FREEPORT-MCMORAN ENERGY

Freeport-McMoRan Energy LLC
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New Orleans, LA 70112

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February 27, 2004

District Engineer
U. S. Army Engineer District, Mobile
Attention: Regulatory Branch
P. O. Box 2288
Mobile, Alabama 36628-0001

Attention: Mr. David Schwartz

Subject: Freeport-McMoRan Energy LLC's Proposed Main Pass Energy Hub™ and Distribution System from Main Pass Block 164 to Coden, Alabama.

Dear Mr. Schwartz:

Enclosed you will find in accordance with Title 33 CFR Parts 320 thru 330, a completed Application for a Department of the Army Permit and Alabama Department of Environmental Management Joint Application, Form 166 8-02, for the subject proposed project, along with the Supporting Document to form 166 8-02. The Main Pass Energy Hub™ will consist of an offshore deepwater natural gas port located in Main Pass Block 299 and a pipeline distribution system delivering natural gas and natural gas liquids to both offshore and onshore facilities. Onshore facilities will be located in the Coden, Alabama and Venice, Louisiana areas. Distribution pipelines will cross shipping fairways in several locations.

This permit application encompasses the following pipeline:

- MP 164 pipeline, From Block 164 of the Main Pass South and East Addition, towards the north and east to Onshore South Mobile County, Alabama.

Included with the Support Document are attachments, which include pipeline survey plats showing fairway crossing locations, shore approaches, onshore routing, and typical design methods. The complete list of figures and attachments is shown below:

Onshore

Figure No.	Description
1	USACE Mobile and New Orleans Districts, Respective Permit Areas
1-3	Route Map, Onshore Coden Pipeline, Milepost 56.9 to 59.5
1-4	Route Map, Onshore Coden Pipeline, Milepost 59.5 to 61.9
2	Survey Permissions, 36" LNG Pipeline
7-2	ROW Configuration Without Utilities (Plan)
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7-10	General Map, Main Line Valve
7-11	Preliminary Meter Station Design with Receiver
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10-1	HDD Shore to Water
10-2	Open-Cut "Wet" Crossings
10-3	Open-Cut Wet Crossing, Using Slackline Configuration
10-4	Temporary Bridge Crossings
10-5	Typical Flume Equipment Crossings
10-6	Non-Flowing Intermediate Ditch Crossing
10-7	Type I "Dry" Wetland Crossing
10-8	Type II "Wet" Saturated Wetland Crossing
10-9	Type III "Wet" Flooded Wetland Crossing
11-1	Typical Filter Bag Dewatering
11-2	Typical Dewatering Structure
11-3	Permanent Diversion Berms
11-4	Permanent Trench Breakers
11-5	Typical Staked Sediment Barrier
11-6	Typical Silt Fence Barrier
11-7	Typical Straw Bale Barrier
TR-CL-D-0001	Pipeline Alignment Sheet
TR-CL-D-0002	Pipeline Alignment Sheet
TR-CL-D-0003	Pipeline Alignment Sheet
TR-CL-D-0004	Pipeline Alignment Sheet
TR-CL-D-0005	Pipeline Alignment Sheet
TR-CL-D-0010	Open-Cut Tidal Creek, Milepost 57.1

Offshore

Figure No.	Description
PC-G-0010	Typical HDD Shoreline Crossing
PC-G-0011	Typical HDD Spread, Shore to Water
PC-G-0012	Typical HDD Spread with Turbidity Containment
PC-G-0020	Typical HDD Exit Hole
PC-G-0030	Typical Buried Pipeline Crossing
PC-G-0050	Gulf of Mexico Typical Fairway Crossing
PC-G-0055	Intracoastal Waterway, Mississippi Sound Channel Crossing
PC-G-0070	Typical Offshore Pipeline Lay Barge Spread
PC-G-0080	Typical Dredge Barge Spread
PC-G-0090	Typical Shallow Water Pipe Lowering Spread (Jetted)
PC-G-0100	Typical Offshore Pipe Lowering Spread (Jetted)
PC-G-0101	Typical Offshore Pipe Lowering, Jet Sled Detail
PC-G-0110	Typical Offshore Post-Lay Plow Spread
PC-G-0120	Mississippi Sound Typical Dredged Pipeline Trench
PC-G-0130	Typical Pipeline Jetted Trench
PC-G-0140	Typical Plowed Pipeline Trench
PC-G-0150	Temporary Spoil Marker Pilings
PC-G-0160	Pipeline Flooding and Hydrostatic Test Equipment
101224	Index Map for Offshore Alignment Sheets
Map 1, 5 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)
Map 1, 6 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)
Map 1, 7 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)
Map 1, 8 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)
Map 1, 9 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)
Map 1, 10 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)

Documents

Attachment	**Description**
A	U.S Wetland and Waterbody Identification Report
B	Upland Erosion Control, Revegetation, and Maintenance Plan
C	Wetland and Waterbody Construction and Mitigation Procedures
D	Archeological, Engineering, and Hazards Survey – MP 299 to Alabama State Waters
E	Archeological, Engineering, and Hazards Survey – Alabama State Waters
F	Cultural Resources Survey (Located Under Separate Cover, PRIVILEDGED AND CONFIDENTIAL INFORMATION)

Permit applications have been filed with the US Coast Guard (under the Deep Water Port Act) including the Minerals Management Service for the proposed pipeline right-of-ways. In accordance with 15CFR 930.53(d), and in compliance with the Coastal Zone Management Act (CZMA), consistency certifications have been forwarded to the appropriate state agencies in the states of Alabama, Louisiana, and Mississippi.

Should you have any questions or require further information, please contact the designated agent Mr. Michael Gartman, Ecology and Environment, Inc. at (850) 435-8925.

Sincerely,

David C. Landry

Enclosures

FREEPORT-MCMORAN ENERGY

Freeport-McMoRan Energy LLC
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New Orleans, LA 70161

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February 27, 2004

UPS Overnight

District Engineer
U. S. Army Engineer District, Mobile
Attn: Regulatory Branch
P. O. Box 2288
Mobile, Alabama 36628-0001

Attention: Mr. David Schwartz

Subject: Freeport-McMoRan Energy LLC's Proposed Main Pass Energy Hub™ and Distribution System from Main Pass Block 299 to Shore, Gulf of Mexico, Federal Waters, Offshore Alabama.

Dear Mr. Schwartz:

Enclosed you will find Privileged and Confidential information concerning cultural resources surveys conducted for the subject project. This Privileged and Confidential information is submitted under separate cover in conjunction with the completed Application for a Department of the Army Permit and Alabama Department of Environmental Management Joint Application, Form 166 8-02, for the subject proposed project, along with the Supporting Document to form 166 8-02.

This Privileged and Confidential information encompasses the following document:

> "A Phase I Cultural-Resource Survey of the Freeport-McMoRan Main Pass Energy Hub (MPEH) Pipeline, Mobile, Alabama," February 20, 2004, prepared by Panamerican Consultants, Inc."

The contents of this enclosure are intended solely for the addressee and all relevant parties (s) hereof.

Should you have any questions or require further information, please contact the designated agent Mr. Michael Gartman, Ecology and Environment, Inc. at (850) 435-8925.

Sincerely,

David C. Landry

David C. Landry

Enclosure

JOINT APPLICATION AND NOTIFICATION
U. S. DEPARTMENT OF ARMY, CORPS OF ENGINEERS
ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

This form is to be used for proposed activities in waters of the United States within the political boundaries of the State of Alabama.

PLEASE TYPE OR PRINT IN INK

1. Date: February 26, 2004 (month day year)	APPLICATION NUMBER (TO BE ASSIGNED BY CORPS)
2. Applicant: Freeport-McMoRan Energy LLC Name and Address: Mr. Dave Landry Freeport-McMoRan Energy LLC 1615 Poydras Street New Orleans, LA. 70112 Telephone Number during business hours: A/C ( ) ________ Residence A/C ( ) 504-582-4880 Office	OFFICIAL USE ONLY COE ________ ADEM ________ STATE CLEARINGHOUSE ________ DATE RECEIVED ________
3. Designation of Agent, Statement of Authorization: I hereby designate and authorize Ecology and Environment, Inc. Attn: Mike Gartman to act on my behalf in the processing of this permit application and to furnish, upon request, supplemental information in support of the application. ________ Signature of Applicant Date	Agent: Ecology and Environment, Inc. Name and Address: Ecology and Environment, Inc. Attn: Mike Gartman 220 West Garden Street, Ste 404 Pensacola, FL. 32501 Telephone Number during business hours: A/C (850) 435-8925 A/C ( ) ________

4. Project Location: See Support Document, Section 4.1 (onshore), 4.2 (offshore)

Street Address ________ City/Community ________

Name of Waterway ________ Latitude ________ Longitude ________

Geographic Location: Section ____ Township ____ Range ____ County ________

Loran C coordinates (if applicable) ________

5. Project Description, including all aspects of the project. Describe completely and in detail. Include any structures such as piers, wharfs, bulkheads, pipelines, boathouses, boatramps, groins, jetties, and appurtenances, as well as any dredging, excavation, or fill activities. Attach additional sheets if necessary.

See Support Document, Section 5.0

5. Project Description (continued)

6. Dredging Project Specifications (Show locations and dimensions of proposed dredge areas on attached plans. Include existing and proposed depths.).

New Work X Maintenance Work ____

Cubic yards of material to be removed Section 6.1 Type of material See Support Document, Section 6.2

Method of excavation See Support Document, Section 6.4

Nature of area to be dredged (check one) Upland ____ Wetland ____ Waterbottom ____

Other (explain) See Support Document, Section 6.5

7. Specifications for Discharge of Dredged or Fill Material (Show locations and dimensions of all disposal or fill areas on attached plans.).

Cubic yards of fill No Fill Type of fill N/A

Source of fill material (check one) Commercially obtained N/A Dredged material ____ Borrowed on-site ____

Other (explain) ____

How will discharged material be contained? (Include erosion control measures, levees, etc.)

See Support Document, Section 7.1, 7.2

Nature of disposal/fill areas (check one) Upland ____ Wetland ____ Waterbottom ____

Other (explain) ____

8. Additional information relating to the proposed activity.

Are oyster reefs located within or near the project area? Yes ____ No X If yes, explain: ____

Will this project result in the siting, construction, and/or operation of an energy-related facility? Yes X No ____

Is the project area greater than 25 acres in size? Yes X No ____

Is any portion of the activity for which authorization is sought now complete? Yes ____ No X If yes, explain: ____

Month and year activity took place ____

If project is for maintenance work of existing structures or existing channels, describe legal authorization for the existing work. Provide permit number, dates or other form of authorization N/A

9. Describe the purpose and public benefit, if any, of the project. Describe the relationship between the project and any secondary or future development the project is designed to support. See Support Document, Section 9.0

Intended use: Public ____ Private ____ Commercial X Other (explain) ____

10. Project Schedule:

Proposed start date March 2005 Proposed completion date December 2007

11. Names and addresses of adjoining property owners, lessees, etc. whose property also adjoins the waterway. Also identify the owners on the plan view in Attachment. See Support Document, Section 11.0

12. List all authorizations or certifications received or applied for from federal, state or local agencies for any structures, construction, discharges, deposits or other activities described in or directly related to this application. Note that the signature in Item 13 certifies that application has been made to or that permits are not required from the following agencies. If permits are not required place NA in space for Type Approval.

Agency	Type Approval	Identification No.	Date of Application	Date of Approval	Date of Denial
AL Dept. of Environmental Management					
U. S. Army Corps of Engineers	See Support Document, Section 12.0				
Alabama State Docks					
City/County__________					
Other__________					

13. Application is hereby made for authorization to conduct the activities described herein. I agree to provide any additional information/data that may be necessary to provide reasonable assurance or evidence to show that the proposed project will comply with the applicable state water quality standards or other environmental protection standards both during construction and after the project is completed. For projects within the coastal area of Mobile and Baldwin Counties, I certify that the proposed project for which authorization is sought complies with the approved Alabama Coastal Area Management Program and will be conducted in a manner consistent with the program. I agree to provide entry to the project site for inspectors from the environmental protection agencies for the purpose of making preliminary analyses of the site and monitoring permitted works. I certify that I am familiar with and responsible for the information contained in this application, and that to the best of my knowledge and belief such information is true, complete and accurate. I further certify that I possess the authority to undertake the proposed activities or I am acting as the duly authorized agent of the applicant.

(SIGNATURE OF APPLICANT OR AGENT REQUIRED BELOW)

______________________________ ____________________

Signature of Applicant or Agent | Date

18 U.S.C. Section 1001 provides that: Whoever, in any manner within the jurisdiction of any department or agency of the United States knowingly and willingly falsifies, conceals, or covers up by any trick, scheme or device a material fact or makes any false, fictitious or fraudulent statements or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years or both.

14. **In addition to the completed application, the following attachments are required:** See Support Document, Section 14.0

Provide a vicinity map showing the location of the proposed site along with a written description of how to reach the site from major highways or landmarks. Provide accurate drawings of the project site with existing structures and proposed activities shown in detail. All drawings must be to scale or with dimensions noted on drawings and must show a plan view and cross section or elevation. ***All plans and attachments must be of reproducible quality on 8 1/2 inch x 11 inch paper.*** **FEES ARE REQUIRED IN CONJUCTION WITH ADEM CERTIFICATION: ADEM WILL CONTACT APPLICANT WITH FEE REQUIREMENTS.**

15. **Send one completed application (or copy) to each agency listed below:**

District Engineer (original application)
U. S. Army Engineer District, Mobile
Attn: Regulatory Branch
Post Office Box 2288
Mobile, Alabama 36628

Permit Coordination Center
Alabama Department of Environmental Management
1751 Cong. W.L. Dickinson Drive
Montgomery, Alabama 36130

Alabama State Docks
Post Office Box 1588
Mobile, Alabama 36633

* For projects in Baldwin or Mobile Counties, including projects requiring Coastal Program certification, send one copy to:

Alabama Department of Environmental Management
Mobile Field Office
2204 Perimeter Road
Mobile, Alabama 36615

Support Document
Joint Application and Notification
U.S. Department of Army, Corps of Engineers
Alabama Department of Environmental Management

February 2004

Prepared For:
Main Pass Energy Hub™

Freeport-McMoRan Energy LLC

By:

Ecology and Environment, Inc.

Permit Application Introduction

This application for the construction of the Main Pass Energy Hub (MPEH)™ is being submitted in accordance with Section 404 of the Clean Water Act (CWA) and Section 10 of the Rivers and Harbors Act (RHA) to the Mobile, Alabama, District Corps of Engineers (COE), and to the Alabama Department of Environmental Management (ADEM) Coastal Program, in accordance with the Section 401 water quality certification guidelines and the Coastal Zone Consistency Program. This application covers those portions of the proposed MPEH™ project within Alabama and associated territorial waters, as well as the federal waters of the Outer Continental Shelf (OCS) within the Mobile District within the Gulf of Mexico (GOM). These include all MPEH™ project components from Main Pass (MP) 164, which is located in Block 164 of the Main Pass South and East Addition (MPSEA), north and east to the onshore metering connection near Coden, Alabama (see Section 14.0, Figure 1). A detailed project description is provided in Section 5.0. An additional permit application will be submitted to the New Orleans, Louisiana, District COE for the remaining portions of the proposed MPEH™ project.

