DOE/EA-0804

Environmental Assessment of the Brine Pipeline Replacement for the Strategic Petroleum Reserve Bryan Mound Facility in Brazoria County, Texas

U.S. Department of Energy

September 1993

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U.S. Department of Energy
Washington, D.C. 20585

September 1993

DOE F 1325.8
(8-89)
EFG (07-90)

United States Government **Department of Energy**

memorandum

DATE: May 11, 1993

REPLY TO ATTN OF: EH-25

SUBJECT: Environmental Assessment (EA) and Finding of No Significant Impact for the Proposed Replacement of the Strategic Petroleum Reserve Bryan Mound Brine Pipeline in Brazoria County, Texas

TO: Jack S. Siegel
Acting Assistant Secretary
Fossil Energy

The Office of NEPA Oversight has reviewed the subject EA (DOE/EA-0804), as requested in your April 28, 1993, memorandum. On December 31, 1992, a revised copy of the EA was transmitted to this office, and it was approved for State review and comment on January 8, 1993. Review comments on the subject EA provided by three agencies of the State of Texas in late February, 1993, are adequately addressed in the EA.

Based on my staff's review and their recommendation, and after consultation with the Office of General Counsel, I have determined that the proposed action will not have a significant effect on the quality of the human environment within the meaning of NEPA and its implementing regulations (40 CFR Parts 1500-1508). Therefore, the preparation of an environmental impact statement is not required, as described in the attached FONSI.

Accordingly, the attached EA is approved, subject to incorporation of the comments noted on the attached mark-up, and I have signed the accompanying FONSI. The FONSI does not need to be published in the Federal Register since this is not an action with effects of national concern. However, the public should be notified of the availability of the EA and FONSI in accordance with 40 CFR 1506.6 and DOE Order 5440.1E.

Please provide the Office of NEPA Oversight with five copies of the EA and a record of distribution of the EA and FONSI. One copy of the EA and FONSI should be submitted to the DOE Headquarters Reading Room in the Forrestal Building.

Peter N. Brush
Acting Assistant Secretary
Environment, Safety and Health

Attachments

cc: James C. Johnson, FE-6
NEPA Compliance Officer

[6450-01]

DEPARTMENT OF ENERGY

FINDING OF NO SIGNIFICANT IMPACT AND FLOODPLAIN STATEMENT OF FINDINGS ON THE BRINE PIPELINE REPLACEMENT FOR THE STRATEGIC PETROLEUM RESERVE BRYAN MOUND FACILITY IN BRAZORIA COUNTY, TEXAS

SUMMARY: The Department of Energy (DOE) has prepared an environmental assessment (EA), DOE/EA-0804, for the proposed replacement of a deteriorated brine disposal pipeline from the Strategic Petroleum Reserve (SPR) Bryan Mound storage facility in Brazoria County, Texas, into the Gulf of Mexico. In addition, the ocean discharge outfall would be moved shoreward by locating the brine diffuser at the end of the pipeline 3.5 miles offshore at a minimum depth of 30 feet. The action would occur in a floodplain and wetlands; therefore, a floodplain/wetlands assessment has been prepared in conjunction with this EA.

Based on the analyses in the EA, DOE has determined that the proposed action is not a major Federal action significantly affecting the quality of the human environment within the meaning of the National Environmental Policy Act (NEPA) of 1969 (42 U.S.C. 4321, et seq.). Therefore, the preparation of an Environmental Impact Statement (EIS) is not required, and the Department is issuing this Finding of No Significant Impact (FONSI). This FONSI also includes a Floodplain Statement of Findings in accordance with 10 CFR Part 1022.

Copies of the EA are available from:

Mr. Hal Delaplane
Strategic Petroleum Reserve (FE-423)
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585
(202) 586-4730

The EA is available for review at the above address at the Freedom of Information Reading Room, IE-190, during normal operating hours, 9 a.m. to 4 p.m., Monday through Friday.

For further information on the DOE NEPA process, contact:

Ms. Carol Borgstrom
Director, Office of NEPA Oversight (EH-25)
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585
(202) 586-4600 or (800) 472-2756

PROPOSED ACTION

The proposed action is to remove from service the existing 36-inch unlined steel pipeline and diffuser and to construct a replacement 24-inch cement-lined steel pipeline and diffuser. The existing pipeline failed in 1989 resulting in a major brine spill. Subsequent engineering analyses indicate such deterioration throughout the entire pipeline caused by corrosion and erosion that its long-term integrity is lost.

The new pipeline would extend southeast from the Bryan Mound facility and would be laid in a trench excavated in the existing 75-foot right-of-way (ROW), 10 feet from the abandoned line. It would cross about 0.6 mile of brackish marsh, the Intracoastal Waterway (ICW), about 0.9 mile of a diked retention area for dredged material, and 300 feet of dunes and beach. The new pipeline would extend about 3.5 miles into the Gulf of Mexico and terminate at the 30-foot contour with an 18-port, 1,100-foot diffuser. Based upon studies conducted in 1992, locating the diffuser 3.5 miles offshore in the existing ROW in a minimum depth of 30 feet would be sufficient to avoid impingement of the brine plume on the shoreline or

any other environmentally sensitive area. The brine disposal system would be capable of a maximum daily discharge of 360,000 barrels per day and a sustained average of 250,000 barrels per day.

Onshore, excavated material would be retained for backfill to restore the trench to original contours. Offshore, the trench would be excavated by hydraulic jetting and the pipeline would be covered by sedimentation. The old pipeline and diffuser would be surveyed, sealed, diffuser ports removed, and abandoned in accordance with Federal, State, and local regulations.

ENVIRONMENTAL IMPACTS

Effects of the project would be direct, minor, and short term. Construction would disrupt about 52 acres of wetlands, increase turbidity of local surface water bodies, and displace wildlife for 2 months. Construction across the ICW would interrupt shipping for 8 hours or less. During the 6-week period of construction across the beach, public access to a State recreation area, which is contiguous to the pipeline ROW, would be restricted to daytime use.

The only endangered or threatened species that potentially is of concern is the piping plover (Charadrius melodus), a shorebird that is a winter visitor to Brazoria County beaches. According to the U.S. Fish and Wildlife Service (USFWS), the proposed action would not affect the piping plover if it were done during the period May through August when the bird has migrated north to nest.

DOE has been conducting an ongoing survey to determine whether any of the piping plover population forages or roosts close enough to the pipeline ROW to be disturbed by the proposed action during the remainder of the year. Preliminary results indicate that the bird probably does not frequent the vicinity and that it is reasonable to expect that the proposed action could be done at any time

without disturbing the species. However, if construction in the potential habitat of the piping plover cannot be done during the period May through August, DOE will reinitiate consultation with USFWS.

Offshore construction would disturb about 90 acres of Gulf bottom by displacing about 75,000 cubic yards of unconsolidated sediments. The loss of benthic populations within the impact area would be temporary and would not have a measurable effect on the food web or commercial fish catch. Similarly, the increase in water column turbidity during construction would not measurably affect photosynthesis, the migration or distribution of motile species, the number of individuals, or the commercial catch.

Operation of the brine diffuser under the terms of a National Pollutant Discharge Elimination System permit would result in incidental elevations in salinity of the bottom water and surficial sediment pore water in the vicinity of the diffuser, but the brine plume would not impinge on the shore or any other environmentally sensitive area and there would be no effect on biotic communities or fisheries.

Based solely on historical operations statistics, one brine spill of 74,000 barrels or greater from a leak in the pipeline could be expected over the life cycle of the Bryan Mound storage facility. However, this risk would be greatly reduced because the replacement pipeline would be internally and externally coated with cement and pipeline integrity tests, inspection, and maintenance would be performed. In the unlikely event of a major spill, the highest potential for impact would be in the brackish marsh between the site and the ICW. Impacts to vegetation could be locally severe, but would be reversible.

No cumulative or long-term impacts of the proposed project have been identified.

ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

Consideration was given to reconstructing an off-site field of underground injection wells. This method was tried before at Bryan Mound and abandoned due to unfavorable geological conditions. Underground injection is deemed to be an impracticable alternative for Bryan Mound because of high construction and operation costs and uncertain environmental consequences.

If DOE decided not to seek approval of a new ocean discharge site 9 miles closer to shore, but to build the replacement pipeline out to the presently authorized site 12.5 miles offshore, it would greatly increase the cost of the replacement without offsetting environmental benefits.

Under the no action alternative, the present deteriorated condition of the pipeline would grow worse until it could not be maintained by any feasible means and the site would be unable to operate. Further, the no action alternative would not prevent adverse environmental impacts from a failed brine pipeline. In contrast, the proposed action would be an appropriate corrective action for a potential environmentally harmful condition.

FLOODPLAIN STATEMENT OF FINDINGS

The onshore portion of the proposed brine pipeline replacement project would be constructed entirely within a 100-year floodplain in Brazoria County, Texas (Fig. 1). Given the location of the SPR Bryan Mound facility and the existing pipeline ROW, there is no practicable alternative to locating the project in a floodplain. The project is required to correct a condition potentially harmful to the environment and to maintain the Bryan Mound facility in an operable state.

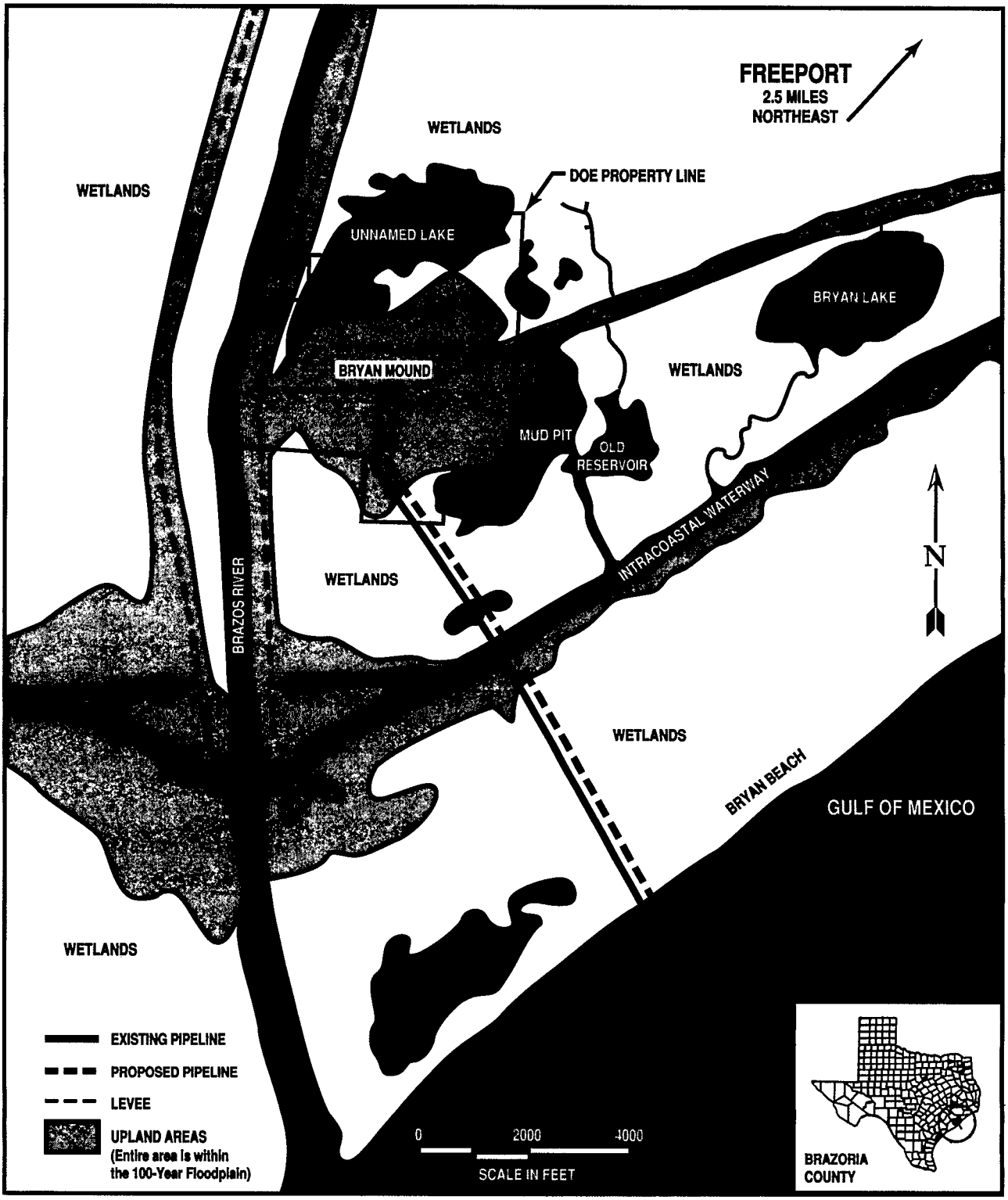

Figure 1. Location of the Pipeline Project Relative to the 100-Year Floodplain, Brazoria County, Texas.

A notice of floodplain and wetland involvement and a solicitation of comments was published in the Federal Register (57 FR 20259, May 12, 1992). No comments have been received.

The proposed action conforms to applicable State and local floodplain protection standards. During construction, frequent gaps would be left in the spoil bank of excavated material along the ROW to maintain normal drainage. After construction, the preexisting surface contours above the trench would be restored and maintained. These measures and any other permit conditions would ensure that effects of the project on the floodplain would be minimized. The buried pipeline would cause no interference with the natural moderation of floods, water quality maintenance, groundwater recharge, or agricultural production and no increase in the threat to life or property from flooding.

DETERMINATION

Based on the information and analyses in the EA, DOE has determined that the proposed action is not a major Federal action significantly affecting the quality of the human environment within the meaning of NEPA. Therefore, an EIS for the proposed action is not required and DOE is issuing this FONSI.

Issued in Washington, D.C., this 11th day of May, 1993.

Peter N. Brush
Acting Assistant Secretary
Environment, Safety and Health

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SUMMARY

The U.S. Department of Energy (DOE) proposes to replace a deteriorated brine disposal pipeline that extends from the Strategic Petroleum Reserve (SPR) Bryan Mound storage facility in Brazoria County, Texas, into the Gulf of Mexico. DOE further proposes to shorten the pipeline by relocating the multiport brine diffuser from a 70-foot depth 12.5 miles offshore to a 30-foot depth 3.5 miles offshore. A failure of the pipeline was discovered in 1989 and a subsequent survey has indicated that the pipeline's long-term integrity is lost. The new diffuser and pipeline would be laid within the existing right-of-way (ROW) and would be sized smaller to reflect a reduced requirement for brine disposal.

The storage facility site is a salt dome which rises by as much as 15 feet above surrounding tidal water bodies and brackish marsh. The immediate vicinity is heavily industrialized and is protected by a system of levees. The coastal wetlands and floodplain within this industrial complex are highly disturbed and drainage patterns have been altered and controlled.

The new pipeline would extend southeast from the Bryan Mound facility and would be laid in a trench excavated in the existing 75-foot ROW, 10 feet from the abandoned line. It would cross about 0.6 mile of brackish marsh, the Intracoastal Waterway (ICW), about 0.9 mile of a diked dredged material retention area, and 300 feet of dunes and beach. The new pipeline would extend about 3.5 miles into the Gulf of Mexico and terminate at the 30-foot contour with an 18-port, 1,100-foot diffuser.

All of the area of the proposed action is within the 100-year floodplain. Crossing the floodplain and wetlands is unavoidable. There are no practicable action alternatives and the no action alternative would not address environmental harm caused by a failed pipeline and would preclude operation of the facility. A buried pipeline does not alter floodplain functions, is unaffected by floods, and does not preclude other land use. The effects of the project on the 100-year floodplain would be direct, minor and short term. During excavation, frequent gaps would be left in the spoil bank to maintain normal drainage. After construction, the surface above the trench would be restored to the preexisting contours.

Effects on wetlands would also be minor and short term. About 52 acres would be disrupted during the 2-month construction period. Wildlife would be displaced during the period and minor and short-term impacts would occur on vegetative communities and local water bodies of the marsh.

Crossing the ICW would have minor, short-term effects on water quality and biota and would interrupt shipping for 8 hours or less.

Offshore construction would jet 75,000 cubic yards of unconsolidated sediments which would produce a substantial turbidity plume during excavation and could bury the benthic populations of up to 90 acres. However, there would be no significant reduction of photosynthetic activity and no effects on the food web or commercial fish catch. Benthic populations would quickly recolonize the impact area.

