

Annual Strategic Petroleum Reserve Report

Submitted pursuant to PL 94-163, Section 165

February 16, 1979

Prepared by:
U.S. Department of Energy
Deputy Under Secretary
Strategic Petroleum Reserve Office



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PREFACE

This Strategic Petroleum Reserve (SPR) 1978 Annual Report is submitted to the President and the Congress by the U.S. Department of Energy (DOE) in accordance with Section 165 of the Energy Policy and Conservation Act of 1975 (EPCA), P.L. 94-163, enacted December 22, 1975. This is the Reserve's second Annual Report; being issued on the second anniversary of transmittal of the SPR Plan.

This report discusses Reserve development activities during 1978 and satisfies the EPCA requirement that the Annual Report include:

1. a detailed statement of the status of the Reserve;
2. a summary of the actions taken to develop and implement the SPR Plan;
3. an analysis of the impact and effectiveness of such actions on the vulnerability of the United States to interruption in supplies of petroleum products;
4. a summary of existing problems with respect to further implementation of the SPR Plan; and
5. any recommendation for supplemental legislation deemed necessary or appropriate by the Secretary of Energy to implement the Reserve Program.

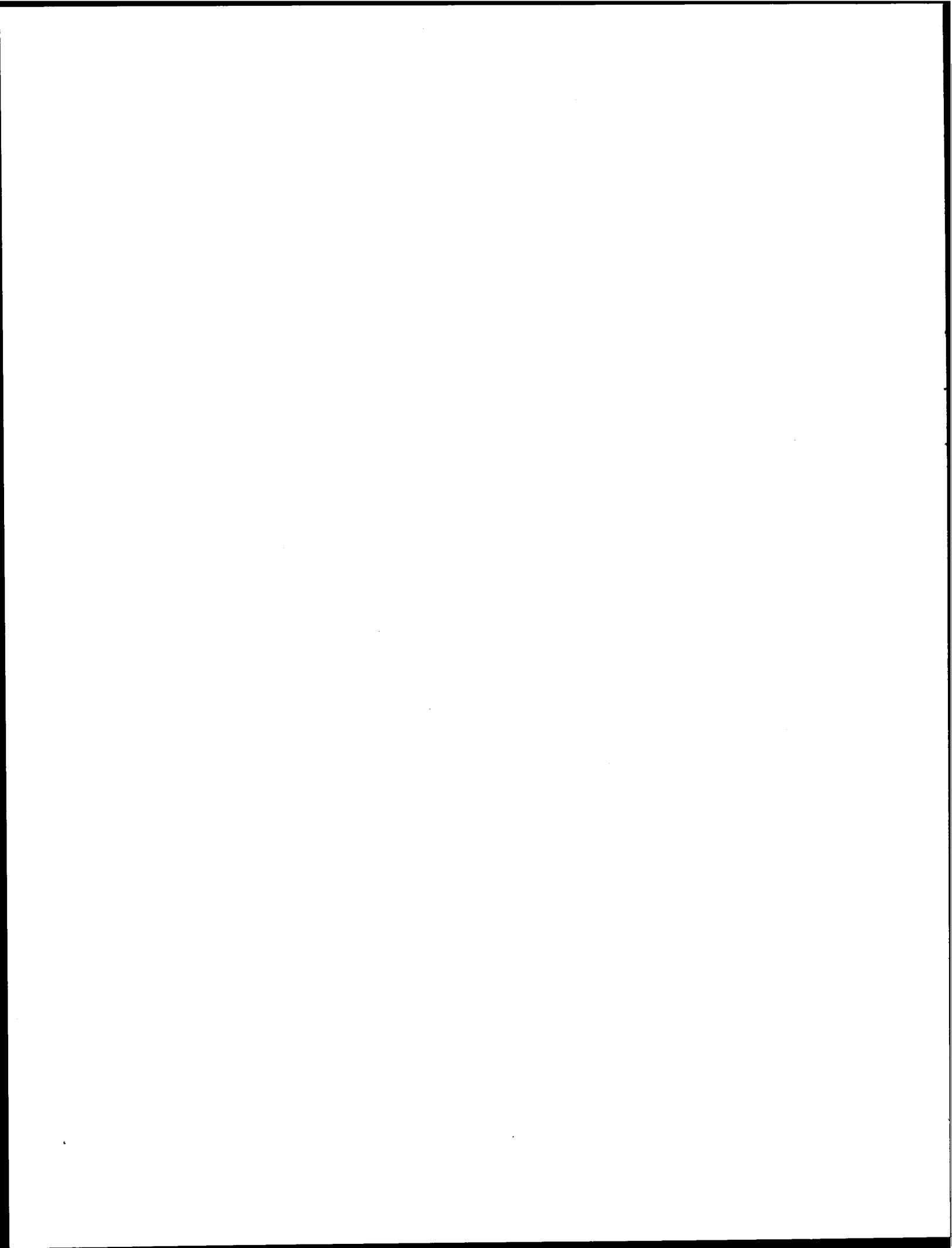
Supplemental legislation, if required, will be addressed separately to the Congress. Proposals for future SPR activities will be covered in amendments to the SPR Plan and informational reports to the Congress.

ABBREVIATIONS AND ACRONYMS

A/E	Architect/Engineer
Corps	U.S. Army Corps of Engineers
CY	Calendar Year
DCAS	Defense Contract Administration Services
DCASR	Defense Contract Administration Services Region
DFSC	Defense Fuel Supply Center
DOE	Department of Energy
EIS	Environmental Impact Statement
EPA	Environmental Protection Agency
EPCA	Energy Policy and Conservation Act
FEA	Federal Energy Administration
FOB	Free on Board
FY	Fiscal Year
GSA	General Services Administration
IEP	International Energy Program
MB	thousands of barrels
MB/D	thousands of barrels per day
MB/H	thousands of barrels per hour
MDWT	thousands of dead weight tons
MMB	millions of barrels
MSC	Military Sealift Command
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
O&M	Operations and Maintenance
P.L.	Public Law
PMO	Project Management Office - Strategic Petroleum Reserve Office
RFP	Request for Proposal
SBA	Small Business Administration
SPCC	Spill Prevention Control and Countermeasure Plan
SPR	Strategic Petroleum Reserve
SPRO	Strategic Petroleum Reserve Office
USCG	United States Coast Guard
VLCC	Very Large Crude Carrier

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LEGISLATION

- AUTHORITY** Congress authorized the creation of the Strategic Petroleum Reserve in Title I, Part B, of the Energy Policy and Conservation Act (EPCA). In this Act, the Congress declared it to be the policy of the U.S. to provide for storing up to one billion barrels of crude oil and petroleum products to diminish U.S. vulnerability to the effects of disruptions in petroleum supplies, or to meet U.S. obligations under the International Energy Program (IEP).
- PROVISIONS** Key provisions of the Act include:
- o Creation of the Strategic Petroleum Reserve.
 - o A schedule for storing the first 500 million barrels (MMB), subject to change in an SPR Plan, which must be met to the maximum extent practicable.
 - 50 MMB to be stored by June 1978,
 - 150 MMB to be stored by December 1978,
 - 325 MMB to be stored by December 1980, and
 - 500 MMB to be stored by December 1982.
 - o Establishment of an SPR Office, through which the Reserve is to be established, managed and maintained.
 - o Submission to the Congress of an SPR Plan containing implementation proposals including a distribution plan showing how the Reserve would be drawn down and distributed.
 - o A prescribed system for Congressional review of this Plan and any amendments to it.
 - o A requirement for petroleum product or crude oil protection for import-dependent regions and non-contiguous areas of the U.S.
 - o A grant of discretion to require, as part of the SPR, that importers and refiners store petroleum products in an Industrial Petroleum Reserve.
 - o Authority to promulgate regulations allocating and pricing SPR oil during drawdown and distribution.
 - o Binding guidance as to when the SPR may be drawn down and distributed, on the basis of a Presidential finding of a "severe energy supply interruption" or that U.S. obligations under the IEP require it.

- o The enumeration of various authorities, objectives and requirements which govern Program implementation.
- o A requirement to report annually to the President and the Congress on all actions taken to implement the SPR Program.

REPORTS

To date, seven SPR Plan documents, annual reports and other reports have been submitted to the Congress to fulfill the statutory reporting requirements for the SPR:

<u>Report</u>	<u>Transmitted</u>	<u>Effective Date</u>
Early Storage Reserve Plan	April 22, 1976	Not applicable
The Exploration, Development and Production of Naval Petroleum Reserve No. 4	August 1976	Not applicable
Strategic Petroleum Reserve Plan	February 16, 1977	April 18, 1977
Strategic Petroleum Reserve Plan Amendment No. 1, Acceleration of the Development Schedule	May 25, 1977	June 20, 1977
Other Storage Reserves Report (Utility Reserves, Coal Reserves, Remote Crude Oil and Natural Gas Reserves)	August 16, 1977	Not applicable
Strategic Petroleum Reserve Annual Report, 1977	February 16, 1978	Not applicable
Strategic Petroleum Reserve Plan Amendment No. 2, Expansion of the Strategic Petroleum Reserve	May 18, 1978	June 13, 1978

SPR
OBJECTIVE

The SPR Plan, revised by two amendments, has been transmitted to the Congress as required by the law. The Plan:

- o States an SPR objective to store one billion barrels of petroleum,
- o Details implementation plans for storing 750 MMB of the one billion barrels, and
- o Sets a storage schedule, to be met to the maximum extent practicable, of:
 - 250 MMB to be stored by December 1978;
 - 500 MMB to be stored by December 1980; and
 - 750 MMB to be stored by December 1985.

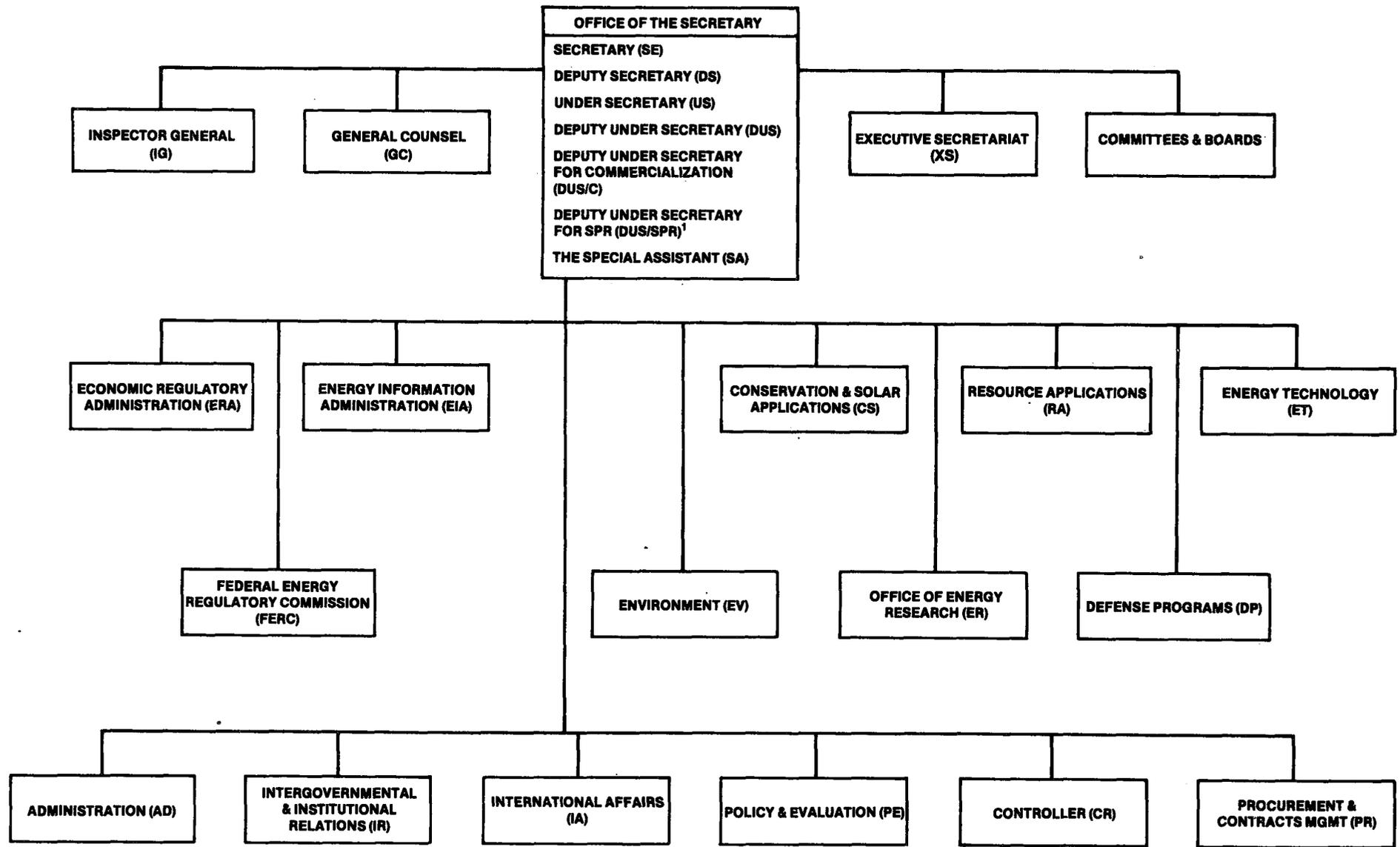
It has not been decided how the level of protection afforded by the fourth 250 MMB can be most effectively achieved.

The SPR's storage capacity is being developed in a three-phase program, as follows:

<u>Phase</u>	<u>Storage Capacity Development</u>	<u>Million Barrels</u>
I	Existing Caverns and Mines -at five sites	248
II	New Leached Caverns -expansion of two of the existing five sites	280
III	New Sites -to be determined (turnkey contracts)	222
	TOTAL	<hr/> 750

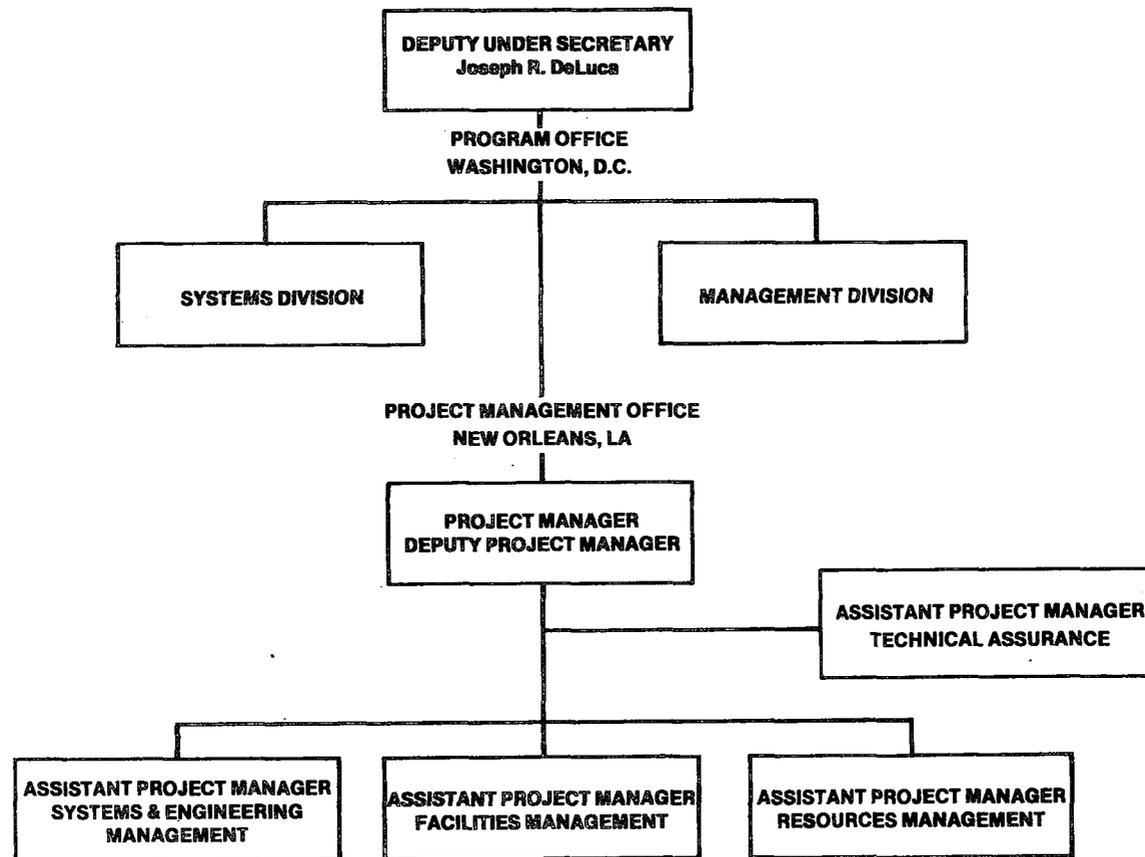
LEADERSHIP AND ORGANIZATION

- FEA** The Energy Policy and Conservation Act of 1975, Section 153, established a Strategic Petroleum Reserve Office (SPRO) within the Federal Energy Administration (FEA). The FEA Administrator was charged with establishing, managing and maintaining the SPR. Until August 1976, the Director of SPRO, Robert L. Davies, reported through the Deputy Assistant Administrator for Energy Projects, John Freeman, to the Assistant Administrator for Energy Resource Development, William G. Rosenberg. At that time, the SPRO became a separate entity within FEA with Thomas E. Noel appointed Assistant Administrator for the SPR. On October 1, 1977 the SPR was transferred from the FEA to the Department of Energy (DOE).
- DOE** Within DOE, responsibility for the SPR resided with the Assistant Secretary for Resource Applications, in which capacity Mr. Noel was acting until January 31, 1978. George S. McIsaac was confirmed on February 22, 1978 as the Assistant Secretary for Resource Applications. The SPRO reported to Mr. McIsaac through the Deputy Assistant Secretary for Oil, Natural Gas and Shale Resources, R. Dobie Langenkamp, who was appointed March 20, 1978. Carlyle E. Hystad was Acting Director of the SPRO from October 1, 1977 to July 10, 1978, when Joseph R. DeLuca was appointed Director. On December 13, 1978, this position was elevated to Deputy Under Secretary reporting directly to the Under Secretary, Dale D. Myers, and to the DOE Secretary. (See Figure 1.)
- SPRO** SPRO's functions and responsibilities have remained essentially the same through these organizational transitions.
- Program Office** The SPRO Program Office in Washington, D.C. has overall responsibility for the SPR Program and for assuring that the system is developed in accordance with the requirements of the EPCA and the SPR Plan and amendments.
- Project Management Office** In early 1978 a Project Management Office (PMO) was in Washington, D. C. and in May of 1978 was transferred to New Orleans, Louisiana. The PMO is the field organization of the SPRO. It has responsibility for site acquisition, design, construction, oil acquisition and transportation, site fill, and operation and maintenance of sites and facilities in accordance with SPR Program goals, system criteria, and parameters. (See Figure 2.)
- STAFFING** At the start of 1978, the authorized staff level of the SPR Office was 147 persons. The current authorized staff level is 206 persons.



¹ EFFECTIVE DEC. 13, 1978

Figure 1 — DEPARTMENT OF ENERGY ORGANIZATION



**Figure 2 — OFFICE OF THE DEPUTY UNDER SECRETARY
STRATEGIC PETROLEUM RESERVE**

Authorized Staff Levels

	<u>Dec 77</u>	<u>May 78</u>	<u>Dec 78</u>
Program Office (Washington, D.C.)	147	73	56
Project Management Office (New Orleans, La.)	---	<u>107</u>	<u>150</u>
TOTAL	147	180	206

CONTRACTOR
SUPPORT

To assist in managing the engineering, design and construction efforts of the Program during 1978, SPRO used the technical services of three primary contractors: an Executive Engineer, a Construction Manager, and an Operations and Maintenance Manager.

The Executive Engineer was Gulf Interstate Engineering Company (GIEC) of Houston, Texas, which had technical management responsibility for site design work. Since the detailed designs on existing and expansion sites are complete, GIEC's role in the Program will not continue in 1979.

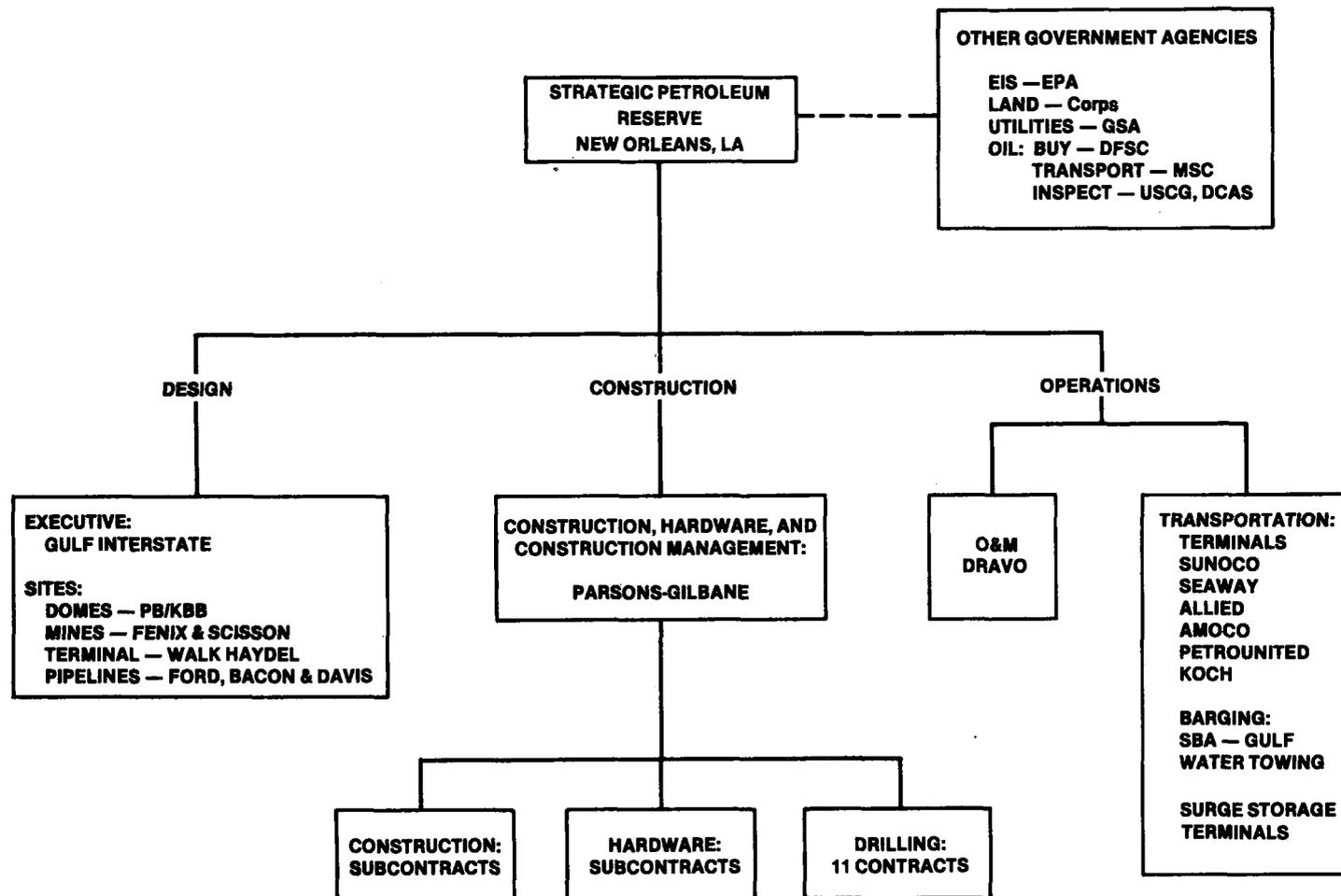
The Construction Manager, Parsons-Gilbane, a joint venture of Ralph M. Parsons Company and the Gilbane Building Company, has technical management responsibility for site construction work. Parsons-Gilbane has also served as interim Operations and Maintenance (O&M) Manager, providing phase-in operations and maintenance services.

In December 1978 Dravo Utility Constructors, Inc. (DUCI) was selected as O&M Manager and assumed these functions in January 1979.

