

St. James Marine Terminal Facility Description



2001

***U.S. Department of Energy
Strategic Petroleum Reserve***

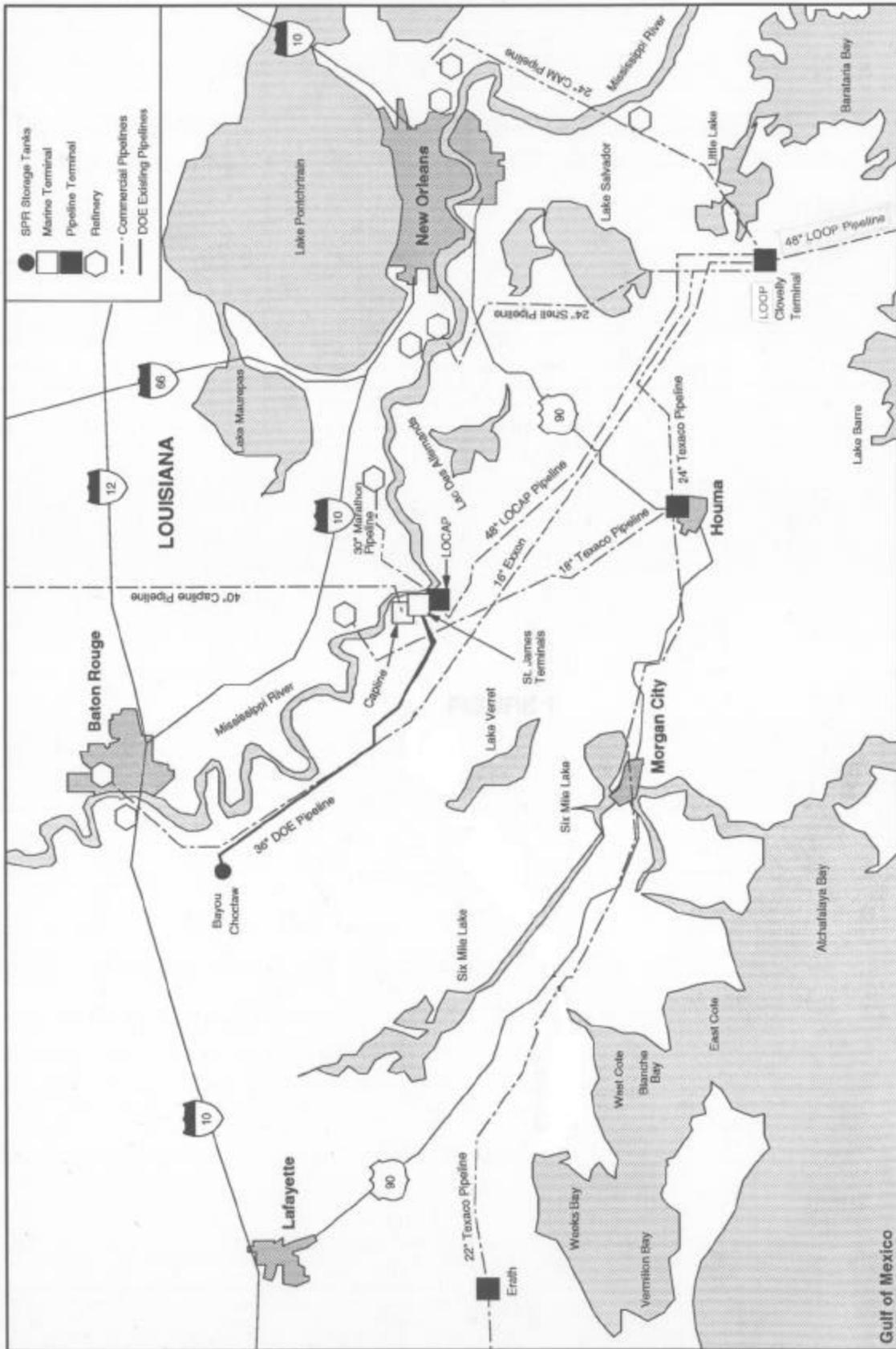


Figure 1. Map Showing General Location of the Strategic Petroleum Reserve's St. James Terminal.

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THE DEPARTMENT OF ENERGY'S STRATEGIC PETROLEUM RESERVE ST. JAMES MARINE TERMINAL

I. INTRODUCTION

The U. S. Department of Energy (DOE) currently owns and leases to Equilon Pipeline Company LLC, a marine terminal on the west bank of the Mississippi River at St. James, Louisiana. The St. James facility was constructed by the Department to provide marine services associated with the fill and drawdown of the Strategic Petroleum Reserve (SPR) crude oil storage facility located at Bayou Choctaw, Louisiana. The St. James terminal is situated such that it has a high potential to serve the commercial industry's needs for crude oil terminalling and storage.

The St. James terminal is located approximately 45 miles west of New Orleans and 30 miles southeast of Baton Rouge, and approximately 160 miles upstream from the mouth of the Mississippi River (Figure 1). Construction of the St. James terminal was initiated in 1978 and was completed in 1980. For crude oil distribution, the St. James terminal was connected to the neighboring LOCAP terminal by a 0.1-mile 36-inch pipeline in 1981 and to the Capline terminal by a 0.5-mile 30-inch pipeline in 1988. Figure 2 shows the relative location of the St. James terminal with respect to the neighboring LOCAP, Capline and Koch terminalling facilities. Figure 3 provides an aerial view of the terminal with the LOCAP terminal to the south and the Capline terminal to the north.

There is also a 37.2-mile 36-inch pipeline connection to the Strategic Petroleum Reserve Bayou Choctaw Storage Site, which provides connection access to a 24-inch pipeline to the Placid Refinery. The terminal has been leased to Equilon Pipeline Company since January 1997 under a year-to-year lease arrangement for commercial crude oil operations. *Note: Over the past few years, many modifications have been made to this facility to enhance its operability. Although efforts have been made to include enhancements in this document, updates to systems descriptions and/or drawings may be necessary after publication.*

II. FACILITY PHYSICAL DESCRIPTION

The St. James marine terminal is comprised of two sites: a main terminal facility occupying approximately 105 acres of land and the two marine docks on the Mississippi River occupying approximately 48 acres of land. The main terminal consists of six storage tanks totaling two million barrels capacity, crude oil pumping stations, metering stations, and control and maintenance facilities. All St. James terminal facilities are described in detail in the following paragraphs.