Ocean discharge of brine is regulated under the National Pollutant Discharge Elimination System. Effective brine dispersion is assured by the permitted diffuser design and operating criteria specified in the permit. This was confirmed by DOE in past comprehensive studies and monitoring which showed conclusively that brine disposal did not impact the biotic communities in the vicinity of the Bryan Mound brine diffuser or result in any negative effects on shrimp catch. It was therefore concluded that no harm occurs to the environment as a result of ocean discharge of brine, provided that the diffuser is designed and operated according to permit requirements.

Based on past experience and numerical modeling, brine dispersion at the proposed site would not impinge on the shore or any other sensitive environment, would not pose a hazard to navigation, and would not adversely affect the biota and biotic communities.

The greatest potential for impact from a brine spill would be in the brackish marsh. Based on historical experience, one spill of 74,000 barrels or greater would be expected in the life-cycle of the Bryan Mound storage facility. The severity, extent, and duration of impacts would vary directly with the spill volume and inversely with normal flushing from rainfall and tidal inundation.

Public access to Bryan Beach State Recreation Area (BBSRA) to the west of the pipeline ROW would be restricted to daytime use for 6 weeks.

Preliminary information indicates that the only endangered or threatened species of concern, the piping plover, probably does not forage in, roost in, or otherwise frequent the vicinity close enough to be disturbed by the project. DOE would provide qualified observers during construction to assure that there would be no disturbance of the species. No other potential impacts to endangered or threatened species have been identified.

There would be no involvement with prime farmland; Native American tribal land; or archaeological, historical, and cultural resources. There would be no impacts to groundwater or potable water supplies. Finally, impacts on air quality, ambient noise, and socioeconomic concerns would be negligible. Worker occupational safety and health would be assured by appropriate administration of DOE's Construction Contractor Safety Program pursuant to DOE Order 5480.9, Construction Safety and Health Program.

1. PROPOSED ACTION

1.1 PURPOSE AND NEED

The DOE Strategic Petroleum Reserve (SPR) is designed to reduce the impact of crude oil supply disruptions and to carry out the obligations of the United States under the International Energy Program. The SPR consists of five underground oil storage facilities, three in Louisiana and two in Texas; a marine terminal on the Mississippi River at St. James, Louisiana; and an administrative facility in New Orleans (Fig. 2). One facility, Weeks Island, was a conventional room-and-pillar salt mine in a salt dome before DOE converted it to use for oil storage. At the other four storage facilities, crude oil is stored in caverns constructed by solution-mining or leaching of salt domes. One of these is the Bryan Mound facility which is located in southwestern Brazoria County, Texas, about 65 miles south of Houston.

Bryan Mound was developed for the SPR in phases which were reviewed under the National Environmental Policy Act (NEPA) in a series of Environmental Impact Statements. The site was acquired by DOE in 1977 and four existing caverns which had been created by the petrochemical industry for production of brine feedstock were converted to crude oil storage.

Phase I of the SPR Bryan Mound facility development consisted of converting the four caverns to 63 million barrels of usable space (1 petroleum barrel = 42 U.S. gallons) and constructing water-, brine-, and crude oil-handling systems at the surface. The raw water system for displacing oil from the caverns during a drawdown included a Raw Water Intake (RWI) structure on the Brazos River Diversion Channel and a pipeline to the site. The brine disposal system was for the displacement of the existing brine by crude oil fill. It consisted of a brine pipeline to an off-site field of underground injection wells. These facilities were addressed in a Bryan Mound site Environmental Impact Statement (EIS) (Federal Energy Administration, FE/S-76/402, January 1977) and Supplement EIS (DOE/EIS-0001, December 1977).

Phase II expansion of the SPR introduced large-scale leaching as the means for creating new storage space in salt domes. Leaching new caverns involved: drilling a well into the salt; suspending concentric tubings down the borehole from a wellhead at the surface; injecting water down one tubing string to dissolve the salt from the borehole wall; and displacing the resulting brine out through the other tubing string.

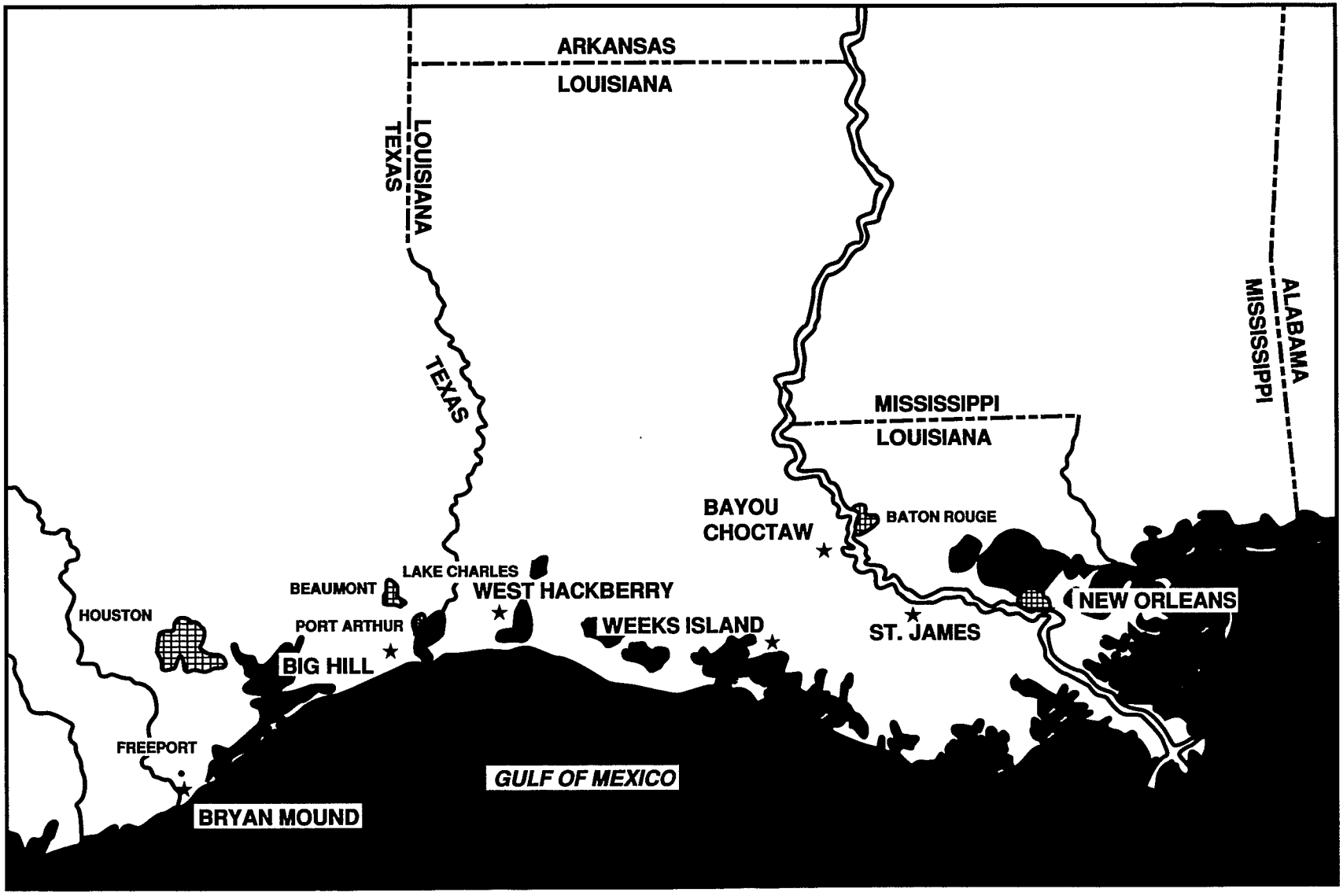


Figure 2. Location of Strategic Petroleum Reserve Facilities.

To leach a cavern with 10 million barrels of net usable space, an extra 12 percent (that is, a total of 11.2 million barrels of gross volume) must be leached. The additional volume is required to accommodate insolubles in the rock salt settling into the sump during the leaching and to provide for future cavern closure or "creep" resulting from normal halokinesis or plastic flow of the salt. About seven barrels of water is required to leach one barrel of space, which results in seven barrels of brine being produced at the surface. The leaching of 12 new 10-million-barrel caverns for Phase II expansion of Bryan Mound required the disposal of nearly one billion barrels of brine of up to 265 parts per thousand dissolved solids at rates of up to one million barrels per day. The only feasible means of disposal of this magnitude was direct discharge into the marine environment.

Phase II expansion of Bryan Mound was considered in the Seaway Group Salt Domes EIS (DOE/EIS-0021, June 1978). Two alternative brine discharge sites were addressed: one about 6 miles offshore in 40 feet of water and the other about 12.5 miles offshore in 70 feet of water.

Ocean discharge criteria did not exist at the time, and the proposed discharge was unprecedented. The U.S. Environmental Protection Agency (EPA) took a cautious approach and permitted the farther discharge site only after the development and implementation of a rigorous and comprehensive monitoring plan and special studies (discussed herein at Sections 2.5, 3.1.2, and 3.2.1) to evaluate effects on regional fishery resources and ecosystems.

Leaching commenced March 1980 with brine disposal to the Gulf of Mexico and continued generally at or near operating capability until the completion of leaching in June 1987. This included a second expansion of Bryan Mound under Phase III which was addressed in the SPR Phase III Development EIS (DOE/EIS-0075, October 1981). Altogether, 163 million barrels of Bryan Mound's current storage capacity of 226 million barrels was new-leached space that resulted in the ocean discharge of about 1.6 billion barrels of brine.

Based on favorable monitoring results obtained at Bryan Mound, EPA permitted subsequent SPR discharge sites for the West Hackberry and Big Hill storage facilities closer to shore at locations requested by DOE in 30 feet of water. At Big Hill, the 30-foot contour was barely 3 miles offshore. EPA concluded that no irreparable harm to the environment had occurred and that there was no justification for incurring the substantial cost of extending discharge further or deeper into the Gulf. In 1985, EPA dropped further requirements for offshore monitoring of the discharge.

After brine disposal in the Gulf of Mexico was established as environmentally sound and efficient, DOE abandoned the Phase I underground injection system, plugged the wells with cement, and relinquished the real estate rights. Brine

disposal by underground injection was a costly disappointment at Bryan Mound. Injection rates were significantly less than expected, and the limited rates that were achieved were maintained only through frequent acidizing, well workovers, and fracturing of the receiving zones.

While there are no plans for further expansion of Bryan Mound, there will continue to be a requirement for brine disposal as long as the site is operated. A minimum brine disposal capability of 180,000 barrels per day is needed to support the site's maximum capability for oil fill and refill. (As of October 1992, there was 9,123,000 barrels of unfilled capacity.) Even when there is no oil fill occurring, there is a continuing requirement for at least intermittent brine discharge of up to 500,000 barrels per year to provide for cavern closure and cavern depressurization for workovers, integrity tests, and sampling.

A failure of the Bryan Mound brine pipeline was discovered during an integrity test on June 22, 1989. About 825,000 barrels of waste water ranging from brackish test water to saturated brine are believed to have been discharged over an 8-week period through clusters of leaks, one in a coastal salt marsh about 0.75 miles south of the site and others under the Intracoastal Waterway (ICW) and offshore from Bryan Beach. Temporary repairs were made by welding patches inside the pipeline which was returned to service September 23, 1989.

An ultrasonic survey of the pipeline was conducted in October 1989 to measure the wall thickness of each 40-foot length (or joint) of pipe and to evaluate the pipeline's integrity. The results of the survey, which are summarized in Appendix E, indicate such deterioration throughout the entire pipeline that its long-term integrity is jeopardized. Numerous pits detected in the unlined steel wall of the pipe are due to the corrosiveness of brine, especially when oxygenated, and erosion resulting from the transport of suspended particulates in the brine, such as sand-sized grains of anhydrite.

1.2 THE PROJECT APPROACH

DOE proposes to remove from service the existing 15-mile, 36-inch unlined steel pipeline and to replace it by constructing a new 5.5-mile, 24-inch cement-lined steel pipeline from the Bryan Mound storage facility. DOE further proposes to replace the existing brine diffuser, currently located at a 70-foot depth 12.5 miles offshore, with a downsized diffuser that would be located at a 30-foot depth 3.5 miles offshore. The new pipeline would be laid in a trench excavated in an existing 75-foot right-of-way (ROW) 10 feet from the abandoned line. The pipeline would end with an 18-port, 1,100-foot diffuser section capable of a maximum daily discharge of 360,000 barrels per day and a sustained average of 250,000 barrels per day (Fig. 3). The diffuser disperses the dense effluent brine discharge into the receiving waters by the action of jet dilution through a series of ports which rise vertically several feet above the bottom.

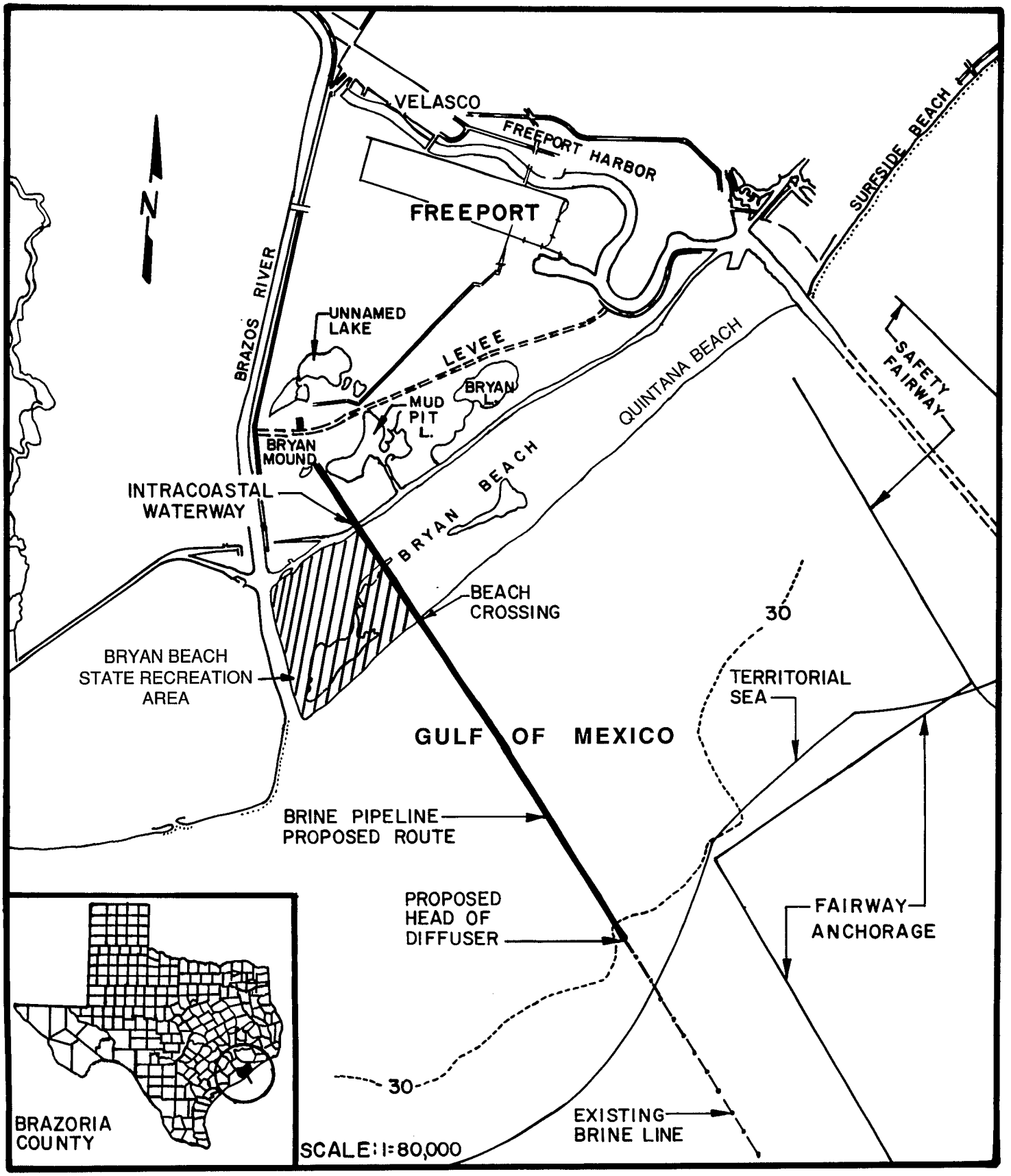


Figure 3. Location of Proposed Brine Pipeline Replacement Project.