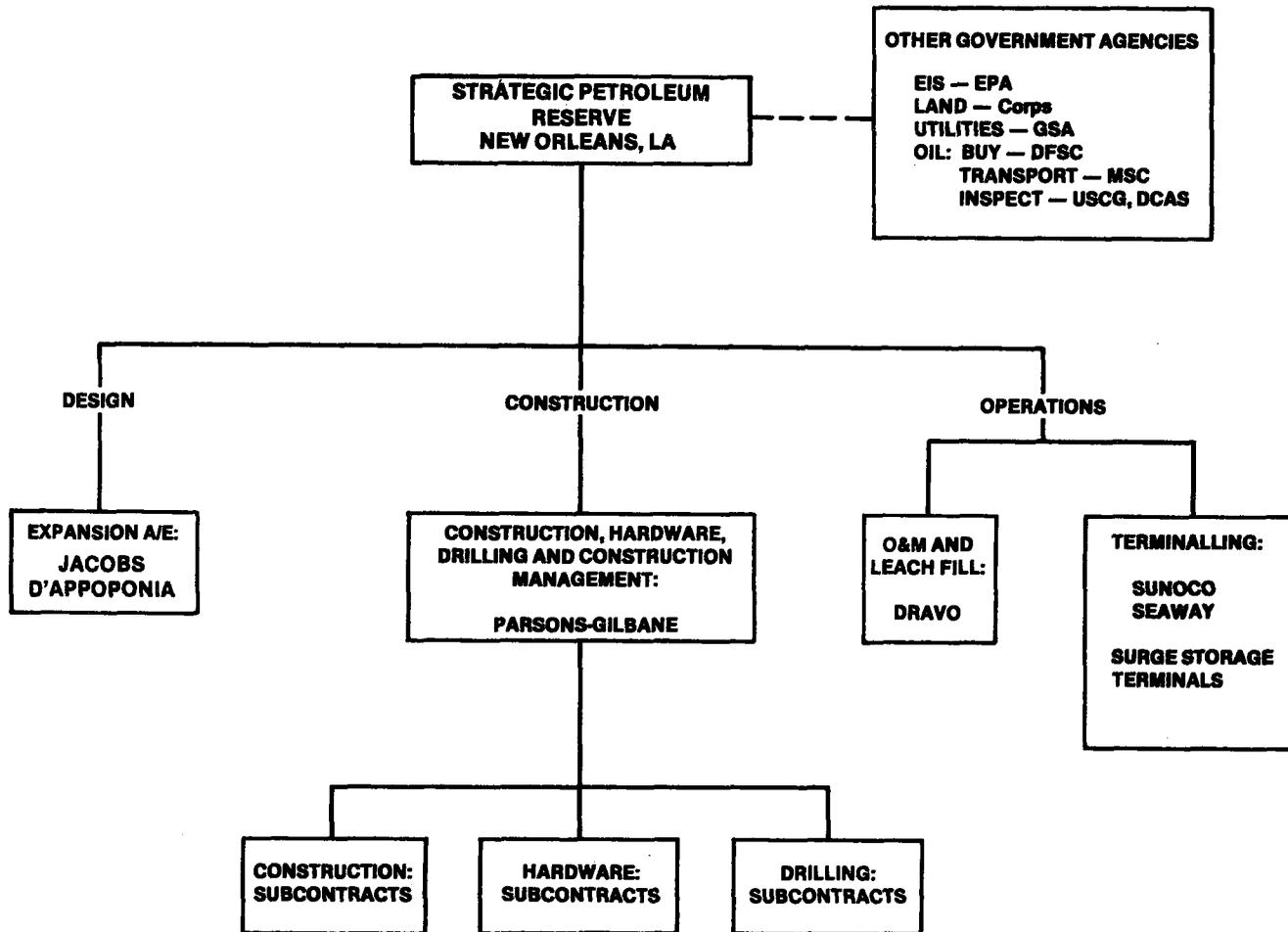
These contractors and other site technical and service contractors are managed through the PMO. (See Figures 3, 4, and 5.)

STATE AND
LOCAL
GOVERNMENT

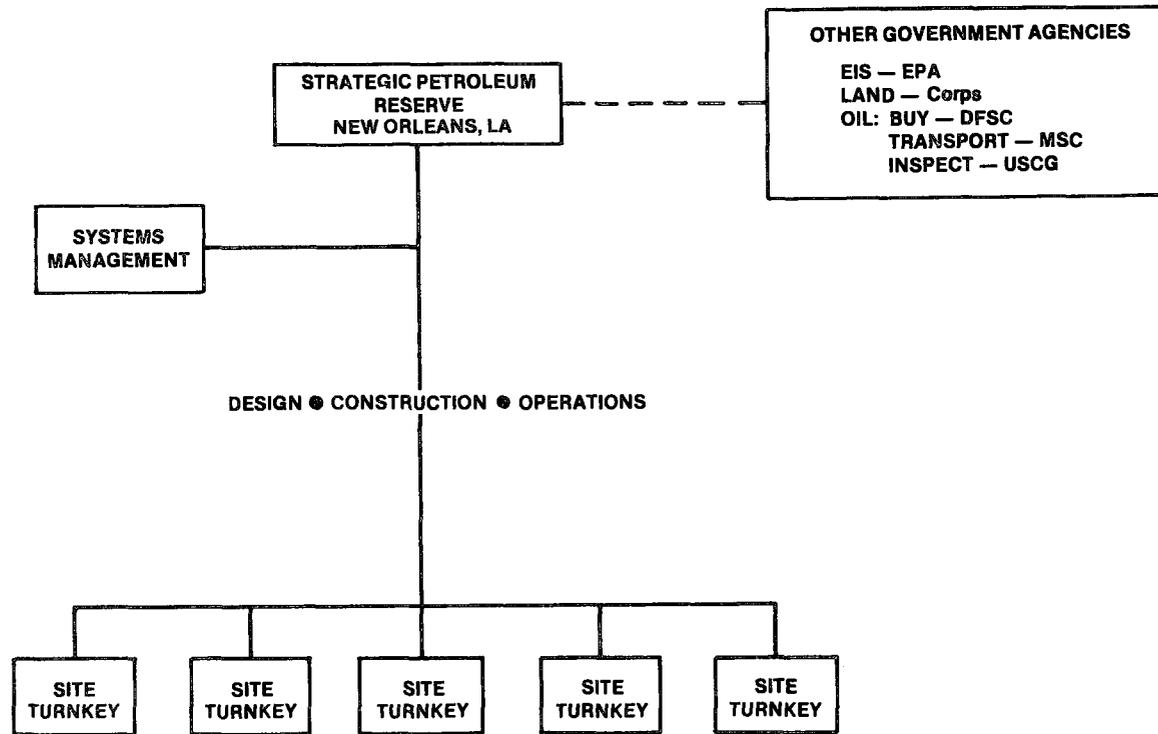
Ongoing Program relationships have been developed with appropriate state and local agencies and officials. Public hearings and required regulatory permit reviews have been held at state and local levels under the auspices of the Secretary of the Department of Natural Resources and the Commissioner of Conservation for the State of Louisiana; and the Police Juries for Iberia, St. James, Assumption, Calcasieu, Cameron, Iberville, and West Baton Rouge Parishes. In Texas, SPR activities are reviewed by the Texas Railroad Commission, other State agencies and local authorities in Brazoria County.



**Figure 3 — CONTRACTUAL RELATIONSHIPS
PHASE I — EXISTING SITES**



**Figure 4 — CONTRACTUAL RELATIONSHIPS
PHASE II — EXPANSION SITES**



**Figure 5 — CONTRACTUAL RELATIONSHIPS
PHASE III — TURNKEY**

SPR SYSTEM PARAMETERS

DISTRIBUTION SYSTEM In developing the SPR system, storage sites were located in areas where they would be most accessible to major interstate crude oil distribution pipelines and port facilities. These locations will allow rapid withdrawal (drawdown) of the oil Reserve should supplies to the U.S. be interrupted for any reason, and will expedite its entrance into the normal crude oil distribution system of the country.

Most crude oil transported to the United States enters through the Gulf of Mexico supplying local refineries or is transported to inland refineries via pipelines. A significant portion of the imported crude oil is transferred inland through three major pipelines: the Seaway and Texoma pipelines to Cushing, Oklahoma, and the Capline pipeline to Patoka, Illinois. Additional smaller pipelines further distribute oil from the major pipelines throughout the Midwest. Thus, the Gulf Coast is a desirable location for storage because DOE can take advantage of existing commercial crude oil distribution systems.

Crude oil stored in the Gulf Coast area can quickly feed the major market areas that are dependent upon oil imports most likely to be interrupted: the interior of the country, the East Coast, the Gulf Coast and the Caribbean refineries. SPR oil can also be moved by tankers to West Coast and Pacific refineries.

Each of the site complexes currently being developed for the SPR will be connected to one of the three major pipelines and tanker docks. The SPR site complexes have been grouped according to the associated major pipelines and marine terminal facilities. The location of current SPR site complexes and the Seaway, Texoma, and Capline pipelines and the inter-connecting pipelines are shown in Figure 6.

The projected cumulative drawdown capabilities for the first 750 MMB of storage for the various phases of the program are as follows:

	<u>Cumulative Storage Volume (MMB)</u>	<u>Drawdown Capability (MMB/D)</u>
Phase I	248	1.7
Phase II	528	3.5
Phase III	750	4.5

SITE SYSTEM DESCRIPTION Two types of sites are currently being developed for the SPR: solution-mined cavern sites and a mechanically mined site. The systems required on each type of site are described below:

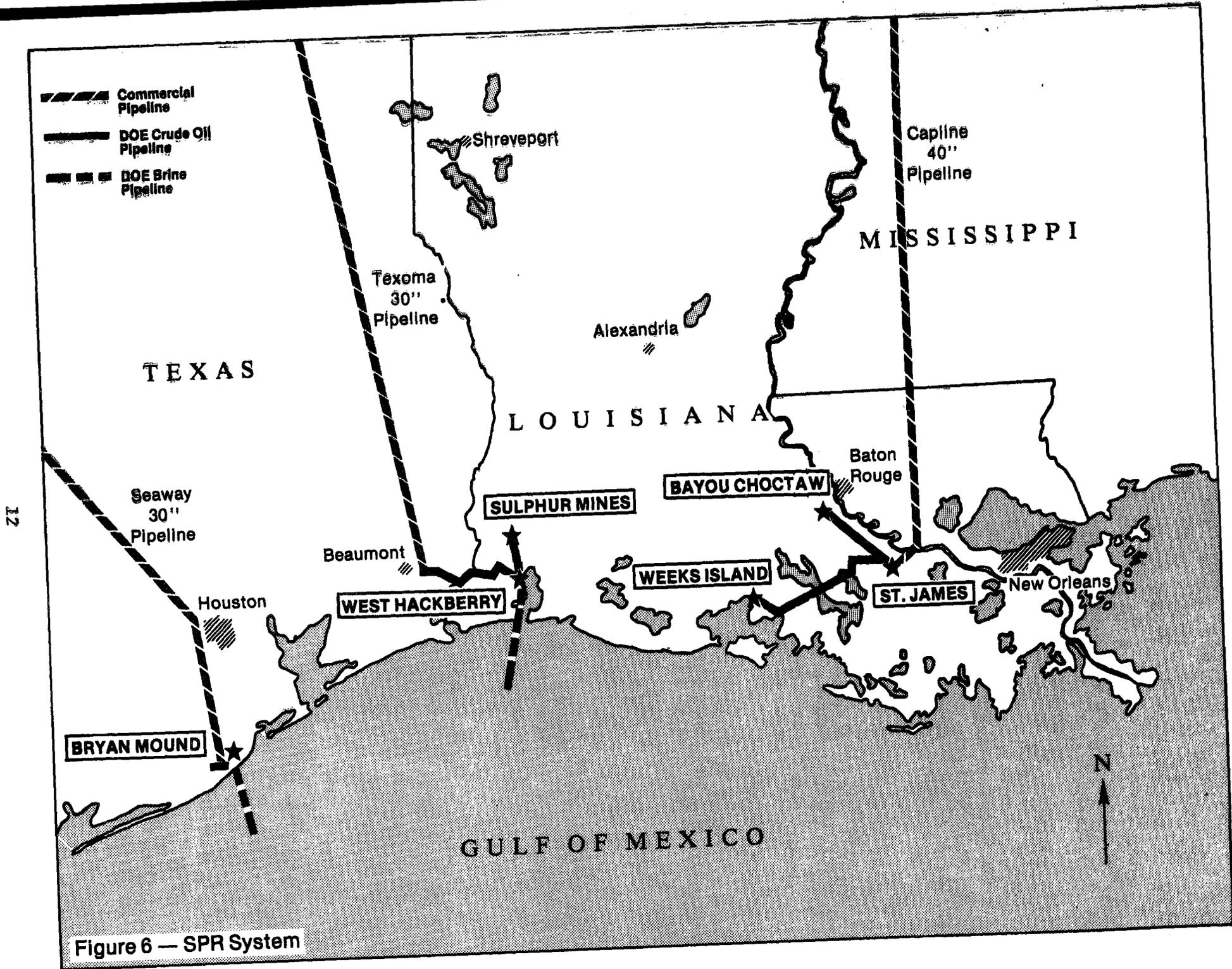


Figure 6 — SPR System

**Solution-
Mined Sites**

**Bryan Mound, Texas, and West Hackberry, Bayou
Choctaw and Sulphur Mines, Louisiana**

- o **Leached caverns with entry wells**
- o **Brine disposal wells**
- o **Oil, brine and raw water piping distribution systems connecting the caverns and brine disposal wells with the pumping stations**
- o **Pumping stations for oil and raw water injection into caverns and for brine injection into disposal wells**
- o **Brine pit for brine treatment and settling**
- o **Fire protection piping system to caverns and pumping stations, foam generation units**
- o **Oil surge tanks (if required)**
- o **Electrical substation and power distribution systems**
- o **Buildings for central control equipment, warehousing and office space**

**Mechanically
Mined Site**

Weeks Island, Louisiana

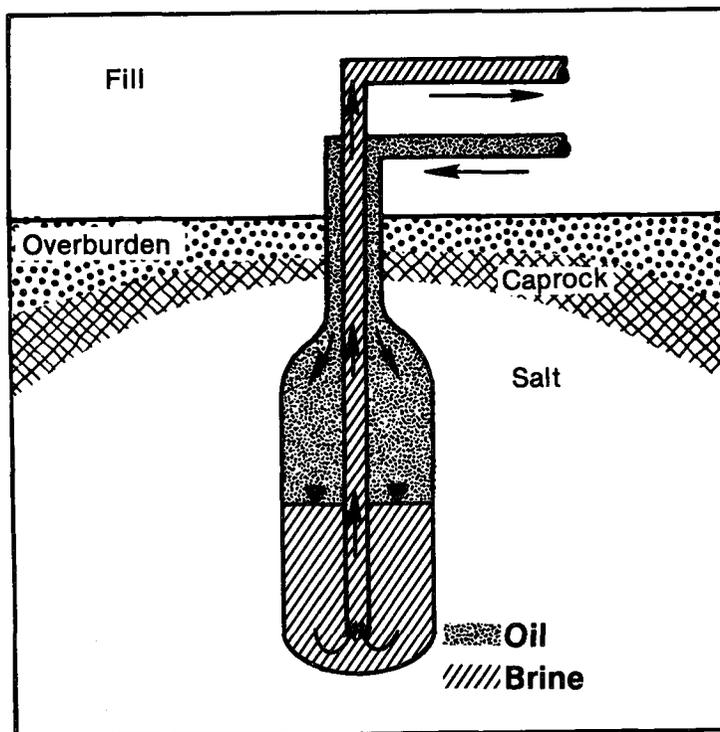
- o **Room and pillar mine with access shafts**
- o **Oil piping distribution system connecting mine and surface pumping station**
- o **Submersible pumps in mine for oil withdrawal and surface pumping station for distribution**
- o **Vapor recovery and mine inerting systems**
- o **Fire protection systems, water tanks and water distribution piping**
- o **Buildings for central control equipment, warehousing and office space**

SITE PROCESS FLOW SYSTEM The development, fill and drawdown of solution-mined sites require oil, brine and raw water fluid process systems to each of the storage caverns.

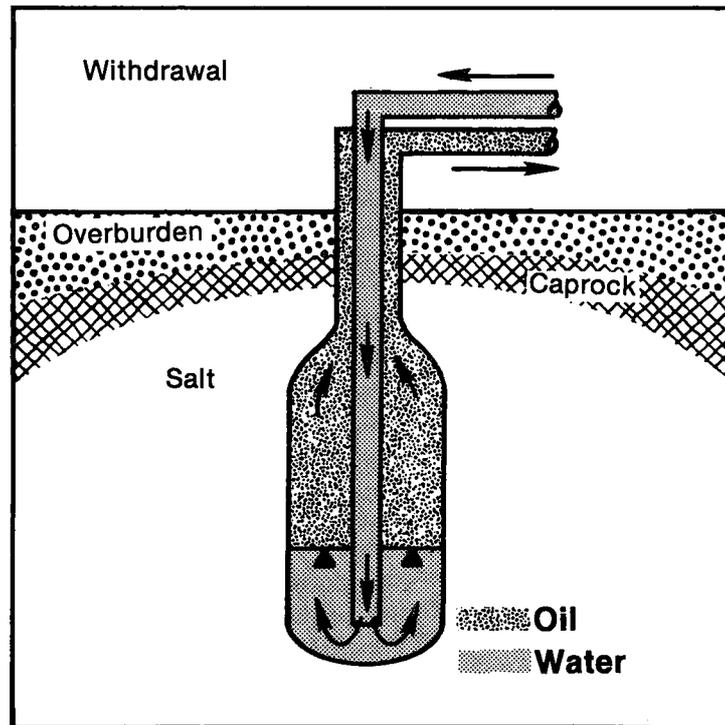
Solution-Mined Sites

Existing Caverns: created through previous brine production operations by industry

- o **Fill:** Oil is supplied from a terminal facility through the site distribution pipeline. As oil is injected into the caverns, a barrel-for-barrel displacement of brine occurs. In 1978, brine was disposed of through deep-injection wells as well as supplied to brine chemical companies. Future plans call for disposal of brine into the Gulf through pipelines. The following schematic depicts fluid flow in solution-mined caverns during the fill cycle.

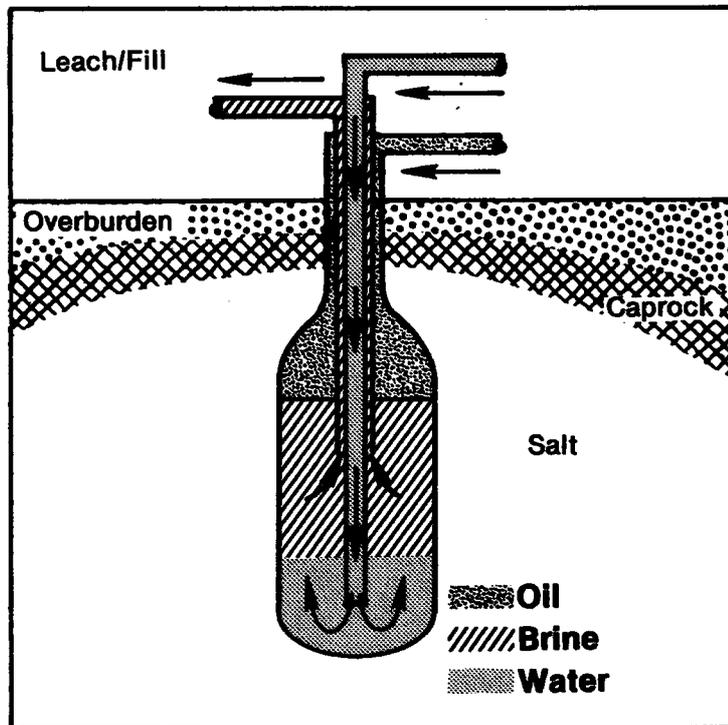


- o **Drawdown:** Fresh water is pumped from a major water source and injected into the cavern to provide a barrel-for-barrel displacement of oil. Oil flows to the distribution terminal and is transported to refineries through pipelines, tankers and barges. The following schematic depicts fluid flow in the caverns during the oil withdrawal cycle.



New Caverns: to be created by leaching

- o **Leaching:** During leaching, fresh water is pumped from a major water source, injected into the cavern, and becomes saturated brine as the salt is dissolved. For each barrel of storage space created, seven barrels of fresh water must be injected and seven barrels of brine must be disposed. This process removes one barrel of salt and creates one barrel of storage volume.
- o **Fill and Drawdown:** The process is the same as described for existing caverns, except that oil injection occurs periodically during the leaching process. The following schematic depicts fluid flow in caverns during the leaching and oil fill process.



Mechanically Mined Sites

The fill and drawdown of mechanically mined sites require an oil fluid process system only.

- o **Fill:** Oil is supplied from a terminal facility through the site distribution pipeline. The mine is filled through a gravity feed system.
- o **Drawdown:** Oil is pumped to the surface by submersible pumps located in the mine. Surface pumps supply the distribution pipeline, which transports oil to the terminal for distribution.

SYSTEM PARAMETER

Site design parameters for the fluid process systems within each SPR pipeline group are as follows:

SYSTEM PARAMETERS-FLOW RATES

Seaway Group	Capacity (MMB)	Design Pumping Rate (MB/D)			Oil Withdrawal
		Raw Water	Brine Disposal	Oil Injection	
Bryan Mound (Phase I)	60	387	130	240	387
Bryan Mound (Phase II)	120				
Cumulative	180	1054	680	240	1054
<u>Texoma Group</u>					
West Hackberry (Phase I)	51	423	130	175	402
Sulphur Mines	22	100	80	80	
West Hackberry (Phase II)	160				
Cumulative	233	1400	1168	255	1400
<u>Capline Group</u>					
Bayou Choctaw	36	627	125	240	480
Weeks Island	75	*	*	480	590
Cumulative	111	627	125	720	1070

* Not applicable

PROGRAM AND SCHEDULE

PROGRAM DEVELOPMENT

The SPR Program is being developed in three phases:

Phase I

Phase I involves the development of five oil storage sites, with existing storage capacity, and one marine terminal. Consistent with Program goals, emphasis during 1978 continued to be focused on accelerating facility design, site construction and oil fill.

The five selected storage sites have a combined underground storage capacity of 244 MMB. These sites are:

<u>Storage Site</u>	<u>Location</u>	<u>Storage Capacity (MMB)</u>
Bryan Mound	Brazoria County, Tx.	60
West Hackberry	Cameron Parish, La.	51
Bayou Choctaw	Iberville Parish, La.	36
Weeks Island	Iberia Parish, La.	75
Sulphur Mines	Calcasieu Parish, La.	<u>22</u>
		244
Tanks and Pipelines		<u>4</u>
Total		248

A marine terminal is being constructed in St. James Parish, Louisiana. The terminal consists of 2 MMB of above-ground storage and two tanker docks for discharging and loading of crude oil.

With the exception of Weeks Island, an operating, mechanically mined salt mine, all selected sites are solution-mined salt caverns. Construction is underway at all sites except Sulphur Mines, where it is expected to start early in 1979.

Oil fill is underway at Bryan Mound, West Hackberry and Bayou Choctaw and is scheduled to start at Sulphur Mines in July 1979 and at Weeks Island in September 1979.

A total of 68.5 MMB of crude oil was in storage at three sites or under U.S. control at the end of 1978. This compares to 7.2 MMB in underground storage at the end of 1977.

Crude Oil Inventory - Dec. 31, 1978

	Crude Oil (MMB)		
	High Sulphur Content (Sour)	Low Sulphur Content (Sweet)	Total
Underground Storage			
Bryan Mound	-	27.3	27.3
West Hackberry	17.7	2.8	20.5
Bayou Choctaw	<u>18.1</u>	-	<u>18.1</u>
Subtotal	35.8	30.1	65.9
Tanks and Pipelines	<u>1.2</u>	<u>1.4</u>	<u>2.6</u>
Total	37.0	31.5	68.5

Phase II

Phase II is the planned expansion of two of the existing sites: Bryan Mound, Texas (an additional 120 MMB) and West Hackberry, Louisiana (an additional 160 MMB). Facilities developed at these sites during Phase I will be supplemented and utilized for solution mining of additional underground storage capacity. The salt caverns will be leached and, as new volume is created, filled with oil in time-phased increments.

Detailed design drawings and expansion plans have been developed for both sites. Land acquisition, long-lead equipment procurement and drilling have been initiated at Bryan Mound. West Hackberry development depends on the availability of FY 1979 funds through a reprogramming request which is now pending.

Phase III

In Phase III, new sites will be developed to provide the remaining capacity. This is proposed to be accomplished through improved contracting with industry, called "turnkey" site development. This approach will enable DOE to purchase, lease, or contract for storage in completed site complexes, each of which would be developed under a single contract for that site to include environmental compliance, permit acquisition, design and construction work, and possibly site operation.

Two procurement techniques are being used in contract soliciting for turnkey site development: non-competitive negotiations with owners and operators at selected sites, and competitive procurement for selection of additional sites and development contractors.

Negotiations are currently underway with the owners or operators of the following candidate storage sites:

- o Non-competitive - Existing sites with a total storage volume of 80 MMB:
 - Ironton, Ohio - 20 MMB capacity
 - Napoleonville, Louisiana - 30 MMB capacity
 - Cote Blanche, Louisiana - 30 MMB capacity
- o Competitive

Under the competitive turnkey bid process, initial statements of interest were requested from industry in August 1978. Following a presolicitation conference, a request for unpriced technical proposals was issued after which bidders' conferences were held with all interested firms. The solicitation limits potential turnkey sites to a minimum of 20 MMB capacity to provide reasonable economy of scale in development and, later, in operations. Sites in North America will be considered. The DOE evaluations of proposals are to take into account a wide range of factors such as price, technical approaches, environmental and permitting compliances, schedule, costs, design trade-offs, corporate experience, technical and managerial know-how, contractual terms, economics, and SPR system compatibility. The schedule for the competitive turnkey procurement is:

August 1978	Commerce Business Daily - "Expression of Interest" Solicitation
October 1978	Request for Industry Comments on RFP
November 1978	RFP Issued
January 1979	Technical Proposals Submitted
January - May 1979	Evaluations
May 1979	Price Proposals Due
Fall 1979	DOE, Office of Management and Budget, and Congressional Review
Fall 1979	Contract Award

**SPR PROGRAM
SCHEDULE**

The overall projected development schedule for the SPR Program's three phases is as follows:

**Projected Cumulative Oil Storage (MMB)
Year End Total**

	Actual								
	1978	1979	1980	1981	1982	1983	1984	1985	1986
Phase I									
Bryan Mound	27	60	60						
West Hackberry	21	51	51						
Bayou Choctaw	18	36	36						
Weeks Island		25	75						
Sulphur Mines		19	22						
Tanks & Pipelines	3	4	4						
Subtotal	69	195	248	248	248	248	248	248	248
Phase II									
Bryan Mound Expansion				22	36	64	92	120	
West Hackberry Expansion				10	34	74	115	155	160
Subtotal				32	70	138	207	275	280
Cumulative	69	195	248	280	318	386	455	523	528
Phase III^{1/}									
Non-competitive Turnkey									
Ironton				20					
Cote Blanche				30					
Napoleonville				18					
Subtotal				68	80	80	80	80	80
Cumulative	69	195	248	348	398	466	535	603	608
Competitive Turnkey									
142 MMB					20	58	85	111	142
TOTAL	69	195	248	348	418	524	620	714	750

^{1/} Dependent upon technical, environmental, schedule and cost proposals by industry.