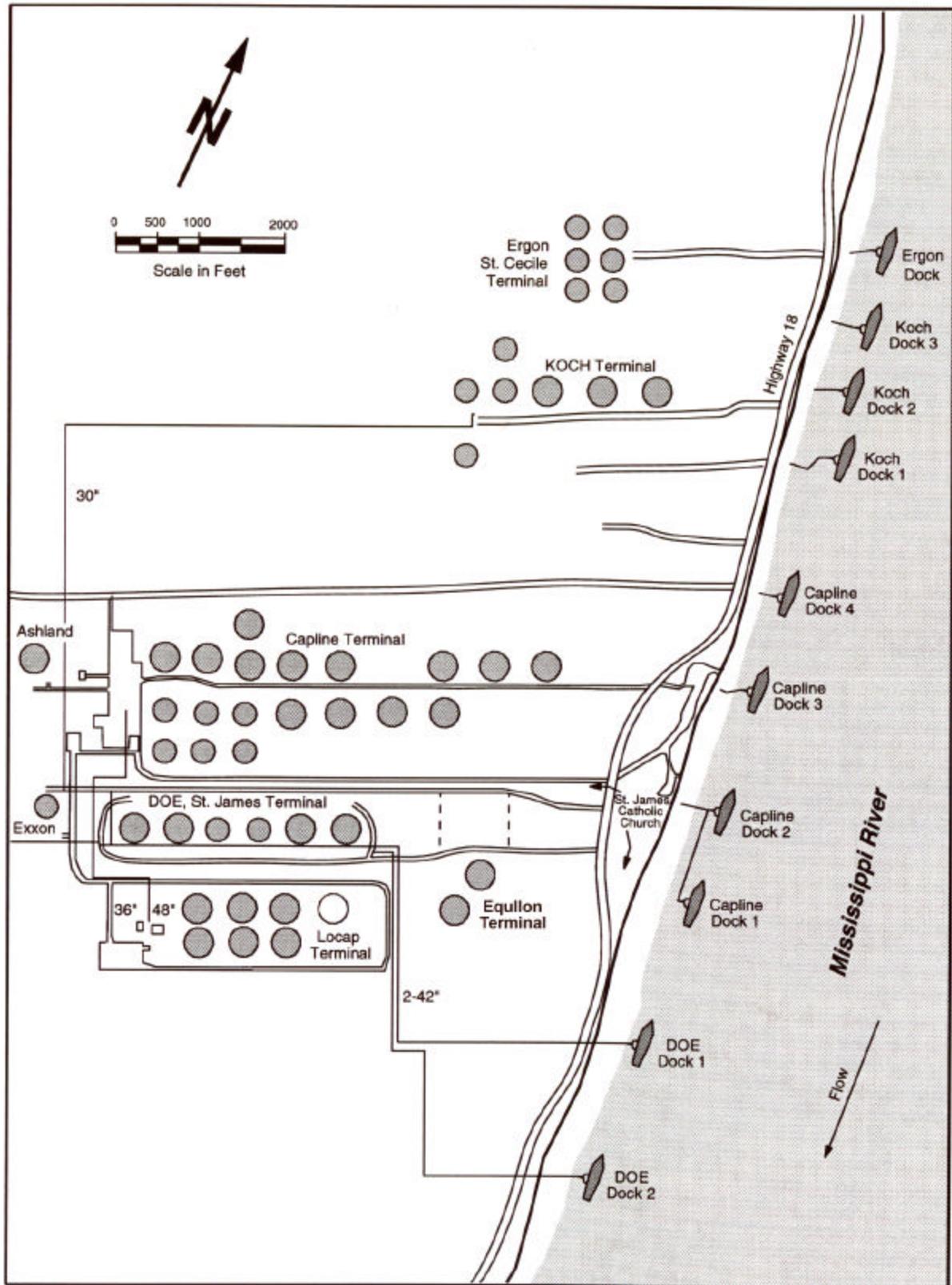


Figure 2. Map of the Local Area Surrounding the Department of Energy's St. James Terminal.



Figure 3: St. James Marine Terminal with LOCAP Terminal (right), and Capline Terminal (left).



Figure 4: St. James Marine Terminal Dock No. 1 and Fire Water Pump House



Figure 5: St. James Marine Terminal Dock No. 2

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a. Marine Facilities

The St. James terminal has two marine docks on the Mississippi River, which are located approximately two miles southeast of the main terminal. Dock 1 is located at Mississippi River milepost 158.3 AHP, and Dock 2 is located at Mississippi River milepost 158.0 AHP. Dock 1 is shown in Figure 4 and Dock 2 is shown in Figure 5.

Both docks are concrete and steel construction with four breasting dolphins and eight mooring dolphins with capstan motors and quick release “pelican hooks”. Each dock is equipped with three 16-inch Continental Emsco hydraulic operated loading arms, a 5-ton hydraulic crane, three in-line samplers with positive displacement pumps and manifolded to a single collection pot, and a control room equipped with full emergency shutdown controls.

Each dock is capable of berthing vessels up to 123,000 Dead Weight Tons (DWT), as delineated in Table 1. Normal vessel loading or unloading operations are performed using only two loading arms, with the third arm as a standby spare. During unloading operations, the vessel discharges oil through the loading arms at design flow rates of 40,000 barrels per hour and at pressures ranging from 50-150 psig. Similarly, in loading operations crude oil can be pumped from the storage tanks at the terminal to the docks at design loading rates of 40,000 barrels per hour and 50 psig.

Table 1
St. James Marine Docks Parameters

Docks	Maximum LOA	Maximum Beam	Maximum Draft	Maximum Air Draft	Maximum DWT	Other Facilities *
Dock No. 1	940 feet	None	45 feet	153 feet less river stage	123,000	-oily bilge water -sludge water
Dock No. 2**	940 feet	None	45 feet	153 feet less river stage	123,000	-oily bilge water -sludge water

Customary Anchorage: Grandview Reach (approximately 11 miles from terminal).
 * The terminal does not possess bunkering or deballasting facilities, nor a vapor recovery system.
 ** Dock 1 is also capable of loading and unloading barges

Both docks are designed for independent and simultaneous operations. Each dock is connected to the main terminal with a 42-inch crude oil line, a 20-inch effluent line, a 6-inch oily water line, and a 2-inch potable water line. The terminal’s firewater pumping system is located at Dock 1. In addition to ships, Dock 1 is capable of loading and unloading barges (3,000 bbls to Integrated Tug Barges (ITBs) (200,000 to 250,000 bbls)) at 8,000 bbls per/hour through the 20-inch effluent line.



Figure 6: St. James Marine Terminal Facility

b. Terminal Facilities

The main terminal provides facilities for crude oil storage, pumping, metering and distribution (a complete reconfiguration of the Distributed Control System for remote operation, a new connection to Exxon, Ship Shoal, and Texaco pipeline, as well as several jumpovers have been incorporated into the terminal configuration by lessee).

Figure 6 provides an aerial photograph of the main terminal. An overall site layout of the terminal facilities is shown in Figure 7 and a schematic of the site's internal piping system is shown in Figure 8.