The authorized agent for the project is Mr. Michael Gartman of Ecology and Environment, Inc., (E & E) as indicated in the application. E & E biologists conducted the necessary field surveys for this MPEH™ route submittal within the Mobile District. Areas were surveyed for wetlands, waterbodies, and endangered species, while cultural resource studies were conducted by Pan American Consultants (onshore) and Fugro Geoservices (offshore).

1.0 See Application

2.0 Applicant:

Freeport-McMoRan Energy LLC
1615 Poydras Street
New Orleans, LA 70112

3.0 See Application

4.0 Project Location

4.1 Onshore

The project would be located in south Mobile County, Alabama, southeast of Coden. The proposed project right-of-way (ROW) would traverse approximately 5.1 miles from the mouth of Bayou Coden to a soon-to-be-constructed metering station located on Rock Road (Section 14.0, Figures 1-3 and 1-4). The onshore landing of the proposed pipeline would lie at approximately latitude 30º22'36?, longitude 88º14'26?, while the terminus would lie at approximately latitude 30º23'42?, longitude 88º10'54?. The onshore liquefied natural gas (LNG) pipeline would span from Township 7S, Range 3W, Section 40, eastward to Township 7S, Range 2W, Section 33. See Section 14.0, Figure 1, for the onshore project area.

4.2 Offshore

A 36-inch-diameter pipeline would extend northeast to connect the MPEH™ terminal to the gas plants south of Mobile. This pipeline would support gas delivery of a maximum of 2,050 million standard cubic feet per day (mscfd) for the life of the project. The jurisdictional break between Mobile and New Orleans COE for this project would lie within Block 164 of the MPSEA. For the purposes of this joint application, the MP 164 pipeline northeast of the MP 299 pipeline interconnections with the Texas Eastern pipeline and the Dauphin Island Gathering pipeline system at MP 164 would be under Mobile District COE jurisdiction. The MP 164 pipeline southernmost location would be within MPSEA Block 164. The offshore component of the pipeline would terminate at Block 34 in the Mississippi Sound area (Alabama). The interconnections for necessary platforms (at the interface of MP 299 and MP 164) would be under Mobile District COE jurisdiction. These facilities will be addressed under the New Orleans District COE. See Section 14.0, Figure 1 for the offshore project area.

5.0 Project Description

Freeport-McMoRan Energy LLC (the applicant, referred to herein as FME) is filing an application for a license pursuant to the Deepwater Port Act of 1974, as amended (DWPA) and using for guidance the United States Coast Guard's (USCG's) January 6, 2004 Temporary Interim Rule,[1] to construct, own, and operate a deepwater port off the coasts of Louisiana, Mississippi, and Alabama. As more fully described within this application, FME proposes to construct the Main Pass Energy Hub™ (MPEH™) as a deepwater port to receive, vaporize, condition, store, and transport liquefied natural gas (LNG) and constituent liquids derived from the processing.

The proposed deepwater port will be located in the Gulf of Mexico (GOM) on the Outer Continental Shelf (OCS) approximately 16 miles (25.7 kilometers [km]) offshore southeast Louisiana at Main Pass Block 299 (MP 299). It will be located in approximately 210 feet (64 meters) of water depth and will be designed to accommodate LNG carriers up to 160,000 cubic meters (m^3).

The proposed location is a former sulphur mining facility and the project will utilize four existing platforms along with associated bridges and support structures with appropriate modifications and additions as part of the deepwater port. Two new platforms will be constructed to support LNG storage tanks and a patent-pending Soft Berth™ system will be used to berth LNG carriers. Living quarters to routinely accommodate 50 personnel will be provided. The deepwater port is designed to process an average of 1.0 billion standard cubic feet per day (bscfd) and deliver a peak of 3.0 bscfd of pipeline-quality natural gas, and a peak of 85,000 barrels per day (bbls/d) of natural gas liquids (NGL).

The proposed action includes the installation of approximately 192 miles (309 km) of natural gas and NGL transmission pipelines. The deepwater port and the majority of the pipeline components will be located offshore of state waters on the federal OCS.

A 36-inch (91.4-centimeter [cm]) diameter natural gas pipeline will originate at the deepwater port and extend northeast for approximately 92.7 miles (149.2 km) to connect the deepwater port to existing gas distribution pipelines near Coden, Alabama. Approximately 5 miles (8 km) of this pipeline segment is proposed for construction on shore in Alabama (above the mean high water line). A proposed metering platform to be installed at Main Pass 164 (MP 164) will be located on this 36-inch (91.4-cm) pipeline route and will provide a tie-in location for two lateral transmission lines. These laterals will be 16 inches (40.6 cm) in diameter and approximately 300 feet (91.4 meters) long extending to proposed subsea tie-ins to existing natural gas transmission lines.

A 16-inch (40.6-centimter [cm]) diameter natural gas pipeline will originate at the deepwater port and extend east for 2.5 miles (4.0 km) to MP 298, and tie into an existing natural gas transmission pipeline. A 20-inch (50.8-cm) diameter natural gas pipeline will extend south-southwest for approximately 51.5 miles (82.9 km) connecting to existing natural gas transmission pipelines at South Pass 55 (SP 55).

A 12-inch (30.5-cm) diameter pipeline will carry NGL derived from natural gas conditioning at the deepwater port. This pipeline will originate at the deepwater port, extend approximately 45.7 miles (74 km) westerly into Louisiana inland waters, and make a connection with an existing NGL facility near Venice, Louisiana.

MP 299 will sit atop a salt dome approximately 2 miles (3.2 km) in diameter. An on-site total gas storage capacity of 28 billion cubic feet (bcf) will be provided in three salt caverns underlying the deepwater port. This storage capacity will allow the deepwater port to provide a more measured and consistent delivery of natural gas volumes into the pipeline system, thereby relieving pipeline operators from the difficulty of managing alternating periods of very low and very high throughput. The ability to deliver consistent volumes of natural gas into the connected transmission pipeline(s) was identified as a key technical and economic requirement for the project.

FME is seeking a deepwater port license at this time to accommodate the country's growing need for infrastructure to accommodate new sources of imported LNG. As amply stated within the Energy Information Administration's (EIA's) *Annual Energy Outlook 2004*, in coming years LNG is expected to play a greater role in providing natural gas to the nation as domestic production declines. The FME MPEH™ deepwater port is being proposed with several principles in mind and a set of characteristics that make the project feasible, including:

- **Environmentally friendly.** Natural gas is a clean-burning fuel whose utilization has been encouraged;
- **Existing facilities**. Re-use of existing offshore facilities reduces the requirement for large capital outlays for construction of new offshore terminal platforms;
- **Salt dome underlay**. MP 299 is underlain by a 2-mile (3.2-km)-diameter salt dome, which enhances the project's suite of services offerings by adding storage capacity;

- **Proximity to shipping fairway.** The 5-mile (8-km) proximity to shipping fairways will allow LNG carriers to maintain navigation within established fairways near the deepwater port;
- **Proximity to shore.** The 16-mile (25.7-km) distance to shore will allow for ease of access to support vessels, while minimizing the environmental impact and eliminating shipping congestion common at onshore locations;
- **Access to pipeline network.** The abundant infrastructure in the north-central GOM provides numerous options to access existing infrastructure plentiful;
- **High throughput capacity.** The terminal will have the capacity to condition and deliver a peak of 3 billion cubic feet per day (bcfd);
- **Conditioning.** The terminal will have the capacity to condition natural gas and accept supply from a variety of sources.
- **Water Depth.** The terminal is located in sufficient water depth to accomodate the largest LNG carriers in service and contemplated.

Commissioning of the deepwater port is scheduled for December 2007. Construction is expected to require approximately 34 months to complete. All the new platforms and most of the specialized modules can be built in existing U.S. fabrication yards. Some specialized modules and equipment may be built overseas. The deepwater port will be designed, constructed, and operated in accordance with applicable codes and standards. The terminal will have an expected service life of approximately 30 years.

5.1 Location and Use

The deepwater port will be located approximately 16 miles (25.7 km) offshore southeast Louisiana on the federal OCS. Water at this location in MP 299 in the GOM is approximately 210 feet (64 meters) deep. A gas pipeline junction platform, also part of the deepwater port, is located in MP 164 approximately 40 miles (64.4 km) offshore Mississippi in the GOM. The location of the deepwater port and all component locations is shown on Section 14.0, Figure 1.

The deepwater port facilities consist of LNG storage tanks, LNG carrier berthing provisions, LNG unloading arms, low-pressure and high-pressure pumps, vaporizers, gas-conditioning plant, salt cavern gas storage, compression, dehydration, metering, utility systems, general facilities, and accommodations. Construction of the deepwater port consists of converting a portion of the former MP 299 sulphur mining operation and installing new structures, facilities, and pipelines. Specifically, the deepwater port construction will consist of converting two existing platforms, three existing bridge support platforms, and existing interconnecting bridge structures, then adding two new LNG storage platforms, new interconnecting bridges, new topsides equipment, a new semisubmersible-based LNG carrier berthing system, five new gas pipelines, a new pipeline junction platform, and a new NGL pipeline. In addition, two existing platforms will be used as storage for tri-ethylene glycol (TEG), spares, and other consumables.

The deepwater port will be designed to handle a nominal capacity of 7.0 million metric tons per year of LNG or 350 bcf per year of gas. The annual LNG throughput volume equates to a nominal vaporization capacity of 1 bcfd. The vaporization facilities will be designed for a peak capacity of 1.6 bcfd to provide additional supply during periods of peak demand.

The deepwater port provides the following basic functions:

- LNG carrier berthing;
- LNG carrier offloading;
- LNG storage;
- LNG vaporization;
- Gas conditioning;
- NGL metering and export pipeline;
- Salt cavern natural gas storage;
- Natural gas compression;
- Natural gas dehydration system;
- Natural gas metering and export pipelines;
- Power generation;
- Storage facilities for spares and consumables; and
- Living quarters and helideck.

5.2 Carrier Berthing

The terminal will use a Soft Berth™ system to berth LNG carriers. The Soft Berth™ system includes two semisubmersible-based dolphins, two auxiliary berthing buoys and associated mooring lines, and seabed anchor piles. The Soft Berth™ system allows the berthing of LNG carriers adjacent to Platform No. 1 (P1), the unloading of LNG to the platform at amidships, and the disconnection and egress of the LNG carrier after unloading. The two Soft Berth™ dolphins are expected to be minimally sized semisubmersibles that incorporate mooring equipment, fairleaders, fenders, hawser attachments, ballast system, bridge support, and other miscellaneous items. In addition, auxiliary berthing buoys will be located near each dolphin (toward the LNG carrier bow and stern) to supplement LNG carrier berthing requirements.

5.2.1 LNG Carrier Unloading

The LNG carriers will berth alongside the Soft Berth™ dolphins, which straddle Platform No. 1. The LNG unloading facilities are located on Platform No. 1. The unloading facilities will be designed to accommodate LNG carriers ranging in capacity from 60,000

m^3 to 160,000 m^3. LNG is unloaded from the carrier to the storage tanks through an LNG unloading arms package. The LNG unloading rate will be 10,500 to 12,000 cubic meters per hour (m^3/hr). The LNG unloading arms package consists of four 16-inch (40.6-cm) diameter offloading arms. The offloading arms will be similar to those used at existing onshore LNG terminals; however, the specific configuration will be designed to accommodate offshore ship movements at berth. During the absence of LNG carriers, LNG from the storage tanks will be re-circulated in the terminal unloading piping network to maintain temperatures (i.e., "ready for service") for the next ship cycle and to minimizing the need for cool-down. LNG custody transfer measurement between ship and terminal will follow normal industry practice and take place on the LNG carrier.

5.2.2 LNG Storage

LNG will be stored in tanks located on two new, eight-legged, twelve skirt-pile, fixed platforms. The terminal will contain six USCG-approved LNG storage tanks (prismatic [SPB], Spherical [Moss] type or any other acceptable containment system), each with an approximate gross capacity of 24,660 m^3 per tank. The total net capacity of the storage tanks is approximately 145,000 m^3. Three LNG storage tanks will be located on each new storage platform. The two LNG storage platforms will be bridge-connected to the processing facilities.

5.2.3 LNG Vaporization

The LNG vaporization facility consisting of boil-off gas compression and re-condensation, low-pressure LNG supply pumps, gas-conditioning plant, high-pressure LNG delivery pumps, vaporizers and seawater intake pumps is located on Platform No. 1.

The LNG will be pumped to the vaporization facilities via the LNG storage in-tank pumps to the suction of low-pressure LNG supply and high-pressure LNG delivery pumps. The high-pressure LNG delivery pumps will pump the LNG to a pressure of up to approximately 1,800 pounds per square inch gauge (psig), which is at or above the required natural gas send-out pressure. The LNG will be vaporized in open rack vaporizers (ORVs) to natural gas, ready for storage in the salt caverns or metering and transportation via pipeline to market. Seawater will be the ORV heating medium for the LNG vaporization.

5.2.4 Gas Conditioning

For the terminal to meet the current gas pipeline gross heating value (GHV) specifications, a gas-conditioning plant is required to condition the vaporized gas by extracting part of the ethane, propane, butane, and heavier components in the LNG. Only part of the LNG stream will be processed in the gas-conditioning plant, and the rest of the LNG stream will be bypassed and recombined with the "lean" LNG stream. The design capacity of the gas-conditioning plant is 1.0 billion standard cubic feet per day (bscfd) of LNG. The extracted stream consisting of ethane, propane, butane, and other heavier components in the LNG will be exported onshore via pipeline.

5.2.5 NGL Metering and Pipeline

The gas-conditioning plant will produce a Y-grade NGL that will be composed of ethane, propane, butane, and other heavier components. Following measurement via check meter(s), the NGLs will be transported via a 12-inch (30.5-cm) diameter pipeline from the deepwater port, a distance of 45.7 miles (73.5 km) westerly into Louisiana inland waters, and make connection with an existing NGL facility near Venice, Louisiana. NGL custody transfer will occur at the connection point near Venice, Louisiana.

5.2.6 Salt Cavern Natural Gas Storage

The deepwater port is situated above a large and well-defined salt dome. Salt has a unique combination of characteristics, making it an ideal rock for storage cavern construction. The deeply buried salt is generally impervious to liquid or gaseous hydrocarbons, has a compressive strength comparable to concrete, and can be easily mined by dissolution in water. Salt domes have been used to store natural gas along the U.S. Gulf Coast for over 30 years.

