. Surface runoff and erosion from the cleared ROW can also increase in-stream sedimentation during construction. Sustained periods of exposure to high levels of suspended solids have been known to cause fish egg and fry mortality and other deleterious impacts on fisheries and other aquatic resources. However, the impacts associated with the methods described in this project would be minimal and short-term.

Long-term impacts on water quality can result from alteration of the waterbody banks and removal of riparian vegetation. If these are not stabilized and revegetated properly, soil erosion associated with surface runoff and waterbody bank sloughing can result in deposition of large amounts of sedimentation in the waterbodies long after construction has been completed.

5.2.2.2 Biological Resources

Construction and operation of new onshore pipelines would result in temporary and permanent alteration of wildlife habitat, as well as direct impacts on wildlife including disturbance, displacement, and mortality. The clearing of ROW vegetation would reduce cover, nesting, and foraging habitat for some wildlife. During construction, the more mobile species would be temporarily displaced from the construction ROW and surrounding areas to similar nearby habitats. Wildlife displaced from the construction ROW would return to adjacent, undisturbed habitats soon after completion of construction. Less mobile species such as small mammals, reptiles, and amphibians, as well as bird nests located in the proposed ROW, could be destroyed by construction activities.

5.2.2.3 Cultural Resources

Several proposed project activities could cause adverse impacts on any present archeological resources. Installation of the pipeline could impact historic shipwrecks or onshore archeological sites. Direct physical contact with a wreck site could destroy fragile remains such as portions of the hull, artifacts carried as cargo or for crew use, and material associated with maritime history in general. Disturbance of a site may cause the loss of the context, which is critical in assessing importance and interpretation. Pipeline placement and anchoring associated with its placement can cause physical impacts on prehistoric and/or historic archeological resources. In particular, the burial of the pipeline and the repositioning of anchors around the pipe-laying barge can disrupt the seabed and can affect shipwrecks by disturbing ferromagnetic debris. This could mask magnetic signatures of significant historic resources and make them difficult to detect with magnetometers (Espey, Huston, and Associates, Inc. 1990).

5.2.2.4 Geologic Resources

Marine pipeline trenching is expected to cause sediment displacement (resuspension of sediments). Trenching or burying of pipelines is required in water depths less than 200 feet (61 meters), as an engineering precaution to reduce the movement of pipelines by high currents and storms. Trenching also reduces the risk of fishing gear becoming snagged and of anchor or trawl damage to the pipeline. "It is estimated that about 5,000 m^3 of sediment will be resuspended for each kilometer of pipeline trenched" (MMS 2001).

Sediment displacement is also expected to occur during pipe-laying activities. Pipe-laying barges use an array of anchors to position the barge and to move it forward along the pipeline route. These anchors are continually moved as the pipe-laying operation proceeds. The area affected by these anchors depends on water depth, wind, currents, and chain length. Marine pipeline repairs would also disturb some of the surrounding area; e.g., where repair activities require sediment removal to expose the buried pipeline. Ship anchors used during construction activities would also disturb the sea bottom. The disturbance generally depends on bottom type and is usually restricted to the upper few meters of the bottom. Pipeline repair activities would be localized; generally short in duration; and, by design, only in response to an emergency situation.

5.2.2.5 Air Quality

Regulated criteria pollutants and hazardous air pollutants (HAPs) would be emitted during construction of the pipeline. However, emissions associated with pipeline construction are not required to be permitted under federal regulations. The expected emission levels would be below PSD thresholds; therefore, ambient air quality modeling would not be required and ambient impacts are expected to be *de minimis*.

The emissions generated during construction would come from fuel combustion in the heavy equipment engines and would consist of nitrous oxides (NO_X), carbon monoxide (CO), small amounts of volatile organic compounds (VOCs), particulate matter of 10 microns or less (PM_{10}), and sulfur dioxide (SO_2) emissions. Construction would cause temporary reduction of local ambient air quality due to emissions generated by the pipeline-laying equipment. The emissions during construction of the pipelines would occur for approximately 330 days during calendar years 2005 and 2007, after which time normal operation of the terminal would begin.

Operation of the pipeline would not result in substantial air emissions under normal operating conditions because the pipeline would be installed under ground and under water, and would be a closed system. Typically, only minor emissions of natural gas, called *fugitive emissions*, occur from pipeline connections at aboveground locations. Because such emissions are typically very small, they are not regulated by permit or source-specific requirements. A leak detection and repair program that is intended to minimize the release of pollutants would control these fugitive emissions.

5.2.2.6 Noise

Construction activities related to the proposed action would be typical of other OCS pipeline projects in terms of schedule, equipment used, and types of activities. As required, equipment may be fabricated in existing onshore facilities.

Because noise impacts occur only on a localized geographic scale, it is not possible to provide numerical noise level estimates that would represent noise impacts on a systemwide or regional scale. Data regarding airborne noise generation by marine vessels generally are not available. Most vessel operations occur well away from coastal areas. Therefore, airborne noise from marine vessel operations is rarely a concern.

There is no scientific consensus regarding absolute thresholds for significance of noise impacts by vessels on marine mammals, fish, and sea turtles (MMS 2000). However, current scientific knowledge can be applied to the assessment of impacts from ocean-going vessels and long-range aircraft on marine mammals and turtles. Underwater decibel (dB) measurements do not equal airborne dB measurements. The impact that a manmade sound can have on sea life depends on its loudness, the specific acoustic frequency pattern at the location where the marine organisms detect the sound, and the distance of the animal from the sound source. Sound intensity decreases with distance from the noise source, and high-frequency components of the noise decrease more rapidly with distance than do low-frequency components.