Storage tanks

The St. James terminal has six storage tanks with a total shell capacity of 2 million barrels. These tanks were designed by Graver, Houston, and are constructed on a concrete ring wall and compacted sand base foundation. The tanks are approximately 33 feet high and have a single skin-floating roof. Each of the tanks are equipped with Jensen propeller-type mixers and temperature and level gauging instrumentation. Storage capacity and specifications are shown in Table 2.

The six tanks are sited in two groups of three, which are each surrounded by a community dike system. Each of the two diked areas could contain the entire volume of one tank with some freeboard allowance. Minor spillage is contained by lower internal dikes between the tanks.

Primary Pump Station

The primary pump station is used to perform all crude oil movements from the terminal's six tanks, whether to the SPR Bayou Choctaw storage site or the neighboring LOCAP and Capline terminals. These pumps are also designed to pump crude oil from the terminal tanks to the docks for vessel loading operations during an energy emergency.

The primary pump station consists of five Peabody-Floway vertical, deep well; three-stage pumps with a designed capacity at discharge of 25,000 barrels per hour at 288 feet of head each. They are driven by 1500 horsepower Westinghouse motors. The pump station is manifolded to provide two independent pumping units of two pumps each: Pumps 1 and 2, and Pumps 4 and 5. Pump 3 is manifolded into both systems as an on-line spare. Figure 9 is an aerial photograph of the primary pump station.

Accelerated Fill Pumps

The terminal also has a second pumping station, which contains three Bingham Williamette horizontal centrifical pumps rated at 10,000 barrels per hour each at 460 PSI discharge that are driven by 1375 horsepower Louis Allis motors.

Metering and Custody Transfer

The terminal has two-meter stations. Each meter station consists of three 12-inch meter runs equipped with "Flow Tech" inline turbine meters having a rated capacity of 18,000 barrels per hour each. The meters are calibrated and proved by a unidirectional prover loop adjacent to the meter station. Figure 10 is a photograph of the Bayou Choctaw meter station.

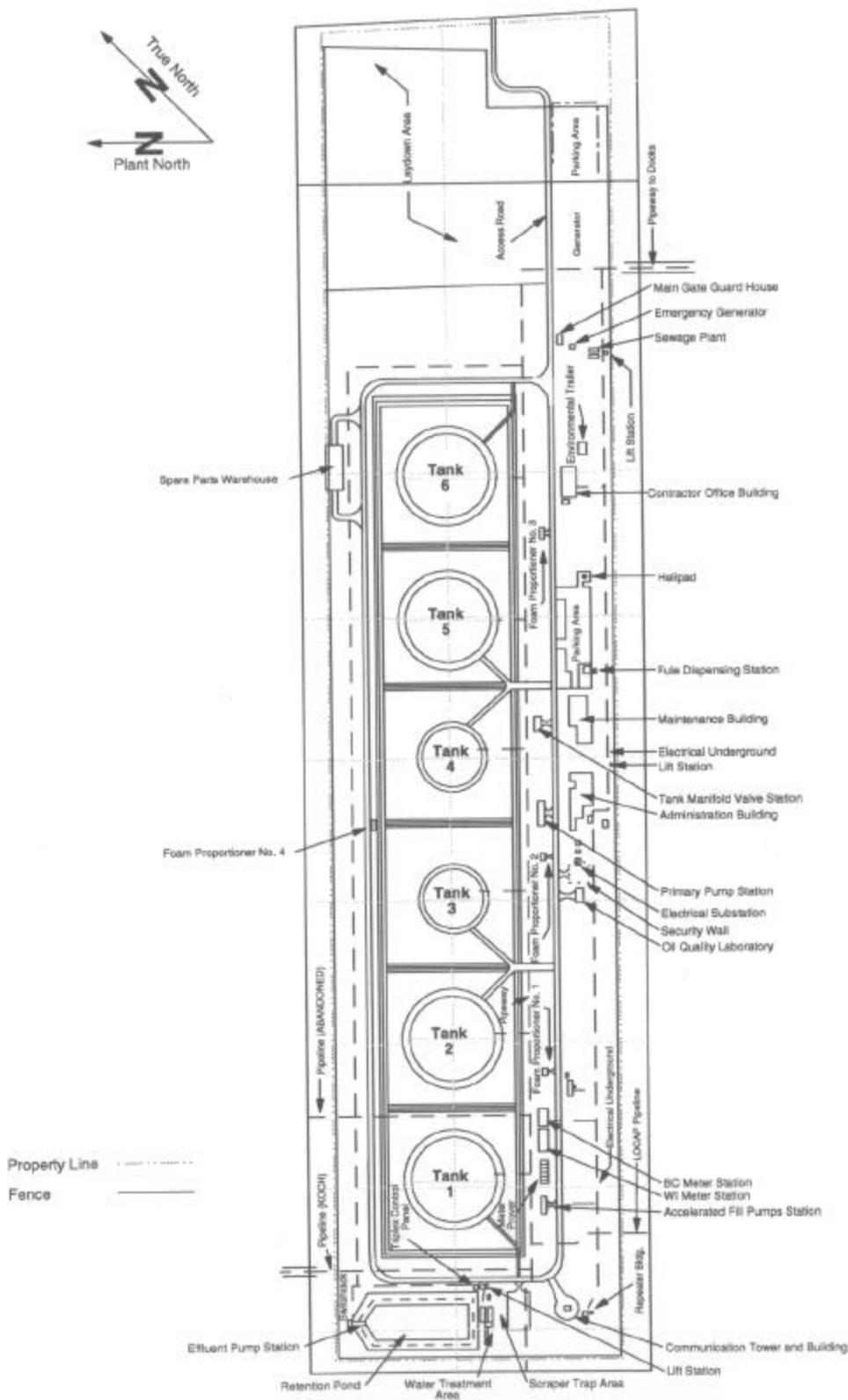
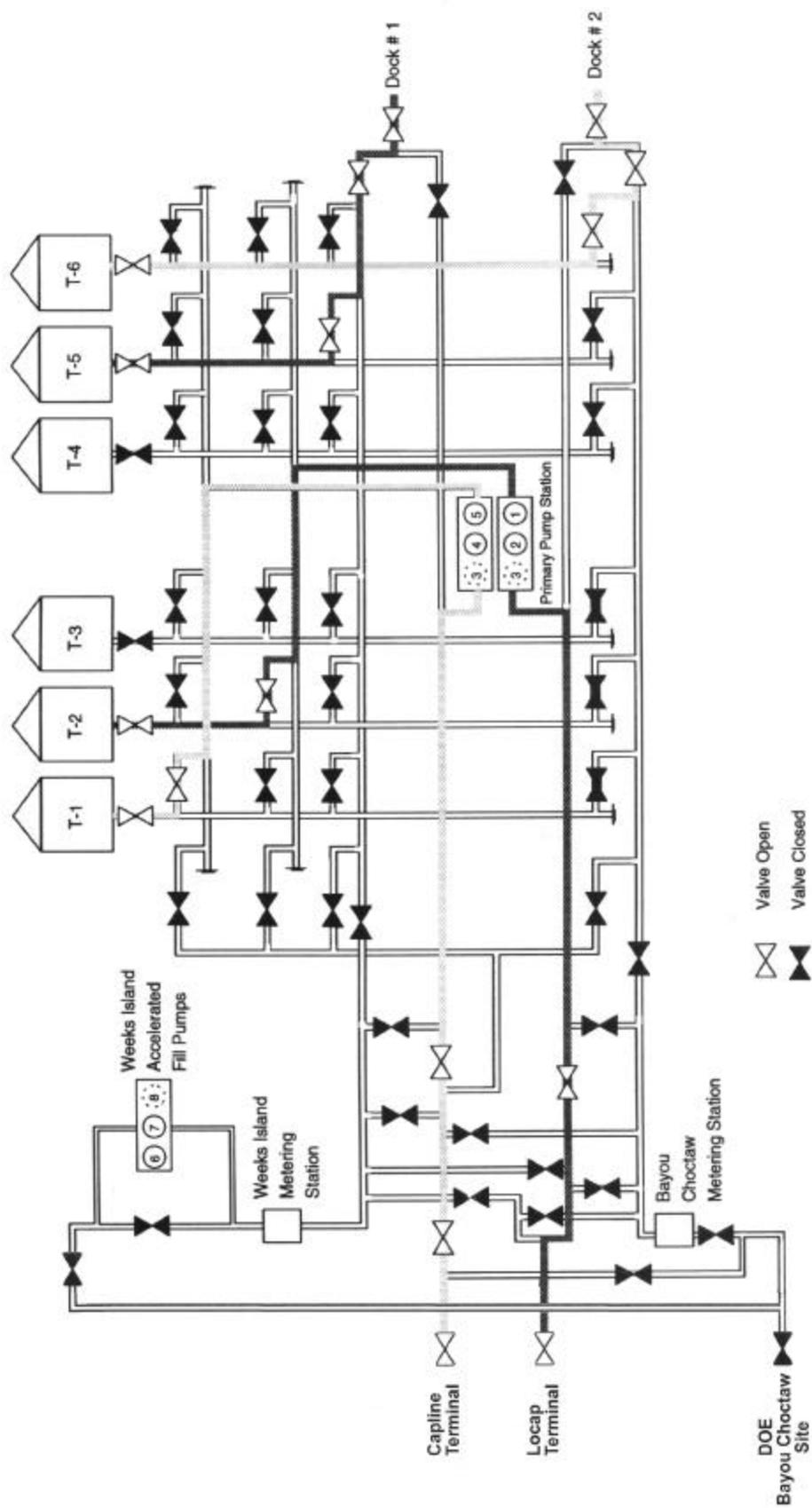