**PRIOR
SCHEDULES**

Development goals for the SPR were established early in the Program and then accelerated to achieve SPR objectives. The chronology of prior schedules is:

<u>Prior Schedules</u>	50 <u>MMB</u>	150 <u>MMB</u>	250 <u>MMB</u>	325 <u>MMB</u>	500 <u>MMB</u>	1 <u>Billion Barrels</u>
EPCA, Dec 75	Jun 78	Dec 78	-	Dec 80	Dec 82	
SPR Plan, Feb 77	-	Dec 78	-	Dec 80	Dec 82	
National Energy Plan, Apr 77	-	-	-	-	-	Dec 85
SPR Plan Amend. No.1, Jun 77	-	-	Dec 78	-	Dec 80	
SPR Plan Amend. No.2, Jun 78	-	-	Dec 78	-	Dec 80	Dec 85

Near-term targets had intentionally been set ambitiously to achieve the maximum fill as early as possible to protect against near-term oil supply interruptions and to assure the lowest ultimate real costs for storage of oil considering projected oil price increases. These targets were based on optimistic assumptions regarding site availability and technical requirements. Program funding had been optimized to assure that SPR development would not be constrained by lack of resources or failure to accelerate design construction and oil storage activities.

In fact, the accelerated schedule has not been met because of unusable cavern volume, delays in land acquisition and construction, problems in obtaining environmental permits, construction delays, and technical difficulties which have adversely affected schedule achievement.

**COMPARISON
TO CURRENT
SCHEDULE**

Based on detailed site plans and schedules developed in 1978 for Phases I and II and planning estimates for Phase III, the current SPR development schedule compares to the above prior schedules as follows:

	50 <u>MMB</u>	150 <u>MMB</u>	250 <u>MMB</u>	325 <u>MMB</u>	500 <u>MMB</u>	750 <u>MMB</u>
	Oct 78	Sept 79	Jun 80	Jul 81	Oct 83	Dec 86

Decisions have not been made regarding the extent of Government and industry involvement in developing the fourth 250 MMB.

FUNDS AND COSTS

APPROPRI-
ATED
FUNDS
THROUGH
FY 1979

A total of \$6.950 billion has been appropriated for the SPR Program since its inception in 1975. Funds (in thousands of dollars) have been appropriated for the activities shown below:

<u>Fiscal Year</u>	<u>Petroleum Acquisition & Transportation</u>	<u>Storage Facilities Development</u>	<u>Planning</u>	<u>Personal & Administrative Services</u>	<u>Total</u>
1976	...	300,000	12,000	1,975	313,975
1977	440,000	...	4,000	3,824	447,824
1978	2,703,469	463,933	7,915	6,789	3,182,106
1979	2,885,670	103,290	12,200	5,694	3,006,854
TOTAL	6,029,139	867,223	36,115	18,282	6,950,759

OBLIGATIONS
THROUGH
FY 1978

Obligations (in thousands of dollars) through fiscal year 1978 were:

<u>Fiscal Year</u>	<u>Petroleum Acquisition & Transportation</u>	<u>Storage Facilities Development</u>	<u>Planning</u>	<u>Personal & Administrative Services</u>	<u>Total</u>
1976/77	437,790	193,570	7,306	4,840	643,506
1978	2,295,314	445,398	10,582	6,649	2,757,943
TOTAL	2,733,104	638,968	17,888	11,489	3,401,449

FY 1979
FUNDING
SUMMARY

Funds (in thousands of dollars) for fiscal year 1979 are as follows:

	<u>Petroleum Acquisition & Transportation</u>	<u>Storage Facilities Development</u>	<u>Planning</u>	<u>Personal & Administrative Services</u>	<u>Total</u>
Carryover from FY 78...	410,365	124,965	6,027	1,099	542,456
Appropriated FY 79.....	2,885,670	103,290	12,200	5,694	3,006,854
Available....	3,296,035	228,255	18,227	6,793	3,549,310
Estimated Obligations..	585,656	863,340	18,227	6,793	1,474,016
Balance.....	2,710,379	-635,085	...	...	2,075,294
Reprogram Request.....	-744,912	732,912	12,000	...	
Unobligated..	1,965,467	97,827	12,000	...	2,075,2

STORAGE
FACILITY
COSTS

Costs for developing the SPR, assuming a 750 MMB underground storage program, have been updated by DOE based on actual costs for Phase I and current planning and design data. Details of estimated obligations through FY 1985 are shown in Table 1. Individual site costs for 608 MMB of the 750 MMB SPR system are shown below:

	<u>Capacity</u> <u>(MMB)</u>	<u>Cost</u> <u>(\$ millions)</u>	<u>Cost per Barrel</u> <u>(\$/barrel)</u>
<u>Phase I</u>			
Bryan Mound	60	119.6	1.99
West Hackberry	51	193.5	3.79
Bayou Choctaw	36	151.6	4.21
Weeks Island	75	207.0	2.76
Sulphur Mines	22	81.6	3.71
St. James Terminal	-	87.6	
Withdrawal Engineering	-	20.0	
Subtotal	<u>248^{1/}</u>	<u>860.9</u>	<u>3.47</u>
<u>Phase II</u>			
Bryan Mound	120	278.3	2.32
West Hackberry	160	394.6 ^{2/}	2.47
Bayou Choctaw	0	3.7 ^{2/}	
Subtotal	<u>280</u>	<u>676.6</u>	<u>2.42</u>
Cumulative (500 MMB System)	<u>528</u> (500)	<u>1,537.5</u> (1,469.8)	<u>2.91</u> (2.94)
<u>Phase III</u>			
Non-competitive Turnkey	80	230.5	2.88
Cumulative	<u>608</u>	<u>1,768.0</u>	<u>2.91</u>
Competitive Turnkey ^{3/}	142	...	...
Total	<u>750</u>	...	...

1/ Total includes 4 MMB of tank and pipeline storage.

2/ Design costs only; no expansion development now planned at this site.

3/ Funding of 142 MMB of turnkey storage is to be carried in Government-wide contingencies in FY 1980, and planned for FY 1980 supplemental submission.

TABLE 1
PROJECTED OBLIGATIONS AND OUTLAYS
(in thousands of dollars)

<u>PHASE I</u>	<u>ACTUAL PRIOR YEARS</u>	<u>FY 79</u>	<u>FY 80</u>	<u>FY 81</u>	<u>FY 82</u>	<u>FY 83</u>	<u>FY 84</u>	<u>FY 85</u>	<u>TOTAL</u>
Bryan Mound	98,004	21,596	0						119,600
West Hackberry	150,247	41,761	1,492						193,500
Bayou Choctaw	101,973	48,138	1,489						151,600
Weeks Island	128,318	70,882	7,800						207,000
Sulphur Mines	51,893	27,743	1,964						81,600
St. James Terminal	73,741	13,859	0						87,600
Withdrawal Engineering	0	20,000							20,000
SUBTOTAL OBLIGATIONS	<u>604,176</u>	<u>243,979</u>	<u>12,745</u>						<u>860,900</u>
SUBTOTAL OUTLAYS	<u>317,477</u>	<u>324,750</u>	<u>192,779</u>	<u>25,894</u>					<u>860,900</u>
 <u>PHASE II</u>									
Bryan Mound Expansion	28,782	154,326	20,918	11,184	13,410	14,113	14,853	20,714	278,300
West Hackberry Expansion	4,452	250,022	40,462	16,234	17,036	17,926	18,866	29,602	394,600
Bayou Choctaw Expansion	1,558	2,117							3,675
SUBTOTAL OBLIGATIONS	<u>34,792</u>	<u>406,465</u>	<u>61,380</u>	<u>27,418</u>	<u>30,446</u>	<u>32,039</u>	<u>33,719</u>	<u>50,316</u>	<u>676,575</u>
SUBTOTAL OUTLAYS	<u>3,480</u>	<u>238,370</u>	<u>209,875</u>	<u>51,325</u>	<u>44,465</u>	<u>37,170</u>	<u>33,000</u>	<u>58,890</u>	<u>676,575</u>
CUMULATIVE OBLIGATIONS	<u>638,968</u>	<u>650,444</u>	<u>74,125</u>	<u>27,418</u>	<u>30,446</u>	<u>32,039</u>	<u>33,719</u>	<u>50,316</u>	<u>1,537,475</u>
CUMULATIVE OUTLAYS	<u>320,957</u>	<u>563,120</u>	<u>402,654</u>	<u>77,219</u>	<u>44,465</u>	<u>37,170</u>	<u>33,000</u>	<u>58,890</u>	<u>1,537,475</u>
 <u>PHASE III</u>									
Negotiated Turnkey	0	211,899	14,299	4,363					230,561
Outlays	0	87,000	117,200	7,500	8,496	3,455	3,455	3,455	230,561
Competitive Turnkey ^{1/}			...	...	...	...	...	...	...
TOTAL OBLIGATIONS	<u>638,968</u>	<u>862,343</u>	<u>88,424</u>	<u>31,781</u>	<u>30,446</u>	<u>32,039</u>	<u>33,719</u>	<u>50,316</u>	<u>1,768,036</u>
TOTAL OUTLAYS	<u>320,957</u>	<u>650,120</u>	<u>519,854</u>	<u>84,719</u>	<u>52,961</u>	<u>40,625</u>	<u>36,455</u>	<u>62,345</u>	<u>1,768,036</u>

1/ Funding of 142 MMB of turnkey storage is to be carried in Government-wide contingencies in FY 1980, and planned for FY 1980 supplemental submission.

FACILITIES
COST
INCREASES

In fall of 1978, an evaluation of the SPR Program's costs led to a quantification of the cost increase or overrun status in the development of the SPR's storage facilities.

The 1976 estimate contained in the SPR Plan for the first 500 MMB of storage facilities was \$766 million or \$1.53 per barrel. Initially, in 1975-1976, inadequate estimates of inflation were made; this has been one of the contributors to cost growth. Current facilities cost estimates account for annual inflation as follows:

Labor - 7 percent;
Equipment - 8 percent; and
Construction - 8 percent.

In contrast, Phase I currently is estimated to cost \$860.9 million, or \$3.47 per barrel for the first 248 MMB of SPR storage facilities.

Phase II, for the next 280 MMB, is estimated to cost \$676.6 million, or \$2.42 per barrel.

Phases I and II, which provide a total capacity of 528 MMB, are estimated to cost \$1,537.5 million, or \$2.91 per barrel.

The cost for 528 MMB can be compared to previous estimates for 500 MMB by taking the cost per barrel of the Phase II expansion (\$2.42/bbl) and subtracting 28 MMB at that cost. This results in a cost of \$1,469.8 million for 500 MMB, or \$2.94/bbl against the original \$1.53/bbl. The total cost increase is \$705.9 million.

The primary reasons for the cost increases include:

- Poor Initial Estimates o The SPR Plan cost estimates were based on feasibility studies which did not completely describe the required facilities. Several significant items contained in the initial estimates, required for a complete, safe and secure storage system, were found to be of inappropriate size or quality when detailed design and actual construction began. Deficiencies included an inadequate oil drawdown and distribution system; an insufficient number of cavern entry and brine disposal wells; lack of marine terminal facilities, dikes around well heads, fire fighting systems, concrete well pads; inadequate size and quality of buildings for personnel and equipment; insufficient instrumentation systems to control oil and brine flows; and inadequate safety and security systems.

The feasibility studies also underestimated the amount of drilling that would be required to develop SPR sites. In 1976, the estimated number of brine

disposal and re-entry wells was 50; today's detailed designs include a total of 61 wells to meet system fill and withdrawal rates. Costs for drilling average \$1.1 million per well versus earlier estimates of \$400,000 to \$500,000 per well.

- Loss of Low Cost Capacity
- o Original cost estimates were based on preliminary information about the capacities of existing conventional mines and solution-mined caverns. Cavern and mine volumetric surveys and certification tests conducted for Phase I sites show that the earlier site capacities were overestimated. Of the 331 MMB originally estimated, only 244 MMB are actually available for oil storage. This overestimation necessitates replacement of the original 87 MMB capacity with potentially higher cost storage facilities in later years.
- Infrastructure Costs
- o Additional capital costs which were not originally included or were underestimated have been incurred in infrastructure, primarily oil pipeline and terminal facilities.
- Inflation
- o Inflation is a major factor in the escalation of SPR facilities costs. The cost of oil field equipment and services has increased significantly over the last two years, particularly since demand in this sector of the economy has been high. Escalation factors used in the \$1.53 per barrel estimate have proven to be low.
- Additional Facilities
- o The need for additional facilities, resulting from a number of design changes required to obtain environmental permits, has contributed to cost growth. One such change included extending the brine disposal pipeline at Bryan Mound 14.6 miles from the site into the Gulf, rather than the planned 7.8 miles which DOE had found to be environmentally acceptable. This decision will increase costs by about \$20 million at that site alone, since it includes an expensive brine dispersion monitoring system designed to ensure compliance with EPA permit requirements. The design and operation costs will be about \$10 million for this system.
 - o At West Hackberry, it has been necessary, at an added cost of \$8 million, to redesign and relocate a raw water pipeline and intake structure from its original location on a nearby lake to a more distant site on the Intracoastal Waterway in order to minimize possible adverse impacts on the fishing industry.

Schedule
Adherence

- o Actions to accelerate the SPR construction and fill schedule have also increased costs. Temporary facilities were constructed so that oil storage could begin as soon as possible. These systems began operating in 1977 and enabled the DOE to start filling the sites more than a year before permanent systems would have allowed.

RE-
PROGRAMMING
OCTOBER 1978

In order to bring the Program funding in line with estimates resulting from actual cost experience, a reprogramming of appropriated funds from expenditures for petroleum acquisition to use in financing SPR site development was requested of the Congress on October 4, 1978. This request was for the reprogramming of \$450 million for the first five months of FY 1979. This was feasible since petroleum funds existed because oil procurements were delayed to reflect facility readiness schedules.

The House of Representatives Subcommittee on Interior and Related Agencies of the Committee on Appropriations deferred action on the request until the 96th Congress was convened in January 1979.

The delay in reprogramming resulted in the following management actions:

- o Reallocation of the available carryover funds of \$228 million, allowing only critical work to be continued at the five existing sites for Phase I. Funding for each of the phases has been reallocated as follows:

	Estimated Obligations Required Oct 78-Feb 79 (\$ Millions)	Funds Available (\$ Millions)	Percent of Requirement
Phase I	138	138	100
Phase II	264	73	28
Phase III	209	17	8
TOTAL	<u>611</u>	<u>228</u>	<u>27</u>

- o Long-lead equipment procurement, drilling, engineering and construction at Bryan Mound expansion continued but on a phased basis.
- o Construction work on the West Hackberry expansion was delayed until reprogramming is approved.
- o Negotiation of turnkey contracts for existing capacity at Ironton, Cote Blanche, and Napoleonville will be based on

reprogramming approval.

- o The amount of oil projected to be in storage at the end of 1980 will be reduced by almost 50 MMB for Phases II and III.

REVISED
REQUEST
JANUARY

A revised FY 1979 and FY 1980 reprogramming request was submitted to the Congress on January 19, 1979 for the reallocation of petroleum acquisition and transportation funds for storage facilities development (site acquisition, site design and construction, and operation and maintenance) and planning. Specifically, DOE is requesting the reprogramming of \$745 million from petroleum funds at the earliest possible date; the allocation of \$733 million of these FY 1979 petroleum acquisition and transportation funds to storage facilities development; and the allocation of \$12 million of petroleum acquisition and transportation funds to planning. This request is summarized below in thousands of dollars:

<u>Facilities</u>	<u>FY 79</u>	<u>FY 80</u>	<u>TOTAL</u>
Estimated Obligations	\$ 863,340	\$ 97,827	\$ 961,167
Available Funds	228,255	---	228,255
Required	635,085	97,827	732,912
<u>Planning</u>			
Estimated Obligations	18,227	12,000	30,227
Available	18,227	---	18,227
Required	---	12,000	12,000
Reprogramming Request			\$ 744,912

The reprogramming requested is vital to the continuation of the SPR Program beyond March 1979. Facility development will be curtailed and oil fill will be adversely impacted if the request is denied or deferred.

The FY 1979 and prior year appropriations provided a total of \$764 million for site acquisition, design, construction and operation for the first 500 MMB of storage. The FY 1979 budget provided an additional \$103 million to start on facilities for the third 250 MMB. The total of \$867 million is insufficient to develop the first 500 MMB and to meet planned obligations on the third 250 MMB in FY 1979. The deferral of the October 1978 reprogramming request required a reallocation of existing funds to continue the major development effort then underway.

The reallocation, phased and estimated obligations through FY 1979 and FY 1980 are shown below in thousands of dollars.

	<u>Oct 78-Feb 79</u>	<u>Mar 79-Sep 79</u>	<u>FY 1979</u>	<u>FY 1980</u>
<u>Existing Sites</u>				
Bryan Mound	16,667	4,929	21,596	0
West Hackberry	32,211	9,550	41,761	1,492
Bayou Choctaw	33,300	14,838	48,138	1,489
Weeks Island	27,958	42,924	70,882	7,800
Sulphur Mines	15,846	11,897	27,743	1,964
St. James Terminal	<u>12,297</u>	<u>1,562</u>	<u>13,859</u>	<u>0</u>
Subtotal	138,279	85,700	223,979	12,745
<u>Sustaining Operations</u>				
Withdrawal	0	997	997	9,403
Engineering	<u>0</u>	<u>20,000</u>	<u>20,000</u>	<u>0</u>
Cumulative	138,279	106,697	244,976	22,148
<u>Expansion of Existing Sites</u>				
Bryan Mound Expansion	46,983	107,343	154,326	20,918
West Hackberry Expansion	23,876	226,146	250,022	40,462
Bayou Choctaw Expansion	2,117	0	2,117	0
Subtotal	<u>72,976</u>	<u>333,489</u>	<u>406,465</u>	<u>61,380</u>
Cumulative	211,255	440,186	651,441	83,528
<u>Non-competitive Turnkey</u>				
Turnkey	17,000	194,899	211,899	14,299
TOTAL	<u>228,255</u>	<u>635,085</u>	<u>863,340</u>	<u>97,827</u>

REAL ESTATE/ENVIRONMENTAL/PERMITS

REAL ESTATE The U.S. Army Corps of Engineers (Corps) acquires property for the SPR under an interagency agreement with DOE. Property is acquired in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act (P.L. 91-646) of 1970. Once DOE identifies the needed property, the Corps must obtain title evidence to determine ownership, conduct a survey and prepare legal descriptions and a property plat, and appraise the property. An amount not less than the approved appraised value is offered to the landowner when negotiations are commenced.

A significant problem during the past year has been the acquisition of easements for pipelines. In 1978, easements were acquired for over 150 miles of pipelines and involved over 2500 individual property tracts. Appraised values established under the "before and after" method in accordance with the Uniform Standards for Federal Land Acquisition (Interagency Land Conference 1973) are significantly below the value commonly paid by the pipeline industry. As a result, a majority of easements had to be acquired through eminent domain proceedings which increases administrative costs, delays the project and further burdens the Federal Courts' already crowded dockets.

ENVIRON- MENTAL COMPLIANCE

Before an SPR site can be selected, DOE must prepare an environmental impact statement (EIS) in compliance with the National Environmental Policy Act (NEPA) of 1969. As of December 1978, a programmatic EIS, 19 site-specific EISs, and four EIS supplements had been prepared. As each site becomes operational, a Spill Prevention Control and Countermeasure (SPCC) plan will be utilized, as required by the Environmental Protection Agency (EPA) regulations under the Federal Water Pollution Control Act of 1972 ("Clean Water Act").

Programmatic EIS Issued in December 1976, the SPR Programmatic EIS addresses the generic impacts of storing 500 MMB of crude oil and petroleum products in both the East Coast and Gulf regions of the U.S. (in salt cavities, conventional mines, and above-ground tanks). This EIS will be supplemented in early 1979 to address a one billion barrel SPR.

Individual Site EISs Between December 1976 and March 1978, EISs addressing the use of existing storage space were issued for the following nine sites: Bryan Mound, Bayou Choctaw, Cote Blanche, Weeks Island, West Hackberry, Kleer, Ironton, Central Rock and Sulphur Mines.

Site EIS Supplements Between April 1977 and December 1977, four supplemental EISs were issued for the following five sites: Bryan Mound, West Hackberry, Bayou Choctaw, and Weeks Island/Cote Blanche (last two include St. James Terminal). These documents address major design modifications.

Site Group EISs Between June 1978 and November 1978, three group EISs were issued for the following 14 sites: Seaway Group --Bryan Mound Expansion, Allen, Damon Mound, West Columbia and Nash; Texoma Group--West Hackberry Expansion, Black Bayou, Vinton and Big Hill; Capline Group--Bayou Choctaw Expansion, Weeks Island Expansion, Napoleonville, Chacahoula and Iberia. These documents address creation of new storage capacity for all 14 sites.

SPCC Plans Spill Prevention Control and Countermeasure plans have been prepared for all three operating storage sites (Bryan Mound, Bayou Choctaw and West Hackberry).

PERMITS To implement the SPR, DOE must obtain a number of permits required by Federal, state, and local laws. Major Federal permits include those issued by the Corps and the EPA. Corps permits regulate dredge and fill operations in navigable water bodies and wetlands under Section 10 of the Rivers and Harbors Act, and Section 404 of the Clean Water Act. EPA permits regulate discharge of substances into surface water bodies under Section 402 of the Clean Water Act. Principal state permits include those issued by the Texas Railroad Commission and the Louisiana Department of Conservation to regulate underground storage of petroleum, and those issued by the Texas Air Control Board and the Louisiana Air Control Commission to regulate air emissions under the Clean Air Act. Interested Federal, state and local agencies are invited to review and comment on all permit requests. As of the end of 1978, four EPA, 14 Corps and eight state permits were issued for SPR facilities.

Corps Fourteen Corps permits have been obtained: Bryan Mound-5; Bayou Choctaw-4; West Hackberry-2; Weeks Island-1; Sulphur Mines-1; St. James Terminal-1. Requests for two additional Corps permits were still pending at the end of 1978.

EPA Four EPA permits have been obtained: Bryan Mound-1; Bayou Choctaw-2; West Hackberry-1. Requests for two additional EPA permits were still pending at the end of 1978.

State Eight state permits have been obtained: Bryan Mound-2; Bayou Choctaw-1; West Hackberry-2; Sulphur Mines-2; and St. James Terminal-1. Requests for four additional state permits were still pending at the end of 1978.

CRUDE OIL LOGISTICS

CRUDE OIL PROCUREMENT

Crude oil requirements are provided by the DOE to the Department of Defense's Defense Fuel Supply Center (DFSC), which under an interagency agreement procures crude oil for the SPR. DFSC solicits offers on a competitive basis and awards contracts based on the lowest overall cost to the Government. During 1978, DFSC awarded 26 contracts which, in conjunction with seven previously awarded contracts, covered a net quantity of 103 MMB of crude oil procured for the SPR. The following table shows the crude oil procured through 1978 by type and country of origin:

Source Country	Net Contract Quantity (MMB)	Percent of Total	Crude Oil Type (MMB)	
			High Sulphur Content (Sour)	Low Sulphur Content (Sweet)
Mexico	34.4	33.4	34.4	--
North Sea (United Kingdom)	24.5	24.0	--	24.5
Libya	20.4	19.8	--	20.4
Iran	18.4	17.8	18.4	--
Saudi Arabia	3.7	3.2	3.7	--
Venezuela	1.0	1.0	1.0	--
Ecuador	.3	.5	.3	--
Algeria	.2	.3	.2	--
TOTALS	102.9	100%	58.0 (56%)	44.9 (44%)

OCEAN TRANSPOR- TATION

DFSC awards crude oil contracts for delivery of oil to the Government primarily on either an FOB origin or FOB destination basis. For the latter type of contract, the oil supplier is responsible for arranging ocean transportation to deliver the crude oil. The U. S. Government has this responsibility under FOB origin contracts. Through an interagency agreement, the Military Sealift Command (MSC) arranges most ocean transportation for FOB origin crude oil movements. During 1978, MSC-chartered tankers delivered approximately 41 MMB of crude oil to the U.S. Gulf. Another 13 MMB was delivered under FOB destination contracts. The remaining 6 MMB of oil shipped to the SPR was delivered under a transportation contract arranged directly with DOE.

The following shows the crude oil actually delivered during 1978, by country of origin and type.

Source Country	1978 Contract Deliveries (MMB)	Percent of Total	Crude Oil Type (MMB)	
			High Sulphur Content (Sour)	Low Sulphur Content (Sweet)
North Sea (United Kingdom)	18.0	30.0	--	18.0
Mexico	15.9	26.5	15.9	--
Iran	15.9	26.4	15.9	--
Libya	8.8	14.6	--	8.8
Saudi Arabia	1.0	1.7	1.0	--
Venezuela	.3	.5	.3	--
Algeria	.2	.3	.2	--
TOTALS	60.1	100%	33.3 (55%)	26.8 (45%)

**TANKER
SCHEDULING**

The SPR Office manages and directs tanker movements to the U.S. Gulf. This responsibility includes ordering cargoes and scheduling tankers to assure continuity of fill operations at the SPR storage sites. Tanker scheduling requires close attention to differences in voyage times from various points of origin such as the following:

<u>Voyage</u>	<u>Time</u>
Saudi Arabia and Iran to Caribbean	31 days
North Africa to Caribbean	14 days
North Sea to Caribbean	12 days
Caribbean to U.S. Gulf	4 days
Mexico to U.S. Gulf	2 days

**CRUDE OIL
MOVEMENTS**

The SPR uses three delivery patterns to supply crude oil to the U.S. Gulf. These delivery patterns are:

- o Source country to U.S. Gulf (direct shipment)
- o Source country to U.S. Gulf via transshipment terminal, and
- o Source country to U.S. Gulf via lightering (ship-to-ship transfer).

During 1978, 27 MMB of crude was transported via Very Large Crude Carriers (VLCCs) to transshipment terminals in the Caribbean. The crude oil was then outloaded into smaller "shuttle" tankers for delivery to the Gulf Coast terminals. The use of this delivery mode allowed the SPR to take advantage of the transportation economies involved with using VLCCs. Transshipment services were provided by Burmah Oil and Transatlantic Petroleum Corporation in the Bahamas and by Bonaire Petroleum Corporation and Curacao Oil Terminal in the Caribbean.

Cargo Preference In accordance with the Cargo Preference Act, the Government is required to transport at least 50% of the oil purchased for the SPR in U.S.-flag vessels. For calendar year 1978, U.S.-flag vessels carried approximately 54% of the crude oil destined for the SPR, calculated on a ton-mile basis.