The old brine pipeline and diffuser would be surveyed, sealed, and abandoned in accordance with Federal, State, and local regulations. Exposed diffuser ports would be removed.

The design and construction of the new brine pipeline and abandonment of the existing brine pipeline would be in accordance with all local, State and Federal requirements. Detailed design and actual construction, excluding welding, of the pipeline would be primarily guided by the Federal requirements of 49 CFR Part 195, "Transportation of Hazardous Liquids by Pipeline," and the American National Standards Institute, ANSI B31.4, "Liquid Petroleum Transportation Piping Systems." Segments of the pipeline involving navigable waters of the United States as addressed in the Rivers and Harbors Act, Sec. 10, and waters of the United States as addressed in the Clean Water Act, Sec. 404, which require issuance of a permit from the Corps of Engineers (COE), would be designed and constructed in accordance with those permit requirements. See Appendix A for construction and operational permit requirements.

During construction of the new pipeline, the existing pipeline will remain in use, albeit intermittently and at low pressure and low flow rate to avoid stressing the pipe. The precise location of the existing line is readily determinable in the field, such that a 10-foot separation from the new construction is judged to be sufficient to avoid hazard.

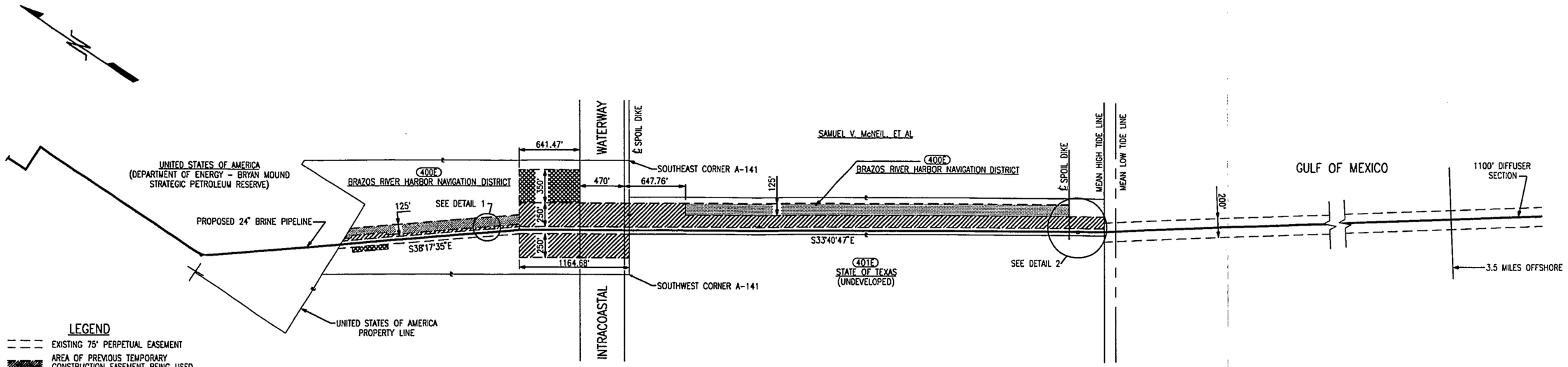
All contractors at the SPR sites are obliged to remove and legally dispose of all wastes generated during construction pursuant to the pollution prevention and waste management provisions of their contract. Oversight is provided by a construction manager.

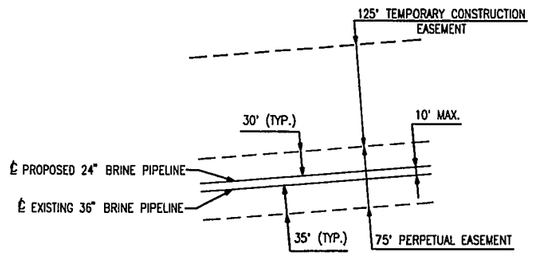
Construction would occur in the field over 4 months of 1993, preferably during the favorable weather period of May, June, July and August. Personnel in the field would range from sixty to eighty workers, depending on whether onshore and offshore activities are conducted separately or simultaneously.

1.2.1 Onshore Construction (2 Months Duration)

Onshore, the replacement pipeline would extend from the SPR facility southeast to the mean high tide line on Bryan Beach. Figure 4 shows in detail the limits of the temporary construction and permanent easements which would be utilized during construction. The permanent easements and ROW both onshore and offshore would remain unchanged. The configuration of the new temporary construction easements are proposed based on construction techniques required for the installation of cement lined pipe.

SAVANNAH	BRACKISH MARSH	DEEP WATER	CORPS OF ENGINEERS SPOIL DISPOSAL AREA NO. 88 COASTAL BARRIER RESOURCES SYSTEM (UNIT T05)	BEACH AND DUNES	OPEN WATER
AREA OF 100-YEAR COASTAL FLOOD PLAIN					





DETAIL 1
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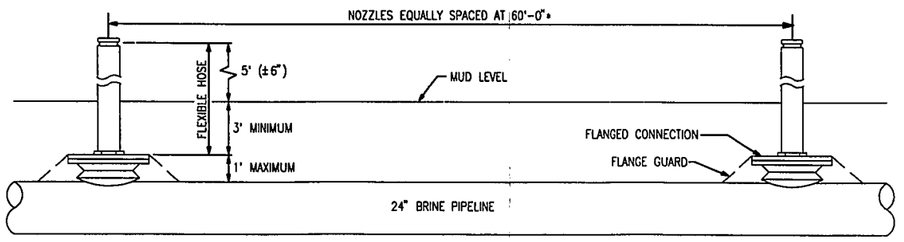
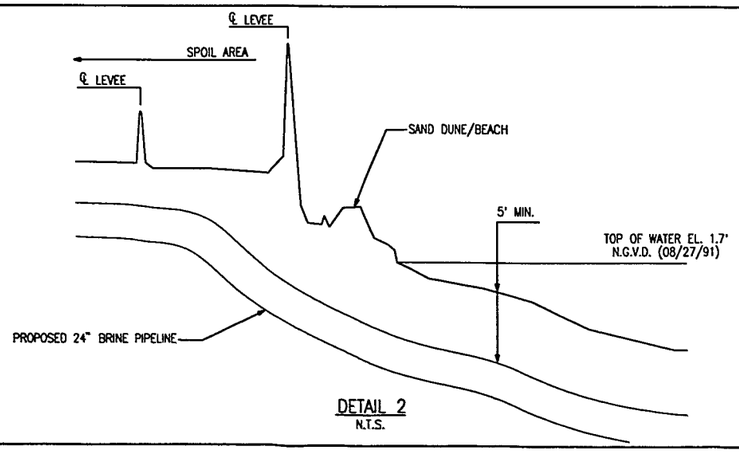
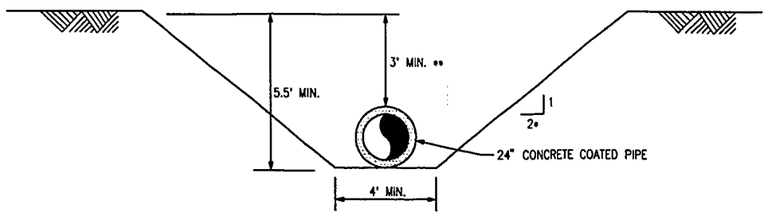


TYPICAL DIFFUSER SECTION
N.T.S.

• DIFFUSER SECTION TO BE CONSTRUCTED WITH EIGHTEEN NOZZLES. DIFFUSER SECTION TO BEGIN AT THE 30-FOOT CONTOUR AND CONTINUE FOR APPROXIMATELY 1100 FEET.



DETAIL 2
N.T.S.



• ACTUAL SIDE SLOPES MAY VARY WITH FIELD CONDITIONS.
•• COVER REQUIREMENTS AT THE INTRACOASTAL WATERWAY WILL BE IN ACCORDANCE WITH PERMITS.

TYPICAL TRENCH CROSS-SECTION
N.T.S.

REV. 1

ACAD FILENAME: 2501SK9X

Figure 4. Proposed Brine Pipeline Route.

A trench would be excavated with heavy equipment (conventional backhoes or draglines) which utilize board roads or mats to minimize destruction of marsh and wetland areas. Another piece of equipment which may be used where appropriate is a marsh backhoe which is specifically designed for use in swampy terrain. Approximately 45,000 cubic yards of earth would be excavated onshore and stored for about 2 months on the east side of the pipeline ROW before backfilling the trench. Frequent gaps would be left in the spoil bank, in accordance with specifications in the COE permit, to maintain surface water flow patterns during construction (see Figure 3 for typical trench cross-section).

The pipe would be laid in the trench by either the pipe push or land lay technique. The choice is determined by how wet or dry the ground is at the time of construction. The pipe push method is usually used to cross swampy marsh, whereas the land lay method is used over drier, firmer soils. For example, the pipe push method of construction typically would be used along the section of ROW between the SPR storage facility and the ICW. This stretch is a low-lying coastal marsh, 0 to 5 feet above mean sea level (MSL), normally with soft, wet ground with patches of standing water. However, if there were a dry spell at the time of construction, the ground could be sufficiently firm and dry to support the land lay method. The appropriate method would be chosen at that time by the contractor.

For the pipe push method, a push site would be designated within the temporary construction easement where pipeline segments would be fabricated, stored and pushed into the trench. Once the pipe is positioned in the bottom of the trench, the trench would be backfilled with the previously excavated spoil. Preconstruction elevations would be reestablished to maintain natural surface drainage and to promote plant and animal recolonization of the disturbed portions of the ROW.

The land lay method differs from the pipe push method in that the placement of pipe in the ditch is performed by a mobile construction spread which moves along the ROW, as opposed to pushing the pipe from a stationary point. The construction spread is made up of welding stations which connect the individual sections of pipe and side boom tractors which pick up and lower the pipe into the trench. Backhoes follow the construction spread and backfill the trench over the newly placed pipeline in the same manner as previously described for the pipe push method. In wet areas, the construction spread and backfilling equipment would use board roads or mats to minimize the destruction of habitat.

From the ICW to Bryan Beach, the ROW crosses a diked COE dredged material disposal area. Being several feet higher than the surrounding marsh, this area is an artificial upland which normally would support the land lay method. It would not be uncommon, however, for a land lay construction spread to encounter

occasional soft, wet patches that would require the use of board roads or mats to cross. If conditions were too wet at the time of construction, the pipe push method may be used.

The containment dikes crossed by the new pipeline would be plugged during construction and restored to preconstruction conditions.

Intracoastal Waterway Crossing (8 Hours Duration)

The brine pipeline crosses a section of the ICW system maintained by the COE, Galveston District. A trench would be excavated across the ICW with barge mounted equipment. Spoils would be placed on the adjacent banks or temporarily stored on barges. A section of pipe with a length necessary to make the complete crossing would be preassembled adjacent to the ICW and then floated into place. This method would minimize blockage of the ICW. Shipping would be inconvenienced for less than 8 hours. The trench would be backfilled with previously excavated spoil.

All construction associated with the ICW crossing, including adjacent wetlands, would be in accordance with permit requirements issued by the COE. The permit would specify the appropriate depth to avoid damage from COE dredging of the ICW. Scheduling of construction activities would be coordinated with the COE so as not to conflict with periodic maintenance dredging of the ICW. Notice of navigational hazards to shipping and boating traffic would be updated daily with the U.S. Coast Guard (USCG).

Beach Crossing (6 Weeks Duration)

To supply and service offshore construction, a staging area (called a laydown area) would be required. The laydown area would be established in the ROW in the existing dredged material disposal area north of the natural sand dune area. A 125-foot-wide easement in addition to the existing ROW would be necessary in the laydown area to accommodate the storage of pipe and equipment. Access would be by the public ROW along Bryan Beach.

The pipeline ROW abuts the east boundary of BBSRA which extends from the ICW to the shore and southwestward to the Brazos River Diversion Channel (Figure 2). Excavation of the trench would limit public access to the BBSRA to daytime use for about 6 weeks. During this period, access would be provided by a temporary vehicle bridge across the trench that would be restricted to daylight hours. The trench would be backfilled promptly following construction. The beach face, sand dunes, and the laydown area and ROW through the diked dredge spoil disposal area would be restored to approximate preconstruction conditions.

1.2.2 Offshore Construction (2 Months Duration)

The offshore portion of the brine pipeline replacement project begins at the mean high tide line where the ROW crosses Bryan Beach and extends 3.5 miles offshore following the existing 200 foot wide ROW to a water depth of approximately 38 feet where the new 1100 foot long diffuser section would begin. The new pipeline would cross Brazos lease blocks 381, 389, 390, 399 and terminate in block 309. It would not cross any existing oil or gas gathering or transmission lines and would not approach any fixed platform. There are no known plans for new oil or gas development that would affect the proposed action.

Offshore, approximately 90 acres of Gulf bottom would be disturbed by displacing about 75,000 cubic yards of sediments during construction. Most of these sediments would quickly settle in the pipeline ROW.

The most probable method for constructing the offshore portion of the brine pipeline is to prefabricate 1000- to 2000-foot long segments of pipe either onshore within the temporary construction easement, or on barges and tow the segments into the desired location offshore. To obtain the required depth of burial for the pipeline, hydraulic jetting or the cutting of a trench under the pipe after it has been laid on the Gulf bottom is necessary. A specially equipped barge would tow a submersible jet sled which straddles the pipeline as high pressure water jets fluidize the sediments under the pipeline allowing the pipe to sink into the newly created trench. Hazards to navigation would be updated daily with the USCG.

Diffuser

Concentrated brine is denser than seawater; unless it is sufficiently mixed with the receiving water body, it may persist undispersed on the ocean bottom, killing bottom flora and fauna with high salinity. The purpose of the diffuser is to assure the greatest possible dilution of the brine in the least space and time to prevent harmful exposures to organisms and to allow natural mixing processes to disperse the excess salinity to undetectable levels.

The diffuser would be located on the end of the new brine pipeline beginning at a point approximately 3.5 miles offshore. The first diffuser port would be at 28°50'56"N and 95°19'42"W. The diffuser area would be marked and recorded in accordance with USCG regulations. The diffuser would be assembled onshore and installed in the same manner as the pipeline.

The design of the brine diffuser would be consistent with those currently being used at Big Hill, West Hackberry and the existing diffuser at Bryan Mound. The efficacy of the diffuser design in meeting performance requirements has been proven through 12 years of use.

The diffuser would be buried with the top of the header pipe about 4 feet below the ocean bottom. Eighteen ports of 3-inch diameter flexible rubber hose spaced 60 feet apart at centers would rise vertically from the top of the diffuser to a nominal height of 4 feet above the ocean bottom. The top of the diffuser ports would be at a minimum of 30 feet below the water line. Overall length of the diffuser would be approximately 1100 feet. The use of flexible hose would minimize the potential for entanglement with fish nets (See Figure 3, Typical Diffuser Section). The required dispersion would be accomplished by the jet dilution of operating at a port exit velocity of 27 feet/second. Jets of brine would rise 15 to 20 feet above the bottom (which would not pose any hazard to navigation) before sinking to the bottom, by which point the brine would be diluted by a factor of 35 or more, to within a few parts per thousand above ambient salinity (Hann, et al., 1985).

1.3 ALTERNATIVES CONSIDERED BUT ELIMINATED FROM DETAILED STUDY

An important element of DOE's plan to replace its deteriorated brine pipeline at Bryan Mound is to relocate a downsized brine diffuser 9 miles closer to shore. If DOE decided not to seek approval of a new nearshore discharge site, but to build the new pipeline out to the presently authorized site, it would greatly increase the cost of the replacement without offsetting environmental benefits. This conclusion is based on brine discharges for the SPR Big Hill and West Hackberry facilities which have operated without harm to the environment nearshore at a depth of 30 feet (Hann, et al., 1984).

Reconstructing an underground injection system was considered, taking into account the reduced volumes of brine that would be produced. This would require about $25 million to reacquire easements and real estate, drill, and construct an extensive disposal well field. As was described in Section 1.1, previous experience with underground injection at Bryan Mound was unsatisfactory due to adverse geological conditions. Given the high construction and operation costs and uncertain environmental consequences, underground injection is deemed to be an impracticable alternative.