Figure 7. Site Layout of the St. James Terminal



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Figure 8. Functional Schematic of St. James Terminal Piping System



Figure 9: St. James Terminal Primary Pump Station

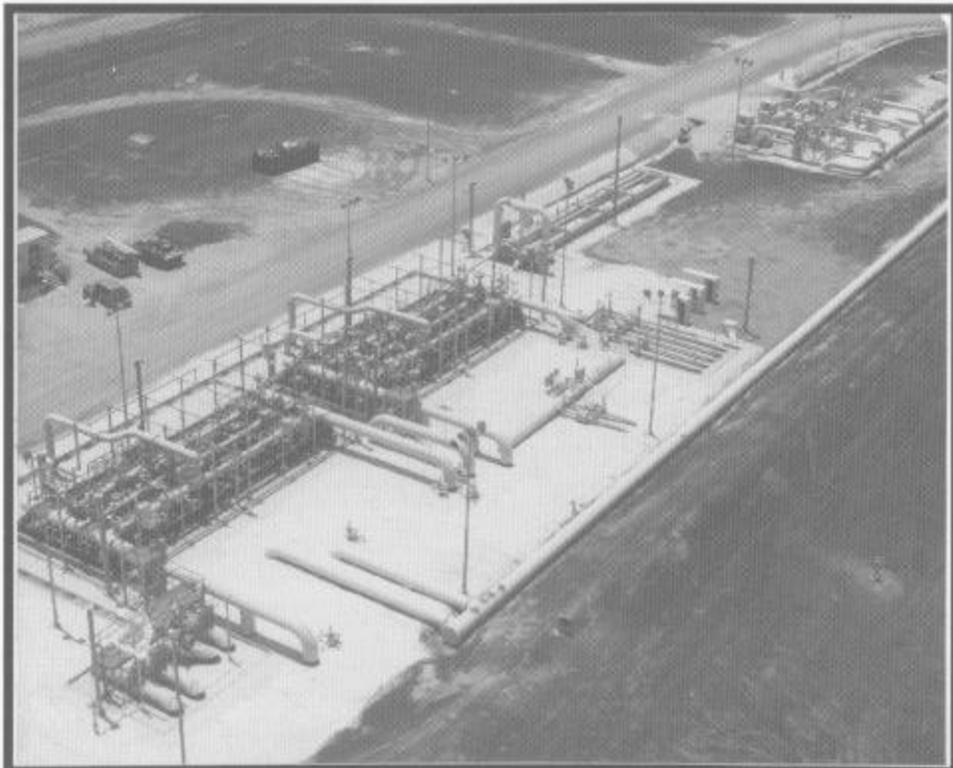


Figure 10: St. James Terminal Weeks Island and Bayou Choctaw Meter Stations

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Table 2
St. James Terminal Storage Tank Specifications

Storage Tanks	Shell Capacity (barrels)	Size Diameter X Height	Tank Mixers
1	400,000	300 ft * 33 ft	3 – 75 hp mixers
2	400,000	300 ft * 33 ft	3 – 75 hp mixers
3	200,000	212 ft * 33 ft	2 – 50 hp mixers
4	200,000	212 ft * 33 ft	2 – 50 hp mixers
5	400,000	300 ft * 33 ft	3 – 75 hp mixers
6	400,000	300 ft * 33 ft	3 – 75 hp mixers

NOTE: Common Diked system for tanks 1, 2 & 3 and tanks 4, 5 & 6.



Figure 11: St. James Marine Terminal Administration and Maintenance Buildings

c. Terminal Buildings

There are four primary buildings at the St. James terminal: the administration building, the office building, the maintenance building and the warehouse. In addition, there are several minor buildings, such as the security operations center, the effluent treatment building, and the various small buildings for safety and oil spill equipment. The Administration and Maintenance buildings are shown in Figure 11. Layouts of the main buildings may be found in the Appendix.

Administration Building

This building provides office space for the terminal management personnel and houses the Central Control Room and Motor Control Center.