Three salt dome caverns will be constructed for the deepwater port for storage in the MP 299 salt dome from Platform No. 2 (P2). The gas storage caverns will be directionally drilled so that the center-to-center spacing between caverns will be a minimum distance of approximately 900 feet (274 meters). Each cavern will be capable of storing up to 9.3 bscf of working gas at pressures of up to approximately 3,100 psig measured at the wellhead. Natural gas, which is regasified in excess of the pipeline demand, will be stored in the gas salt caverns. Likewise, whenever the regasification rate falls short of the pipeline demand, gas from the cavern will be supplied to the pipeline.

5.2.7 Natural Gas Compression

The gas compression system will perform dual functions and will operate under the following events. First, in the event the LNG regasification rate is higher than the pipeline demand and the cavern pressure is higher than the pipeline send-out pressure, the compression system will boost the excess natural gas pressure to inject into the cavern. Second, in the event the LNG regasification rate is lower than the pipeline demand and the cavern pressure is lower than the pipeline send-out pressure, the compression system will boost the pressure of cavern gas to make up the shortfall in gas demand. Two 50% gas compression trains will be provided. The trains are generally operated in parallel to achieve the desired pressure and flow rate in each case, except for high-pressure injection when the compressors operate in series.

5.2.8 Natural Gas Dehydration

Natural gas from the caverns may be water-saturated and will require dehydration in order to meet the pipeline specification of 7 pounds of water per million standard cubic feet (mmscf) of gas. The natural gas directly from the LNG vaporization plant is “dry” gas and does not need dehydrating. TEG will be the selected dehydration medium. The dehydration unit will accept wet gas either directly from the caverns or from the gas compression system. The wet gas will be directed into the gas contactor where the gas and dehydration medium, TEG, will be contacted over structured packing. When the TEG comes in contact with the wet gas, water is absorbed from the gas into the TEG, resulting in "dry" gas exiting the contactor. The dry gas will be sent to a natural gas scrubber to allow the knockout of any TEG carried over from the gas contactor operation. The gas will then be sent to gas metering and pipeline transmission.

5.2.9 Natural Gas Metering and Export Pipelines

The natural gas departing the deepwater port will pass through check meters before entering the natural gas transmission pipelines. The majority of the export natural gas pipeline components will be located offshore of state waters on the federal OCS. A 36-inch (91.4-cm) diameter natural gas pipeline will extend northeast for approximately 30.8 miles (49.6 km) to connect the deepwater port to a new purpose-built junction platform located at MP 164. Departing the MP 164 junction platform will be two 16-inch (40.6-cm) diameter pipeline segments to tie in subsea to existing natural gas pipelines owned by Texas Eastern Transmission Corporation (TETCO) and Dauphin Island Gathering Partners (DIGP). Custody transfer for natural gas sold to TETCO and DIGP will occur on MP 164. In addition, the 36-inch (91.4-cm) diameter natural gas pipeline will continue approximately 61.9 miles (99.6 km) to Coden, Alabama. Approximately 5 miles (8 km) of this pipeline segment is proposed for construction on shore in Alabama (above the mean high water line). Custody transfer of natural gas sold to one of the three planned pipeline tie-ins, Gulf South Pipeline Company LP (Gulf South), Gulfstream Energy Services, Inc. (Gulfstream), and Transco, will occur in the vicinity of the tie-ins near Coden, Alabama. A second new 16-inch (40.6-cm) diameter natural gas pipeline will originate at the deepwater port and extend southeast for 2.5 miles (4.0 km) to MP 298, and tie into an existing natural gas pipeline owned by Southern Natural Gas Company (Southern Natural). Custody transfer for gas sold to Southern Natural will occur at MP 298. A third new natural gas pipeline, 20 inches (50.8 cm) in diameter, will extend south-southwest for approximately 51.5 miles (82.9 km) connecting to existing natural gas transmission pipelines at SP55. Custody transfer for gas sold to existing pipelines at SP 55 will occur at SP 55.

5.2.10 Power Generation

Electrical power requirements will be generated by three 50% load capacity natural gas-powered turbine generators. Out of the three units, two will be for working operations and one will be an installed spare. Each power generation turbine will have capacity to generate approximately 19.5 MW of power (site rated). For normal terminal operations, gas to run the power generation turbines will be supplied by the fuel gas system from product natural gas. Three GE LM-2500 or equivalent turbines generators will be installed. All three power-turbine generators exhausts are treated for nitrogen oxide (NO_X) reduction in Selective Catalyst Reduction (SCR) units. A diesel engine-driven emergency generator will supply emergency backup power service.

5.2.11 Consumables and Spares Storage

Two existing platforms will be used for storage of consumables and spares. Platform No. 3 (P3) will be used for deck storage of containers, equipment, spares and other materials for the facilities operation and maintenance activities. Platform No. 4 (P4) will be used for the storage of TEG (used in the dehydration of gas stored in the salt dome caverns to pipeline specifications) and other operating chemicals. Additional deck storage for spares and consumables will be available on P4 also.

5.2.12 Living Quarters and Helideck

Living quarters will be located on the existing bridge support Y-7 (BS-Y7) located between Platform No. 1 and 2. The living quarters will routinely accommodate 50 personnel, but can accommodate up to 94 personnel for brief periods, and includes offices, recreation, communications, and a galley. A jib crane will be provided for loading and offloading stores. In addition to the living areas, the living quarters will include the control room, offices, shop, warehouse, and laboratory spaces.

An existing helideck is located on BS-9 and can accommodate two helicopters. There will be a helideck located above the living quarters building and a further helideck is located nearby on Platform No. 3. All these helidecks will meet the latest Federal Aviation Administration (FAA) and USCG rules and regulations for lighting and firefighting requirements.

5.3 Construction Procedures

5.3.1 Construction Schedule

Construction is estimated to take approximately 34 months from start of activities in the first quarter of 2005 to terminal complete late in the fourth quarter of 2007 (Table 5.1). The storage caverns are estimated to be complete in the second quarter of 2009.

Table 5.1. Construction Schedule

Description	2005	2006	2007	2008	2009
Cavern Creation					
Drilling	X	X			
Leaching/Dewatering		X	X	X	X
Demolition					
Remove Existing Drill Rigs	X				
P&A Existing Wells on Platform No. 1		X			
Pipelines					
36-inch MP 299 to Coden			X		

Table 5.1. Construction Schedule

Description	2005	2006	2007	2008	2009
36-inch Coden to Delivery Points (onshore)			X		
20-inch MP 299 to SP 55			X		
16-inch MP 299 to MP 298	X				
12-inch MP 299 to Venice			X		
Fixed Offshore Structures					
Platform No. 1 Deck and Bridge Removal		X			
Platform No. 1 Deck and Bridge Installation			X		
Quarters Installation			X		
MP 164 Junction Platform		X			
Storage Plat. No. 1/2 Installation			X		
Hook-up and Commissioning					
Platform No. 2 Hook-up			X		
Platform No. 1 Hook-up			X		
Commissioning and Startup			X		
Soft Berthä System					
Pile Installation			X		
Dolphins and Buoys Installation			X		

All terminal construction activities are anticipated to occur at existing U.S. Gulf Coast facilities or at the terminal site, except for the construction of the Soft Berth™ system dolphins, which are anticipated to be fabricated in the Far East. The following sections describe the construction activities for each component of the deepwater port construction.

5.3.2 Cavern Creation

The three gas storage caverns will be similar and constructed sequentially over a period of four years. Cavern creation includes installing the surface conductor pipe, drilling and completing the wells, preparing the wells for leaching operations, leaching the caverns by circulating seawater, dewatering the caverns with gas and preparing the wells for gas storage operations.

5.3.3 Demolition

- Removal of Existing Drill Rigs on Platform No. 1 and 2

The drill rigs on Platform No. 1 and 2 originally used in the sulphur mining operation will be removed. A heavy lift vessel (HLV) will mob to site to remove the drill rigs and their associated packages from each platform. The drill rig packages will be placed on material barges and barged to an on-shore site.

- Plug and Abandon (P&A) Existing Wells

Existing wells on Platform No. 1 formerly used in the sulphur mining operation will be plugged and abandoned. This operation is assumed to require 24 days using one support vessel, one workover rig, and one generator.

5.3.4 Pipelines

The pipeline construction will utilize several different pipe installation methods and techniques depending on the time of year, size of pipe, length of line, water depth range, bottom conditions and obstacles

- **MP 299 to Offshore Coden – 36-inch (91.4-cm) Gas Pipeline**

A 3rd Generation Lay Vessel (3GLV) will be used to install the 36-inch (91.4-cm) diameter pipeline. This pipeline originates at Platform No. 2, in MP 299 in over 200 feet (61 meters) of water and proceeds northerly approximately 30 miles (48 km) to a platform, in about 130 feet (39.6 meters) of water. The 3GLV is limited to a minimum of 50 to 60 feet (15.2 to 18.3 meters) water depth. Consequently a 2nd Generation Lay Barge (2GLB) will continue laying the pipeline from the 3GLV drop-off crossing the Alabama State 3-mile (4.8-km) line until about 15 feet (4.6 meters) of water west of Dauphin Island, at which point the shallow-water lay barge (SWLB) will pickup and continue laying the pipe to the shore approach. The shore approach near Coden, Alabama, will be made by a horizontal directional drill (HDD).

Since this pipeline is predominately in water depths less than 200 feet (61 meters), most of the line will require lowering. From 200 feet (61 meters) to about 20 feet (6.1 meters) water depths, a pipeline jet barge and/or a pipeline plow can be used. From 20 feet (6.1 meters) to shore, a shallow-water jetting system or a pre-lay dredged trench will develop the desired depth of burial. Existing pipeline or communication cables will have to be properly spaced prior to the 36-inch (91.4-cm) pipeline crossing. A diver support vessel (DSV) may be used to lower the existing line and/or to place the spacing material (cement/sand bags or concrete mattresses) for crossing over the existing lines. After the pipeline is installed, other construction activities required are the installation of the risers and platform piping tie-ins at the MP 299 and MP 164 platforms. These installations may be performed with the lay vessel, a derrick vessel, or a large DSV. All offshore alignment sheets can be found in Section 14, Figures Map 1, 5 through 10.

- **Horizontal Directionally Drilled Hole Offshore Coden to Onshore Coden – 36-inch (91.4-cm) Gas Pipeline**

The marine-to-shore crossing will be by means of a HDD hole from onshore to a pre-determined exit hole offshore Coden, Alabama. This type of marine-to-shore crossing will be used to construct landfalls without disturbing the shoreline. The HDD exit hole and the pipe transition ditch will require dredging and side-casting the spoil to insure egress for the pipe pulled into the HDD and flotation for the lay barge to assemble the HDD pipe string, make the tie-in after the pull, and lay the pipe away from the HDD site. A dipper/backhoe or clamshell dredge barge may be used to excavate the pipe trench. Or, if the water is deep enough for flotation for the lay barge, the pipe may be buried by jetting or hydraulic lifting the spoil from under the pipe. A land-based HDD rig will bore the pilot hole, ream the hole with successive larger reamers, and finally pull the pre-laid pipe string through the HDD hole to shore. All HDD drawings developed for this project can be found in Section 14.0, Figures PC-G-0010 through PC-G-0020.

- **MP 299 to SP 55 – 20-inch (50.8-cm) Gas Pipeline**

This particular pipeline leg is entirely in water depths greater than 200 feet (61 meters) and is between two existing platforms. Consequently, no burial or lowering of the pipeline will be required.

A 2GLB or a 3GLV may be used to install the 20-inch (50.8 cm) diameter pipeline. A 2GLB normally assembles the pipeline using 40-foot (12.2-meter) joints of pipe. If a 3GLV is used, this type of vessel can fabricate pipe sections in 'double jointed' (80-foot [24.4-meter]) lengths. The higher production rate as a result of the longer sections of pipe minimizes the construction time and, subsequently, the risks of damage. A DSV will be used to lower the existing line and/or to place the spacing material (cement/sand bags or concrete mattresses). Other construction activities will be the installation of the risers and platform piping tie-ins at the Platform No. 2, MP 299, and SP 55 platforms. These installations may be performed with the lay vessel, a derrick vessel, or a large DSV. A number of pipe haul barges and tugs or pipe transporter vessels will be used to move the pipe from the concrete weight coating plant to the lay vessel.

- **MP 299 to MP -298 – 16-inch (40.6-cm) Gas Pipeline**

This particular pipeline leg is entirely in water depths greater than 200 feet (61 meters) and is between two existing platforms. Consequently, no burial or lowering of the pipeline will be required.

A 2GLB or a 3GLV may be used to install the 16-inch (40.6-cm) diameter pipeline. As previously described, a 2GLB normally assembles the pipeline using 40-foot (12.2-meter) joints of pipe. If a 3GLV is used, this type of vessel can fabricate pipe sections in 'double jointed' (80-foot [24.4-meter]) lengths. The higher production rate as a result of the longer sections of pipe minimizes the construction time and, subsequently, the risks of damage. A DSV will be used to lower the existing line and/or to place the spacing material – cement/sand bags or concrete mattresses. Other construction activities are the installation of the risers and platform piping tie-ins at the Platform No. 2, MP 299 and MP 298 platforms. These installations may be performed with the lay vessel, a derrick vessel or a large DSV. A number of pipe haul barges and tugs or pipe transporter vessels will be used to move the pipe from the concrete weight coating plant to the lay vessel.

- **MP 299 to Venice – 12-inch (30.5-cm) NGL Pipeline**

A 2GLB will be used to install the 12-inch (30.5-cm) diameter pipeline from platform BS-8 at MP 299 in over 200 feet (61 meters) of water proceeding to near Venice, Louisiana. From 200 feet (61 meters) to about 15 feet (4.6 meters) water depths, a pipeline jet barge or plow can be used to lower the pipeline after it has been installed. From 15 Feet to shore, a post-lay shallow water jetting system or a pre-lay dredged trench can be used to lower the pipeline below the existing bottom. For the offshore and inshore crossings, a DSV may be used to lower the existing line and/or to place the spacing material (cement/sand bags or concrete mattresses). Other construction activities relating to the 12-inch (30.5-cm) NGL pipeline are the installation of the riser and platform piping tie-in at the BS-8 platform in MP 299. These installations may be performed with the lay vessel, a derrick vessel, and/or a shallow water construction barge

5.3.5 Fixed Offshore Structures

- **Platform No. 1 (P1)**

The retrofit of Platform No. 1 will occur in three phases:

Phase I – Removal of deck;

Phase II – Onshore retrofitting of the deck; and

- **Phase III – Reinstallation of the deck.**

Phase I (removal of deck) and Phase III (reinstallation of deck) will occur offshore.
Phase I will involve the removal of the Platform No. 1 deck and Bridge No. 10. A pre-cut crew will mobilize offshore prior to the arrival of a HLV. This crew will pre-cut the conductors, bridge and deck. Once the HLV arrives, conductors will be pulled and loaded on barges. The Platform No. 1 deck and bridge will then be lifted and loaded on to a barge for transport to the retrofit fabrication yard.