Under the no action alternative, the present deteriorated condition of the pipeline would worsen until it could not be maintained by any feasible means and the site would be unable to operate, even to the extent of relieving cavern pressure resulting from cavern creep. In an emergency, brine could be trucked from the storage site to commercial disposal wells. However, this method is limited in capability and extremely costly and inefficient. It is not a practicable long-term solution. Finally, the no action alternative would not prevent adverse environmental impacts from a failed brine pipeline. In contrast, the proposed action would be an appropriate corrective action for a potential environmentally harmful condition.

2. THE AFFECTED ENVIRONMENT

2.1 PHYSIOGRAPHY

Bryan Mound is located on the east bank of the Brazos River Diversion Channel 3 miles southwest of Freeport in Brazoria County, Texas. The Gulf of Mexico lies 2 miles southeast.

The relative abundance, distribution, and kinds of terrestrial plants and animals in this region of the Gulf Coastal Plain are strongly influenced by the humid subtropical climate. The area is subject to frequent storms with high winds and intense rainfall which result in pronounced variation in water heights and frequent coastal flooding. Average annual rainfall is about 45 inches. Temperature ranges from an average winter minimum of about 45°F to an average summer maximum of about 90°F (Federal Energy Administration, 1977).

The site of the storage facility is a salt dome which rises by as much as 15 feet above surrounding tidal ponds and brackish marsh. The immediate vicinity is heavily industrialized and is protected by a system of levees that are maintained by the Velasco Drainage District. Except for the upland area of the salt dome, the entire project would be within the 100-year floodplain. The coastal wetlands and floodplain within this industrial complex are highly disturbed and drainage patterns have been altered and controlled. A Floodplain/Wetlands Assessment is provided in Appendix B.

2.2 LAND USE

The land area that would be traversed by the project is undeveloped due to Federal, State, and local restriction. The land between Bryan Mound and the ICW is owned by the Brazos River Harbor Navigation District (Port of Freeport) who maintains it for its floodplain value as a flood and storm surge buffer zone.

The land south of the ICW is a unit of the Coastal Barrier Resource System (Brazos River Complex T05) administered by the U.S. Fish and Wildlife Service. This unit includes the COE's spoil retention area along the ICW, Bryan Beach, and BBSRA.

Bryan Beach, which is a public access beach, is a sand dune protection zone established under the Texas Coastal Management Plan. To cross Bryan Beach with the proposed pipeline, DOE would need to obtain a Dune Protection Permit from the Brazoria County Dune Protection Committee which would include requirements for restoring the beach and dunes habitat.

The BBSRA is an 878-acre tract between DOE's existing brine pipeline ROW and the Brazos River Diversion Channel 1.4 miles to the west. It is a primitive area (no facilities) managed by the Texas Parks and Wildlife Department for public camping, fishing, and swimming. Public use is greatest during the four spring and summer months planned for construction (Texas Parks and Wildlife Department, 1991). In order to maintain public access to the recreation area during construction, DOE would provide a temporary bridge across the trench. Public use of the bridge would be restricted to daylight hours.

No prime farmland would be involved.

2.3 GEOLOGY

The only aquifer containing fresh water in the vicinity of Bryan Mound is the upper unit of the Chicot aquifer (Federal Energy Administration, 1977). The Upper Chicot consists of interconnected shallow sands which dip towards the southeast at about 2 feet/mile (ibid.). At Bryan Mound, the aquifer is located between 175 feet and 250 feet below the surface. At Freeport, the Upper Chicot is shallower and considerably thicker, extending from 120 feet to 300 feet below the surface (ibid.).

Soils in the area between Bryan Mound and the ICW are poorly drained, low-permeability clayey soils of the Moreland-Pledger-Norwood association (U.S. Department of Energy, 1978). Within the existing ROW, however, the soil structure has been irreversibly altered due to prior excavation, backfill, and compaction.

Around the region, soils seaward of the ICW are generally of the Harris-Veston-Galveston association (ibid.). Harris soils are primarily montmorillonite clay, Galveston soils are sandy, and Veston soils are loams intermediate in texture between Harris and Galveston soils. In the Bryan Mound vicinity, these soils often have a high salinity that limits plant growth due to frequent flooding from the sea (ibid.). In the ROW through the diked dredged material retention area, these soils are overlain by several feet of fine material (silts, mud, and clay) dredged from the ICW.

2.4 TERRESTRIAL AND AQUATIC ECOLOGY

The new pipeline would exit the Bryan Mound facility to the southeast and would cross about 0.6 mile of brackish marsh, the ICW, about 0.9 mile of COE-maintained dredged material retention area, and 300 feet of sand dunes and beach face before entering the Gulf of Mexico.

2.4.1 Brackish Marsh

Surface water bodies of the brackish marsh include Mud Lake on the southeast flank of Bryan Mound, drainage ditches and sloughs, and several small isolated marsh ponds. Mud Lake is connected to the ICW. Hydrologic circulation of the isolated ponds, however, is essentially dependent on periodic inundations of fresh water from heavy rainfall and saline water from extreme tidal fluctuations and storm surges. The city of Freeport pumps runoff into the marsh north of the Bryan Mound facility.

Vegetation is typical for a saline marsh of the Texas Gulf Coast. The dominant species are saltgrass, (Distichlis spicata), smooth cordgrass or oystergrass (Spartina alterniflora), and the Carolina wolfberry (Lycium carolinianum). Also abundant are sea-oxeye (Borrichia frutescens), leafy threesquare (Scirpus robustus), and marshhay cordgrass or wiregrass (Spartina patens) (Boeing Petroleum Services, Inc., 1990). These provide a moderate to dense cover for wildlife, such as migratory waterfowl, common egret, snowy egret, great blue heron, roseate spoonbill, killdeer, least tern, black-necked stilt (the latter two are State-protected), nutria, raccoon, coyote, skunk, rattlesnakes, water snakes, turtles, and frogs. The surface water bodies are habitat for shrimp, crabs, trout, flounder, and redfish.

2.4.2 Intracoastal Waterway

In the Bryan Mound area, the ICW lies within one mile of the Gulf of Mexico and roughly parallels the shoreline from Freeport Harbor to the Brazos River Diversion Channel about 5 miles to the southwest. This portion of the ICW is a man-made canal with an authorized navigation channel width of 125 feet and a controlled depth of 12 feet. At the ROW, the canal is about 470 feet wide from bank to bank. The COE dredges this stretch about every 2 years to a depth of 16 to 18 feet.

The COE operates a set of locks on the ICW at the Brazos River Diversion Channel to keep out detritus and silt during high river flow (U.S. Department of Energy, 1978). The locks are normally kept open for the convenience of heavy shipping traffic which averages 35 to 40 barge tows per day.

When the locks are open, there is evident mixing between the Brazos River Diversion Channel and the ICW. Accordingly, the ICW reflects the wide variation in water quality exhibited by the tidal Brazos River estuary (ibid.). Salinity ranges from 8 to 40 parts per thousand. Dissolved oxygen is occasionally below applicable standards due to the oxygen demand in the lower Brazos estuary. The pH of the lower estuary tends to be at the high end of the acceptable range. Conversely, pH in Freeport Harbor is low. In addition, Freeport Harbor water has

elevated metal concentrations (ibid.). Each passing tug in the ICW stirs the entire water column and creates a wake and dense turbidity plume from bank to bank.

Notwithstanding the stressful environment described above, the ICW contains biologic communities similar to other surface water bodies nearby. The benthos are dominated by polychaete worms, snails, and clams. The most abundant of the mobile nekton are shrimp, blue crabs, spot, Atlantic croaker, menhaden, mullet, seatrout, and cyprinids (ibid.).

2.4.3 Beach, Dunes, and Retention Area

The dredged material retention area along the south bank of the ICW is actively being used by the COE for disposal during their periodic maintenance dredging of the ICW between Freeport Harbor and the Brazos River Diversion Channel. The disposal area is 4700 feet wide where the brine pipeline ROW crosses it and has an elevation of up to 15 feet above mean sea level. Where it meets the dunes, the retention area is bounded by an 8- to 10-foot high dike.

The dunes and beach are 300 feet wide at the pipeline ROW. Plant species include gulf cordgrass, trailing wildbean, cut-leaf evening primrose, bulrushes, and marsh fimbristylis. These provide habitat for various sea birds, reptiles, and mammals for resting and foraging. Rookeries for least terns and black skimmers are found more than five miles to the northeast up the coast, but none occur along Bryan Beach in the vicinity of the ROW.

2.5 MARINE ECOLOGY

The ocean bottom off Brazoria County is smooth and featureless and has the gentle gradients typical of the inner shelf of the northwest Gulf. In the vicinity of the nearshore site, the bottom deepens by 6 to 7 feet/mile and by 4 to 5 feet/mile at the disposal site 12.5 miles offshore.

Surficial sediments along the brine pipeline ROW are primarily clayey sand and silty sand overlying firm sandy clay. Texture and thickness of the surficial sediments is subject to sudden shifts attributed to scouring during storms and accretion of fine material from the Brazos River during calm periods. The bottom is generally soft, medium-to-fine silts at the offshore site and loose fine sand in the more turbulent environment of the nearshore site (Hann and Randall, 1982).

Neither the existing discharge site offshore nor the proposed discharge site nearshore is located in or near unique or critical habitat. The resident biotic assemblages (nekton, plankton, and benthos) are typical of the inner shelf environment of the northwest Gulf of Mexico (Turgeon, 1984).

The nearshore site is in the white shrimp community characterized by Atlantic croaker, star drum, silver seatrout, and sand seatrout which comprise most of the ichthyofauna. In contrast, the offshore site at a 70-foot depth is a transition region between white shrimp and offshore brown shrimp communities which is reflected in a greater diversity of species than the white shrimp community (Turgeon, 1984).

At both sites, the phytoplankton is dominated by diatoms, such as Biddulphia, Rhizosolenia, Nitzchia, Skeletonema, Chaetoceros, Coscinodiscus, and Asterionella which are estuarine to neritic. The zooplankton is overwhelmingly dominated by copepods as is common throughout the coastal and estuarine waters of the northwest Gulf of Mexico (Turgeon, 1984).

The benthic communities of both sites are dominated by polychaetes. One species, Paraprionospio pinnata comprised one-third of the population at the offshore site and over 40 percent of the nearshore population. Other important species included the polychaete, Magelona phyllisae, and the surf clam, Abra aequolis, nearshore and the polychaete, Nereis micromma, and the amphipod, Ampelisca abdita offshore. The majority of species are euryhaline (tolerant to wide salinity ranges) with estuarine affinities (Hann and Randall, 1980).

Population densities and diversities of the nekton, plankton, and benthos are highly seasonal and reflect normal migration patterns out the estuaries and reproductive responses to temperature and nutrients. Also, biotic assemblages exhibit physiological and behavioral responses to natural stresses, such as sudden cold spells, tropical storms, heavy freshwater discharges, and episodes of naturally occurring hypoxia (dissolved oxygen of less than 2 mg/l).

The commercially valuable shrimp fishery of Texas and Louisiana is based primarily on two penaeid shrimp--white shrimp (Penaeus setiferus) and brown shrimp (P. aztecus). These species are estuarine dependent and spawn offshore. The eggs are neutrally buoyant and are easily carried throughout the water column by the currents. They hatch within 8 to 10 hours into planktonic nauplii. These develop rapidly through protozoal and mysis stages into larvae and postlarvae within a couple of weeks. The post larvae move onshore and enter the estuaries where they quickly transform into juveniles. They reach commercial size within 2 to 4 months shortly before returning to sea (U.S. Department of Energy, 1981).

Spawning of white shrimp and brown is broadly distributed along the central and northeastern Texas and Louisiana coast within depth bands. Off central Texas, white shrimp spawn April through August within a 5-mile wide band in depths of 25 to 100 feet. Their postlarvae enter the estuaries in May, June, and September (ibid.). Brown shrimp spawn in deeper water, between 150 and 360 feet deep from September through May with a peak occurring February to March and a secondary autumn peak around September (ibid.).

Mature white shrimp begin to emigrate from the central Texas estuaries about mid-July. Peak migrations of brown shrimp from the estuaries back to sea occur May to June (ibid.). In addition to seasonal inshore-offshore migration, mature white shrimp and brown shrimp move along the coast--southward in the fall and northward in the spring.

The marine habitat in the project area is not conducive to the establishment of significant oyster reef communities. Major oyster populations and fisheries are restricted to the shallow bays and estuaries along the Texas coast. There are no permitted oyster harvest areas in the area around the proposed action. Recent marine surveys of the existing offshore ROW and adjacent areas did not identify any oyster reefs, coral heads, or hard bottoms within or near the ROW (Chance and Associates, 1991).

The shelf circulation system of the Texas coast is principally driven by the alongshelf component of wind stress. Mean alongshelf components of wind stress and currents are downcoast (towards the southwest) from autumn through spring (Hann and Randall, 1982). During this period, river discharge from the Mississippi-Atchafalaya system, 400 miles to the east, is advected through the Freeport area. This typically results in moderate stratification in the water column and frequent weak to moderate salinity fronts that pass back and forth over the discharge site with the tides. During summer, upcoast (towards the northeast) currents prevail (ibid.). This is the period of most frequent and intense episodes of stratification and hypoxic bottom water. True stagnation, however, does not occur; bottom current speed falls below 6 cm/s infrequently and only for brief periods of a few hours (ibid.). Ambient (natural) bottom salinity at the existing discharge site offshore normally is oceanic or sub-oceanic, exhibiting an annual range of 30 to 36 parts per thousand. At the proposed site nearshore, conditions are spatially and temporally more variable and less marine. Bottom salinity ranges from 25 to 35 parts per thousand. Typically, bottom salinity is 2 to 5 parts per thousand lower at the nearshore site than the offshore site (ibid.).

The local environment is naturally very high in suspended particulates with very low light levels near the bottom; sediments are generally oxidative.

2.6 ARCHAEOLOGICAL, HISTORICAL, AND CULTURAL RESOURCES

A State Archaeological Landmark, designated 41BO110, is reported to be located in or near the existing pipeline ROW under approximately 8 to 10 feet of spoils within the COE spoil area south of the ICW. Pipeline excavation would be limited to a depth of about 7 feet in this area. Given the disturbed nature of the construction ROW, involvement with any potential unidentified resource is

unlikely. Recently conducted onshore and offshore archaeological surveys which encompassed the existing and proposed ROW didn't identify any significant cultural or historical resources (Coastal Environments, 1991).

Offshore, the proposed diffuser site is in an area of no reported shipwrecks. The probability of there being an unreported shipwreck in this intensively trawled, fished and traveled area is very low (Texas Antiquities Commission, 1990).

2.7 ENDANGERED SPECIES

There are 21 species in Brazoria County that have been listed as endangered or threatened by the Federal Government, by the State of Texas, or both. In addition, four species of marine turtles and 15 species of cetaceans (dolphins and whales) that have been listed as endangered or threatened are reported to occur in the Gulf of Mexico off Texas. These 40 terrestrial, aquatic, and marine species are listed with their status in Appendix D.

According to the Texas Parks and Wildlife Department (1991), there are no reported occurrences of endangered or threatened species in the vicinity of Bryan Mound or the ROW. One species of concern, the threatened piping plover (Charadrius melodus), uses most of the coastal beaches and barrier islands in Texas as wintering habitat where it is mainly observed foraging on intertidal sandflats and sandy mudflats. Little is known about its roosting habits. Because adults are relatively site-faithful, particular areas of high concentrations have been designated as essential habitat sites. These include Brazos Island State Park and San Bernard National Wildlife Refuge in Brazoria County. During the months of May through August, the piping plover returns to the northern Great Plains and Great Lakes to nest.

The closest reported sightings of the piping plover to the pipeline ROW have been at Quintana Beach, more than two miles to the northeast (Figure 3). A roost has been reported on the other side of the Brazos River Diversion Channel in the area seaward of the ICW between the Diversion Channel and the San Bernard River.

Four species of endangered or threatened sea turtles (Kemp's Ridley, Atlantic Green, leatherback, and loggerhead) are known to occur in the waters offshore of Bryan Mound. None nest in Texas above Padre Island (which is below Corpus Christi to the south).