The Central Control Room is the operations center for the terminal. St. James terminal systems are fully automated such that all terminal operations may be conducted from the Central Control Room. Operational commands are given on a Allen Bradley PLC 560 computer system with data displayed visually and with hard copy. An annunciator panel provides audio and visual alarms to alert operators to any operational changes or problems. A graphic display panel provides a visual representation of the terminal's piping systems and the status of all valves, pumps, and motors. A meter panel provides flow rates, quantities, pressures at the prover loop, meter calibration factors, and printouts of total quantities.

The Motor Control Center area of the Administration building contains the 4160-volt switchgear and uninterrupted power supply.

Office Building

This building contains 4,300 square feet of office spaces, including a conference room and lunchroom.

Maintenance Building

The maintenance building contains a maintenance office area and lunchroom, a maintenance shop and housing for the fire truck and its associated equipment.

Warehouse

The St. James warehouse contains 9,000 square feet of space and is used for the storage of spares, repair parts and supplies. The warehouse is protected by a dry pipe sprinkler system.

Laboratory Building

The St. James laboratory building contains 1,128 square feet of space and is currently vacant. It has a small storage area and half-bath with the main area designed for crude oil and water analyses, including the utilization of fume hood space.



Figure 12: Photograph of Foam Proportioner No. 3

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d. Environmental and Safety Systems

The terminal and docks have elaborate control system to prevent fire and environmental contamination from possible spills and accidents.

Fire Protection System

The facility is equipped with a primary fire protection system using potable (City) water and a secondary or backup fire protection system using river water. The primary fire protection system is located at the main terminal and consists of a 400,000 gallon water tank, two 200 horsepower, 1,500 gallon per minute pumps (one electric and one diesel) and a 10 horsepower, 50 gallon per minute jockey pump. These pumps supply pressures of 150 psi to the site's fire protection system.

If conditions warrant an additional water supply, the secondary fire system located on a platform next to Dock 1, will automatically activate. The secondary fire system has two 10,000 gallon per minute pumps (one electric and one diesel), two 1,300 gallon per minute pumps (one electric and one diesel) and a 150 gallon per minute jockey pump. The secondary system is capable of supplying a total of 22,500 gallons per minute as required.

Fire Equipment and Alarms

The terminal is equipped with portable dry-chemical extinguishers strategically located throughout the facility for controlling small petroleum and electrical fires. For non-petroleum fires (e.g., fire in buildings or grass areas), both water and fire extinguishers are provided, with hydrants and fire water hose strategically located for this purpose.

Foam System

The St. James terminal has five foam proportioners located throughout the terminal. These proportioners have foam concentrate bladder tanks mixing 3 percent concentrate with 97 percent water and supplying foam to tanks, pumps, and meter stations. The foam system on the oil storage tanks is manually activated in the event of a fire. An automatic activation system is provided for the foam systems at all other locations. Figure 12 is a photograph of the foam proportioners.

Foam Retention Ponds

Two foam retention ponds have been constructed at the terminal to collect foam/water discharged by the fire control foam system. One pond collects foam/water and all storm water from the meter skids area, while the other performs the same function for the booster pumps area. Should the foam/water concentration in either pond exceed allowable limits, it must be disposed of by vacuum truck to appropriate off-site facilities.

Oil Spill Containment System

The terminal and the docks have an oil containment system, which collects any oil spilled during normal operations. All major equipment is connected to a closed loop sump oil system, which has collection tanks and pumps. All oil collected in the system is pumped into the storage tanks. On the docks, a purge pump is used to drain oil from the equipment after which it is pumped to the storage tanks. A similar system of open drains, or in the case of the docks, closed drains, collects rain water and small amounts of spilled oil, which are then pumped to the storage tanks.

Each of the dock platforms have been designed to contain a 666-barrel oil spill before overflowing. Containment equipment is stored at the terminal and includes approximately 2,000 feet of containment boom, and several boats for spill boom deployment and oil spill containment.

The storage tanks are divided into two groups (Tanks 1, 2, 3 and Tanks 4, 5, 6), each of which is surrounded by a dike that can contain the entire volume of crude oil from one tank. The entire terminal site is also surrounded by drainage ditches to carry rainwater from the area into the parish drainage system. The drainage system has four weir gates which prevent spilled oil from leaving the site.

Collection of Oily Waste Discharge

The two docks are also connected to the terminal by a 6-inch line and its attendant pump. Oil waste from the dock platform and runoff is pumped to the terminal for separation. Oil recovered by separation is delivered to the tanks, while the untreated water that meets the environmental permit requirements is discharged through a 20-inch line to Dock 1 and then into the Mississippi River.

e. Utilities

The St. James Terminal's facilities for communications, electrical power, potable water, and sanitary wastes are described below.

Communications Systems

The St. James facility has a communications system that ensures close and timely co-ordination of all simultaneous oil transfer operations. In addition to normal public utility communications systems, an internal private communication system allows direct wired communications within the terminal and to the two docks. A master station is located at the operations control console and is connected to nine stations: one at each dock, at the metering stations, and at each of the six crude oil storage tanks.

Electric Power Services

The St. James terminal power requirements are supplied by Entergy-Louisiana Power and Light. Primary feeders bring 34.4 kilovolts, 60-hertz electricity to a LP&L substation located within the terminal in an area west of the Administration building. Substation transformers step down the power to a lower voltage prior to feeding the terminal power distribution system. In addition to transformers, the substation contains fused disconnect switches, protective devices, and power meters.

In the event of normal power outages, standby generating facilities automatically supply emergency power. The standby diesel-powered generator provides 480/277 volt, 60-hertz electricity for lighting the Administration and Maintenance buildings and for closing motor-operated valves in the terminal emergency shutdown system. Upon restoration of the normal power supply, controls automatically transfer the load back to the normal source and stop operation of the standby generator.

Potable Water

Potable water is supplied to the terminal facilities from a St. James Parish water main. Water flows through a 4-inch line to a water meter and then to the Maintenance and Administration/Office buildings. Potable water is used for drinking fountains, urinals, lavatories, lunchroom, Maintenance/Shop building showers, laboratory sinks, the first aid sink, and the primary fire water tank. Potable water is also supplied through a 2-inch line to each of the two docks.

Sanitation System

Liquid sanitary wastes from the Maintenance and Administration/Office, and crude oil laboratory buildings (wastewater and sewage) are collected in a sump and then pumped to a packaged chlorination unit for treatment. The treated sewage joins other waste streams en route to municipal wastewater treatment facilities.