Phase II will involve the on-shore retrofitting of the deck, including modification of the existing deck structure and the installation of the new equipment, piping, electrical, and control systems. Systems will be tested and pre-commissioned to the extent possible onshore prior to the load-out for transportation to the site and the Phase III installation activities.

Phase III will include the reinstallation of the Platform No. 1 deck and bridge on to the existing platform jacket. This will include transportation of the deck and bridge from the retrofit yard to MP 299. The reinstallation of the Platform No. 1 retrofitted deck will require a dual HLV lift. The second HLV will demob after the deck is lifted in place. The equipment modules, i.e., loading arms, ORV, gas turbines, and demethanizer, will be installed prior to the installation of Bridge No. 10.

Platform No. 1-Soft Berth™ System Bridges

Two new bridges will be built to span the distance from Platform No. 1 deck to the mooring dolphins for the Soft Berth™ system. These bridges will be fabricated onshore and transported to the MP 299 site. Installation will occur after the installation of the Platform No. 1 deck and the Soft Berth™ dolphins.

- **Living Quarters Located at BS-Y7**

A new quarters building will be installed on BS-Y7. Installation of the living quarters will occur in conjunction with the other installation activities.

- **Platform No. 2, Bridge Support Platforms and Bridge Retrofitting**

Platform No. 2 (P2), BS-8, BS-9 and the interconnecting bridges (numbers 11, 12 and 13) will have extensive modifications performed. This work to complete the retrofit of both the platform deck and the bridges will be performed on site.

- **Storage Platforms Nos. 1 and 2**

Two new storage platforms and six new LNG tanks will be installed. The platforms will be eight-legged/twelve-skirt pile structures and will be installed by the following procedure for both platforms:

- Launch and upend jacket;
- Set jacket at final location;
- Drive main piles and skirt piles;
- Weld jacket shims and make final deck cuts;
- Lift and set deck;
- Lift and set LNG storage tanks #1, #2, and #3 on each platform; and
- Install interconnecting bridges, piping, and cables.

- **Junction Platform Located at MP 164**

A new platform will be installed at MP 164 to serve as a junction platform for pipeline tie-ins. This platform will be a four-pile structure with a small unmanned deck structure to house pig launchers and meter skids. The components will be transported on a single material barge. The platform will be installed by the following procedure:

- Lift and upend jacket;
- Set jacket at final location;
- Drive piles;
- Weld jacket shims and make final deck cuts;
- Lift and set deck; and
- Install risers.

5.3.6 Hook-Up And Commissioning

- **Platform No. 1 (P1) Hook-up**

Platform No. 1 is being removed, modified onshore, and reinstalled. The hook-up activities begin after the deck is reinstalled and include inter-module connections, as well as connections to the bridges to the other platforms. A work barge including a crane and generator will be required along with support vessels, platform-mounted generator, and the use of the existing platform cranes.

- **Platform No. 2 (P2) Hook-up**

As stated previously, Platform No. 2 will be modified offshore. However, modularized equipment will be transported offshore, lifted on to Platform No. 2, and system interconnects will have to be made. A work barge including a crane and generator will be required for the hook-up work along with support vessels, platform mounted generator, and the use of the existing platform cranes.

- **Commissioning and Start-up**

The commissioning and start-up activities are estimated to require 120 days. A work barge including a crane and generator will be required along with support vessels, platform mounted generator, and the use of the existing platform cranes.

5.3.7 Soft BerthÔ System

- **Construction**

The Soft Berth™ system dolphins will most probably be constructed in the Far East and dry-towed to a protected U.S. Gulf Coast location to await installation. The Soft Berth™ system dolphin mooring system and berthing buoys will be assembled in the U.S. Gulf Coast.

- **Installation**

A jack-up, barge, or other type of vessel will be used to install the piles to be used for seabed mooring of both the Soft Berth™ system dolphins and berthing buoys. The pile installation vessel will be positioned over the site for the particular pile, and the pile will be lowered by an onboard crane to the seabed and allowed to penetrate under its own weight. The pile can be installed either with a pile driver or by using suction piles, the preferred method being pile driving. For pile driving, a pile follower will be used to avoid the use of underwater hammer. The hammer will be placed on the follower allowing the pile to sink even farther into the seabed. The pile will then be driven to grade using a hammer (steam or diesel). After the first pile is installed, the vessel will move to the next location and repeat the procedure until all piles are installed. This will be done and completed before the dolphins are brought to the site for installation.

The mooring lines will be attached to the piles in sequence while a tug maintains the dolphin on site. When all mooring lines have been attached, all lines will be pre-tensioned to a predetermined value, the dolphin location will be verified, and the dolphin/mooring system installation will be complete. The installation of the berthing buoys will be performed in a similar manner.

5.4 Description of the Project Within Alabama and Federal Waters

Portions Within Mobile District Jurisdiction

The proposed onshore portion of the route for the MPEH™ was selected to maximize the use of existing utility and transportation corridors. The route would also minimize the adverse environmental impacts of the construction activities and would attempt to avoid unique natural areas, critical wildlife habitat, public lands and parks, and urban and other densely populated areas. The offshore portion of the route was selected to minimize impacts from underwater obstacles, such as rock outcrops and shipwrecks, and impacts on areas considered environmentally sensitive. The onshore and offshore routes have been selected to minimize the overall length. The MPEH™ would traverse southwest Alabama and associated State waters, as well as the GOM. Specifically, within Alabama and its associated waters, and federal waters under Mobile District jurisdiction, the MP 164 pipeline would enter the federal waters within Mobile District jurisdiction in a northerly direction at Block 164 of the MPSEA. From there, the MP 164 pipeline would progress north to the 3-mile line of Alabama. The line from there would change names to *MPEH™ 3-mile line*. It would progress north between Dauphin and Petit Bois Islands into Mississippi Sound, while turning more northeast, toward Bayou Coden. Renamed, the Coden onshore pipeline would continue northeast for approximately 5.1 miles to meet the connection station along Rock Road (Section 14.0, Figure 1).

6.0 Dredging Project Specifications

6.1 Cubic Yards of Material to be Removed

The total cubic yards of material to be removed for excavation is listed in Table 6.1 (offshore) and Table 6.2 (onshore). All removed material would be replaced after construction. No permanent filling of uplands, water bottoms, or wetlands would occur.

Table 6.1 Excavation Calculations, Alabama State Waters

Ditch	Length (feet)	Comment	Sectional Area (square feet)	Trench Volume (cubic yards)
Jet (3-mile line to within 1,000 feet of point of intersection) (excludes intracoastal waterway)	76,821	8-foot-deep ditch pipe	272	773,898
Dredge intracoastal waterway crossing	1,300	575-foot transitions	Varies	47,848

Dredge (to point of intersection)	1,000	8-foot-deep ditch pipe	208	7,704
Dredge (beyond point of intersection)	1,000	8-foot-deep ditch pipe	208	7,704
Jet (from 1,000 feet beyond point of intersection to Coffee Island line)	4,539	8-foot-deep ditch pipe	272	45,726
Dredge (from Coffee Island line to horizontal directional drill)	1,055	8-foot-deep ditch pipe	208	8,127
Horizontal directional drill exit hole (dredge)	376		Varies	21,559
Total Jetted Volume				**819,625**
Total Dredge Volume				**92,942**

Basis of Volume Estimates
MP 164 to Coden — 36-inch outside diameter gas pipeline
Jetted Ditch
 Ditch 10 feet wide at toe
 3:1 slope (run/rise)
Dredged Ditch
 Pipe ditch 10 feet wide at toe
 2:1 slope (run/rise)
Dredged Horizontal Directional Drill to Exit Hole
 6° exit angle
 3,600 radius of curvature
 4-foot cover (top of flange)

Table 6.2 Excavation Calculations, Coden Onshore Pipeline

Soil Condition	Trench Slope	Excavation Amount (cubic feet) per Linear Foot	Amount of Material to be Removed (cubic feet)	Spoil Material Pile Width (feet)
Dry	1.0:1	78	**2,100,384**	22
Wet	1.5:1	103	**2,773,584**	25
Flooded	2.0:1	129	**3,473,712**	28

Basis of Volume Estimates
Assumed 6.5-Foot Trench Depth
Assumed 3.5-Foot Trench Bottom Width
Amount of Material to be Removed
Assumed linear footage of 5.1 miles
Estimates are extremes. Most likely, the actual amount would be somewhere between based on site-specific conditions during construction.

6.2 Types of Material to be Removed During Excavation

6.2.1 Offshore

These may include Pleistocene-age bay/estuarine deposits that may be capped by a thin veneer of sand in near-shore areas, usually within the 3-mile line, and typical marine sediments normally found in the northern GOM region.

6.2.2 Onshore

The entire route would encounter sandy soils with a relatively shallow water table and/or flooding. High-content, low-plasticity soils are found down to depths on the order of 6 feet.

6.3 Surface Area to be Impacted

6.3.1 Onshore

Temporary and permanent easement would encompass 54.35 acres (2,367,486 square feet).

6.3.2 Offshore

The total spatial extent of excavation within Alabama State Waters is anticipated to be approximately 130.3 acres (5,675,868 square feet), including temporary spoil placement areas. The actual trench area, excluding spoil piles is approximately 116.3 acres (5,066,028 square feet).

Note that a significant portion of this route segment will be jetted (aproximately. 89%) and therefore does not have associated spoil piles.

6.4 Methods of Excavation

<u>6.4.1 Offshore</u>

Because this pipeline would be predominantly in water depths less than 200 feet, most of the line would require lowering. From water depths of 200 feet to approximately 20 feet, a pipeline jet barge and/or a pipeline plow can be used. From 20 feet to shore, a shallow water jetting system or a pre-lay dredged trench would develop the desired depth of burial (See Section 14.0, Figures PC-G-0080, PC-G-0090, and PC-G-0120). Existing pipeline or communication cables would have to be properly spaced before the 36-inch pipeline crossing. A DSV may be used to lower the existing line and/or to place the spacing material (cement/sand bags or concrete mattresses) for crossing over the foreign line. The number of crossings would be determined during the geophysical survey. After the pipeline is installed, other required construction activities would include the installation of the risers and platform piping tie-ins at the MP 299 and MP 164 platforms. These installations may be performed with the lay vessel, a derrick vessel, or a large DSV. The pipeline filling and drying may be performed from the MP 299 platform. The hydrotesting and dewatering may be conducted from the onshore site near Coden, or the hydrotesting may be performed in conjunction with the other pipeline testing at the MP 299 facility.

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

6.4.1.1 Offshore Pipeline Lay Vessels

A typical offshore pipeline lay barge spread can be found in Section 14.0, Figure PC-G-0070.

Shallow-Water Lay Barge

Water depths of 20 feet (6.1 meters) or less normally require a shallow-water lay barge (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 support vessels assist with maintaining station and moving the vessel ahead as the joints are welded together. A vessel of this type would be used in the shallow and protected water areas on the north end of the 36-inch (91.4-centimeter) pipeline, from west of Dauphin Island to offshore Coden.

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

Intermediate or Second-Generation Lay Barge

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. They would 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 the vessels in this class could use eight to 12 anchors for station keeping and advancing along the proposed pipeline route. Two anchor-handling support vessels would tow the vessel to the site and would remain with the lay barge through project completion. The support vessels would continually relocate the anchors as the vessel moves along the pipeline route. The individual joints of pipe would be assembled by means of a qualified welding procedure. Multiple welding stations would 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 would be used for the 36-inch (91.4-centimeter) pipeline transition from the deep-water lay vessel (third-generation lay barge [3GLB]) to the SWLB near the 3-mile (4.8-kilometer) line offshore

Alabama, and the 12-inch (30.5-centimeter) NGL pipeline from MP 299 to a point near Pass A Loutre in approximately 15 feet (4.6 meters) of water.
The lay barge operation would be 24 hours per day, seven days per week. The vessel would be manned with two 12-hour shifts per day. Onboard provisions would be provided for messing and accommodations for all construction personnel, including inspection personnel and company representatives.

Third-Generation Lay Vessel

These vessels are typically more than 500 feet (152.4 meters) long and more than 120 feet (36.6 meters) wide, with an operating draft in excess of 40 feet (12.2 meters). Vessels in this class may be semi-submersible-barge-shaped or ship-shaped. They would receive 40-foot (12.2-meter) joints of pipe onboard, 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 the vessels in this class would 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 AHTs would tow the vessel to the site and would remain with the lay vessel through project completion. The support vessels would continually relocate the anchors as the vessel moves along the pipeline route. The individual joints of pipe would be assembled by means of an automatic welding procedure. Multiple welding stations would 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 would install the 36-inch (91.4-centimeter) pipeline from MP 299 north to the 40-foot (12.2-meter) contour near the Alabama 3-mile (4.8-kilometer) line. It could install the 20-inch (50.8-centimeter) pipeline from MP 299 to SP 55.

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

6.4.1.2 Pipeline Lowering

Typical pipeline lowering spreads for jetting and jet sled can be found in Section 14.0, Figures PC-G-0100 and PC-G-0101.

The term *pipeline lowering* refers to a variety of processes used to ensure that a pipeline is installed below the natural bottom of the sea bed. The methods for lowering and protecting the pipeline are classified into three groups: pre-lay trenching; post-lay trenching, which includes diver hand excavation near crossings of existing utilities; and post-lay protection of a pipeline. The latter method involves covering the pipe with armor protection, such as rock or concrete mattresses, when it is difficult or impractical to lower the pipe to the design depth below sea bed. Bulleted below are lowering and burial requirements for pipelines in Federal and State Waters. These requirements will be adhered to by FME.

- **Federal Waters:** The Minerals Management Service (MMS) requirements for lowering a pipeline in federal waters are at least 3 feet (0.9 meter), top of pipe, below the sea floor, in water depths of 200 feet (61 meters) or less. Lowering is not required in water depths greater than 200 feet (61 meters). Exceptions to the MMS requirements are fairways, anchorages, communication cables, or pipeline crossings. Burial in fairways and anchorage areas may be required by local, U.S. Coast Guard (USCG), and/or United States Army Corps of Engineers (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; and
- **State Waters:** Generally, the pipe must have at least 3 feet (0.9 meter) of cover, but in some cases, at least 4 feet (1.2 meters) top of pipe is required. Fairways, waterways, and channels may have 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 would be required to more precisely determine the structure and composition of these bottom conditions. This information would be essential in the final determination of the lowering methodology.

In some cases, especially in shallow waters, the sea bottom may be prepared for pipeline installation before 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.