The loggerhead, which is the rarest of the four in Texas waters, forages primarily on benthic organisms in nearshore areas that could include the area influenced by the brine diffuser. None of the other three species of sea turtle is particularly likely to forage around the diffuser. The Kemp's Ridley and

Atlantic Green are also coastal species that frequent the nearshore zone; however, they prefer seagrass beds in murky or sheltered waters. The leatherback is more pelagic in habit and prefers jellyfish in the water column.

Of the 15 listed cetaceans, the U.S. Fish and Wildlife Service (USFWS) has expressed concern about four species of baleen whale (i.e., fin, sei, humpback, and right) and one species of tooth whale (sperm). All of these species are incidental winter visitors in the Gulf. They eat little during this period, living off their fat reserves.

2.8 SOCIOECONOMICS

Brazoria County is mostly rural with a 1990 population of 190,900, an increase of 12.6 percent from 1980. The local communities of Freeport, Lake Jackson and Clute, which are towns with roughly 10,000 to 20,000 population, are within 10 miles of Bryan Mound.

The major economic activities in the county are manufacturing, mineral extraction, shrimp fishing, services, and government services. Of a total 1989 workforce of 215,000, almost 10,000 were in construction and 16,000 in manufacturing. The permanent workforce on Bryan Mound is 162 Federal and contractor personnel.

Unemployment was at 7.7 percent in 1990. While this exceeded State and national averages, it was a marked improvement from a 1986 peak unemployment of 11.3 percent. The housing occupancy rate is currently 82 percent. There were 9,146 units available for rent in 1990 and 3,728 units for sale.

The major highway in the county is Texas State 288, a modern, multilane divided highway that links Freeport, Clute, and Lake Jackson to Houston. There are no interstate or U.S.-designated highways in the county. Bryan Mound is accessed from Freeport by County Road 242 which is a paved road in good condition on top of the flood protection levee that runs along Brazos River Diversion Channel and through the site. All of the bridges involved in accessing Bryan Mound are adequate to carry a maximum legal load of 80,000 pounds. None are currently under construction or rehabilitation.

3. ENVIRONMENTAL IMPACTS

3.1 CONSTRUCTION

3.1.1 Onshore

Construction of the pipeline across 3,300 linear feet of brackish marsh would disrupt about 17 acres of wetlands. About two-thirds the width of the ROW was previously disturbed during the 1979 construction of the existing 36-inch pipeline. Wildlife would be displaced for 2 months due to noise, increased traffic, and human activity. There would be no impact to groundwater since the excavation would be confined to the upper layers of impermeable clay soil. Potable groundwater lies more than 100 feet below (Federal Energy Administration, 1977).

About 45,000 cubic yards of excavated material would be stored temporarily in a spoil bank on the east side of the ROW. Runoff could erode the spoil causing sedimentation impacting local vegetation and increasing turbidity in local water bodies. This could be controlled by using silt fences and sediment traps or straw bales around the spoil bank.

The use of timber mats would minimize the compaction and destruction of the marsh within the ROW and the trench would be backfilled to restore and maintain the original grade. If surface drainage in the marsh were subsequently altered due to subsidence of the trench fill, additional fill material from an approved borrow area could be used to restore the floodplain. Alternatively, a series of check dams could be installed to promote restoration by siltation. Appropriate restoration would be a requirement of the COE construction permit.

Bryan Mound's wet climate of about 45 inches annual rainfall is conducive to rapid revegetation (Federal Energy Administration, 1977). Based on past experience with constructing Bryan Mound's crude oil, water, and brine pipelines across wetlands, the marsh would be expected to recover within one or two growing seasons.

Excavation of the pipeline trench across the 470-foot wide ICW would interrupt shipping for 8 hours or less, a period during which 12 or 13 boats and barge tows would normally pass by. The crossing would result in 16,000 cubic yards of soft mud from 2 acres of bottom being dredged and stockpiled on barges or adjacent banks of the ICW before being returned as backfill.

The ICW crossing would result in temporary degradation of water quality and aquatic habitat in a water body that is normally stressed and frequently perturbed by propeller wash of passing boats and tugs (35 to 40 times a day) and by periodic maintenance dredging. In addition to increased turbidity, these impacts could include the release from bottom sediments into the water column of nutrients, heavy metals, hydrocarbons, and pesticides. Dissolved oxygen could be reduced by the suspension of readily oxidizable matter in the sediments.

Benthic organisms in the ROW could be destroyed by the dredging; those nearby could be buried or suffocated by resettling of suspended sediments. Indirect effects could include behavioral responses and sublethal toxicological effects. However, the overall long-term effects on species diversity and abundance would be inconsequential. Within a few days, restoration of the benthic habitat and recolonization would begin.

Crossing the COE dredged material disposal area would disrupt 35 acres of wetlands over 4,700 linear feet. All of this artificial upland is wetlands by virtue of the retention dikes which would preclude contamination of surface water bodies from stormwater runoff.

A 200-foot wide swath comprising an area of 1.4 acres of beach and dunes would be disrupted for 6 weeks. During this period, public recreational use of the beach face within the ROW would be restricted. Public access to the 878-acre Bryan Beach State Recreational Area west of the ROW would be limited to daytime use of a temporary bridge over the trench. Restoration would be in accordance with the county Dune Protection Permit.

3.1.2 Offshore

Offshore, about 90 acres of Gulf bottom would be disturbed by jet sled excavation of about 75,000 cubic yards of sediments during construction. Most of the sediments, particularly the more coarse sands within the surf zone, would rapidly resettle on either side of the trench and bury the benthic populations within a corridor estimated to be up to 150 feet wide. The trench would backfill naturally and benthic populations would recolonize the impact area as occurred with the existing pipeline. The effect of the temporary loss of benthic populations within the ROW on the food web would not be measurable, as the motile predators, such as white shrimp, would simply graze in other areas.

For the 2-month offshore construction period, local water quality would be degraded by the highly turbid sediment plume. Potentially, nutrients, heavy metals, hydrocarbons, and pesticides could be released to the water column. The effects would be minor and short-term. Monitoring studies performed by Texas A&M

University (TAMU) in 1979-1980 during construction of the existing pipeline failed to detect any effects either on water quality or biota (Hann and Randall, 1980).

The presence of work boats and barges and the turbidity plume of excavation would hinder commercial and sport fishing activity in the immediate vicinity of construction for the 6-week period. However, fishing could continue away from the construction-influenced area without any impact to catch because of the absence of any bottom features in the affected area that attract fish. Further, fishing in the area is so heavy that the habitat normally is below carrying capacity (U.S. Department of Energy, 1981).

3.1.3 Other Impacts

Construction impacts on air quality would be negligible. Gaseous and particulate emissions from construction equipment would be temporary and localized. The project area is undeveloped and nonresidential. Impacts of increases in ambient sound levels would be minor and limited to the recreational use of Bryan Beach.

The project would not directly result in any new permanent jobs. Between 60 to 80 welders, heavy equipment operators, and general construction workers would be employed for four months. These jobs would likely be filled by the local workforce which includes almost 10,000 construction workers, 16,000 manufacturing workers and, currently, less than full employment. Any in-migration would be minimal and would be easily absorbed without impacts on the housing market or municipal services and infrastructure of a community that includes over 85,000 urban population within 10 miles. The only significant socioeconomic impact would be the additional personal income generated by the $14 million project.

Worker occupational health and safety would be assured by appropriate administration of DOE's Construction Contractor Safety Program pursuant to DOE Order 5480.9, Construction Safety and Health Program.

3.2 OPERATIONS

The SPR maintains and updates facilities so that they are presumed always to have 20 years of useful life remaining. Therefore, the minimum life-cycle brine disposal requirement would be 10 million barrels to provide for cavern creep and standby operations as described in Section 1.1. This could be accomplished with five batched discharges per year. Each batch would take between 9 and 10 hours at the design discharge rate.

The theoretical maximum life-cycle brine disposal requirement would add 9,194,000 barrels for completing initial site fill plus four subsequent refills at 226 million barrels each. Excluding the minimum period of 720 days required to

draw down the site four times, the discharge for the theoretical maximum life-cycle brine disposal requirement would average 140,000 barrels per day for 6,580 days.

3.2.1 Ocean Discharge of Brine

Oceanographic studies were conducted for DOE by the National Oceanic and Atmospheric Administration (NOAA) and by TAMU from 1977 to 1980 to characterize baseline conditions at candidate discharge sites at a depth of 50 feet 5.8 miles offshore and in 70 feet of water 12.5 miles offshore. The grid of stations for sampling benthos, hydrography, water and sediment quality, and nekton for the baseline studies of the 5.8-mile site encompassed the present candidate site 3.5 miles offshore (Hann and Randall, 1980). These data are the basis for this environmental assessment.

After DOE received authorization to discharge at the 12.5-mile site, NOAA and TAMU performed monitoring and resource assessment studies pursuant to a monitoring plan required by the National Pollutant Discharge Elimination System (NPDES) permit. Benthic sampling continued about the nearshore site as a control.

Monitoring included site-specific elements performed by TAMU and regional trends and effects assessments and predictions conducted by NOAA's National Marine Fisheries Service (NMFS) Galveston Laboratory. The NMFS work focused primarily on shrimp population studies which were designed to discriminate among sources of environmental and ecological variation to detect any impacts of brine on commercial fisheries catch over a broad region.

Elements of the NMFS studies included: identifying shrimp spawning areas; determining toxicities and avoidance/attraction behavioral response of shrimp and redfish to elevated salinities; discriminating among sources of annual variation in the regional shrimp catch; and determining the effects of brine discharge on regional shrimp migratory patterns, reproduction, growth rates, and mortality. The results were summarized and assessed for Bryan Mound by Matis, Carothers, and Grant (1982).

Field observations were made by TAMU of the orientation and extent of the brine plume about the diffuser in near-real time and the nature and extent of effects on the biotic communities and water and sediment quality in the area of brine influence. The results were published by TAMU in a series of reports ending in 1985 (Hann, Giammona, and Randall, 1985). A summary assessment based on the TAMU and NMFS work was made by Turgeon (1984).

The Bryan Mound NPDES permit regulated effluent brine quality for pH (between 6.0 and 9.0) and oil and grease (no more than 15 mg/l). It specified a minimum exit velocity at the diffuser port of 20 ft/s and maximum daily discharge of 1.1 million barrels per day. The TAMU and NMFS studies showed conclusively that operation of the diffuser in accordance with the exit velocity standard resulted in adequate brine dispersion under all oceanographic conditions such that the discharge did not affect marine life or adversely impact environmental quality (ibid.).

The historical envelope of observed brine plume boundaries (as delineated by the 1 part-per-thousand above-ambient salinity contour) indicated that, during the leaching of Bryan Mound, the maximum length of the plume was 6.5 miles in the offshore direction. The maximum distance shoreward was 2.2 miles. This is a reflection of the effect of the bottom slope on plume distribution. Gravity resists the uphill advection shoreward of the dense brine plume on the bottom. The highest excess salinities at the bottom impact zone seldom exceeded 7 parts per thousand above ambient. These occurred in the immediate vicinity (within 100 m) of the diffuser and covered an area of less than 25 acres (ibid.).

Although the nearshore site and offshore site have dissimilar benthic community structure, they exhibit similar responses to the same set of environmental factors and similar patterns of intra- and inter-annual variation. Consequently, the nearshore site was a suitable control for establishing brine effects at the offshore site. Analysis of Variance showed that brine exposures of the benthos at the offshore site produced no significant difference in species diversity, number of species, or abundance of individuals (ibid.). In addition, no brine effects were detected upon the passively floating plankton or upon the dynamic and motile nekton. The same result (i.e., no effect) would be predicted or the nearshore site under similar brine exposures.

Similarly, the NMFS studies indicated there were no noticeable effects of brine discharge on white or brown shrimp migration patterns, growth, mortality, and spawning activity. Matis, Carothers, and Grant (1982) concluded there were no noticeable detrimental effects of brine disposal at Bryan Mound on brown or white shrimp or redfish and no negative trends in catch of brown or white shrimp. Consequently, offshore compliance monitoring requirements were rescinded in fiscal year 1984 for all brine disposal sites based on the determination that the brine discharge does not cause any unreasonable degradation of the marine environment and the studies were concluded.

In the early 1980s, an empirical numerical model was developed based on Bryan Mound oceanographic field observations and used to estimate benthic community exposures between monthly cruises. Subsequently, this model was used to predict brine dispersion in support of permit applications for discharge from the SPR Big Hill facility. Its results were accepted by the responsible regulatory

agencies. The same model has been used in support of the proposed action to determine the minimum separation needed between the brine diffuser and the shore to avoid impingement of the brine plume (Randall, 1992).

Ambient bottom currents of 3 cm/s and 9 cm/s were input to simulate conditions for a large plume and a typical plume, respectively. These were chosen based on data bases for the Bryan Mound, Big Hill, and West Hackberry sites. These are considered conservative assumptions absent actual current data from the proposed site. The simple fact of shallower depth at the nearshore site would mean greater wave-generated turbulent diffusion and greater bottom advection than for the deeper offshore site for any wind condition. Given comparable diffuser performance conditions, a sufficient minimum depth that precludes the brine jet from reaching the surface, and a comparable wind, dispersion of the brine plume on the bottom should be enhanced at the shallower site compared to the deeper site. Another conservative factor of the model is that it does not consider the effect of the bottom slope on plume distribution.

Model outputs predict that the largest plume from the new diffuser would cover 10,400 acres and extend 3.2 miles downcurrent. The typical plume would cover 2,600 acres and extend 1.6 miles downcurrent. The highest above-ambient salinity contour in either case would be +4 parts per thousand which would cover 300 or 1,800 acres for the typical or extreme case, respectively, in the vicinity of the diffuser. For any case, locating the diffuser 3.5 miles offshore in the existing ROW in a minimum depth of 30 feet would be sufficient to avoid impingement of the brine plume on the shoreline or any other environmentally sensitive area.

The brine diffuser is not an obstacle or hazard to fishing or shipping. The manifold is buried too deep below the sea floor to be snagged by ships' anchors or shrimp trawl doors. The use of flexible hoses as port risers has proved to be effective in avoiding entanglement with shrimp nets. Consequently, there is no need to maintain buoys to mark the diffuser location.

3.2.2 Brine Spill Risk

Over the last 7 years for which data are available, 1984 through 1990, the SPR has had 96 brine spills of more than one barrel from pipelines and site piping at all sites (excluding the SPR Weeks Island facility in Iberia Parish, Louisiana, which has no brine handling). The range in frequency of occurrence has been between 6 and 22 per year. Almost all, 92 of the 96, have been small, averaging about 75 barrels. These spills have typically (but not always) been on-site in a containment area. Most were caused by corrosion and/or erosion of pipe, although other causes, such as failures of pipe welds, gaskets, flanges and valves, and operator error are common (Boeing Petroleum Services, Inc., 1991).

There have been four spills during this period, however, that were quite large. These were off-site failures of a brine disposal pipeline. Three were at Bryan Mound and one was at the SPR West Hackberry facility in Calcasieu Parish, Louisiana. These four spills ranged in magnitude from 74,000 barrels to 825,000 barrels, averaged more than 376,000 barrels, and together account for 99.5 percent of all brine spilled during the period. The quantity spilled in these four incidents amounts to 0.06 percent of the throughput handled at all sites from 1984 through 1990.

Based solely on historical SPR-wide statistics, one major spill of 74,000 barrels or greater could be expected for every 589 million barrels of brine throughput. At Bryan Mound, this would amount to once every 2.6 oil refill cycles.

This above-stated spill risk does not take into account significant improvements in SPR brine management as reflected by experience at the SPR Big Hill facility in Jefferson County, Texas, where there has not been a comparable major spill. At Big Hill, after the completion in 1991 of leaching 160 millon barrels of storage space, electronic testing revealed there was still sufficient thickness of the pipe wall for the brine disposal pipeline to last the 20-year life of the storage facility. This is attributed to improvements in operations as a result of lessons learned at Bryan Mound, namely, more efficient removal of suspended solids and use of oxygen scavenging.