Route	Percent U.S. Flag	Billions of Ton-Miles	
		U.S. Flag	Foreign Flag
United Kingdom to Caribbean ^{1/}	78%	8.0	2.2
Persian Gulf to Caribbean ^{1/}	38%	8.5	14.1
North Africa to U.S. Gulf	0%	0	1.1
North Africa to Caribbean ^{1/}	76%	4.0	1.3
Persian Gulf to U.S. Gulf (Lightering)	42%	1.1	1.5
Caribbean to U.S. Gulf ^{2/}	64%	5.5	3.1
TOTAL	54%	27.1	23.4

^{1/} Caribbean destinations are transshipment terminals.

^{2/} Caribbean to U.S. Gulf includes all cargoes from Mexico and Venezuela, as well as shuttles from transshipment terminals.

Customs All cargoes of crude oil for the SPR are subject to U.S. Customs regulations and the payment of customs duties. SPRO is responsible for compliance with the regulations, submission of all customs documentation and the verification of all invoices prior to the payment of duties. Presidential Proclamation 4543, December 27, 1977, exempted the SPR from the payment of import license fees normally collected in conjunction with customs duties. A bill to exempt the SPR from the payment of customs duties was introduced in Congress during the 1978 session, but expired without legislative action.

Quality Assurance The DFSC is responsible for performing quality control functions and preparing necessary documentation for crude oil until it reaches the Gulf Coast terminals. At that point, quality control responsibilities transfer to the cognizant Department of Defense, Defense Contract Administration Services Region (DCASR). DCASR representatives witness the Customs inspection and oversee the movement of the crude oil through the marine terminal to the delivery pipeline or barge which will transfer the crude oil to the storage site.

Demurrage When tankers and barges are delayed in loading or unloading, the charges for their time are, under certain circumstances, borne by DOE. In 1978, technical problems at DOE's storage sites affected the oil injection schedule. The subsequent delays caused a back-up in the logistics chain, and tankers had to wait to offload their SPR cargoes at U.S. terminals. DOE incurred approximately \$7 million of such demurrage charges through the end of 1978.

Oil Pipelines The final link in the SPR logistics chain is the oil pipeline from the terminals to the storage sites. Each operating site now has an operational crude oil delivery pipeline from its supporting marine terminal. However, for most of 1978, oil was delivered to two of the sites -- Bayou Choctaw and West Hackberry -- by barge while their pipelines were under construction. Crude oil is delivered to the terminal by tankers or barges. Oil for Bayou Choctaw was loaded onto barges at Mississippi River terminals and barged up the Mississippi to Allied Chemical Company docks at Bull Bay, one-half mile from the site. Oil for West Hackberry was loaded onto barges at the Sunoco terminal and barged up the Intracoastal Waterway, through a series of bayous and canals, to the Amoco docks, one and one-half miles from West Hackberry. Deliveries to the Bryan Mound site were made via the DOE 30-inch diameter, 3.6-mile pipeline from the Seaway terminal.

OIL
ACCOUNTING

Oil accounting and inventory systems and procedures have been developed and implemented. Crude oil movements are tracked and losses determined from origin countries to Caribbean transshipment terminals, to shuttle tankers, to U.S. Gulf Coast terminals and via barges and pipelines to salt domes. In-transit losses from origin to salt dome through all transportation modes averaged 0.84%. These figures, cumulative since July 1977, compare favorably to an oil industry range for similar type transfers.

DRAWDOWN

PERMANENT DRAWDOWN

Construction of SPR drawdown facilities has been scheduled on a lower priority basis than permanent fill facilities.

- o During 1978, continued emphasis was placed on accelerated fill to achieve near-term targets. Fill goals have been intentionally ambitious to maximize early protection from supply interruptions.
- o Drawdown capabilities have thus been phased to be operable on a priority basis after completion of facilities required for early oil storage. Drawdown plans, designs and construction to date have been based on this approach.

The SPR permanent drawdown facilities are scheduled to be in place by September 1979, with a drawdown rate of approximately 1.0 MMB/D increasing to 3.5 MMB/D in 1980 as follows:

PHASE I DRAWDOWN

SEPTEMBER 1979 CAPABILITY

<u>Site</u>	<u>Date</u>	<u>Drawdown Rate (MB/D)</u>	<u>Final Capacity (MMB)</u>
Bryan Mound	Aug 79	387	60
West Hackberry	Sep 79	402	51
Bayou Choctaw	Sep 79	<u>240</u>	<u>36</u>
		1,029	147

1980 CAPABILITY

<u>Site</u>	<u>Date</u>	<u>Drawdown Rate (MB/D)</u>	<u>Final Capacity (MMB)</u>
Bryan Mound	Aug 79	387	60
West Hackberry	Sep 79	402	51
Bayou Choctaw	Sep 79	240	36
Weeks Island	Mar 80	590	75
Sulphur Mines	Nov 79	100	22
Tanks and Pipelines		—	<u>4</u>
		1,719	248

PHASE II DRAWDOWN

<u>Site</u>	<u>Date</u>	<u>Drawdown Rate (MB/D)</u>	<u>Final Capacity (MMB)</u>
Bryan Mound	Jan 80	1,054	180
West Hackberry	Feb 80	1,400	211
Bayou Choctaw	May 80	480	36
Weeks Island	Mar 80	590 ^{1/}	75
Sulphur Mines	Nov 79	100	22
Tanks and Pipelines		<hr/>	<hr/>
		3,524	528

^{1/} Combined capacity of West Hackberry and Sulphur Mines is 1,400 MB/D.

While the facilities to draw down up to 3.5 MMB/D of oil will be in place by mid-1980, Phase II rates cannot be initially sustained due to the hydraulic limitations of the drawdown system of the existing storage caverns. As the Phase II expansion of storage at Bryan Mound and West Hackberry progresses between 1980 and 1986, the sustained drawdown rate that can be achieved will increase from 1.7 to 3.5 MMB/D.

EMERGENCY DRAWDOWN

Should events necessitate an emergency drawdown prior to installation of the permanent system, temporary emergency drawdown systems can be installed at the three existing storage sites which now contain oil. Emergency drawdown implementation requires:

- o Use of most readily available water sources;
- o Expedited processing or waiver of certain environmental actions and permits;
- o Award of contracts for procurement of construction, materials, pumps and services;
- o Industry cooperation--construction, terminals, services; and
- o Stopping of oil fill at storage sites during drawdown.

The cost of constructing emergency drawdown systems is estimated at \$3-5 million exclusive of site operations, services and oil terminalling.

Depending on the drawdown implementation factors cited above, the possible interim emergency drawdown schedule and corresponding drawdown rates are as follows:

<u>MB/D</u>	<u>Leadtime (Days)</u>
200	45-60
250	60

Drawdown capability can be in place within 45 days following approval of selected environmental waivers, permits and award of contracts for procurements of materials, equipment and services.

**WITHDRAWAL
ENGINEERING**

To assure the integrated SPR system drawdown rates can be sustained and current designs are optimized from a value engineering standpoint, the following tasks will be completed during 1979:

- o Promulgate system criteria document for 750 MMB system;
- o Validate systems capabilities for existing and expansion sites;
- o Conduct distribution and port studies;
- o Develop distribution parameters for integrating possible turnkey sites;
- o Assess and re-evaluate distribution parameters after turnkey site selections; and
- o Establish tracking and management system to monitor progress of completion of drawdown capability of existing and expansion sites.

**VULNERABILITY
IMPACT**

The progress achieved to date would permit the SPR to be of some assistance in mitigating the effects of a severe energy supply interruption, should a decision be made to draw down the Reserve on an emergency basis. During 1979, the SPR should become more valuable as a means of reducing U.S. vulnerability to interruptions in supplies of petroleum products.

SPR DISTRIBUTION PLAN

SCHEDULE The Office of Assistant Secretary for Policy and Evaluation, with assistance from the Economic Regulatory Administration, SPRO and other DOE offices is currently preparing a detailed plan for distribution of the SPR oil.

CONTENT The distribution plan will address:

- o How SPR oil will be sold;
- o The physical distribution capabilities of the SPR;
- o Organization and management of an emergency drawdown of the SPR; and
- o How the needs of regional and non-contiguous areas will be met.

MAJOR IMPLEMENTATION PROBLEMS

REDUCED SITE CAPACITIES	The usable cavern volume in the five initial sites has been reduced by 87 MMB from original estimates. The major portion of lost underground storage capacity is attributable to the Bayou Choctaw site where technical problems, such as the failure of existing caverns to hold pressure, resulted in the loss of 38 MMB of planned storage capacity. Another 20 MMB at Bayou Choctaw was not acquired in order to avoid the severe impacts on the area's chemical industry, which would have resulted from loss of storage for feedstock and hydrocarbon products. Remaining reductions resulted from the differences between capacity estimates and actual volumetric surveys conducted after the sites were acquired. The reductions attributable to such differences were 3 MMB at Bryan Mound, 10 MMB at West Hackberry, 14 MMB at Weeks Island, and 2 MMB at Sulphur Mines.
LAND ACQUISITION DELAYS	Real estate acquisition, particularly for pipeline rights-of-way, presented a significant problem in 1978. Because of the thousands of landowners involved, extended periods for negotiations were necessary. Government appraisal values were below prices paid by private industry, so the majority of tracts had to be acquired through eminent domain. Landowners opposed the Government's condemnation actions in the Federal District Courts. Transfer of possession of property was frequently delayed until after hearings, and in some cases possession was not granted until further negotiation had transpired.
WEEKS ISLAND JOINT UTILIZATION	In cooperating with the State of Louisiana and the Morton Salt Company for economic reasons, DOE absorbed a significant delay in its development schedule. To permit continuation of salt production operations, avoid a shutdown of the Morton Salt Company mining operation and unemployment of up to 300 mine workers at Weeks Island, an agreement was reached whereby Morton could continue operations while opening a new mine nearby. This agreement required development of alternative SPR mine conversion plans to permit joint utilization of the mine shafts. Mine conversion work could not be initiated immediately when the site was acquired in October 1977. The planned construction schedule has been delayed 11 months. Arrangements for joint utilization of shafts are working satisfactorily now, and oil injection is planned for September 1979.
DELAYS IN CONTRACT AWARDS	A number of procurement problems and delays have been encountered. A large portion of the sector of industry participating in SPR equipment and construction contracts was unfamiliar with the Government procurement process and the Federal Procurement Regulations. This has resulted in

a limited number of bids for some procurements, unresponsive bids, a need to readvertise some procurements, or extended negotiations with the firms responding. Early in 1978 the large number of procurement actions could not be handled on an expedited basis. Additional DOE staff and greater procurement responsibility by the SPR Construction Manager has improved the timeliness of contract awards.

CONSTRUCTION
DELAYS

Delays in construction have occurred due to unanticipated technical problems. At Bayou Choctaw construction was delayed due to problems with cavern certification. Also, an abandoned cavern at the site was determined to have no salt roof, which raised concern about the structural stability of the cavern and potential subsidence above the cavern. A detailed geotechnical study was necessary before designs could be completed and construction started. Strikes and injunctions have also contributed to construction delays. At Bryan Mound, a temporary restraining order, issued in response to a challenge to the Davis-Bacon wage rates, delayed award of construction contracts by seven weeks. Temporary restraining orders regarding right-of-way disputes were issued after construction started on the West Hackberry pipeline. Simultaneously, labor problems delayed construction progress at West Hackberry and St. James. Weather also delayed a number of jobs. Current schedules have been adjusted for the above events.

BRINE
DISPOSAL
LIMITATIONS

Problems associated with disposal of brine from the storage caverns into deep-injection wells have limited 1978 fill rates at the three existing sites which contain oil. Original feasibility studies conducted on brine disposal wells in the Gulf Coast estimated an average rate in excess of 30 MB/D for each well. Operating experience with these wells achieved 10 to 15 MB/D of brine disposal. Corrective actions of acidization and air lift cleaning of wells, dilution of brine, oxygen scavenging, and filtration are being applied to increase disposal rates.

The long-term solution to the brine problem is disposal into the Gulf of Mexico, but DOE efforts to accomplish this at Bryan Mound were delayed about 18 months by the environmental hearings and permitting process. The 14.6-mile brine disposal pipeline to the Gulf is under construction, and DOE is currently negotiating the elements of the monitoring plan with the EPA, environmentalists and fishermen to ensure safe operation of the pipeline.

WEST
HACKBERRY
FIRE

On September 21, 1978, a blowout occurred at cavern #6 at West Hackberry resulting in a major oil fire and spill, with the loss of one life and one serious injury. The fire burned for five days before being extinguished. Seventy-two thousand barrels of crude oil were released, of which fifty-two thousand barrels were recovered and reinjected

into cavern #9. Rapid deployment of oil containment booms by on-site personnel, and later assistance from the U.S. Coast Guard, resulted in containment and effective clean-up of oil spilled on Black Lake. Fire departments from nearby areas responded to the fire and rendered a valuable service in controlling and extinguishing the fire with a mostly volunteer force. The total economic impact of the incident with respect to property damage and costs incurred, is estimated to be \$15 million including oil loss, fire-fighting, equipment damage, cleanup and environmental assessment. The Under Secretary of DOE established an Accident Investigation Team, which reported on the accident in November 1978. Numerous corrective actions have been initiated regarding safety and operating procedures as a result of the Team's findings.

**TIME TO
DEVELOP
EXPANSION**

The schedules for developing new caverns at existing sites were originally based on limited feasibility studies. More detailed technical analysis conducted in 1978 identified additional variables affecting leaching schedules. Salt properties at the sites have shown a much higher insoluble content than anticipated. This requires leaching larger sumps prior to development of the storage caverns, a delay in oil fill of about six months. Also, more realistic times associated with startup and system operation and maintenance during the leaching process have been recognized. Oil fill rates have been revised to be consistent with the logistic constraints associated with oil transportation and terminalling. These technical factors have been incorporated into a detailed SPR Expansion Execution Plan for two sites.

**INCREASED
FACILITIES
DEVELOPMENT
COSTS**

During 1978, actual cost experience and DOE's analysis thereof, indicated that facilities cost would exceed the original 1976 estimate of \$766 million for 500 MMB of storage, or \$1.53 per barrel. Due to incomplete estimating in 1976, loss of low cost capacity, schedule acceleration, environmental protection actions, inflation and over \$250 million for infrastructure costs (pipelines, docks, and the St. James Marine Terminal), a \$705 million increase is estimated. In October, DOE requested from the Congress the authority to use \$450 million of petroleum funds to partially finance the facilities cost increase. The Congress deferred the request until 1979 which required DOE to reallocate available funds among various sites and curtail expansion plans at West Hackberry until funds became available.

**STAFF
EXPERIENCE**

Organizational and skilled level staffing within the PMO and with the SPR Construction Manager has required build-up and training. Management and performance control systems had to be improved or established.

**SYSTEMS
ENGINEERING
AND
MANAGEMENT**

Systems engineering, integration, management and network analysis and controls provided for in the SPR program need improvement and intensification. With the completion of the detailed designs for Phase I and Phase II sites, emphasis has been redirected to improve systems engineering and management.

MAJOR ACCOMPLISHMENTS

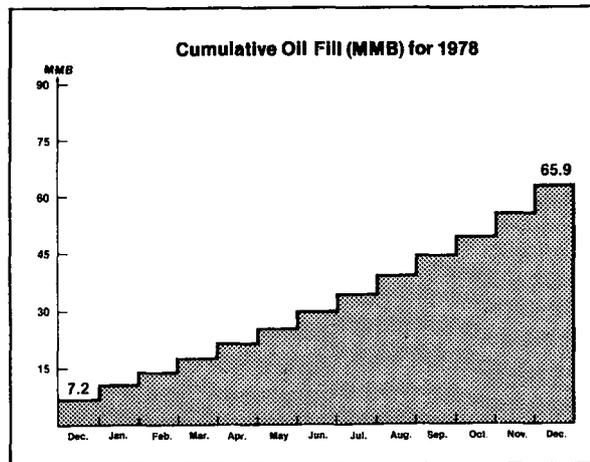
**OIL
INVENTORY**

A total of 68.5 MMB of crude oil was under Government control at the end of 1978. End of year cavern inventories at the three operating sites are shown below.

<u>SPR Site</u>	<u>Cavern #</u>	<u>Crude Oil Quantity (MMB)</u>			<u>Cavern Capacity</u>
		<u>Sour</u>	<u>Sweet</u>	<u>Site Total</u>	
Bryan Mound					
	1		5.4	5.4	6.5
	2		5.6	5.6	5.8
	4		3.8	3.8	16.1
	5		<u>12.5</u>	<u>12.5</u>	<u>31.9</u>
			27.3	27.3	60.3
West Hackberry					
	6	6.9		6.9	12.1
	7		2.8	2.8	12.0
	8	2.0		2.0	9.9
	9	2.3		2.3	8.5
	11	6.5		6.5	8.1
		<u>17.7</u>	<u>2.8</u>	<u>20.5</u>	<u>50.6</u>
Bayou Choctaw					
	15	11.4		11.4	15.7
	18	2.5		2.5	8.1
	19	4.2		4.2	7.1
	20	--		5.1	
		<u>18.1</u>	<u>---</u>	<u>18.1</u>	<u>36.0</u>
Subtotal		35.8	30.1	65.9	146.9
Tanks and Pipelines		<u>1.2</u>	<u>1.4</u>	<u>2.6</u>	
TOTAL		<u>37.0</u>	<u>31.5</u>	<u>68.5</u>	

1978 FILL

A total 58.7 MMB of crude oil was placed in underground storage in 1978 compared to only 7.2 MMB in 1977 as shown on the following page. In December 1978, 9.8 MMB of oil was stored, the largest quantity stored in a single month. The largest quantity of oil stored in a single day was December 18, 1978 when 477 MB was injected into underground caverns. During 1979, SPR facilities will have a capability of storing an average of 10.5 MMB per month.



LAND ACQUISITION

Land and pipeline rights-of-way for the DOE marine terminal at St. James, Louisiana were obtained in 1978. In addition, over 150 miles of pipeline rights-of-way were acquired which involved over 2500 individual tracts of land.

ENVIRONMENTAL PLANS AND PERMITS

In 1978, DOE published four final environmental impact statements (EISs) for SPR sites. Spill Prevention Control and Countermeasure plans were prepared for the three operating SPR sites as required by the the Clean Water Act. During 1978, four Environmental Protection Agency, ten Corps of Engineers and six Louisiana and Texas permits were issued for SPR facilities. Additionally, detailed oceanographic baseline data collection and computer simulation analyses were conducted in cooperation with the National Oceanic and Atmospheric Administration (NOAA) to assess the effects of brine disposal in the Gulf of Mexico.

SYSTEMS DESIGN

Detailed designs were completed for five storage sites with storage capacity of 248 MMB and the St. James Terminal. Designs were also completed for a 280 MMB expansion of two sites.

Site	Existing Capacity (MMB)	Expansion Capacity (MMB)	Total
Bryan Mound	60	120	180
West Hackberry	51	160	211
Bayou Choctaw	36		36
Weeks Island	75		75
Sulphur Mines	22		22
Tanks and Pipelines	4		4
TOTAL	248	280	528

**SITE
CONSTRUCTION**

Major construction efforts were underway at four SPR storage sites and the St. James Terminal during 1978. Costs for facilities and equipment in-place amounted to \$506 million. Sixty-six construction contracts valued at \$224 million were awarded.

DRILLING

In 1978, 12 wells were drilled into storage caverns at three sites in order to achieve oil fill and withdrawal. Another 24 wells for brine disposal were drilled into deep underground sands on the perimeter of four sites. At the end of 1978, drilling for eight additional cavern wells and one brine disposal well was in progress. Three of the cavern wells will be used in Phase II of the Program.

**PIPELINE
CONSTRUCTION**

Over 104 miles of 42- and 36-inch diameter crude oil pipelines were installed in 1978. Oil pipeline connections were completed from West Hackberry to Nederland, Texas (41.5 miles) and Bayou Choctaw to St. James, Louisiana (39 miles). Additionally, 8.2 miles of 36-inch brine disposal pipeline were laid, 6.2 miles of which were in the Gulf of Mexico.

**OIL
LOGISTICS**

For 1978, 224 tankers were unloaded at four marine terminals in the Gulf Coast. On a ton-mile basis, U.S.-flag tankers carried 54% of the crude oil destined for the SPR, in accordance with the 50% minimum required by the Cargo Preference Act.

**PROGRAM
MANAGEMENT**

In May 1978, a DOE Project Management Office with procurement authority was established in New Orleans, Louisiana, as part of the SPR Office, in order to improve management control of contracts and site activities. This office is directly responsible for all site engineering and development efforts and the day-to-day operations and maintenance of sites. The Project Management Office maintains centralized technical and managerial control over the contractors building the SPR.

Throughout 1978, DOE management control over the program was increased by means of:

- o Extensive review and control of prime contractors' procurement systems including policies, procedures, resources and accountability;
- o Intensified management of DOE contractors. Active contracts were reduced from about 220 to 90 by end of 1978;
- o The SPR Construction Manager, Parsons-Gilbane, assumed an integration role through DOE assigned management and procurement efforts in the areas of construction and equipment and material acquisition;
- o Establishment of critical path management and network controls and analyses over all construction and operations efforts including technical, cost and milestones;
- o Review and approval of all cost and schedule changes by a Configuration Control Board within the SPR Office; and
- o An SPR operations and maintenance contractor, Dravo Utility Constructors, Inc. (DUCI), was selected to manage all site activities.

**TECHNICAL
EVALUATIONS**

In 1978, technical assessments were made to evaluate SPR capabilities, deficiencies and requirements. Specific areas being corrected and improved include quality controls, safety, security, environmental compliance, contingency plans and capabilities, integrated logistics management, failure mode analyses, brine disposal, drilling management, depressurization operations, leach/fill processes, drawdown engineering, operability and reliability, and design trade-offs for SPR systems effectiveness and economy.

Additionally, DOE is negotiating an agreement with the U.S. Army Corps of Engineers for the Corps to provide long-term technical support for system engineering.

**PROGRAM
MATURITY**

During 1978, the SPR Program progressed from the planning stage to a heavy construction and implementation effort. This involved the transition from initial feasibility and rough cost estimates to actual site experience and the awarding of construction and equipment contracts. The result of this process is a set of attainable goals with realistic funding requirements.

**SYSTEMS
MANAGEMENT**

As part of its efforts to improve SPR integration and control, DOE instituted systems management over the Program in 1978. Technical and engineering aspects of the SPR system are being analyzed and designed under a network approach to achieve maximum system effectiveness.

CORPS OF
ENGINEERS

In late 1978, DOE initiated negotiations with the U.S. Army Corps of Engineers for an interagency agreement whereby the Corps would provide engineering, systems and construction support to the SPR Program Management Office. Negotiations were still underway in early 1979; however, the Corps was assisting DOE in the evaluation of turnkey proposals.

SANDIA LABS

The Department initiated an SPR systems analysis study in December 1978. The study, being conducted by Sandia Laboratories of Albuquerque, New Mexico, will:

- o Assess the geotechnical and engineering assumptions and criteria under which the SPR is being developed;
- o Identify potential technical problems and recommend corrective actions;
- o Assess capabilities of the currently proposed SPR system; and
- o Provide recommendations on systems engineering management.

SPRO
ORGANIZATION

With the creation of the Project Management Office in mid-1978, the SPRO staff has become an integrated and streamlined organization with clearly assigned functions, responsibilities and authorities.

The Program Office performs all headquarters functions including:

- o Establishment of program objectives and policies; management procedures, systems and site parameters, criteria and resources;
- o Assurance of environmental, technical and managerial compliance; and
- o Preparation of program documentation including the annual budget request.

The PMO, as a field office, provides centralized managerial control over contractors involved in SPR site development (including design, engineering, geotechnical analysis, construction and operations). Contractor compliance with technical, cost, schedule and procedural requirements is continually monitored to assure SPR effectiveness and operability.

At the end of 1978, the SPR Office was authorized a total of 206 people, divided as follows:

Program Office (Washington, DC)	56
Project Management Office (New Orleans, La.)	150

**STAFF
EXPERTISE**

During 1978, the level of staff expertise, in both SPRO and its major contractors, improved significantly. Construction and operating activities at SPR sites have made personnel aware of the work, systems, controls and management necessary to safely and effectively develop the SPR. On-the-job training requirements have been greatly reduced and personnel productivity and progress have steadily improved.

**FACILITY
COSTS
ESTIMATES**

By the end of 1978, facility cost estimates for all Phase I and II sites had been revised based on costs to date, contract awards, and detailed site designs. Unlike earlier estimates, these costs are based on actual experience and detailed plans and therefore represent a better estimate of the ultimate facility costs of SPR sites.

**SITE
DEVELOPMENT
SCHEDULE**

During 1978, detailed facility development schedules were established for each Phase I and II site. These plans incorporate over a year's worth of construction and operating experience at three SPR sites. They are, therefore, realistic and achievable when coupled with established management controls.