<u>Pre-Pipeline-Lowering Method — Dredging</u>

The excavation or preparation of a trench before installation of a 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 is dredged when water depths range from approximately 8 to 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*, which will allow installation vessels to access the work site by floating directly over the pipeline.

The dredges anticipated for use on this project would 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 center line (providing less opportunity for inadvertent trench infill) would be mounted on the dredge barge. The dredged material would be placed or side cast alongside the ditch where the spoil may be retrieved and placed back into the trench (backfill) after pipeline installation. Before laying the pipeline, a dredge would 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 would be marked with signs and lights on temporary timber piling. The piling would be maintained until the spoil is returned to the pipeline trench from which it was removed. At such time, the temporary piling and signs would be removed.

The main advantage of this type of lowering is that the pipeline would 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 is installed. The two common methods are the plow and jetting equipment. To plan the lowering operation, the following preparations 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 would be approximately the same dimensions as those expected for the 2GLB pipe lay vessel. The vessel would use eight to 12 anchors for station keeping and advancing along the pre-laid pipeline. Two AHTs would tow the vessel to the site and would remain with the barge through project completion. The support vessels would continually relocate the anchors as the vessel advances.

The jet barge would be equipped with hydraulic pumps to provide high-pressure water to a subsea (jet) sled. The pipeline lowering would be initiated by setting the jet sled in position, straddling the pipeline. The high-pressure water would apply cutting action and liquefy the soil beneath the pipeline via jetting nozzles installed in the jet sled legs. The soil would 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 would be 24 hours per day, seven days per week. The vessel would be manned with two 12-hour shifts per day. Onboard provisions would 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 of lowering a pipeline below the sea bed. Furthermore, a backfill plow may be used to return available spoil into the plowed trench, subject to availability of the equipment (See Section 14.0, Figure PC-G-0140).

A towing vessel capable of lifting and positioning the plow and equipped with an eight- or 12-point mooring system is a typical requirement for a plowing vessel. Anchor positioning is controlled and monitored with navigation and positioning equipment located on the plowing vessel and the AHTs.

The plowshares would 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 would allow monitoring and control of the plow functions. Adjustments can be made to the plowshare and moldboard positions from the control room. The moldboards would be 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 would furnish the plowing operators with information regarding 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 would 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 sea bottom.

Once the plow is in place, the towing vessel would 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 would be secured, and the towing vessel would commence the plowing operations. As the towing vessel moves itself forward by pulling and releasing anchor lines, the AHTs would begin the routine of moving the anchors ahead of the towing vessel. The spoil resulting from the plowing operation would be spread to both sides of the trench by the moldboards. A typical Post-Lay Plow Spread can be seen in Section 14, Figure PC-G-0110.

The type of sea-bottom sediment would 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 (e.g., soft rock or dense material) are encountered, the depth of the plowshares and/or speed of the plow may have to be reduced.

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

Foreign Utility Crossings

Foreign utility crossings refers to any communications cable, pipeline, or other similar object that currently exists within the pipeline route. Characteristics of the foreign utility would be determined by exchanging installation information with the utility owner (Section 14.0, Figure PC-G-0030).

General pre-lay construction tasks would include the following:

- Seventy-two-hour notification would be given to the owner of the foreign utility before arrival of any inspection or construction vessel at the site;
- Pre-lay crossing preparation, specifically placement of concrete mats and sand/cement bags, would be undertaken before installation of the proposed pipeline; and
- To further protect the existing utility, anchors typically would not be placed within 500 feet (152.4 meters) on the near side and 1,000 feet (305 meters) on the far side of the existing foreign utility.

The previously noted jetting operation would cease approximately 100 feet (30.5 meters) on either side of the foreign utility crossing. This approximately 200-foot (61-meter) gap in the lowering operation would be completed by diver hand jetting. A hand jet is a human-portable piece of pipe connected to the surface support vessel, typically by a hose. The diver may then use the water stream to "wash" the bottom material from beneath the pipeline. Because this method of lowering is extremely inefficient and time-consuming, its use is limited as much as possible. In the case of a foreign utility crossing, this method would be limited to the area of the newly installed pipeline between the ends of the jetted area and the edges of the previously installed concrete mats.

6.4.1.3 Hydrostatic Testing

Testing of all newly constructed natural gas pipelines is required by United States Department of Transportation in 49 *Code of Federal Regulations* (CFR) 192, "Transportation of Natural and Other Gas by Pipeline: Minimum Federal Safety Standards." The testing medium is typically water.

During detailed design, a testing plan would be developed to identify the number and locations of test sections; however, for the purposes of this application, the test segments and locations would be as defined below.

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 sizing plate 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 (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 air pressure. The water would be discharged to the location from which 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. Typical design of pipeline flooding and hydrostatic test equipment can be seen in Section 14.0, Figure PC-G-0160.

6.4.1.4 Project Work Plan for Fairways and State Waters

The project would minimize adverse impacts on shipping and navigation during installation:

- In all cases before a vessel commencing operations within a fairway, notification would be provided to the USCG Captain of the Port in the appropriate office so that notice may be broadcast to mariners per standard USCG policy and to the district office of USACE;
- Personnel onboard the work vessel who are responsible for monitoring positioning of that vessel would monitor their vicinity using radar and visual methods for vessel traffic; and
- Anchor buoys placed in a fairway would be marked and lighted during nighttime operations. Additionally, an AHT would remain in the immediate vicinity to warn off approaching vessels.

6.4.2 Onshore

Excavation of onshore soils for pipeline installation would be carried out in many ways. The type of excavation would depend on the condition of various land features such as uplands, wetlands, and waterbodies. Wetlands and waterbodies are the most sensitive of these features and therefore would potentially carry the greatest impact.

6.4.2.1 Waterbody Crossings

Onshore water quality impacts associated with this project would be localized, would be temporary, and would not result in long-term degradation of onshore water quality. The Coden onshore pipeline system would comply with State and local water quality management plans, and with federal and State water quality standards. Compliance with these regulations would result in the pipeline having no significant effect on the management of water quality by the various governing bodies in Alabama.

Pipeline waterbody-crossing techniques can be divided into three main categories:

1. Wet crossings, which involve construction activities that are in contact with the live waterbody.
2. Dry crossings, which involve the use of measures to isolate trench excavation and pipe placement activities from the live waterbody or open water.
3. Trenchless crossings, which involve drilling or boring of the pipeline under the waterbody, with the

most common form being horizontal directional drilling (HDD).

Except for the shore approach, all the proposed waterbody crossings would utilize the wet crossing technique. The shore approach would utilize a shore-to-water horizontal directional drill. The description and specifications would be finalized following completion of detailed design and permitting activities.

6.4.2.2 Dry Crossings

Typically, dry crossings employ dam and pump or flume techniques, but none of these techniques should be utilized for this project.

6.4.2.3 Trenchless Crossings

Installation of pipeline by HDD is generally accomplished in three stages. The first stage consists of directionally drilling a small-diameter pilot hole along a designated directional path. The second stage involves enlarging this pilot hole to a diameter that will accommodate the pipeline. The third stage involves pulling the prefabricated pipeline back into the enlarged hole.

The actual path of the pilot hole is monitored during drilling by taking periodic readings of the inclination and azimuth of the leading edge. Readings are taken with an instrument commonly referred to as a *probe*, inserted in a drill collar as close as practicable to the drill bit.

A completed pilot hole for a large-diameter installation is approximately 12 inches in diameter, depending on bit size and soil characteristics. Typically, a pilot hole is reamed to a diameter approximately 12 inches greater than the diameter of the pipeline to be installed by running reaming tools of increasing diameter along the pilot hole. Reaming tools typically consist of a circular array of cutters and drilling fluid jets. Drilling fluid is pumped through the reamers to aid in cutting, to support the reamed hole, and to lubricate the trailing pipe. Drill pipe is added behind the reamers as they progress through the hole.

Pipe installation is accomplished by attaching a prefabricated pipeline pull section behind a reaming assembly at the exit point and pulling the reaming assembly and pull section back to the drilling rig after completion of pre-reaming. A swivel is utilized to connect the pull section to the lead reaming assembly to minimize torsion transmitted to the pipe.

All stages of HDD involve circulation of drilling fluid from the rig on the surface, through the drill pipe, and back to either the entry or exit point through the drilled annulus. Drilling fluid is required to drive down-hole motors, create hydraulic cutting action, and transport spoil back to the surface. Drilling fluid returns collected at the surface are processed through a solid control system that removes spoil from the drilling fluid, allowing the fluid to be reused. The excess spoil and drilling fluid are disposed of on land, either at the site or in an approved disposal location.

In order for water to perform the HDD functions required, it is generally necessary to modify its properties by adding a viscosifier. The viscosifier used almost exclusively in drilling fluids is a naturally occurring clay in the form of bentonite. Bentonite typically comes from Wyoming and consists principally of montmorillonite clay. Bentonite is not a hazardous material as defined by the U.S. Environmental Protection Agency.

The properties of bentonite used in drilling fluids are often enhanced by the addition of polymers. This enhancement typically involves increasing the yield; i.e., reducing the amount of dry bentonite needed to produce given amounts of drilling fluid.

HDD technology and contractor expertise have advanced significantly over the past 10 years. Many crossings involving lengths, depths, diameters, and soil conditions that would have been considered prohibitive in the past are completed today. However, certain subsurface conditions remain significant impediments for large-diameter crossings. These conditions include:

- Extensive deposits of cobbles and boulders;
- Caverns typical of limestone or dolostone; and
- Strong, hard bedrock (although most bedrock can be drilled).

Extensive deposits of cobbles and boulders are problematic for HDD because coarse granular material is not sufficiently stable to support an open-drilled hole, nor can it be fluidized by injection of drilling mud. Even if a hole can be drilled, the boulders and cobbles tend to collapse into the hole and create an obstruction, preventing successful completion of the drilled crossing.

As noted above, HDD requires the almost continuous use of drilling fluids pumped down hole. Once the fluid has been used for cutting action, it follows the path of least resistance, which usually results in mud returns to the surface at either the entry or exit point. However, where subsurface voids are present, drilling mud is lost. This lost mud may enter and fill subsurface caverns; fill voids within the soil mass; or migrate to the surface at points other than the entry and exit points, and possibly into the waterbody being crossed.

Caverns become problematic for HDD when the size of the cavern exceeds that which can be spanned by the drill string while retaining directional control. Typical shore-to-water HDD is shown in Section 14.0, Figure 10-1.

6.4.2.4 Wet Crossings

Excavation. An open-cut wet crossing involves the excavation of the pipeline trench across the waterbody, with the excavation activities in contact with the open water. The pipe is installed in the excavated trench, and the trench is backfilled.

Trench excavation and/or pipe placement for wet crossings are usually accomplished using one of the following categories of equipment: backhoes, clamshells, draglines, or slacklines (Yo-Yo's).

Backhoes. Backhoes can be used to excavate an in-stream trench from the banks, the stream bed, or barges located in-stream. Two backhoes, one working from each bank, can excavate a large-diameter pipeline trench across streams up to 50 feet wide. However, it is often necessary to provide timber or rock fill work pads at the edge of the watercourse, in order to support the backhoes and to allow full utilization of the equipment's reach. A typical setup showing a backhoe working from one side of the bank is presented in Section 14.0, Figure 10-2.

Draglines. For situations where the water is too shallow for barges or too deep for backhoes to work in-stream, where the river is greater than 50 feet wide, or where other site conditions prevent the use of backhoes, draglines working from one or both banks are often used.

Slacklines (Yo-Yo's). For water crossings greater than 50 feet, and where soil conditions and equipment availability warrant, slackline dragline equipment may be used to excavate the marine trench. With this method, a bucket is dragged along the trench alignment by cables supported on towers at each bank. The bucket is repeatedly dragged onshore and emptied into a temporary sump excavated at the edge of the river or on the adjacent flood plain / approach slope. The material is removed from this sump and stockpiled in a spoil containment area. The stockpile is typically located at least 50 feet back from the edge of the watercourse where topographic conditions permit. Backfilling is accomplished by reversing the bucket and pulling material from the sump back out into the in-stream trench. *Sauerman* is a common trade name applied to this type of equipment. A typical slackline configuration is shown in Section 14.0, Figure 10-3.

Pipe Installation. The method of pipe installation used for wet crossings depends on the width of the crossing and the nature of the substrate material. For smaller crossings (typically less than 200 feet), the following method is used.

Pipe sections across waterbodies are typically constructed separately from mainline pipe installation. The crossing sections are typically prefabricated adjacent to the waterbody within the working ROW or temporary workspace. Pipe fabrication is generally completed before initiation of in-stream excavation activities. Typically, the pipe is also coated with concrete-weight coating before any in-stream activity.

The excavation across the waterbody is initially prepared leaving hard plugs (unexcavated ditch) on each side of the crossing. The hard plugs are removed immediately before pipe installation. The soft plugs are reinstalled after the pipe is lowered in before tie-in.

For most crossings, the welded and concrete-coated pipe section is carried with sidebooms down one approach slope to the edge of the watercourse. A winch (often on a dozer) situated on the opposite side will pull the pipe section across the watercourse along the base of the in-stream trench.

Vehicle/Equipment Crossings. Vehicle/equipment crossing structures (temporary bridges) are installed at most perennial watercourses that support a designated fishery and that are considered significant by the State, and at all waterbodies more than 10 feet wide that require a vehicle crossing. Where the crossing is too wide for temporary bridges, construction traffic utilizes existing or new access trails. For streams in which a temporary vehicle/equipment crossing is needed, the bridge consists of one of the following:

- Equipment pads and culverts, where culverts are necessary to support the equipment pads;

- Clean rock fill and timber riprap;
- Portable or flexi-float bridges;
- A temporary wooden or wooden and steel structure; or
- A railroad flatbed car.

Typicals for a temporary bridge and flumed access specifications are shown in Section 14.0, Figures 10-4 and 10-5.

Clearing and grubbing for temporary vehicle/equipment crossings at streams would be carefully controlled to minimize the introduction of harmful materials into the waterbody. Crossings would be perpendicular to the stream alignment whenever possible. Under no circumstances would stream bed materials be removed for use as backfill, embankments, road surfacing, or other construction purposes. Crossing of flowing streams would be limited to one crossing per vehicle if clearing equipment must cross the stream before placement of the vehicle crossing structure.

Temporary bridges and flume installations would be designed to accommodate the highest flow reasonably expected to occur while the bridge or flume is in place. FME proposes to design temporary bridge and flume installations to accommodate the two-year design flow wherever practicable. Flumes for dry-flume crossings would be sized to accommodate the measured base flow at the time of construction.

Flumes would be installed with the inlet and outlet at natural grade. If backfill is used, the flumes would have a minimum cover of 1 foot for flumes 18 to 36 inches in diameter, or a cover of one-third the flumes' diameter for flumes greater than 36 inches.