In addition to operational improvements, DOE believes that the use of cement-lined pipe would dramatically increase the life of the brine pipeline and reduce the risk of spills. Germany, which has had more than 20 years' experience operating a crude oil storage program similar to the SPR, experimented with protective coatings for brine piping and pipelines, and established a specification for cement-lining steel pipe intended for brine service. Recently, DOE has conducted its own tests of cement linings in brine service. Preliminary results indicate the suitability of cement lining in protecting steel pipe from the corrosiveness of brine, provided the cement lining is kept moist. This is readily achieved by keeping the line packed with either brine or water. With the cement lining, oxygen scavenging will not be required at Bryan Mound and the practice will be discontinued there.

In the unlikely event of a major spill at Bryan Mound caused by the failure of the new brine pipeline, the highest potential for impact would be in the brackish marsh between the site and the ICW. Impacts to vegetation could be locally severe but reversible, analogous to the impacts of the 1989 spill.

In the 1989 incident, which killed or damaged vegetation over 8.3 acres, salinities of the impacted marsh ponds initially were elevated and dissolved oxygen was depressed. The water bodies were fully recovered within a month or

two due to frequent heavy rains and strong tidal flushing episodes. Elevated soil salinities were more persistent but returned to normal within 5 to 6 months (Boeing Petroleum Services, Inc., 1990).

Vegetation in the impacted area, which had been predominantly Scirpus sp. with some Spartina alterniflora and Borrichia frutescens, began to recover within a few months throughout most of the area. For the most severely impacted area of 2.6 acres at the pipeline rupture, however, the seed crop was damaged such that restoration of vegetation required an additional year. The pioneer species was S. alterniflora which is now dominant in the most severely impacted area. Overall, current species composition and community structure are quite similar to conditions prior to the spill. An abundance of invertebrates has returned, providing food for shorebirds, wading birds and occasional raccoons and other small mammals.

Rainfall was normal during the 1989 spill and recovery period. The impacts would have been aggravated if the spill had occurred during drought. A significant reduction in flushing by rainfall or tidal inundation would result in a larger impact area and delay the recovery of vegetation. In such an instance, recovery of the marsh could be accelerated by revegetation.

A brine spill would not threaten contamination of potable water because there is none within the influence of the pipeline. The clay soil would resist lateral spreading and transport of the brine in the subsurface and would tend to confine brine from a small leak along the pipeline. In the case of a rupture, brine would be forced to the surface where it would be readily visible. The Upper Chicot freshwater aquifer is too deep and its recharge zones are too far inland for potable groundwater supplies to be at risk from brine spills.

Coating the replacement pipeline internally and externally with cement, as proposed, would greatly reduce the risk of brine spills compared to historical DOE experience. Pipeline integrity tests, inspection, and maintenance would further reduce the risk of brine spills or leaks.

To reduce extent and severity of a brine spill and enhance recovery rates, DOE plans to enhance tidal circulation in the construction area of the marsh by adding some culverts under a road bed to promote nutrient transport. This action was planned as a response to the 1989 brine spill, but it was postponed pending construction of the new brine pipeline.

Finally, adequate and appropriate training of site personnel in Bryan Mound Emergency Response Procedures (Boeing Petroleum Services, Inc., 1992) would assure that harm would be minimized in the event of a spill. The emergency

response manual referenced above addresses spill detection and response procedures, cleanup equipment, and available contractor specialists and emergency support services.

3.3 ENDANGERED SPECIES

The piping plover (Charadrius melodus), a Federally threatened shorebird that is a winter visitor to Brazoria County, is the only endangered or threatened species that could be affected by the project. The USFWS indicated that construction would have no effect on the piping plover if it were carried out between May and August (Appendix D). This is because the bird migrates north to nest during this period. It was not known, however, whether any of the piping plover population foraged or roosted close enough to be disturbed by the proposed action during the remainder of the year. Therefore, the USFWS added that if construction cannot be limited to May through August, the project would have to be reevaluated.

Based on the preliminary results of an ongoing DOE survey and on available information on piping plover behavior, DOE believes that the piping plover does not frequent the vicinity of the proposed pipeline construction and that there is now a reasonable expectation that the proposed action could be done without disturbance to the species. However, if construction cannot be done in the piping plover potential habitat during the period May through August, DOE will reinitiate consultation with USFWS. Observations by qualified personnel would be conducted during construction to assure that there would continue to be no disturbance of the species.

Offshore, the loggerhead sea turtle, which is the only endangered or threatened species likely to forage in the area of the proposed diffuser site, could avoid the area without affect to its diet or behavior.

3.4 CUMULATIVE IMPACTS

No cumulative or long-term impacts of the proposed project have been identified.

It makes no difference whether onshore and offshore construction activities occur simultaneously or separately. Onshore and offshore construction crews work independently and use different equipment in separate areas. It is immaterial whether the impacts of their respective efforts occur sequentially or concurrently.

Regardless of whether pipeline construction occurs in pristine or previously disturbed wetlands, impacts would be minor and short-term. It is DOE construction practice to disturb previously disturbed areas in preference to pristine areas. The proposed action is consistent with this practice.

Relocating the diffuser to the 3.6-mile site would place the discharge within the white shrimp spawning zone. Individual eggs and early planktonic stages could be impacted physically by the diffuser jets and by elevated salinities in the near field of the discharge. However, the loss of individuals in a small, localized area would not result in reduced populations, disrupted migrations, or in reduced commercial catch (Matis, et al., 1982; Turgeon, 1984). The reasons for this may be the high fecundity of the species (up to 500,000 eggs per female) and the fact that commercial shrimp fishing is so heavy, the habitat is below carrying capacity.

For analogous reasons, the turbidity plume from offshore construction during the May-June peak migration of brown shrimp out the estuary would not adversely impact the migration, the distribution of the species, the number of individuals, or the commercial catch.

There is no risk of cumulative impacts from a synergistic effect of multiple discharges along the coast at Bryan Mound, Big Hill, and West Hackberry. The area of observable effects is confined to the vicinity of the diffuser. The area is very small compared to the envelope of brine plume exposures; and the length of brine plumes is very small compared to the distance separating the three discharges. In addition, the combined salt mass discharged by Bryan Mound, Big Hill, and West Hackberry over their respective life cycles would be an infinitesimal increment to the salt budget of the northern Gulf of Mexico. The impact of the combined discharges on the salinity of the coastal waters would be negligible.

4. CONCLUSIONS

- Pipeline construction and operation are not a concern with regard to floodplain impacts. A buried pipeline does not alter floodplain functions, is unaffected by floods, and does not preclude other land use.

- There are two types of ecological resources that are of concern to the proposed project--endangered species and wetlands.

- DOE believes that the threatened piping plover does not frequent the vicinity of the proposed pipeline construction and that there is a reasonable expectation that the project would have no effect on the species. DOE would provide qualified observers to assure that there would be no disturbance of the species. No other potential impacts to endangered or threatened species have been identified.

- About 52 acres of wetlands would be disrupted during a 2-month construction period. Wildlife would be displaced during the period and minor and short-term impacts would occur on vegetative communities and local water bodies of the marsh.

- The greatest potential for impact from a brine spill would be in the brackish marsh. Based on historical experience, one spill of 74,000 barrels or greater would be expected in the life-cycle of the Bryan Mound storage facility. The severity, extent, and duration of impacts would vary directly with the spill volume and inversely with normal flushing from rainfall and tidal inundation.

- Crossing the ICW would have minor, short-term effects on water quality and biota and would interrupt shipping for 8 hours or less.

- Public access to recreation at Bryan Beach State Recreation Area to the west would be minimally impacted for 6 weeks.

- There would be no impacts on groundwater or potable water supplies.

- Impacts offshore to sport and commercial fishing would be negligible. Construction impacts on the benthos and water quality would be minor and short-term. Brine discharge would not impinge on the shore or any other sensitive environment, would not pose a hazard to navigation, and would not adversely affect the biota and biotic communities.

- Impacts would be negligible for air quality and socioeconomic concerns. Worker occupational health and safety would be assured by appropriate administration of DOE's Construction Contractor Safety Program pursuant to DOE Order 5480.9, Construction Safety and Health Program.

- No cumulative or long-term impacts of the proposed project have been identified.

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APPENDIX A

MAJOR ENVIRONMENTAL PERMITS

MAJOR ENVIRONMENTAL PERMITS
BRYAN MOUND BRINE PIPELINE REPLACEMENT

AGENCY	PERMIT
(CONSTRUCTION)	
U.S. Army Corps of Engineers	Amend Existing Sec. 404 Permit No. 12062
U.S. Environmental Protection Agency	Hydrotest Discharge Permit "Minor Industrial", NPDES Permit
U.S. Environmental Protection Agency	Stormwater Discharge Permit, for construction sites over 5 acres
Railroad Commission of Texas	Temporary Water Use Permit, (Hydrotest Discharge)
Brazoria County Engineers Office	Construction, Building Permit
Brazoria County Dune Protection Committee	Dune Protection Permit (Construction Activities)
Velasco Drainage District No. 2	Levee Crossing Permit (On-site Hurricane Levee)
(OPERATION)	
Railroad Commission of Texas	Modify Existing Permit No. 02271, to dispose of waste in State waters (outfall 001)

APPENDIX B

FLOODPLAIN/WETLANDS ASSESSMENT

FLOODPLAIN/WETLANDS ASSESSMENT

Project Description

The U.S. Department of Energy (DOE) proposes to replace the existing 15-mile long 36-inch diameter brine pipeline, which currently transports brine produced from the Strategic Petroleum Reserve (SPR) Bryan Mound facility located in Brazoria County, Texas, to an existing diffuser located in the Gulf of Mexico, with a new 5.5-mile long 24-inch diameter brine pipeline. Further, DOE proposes to replace the existing brine diffuser, currently located at a 70-foot depth 12.5 miles offshore, with a downsized diffuser that would be located at a 30-foot depth 3.5 miles offshore. The new brine pipeline would follow the same route and be constructed adjacent to and in the same right-of-way (ROW) as the existing brine pipeline. Figure B-1 illustrates the proposed onshore route for the replacement brine pipeline.

All of the area associated with the proposed action is within the 100-year floodplain. The floodplain is subject to flooding from high rainfall and storm surges associated with coastal storms and hurricanes. The environments characterizing the floodplain which are associated with the proposed action include industrial land, coastal wetlands, spoil areas, recreational beaches and dunes.

According to Executive Order 11988 (Floodplain Management, May 24, 1977), Federal agencies "shall consider alternatives to avoid adverse effects and incompatible development in the floodplain". If there is no "practicable alternative" to locating a project in a floodplain, an agency is to "design or modify its action in order to minimize potential harm to or within the floodplain". Natural and beneficial floodplain values to be protected include natural moderation of floods, water quality maintenance, groundwater recharge, support of living resources (marshes, fish and wildlife), cultural richness (archaeological, historical, recreational, scientific), and agricultural, aquacultural, and forestry production.

The location of floodplain/wetland areas associated with the proposed action are shown in Figure B-1. The existing DOE pipeline ROW proposed for the location of the replacement brine pipeline crosses about 2 miles of wetlands. There are no high hazard areas as defined in 10 CFR Part 1022.4. However, the dunes and beach seaward of the Intracoastal Waterway (ICW) are subject to the erosive force of the wave impact during a hurricane storm surge. Restoration of the dunes after construction would be a major concern for the protection of floodplain values.

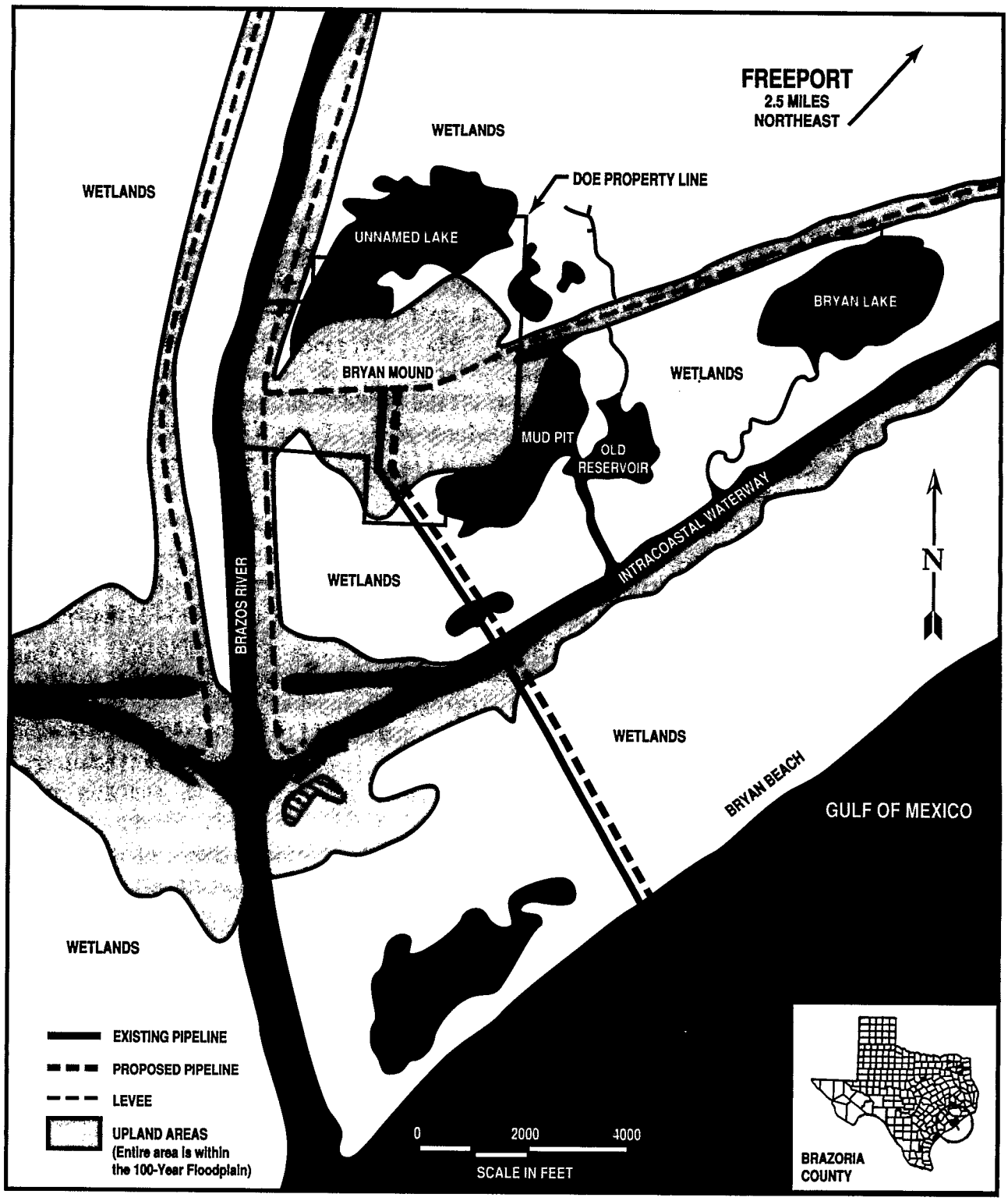


Figure B-1. Location of the Pipeline Project Relative to the 100-Year Floodplain, Brazoria County, Texas.

Executive Order 11990 (Protection of Wetlands, May 24, 1977), requires Federal agencies to avoid construction in wetlands (e.g., coastal marshes) unless "there is no practicable alternative" and "all practicable measures to minimize harm" are included. Given the location of the Bryan Mound storage facility and the existing pipeline ROW, there is no practicable alternative to locating the proposed replacement brine pipeline in a floodplain or from crossing wetlands. Proposed pipeline construction activities would follow prudent wetland management practices while crossing wetlands.

Floodplain/Wetlands Effects

The effects of the proposed action on the 100-year floodplain would be direct, minor and short-term. During construction, frequent gaps would be left in the spoil bank of excavated material along the ROW to maintain normal patterns of surface water flow. After construction, the preexisting surface contours above the trench would be restored and maintained. Construction activities would disturb wildlife habitat within the construction ROW which varies in width from 125 feet to 250 feet, and the existing 75-foot wide permanent ROW would continue to be kept clear of woody vegetation to allow for maintenance. The replacement brine pipeline would utilize mostly existing pipeline ROW for construction resulting in little net change to habitat. The pipeline would be entirely in the existing permanent maintenance ROW. Because the replacement brine pipeline would be buried, there would be no interference with natural moderation of floods, water quality maintenance, groundwater recharge, or agricultural production. Similarly, there would be no increase in the threat to life or property from flooding as a result of the buried brine pipeline.