**SPR SYSTEM
DEVELOPMENT
PROGRAM**

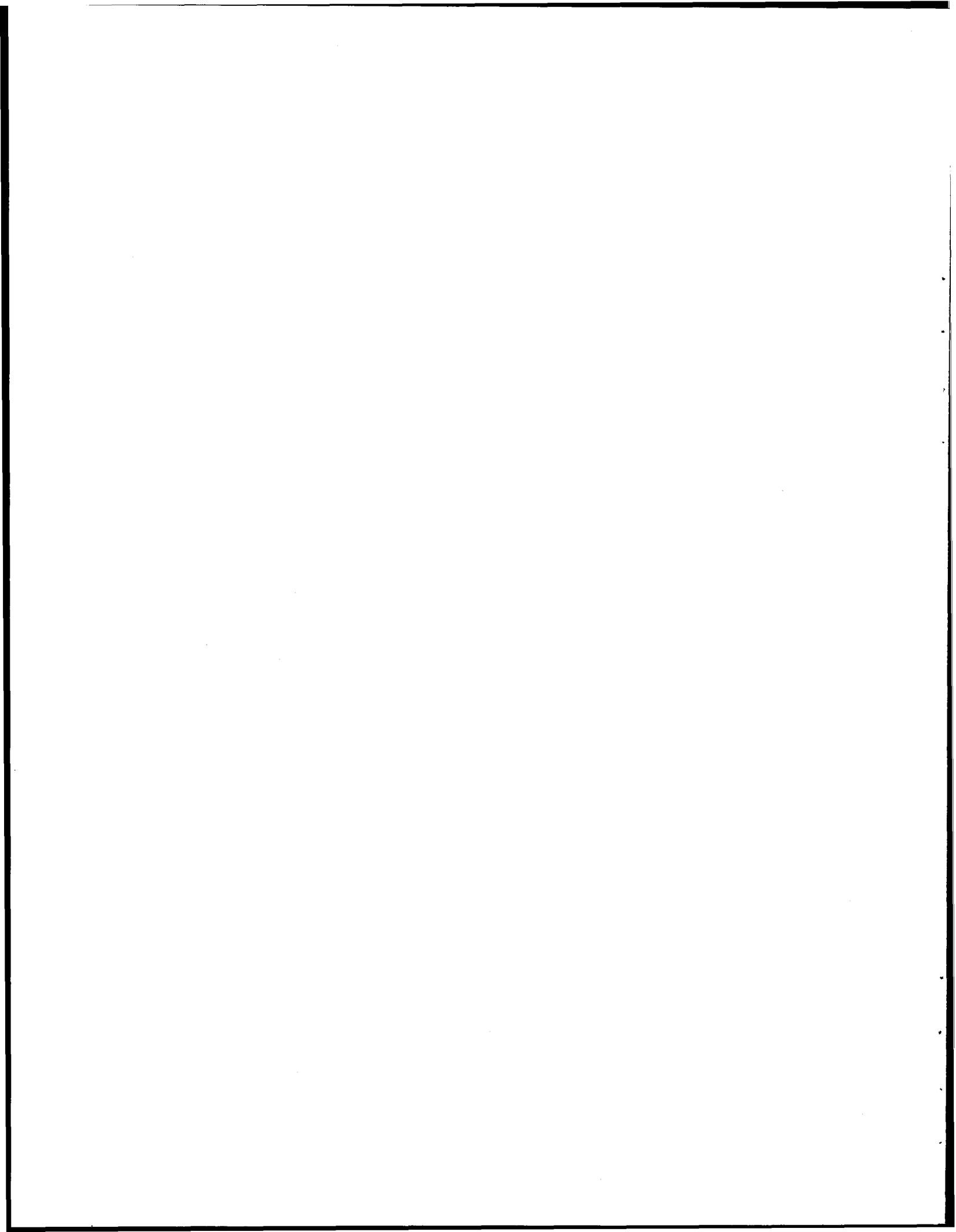
By the end of 1978, the SPR Program had been structured into three distinct development phases. In doing so, DOE improved the visibility and understanding of its development efforts by all segments of U.S. industry wishing to participate in the program. More importantly, DOE created a plan by which an orderly process of site selection decisions could be made based on measurable, cost effective factors.

SPR BASELINE

"Stewardship Report" #1 (Managerial) and #2 (Technical and Engineering) by the Deputy Under Secretary for the SPR in conjunction with the Project Manager describe the foundation to the current SPR Baseline of system development. The SPR system is now capable of averaging approximately 10.5 MMB per month of crude oil fill. This is consistent with the baseline of 244 MMB in storage and 4 MMB in tanks and pipelines by June 1980 (248 MMB). Permanent drawdown capability for the current three sites having oil storage is projected for the September 1979 timeframe. Should National exigencies require emergency drawdown, 200 MB/D oil drawdown within 45 days can be achieved after receipt of environmental and permit waivers and award of contracts.

Current oil market conditions affect SPR oil deliveries under contract and projected procurements. This situation now paces and may revise the oil fill schedules. To date, no actions are underway to divert current deliveries or defer actions to procure.

SPR performance and progress are specifically measurable from this managerial, technical and engineering baseline in achieving this urgent National Program.



APPENDIX - STATUS OF EACH SITE COMPLEX

BRYAN MOUND

WEST HACKBERRY

BAYOU CHOCTAW

SULPHUR MINES

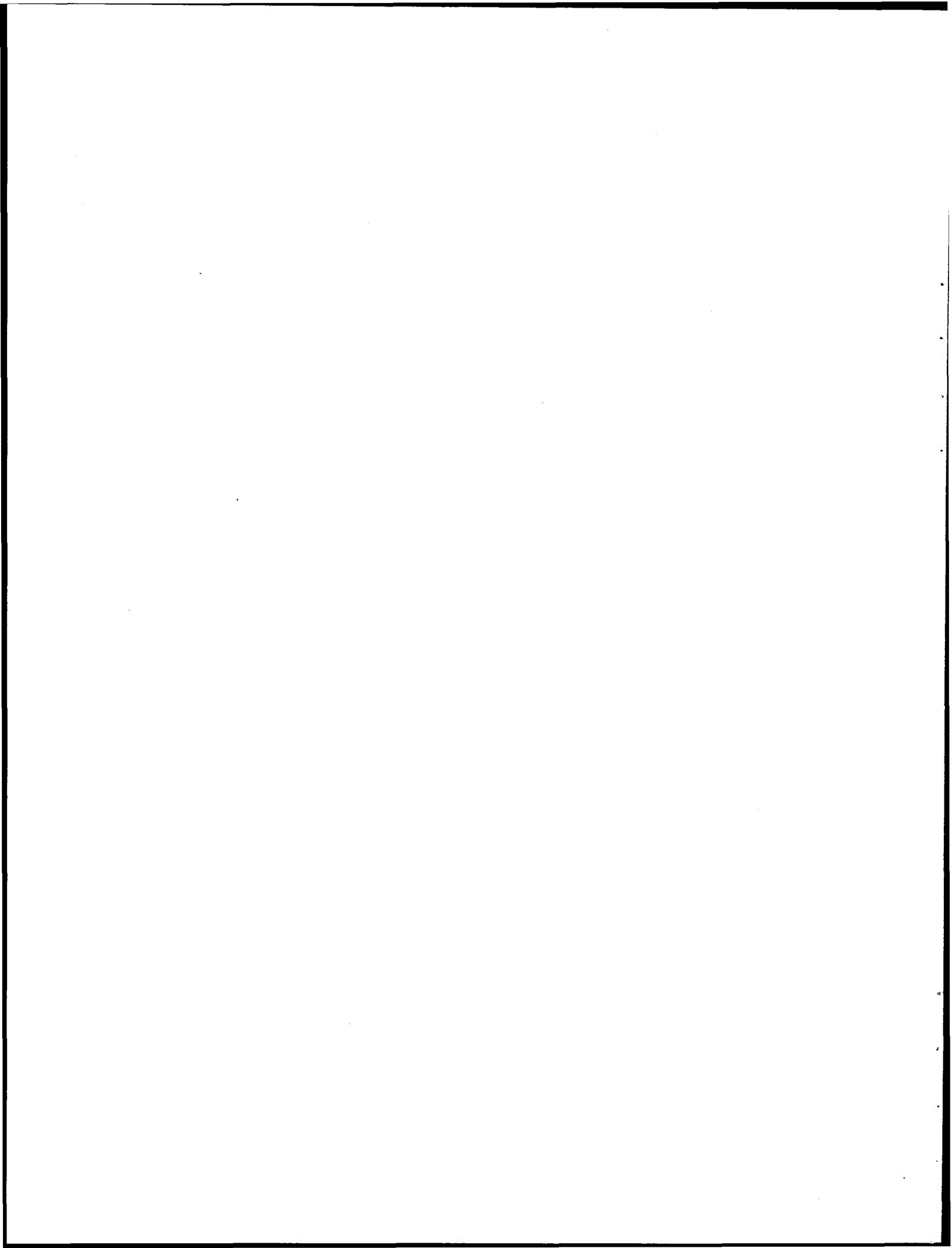
WEEKS ISLAND

ST. JAMES MARINE TERMINAL

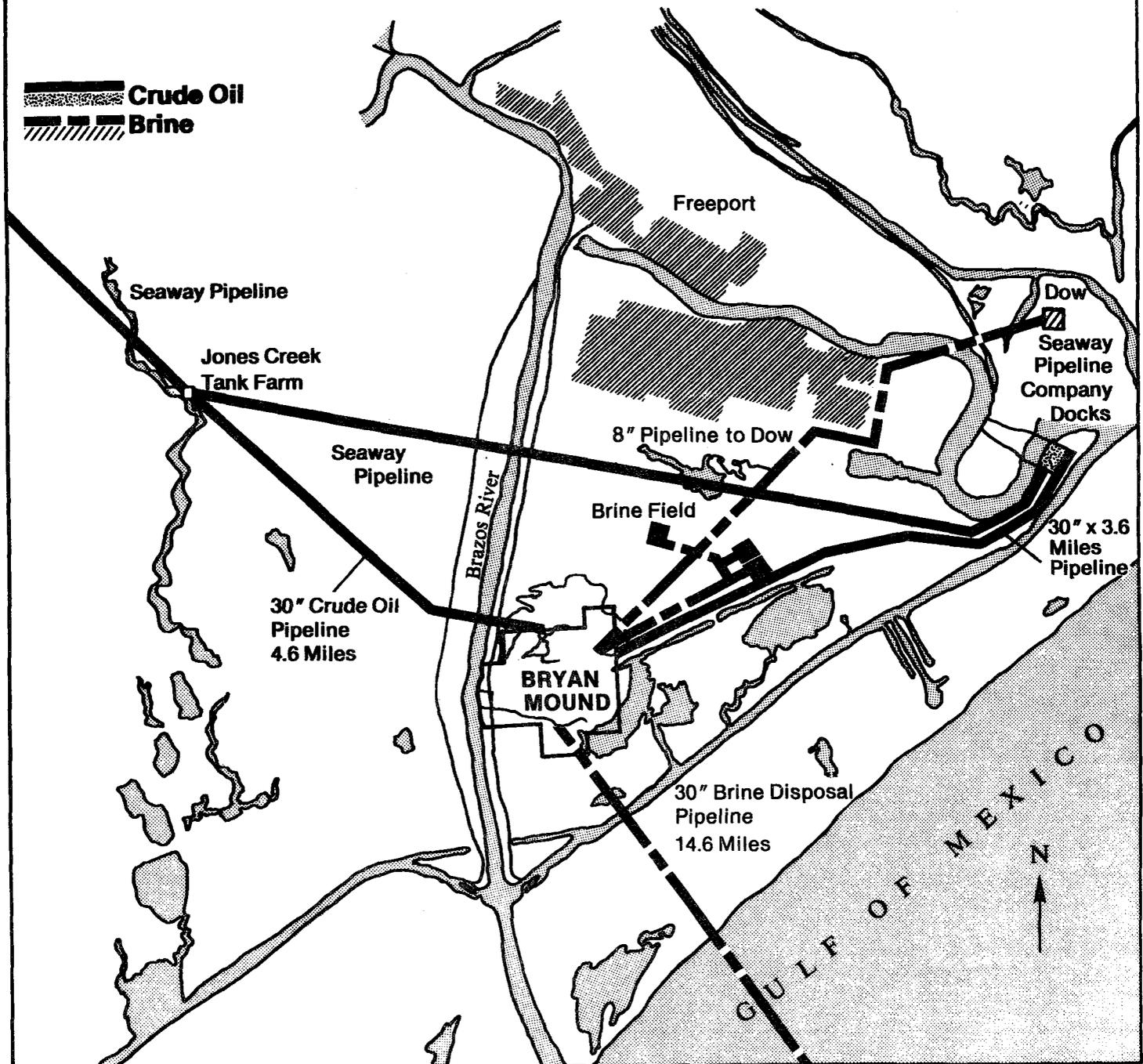
IRONTON

COTE BLANCHE

NAPOLEONVILLE



BRYAN MOUND



BRYAN MOUND • Phase I - Existing

Location

- o Brazoria County, Texas, three miles southwest of Freeport, Texas

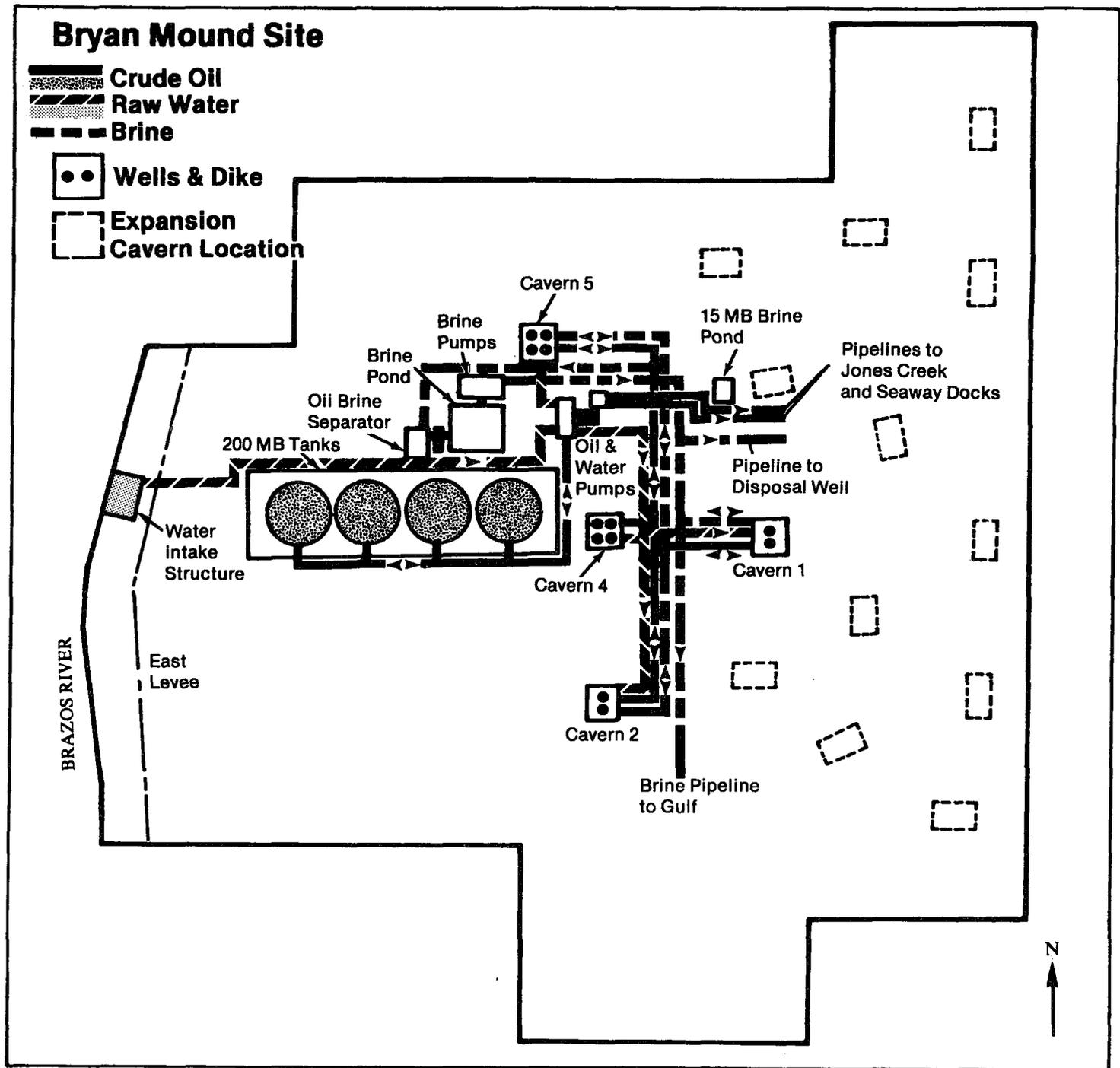
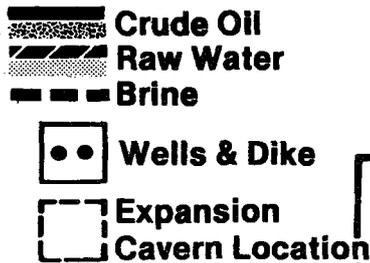
Acquisition

- o Acquired 500-acre site by condemnation April 1977 from Freeport Mineral Company and other owners. Dow Chemical Company was previous operator.

Environmental/Permits

- o Environmental Impact Statement published January 1977; supplement published December 1977.
- o Five major federal and state permits related to pipelines, water intake, and storage acquired in 1977 and 1978.

Bryan Mound Site



BRYAN MOUND - PHASE I

Cavern No.	Amount Stored ^{2/} 12/78 (MMB)	Storage Capacity (MMB)	Number of Wells	Depth to Casing Seat	Salt above Cavern	Date of ^{1/} Certification
1	5.4	6.5	2	2181'	1209'	1/10/78
2	5.6	5.8	2	1451'	315'	9/23/77
4	3.8	16.1	4	1918'	1419'	11/7/77
5	12.5	31.9	4	1917'	994'	12/16/77
Total	27.3	60.3	12			

^{1/} Certification of cavern for storage by Gulf Interstate Engineering Co.
^{2/} Sweet, or low sulphur content, crude oil

Site Description

- o 60.3 MMB storage facility consisting of four existing caverns:
 - 60.3 MMB sweet crude will be stored in existing caverns.
 - Oil, brine, and raw water piping distribution system connecting caverns with central plant, water intake structure and disposal wells, consists of over 25,000 feet of piping and 17 pumps totalling over 21,000 horsepower.
 - Four 200 MB oil storage tanks.
 - Six deep-injection brine disposal wells two miles off-site. Pipeline for brine supply to Dow Chemical.
 - 15,000 and 100,000-barrel brine pits, oil-brine separator, maintenance and control center buildings, roads, well pads, and dikes.
 - Water intake structure on the Brazos River, one-half mile off-site connected by a 36-inch diameter pipeline.

System Parameters

- o Fill via 30-inch diameter, 3.6-mile pipeline to Seaway Docks;
 - Designed oil injection rate - 240 MB/D.
 - Sustained system rate - 130 MB/D.
- o Raw water design pumping rate 387 MB/D.
- o Brine disposal - 130 MB/D total projected disposal rate.

Drawdown

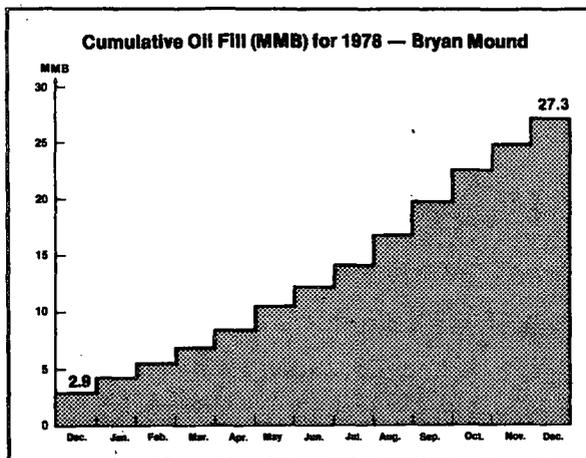
- o Drawdown via 30-inch diameter pipelines, 3.6 miles to Seaway docks and 4.6 miles to Seaway pipeline.
 - 387 MB/D capability - ready August 1979.

BRYAN MOUND PHASE I
(thousands of dollars)

Cost Element	Cumulative Cost through 12/78	Cost 1/79 to Completion	Total Estimate at Completion
Site Acquisition	\$12,782.	\$1,418.	\$14,200.
Design	5,523.	-----	5,523.
Facility Construction	32,304.	22,373.	54,677.
Well Construction	13,788.	1,712.	15,500.
Pipelines	5,000.	-----	5,000.
Contractor Management	4,914.	2,986.	7,900.
O&M through fill	4,596.	12,204.	16,800.
Total	\$78,907.	\$40,693.	\$119,600.

Schedule of Events

- o Oil fill initiated via interim system October 1977 at approximate rate of 55 MB/D.
- o Construction of permanent facilities commenced January 1978.
- o Deep-injection brine disposal system completed August 1978; fill capability increased to 110 MB/D.
- o Construction of permanent facilities to be completed June 1979.
- o Drawdown system to be completed August 1979.
- o Fill of existing caverns to be completed September 1979.



Major Accomplishments

- o Over 20 construction contracts awarded. Construction of Phase I facilities at Bryan Mound 53% completed.
- o Completion of deep injection brine disposal system including a 100 MB brine settling pond, ancillary pumps, motors and pipelines; and six brine disposal wells approximately 6,000 feet deep.
- o Erection of four 200 MB tanks; testing completed on two.
- o Completion of 5 cavern re-entry wells.
- o Injection of 24.2 MMB of oil into the existing caverns, bringing total inventory to 27.3 MMB, filling caverns to 45% of capacity.

BRYAN MOUND EXPANSION

Phase II - Expansion

Location

- o On existing site.

Acquisition

- o Property acquired in Phase I.

Environmental/Permits

- o Environmental Impact Statement published June 1978.
- o EPA permit to discharge brine into Gulf of Mexico applied for April 1977, acquired September 1978. Permit requires development and implementation of plan to monitor environmental impact. Corps of Engineers permit for brine line construction approved October 1978.
- o State of Texas permit to store oil acquired in 1978.
- o State air quality permit pending, applied for December 1978.

Site Description

- o 120 MMB of new leached storage capacity consisting of 12 caverns to be created in stages of 5 and 7 caverns.
 - 120 MMB of sour crude to be stored in expansion caverns.
 - 36-inch diameter, 14.6-mile brine disposal pipeline (13 miles offshore) to Gulf of Mexico.
 - Oil, brine and raw water piping distribution system connecting caverns with central plant, water intake and brine pipeline; additional pumps for leaching and brine disposal. Consists of over 32,000 feet of piping and 16 pumps totalling approximately 17,000 horsepower.
 - 36 cavern wells to approximate depth of 4000 feet.

System Parameters

- o Fill via 30-inch diameter, 3.6-mile pipeline to Seaway docks.
 - Projected sustained rate of fill - 75 MB/D.
- o Raw water design pumping rate - 1054 MB/D.

- o Brine disposal - 680 MB/D total projected disposal rate.

Drawdown

- o Drawdown via 30-inch diameter pipelines; 3.6 miles to Seaway docks and 4.6 miles to Seaway pipeline.
- 1054 MB/D capability - ready January 1980.

Schedule of Events

- o Brine disposal pipeline construction started October 1978.
- o Drilling of expansion cavern wells started December 1978.
- o Construction of on-site facilities to commence April 1979.
- o Leaching of caverns to commence September 1979.
- o Withdrawal system to be completed by January 1980.
- o Cavern oil fill to commence January 1981.
- o Fill of expansion caverns to be completed December 1985.

Major Accomplishments

- o Design of Phase II facilities completed; value engineering design revisions initiated.
- o Bids solicited for long-lead equipment; contract awarded for casing, line pipe and well heads.
- o EPA permit for discharge of brine into the Gulf approved.
- o Brine disposal pipeline to Gulf 60% complete.
- o Construction of initial well pads completed; drilling of wells for first three caverns started.

BRYAN MOUND PHASE II
(thousand of dollars)

Cost Element	Cumulative Cost through 12/78	CY 1979	CY '80 to completion	Total Estimate at Completion
Site Acquisition	\$ 0	\$ 100.	0	\$ 100.
Design	1,631.	1,769.	0	3,400.
Facility Construction	0	74,500.	0	74,500.
Well Construction	4,316.	58,084.	0	62,400.
Brine Pipelines	11,952.	22,348.	0	34,300.
Leaching Construction	0	1,575.	46,125.	47,700.
Management	373.	13,627.	0	14,000.
Site Maintenance	0	2,150.	39,750.	41,900.
Total	\$18,272.	\$174,153.	\$85,875.	\$278,300.