Bridges would be designed to support the expected loads and to accommodate the two-year design flow. The bridges would also be well maintained to prevent accumulation of debris (soil) on the deck, which may enter the waterbody.

At all streams less than 10 feet wide that do not support a significant fishery, and at all agricultural drains specifically indicated on the pipeline alignment sheets, provisions for vehicle access would be required only where necessary for the physical support of construction equipment. Provisions may include any of the crossing structures identified above or timber mats, rock fill pad, and timber riprap.

When no longer needed, all temporary structures or fill installed at stream crossings would be removed, and the course and banks of the stream channel would be re-established to original contours.

Non-Flowing, Intermittent Streams and Agricultural Drains. For all intermittent streams and drains less than 10 feet wide that are not flowing at the time of construction, and all agricultural field drains specifically identified as such, FME proposes a modified version of the open-cut wet crossing technique. This modified procedure is designed to better accommodate pipeline construction operations at these less-sensitive and/or highly disturbed crossings. Critical elements of the proposed procedure would include optional vehicle crossing requirements, elimination of the need to make up crossing pipe separate from the main line, and elimination of buffer requirements in cultivated lands. The proposed procedure is outlined in Section 14.0, Figure 10-6.

6.4.2.5 Major Waterbody Crossings

Onshore Horizontal Directional Drilling Approach. FME proposes HDD installation from a point offshore for the Alabama landfall to the entry located at MP 56.88. The drill segment would be approximately 5,000 feet long. The profile would be designed to pass by the mean high water mark. The pipe string would be accomplished offshore by a rig positioned at the exit hole. A typical HDD drawing is presented in Section 14.0, Figure PC-G-0010. All drawings prepared for the purpose of this joint application, involving the HDD of onshore Alabama approach can be found in Section 14, Figures PC-G-0011 through PC-G-00020.

Unnamed Tidal Creek at Main Pass 57.1. This creek is a perennial stream that flows into Mississippi Sound. The crossing width of this tidal creek is 102 feet from bank to bank. The banks are approximately 2.5 feet high, with a slope of 0° to 11°. Water depth at the proposed center line is approximately 48 to 60 inches. An open cut is proposed for the crossing of this tidal creek. A site-specific drawing is presented in Section 14.0, Figure TR-CL-D-0010.

6.4.2.6 Wetland Crossings

Techniques for wetland crossings would vary according to the type of wetland to be crossed, the length of the crossing, and the level of soil saturation or standing water present at the time of crossing.

FME proposes the use of three techniques for wetland crossings. Techniques would be selected according to site-specific wetland conditions. The three methods are as follows.

Type I — Dry or Moist Wetlands with Low Groundwater Level. This method is appropriate for areas with unsaturated or cohesive soils, where equipment can traverse the wetland without the support of mats, and where trench excavations are stable. Topsoil stripping is possible. Pipe stringing and fabrication may occur within the wetland adjacent to the trench line or adjacent to the wetland in a designated extra workspace. This method is shown in Section 14.0, Figure 10-7.

Type II — Saturated, Non-Cohesive Soils. These represent difficult trenching conditions, where trench widths to accommodate a 36-inch pipeline can significantly exceed normal trench widths. Supplemental support in the form of timber riprap or prefabricated equipment mats is required. Topsoil stripping is impossible because of the saturation. Pipe stringing and fabrication may occur within the wetland adjacent to the trench line or adjacent to the wetland in a designated extra workspace. This method is shown in Section 14.0, Figure 10-8.

Type III — Flooded Wetland. Supplemental support is required for excavation equipment in areas of standing surface water or groundwater at the surface. Only clearing, excavation, and backfill equipment will enter the wetland. All other equipment must move around. Topsoil stripping is impossible because of the flood conditions. This method is shown in Section 14.0, Figure 10-9.

6.5 Nature of Area to be Dredged

The proposed MPEH™ project would traverse several locations. Dredging would occur in all locations traversed by the proposed project. Offshore, the nature of the area to be dredged is water bottoms in Alabama State waters and federal waters within Mobile District jurisdiction, although dredging will actually only occur on approximately 11% of the offshore route within Alabama State Waters. Onshore wetlands and uplands would be traversed by the proposed Coden onshore pipeline. Trenching would occur within these upland and wetland areas. However, because approximately 80% of the proposed onshore ROW lies within wetlands, most trenching would occur in wetland areas.

7.0 Specifications for Discharge of Dredged or Fill Material

There would be no fill of any areas associated with the project. All dredged or excavated material would temporarily be stockpiled during pipeline installation. This stockpile would then be used as backfill for pipeline trenches.

7.1 How Discharge Material Would be Contained

7.1.1 Offshore Pipeline

Jetting will be the principle method utilized to lower the pipeline into the trench. However, bucket or clamshell dredging will be used to dredge a pipeline or flotation trench in certain locations, specifically HDD exit points, at fabricated bend locations, at boat channel crossings (except to Coden boat channel) and at a shallow area southwest Of Dauphin Island. Dredged spoil will be contained at HDD exit points and at fabricated bend locations. Raking will be utilized at all shallow water areas where the pipeline will be jetted (See Section 14.0, Figure PC-G-0130).

For all areas within Mississippi Sound, with the exception of the HDD location and the crossings of shipping channels, the proposed pipeline will be installed by jetting the pipeline below the mudline. In areas of Mississippi Sound where water depths are sufficient for jetting equipment and where the softer material is of sufficient thickness to accommodate the required depth for lowering of the pipeline, controlled jetting is the preferred method of installation. At HDD and fabricated bend locations, a pathway for the pipelay barge and dredge barge will be made by temporarily removing sufficient bottom material to allow vessel flotation. The material will be stored on either side of the cut. The removed materials will be returned to the dredged areas after installation of the facilities has been completed. A minimum of four feet of cover above the pipeline will be provided, which is in compliance with burial depths required by the State of Alabama.

During all pipeline lowering operations, care will be taken to limit the migration of turbidity. Spoil from shallow water dredged areas, specifically the Coden HDD exit points and fabricated bends, will be contained within sheet piled structures or within hopper barges until instillation activities are complete and the pipeline has been successfully installed. Turbidity curtains will surround the work site, depending on tidal or wind driven currents existing at that site. Turbidity-producing tasks will be stopped should damage occur to the spoil containment area and turbidity curtains causing turbidity readings to exceed allowable levels at the monitoring points until the situation is corrected. Spoil storage areas will be marked with temporary, lighted pilings that are maintained until the spoil has been returned to the trench (Section 14.0, Figure PC-G-0150).

In areas to the west of the Portersville Bay demarcation line, jetting will be the predominant method utilized to lower the pipeline. This is the preferred method of the regulatory agencies. In all areas where the pipeline is to be lowered by shallow water jetting techniques, raking will be used to check for and remove stumps prior to the pipelay operation (Section 14.0, Figure PC-G-0090). Some pipelines previously installed in Mississippi Sound encountered large, old tree stumps, some possibly petrified, which required removal prior to installation of the pipeline. The term "raking" describes the process where a bucket or clamshell dredge is worked down the pipeline right-of-way checking for stumps. The dredge bucket lifts a load of soil from the bay bottom, checks the load for evidence of stumps, then returns the load to the spot from which it was removed if no stumps are encountered. Any stumps located in this manner will be removed from the worksite for offsite disposal. There will be no spoil mounds created during the raking process.

All dredged areas within State Waters of Alabama will be marked with spoil marker pilings until installation activities are complete and the pipeline has been successfully installed. Other than the nearshore areas around Coffee island, dredge spoil will be side cast to either side of the proposed pipeline route, dependent on agreed-upon installation procedures and prevailing wind and waves. The spoil area will be marked with temporary, lighted pilings that will be maintained in accordance with the United States Coast Guard (USCG) requirements until the dredged area has been backfilled with the spoil material.

Installation activities within Portersville Bay will be restricted to the six-month window commencing October 1, 2001 due to the oyster spat season. Dredging 'will be required for a distance of approximately 1,800 feet from the Coden HDD exit point to the Portersville demarcation line to allow the tie-in vessels to access the work site. The trench will also be dredged in a manner to provide a transition from the exit hole to the bay bottom. This transition will be such that the pipeline will achieve a safe radius of curvature as determined by engineering calculations. The dredging will be accomplished with bucket or clamshell dredges.

A turbidity prevention system will be installed around the HDD exit prior to the commencement of any installation activities (Section 14.0, Figure PC-G-0012). This system will be comprised of a row or multiple rows or "fences" of wooden pilings driven into the' bay bottom, from which turbidity reduction curtains will be suspended. The quantity of fence-rows installed will ensure that allowable turbidity levels are not exceeded. All pilings and curtains will be appropriately marked, lighted and maintained throughout the duration of dredging activities.

The dredging for the Coden HDD exit points will be accomplished with a dredge that will place the dredged material into an area of positive containment (hopper barges or sheet pile pins located near the exit holes). During the excavation process, the bucket/clamshell will be completely inside the boundaries of the containment area(s) prior to releasing the load. During the backfill process, the clamshell or bucket will be submerged below the surface of the water prior to releasing the load. Once the HDDs have been completed and the pipelines tied in, the spoil will be returned to the trench and all equipment and installation aids utilized to contain the spoil will be removed.

7.1.2 Pipeline Routes

Main Pass 164 to Offshore Coden: 36-Inch Gas Pipeline
A third-generation lay vessel (3GLV) would be used to install the 36-inch-diameter pipeline. This pipeline would originate at Platform No. 2, MP 299, in more than 200 feet of water and proceed north approximately 30 miles to a platform, in approximately 125 feet of water. Some of the gas may be transferred to another gas transmission company line at this point. From this platform, the remaining gas would continue north through the 36-inch pipeline toward Alabama. The pipeline route will pass through Mobile Area Block 819 and continuing to cross the Alabama 3-mile line, west of Dauphin Island, and finally making landfall near Coden. The 3GLV would be limited to a 50- to 60-foot water depth. Consequently, a 2GLB would continue to lay the pipeline from the 3GLV dropoff, crossing the Alabama State 3-mile line until approximately 15 feet of water west of Dauphin Island, where the SWLB would pick up and continue laying the pipe to the shore approach. The shore approach near Coden would be made by a horizontal directional drill.

7.2 Onshore Pipelines

7.2.1 Pipeline Route

Onshore Coden to Metering Tie-Ins

From the onshore HDD landing location, north of Henry Johnson Road, progressing east, the proposed ROW would lie parallel to Henry Johnson Road and adjacent to the existing Gulfstream easement. This scenario would continue to MP 57.7. At that point, the proposed ROW would no longer lie parallel to Henry Johnson Road and would progress north, all the while being co-located with the existing Gulfstream easement. At MP 58.2, the proposed ROW would turn eastward approximately 1,000 feet north of Highway 188. This general north-and-east direction would continue to MP 61.9, where the proposed pipeline would interconnect with the proposed metering tie-ins located south of and adjacent to Rock Road. The entire Coden onshore proposed route would be co-located with the Gulfstream easement from MP 56.9 to MP 60.3, and MP 60.7 to 61.9. One section of the proposed route would be co-located with the Transco existing easement from MP 60.3 to MP 60.7, which is where Gulfstream deviates to its compressor station (see Section 14.0, Figures TR-CL-D-0001 through TR-CL-D-0005 [ALIGNMENT SHEETS]).

7.2.2 General Construction and Restoration Methods

FME has developed two site-specific plans in order to control temporarily placed stockpiles and cleared areas. These plans address pre-construction planning, erosion controls, and revegetation in uplands, wetlands, and water bottoms. These plans are derived from Federal Energy Regulatory Commission plans and procedures addressing like issues. The plans are in Section 14.0, Documents B and C. Figures outlined within these plans are found in Section 14.0.

7.2.3 Additional Land Requirements for Onshore Construction

The construction width of the Coden Onshore Pipeline will be 75 feet. Approximately 90% of the pipeline will be collocated with the existing Gulfstream pipeline corridor. The permanent ROW width will be 50 feet. Details of the ROW configurations are shown in Section 14.0, Figures 7-2, 7-3, 7-4, and 7-5.

7.2.3.1 Extra Work/Staging Areas

FME proposes to use 10.8 acres for construction in extra workspaces and staging areas to allow safe crossings of roads, waterbodies, and utilities. Typical configurations are shown in Section 14.0, Figures 7-6, 7-7, 7-8, 7-9 and pipeline alignment sheets (Figures TR-CL-D-0001 through TR-CL-D-0005). A summary of extra workspaces and staging areas is listed in Table 7.1.

Table 7.1. Locations of Temporary Extra Workspace for Construction of the Coden Onshore Pipeline

Type	EWS #	Milepost	Feature	Approximate Extra Workspace Dimension (feet)			Reason For Extra Workspace
a/	1	56.8	HDD[1,2]	100	x	580	A, B
a/	2	57.1	Creek	100	x	150	C, D
a/	3	57.2	Creek	100	x	250	C, D
a/	4	57.6	Road	100	x	150	E, F
a/	5	57.6	Road	100	x	150	E, F
a/	6	58.0	Road	75	x	100	E, F
a/	7	58.0	Road	100	x	150	E, F
b/	8	58.6	Creek	100	x	150	C, D
b/	9	58.7	Creek	100	x	150	C, D
b/	10	58.8	Road	100	x	150	C, D, G
b/	11	58.8	Road	100	x	140	C, D, G
b/	12	58.9	Road	100	x	150	C, D, G
b/	13	60.0	Ditch	100	x	50	C, D
b/	14	60.0	Ditch	100	x	100	C, D
c/	15	61.3	Pipe	100	x	300	D, H
c/	16	61.4	Pipe	100	x	300	D, H
c/	17	61.5	Pipe	100	x	150	D, H
c/	18	61.6	Powerline	100	x	325	D, H

c/	19	61.7	Powerline	100	x	150	D, H
c/	20	61.8	Pipe	100	x	150	D, H
c/	21	61.9	Pipe	150	x	100	D, H
c/	22	62.2	Pipe	150	x	100	D, H
c/	23	62.3	Pipe	50	x	230	D, H
d/	24	62.4	Pipe	100	x	345	D, H
D/ a/	25	62.7	Pipe	100	x	150	D, H
D/ a/	26	62.8	Pipe	100	x	150	D, H
a/	27	62.9	Staging Area	240	x	200	B

Notes:
1 - Horizontal Directional Drill
2 – Extra Work Space (EWS) includes HDD and Staging Area
Crossing Type:
a/ Forested Wetland
b/ Cropland and Pasture
c/ Evergreen Forest Land
d/ Deciduous Forest Land
Key:
A - EWS for HDD construction.
B - Mobilization and staging area for pipeline equipment and operations.
C - Construction requires EWS for waterbody crossing.
D - Additional spoil storage area.
E - Construction requires EWS for road bore equipment.
F - Area needed for welding equipment and operation.
G - Construction requires EWS for access road crossing.
H - Foreign utility crossing.