When underwater objects vibrate, they create sound pressure waves that alternately compress and decompress the water molecules as the sound wave travels through the sea. These sound waves radiate in all directions away from the source. Noise can have a detrimental effect on marine animals by causing stress, increasing their risk of mortality by changing the balance in their predator/prey detection and avoidance, and by interfering with their communication relative to reproduction and navigation. Acoustic overexposure can lead to temporary or permanent loss of hearing.

5.3 Natural Gas Pipelines Alternatives Analysis

5.3.1 New Pipeline to Coden—Bayou La Batre Channel Alternative

The Bayou La Batre Channel alternative begins from MP 299, passes between Dauphin Island and Petit Bois Island, parallels the Bayou La Batre Channel, turns north of Coffee Island, and transitions to shore with an HDD under the shoreline to arrive at the existing transmission pipelines in Coden, Alabama. Aerial images of the onshore portion of this route are presented in Appendix A.

The nearshore pipeline corridor and the location of the HDD crossing for the Bayou La Batre Channel pipeline are closely adjacent to the two existing Gulfstream pipelines at Coden. One pipeline runs from Pascagoula, Mississippi, to Coden, and another leg runs from Coden to Tampa, Florida. The Gulfstream plans and construction work were approved and successfully carried out under close inspection by the United States Army Corps of Engineers (USACE). The proposed pipeline would follow this successful model for construction plans and activities.

5.3.1.1 Offshore Marine Resources

Water Resources

Although the proposed marine pipeline would be 92.7 miles (149 km) long, only 84.7 miles (136 km) would be installed in water depths that require burial. Burying the pipeline would require trenching, which would cause unavoidable resuspension of approximately 680,000 m^3 of sediments and a temporary increase in turbidity levels along the pipeline corridor. Once trenching is complete, local water turbidity should return to pre-trenching levels without mitigation (MMS 2002).

FME would minimize this potential for impact by employing special marine pipeline construction techniques to reduce effects on waterbodies. To minimize the potential for adverse impacts on the shoreline and navigation areas from construction activities, the pipeline would be installed by HDD at the transition zone from offshore to onshore. At the HDD exit hole, FME would use sheet-piled structures to contain the excavated material and turbidity curtains would surround the work site. BMPs would be used to reduce potential impacts on water quality within Alabama and OCS waters.

The release of drilling fluids during the HDD process could also affect water quality. Although some drilling fluids likely would be released during construction, this should occur only at the offshore drill site; therefore, effects on water quality would be limited to a localized area. Turbidity barriers would be erected at the nearshore drill site to contain and restrict any such releases of drilling fluids and to limit such impacts on the immediate area. Any release of drilling fluid offshore would dissipate quickly in surrounding waters, which should soon return to their original condition. Any accidental release of drilling fluids in other areas of the drilled segment could temporarily affect water quality, but FME would maintain BMPs to ensure that this does not occur.

Past marine activities along the corridor have caused disturbances and continue to disturb the seafloor. The Bayou La Batre Channel is periodically dredged to maintain a navigable depth, and the Coden Channel is also dredged when necessary. Spoil from dredging has been deposited in mounds along the west side of the Bayou La Batre Channel.

Mississippi Sound and much of Portersville Bay are active shrimp-trawling areas. Trawling activities have also disturbed the seafloor of the sound and continue to do so. The new pipeline to Coden is proposed to be collocated with the existing Gulfstream pipelines that run from Pascagoula to Coden and from Coden to Tampa, Florida. The impacts of the MPEH™ pipeline construction would be comparable to construction of Gulfstream's two pipeline segments—all three pipelines are the same size but differ significantly in length.

Biological Resources

Turbidity Impacts on Fish Resources and Essential Fish Habitat

The buried portion of the proposed marine pipeline would be 84.7 miles (136 km) long, and its installation would cause the resuspension of approximately 680,000 m^3 of sediments. Turbidity effects are expected to be temporary because the suspended sediments would redeposit after the pipeline has been laid and buried. These expected impacts on fish and essential fish habitat (EFH) should be temporary and minor, resulting in displacement followed by rapid post-construction return by these organisms (FERC and MMS 2001).

Each anchor relocation that occurs during offshore construction of the pipeline would cause sediment displacement and resuspension, which would cause temporary local increases in turbidity. Such impacts on water quality would be minor because it is anticipated that water turbidity at any given anchoring site would return to background levels within hours following a relocation. Although impacts from the proposed marine pipeline construction may result in considerable mortality to eggs and larvae, the impacts on populations would be minor because spawning occurs over broad areas (FERC and MMS 2001). Scheduling construction activities to avoid the spawning seasons of indigenous fish species can also minimize impacts.

Increased turbidity is expected to negatively affect soft-bottom species such as red drum (*Sciaenops ocellatus*), sand sea trout (*Cynoscion arenarius*), and spotted sea trout (*Cynoscion nothus*)—all species sought by recreational fishers. This impact is expected to be temporary, localized in scope, and negligible in effect.

Sediment Displacement Impacts on Essential Fish Habitat

The area proposed for construction of the marine pipeline consists predominantly of soft sediments, is devoid of vegetation, and would not cross any sensitive benthic resources. Soft sediments such as silt and sand are designated as EFH for various life stages of brown shrimp (*Farfantepenaeus aztecus*), white shrimp (*Litopenaeus setiferus*), lane snapper (*Lutjanus synagris*), and red snapper (*Lutjanus campechanus*). Impacts on sediments from the construction of the pipeline would be similar to impacts from the placement of additional structures, affecting fish resources and EFH by disturbing sediments and crushing or displacing benthos. Although the disturbance area may be large, it includes only a small portion of the total soft sediments available in the area. Additionally, the impacts on benthic habitat would be short in duration and temporary. Therefore, impacts on EFH and fisheries resources are expected to be minimal.