Major Contractors And Subcontractors

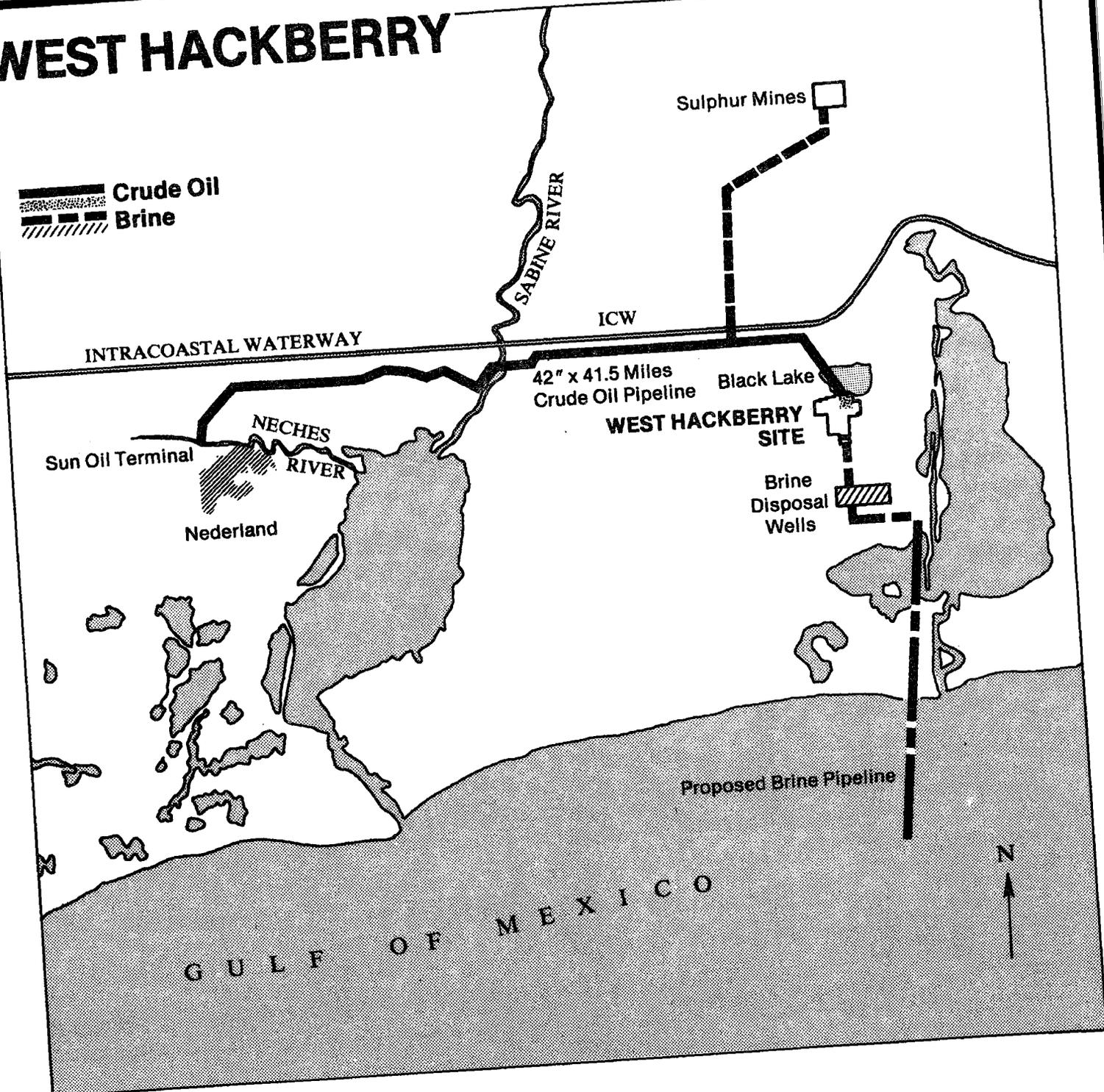
	Activity	Firm	City/State
MANAGEMENT	Construction Mgt. & Site Operations & Maint.	Parsons-Gilbane	New Orleans, La.
	Drilling Supervision	Louis Records & Assoc.	Lafayette, La.
DESIGN	Conceptual Site	Gulf Interstate (GIEC)	Houston Tx.
	Oil Pipeline	Parsons, Brinckerhoff/KBB	New York, N.Y.
	Brine Pipeline	Gulf Interstate (GIEC)	Houston, Tx.
		Ford, Bacon & Davis	Monroe, La.
EQUIPMENT AND MATERIAL	36-inch pipe	Kaiser Steel Co.	Houston, Tx.
	Pipe Coating	H.C. Price Co.	Bartlesville, Ok.
	Pumps	Peabody Floway Inc.	Fresno, Ca.
	Pumps	Dyna-Quip Co.	Houston, Tx.
	Pumps	Bingham-Willamette Co.	New Orleans, La.
	Well Casing	Superior Iron Works	Houston, Tx.
	Well Casing	Bethlehem Steel	Tulsa, Ok.
	Well Casing	Mid Continent Supply	Fort Worth, Tx.
	Well Casing	Smith Pipe & Supply	New Orleans, La.
	Well Casing	Redman Supply	Tulsa, Ok.
	Valves	Custom Controls Co.	Bellaire, Tx.
	Valves	M & J Valve Co.	Houston, Tx.
	Pipe	Armco Steel Corp.	Houston, Tx.
	Wellhead	Seaboard Wellhead	Houston, Tx.
	Electrical Tanks	Midco Control Systems	Houston, Tx.
	Brown Minneapolis Tank	Minneapolis, Mn.	
CONSTRUCTION	Water Intake Structure	Farrel Construction	Memphis, Tn.
	36-inch brine pipe	R.B. Potaschinck	Girardeau, Mo.
	20-inch brine pipe	Gregory & Cook	Houston, Tx.
	30-inch oil pipeline	Gregory & Cook	Houston, Tx.
	Earthwork	S&M Construction	Houston, Tx.
	Electrical Tanks	Fraudman/Beacon & Meldrum	Houston, Tx.
	Site piping	S&B Construction	Houston, Tx.
	Metering	Daniel Systems	Houston, Tx.
DRILLING	Re-entry and Brine Disposal Wells	Cactus Drilling Co.	Richardson, Tx.
		Progress Drilling, Inc.	Houston, Tx.
OIL TRANSPORTATION SERVICES	Tanker Terminal	Seaway Terminal	Freeport, Tx.

WEST HACKBERRY



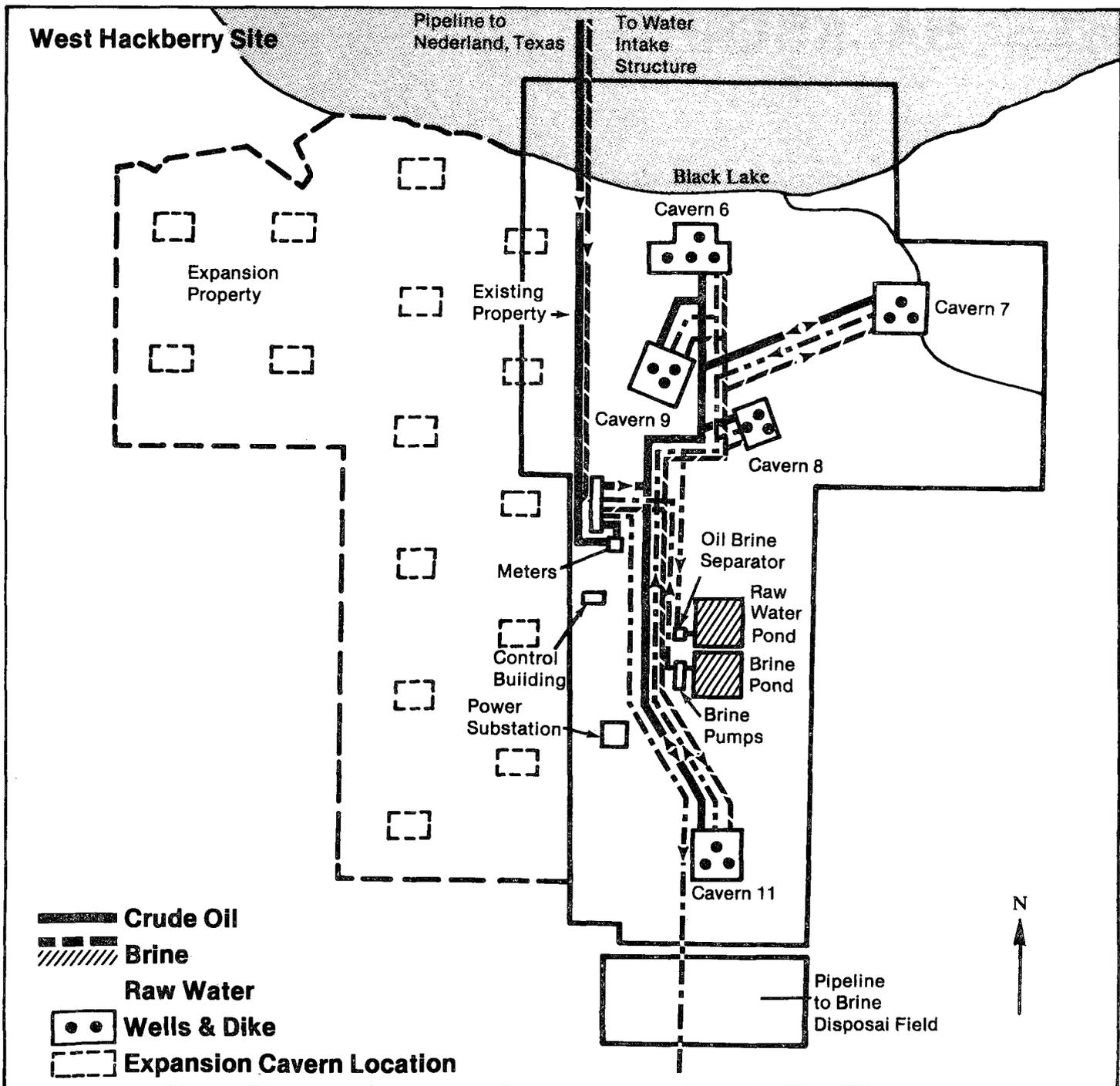
 Crude Oil

 Brine



WEST HACKBERRY • Phase I - Existing

- Location**
- o Cameron Parish, Louisiana, 12 miles southwest of Lake Charles, Louisiana.
- Acquisition**
- o Acquired 290-acre site by condemnation in April 1977, from numerous landowners including the Lowery, Ellender, and Hamilton families. Olin Corporation was the previous site operator.
- Environmental/Permits**
- o Environmental Impact Statement published January 1977; Supplement published April 1977.



WEST HACKBERRY - PHASE I

Cavern No.	Amount Stored 12/78 (MMB)	Storage Capacity (MMB)	Number of Wells	Depth to Casing Seat	Salt above Cavern	Date of Certification ^{1/}
6	6.9 ^{2/}	12.1	4	2632'	1268'	11/8/77
7	2.8 ^{2/}	12.0	3	2400'	555'	11/8/77
8	2.0	9.9	3	2402'	438'	11/8/77
9	2.3	8.5	3	2402'	1065'	11/8/77
11	6.5	8.1	3	2808'	889'	11/8/77
Totals	20.5	50.6	16			

^{1/} Certification of cavern for storage by Gulf Interstate Engineering Co.
^{2/} Sweet, or low sulphur content, crude oil

- o Five major federal and state permits related to pipelines, drilling pads, and storage acquired in 1977 and 1978; water intake permit applied for August 1977.

Site Description

- o 50.6 MMB storage facility consisting of five existing caverns:
 - 12 MMB sweet crude and 38.6 MMB sour crude to be stored in existing caverns.
 - Oil, brine, raw water piping distribution system connecting caverns with central plant, water intake structure and disposal wells. Consists of over 60,000 feet of piping and 12 pumps totalling over 17,000 horsepower.
 - Ten deep-injection brine disposal wells two miles off-site.
 - 175 MB brine pit, oil-brine separator, control center and maintenance buildings, roads, well pads, and dikes.
 - Water intake structure on Intracoastal Waterway, 42-inch diameter 4.5 mile pipeline connecting to site.

System Parameters

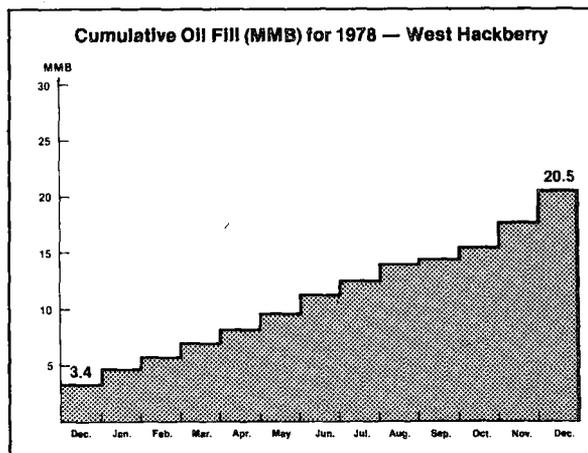
- o Fill via 42-inch diameter, 41.5-mile pipeline to Sunoco Terminal, Nederland, Texas.
 - Design oil injection rate - 175 MB/D.
 - Sustained system rate - 130 MB/D.
- o Raw water design pumping rate - 423 MB/D.
- o Brine disposal - 130 MB/D total projected disposal rate.

WEST HACKBERRY PHASE I
(thousands of dollars)

Cost Element	Cumulative Cost through 12/78	Cost 1/79 to completion	Total Estimate at Completion
Site Acquisition	\$10,097.	\$30,003.	\$13,100.
Design	4,700.	900.	5,600.
Facility Construction	49,202.	23,398.	72,600.
Well Construction	23,080.	920.	24,000.
Pipelines	45,696.	3,404.	49,100.
Contractor Management	2,625.	13,775.	16,400.
O&M through Fill	9,280.	3,420.	12,700.
Total	\$144,680.	\$48,820.	\$193,500.

Schedule of Events

- o Oil fill initiated via interim system July 1977 at approximate rate of 40 MB/D.
- o Construction of permanent facilities commenced May 1978.
- o Oil fill via pipeline to Sunoco Terminal commenced October 1978; fill capability increased to 130 MB/D.
- o Permanent facilities to be completed June 1979.
- o Existing caverns to be filled August 1979.
- o Withdrawal system to be completed September 1979.



Drawdown

- o Drawdown via 42-inch diameter, 41.5 mile pipeline to Sunoco Terminal and Texoma pipeline, Nederland, Texas.
- 402 MB/D capability - ready September 1979.

Major Accomplishments

- o Seven major construction contracts awarded. Construction of Phase I facilities 70% completed.
- o Completion of 42-inch diameter, 41.5-mile oil pipeline to Nederland, Texas.
- o Construction of 175 MB brine pit and brine injection system.
- o Completion of seven re-entry wells and eight brine disposal wells.
- o Injection of 17.1 MMB of oil into the existing caverns bringing the total inventory to 20.5 MMB, filling the caverns to 40% of capacity.

WEST HACKBERRY

Phase II - Expansion

Location

- o Adjacent to existing Phase I site.

Acquisition

- o 160 additional acres adjacent to the existing site are scheduled to be acquired in July 1979.

Environmental/Permits

- o EIS published November 1978.
- o Permits for brine disposal to the Gulf and storage to be filed early 1979.

Site Description

- o 160 MMB of new leached storage capacity consisting of 16 new caverns, to be created in two phases of 8 caverns each:
 - 80 MMB sour crude, and 80 MMB sweet crude to be stored in expansion caverns.
 - 36-inch diameter, 27-mile brine disposal pipeline (nine miles offshore) to Gulf of Mexico.
 - 20-mile, 69 KV power transmission line.
 - Oil, brine, raw water piping distribution system connecting caverns with central plant, water intake and brine pipeline with additional pumps for leaching and brine disposal. Consists of over 100,000 feet of piping and 35 pumps totalling over 45,000 horsepower.
 - 48 cavern wells to approximate depth of 4500 feet each.

System Parameters

- o Fill via existing 42-inch diameter, 41.5-mile pipeline to Sunoco Terminal
 - Projected sustained rate - 115 MB/D.
- o Raw water design pumping rate - 1400 MB/D.
- o Brine disposal - 1088 MB/D design disposal rate.

Drawdown

- o Drawdown via existing 42-inch diameter, 41.5-mile pipeline to Sunoco Terminal and Texoma pipeline, Nederland, Texas.
- 1400 MB/D drawdown capacity - ready February 1980.

Schedule of Events

- o Expansion property to be acquired July 1979.
- o Drilling of expansion caverns to commence July 1979.
- o Withdrawal system to be completed February 1980.
- o Construction of on-site facilities to commence August 1979.
- o Leaching of caverns to commence September 1980.
- o Cavern oil fill to commence June 1981.
- o Fill of expansion caverns to be completed February 1986.

Major Accomplishments

- o Design of facilities completed; value engineering design revisions initiated.
- o Acquisition of expansion property initiated.
- o Materials for raw water intake pipeline purchased.
- o Further construction activities precluded due to funding limitations.

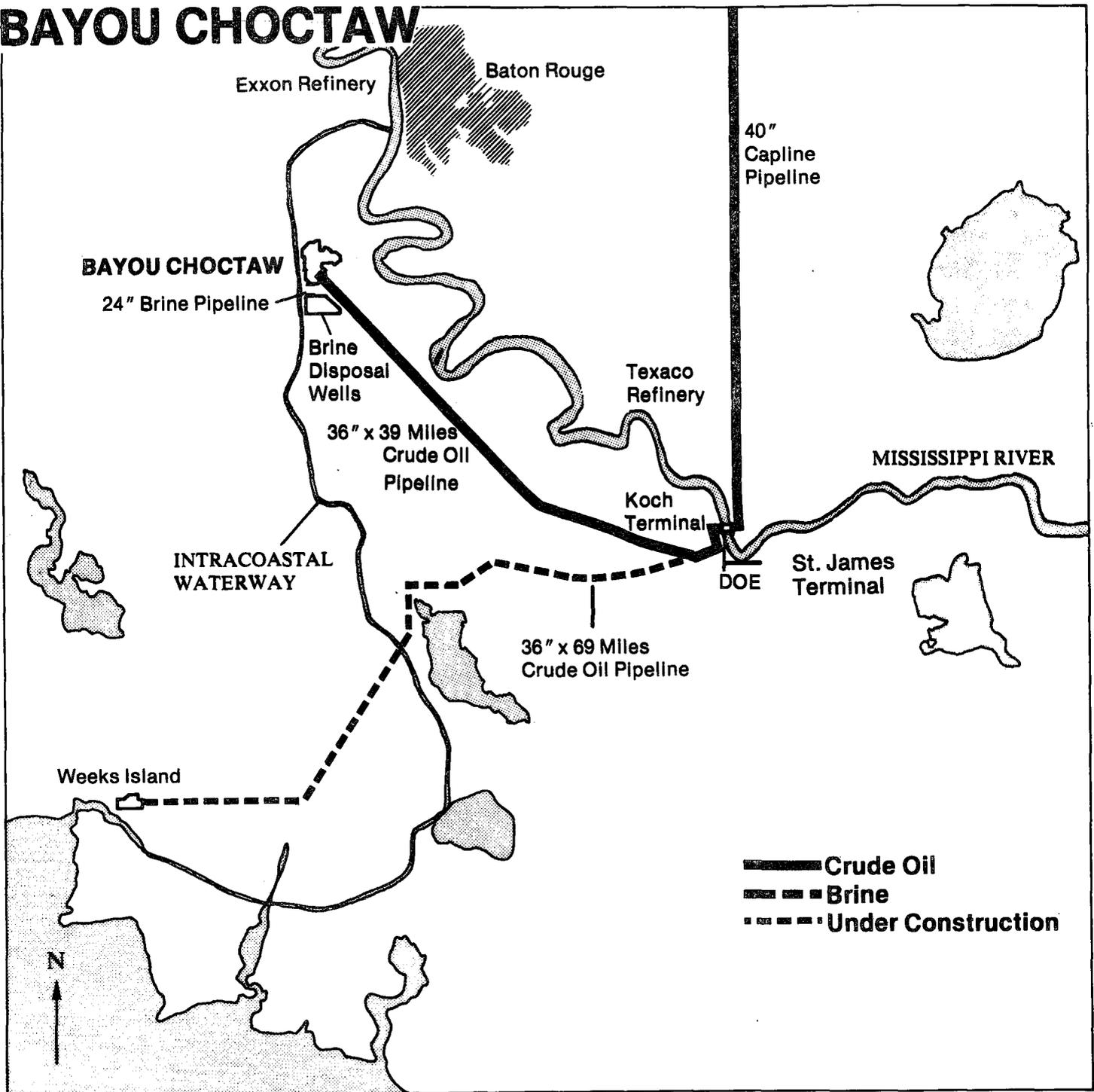
WEST HACKBERRY PHASE II
(thousands of dollars)

Cost Element	Cumulative Cost through 12/78	CY 1979	CY '80 to Completion	Total Estimate at Completion
Site Acquisition	\$ 0	\$10,800.	\$ 0	\$10,800.
Design	2,131.	2,069.	0	4,200.
Facility Construction	0	43,500.	49,400.	92,900.
Pipelines	335.	41,500.	30,065.	71,900.
Well Construction	127.	44,600.	45,573.	90,300.
Leaching	0	0	63,400.	63,400.
Construction Management	84.	17,200.	6,216.	23,500.
Site Maintenance	0	0	37,600.	37,600.
Total	\$2,677.	\$159,669.	\$232,254.	\$394,600.

Major Contractors And Subcontractors

	Activity	Firm	City/State
MANAGEMENT	Construction Mgmt. & Operations and Maint.	Parsons-Gilbane	New Orleans, La.
	Drilling Supervision	Louis Records & Assoc.	Lafayette, La.
DESIGN	Conceptual Site	Gulf Interstate (GIEC)	Houston, Tx.
	Oil pipeline	Parsons, Brinckerhoff/KBB	New York, N.Y.
		Ford, Bacon & Davis	Monroe, La.
EQUIPMENT AND MATERIAL	Pumps	Peabody Floway, Inc.	Fresno, Ca.
	Pumps	Bingham-Willamette	New Orleans, La.
	Pumps	W.L. Somner Co., Inc.	Shreveport, La.
	Valves	Grove Valve & Regulator	Oakland, Ca.
	Valves	M&J Valve Company	Houston, Tx.
	Valves	Custom Controls Company	Bellaire, Tx.
	Valves & piping	Peabody Floway, Inc.	Fresno, Ca.
	Pipe	Smith Pipe & Supply, Inc.	New Orleans, La.
	Pipe	Armco Steel Corp.	Houston, Tx.
	Wellhead	Seaboard Wellhead Inc.	Houston, Tx.
	Casing	Bethlehem Steel	Tulsa, Ok.
	Casing	Mid Continent Supply	Fort Worth, Tx.
	Electrical	C.G.I.	Paramount, Ca.
	Limestone/Sand	Acadian Sand & Limestone	Abbeville, La.
CONSTRUCTION	Permanent facility and fill system	Woodson Construction Co.	Lafayette, La.
	Site Piping	Alonso/Messina/Meyer	Baton Rouge, La.
	Water intake Site preparation	M.P. Dumesnil	Lafayette, La.
		J.P. Messina Contractors, Inc.	Plaquemine, La.
DRILLING	Re-entry & Brine Disposal Wells	Drillers	Houston, Tx.
		Mac Drilling	Livolia, La
		Welsh Drilling	Houston, Tx.
		Wallace Engineering, Inc.	Houston, Tx.
		Progress Drilling, Inc.	Houston, Tx.
		Well Tech Services	Lafayette, La.
OIL TRANS-PORTATION SERVICES	Tanker Terminal	Koch Industries	St. James, La.
	Tanker Terminal	Petro United	Sunshine, La.
	Barge Docks	Allied Chemicals	Houston, Tx.
	Barge	Coastal Towing, Inc.	Houston, Tx.

BAYOU CHOCTAW



BAYOU CHOCTAW

Location

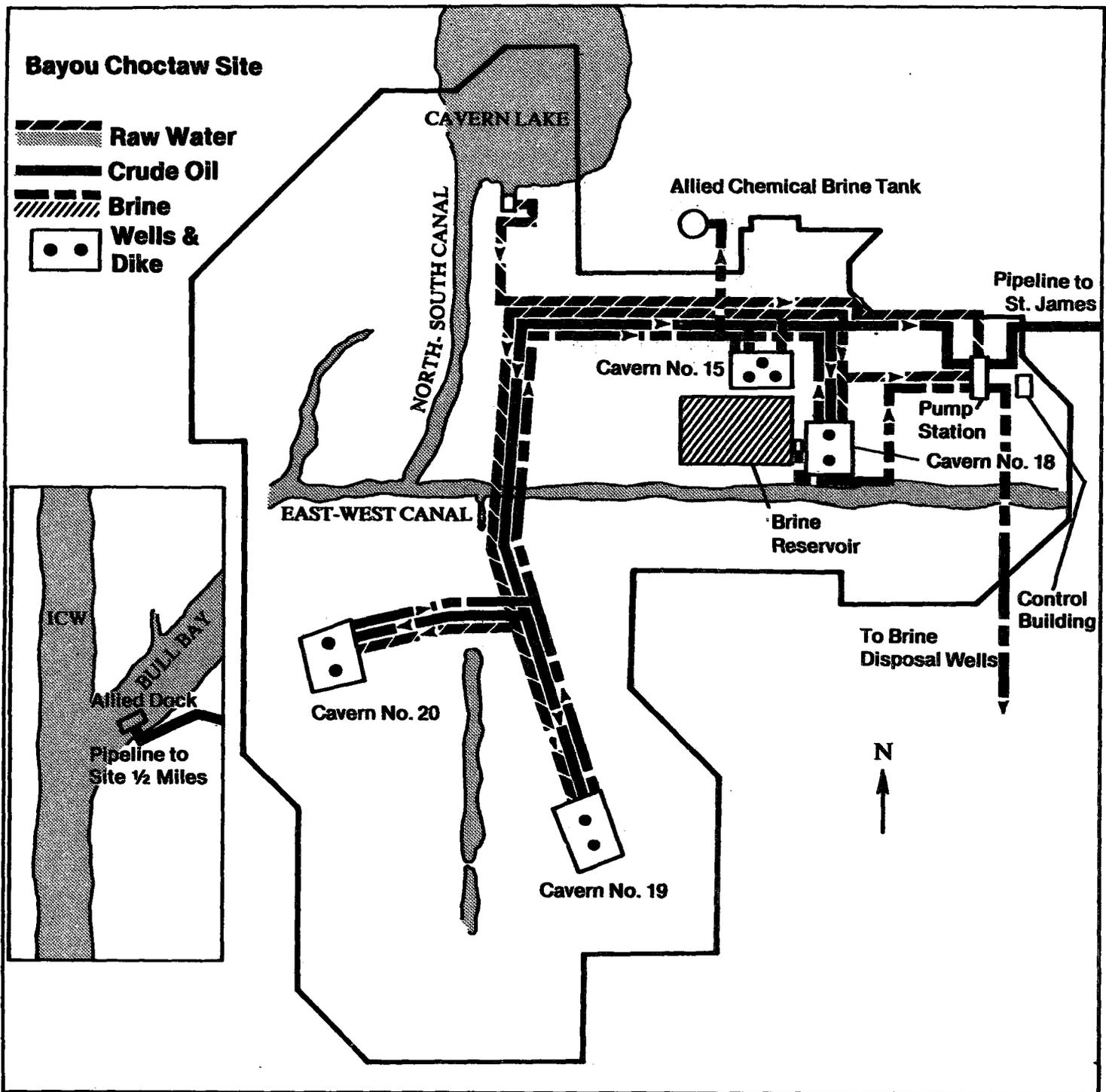
- o Iberville Parish, Louisiana, twelve miles southwest of Baton Rouge, Louisiana.

Acquisition

- o Acquired 375-acre site by condemnation April 1977, from numerous private owners. Allied Chemical Corporation was the previous operator.

Environmental/Permits

- o Environmental Impact Statement published December 1976, supplement published May 1977.
- o Four major Federal and state permits related to pipeline, well pad, storage and storm water runoff acquired in 1978.