7.2.3.2. Access Roads

Pipeline ROW access will be made from public roads that cross the ROW, two private access roads, two access roads on the edge of an existing pipeline facility, and one additional new access road at the start of the pipeline. These roads will provide access to project areas for construction and management personnel, materials and equipment to the construction ROW. Repairs, upgrades, and new installation are required (Table 7.2). FME will make any repairs to these roads necessitated by damage or wear to those roads resulting from their use for the project.

Table 7.2. Proposed Access Roads for the Proposed Coden Onshore Pipeline

Road #	Milepost	Road Name	Description	Public/ Private	Crossing	Needs Work
AR-01	57.9	New Access Road	New access road at HDD	Private/New		Yes
AR-02	58.9	Private Rd.	Existing dirt road	Private	yes	Yes
AR-03	59.0	Private Rd.	Existing dirt road	Private	Yes	Yes
AR-04	61.6	Pipeline Station	Access to ROW around station yard	Private		Yes

Table 7.2. Proposed Access Roads for the Proposed Coden Onshore Pipeline

Road #	Milepost	Road Name	Description	Public/ Private	Crossing	Needs Work
AR-05	61.6	Pipeline Station	Access to ROW around station yard	Private		Yes

Key:
HDD = Horizontal directional drill.
ROW = Right-of-way.

7.2.3.3. Pipe and Contractor Yard

Approximately 3.50 acres will be required for pipe storage and 5.25 acres will be required for the contractor yard and materials warehouse. The areas of these off-ROW requirements are estimated. Specific locations will be selected and submitted as the project develops.

7.2.3.4. Aboveground Facilities

Three aboveground facilities will be required (Section 14.0, Figures 7-10, 7-11, and 7-12). A mainline valve will be required at the start of the pipeline, totaling 0.23 acres . Meter stations and pig receiving facility will be required for the proposed interconnect sites totaling 1.59 acres. A summary of the impacts associated with the aboveground facilities is shown in Table 7.3.

Table 7.3. Summary of Land Requirements for Aboveground Facilities forthe Proposed Coden Onshore Pipeline

Facility	Approximate Milepost	Current Land Use	Land Affected During Construction (acres)	Land Affected During Operations (acres)
Main Line Valve	56.9	Forested Wetland	0.1	0.1
Station 1	61. 6	Deciduous Woodland	0.3	0.2
Station 2	61.9	Forested Wetland	0.3	0.2
Total Acreage Affected			**0.7**	**0.5**

7.2.4 Hydrostatic Test Waters

The Coden onshore pipeline, which would consist of 5 miles of 36-inch pipeline, would be constructed using one small pipeline construction spread. The hydrostatic test of the pipeline would also likely be done in one section. Table 7.4 identifies the proposed water source, discharge location, and quantity of hydrostatic test water. Discharge water would be filtered to remove pipe debris and particles before discharge.

Test water intake and discharge would be done in accordance with State and federal regulations. Test water would be obtained from approved sources and would be screened, if necessary, to prevent fish entrainment. The test water would be discharged in an upland area. No chemicals or additives are anticipated in the hydrostatic testing or pipeline drying for the Coden onshore pipeline.

Table 7.4 Coden Onshore Pipeline
Potential Hydrostatic Test Water Sources

No.	Test Water Volume (gallons)	Water Source	Water Discharge Point
1	1,304	Municipal water — MP 56.9	Upland area on pipeline ROW — MP 58.7 to MP 59.8
2	1,304	Pond water — MP 57.9	Upland area on pipeline ROW — MP 58.7 to MP 59.8

8.0 See Application

9.0 Purpose and Need

9.1 Markets and Pricing

Domestic natural gas prices are projected to remain higher than historical levels because of increasing demand and declining North American production. Pricing would be mainly driven by demand response through efficiency and fuel flexibility of consuming systems (power plants and consumer heating and cooling systems); the ability to augment conventional and unconventional sources of supply from North America, including the Artic; and increasing access to world resources through LNG. The U.S. Government removed price controls on natural gas in the late 1980s, and gas futures trading on the (NYMEX) began in April 1990.

Effective mechanisms for the sale, purchase, and pricing of natural gas have evolved in the U.S. market. There has been progressive reliance in recent years on open access to competitive markets at points along the natural gas supply value chain in an effort to provide competitive pricing and supply alternatives to the nation's natural gas consumers.

9.2 The Annual Energy Outlook 2004 Report

The *Annual Energy Outlook 2004* (AEO2004) report, released in January 2004, forecasts lower natural gas demand and higher natural gas prices than last year's long-run projections, because of (EIA's) re-evaluated expectations regarding the future role of natural gas in energy markets, the economics of natural gas exploration and development, and future natural gas price trends.

Total natural gas supply is projected to grow to 31.3 (TCF) in 2025, which is 3.3 TCF less than the amount in the AEO2003 report. Domestic natural gas production is projected to increase from 19.1 to 24.1 TCF between 2002 and 2025, which is 2.8 TCF less than the amount in the forecast released last year. Conventional onshore production is lower because of slower reserve growth, fewer new discoveries, and higher exploration and development costs. Offshore natural gas production is also lower because of the tendency to find more oil than natural gas offshore and higher costs than previously anticipated.

Future growth in U.S. natural gas supplies would depend on unconventional domestic production, natural gas from Alaska, and LNG imports. Total non-associated unconventional natural gas production is projected to grow from 5.9 TCF in 2002 to 9.2 TCF in 2025. With completion of an Alaska natural gas pipeline in 2018, total Alaska production is projected to increase from 0.4 TCF in 2002 to 2.7 TCF in 2025. Total net LNG imports are projected to increase from 0.2 TCF in 2002 to 4.8 TCF in 2025, more than double the AEO2003 projection.

Average natural gas prices are projected to increase from $2.95 (MMBTU) (2002 dollars) in 2002 to $4.40 MMBTU in 2025 (equivalent to approximately $8.50 [MCF] in nominal dollars). At $4.40 MCF, the 2025 wellhead natural gas price in AEO2004 is $0.44 higher than that in the 2003 forecast.

The changes lead to a revised expectation regarding the fuel mix of future electric-generating capacity additions and generation. Coal is now projected to play a more important role, particularly in the later years of the forecast. Cumulative projected additions of natural-gas-fired generating capacity are lower in the AEO2004 report than they are in the AEO2003 report, and more additions of coal and renewable generating capacity are projected.

The higher natural gas prices also impact the demand for natural gas in the industrial sector, particularly in energy-intensive industries. Total industrial demand for natural gas is projected to increase from 7.2 TCF in 2002 to 10.3 TCF by 2025, which is 0.7 TCF less in 2025 than that forecast last year. While industrial natural gas demand is lower in the AEO2004 report because of the higher natural gas prices, output in the energy-intensive manufacturing industries still grows at 1.6% per year from 2002 to 2025. The non-energy-intensive manufacturing industries grow at a rate of 3.2% per year over the same period.

9.3 Main Pass Energy Hub™ Economics

An important aspect of and key economic provision to the construction of the MPEH™ would be the conversion and reuse of existing facilities located at MP 299, which were previously used for sulfur-mining activities. Use of existing facilities would compress the project schedule, reduce fabrication costs, and eliminate potential decommissioning costs to remove existing infrastructure that is currently underutilized. Based on cost projections, such cost savings would be essential to make the project an economically feasible, competitive business venture for the applicant.

9.4 Main Pass Energy Hub™ Location

The geographic location of MP 299 also would ensure the close proximity of shipping and navigation channels that would ease transportation and minimize the creation of additional fairways in the GOM. The location in the north-central GOM would maximize the use of existing offshore infrastructure and allow for the use of local experienced labor.

9.5 Main Pass Energy Hub™ Storage in Salt Domes

MP 299 sits atop a salt dome approximately 2 miles in diameter. An on-site total capacity of 28 billion cubic feet would be provided in three salt caverns underlying the LNG terminal. This volume of stored LNG would last for approximately two days, while the terminal would continue to deliver 1 bscfd of natural gas into the facility export pipelines. This storage capacity would allow the LNG terminal to provide more measured and consistent delivery of natural gas volumes into the pipeline system, thereby relieving pipeline operators from the difficulty of managing alternating periods of very low and very high throughput. The ability to deliver consistent volumes of natural gas into the connected transmission pipeline(s) was identified as a key technical and economic requirement for the project.

9.6 Main Pass Energy Hub™ High Throughput Capacity

To be economically feasible, the selected terminal type and location must have the ability to receive approximately 135 LNG carrier port calls per year, and have a peak send-out rate of approximately 1.2 bscfd of natural gas, with a peak capacity of 3.1 bscfd. This volume translates to approximately 8 million tons per annum of regasified LNG. The facility throughput requirement is a principal economic driver behind the project.

9.7 Main Pass Energy Hub™ Access to Pipelines

The north-central GOM has an extensive network of offshore pipelines carrying processed and unprocessed products to shoreside terminals and markets. The ability of the MPEH™ to deliver product into existing pipelines would mean less environmental disruption through construction of pipelines offshore, and better access to commercial markets.

10.0 See Application

11.0 Landowner Information

11.1 Adjacent Property Owners and Block Lease's.

Landowners who would be adjacent to the Coden onshore pipeline are listed by tract number in Table 11.1. Tract numbers are shown in Section 14.0, Figure 2.

Table 11.1 List of Landowners by Tract

Tract No.	Landowner
1	Charles Henry Campbell 418 Dogwood Drive Saraland, AL 36571
2	Gulfstream Natural Gas Systems Attn: Al Taylor P.O. Box 1642 Houston, TX 77251
3	Archbishop of Mobile Attn: Jim Weisser 356 Government Street Mobile, AL 36602
4	William Martin Folks and Swan Equities P.O. Box 16645 Mobile, AL. 36616
5	Karne D. Gary et al. 220 South Dearborn Street Mobile, AL. 36602
6	William T. Tonsmeire P.O. Box 6068 Mobile, AL. 36660
7	Paul H. Sandagger 7101 East Greenview Drive Mobile, AL 36618
8	Joseph E. Mareno 8400 East Rabby Street Bayou La Batre, AL 36509
9	Frederick E. DeMouy Jr. P.O. Box 224 Coden, AL 36523-0224
10	ExxonMobile Production Company Contact: Carl Southern 515 West Greens Road, Suite 625-77067 P.O. Box 4610 Houston, TX 77210-4610
11	Robert P. Wooldridge 4375 Goldmine Road Mobile, AL 36619
12	Paul E. Ford P.O. Box 398 Coden, AL 36523

13	Margie Thomas Duncan et al. 2412 Luvenia Drive Mobile, AL 36617
14	P.E. Howard Berry 2909 Gaslight Lane South Mobile, AL 36617
15	Mr. Phelian Clarck P.O. Box 7 Irvington, AL 36544
16	Patricia Ann Lee 7600 Ken Buck Road Irvington, AL 36544
17	Rosemary Butler 470 West Creek Circle Mobile, AL 36617
18	Coden Lodge No. 293 c/o Chester McDougle P.O. Box 104 Coden, AL 36523

Lessees of offshore blocks upon which the MP 164 pipeline would traverse to the Coden onshore pipeline are listed in Table 11.2.

Table 11.2 Offshore Block Leases

MPEH™ CROSSING BLOCKS	PIPELINES	OPERATOR NAME	CONTACT NAME	TELEPHONE NO.
MP 164 North				
MP 164 North	8,089	Duke Energy Texas Eastern Transmission LP	Mr. Mike Fletcher	(281) 424-6839
MP 164 North	10,824	Duke Energy Texas Eastern Transmission LP	Mr. Mike Fletcher	(281) 424-6839
MP 159	Not applicable (N/A)			
Chandeleur East Addition				
CA 41	N/A			
CA 38	N/A			
CA 37	N/A			
Viosca Knoll Area				
VK 201	N/A			
VK 202	N/A			
VK 158	N/A			
VK 114	N/A			
VK 115	N/A			
VK 71	N/A			

VK 70	N/A			
VK 26	9,239	Chevron USA, Inc.	Mr. Gordon Cain	(504) 592-6000
Mobile Area				
MO 994	N/A			
MO 995	N/A			
MO 951	N/A			
MO 907	11,273	Destin Pipeline Company, LLC / BP Amoco Co.	Mr. Mike Cunningham	(228) 696-0120
MO 863	9,379	Chevron Pipe Line Company	Mr. Thomas August Jr.	(281) 596-2969
MO 863	9,474	Callon Petroleum Operating Company	Ms. Dee Newman	(601) 442-1601
MO 863	11,759	Chevron USA, Inc.	Mr. Gordon Cain	(504) 592-6000
MO 863	11,760	Chevron USA, Inc.	Mr. Gordon Cain	(504) 592-6000
MO 863	11,761	Chevron USA, Inc.	Mr. Gordon Cain	(504) 592-6000
MO 819	N/A			

12.0 Federal, State, and Local Requirements for Main Pass Energy Hub™ Alabama Pipeline Segments

Federal, State, and local requirements for MPEH™ Alabama pipeline segments are presented in Table 12.1.

Table 12.1 Federal, State, and Local Requirements

Agency	Permit/Approval	Status
Federal		
Advisory Council on Historic Preservation	Section 106, National Historic Preservation Act	Under review by Alabama SHPO.
Federal Energy Regulatory Commission		In review of the MPEH™ deepwater port license application.
U.S. Army Corps of Engineers	Section 10, Rivers and Harbors Act Section 404, Clean Water Act	USACE/ADEM joint application submitted on 02/27/04
NOAA Fisheries Office of Protected Resources	Section 7, Endangered Species Act Marine Mammal Protection Act Essential Fish Habitat	Consultation completed on 02/27/04
Minerals Management Service	ROW pipeline offshore	In review of the MPEH™ deepwater port license application.
U.S. Fish and Wildlife Service	Section 7, Endangered Species Act Marine Mammal Protection Act	Consultation ongoing.
State of Alabama		
ADEM Field Operations Division — Mining and Nonpoint Source Section	USACE/ADEM joint application and notification submitted on 02/27/04 NPDES permit application and notice of registration to be submitted.	Joint application and notification submitted on 02/27/04 NPDES application and registration submitted on [date].
ADEM Field Operations Division — Coastal Section	Coastal Zone Management Act and ADEM Administrative Code 335-8	Coastal consistency certification to be submitted.
ADCNR State Lands Division	Shallow hazards survey, submerged ROW contract, and variance for drilling mud disposal	Ongoing
Alabama State Port Authority — Environmental, Health, and Safety	USACE/ADEM joint application and notification	Ongoing

Agency	Permit/Approval	Status
Alabama Public Service Commission	Jurisdiction for pipelines in State waters, transmission lines onshore, and gathering lines onshore in non-rural areas.	Reviews the specifications and would attend any pre-consultation meetings.
State Oil and Gas Board		
ADEM Water Quality Section	Section 401, Clean Water Act NPDES	State water quality certification and notice of registration for hydrostatic test water discharges.
ADCNR Marine Resources Division	Code of Alabama 1975 § 9-2-4, 9-2-7, 9-2-8, and 9-2-12	
ACDNR Wildlife and Freshwater Fisheries Division	Alabama Act No. 82-424, State-protected species consultation	
Alabama Department of Transportation	State Highway Crossing Easement	
Alabama Historical Commission State Historic Preservation Officer	Section 106, National Historic Preservation Act	
ADECA Office of Water Resources		Certificate of Beneficial Use.
Local Government		
Mobile County Commission and applicable city governments		

Key:

ADCNR = Alabama Department of Conservation and Natural Resources.
ADECA = Alabama Department of Economics and Community Affairs.
ADEM = Alabama Department of Environmental Management.
MPEH™ = Main Pass Energy Hub™.
NOAA = National Oceanic and Atmospheric Administration.
NPDES = National Pollutant Discharge Elimination System.
ROW = Right-of-way.
SHPO = State Historic Preservation Office.
USACE = United States Army Corps of Engineers,

13.0 See Application

14.0 Attachments

Included in the attachments are pipeline survey plats showing fairway crossing locations, shore approaches, and onshore routing; a wetland and waterbody identification report; onshore and offshore cultural resources survey report, and upland and wetland construction plans. Figure numbers for typicals and alignments sheets were provided based on location within the USCG deepwater port application environmental impact statement. The complete list of figures and attachments is shown in Tables 14.1 (onshore), 14.2 (offshore), and 14.3 (documents).