Effects on wetlands would also be minor. Construction activities would temporarily destroy vegetation and force indigenous wildlife to utilize other locally available habitat during the period of construction. Following construction and testing of the replacement brine pipeline, the disrupted portions of the ROW would be restored to approximate preconstruction conditions and made available for natural recolonization of the habitat. None of the existing pipeline ROW proposed for routing of the replacement brine pipeline crosses wetlands set aside for wildlife habitat. Construction would temporarily disturb approximately 52 acres of coastal wetlands of which about 90 percent are located in existing spoil disposal areas or pre-existing pipeline ROWs.

One area of concern is the potential impact of a brine spill in wetlands. During construction, the existing pipeline would remain in use, although it would be kept at low pressure to minimize stress. The precise location of the existing pipeline is readily determinable in the field such that a 10-foot separation from the new construction would be safe.

A brine leak in the wetlands during pipeline operation would result in temporary increases in salinity of adjacent soils and water bodies and burned vegetation. The severity of impacts to vegetation, the extent, and duration would vary directly with the spill volume and inversely with normal flushing from rainfall and tidal inundation.

The replacement pipeline would be externally and internally cement coated and lined, greatly reducing the possibility of any potential leaks for at least 20 years. Pipeline integrity tests, inspection, and maintenance would further reduce the risk of brine spills or leaks. Finally, adequate and appropriate training of site personnel in the Bryan Mound Spill Contingency and Emergency Response Plans would assure that, in the event of a spill, harm would be minimized.

Design, construction and operation of the replacement brine pipeline would be in accordance with applicable permits and amendments authorizing the proposed action, thus ensuring that potential effects on floodplains and associated wetlands would be minimized and temporary. Construction of the existing brine pipeline was authorized by the U.S. Army Corps of Engineers (Bryan Mound Permit 12062). Authorization to construct the replacement brine pipeline would be in accordance with amendments to this permit. Operation of the replacement brine pipeline would be in accordance with the existing U.S. Environmental Protection Agency permit requirements for the existing brine pipeline (National Pollutant Discharge Elimination System, Bryan Mound Permit TX0074012) and any new permit restrictions required by the State of Texas, Texas Water Commission.

Alternatives

The proposed action would be an appropriate corrective action for a potential environmentally harmful condition. There are no practicable alternatives that would avoid the floodplain/wetlands altogether. Substitution of an underground injection system for the ocean discharge system would still require construction of a pipeline in the floodplain/wetlands. Further, the injection wells themselves would probably be constructed in the floodplain/wetlands.

The underground injection alternative is deemed unsuitable because past experience at Bryan Mound was extremely costly and unreliable due to adverse geological conditions.

The no action alternative is not acceptable since the deteriorated state of the brine pipeline would only worsen until it could not be maintained by any feasible means, rendering Bryan Mound inoperable. Trucking brine from the site to commercial disposal wells is limited to small quantities in emergencies. This method is too costly and inefficient to be a practicable long-term solution for brine disposal.

APPENDIX C

AGENCIES AND PERSONS CONSULTED

AGENCIES AND PERSONS CONSULTED

A consultation and coordination meeting was held on December 4, 1991, at the Corps of Engineers (COE) District Office in Galveston, Texas. Comments received were considered during the preparation of this environmental assessment. The agencies in attendance were as follows:

- o U.S. Army Corps of Engineers
- o National Marine Fisheries Service
- o U.S. Fish and Wildlife Service
- o Texas Water Commission
- o Texas General Land Office
- o Texas Parks and Wildlife Department

The Brazoria County Floodplain Administrator was consulted in the field on July 23, 1991, regarding potential impacts to the floodplain and local sand dunes and beach habitat. Comments received were considered during the preparation of this document.

No Native American tribes were consulted since the proposed action would not affect a reservation. A list of Federal, State and local agencies and private groups and parties contact is given below. DOE is providing this Environmental Assessment to them.

A. Federal Agencies	Jurisdiction/Expertise
National Marine Fisheries Service Habitat Conservation Division Galveston Field Branch Galveston, Texas	Endangered Species Act Fish and Wildlife Coordination Act
Soil Conservation Service Victoria, Texas	Farmland Protection Policy Act
U.S. Army Engineer District, Galveston Corps of Engineers Galveston, Texas	Rivers and Harbors Act Clean Water Act
U.S. Department of the Interior Minerals Management Service New Orleans, Louisiana	Abandonment of Pipelines Outer Continental Shelf
U.S. Environmental Protection Agency Region VI Dallas, Texas	Clean Water Act Ocean Discharge Criteria General Coordination
U.S. Fish and Wildlife Service Houston, Texas	Endangered Species Act Fish and Wildlife Coordination Act Coastal Barriers Resources Act

B. State Agencies

Oil and Gas Division Railroad Commission of Texas Austin, Texas	Brine Discharge Into State Waters
Coastal Division Texas General Land Office Austin, Texas	Coastal Zone Management Easement Agreements General Coordination
Texas Historical Commission Austin, Texas	National Historic Preservation Act
Resource Protection Division Texas Parks and Wildlife Department Austin, Texas	Endangered Species Act Fish and Wildlife Coordination Act State Parks and Recreational Areas Adjacent Land Owner
Texas Water Commission Austin, Texas	Brine Discharge Into State Waters Water Acquisition Water Quality

C. Local Government

Floodplain Administrator Office of Brazoria County Engineer Angleton, Texas	Floodplain, Wetland and Beach and Dune Areas
Brazos River Harbor Navigation District Freeport, Texas	Easement Agreements General Consultation
Velasco Drainage District No. 2 Clute, Texas	Levee Crossings General Consultation

APPENDIX D

ENDANGERED AND THREATENED SPECIES

(SECTION 7) COORDINATION

TABLE D. ENDANGERED OR THREATENED SPECIES OF THE BRYAN MOUND AREA

Common Name (Scientific Name)	Status Federal	State
D.1. Terrestrial/Aquatic Species of Brazoria County		
D.1.a. Birds		
American Swallow-tailed Kite (Elanoides forficatus)	-	T
Arctic Peregrine Falcon (Falco peregrinus tundrius	T	T
Attwater's Greater Prairie Chicken (Tympanuchus cupido attwateri)	E	E
Bald Eagle (Haliaeetus leucocephalus)	E	E
Brown Pelican (Pelecanus occidentalis)	E	E
Interior Least Tern (Sterna antillarum athalossos)	E	E
Piping Plover (Charadrius melodus)	T	T
Red-cockaded Woodpecker (Picoides borealis)	E	E
Reddish Egret (Egretta rufescens)	-	T
Rose-throated Becard (Pachyramphus aglaiae)	-	T
Sooty Tern (Sterna fuscata)	-	T
White-faced Ibis (Plegadis chihi)	-	T
White-tailed Hawk (Buteo albicaudatus)	-	T
Whooping Crane (Grus americana)	E	E
Wood Stork (Mycteria americana)	E	T
D.1.b. Terrestrial Mammals		
Jaguarundi (Felis yagouaroundi)	E	E
D.1.c. Terrestrial/Aquatic Reptiles and Amphibians		
Alligator Snapping Turtle (Macroclemys temminckii)	-	T
Texas Horned Lizard (Phrynosoma cornutum)	-	T
Texas Scarlet Snake (Cemophora coccinea lineri)	-	T
Timber Rattlesnake (Crotalus horridus)	-	T
Western Smooth Green Snake (Opheodrys vernalis blanchardi)	-	E

Common Name (Scientific Name)	Status Federal	State

D.2. Marine Species Offshore of Bryan Mound

D.2.a. Marine Mammals

Atlantic Spotted Dolphin (Stenella plagiodon)	-	T
Blue Whale (Balaenoptera musculus)	E	E
Dwarf Sperm Whale (Kogia simus)	-	T
False Killer Whale (Psuedorca crassidens)	-	T
Finback Whale (Balaenoptera physalus)	E	E
Gervaris' Beaked Whale (Mesoplodon europaeus)	-	T
Goose-beaked Whale (Ziphius cavirostris)	-	T
Killer Whale (Orcinus orca)	-	T
Pygmy Killer Whale (Feresa attenuata)	-	T
Pygmy Sperm Whale (Kogia Breviceps)	-	T
Right Whale (Balaena glacialis)	E	E
Rough-toothed Dolphin (Steno bredanensis)	-	T
Sei Whale (Balaenoptera borealis)	E	E
Short-finned Pilot Whale (Globicephala macrorhynchus)	-	T
Sperm Whale (Physeter macrocephalus)	E	E

D.2.b. Marine Turtles

Atlantic Green Sea Turtle (Chelonia mydas mydas)	T	T
Kemp's Ridley Sea Turtle (Lepidochelys kempii	E	E
Leatherback Sea Turtle (Dermochelys coriacea)	E	E
Loggerhead Sea Turtle (Caretta caretta)	T	E

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Division of Ecological Services
17629 El Camino Real, Suite 211
Houston, Texas 77058

September 24, 1992

Mr. David Brine, FE-4441
U.S. Department of Energy
Strategic Petroleum Reserve
900 Commerce Road, East
New Orleans, Louisiana 70123

Dear Mr. Brine:

This responds to the September 2, 1992 letter from Fluor Daniel, Inc., which requested concurrence with a "no effect" determination on the possible impacts of the proposed replacement of the brine disposal pipeline servicing the Bryan Mound Strategic Petroleum Reserve near Freeport. The proposed project site is located in Brazoria County, Texas.

The U.S. Fish and Wildlife Service (Service) concurs with your findings that the proposed project will have no adverse effect on any federally endangered or threatened species. This concurrence is based upon a comparison of your reference maps and Service files and upon construction activities proceeding as stated in the draft environmental assessment. If all construction activities cannot be limited to the months of May, June, July and August the proposed project will have to be reevaluated to determine the effects it may have on the threatened piping plover (Charadrius melodus).

We appreciate your coordination efforts on this project. If we can be of further assistance, please contact Edith Erfling at (713) 286-8282.

Sincerely,

Frederick T. Werner
Chief, Regulatory Activities

cc:
Paul K. Johnson, Fluor Daniel, Inc., P.O. Box 5014, Sugar Land, TX 77487

APPENDIX E

ULTRASONIC SURVEY OF THE BRINE PIPELINE

Pipetronix Ultrasonic Pig Survey
Bryan Mound Brine Pipeline

276 total joints of pipe
70 (25%) have thin spots less than .200" (5.0mm)
38 (14%) have thin spots less than .157" (4.0mm)
25 (9%) have thin spots less than .137" (3.5mm)
15 (5%) have thin spots less than .118" (3.0mm)
7 (2.5%) have thin spots less than .100" (2.5mm)

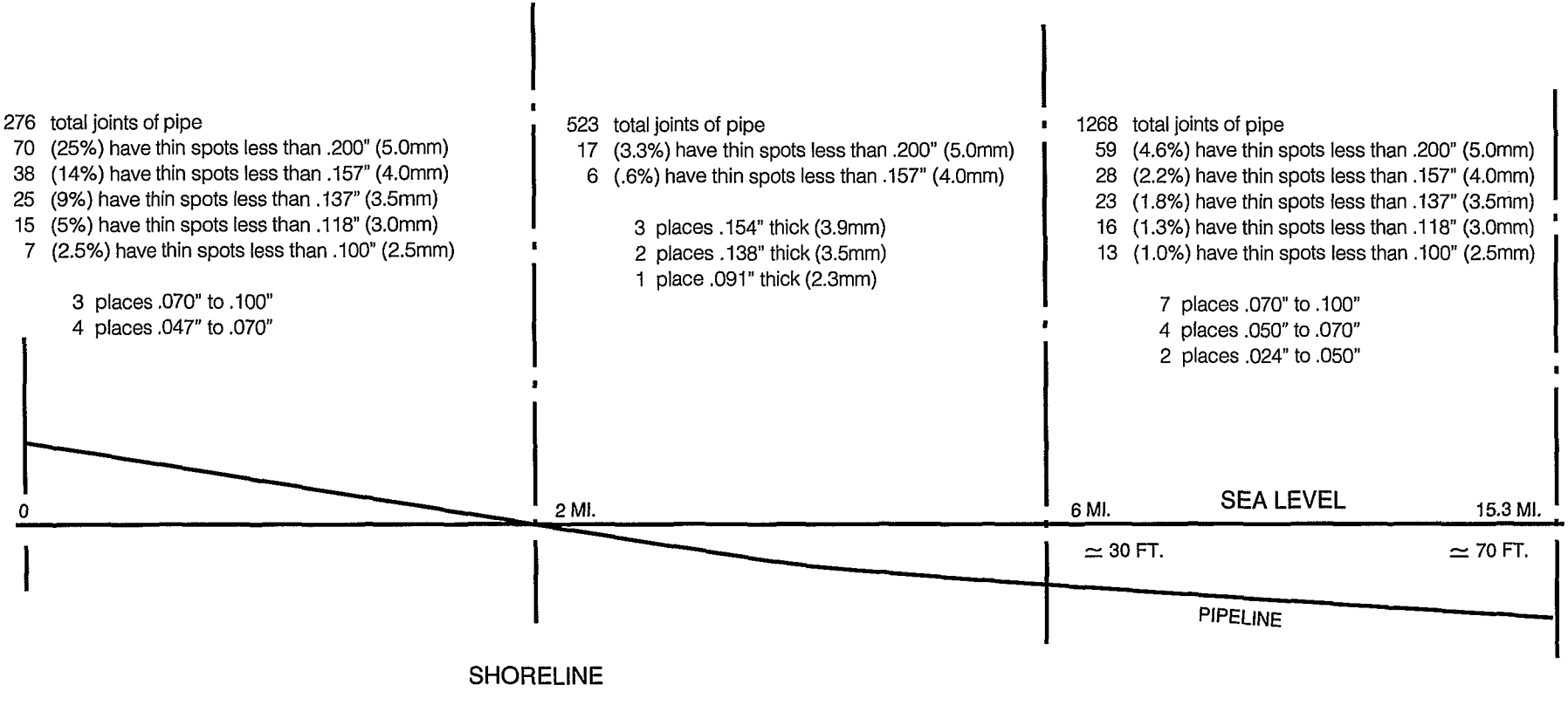
3 places .070" to .100"
4 places .047" to .070"

523 total joints of pipe
17 (3.3%) have thin spots less than .200" (5.0mm)
6 (.6%) have thin spots less than .157" (4.0mm)

3 places .154" thick (3.9mm)
2 places .138" thick (3.5mm)
1 place .091" thick (2.3mm)

1268 total joints of pipe
59 (4.6%) have thin spots less than .200" (5.0mm)
28 (2.2%) have thin spots less than .157" (4.0mm)
23 (1.8%) have thin spots less than .137" (3.5mm)
16 (1.3%) have thin spots less than .118" (3.0mm)
13 (1.0%) have thin spots less than .100" (2.5mm)

7 places .070" to .100"
4 places .050" to .070"
2 places .024" to .050"



APPENDIX F

COORDINATION WITH THE STATE OF TEXAS

COORDINATION WITH THE STATE OF TEXAS

This EA was coordinated with the State of Texas. Written comments were received from the Texas Water Commission, the Texas Parks and Wildlife Department, and the Railroad Commission of Texas. Their comments are addressed below followed by copies of their letters.

F.1. Responses to comments from the Texas Water Commission

F.1.1. "...it appears that DOE has developed a new model that predicts the salinity impact of the new discharge location..."

Response: The model was developed by R.E. Randall of Texas A&M University in the early 1980s in conjunction with offshore monitoring of brine discharge for the SPR Bryan Mound and West Hackberry facilities and described in various reports (Hann and Randall, 1982; Hann, Giammona, and Randall, 1984; Hann, Giammona, and Randall, 1985; Randall, 1992). The model is empirical and was developed from actual observations of brine discharge to predict the areal extent of the plume, vertical rise of the brine jet, and above-ambient salinity contours. It was also used in connection with current meter records to generate estimates of the benthic community's exposure to the brine plume during the period between sampling cruises.

In addition to its successful application to monitoring at Bryan Mound and West Hackberry, the model was used to predict brine dispersion in support of permit applications for discharge from the SPR Big Hill facility. The results were accepted by the responsible regulatory agencies, including the Texas Water Commission.

Section 3.2.1 has been revised to clarify that the model under discussion is not new or unproved.