BAYOU CHOCTAW - PHASE I

Cavern No.	Amount Stored	Capacity (MMB)	Number of Wells	Depth to Casing Seat	Salt above Cavern	Date of Certification
15	11.4	15.7	3	2560'	1960'	1/
18	2.5	8.1	2	1177'	2650'	8/26/78 ^{2/}
19	4.2	7.1	2	2305'	1750'	4/25/78 ^{2/}
20	0	5.1	2	1085'	3445'	3/
Totals	18.1	36.0	9			

1/ In use as storage cavern by Allied Chemical, prior to acquisition, tested by Allied in conformance with Louisiana Dept. of Conservation requirements in 1974.

2/ Certification of cavern for storage by Gulf Interstate Engineering Co.

3/ Projected completion of certification March 1979.

- o Permits pending include:
 - Corps of Engineers permit for dredging in construction of water intake system, applied for in February 1978.
 - Louisiana Air Control Commission permit for site emissions, applied for in September 1978.

Site Description

- o 36 MMB storage facility consisting of four existing caverns:
 - 36 MMB of sour crude will be stored in existing caverns.
 - Oil, brine, raw water piping distribution system connecting caverns with central plant, water intake structure and disposal wells. Consists of over 50,000 feet of piping and 18 pumps totalling over 20,000 horsepower.
 - Eleven brine disposal wells 2.5 miles off-site; pipeline for supplying brine to Allied Chemical.
 - 100 MB brine pit, control center, building, roads, well pads, and dikes.
 - Water intake structure in Cavern Lake on site.

System Parameters

- o Oil fill via 36-inch diameter, 39-mile pipeline to St. James Marine Terminal,
 - Design pumping rate - 240 MB/D.
 - Sustained system rate - 110 MB/D.
- o Raw water design pumping rate - 627 MB/D.
- o Brine disposal - 125 MB/D projected disposal rate.

Drawdown

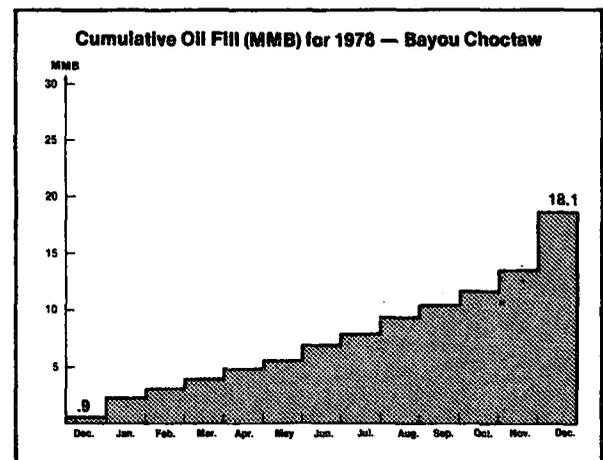
- o Drawdown via 36-inch diameter 39-mile pipeline to St. James Marine Terminal and to Capline pipeline.
 - 240 MB/D capability - ready September 1979.
 - 480 MB/D capability - ready May 1980.

BAYOU CHOCTAW PHASE I
(thousands of dollars)

Cost Element	Cumulative Cost through 12/78	Cost 1/79 to Completion	Total Estimate at Completion
Site Acquisition	\$ 13,724.	\$ 0	\$ 13,724.
Design	9,501.	0	9,501.
Facility Construction	32,042.	20,133.	52,175.
Well Construction	21,043.	1,257.	22,300.
Pipelines	25,750.	950.	26,700.
Contractor Management	8,137.	5,543.	13,700.
O&M through Fill	1,338.	12,162.	13,500.
Total	\$111,555.	\$ 40,045.	\$151,600.

Schedule of Events

- o Oil fill initiated via interim system December 1977 at approximate rate of 30 MB/D.
- o Construction of permanent facilities commenced May 1978.
- o Pipeline from St. James operational November 1978; fill capability increased to to over 100 MB/D.
- o Withdrawal system to be completed by September 1979.
- o Construction of permanent facilities to be completed October 1979.
- o Existing caverns to be filled by October 1979.



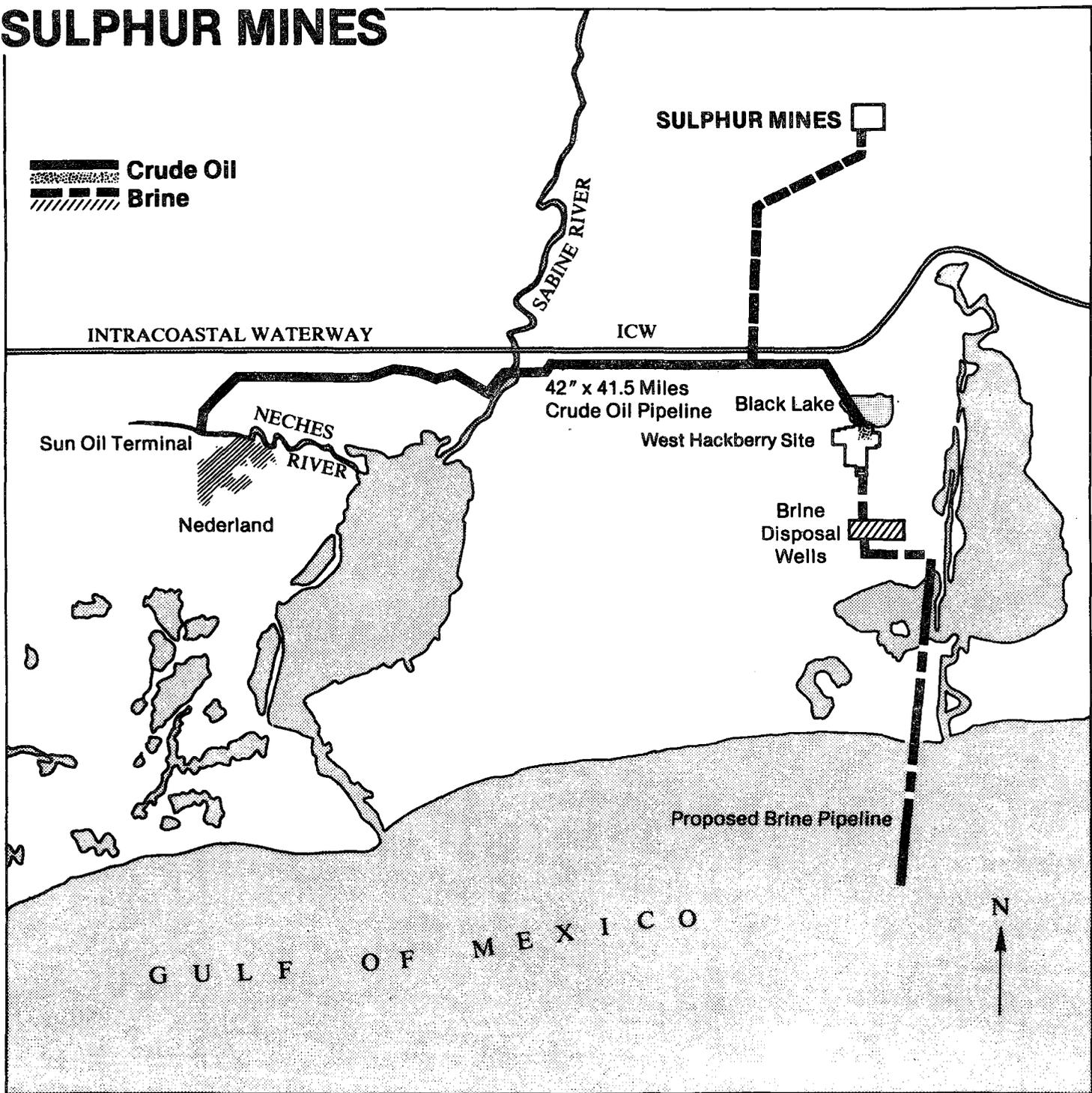
Major Accomplishments

- o Thirteen major construction contracts were awarded. Construction of Phase I facilities 74% completed.
- o Completion of 36-inch diameter, 39-mile pipeline connecting site to St. James Marine Terminal.
- o Completion of four re-entry wells and ten brine disposal wells.
- o Completion of 100 MB brine pit and oil and brine injection systems.
- o Injection of 17.2 MMB of crude oil into existing caverns bringing total inventory to 18.1 MMB filling caverns to 50% of total capacity.

Major Contractors And Subcontractors

	Activity	Firm	City/State
MANAGEMENT	Construction Mgmt. Operations and Maint.	Parsons-Gilbane	New Orleans, La.
	Drilling Supervision	Louis Records & Assoc.	Lafayette, La.
DESIGN	Conceptual Site	Gulf Interstate (GIEC) Parsons, Brinkerhoff/KBB	Houston, Tx. New York, N.Y.
	Oil pipeline	Ford, Bacon & Davis	Monroe, La.
	EQUIPMENT AND MATERIAL	Pumps Pumps Pumps Valves Valves Valves Valves & piping Pipe Pipe Wellhead Casing Casing Electrical Limestone/Sand	Peabody Floway, Inc. Bingham-Willamette W.L. Somner Co., Inc. Grove Valve & Regulator M&J Valve Company Custom Controls Company Peabody Floway, Inc. Smith Pipe & Supply, Inc. Armco Steel Corp. Seaboard Wellhead Inc. Bethlehem Steel Mid Continent Supply C.G.I. Acadian Sand & Limestone	Fresno, Ca. New Orleans, La. Shreveport, La. Oakland, Ca. Houston, Tx. Bellaire, Tx. Fresno, Ca. New Orleans, La. Houston, Tx. Houston, Tx. Tulsa, Ok. Fort Worth, Tx. Paramount, Ca. Abbeville, La.
CONSTRUCTION	Permanent facility and fill system	Woodson Construction Co.	Lafayette, La.
	Site Piping	Alonso/Messina/Meyer	Baton Rouge/ Plaquemine, La.
	Water intake Site preparation	M.P. Dumesnil J.P. Messina Contractors, Inc.	Lafayette, La. Plaquemine, La.
DRILLING	Re-entry & Brine Disposal Wells	Drillers	Houston, Tx.
		Mac Drilling	Livolia, La
		Welsh Drilling	Houston, Tx.
		Wallace Engineering, Inc.	Houston, Tx.
		Progress Drilling, Inc.	Houston, Tx.
		Well Tech Services	Lafayette, La.
OIL TRANS- PORTATION SERVICES	Tanker Terminal	Koch Industries	St. James, La.
	Tanker Terminal	Petro United	Sunshine, La.
	Barge Docks	Allied Chemicals	Houston, Tx.
	Barge	Coastal Towing, Inc.	Houston, Tx.

SULPHUR MINES



SULPHUR MINES

Location

- o Calcasieu Parish, Louisiana, two miles west of Sulphur, Louisiana, and 20 miles north of West Hackberry salt dome.

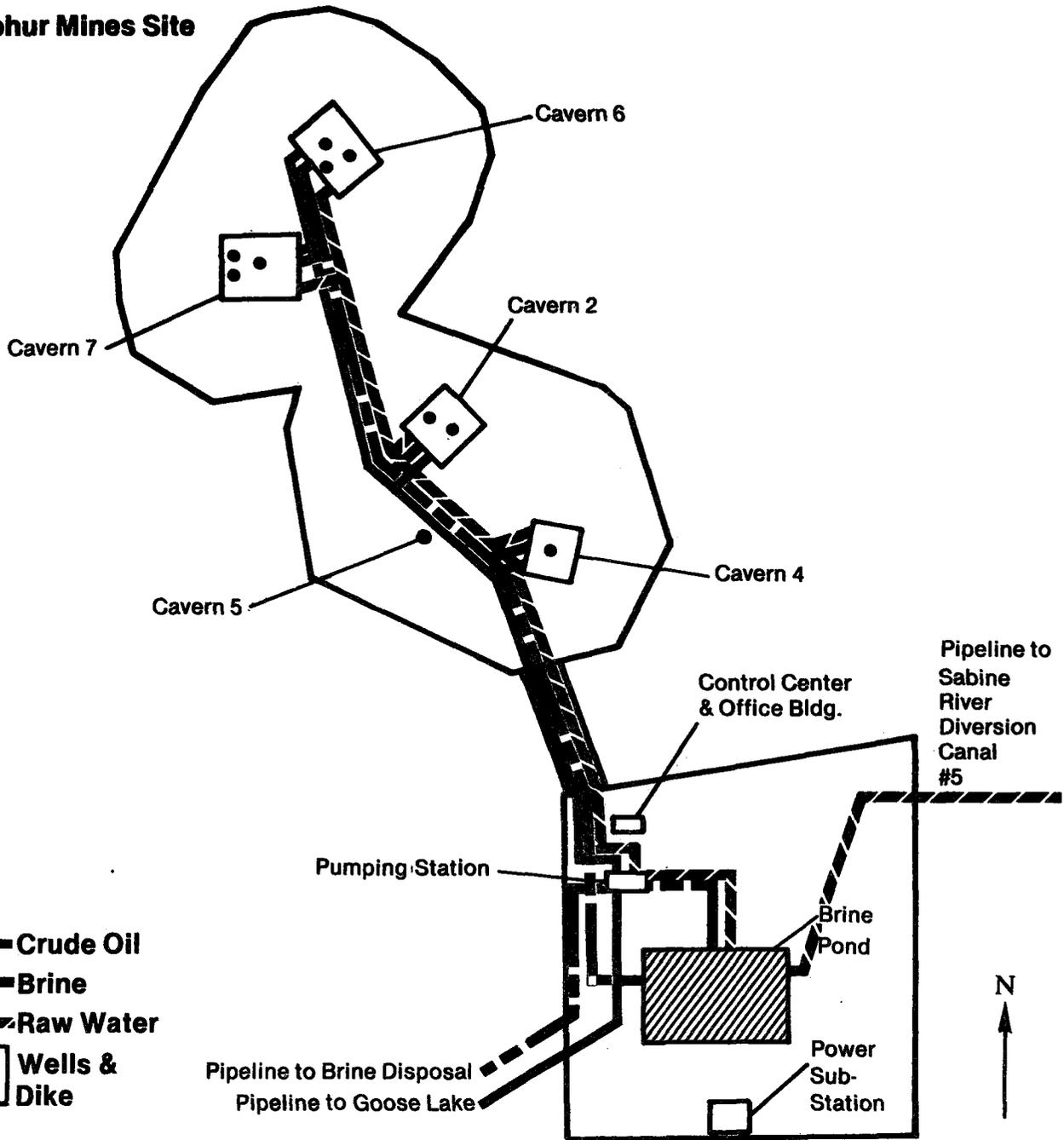
Acquisition

- o Acquisition of 173-acre site anticipated in February 1979 from Allied Chemical Corporation. PPG Industries, Inc., is present operator.

Environmental/Permits

- o Environmental Impact Statement published March 1978.
- o Three major federal and state permits for pipeline construction, oil storage, and air emission acquired in 1978.
- o EPA permits for storm water and sewage discharge pending; applied for September 1978.

Sulphur Mines Site



SULPHUR MINES

Cavern No.	Amount Stored 12/78 (MMB)	Capacity (MMB)	Number of Wells	Depth to Casing Seat	Salt above Cavern	Date of Certification ^{1/}
2, 4, 5 ^{2/}	0	11.7	3	1562'	884'	11/02/77
6	0	4.9	3	1814'	1498'	2/03/78
7	0	5.4	3	1822'	1289'	12/17/77
Total	0	22.0	9			

^{1/} Certification of cavern for storage by Gulf Interstate Engineering Co.

^{2/} Original three caverns have coalesced to form one cavern.

Site Description

- o 22 MMB storage facility consisting of five existing caverns:
 - 22 MMB sour crude to be stored in existing caverns.
 - Oil, brine, raw water piping distribution system connecting caverns with central plant, water intake structure and brine disposal wells. Consists of over 77,000 feet of piping and 18 pumps totalling over 8,000 horsepower.
 - Four deep-injection brine disposal wells.
 - 100 MB barrel brine pit, control center buildings, roads, well pads, dikes.
 - Water intake structure 1.5 miles off-site on Houston Canal (Sabine River Diversion Canal #5) connected to facility by 16-inch diameter pipeline.

System Parameters

- o Oil fill via 16-inch diameter, 17-mile spur pipeline connecting to existing West Hackberry-Nederland pipeline at Goose Lake.
 - Design pumping rate - 100 MB/D.
 - Sustained system rate - 80 MB/D.
- o Raw water design pumping rate - 100 MB/D.
- o Brine disposal - 80 MB/D projected disposal rate.

Drawdown

- o Drawdown via 16-inch diameter, spur pipeline to Goose Lake, then through 42-inch diameter West Hackberry line, 34.4 miles to Sunoco Terminal and Texoma pipeline, Nederland, Texas.
 - 100 MB/D capability-ready November 1979.

SULPHUR MINES (thousands of dollars)

	Cumulative Cost through 12/78	Cost 1/79 to Completion	Total Estimate at Completion
Site Acquisition	\$ 0	\$ 10,000.	\$ 10,000.
Design	4,646.	1,954.	6,600.
Facility Construction	875.	29,125.	30,000.
Well Construction	1,702.	8,798.	10,500.
Pipelines	2,353.	5,247.	7,600.
Contractor Management	2,892.	6,808.	9,700.
O&M through Fill	140.	7,060.	7,200.
Total	\$ 12,608.	\$ 68,992.	\$ 81,600.

Schedule of Events

- o Site acquisition anticipated February 1979.
- o Construction of 17-mile oil pipeline to commence January 1979.
- o Construction of on-site facilities to commence February 1979.
- o Cavern oil fill to commence July 1979.
- o Drawdown system to be completed November 1979.
- o Cavern fill to be completed May 1980.
- o On-site facilities to be completed January 1980.

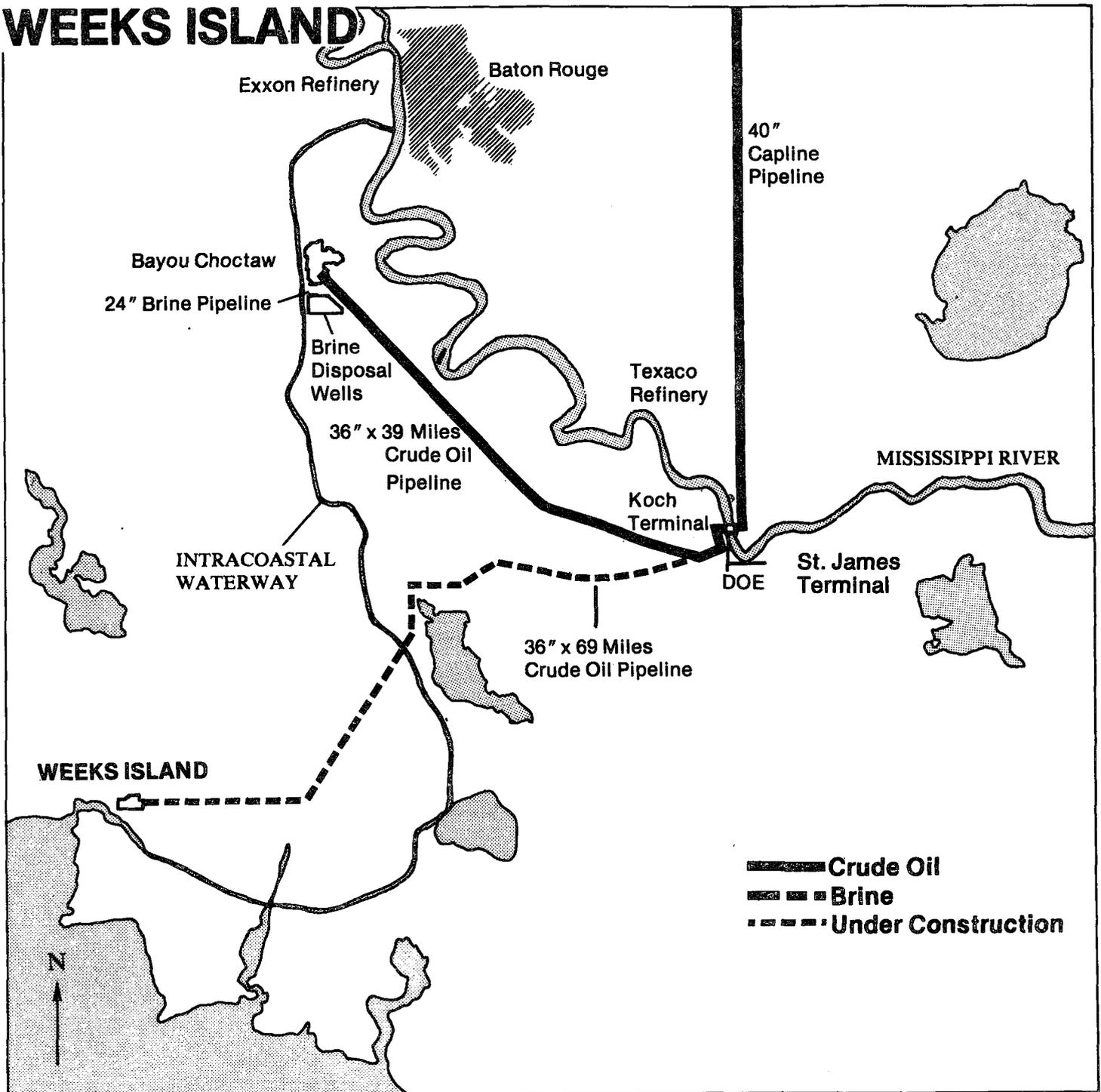
Major Accomplishments

- o Complex negotiations with site owner, Allied Chemical, and site leasee, PPG Industries, for accommodation agreement to permit them to continue operations at the site are now near completion.
- o Test brine disposal well completed.
- o Design of permanent facilities and pipeline completed.
- o Cavern testing and certification completed.
- o 54 contracts for facilities construction work and equipment procurement awarded.

Major Contractors And Subcontractors

	Activity	Firm	City/State
MANAGEMENT	Construction Mgt.	Parsons-Gilbane	New Orleans, La.
DESIGN	Conceptual	Gulf Interstate (GIEC)	Houston, Tx.
	Site	Parsons, Brinckerhoff/KBB	New York, N.Y.
	Pipeline	Ford, Bacon & Davis	Monroe, La.
EQUIPMENT AND MATERIAL	16- & 20-inch pipe	Consolidated Pipe & Supply	Kenner, La.
	Pumps	Bingham-Willamette	New Orleans, La.
	Pumps	W.L. Somner Co., Inc.	Shreveport, La.
	Valves	Lone Star Industrial	Houston, Tx.
	Valves	Grant Supply Co.	Baton Rouge, La.
	Electrical	Midco Control Systems	Houston, Tx.
	Electrical	Wallco Electric Co.	Providence, R.I.
CONSTRUCTION	Oil spur pipeline	Houston Contracting Co.	Houston, Tx.

WEEKS ISLAND



WEEKS ISLAND

Location

- o Iberia Parish, Louisiana, 95 miles southwest of New Orleans.

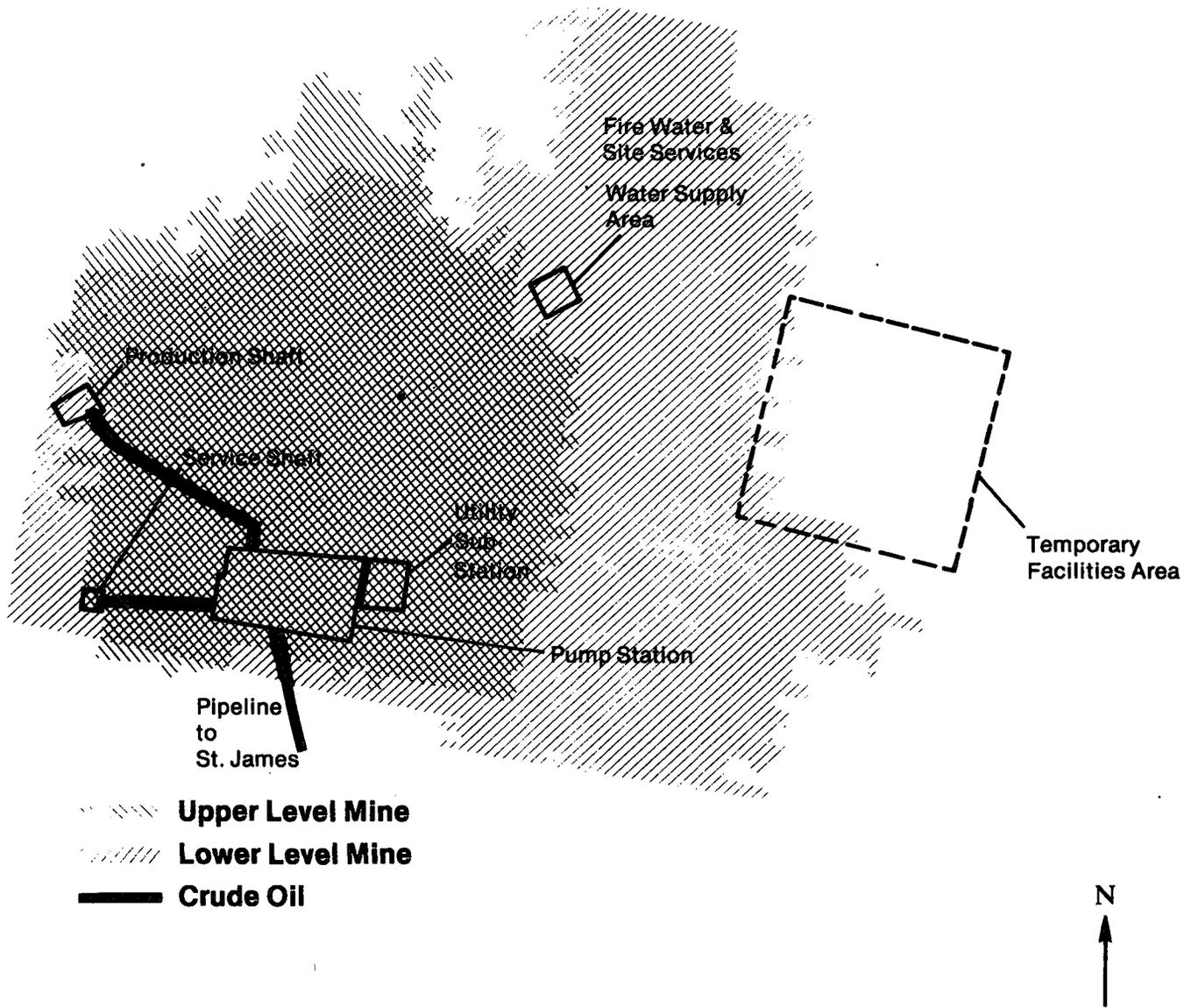
Acquisition

- o Acquired 388-acre site September 1977 from Morton Salt Company.