Table 14.1 Onshore Figures

Figure No.	Description
1	USACE Mobile and New Orleans Districts, Respective Permit Areas
1-3	Route Map, Onshore Coden Pipeline, Milepost 56.9 to 59.5
1-4	Route Map, Onshore Coden Pipeline, Milepost 59.5 to 61.9
2	Survey Permissions, 36? LNG Pipeline
7-2	ROW Configuration Without Utilities (Plan)
7-3	ROW Configuration Without Utilities (Section)

7-4	ROW Configuration With Co-Located Utilities (Plan)
7-5	ROW Configuration Co-Located With Utilities (Section)
7-6	Extra Work Space Configuration Minor Creek Crossing
7-7	Extra Work Space Configuration Intermediate Creek Crossing
7-8	Extra Work Space Configuration, Two-Lane Road
7-9	Extra Work Space Pipeline Utility Crossing
7-10	General Map, Main Line Valve
7-11	Preliminary Meter Station Design with Receiver
7-12	Preliminary Meter Station Design with One Meter
10-1	HDD Shore to Water
10-2	Open-Cut "Wet" Crossings
10-3	Open-Cut Wet Crossing, Using Slackline Configuration
10-4	Temporary Bridge Crossings
10-5	Typical Flume Equipment Crossings
10-6	Non-Flowing Intermediate Ditch Crossing
10-7	Type I "Dry" Wetland Crossing
10-8	Type II "Wet" Saturated Wetland Crossing
10-9	Type III "Wet" Flooded Wetland Crossing
11-1	Typical Filter Bag Dewatering
11-2	Typical Dewatering Structure
11-3	Permanent Diversion Berms
11-4	Permanent Trench Breakers
11-5	Typical Staked Sediment Barrier
11-6	Typical Silt Fence Barrier
11-7	Typical Straw Bale Barrier
TR-CL-D-0001	Pipeline Alignment Sheet
TR-CL-D-0002	Pipeline Alignment Sheet
TR-CL-D-0003	Pipeline Alignment Sheet
TR-CL-D-0004	Pipeline Alignment Sheet
TR-CL-D-0005	Pipeline Alignment Sheet
TR-CL-D-0010	Open-Cut Tidal Creek, Milepost 57.1

Table 14.2 Offshore Figures

Figure No.	Description
PC-G-0010	Typical HDD Shoreline Crossing
PC-G-0011	Typical HDD Spread, Shore to Water
PC-G-0012	Typical HDD Spread with Turbidity Containment
PC-G-0020	Typical HDD Exit Hole
PC-G-0030	Typical Buried Pipeline Crossing
PC-G-0050	Gulf of Mexico Typical Fairway Crossing
PC-G-0055	Intracoastal Waterway, Mississippi Sound Channel Crossing
PC-G-0070	Typical Offshore Pipeline Lay Barge Spread
PC-G-0080	Typical Dredge Barge Spread
PC-G-0090	Typical Shallow Water Pipe Lowering Spread (Jetted)

PC-G-0100	Typical Offshore Pipe Lowering Spread (Jetted)
PC-G-0101	Typical Offshore Pipe Lowering, Jet Sled Detail
PC-G-0110	Typical Offshore Post-Lay Plow Spread
PC-G-0120	Mississippi Sound Typical Dredged Pipeline Trench
PC-G-0130	Typical Pipeline Jetted Trench
PC-G-0140	Typical Plowed Pipeline Trench
PC-G-0150	Temporary Spoil Marker Pilings
PC-G-0160	Pipeline Flooding and Hydrostatic Test Equipment
101224	Index Map for Offshore Alignment Sheets
Map 1, 5 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)
Map 1, 6 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)
Map 1, 7 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)
Map 1, 8 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)
Map 1, 9 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)
Map 1, 10 of 10	Archeological, Engineering, and Hazard Map (Offshore Alignment Sheets)

Table 14.3 Documents

Attachment	Description
A	U.S Wetland and Waterbody Identification Report
B	Upland Erosion Control, Revegetation, and Maintenance Plan
C	Wetland and Waterbody Construction and Mitigation Procedures
D[1]	Archeological, Engineering, and Hazards Survey – MP 299 to Alabama State Waters
E	Archeological, Engineering, and Hazards Survey – Alabama State Waters
F[2]	Cultural Resources Survey

[1]- Survey was conducted for the MP 299 pipeline, north to Alabama State Waters. Only the sections involving MP 164 pipeline, north to Alabama State Waters are covered by this joint permit application.

[2]- Included under separate cover, Privileged and Confidential Information.

Onshore Figures

Figure No.	Description
1	USACE Mobile and New Orleans Districts, Respective Permit Areas
1-3	Route Map, Onshore Coden Pipeline, Milepost 56.9 to 59.5
1-4	Route Map, Onshore Coden Pipeline, Milepost 59.5 to 61.9
2	Survey Permissions, 36? LNG Pipeline
7-2	ROW Configuration Without Utilities (Plan)
7-3	ROW Configuration Without Utilities (Section)
7-4	ROW Configuration With Co-Located Utilities (Plan)
7-5	ROW Configuration Co-Located With Utilities (Section)
7-6	Extra Work Space Configuration Minor Creek Crossing
7-7	Extra Work Space Configuration Intermediate Creek Crossing
7-8	Extra Work Space Configuration, Two-Lane Road
7-9	Extra Work Space Pipeline Utility Crossing
7-10	General Map, Main Line Valve
7-11	Preliminary Meter Station Design with Receiver
7-12	Preliminary Meter Station Design with One Meter
10-1	HDD Shore to Water
10-2	Open-Cut “Wet” Crossings
10-3	Open-Cut Wet Crossing, Using Slackline Configuration
10-4	Temporary Bridge Crossings
10-5	Typical Flume Equipment Crossings
10-6	Non-Flowing Intermediate Ditch Crossing
10-7	Type I “Dry” Wetland Crossing
10-8	Type II “Wet” Saturated Wetland Crossing
10-9	Type III “Wet” Flooded Wetland Crossing
11-1	Typical Filter Bag Dewatering
11-2	Typical Dewatering Structure
11-3	Permanent Diversion Berms
11-4	Permanent Trench Breakers
11-5	Typical Staked Sediment Barrier
11-6	Typical Silt Fence Barrier
11-7	Typical Straw Bale Barrier
TR-CL-D-0001	Pipeline Alignment Sheet
TR-CL-D-0002	Pipeline Alignment Sheet
TR-CL-D-0003	Pipeline Alignment Sheet
TR-CL-D-0004	Pipeline Alignment Sheet
TR-CL-D-0005	Pipeline Alignment Sheet
TR-CL-D-0010	Open-Cut Tidal Creek, Milepost 57.1

Figure 1

USACE Mobile and New Orleans Districts, Respective Permit Areas, General Location Map

Figure 2

Survey Permissions, 36? LNG Pipeline

Offshore Figures

Attached Documents

Attachment	Description
A	U.S Wetland and Waterbody Identification Report
B	Upland Erosion Control, Revegetation, and Maintenance Plan
C	Wetland and Waterbody Construction and Mitigation Procedures
D[1]	Archeological, Engineering, and Hazards Survey – MP 299 to Alabama State Waters
E	Archeological, Engineering, and Hazards Survey – Alabama State Waters
F[2]	Cultural Resources Survey

Attached Document A

U.S. Waters/Wetland Identification Report
Main Pass Energy Hub™, Onshore Natural Gas Pipeline
Mobile County, Alabama

Attached Document B

FME’s Modified FERC
Upland Erosion Control, Revegetation, And Maintenance Plan

Attached Document C

FME's Modified FERC
Wetland And Waterbody Construction And
Mitigation Procedures

Attached Document D

Archeological, Engineering, and Hazards Survey
Two Proposed 36-inch Gas Pipelines
Block 299 To Block 164, Main Pass Area
And
Block 164, Main Pass Area To
Block 819, Mobile Area
And
Two Proposed 16-inch Gas Pipelines
Block 164, Main Pass Area
Gulf of Mexico

Attached Document E

Archeological, Engineering, and Hazards Survey
Proposed 36-inch Gas Pipelines
Block 819, Mobile Area To
Alabama Landfall
Mississippi Sound

Attached Document F

A Phase I Cultural-Resource Survey of the Freeport-McMoRan Main Pass Energy Hub (MPEH™) Pipeline, Mobile County, Alabama

<u>Included Under Separate Cover, Privileged and Confidential Information</u>

15.0 See Application

16.0 Additional Information

Section 10 of Rivers and Harbors Act of 1899
This section discusses the portions of the project that would be subject to Section 10 of the RHA under the jurisdiction of USACE.

Fairway Crossings
The proposed MPEH™ 164 pipeline would traverse three shipping fairways and two navigation channels within the Mobile District's boundaries in the State waters of Alabama and federal waters of the OCS. The locations of shipping fairways and navigation channels in Mississippi Sound, Mobile Bay, and federal waters, with respect to the proposed pipeline route, are indicated in Section 14.0, Figure 1. The distances and directions of all navigation channels that would be traversed by the MPEH™ are presented in Table 16.1. A typical fairway-crossing profile of the proposed crossings of offshore fairways by the MPEH™ pipeline is presented in Section 14.0, Figure PC-G-0050. Offshore alignment sheets can be found as an appendix to the Archeological, Engineering, and Hazards Survey located in Section 14.0, Attachments D and E.

Table 16.1. Shipping Fairways and Navigation Channels Traversed Within the COE Mobile District Boundaries in Alabama State Waters and Federal Waters of the OCS

Channel or Fairway	Line	Proposed Burial Method and/or Depth
Bayou Coden	164	Dredge/10ft.
Intracoastal waterway	164	Dredge/10ft.
Pascagoula	164	Dredge/10ft.
Coastwise	164	Dredge/10ft.
Mississippi River, Gulf Outlet	164	Dredge/10ft.

The MPEH™ would cross three shipping fairways in the federal waters of the OCS: the Coastwise, Pascagoula, and Mississippi River Gulf Outlet fairways. The pipeline would be buried to 10 feet in all fairways crossed, using conventional jetting techniques. The Coastwise fairway would be traversed in Block 863 (Mobile area). The Mississippi River Gulf Outlet would be traversed in Blocks MO 115 and MO 71 (Viosca Knoll area). The Pascagoula fairway would be traversed in Blocks 994 and 995 (Viosca Knoll area). A typical fairway crossing can be seen in Section 14.0, Figure PC-G-0050 and PC-G-0055.

State Water Crossings
The water bottoms from the mean low water along the mainland coast of Alabama seaward to the 3-mile line are owned by the State of Alabama and are managed by the State Lands Division of the Alabama Department of Conservation and Natural Resources.

ROWs must be obtained from the respective agencies for the construction and operation of pipelines on or in these State-owned water bottoms. Three hundred feet of temporary ROW and 50 feet of permanent ROW are being applied for in Alabama. Additionally, a 500-foot-wide temporary ROW, where dredging methods would be used to lower the pipeline, is being applied for in Alabama.

The MPEH™ does not anticipate any adverse impact on Alabama State waters. The pipeline would avoid Petit Bois Island, which is part of the Gulf Islands National Seashore, and Dauphin Island by entering Mississippi Sound via Petit Bois Pass.

Coden Onshore Waterbodies

Five waterbodies would be crossed by the Coden onshore pipeline ROW. Three of these are designated as Section 10 perennial waterbodies. They are an unnamed tidal inlet located at MP 57.1, Bayou Como at MP 58.7, and Bayou Jonas at MP 61.3. All five features are discussed in detail, along with survey procedures, hydrology, vegetation, and soils, in Section 14.0, Attachment A.

Section 404 of the Clean Water Act

The wetland investigation involved identification and preliminary delineation of waters of the United States, including wetlands, which are subject to USACE jurisdiction under Section 404 of the CWA. From January 20 to 22, and 26 to 28, 2004, E & E performed a field identification and preliminary delineation survey along the proposed MPEH™ ROW. Procedures followed the routine determination methodology established in the 1987 *Corps of Engineers Wetland Delineation Manual* (Technical Report Y_87-1).

Results of the identification and delineation of waters of the United States, including wetlands, at the project site in Mobile County, Alabama, show that the proposed project survey area contains waters/wetlands subject to USACE jurisdiction. These jurisdictional areas consist of low pasture, hydric pine flatwoods, mixed wetland hardwoods, cypress stands, herbaceous wetland, and defined bayous located within the Mobile Bay watershed. These areas meet the definition of *waters of the United States* as stated in 33 CFR 328.3. The proposed pipeline ROW would traverse four wetland areas totaling 38.61 acres and five streams. It is expected that the proposed ROW would impact 10.21 acres of forested wetland, with 6.65 acres being impacted permanently. Design engineers planned activities during preliminary site analysis to minimize the impact on wetland areas and stream crossings within the proposed project area.

The USACE jurisdictional determination of waters of the United States would be required and would directly influence construction and operation activities, which are planned to minimize impact on wetland areas and stream crossings. Subsequently, final permitting requirements and potential mitigation would be established upon final determination by USACE.

Detailed descriptions of each wetland that would be intersected by the proposed ROW are in Section 14.0, Attachment A, which also contains detailed descriptions of vegetation, hydrology, soils, and survey procedures.