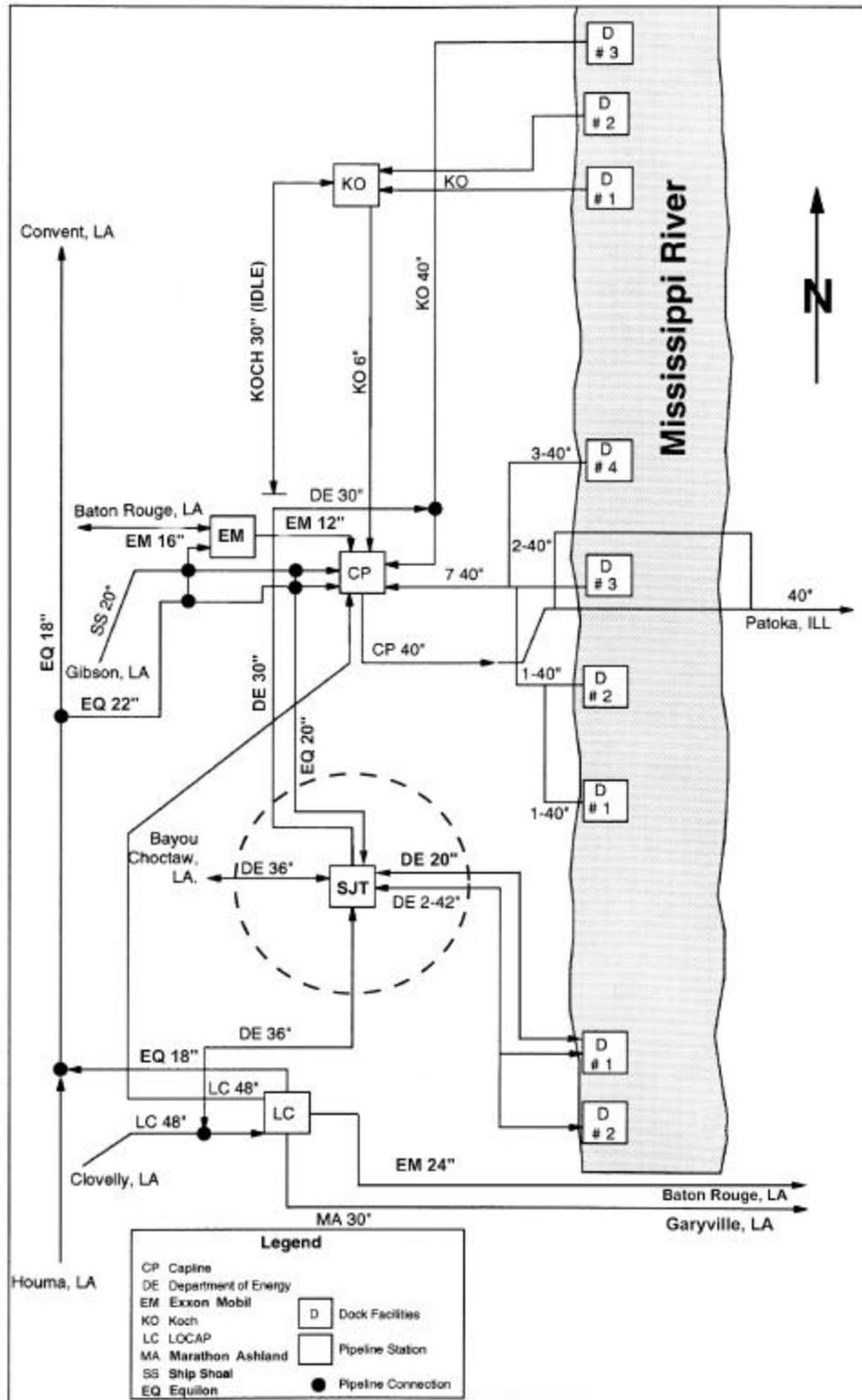


Figure 13. Pipeline Distribution Capability in the St. James Terminal Region

III. OPERATIONAL CAPABILITIES

The St. James terminal has the capability to both unload and load marine vessels at each of its two docks at rates of up to 40,000 barrels per hour. These two docks are totally independent of each other and capable of simultaneous operations.

In addition to marine capabilities, the St. James terminal has three major crude oil pipelines, which connect to other facilities. These are:

- (i) 36-inch pipeline to the DOE Bayou Choctaw site.
- (ii) 36-inch pipeline to the LOCAP terminal.
- (iii) 30-inch pipeline to the Capline terminal.

These specific pipelines are shown in relation to the other terminals and pipelines in the St. James area in Figure 13. The St. James terminal has the capability to deliver and/or receive crude oil via these pipelines at the rates shown in Table 3.

Table 3
St. James Terminal's Pipeline Distribution Capability
(barrels per hour)

Facility	Delivery Capability	Receipt Capability
DOE Bayou Choctaw Site	4,166 (a)	20,000 (a)
LOCAP Terminal	45,000	45,000
Capline Terminal	45,000	(b)
Ship Sholas 20" Pipeline	(b)	10,000
Equilon 22" Pipeline	(b)	10,000
(a) Capability constrained by the specific Site/Terminal served.		
(b) Capability currently unavailable.		

The St. James Terminal has the complete flexibility in crude oil receipt and distribution operations. Figure 8 shows the terminal receiving oil from Docks 1 and 2 into Tanks 5 and 6 while simultaneously distributing oil from Tanks 1 and 2 to the Capline and Locap Terminals respectively.

IV. TERMINAL CERTIFICATION AND PERMITS

The Department of Energy received approval from the United States Coast Guard to commence operations at St. James Terminal in July 1979.

Since 1988 the St. James Terminal has been covered by a Certificate of Adequacy from the U. S. Coast Guard as to its oily waste reception facilities for vessel sludge and oily bilge water wastes. However, the terminal does not have reception facilities for oily ballast. In February 1993, the Department made submissions to the U.S. Coast Guard and the U.S. Environmental Protection Agency for compliance with the Oil Pollution Act of 1990.

Equilon operates the St. James Terminal under a number of Federal and State issued permits.