F.1.2. "If the modelling results reported are accurate, no high salinity water will come ashore in the vicinity of the discharge. However, there will be a large impact zone and this zone will be very near the shore."

Response: The model conservatively estimates the area of exposure to brine by characterizing the long-term above-ambient salinity regime as a function of distance and direction from the brine diffuser. It was used in the present study (Randall, 1992) to determine the minimum separation needed between the brine diffuser and the shore to avoid impingement of the brine plume. The model is not time-dependent; therefore, it is not intended or designed to represent the instantaneous shape of the plume.

The brine plume boundary is defined as the limit of detectability which is 1 part per thousand above ambient in this area of the coastal ocean due to natural spatial and temporal variation. The area of the detectable plume should not be confused with an "impact zone." Beyond 1000 feet from the diffuser, the plume is predominantly equal to or less than 3 parts per thousand above ambient which is within normal mesoscale variation in the coastal environment over a tidal cycle. As discussed in Section 3.2.1, impacts of past Bryan Mound brine discharge were determined to be inconsequential and unmeasurable.

F.1.3. "...the long term hydrodynamic features of the near-coast waters of the Gulf of Mexico are not well known and it is difficult to predict the specific behavior of a discharge of this nature."

Response: As summarized in Sections 2.5 and 3.2.1, the SPR oceanographic support activity, which included site baseline characterizations and brine discharge monitoring from 1977 through 1985, contributed substantial information and insight into the hydrodynamics of the shallow coastal waters of Texas and Louisiana and advanced the state of the art for predicting the dispersion of negatively buoyant submerged effluents in the marine environment. Although the high natural variability of the regional marine environment is readily apparent, the major factors of the physical circulation and marine ecology have been identified and characterized sufficiently to site, design, build, and operate a brine discharge in an environmentally benign manner. These were the conclusions reached by DOE after four years of comprehensive monitoring. The U.S. Environmental Protection Agency agreed with these conclusions and, with the concurrence of the State of Texas, rescinded the requirement for further offshore monitoring.

F.1.4. "...use of these [oxygen scavenging] compounds to reduce the risk of a pipeline break can cause other water quality problems such as low dissolved oxygen concentrations in the brine discharge. Because the brine discharge settles along the bottom of the shelf, the depression of dissolved oxygen can produce significant detrimental effects on the benthic organisms in the vicinity of the discharge."

Response: Because the replacement pipeline will be cement lined, oxygen scavenging will no longer be required at Bryan Mound and the practice will be discontinued there. However, oxygen scavenging to protect the brine pipeline at Big Hill will continue, so the issue is addressed below.

The use of an oxygen scavenger, such as ammonium bisulfite, is carefully regulated under the discharge permit to provide for a minimum concentration of oxygen in the discharge. There are no toxic products and no other detectable sources of oxygen demand in the discharge.

For the present SPR diffuser design and performance criteria, the entrainment of ambient seawater in the turbulent jet dilutes the brine by a volumetric factor of 35 or more at the point of impact; i.e., at the start of the intermediate field where it undergoes lateral spreading along the bottom, the brine plume is 97 percent or more ambient seawater.

Natural anoxic and hypoxic events, which occur periodically in the region in late spring to early autumn, are associated with high river discharge, light winds, and strong stratification. In such instances, the diffuser jets enhance mixing and introduce oxygenated upper waters to the bottom, although the extent of this positive effect is probably insignificant. There are no facts to support a hypothesis that the discharge could exacerbate or perpetuate hypoxic conditions. Under any environmental conditions, the impact of the discharge on ambient bottom dissolved oxygen would be negligible. As discussed in Section 3.2.1, no effects of the discharge on the benthic community were detected.

F.1.5. "The EA details the recovery of wetland vegetation after a spill of brine in 1989. While some vegetation is said to have reclaimed the spill site, no mention is made of the species composition or the biotic integrity of the recolonized area."

Response: The area impacted by the 1989 spill was predominantly Scirpus sp. with some Spartina alterniflora and Borrichia frutescens. As natural revegetation proceeded, the pioneer species was S. alterniflora which now dominates the most heavily impacted areas. Overall, current species composition and community structure are quite similar to conditions prior to the spill. An abundance of invertebrates has returned, providing food for shorebirds, wading birds and occasional raccoons and other small mammals.

This information has been added to Section 3.2.2.

F.1.6. "...are any mitigation requirements being considered along with this project?"

Response: Numerous pipeline engineering, construction, maintenance, and operating practices whose purpose is to minimize or avoid impacts; to rectify impacts by restoring the environment; or to reduce or eliminate impacts over time are discussed in Sections 1.2, 3.1, 3.2, and Appendix B.

In addition, DOE plans to enhance tidal circulation in the construction area of the marsh by adding some culverts under a roadbed to promote nutrient transport. This action was planned as a response to the 1989 brine spill but it was postponed pending construction of the new brine pipeline. The need for manual revegetation will be addressed subsequent to construction and in accordance with the conditions of the construction permit.

Because the pipeline would be buried and the wetlands would be restored, no cumulative or long-term impacts have been identified. Consequently, there would be no need to consider wetlands compensation.

F.2. Responses to comments from the Texas Parks and Wildlife Department

F.2.1. "The project could potentially affect the piping plover (Charadrius melodus) which is federal and state listed as threatened. Adverse affects [sic] to this species could occur according to the Fish and Wildlife Service if construction cannot be limited to the months of May, June, July, and August."

Response: The basis for the U.S. Fish and Wildlife Service's recommendation was that during the four-month period of May through August, C. melodus returns to the northern Great Plains and Great Lakes to nest. It was not known whether any of the piping plover population foraged or roosted close enough to be disturbed by the proposed action during the remainder of the year.

Accordingly, DOE has been conducting a survey since November 1992, to extend through April 1993, for the presence of the piping plover in the vicinity of the proposed brine pipeline ROW. To date, no piping plovers have been observed in the study area although other members of the maritime shorebird guild have been observed. The closest reported sightings (which were not part of the DOE survey) have been at Quintana Beach, more than two miles to the northeast. In addition, a roost has been reported on the other side of the Brazos River Diversion Channel in the area seaward of the ICW between the Diversion Channel and the San Bernard River. This location is more than a mile southwest of the ROW.

Based on the preliminary results of the DOE survey and on available information on piping plover behavior, DOE believes that the piping plover does not frequent the vicinity of the proposed pipeline construction and that there is now a reasonable expectation that the proposed action could be done without disturbance to the species. However, if construction cannot be done in the piping plover potential habitat during the period May through August, DOE will reinitiate consultation with USFWS. Observations by qualified personnel would be conducted during construction to assure that there would continue to be no disturbance of the species.

This information has been incorporated into the EA at Sections 2.7, 3.3, 4.0, and the Summary. The final report on the DOE piping plover survey should be available in summer 1993.

F.2.2. "Disrupted wetland areas should be recontoured to the original topography and revegetated with marsh plants within 3 months of project completion."

Response: As described in Sections 1.2.1 and 3.1.1, the trench would be backfilled and appropriate measures would be taken as required to restore and maintain the original grade. If resprigging the disturbed area is required, it would normally be done immediately after restoring the grade unless the growing season is past, in which case the work would be postponed to the following growing season.

F.2.3. "...in the event of an accidental brine discharge or spill, immediate notification of the Texas Parks and Wildlife Department, Resource Protection Division... is requested."

Response: As a courtesy, DOE has modified its spill reporting procedures to add the Texas Parks and Wildlife Department permanently, including during construction, to the list of agencies notified of all reported spills.

F.2.4. "Project area delineation provided with the documentation is not sufficiently detailed to make a positive determination of potential conflict with this State-owned land [Bryan Beach State Recreation Area (BBSRA)]. Verification that the project will not impact BBSRA is needed prior to authorization of the project."

Response: The pipeline ROW abuts the BBSRA which extends from the ICW to the shore southwestward to the Brazos River Diversion Channel. Figure 3 and the text of Sections 1.2.1 and 2.2 have been modified to reflect this.

F.2.5. "Staff at the Bryan Beach State Recreation Area should be contacted to notify the public of impending night closure and limited day use."

Response: DOE would give BBSRA advance notice in writing of the scheduled days when public access to the park would be limited by construction across the beach.

F.3. Responses to comments from the Railroad Commission of Texas

F.3.1. "The Railroad Commission of Texas under Chapter 91 of the Texas Natural Resource code has jurisdiction over brine mining and the disposal of waste from these activities. Therefore appendix A should be amended to reflect the above."

Response: Appendix A has been revised accordingly.

F.3.2. "The Final EA should be updated to include any new information on the use of cement lined pipe for brine service."

Response: New information on German experience with cement-lined steel pipe in comparable applications and preliminary information on ongoing DOE tests have been added to the discussion of Section 3.2.2.

F.3.3. "...the discontinuance of the use of an oxygen scavenger should be addressed in the final EA."

Response: This information has been added to Section 3.2.2. With respect to potential impacts of oxygen scavengers in the brine discharge, see the response to Texas Water Commission comment F.1.4.

F.3.4. "It appears the project must be accomplished in the above months [May through August] or additional precautions taken."

Response: See the response to Texas Parks and Wildlife Department comment F.2.1.

Texas Water Commission

INTEROFFICE MEMORANDUM

To: Kendall Moss Date: February 16, 1993
Office of the Executive Director

From: Richard L. Kiesling, Ecosystem Research and Assessment Team, Research and Environmental Assessment Section, Environmental Assessments Division

Subject: Comments on the DOE Bryan Mound SPR pipeline replacement

The Environmental Assessments Division has previously reviewed this issue when DOE first submitted their Water Quality Discharge Permit for renewal to the Texas Water Commission. At the request of the Texas Railroad Commission (TRC), Lesley Pedde of the Permitting Team, Watershed Management Division transferred responsibility for this permit to the TRC. At that time several water quality issues had not been resolved, including the development of an updated salinity plume model, the presence of potentially toxic metal concentrations in the brine, and the use of oxygen scavenging compounds in the discharge pipe.

① In reviewing the EA, it appears that DOE has developed a new model that predicts the salinity impact of the new discharge location (see page 24, last paragraph; Randall 1992). If the modelling results reported are accurate, no high salinity water will come ② ashore in the vicinity of the discharge. However, there will be a large impact zone and this zone will be very near the shore. I would also like to point out that the long term hydrodynamic ③ features of the near-coast waters of the Gulf of Mexico are not well known and it is difficult to predict the specific behavior of a discharge of this nature. On the other hand, the model developed does incorporate some conservative elements that provide a margin for error.

The other major water quality issue involves the use of oxygen scavenging compound in the brine effluent. These materials are necessary to prolong the life of the pipeline, but they also produce anoxic discharges if used incorrectly. Data from previous applications of some of these compounds has produced water quality violations. In summary, use of these compounds to reduce the risk of a pipeline break can cause other water quality problems such as ④ low dissolved oxygen concentrations in the brine discharge. Because the brine discharge settles along the bottom of the shelf, the depression of dissolved oxygen can produce significant detrimental effects on the benthic organisms in the vicinity of the discharge.

Two issues concerning wetland destruction or disruption exist for this project. The EA details the recovery of wetland vegetation after a spill of brine in 1989. While some vegetation is said to ⑤ have reclaimed the spill site, no mention is made of the species

composition or the biotic integrity of the recolonized area. What is of interest here is the functionality of the wetland community and the extent to which time (6 to 18 months in this example) mitigates the effects of these spills. These comments also apply to the 45 acres of wetlands that would be disrupted during the ⑥ construction phase. In addition, are any mitigation requirements being considered along with this project? I saw no discussion of this in the EA.

Received 2/23/93.

TEXAS
PARKS AND WILDLIFE DEPARTMENT
4200 Smith School Road • Austin, Texas 78744 • 512-389-4800

ANDREW SANSOM
Executive Director

February 19, 1993

Mr. Hal Delaplane
Strategic Petroleum Reserve
FE-423
U.S. Department of Energy
1000 Independence Avenue S.W.
Washington, DC 20585

Re: Environmental Assessment of the Brine Pipeline Replacement for the Strategic Petroleum Reserve Bryan Mound Facility in Brazoria County, Texas

Dear Mr. Delaplane:

The above referenced document has been reviewed by Department staff and the following comments are provided.

The Department of Energy is proposing to replace the existing, failed Bryan Mound brine disposal pipeline, which extends 12.5 miles offshore to a depth of 70 feet with a pipeline that extends 3.5 miles offshore to a depth of 30 feet. The new pipeline would be smaller and be concrete lined. The project could ① potentially affect the piping plover (Charadrius melodus) which is federal and state listed as threatened. Adverse affects to this species could occur according to the Fish and Wildlife Service if construction cannot be limited to the months of May, June, July, and August.

A total of 52 acres of wetlands will be disturbed during the 2 month construction ② period. Disrupted wetland areas should be recontoured to the original topography and revegetated with marsh plants within 3 months of project completion.

During the construction period the risk for one or more brine spills is considered high. Three significant spills (≥ 74,000 barrels) occurred at this site from 1984 to 1990. A spill at this site in 1989 killed or damaged vegetation on 8.3 acres and affected salinity and dissolved oxygen in adjacent marsh ponds. Recovery of the area required approximately one year. Studies and monitoring activities conducted by Department of Energy concluded brine disposal at this site did not adversely impact biotic communities or shrimp catch. However, in the event of ③ an accidental brine discharge or spill, immediate notification of the Texas Parks and Wildlife Department, Resource Protection Division (512-389-4634) is requested.

This proposed project site may coexist with Bryan Beach State Recreation Area (BBSRA). Project area delineation provided with the documentation is not ④ sufficiently detailed to make a positive determination of potential conflict with this State-owned land. Verification that the project will not impact BBSRA is needed prior to authorization of the project.

Additional impacts will affect recreation. Human activity associated with the Bryan Beach State Recreation Area will be limited to day time use during ⑤ construction. Staff at the Bryan Beach State Recreation Area should be contacted to notify the public of impending night closure and limited day use.

I appreciate your coordination on this project.

Sincerely,

Robert W. (Bob) Spain, Chief
Habitat Assessment Branch
Resource Protection Division

RWS:RGF:dab

cc: T.C. Adams, Governor's Office

RAILROAD COMMISSION OF TEXAS
OIL AND GAS DIVISION

JAMES E. (JIM) NUGENT, Chairman
MARY SCOTT NABERS, Commissioner
BARRY WILLIAMSON, Commissioner

DAVID M. GARLICK
Director
LORI WROTENBERY
Director of
Environmental Services
(512) 463-6790
Fax (512)463-6780

1701 N. CONGRESS | P. O. BOX 12967 | AUSTIN, TEXAS 78711-2967

TO: Brian Schiable - Director
Information Services

Received 3/16/93. [illegible]

FROM: Windle Taylor - Manager
NPDES Program

DATE: February 24, 1993

SUBJECT: Review of U.S. Department of Energy Environmental Assessment of the Brine Pipeline Replacement for the Strategic Petroleum Reserve Bryan Mound Facility in Brazoria County, Texas

The Railroad Commission of Texas under Chapter 91 of the Texas Natural Resource code has jurisdiction over brine mining and the disposal of waste from these activities. Therefore appendix A should be amended to reflect the above. This includes discharge of any hydrotest water, the discharge of brine water plus other discharges associated with the facility. ①

The use of cement lined pipe as outlined on page 26 is of concern since there is no history on the use of this type of pipe for brine service (paragraph 2 of page 26). However, based on telephone conversations with Sid Evans and Julio Maldonado on February 16, 1993 it appears DOE is addressing this question by having research performed to determine the adequacy of various cement coating to withstand the corrosive and erosive effects of brinewater. The Railroad Commission staff is concerned about premature failing of the pipeline with subsequent negative consequences on the environment. The final EA should be updated to include any new information on the use of cement lined pipe for brine service. ② Also, as discussed in the February 16, 1993 telephone conversation, the discontinuance of the use of an oxygen scavenger should be addressed in the final EA. ③

The importance of construction activities occurring during the months of May thru August, as outlined in the letter dated September 24, 1992 from Frederick T. Werner of the U.S. Fish and Wildlife Service to Mr. David Brine of DOE contained in appendix D is noted. It appears the project must be accomplished in the above months or additional precautions taken. For this reason we will make every effort to expedite this project. ④

If there are questions please contact me at (512) 463-6803.

Windle Taylor
WINDLE TAYLOR

cc: Jerry Mullican
Lori Wrotenbery