V. GOVERNMENT REQUIREMENTS

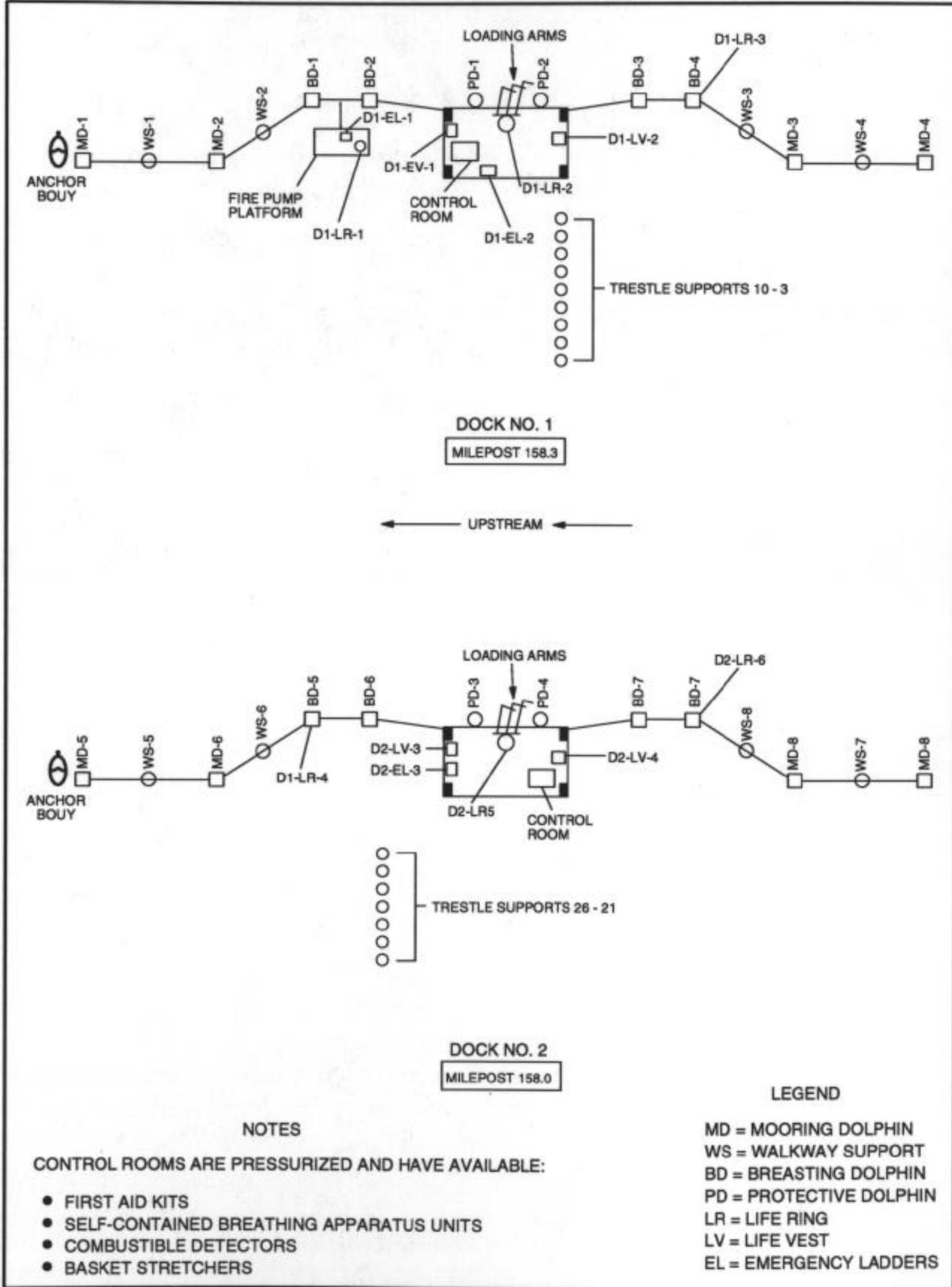
The St. James facility was constructed to provide oil terminaling services for the SPR crude oil storage facilities located at Bayou Choctaw and Weeks Island (since closed), Louisiana. The Government will require the St. James Terminal to support future oil movement operations in terms of further oil fill requirements (approximately 20 million barrels), annual pipeline inspection and maintenance, periodic system tests and actual emergency drawdown of the Reserve. To the largest extent, these services can be strategically scheduled to allow for uninterrupted crude oil distribution through the dock and terminal into adjacent commercial facilities (LOCAP, Capline, etc.).

The U.S. Government SPR mission must be supported by the St. James facilities including manpower as required to meet any emergency drawdown as well as provide for emergency repair and maintenance of the facility. The SPR's St. James facility, (distribution equipment (pumping, manifolding, and piping, etc.)) shall not be modified in any fashion that would detrimentally effect the Government's crude oil movement activities.

APPENDIX

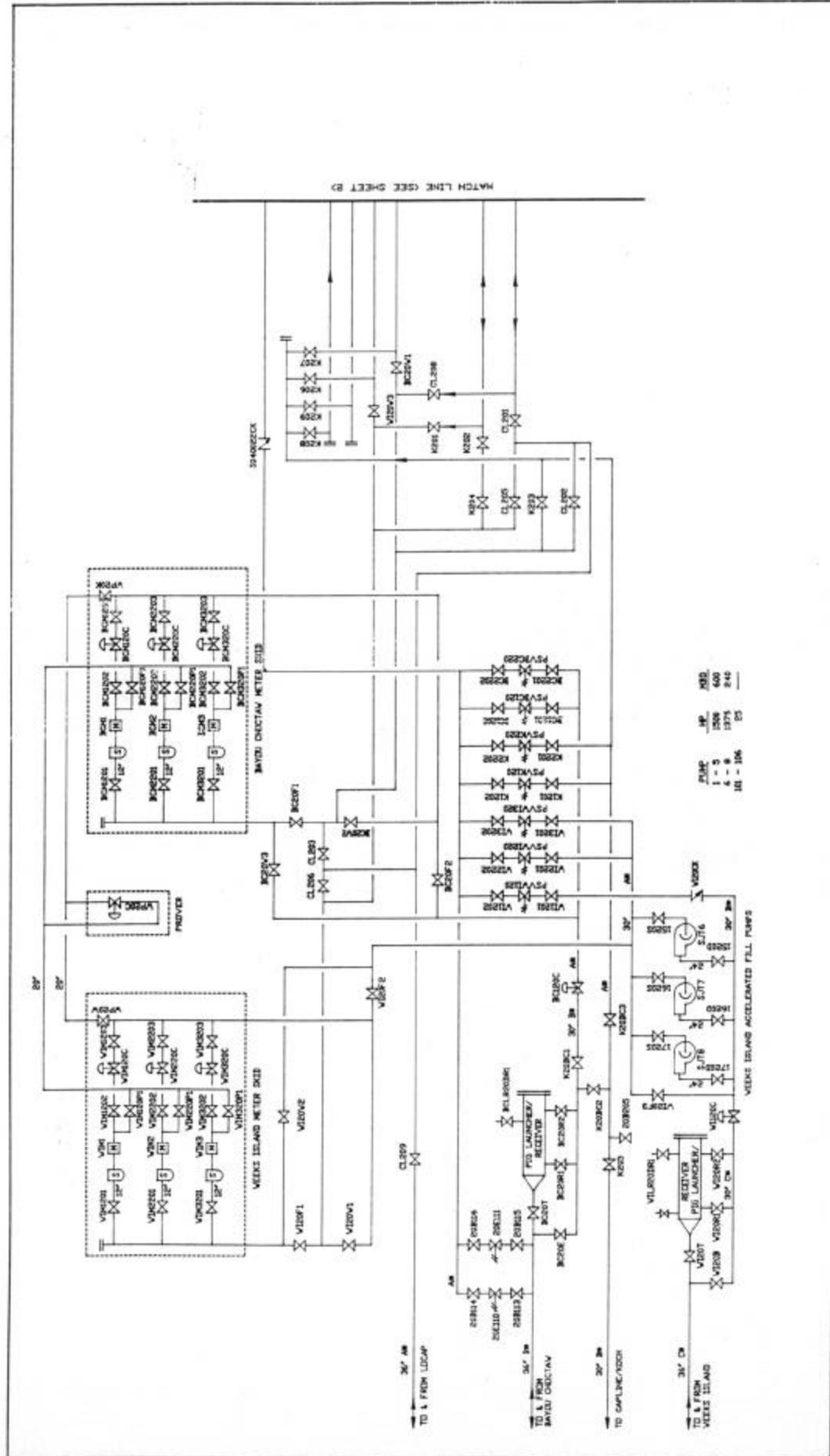
Reference Number on Map	280	Dock Code No. 301	281	Dock Code No 301
Name	U.S. Department of Energy Strategic Petroleum Reserve Dock No. 1			Dock No.2
Location on Waterfront	Mile 158.3 A.H.P			Mile 158.1 A.H.P.
Owned By	U.S. Government Department of Energy			U.S. Government Department of Energy
Purpose For Which Used	Receipt of crude oil by vessel			Receipt of crude oil by vessel
Type of Construction	Concrete pile, concrete-decked, off-shore wharf with 540- by 15-foot part concrete and part steel pile, concrete-decked approach; 2 steel breasting platforms in line with face and 2 steel mooring dolphins in rear of line of face on each side, all connected by catwalks.			Concrete pile, concrete-decked, off-shore wharf with 540- by 15-foot part concrete and part steel pile, concrete-decked approach; 2 steel breasting platforms in line with face and 2 steel mooring dolphins in rear of line of face on each side, all connected by catwalks.
Description	Face	Upper Side	Lower Side	Face Upper Side Lower Side
Dimensions (Feet)	100	60	60	100 60 60
Depth Alongside at ALWP Do.	50	-	-	50 - -
Usable Berthing Space Do.	398 w/plats. (See Remarks)			398 w/plats. (See Remarks)
Width of Apron Do.	60			60
Height of Deck Above ALWP Do.	42			42
Load Capacity per Sq. Ft. (Lbs.)	-			-
Lighted or Unlighted		Lighted		Lighted
Transit Sheds		None		None
Number and Type of Construction				
Length and Width (Feet)				
Height Inside Do.				
Floor Area for Cargo (Sq. Ft.)				
Load Capacity per Sq. Ft. (Lbs.)				
Cargo Doors				
Mechanical Handling Facilities	Three 16-inch, swivel-jointed unloading arms. One 5-ton, hydraulic crane with 60-foot boom for handling supplies and equipment.			Three 16-inch, swivel-jointed unloading arms. One 5-ton, hydraulic crane with 60-foot boom for handling supplies and equipment.
Railway Connections	None			None
Highway Connections	Via road over levee, shell, various widths, from Louisiana State Highway 18 (River Road), asphalt, 20 feet wide.			Same as Ref. No. 280
Water Supply (Available to Vessels)	Through one 2-inch line.			Same as Ref. No. 280
Electric Current (Available to Vessels)	A.C., 110 volts, single-hase, 60-cycle. A.C., 220/440 volts, 3-hpase, 60-cycle.			Same as Ref. No. 280
Fire Protection (Other than City)	10-inch fireline, pump, hose, and hand extinguishers.			Same as Ref. No. 280
Remarks	Mooring dolphins allow berthing of 940-foot vessels. One 24-inch water intake and one 55-by 45-foot concrete-decked pump platform located at rear of upper breasting platform. One 42-inch pipeline extends from wharf to 6 steel storage tanks at terminal in rear, total capacity 2,000,000 barrels; 36-inch pipelines extend from terminal to the Bayou Choctaw SPR site. One 6-inch slops line serves wharf.			Mooring dolphins allow berthing of 940-foot vessels. One 42-inch pipeline extends from wharf to storage facilities described under Ref. No. 280. One 6-inch slops line serves wharf.

Figure A-1, U.S. Army Corps of Engineers, Port Series, No. 20A, 1981 (modified)



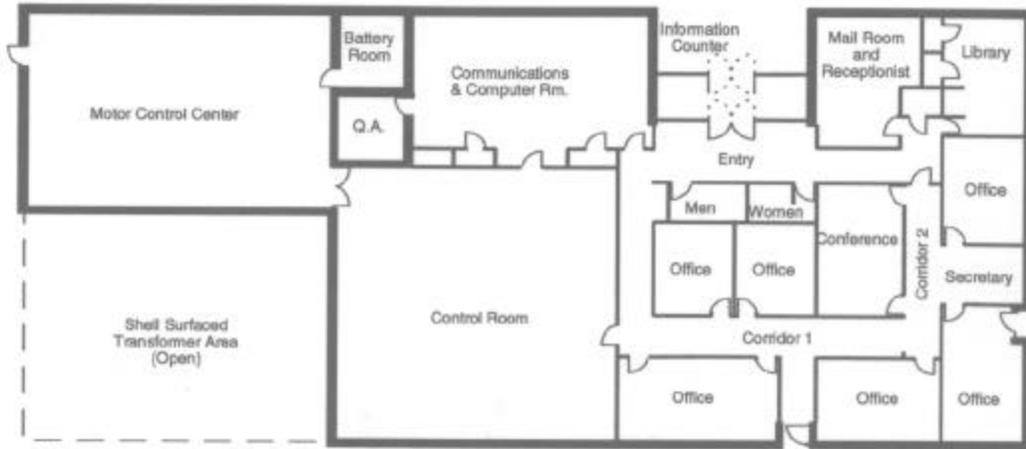
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Figure A-2. Detailed Schematic of the St. James Terminal Docks



OFFICE OF ENGINEERING AND CONSTRUCTION  STATEWIDE PIPELINE CENTER		PROJECT NUMBER: 10010 PROCESS: MATE SHEET NUMBER: SJ-M-101-015 REV: 1 OF 2	
SITE OPERATIONS MANUAL CRUDE OIL LINE UP SHEET ST. JAMES TERMINAL ST. JAMES PARISH, LOUISIANA		JOB NO: B-10-PR DATE:	DESIGNED BY: [blank] CHECKED BY: [blank] DATE: [blank]
NOTE: ALL PIPING WATED AS CLASS 400 P310 UNLESS OTHERWISE SHOWN AS CLASS 300 OR 150 P310 OR CLASS 20 (1500 P310).		1 24V5 MADE INTO 2 DMT. ASSES WITH 200V VALVES 2 RELEASED FOR 05'S MANUAL CHANGE DESCRIBED	NO. [blank]

Figure A-3 Schematic of Piping and Values at St. James Terminal



Administration Building/Control Center
(150 ft x 64 ft)



Maintenance Building/Shop
(166 ft x 49 ft)

Figure A-4. Details of Main Buildings at St. James Terminal

ST. JAMES TERMINAL GENERAL LOCATION