Environmental/Permits

- o Environmental Impact Statement published January 1977; supplement published August 1977.
- o One major federal permit related to pipeline construction acquired in 1978.
- o Major permits pending include:
 - State of Louisiana permit to store oil, applied for July 1978.
 - State of Louisiana permit for emissions, applied for September 1978.

Weeks Island Site



Site Description

- o Conventional salt mine containing two large horizontal grids of tunnels with total storage capacity of 75 MMB:
 - 75 MMB of sour crude oil to be stored.
 - Oil piping distribution system will consist of 11 electrical, submersible pumps in the mine to boost crude to the surface and twin main-line pumps to push crude to St. James Terminal during drawdown totalling over 17,000 horsepower.
 - 500,000 gallon firewater tank and pumps.
 - Mine inert gas and vapor recovery systems.

System Parameters

- o Fill via 36-inch diameter, 69-mile pipeline from St. James Terminal.
 - Design pumping rate - 480 MB/D.
 - Sustained system rate - 350 MB/D.

Drawdown

- o Drawdown via 36-inch diameter, 69-mile pipeline to St. James Terminal and to Capline pipeline.
 - 590 MB/D drawdown capability - ready March 1980.

Schedule of Events

- o Mine conversion initiated May 1978.
- o Oil pipeline connecting facility to St. James to be completed August 1979.
- o Oil fill to commence September 1979.
- o Withdrawal system to be completed March 1980.
- o Oil fill to be completed May 1980.

WEEKS ISLAND (thousands of dollars)

Cost Element	Cumulative Cost through 12/78	Cost 1/79 to Completion	Total Estimate at Completion
Site Acquisition	\$ 30,000.	\$ 0	\$ 30,000.
Design	3,578.	922.	4,500.
Facility Construction	23,412.	44,488.	67,900.
Well Construction	0	0	0
Pipelines	37,587.	40,313.	77,900.
Contractor Management	5,993.	11,407.	17,400.
O&M through Fill	482.	8,818.	9,300.
Total	\$101,052.	\$105,948.	\$207,000.

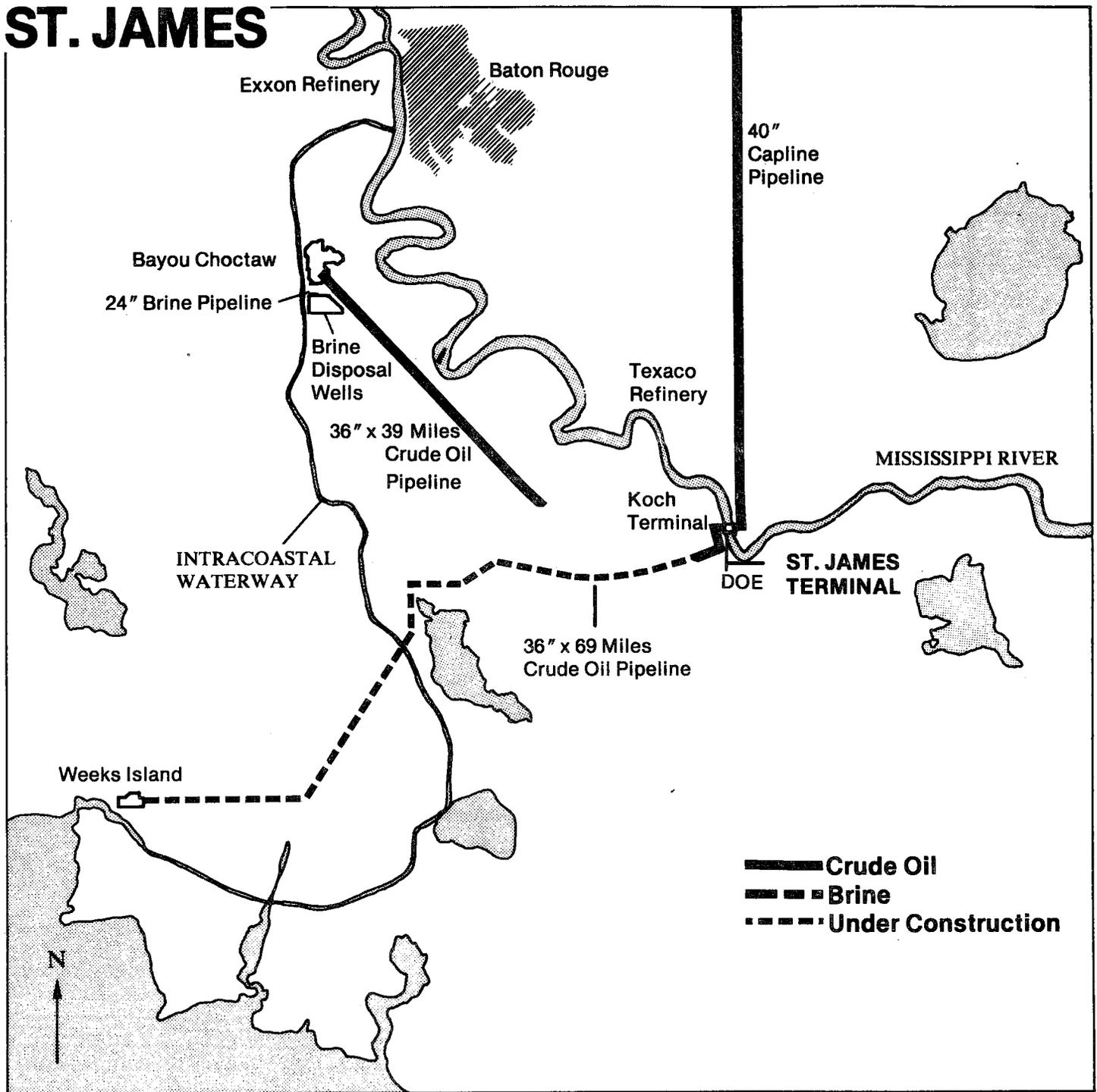
Major Accomplishments

- o Design of the mine conversions substantially completed in 1978.
- o Eleven construction contracts awarded; mine conversion and site facilities 43% complete.
- o Completion of 23 miles of 36-inch diameter pipeline to St. James, including Atchafalya Basin crossing.

Major Contractors And Subcontractors

	Activity	Firm	City & State
MANAGEMENT	Construction Management	Parsons-Gilbane	New Orleans, La.
DESIGN	Conceptual Site Pipeline	Gulf Interstate (GIEC) Fenix & Scisson, Inc. Gulf Interstate (GIEC)	Houston, Tx. Tulsa, Ok. Houston, Tx.
EQUIPMENT AND MATERIAL	Pipe Pipe Submersible Pumps Pumps Mine Equipment Electrical	Armco Steel Corp Oilwell Division - U.S. Steel Bryon Jackson Pump Bingham - Willamette Morton Norwich Midco Control Systems	Houston, Tx. Houston, Tx. Los Angeles, Ca. New Orleans, La. Chicago, Ill. Houston, Tx.
CONSTRUCTION	Site preparation Piping Instrumentation Mine & Shaft Under-ground Construction 36-inch pipeline	Frees Construction Co. Woodson Construction DATEC System Ind. Morton/Dravo Bannister	Franklin, La. Lafayette, La. Tucker, Ga. New Orleans, La. Eaglewood, Co.

ST. JAMES



ST. JAMES TERMINAL

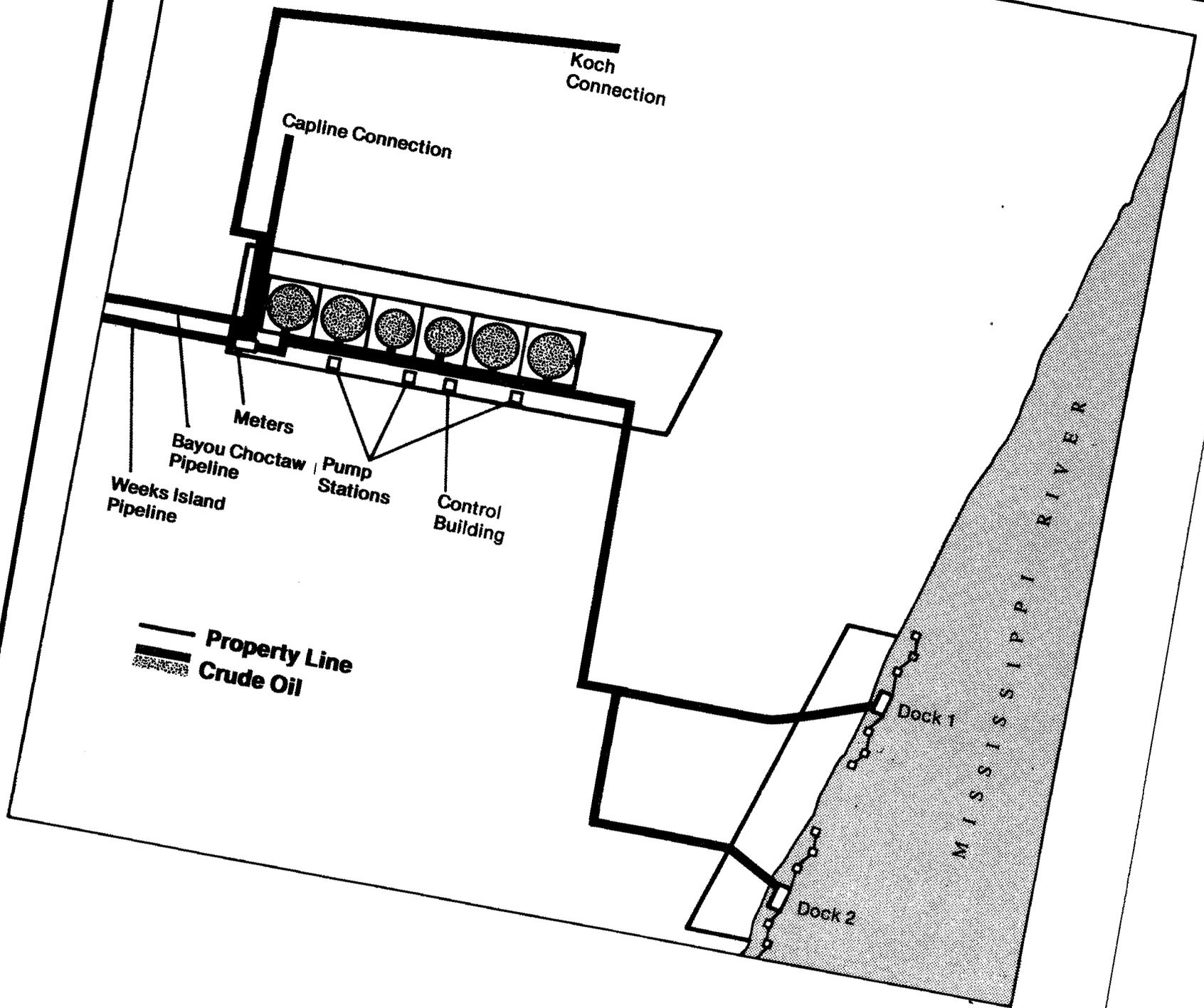
Location

- o St. James Parish, Louisiana, 30 miles southeast of Baton Rouge, Louisiana, on Mississippi River.

Acquisition

- o 160-acre terminal site acquired May 1978.
- o 27-acre dock site acquired July 1978.

St James Marine Terminal



Environmental/Permits

- o St. James' EIS is a component of Bayou Choctaw supplement, published May 1977, and Weeks Island supplement, published August 1977.
- o Two major federal and state permits related to dock construction acquired in 1978.
- o EPA storm water discharge permit applied for March 1978.

Site Description

- o Terminal facilities include six storage tanks totalling 2 MMB capacity, tie-ins to the pipelines to Koch Oil Co. Terminal, Bayou Choctaw and Weeks Island, and provisions for tie-in to Capline pipeline and Capline terminal complex.
- o Oil distribution piping system connecting docks, tanks and pump station. Consists of over 35,000 feet of piping and eight pumps totalling over 12,000 horsepower, metering systems and maintenance and central buildings.
- o Two docks with one berth each, able to accommodate lightened vessels of up to 100 MDWT. A 42-inch diameter pipeline connects the docks with the storage tanks.

System Parameters

- o Tanker unloading - three marine unloading arms per dock with design capacity of 20 MB/H per arm.
- o Distribution from terminal.
 - To Bayou Choctaw - design pumping rate - 240 MB/D.
 - To Weeks Island - design pumping rate - 480 MB/D.
- o Terminal throughput:
 - Design rate-380 MB/D.
 - Sustained system rate-350 MB/D.

Drawdown

- o Crude oil from Bayou Choctaw and Weeks Island to be distributed across docks and to Capline and Koch terminals.

ST. JAMES
(thousands of dollars)

Cost Element	Cumulative Cost through 12/78	Cost 1/79 to Completion	Total Estimate at Completion
Site Acquisition	\$ 3,120.	\$ 380.	\$ 3,500.
Design	2,680.	620.	3,300.
Facility Construction	35,063.	45,737.	80,800.
Total	\$ 40,863.	\$ 46,737.	\$ 87,600.

Schedule of Events

- o Construction of docks and terminal commenced May 1978.
- o Dock construction to be completed May 1979.
- o Terminal construction to be completed August 1979.
- o Terminal and dock to be operational September 1979 for Weeks Island fill.

Major Accomplishments

- o Facilities design completed. A value engineering design change eliminated the need for nine pumps and associated equipment, and enhanced the terminal's flexibility to conduct simultaneous operations.
- o Seven major construction contracts awarded. Construction is 50% completed.
- o A pipeline through the terminal connecting Koch terminal to the Bayou Choctaw line completed.
- o Four of six tanks were completed, excluding painting and testing.

Major Contractors And Subcontractors

	Activity	Firms	City & State
MANAGEMENT	Construction Management	Parsons-Gilbane	New Orleans, La.
DESIGN	Conceptual Dock	Gulf Interstate (GIEC) Raymond International, Inc.	Houston, Tx. Houston, Tx.
	Terminal	Walk, Haydel, & Assoc.	New Orleans, La.
EQUIPMENT AND MATERIAL	Pumps	Peabody Floway, Inc.	Fresno, Ca.
	Pumps	Bingham - Willamette	New Orleans, La.
	Valves	Flow Control Co.	Houston, Tx.
	Valves	M&J Valve Co.	Harvey, La.
	Pipe	Oilwell Division, U.S. Steel	Houston, Tx.
	Electrical Tanks	Nunn Electric Supply Graver Southwest	Harahan, La. Houston, Tx.
CONSTRUCTION	Site Preparation	Ragusa Brothers	Hammond, La.
	Storage Tanks	Graver Southwest	Houston, Tx.
	Site Preparation	Landis Construction	New Orleans, La.
	Equipment Install.	E.C. Ernst	Metairie, La.
	Metering Skids	Systems Fabrication Co.	Houston, Tx.
	Dock	Raymond International, Inc.	Houston, Tx.

IRONTON

Location

- o Ironton, Ohio.

Acquisition

- o Site to be acquired through turnkey contract (lease or purchase) from Alpha-Portland Cement Company.

Environmental/Permits

- o Environmental Impact Statement published July 1977.
- o Required federal, state and local permits to be acquired by turnkey contractor.

Site Description

- o Conventional limestone mine containing a horizontal grid of tunnels with a total storage capacity of 20 MMB:
 - Oil piping distribution system to include submersible pumps in the mine to boost crude oil to the surface, and mainline pumps to push crude oil to Ashland terminal.
 - Firewater tanks and pumps.
 - Mine inert gas and vapor recovery systems.

System Parameters

- o Fill via 13-mile pipeline from existing 24-inch diameter Ashland Pipeline to Owensboro terminal.
 - Projected design pumping rate - 60 MB/D.

Drawdown

- o Drawdown via 13-mile pipeline to Ashland Pipeline to Owensboro Terminal and Catlettsburg refinery.
 - Projected design pumping rate - 140 MB/D.

Schedule of Events

- o Request for Proposal issued to Fenix and Scisson, November 1978.
- o Contract to be awarded in April 1979.
- o Construction to commence June 1979.
- o Construction and oil fill schedule subject to negotiations.

Major Accomplishments

- o Meetings with Fenix and Scisson, Alpha-Portland Cement Company (owner) and Ashland Oil Company determined feasibility of developing site.
- o Request for Proposal issued to Fenix and Scisson.

COTE BLANCHE

Location

- o St. Mary Parish, Louisiana, 90 miles southwest of New Orleans, five miles southeast of the Weeks Island Mine.

Acquisition

- o Site to be acquired through turnkey contract (lease or purchase) from Domtar Chemical, Inc. (present operator) on behalf of private owners.

Environmental/Permits

- o Environmental Impact Statement published January 1977, supplement published August 1977.
- o Required federal, state and local permits to be acquired by turnkey contractor.

Site Description

- o Conventional salt mine containing a horizontal grid of tunnels with a total storage capacity of 30 MMB:
 - 30 MMB of sour crude to be stored.
 - Oil piping distribution system to include submersible pumps in the mine to boost crude oil to the surface, and mainline pumps to push crude oil to the St. James Terminal during drawdown.
 - Firewater tanks and pumps.
 - Mine inert gas and vapor recovery systems.

System Parameters

- o Fill via 1.3-mile spur pipeline connecting to existing 36-inch diameter, 69-mile Weeks Island-to-St. James Terminal pipeline.
 - Projected design pumping rate - 270 MB/D.

Drawdown

- o Drawdown via spur pipeline and 36-inch diameter, 69-mile pipeline to St. James Terminal and to Capline pipeline.
 - Projected design pumping rate - 200 MB/D.

Schedule of Events

- o Request for Proposal issued to Domtar Chemical, Inc., December 1978.
- o Contract award projected April 1979.
- o Construction and oil fill schedule subject to negotiations.

Major Accomplishments

- o Meetings with Domtar Chemical, Inc. determined feasibility of site development and mine conversion.
- o Domtar Chemical, Inc. initiated negotiations with present landowners.
- o Request for Proposal issued to Domtar Chemical, Inc.

NAPOLEONVILLE

Location

- o Assumption Parish, Louisiana, 30 miles south of Baton Rouge, Louisiana.

Acquisition

- o Site to be acquired through turnkey contract (lease or purchase) from Dow Chemical Company (present operator) on behalf of private owners.

Environmental/Permits

- o Environmental Impact Statement published July 1978.
- o Required federal, state and local permits to be acquired by turnkey contractor.

Site Description

- o 30 MMB storage facility consisting of two existing solution mined caverns.
 - 30 MMB sour crude oil to be stored in existing caverns.
 - Oil, brine, raw water piping distribution system connecting caverns with central plant and water intake structure.
 - Pipeline for brine supply to Dow Chemical Company.
 - Brine pit, oil-brine separator, maintenance and control center buildings, roads, well pads and dikes.
 - Water supply source for drawdown.

System Parameters

- o Fill via 1/2-mile spur pipeline to existing 69-mile, 36-inch diameter Weeks Island-to-St. James Terminal pipeline.
 - Projected design pumping rate - 60 MB/D.
- o Raw water projected design pumping rate - 200 MB/D.
- o Brine disposal - projected design disposal rate 60 MB/D, to Dow Chemical Company.

Drawdown

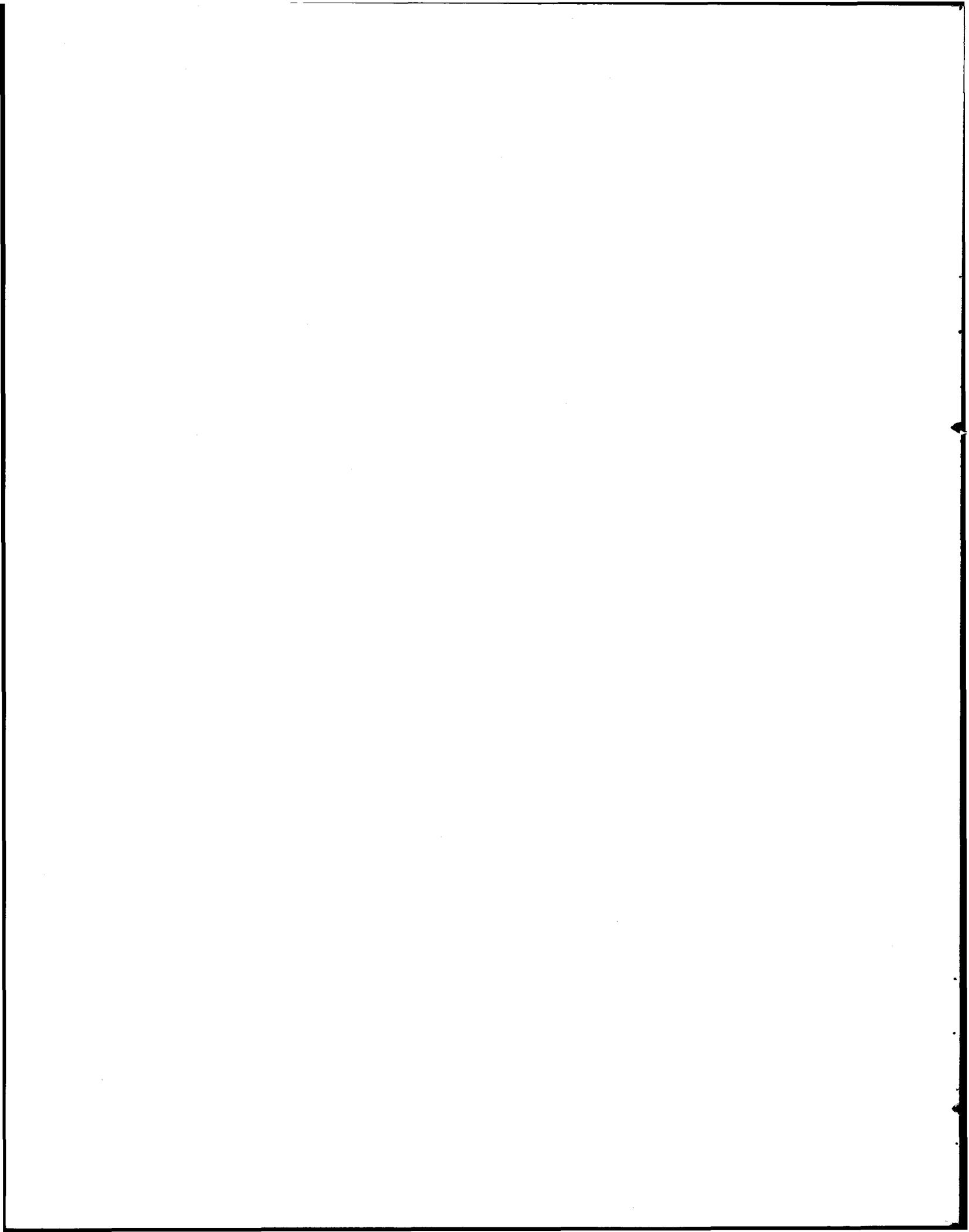
- o Drawdown via spur pipeline and Weeks Island-to-St. James Terminal pipeline to St. James Terminal and to Capline pipeline.
 - Projected design pumping rate - 200 MB/D.

Schedule of Events

- o Request for Proposal issued to Dow Chemical Company December 1978.
- o Contract award projected April 1979.
- o Construction and oil fill schedule subject to negotiations.

Major Accomplishments

- o Several meetings with Dow Chemical determined feasibility of site development.
- o Request for Proposal issued to Dow Chemical Company.



EXECUTIVE SECRETARIAT OSE REVIEW AND ROUTING CONTROL

Subject: OO-LOGGING SPDS

Control No. XS-78-2073

Date October 23, 1976

Originating Office: DA/Johnson

The attached document has been reviewed by the Executive Secretariat and is forwarded

To: UNDER SECRETARY

For: Approval/Signature
 Concurrence
 Information
 Other (see comments)

From: Director, XS *RD*

Comments:

Concurrences: _____

Nonconcurrences (see tabs) _____

Info copies sent to: SE DS US SA

This control slip is attached to an official file. Please return entire package to the Executive Secretariat upon completion of action by OSE Principal.

OSE instructions to XS: _____



Department of Energy
Washington, D.C. 20461

MEMORANDUM FOR WILLIAM S. HEFFELFINGER

THROUGH: DALE D. MYERS
FROM: GEORGE S. McISAAC *SM* OCT 20 1978
SUBJECT: CO-LOCATING SPRO

As you know, the Strategic Petroleum Reserve (SPR) is one of the Department's most important programs. It is an enormous and complex project with difficult goals, critical deadlines, and great political visibility.

The SPR is a program which needs senior management supervision. This supervision has been impeded by having the SPR offices at 1726 M Street and the Deputy Assistant Secretary and myself at 12th & Pennsylvania Avenue. There is a need for nearly daily consultation with SPR program staff. For example, in the last months the preparation of the SPR budget required numerous meetings to work out the options and all their ramifications. Having staffs in separate locations made the process very difficult. Situations are rising, such as the recent fire or inquiries from Congressional subcommittees, where quick response and close coordination are vital. Co-locating SPRO with me at 12th & Pennsylvania Avenue would significantly improve coordination between the program office and mine.

For these reasons, I request your assistance in speeding the relocation of SPRO to the Federal Building.

**Department
of Energy**

Information



Office of Public Affairs
Washington, D.C. 20585

**FOR IMMEDIATE RELEASE
OCTOBER 3, 1978**

**DOE ESTABLISHES CLAIMS OFFICE AT SITE OF
STRATEGIC PETROLEUM RESERVE FIRE IN LOUISIANA**

The Department of Energy (DOE) has established a claims office to handle individual claims for damages caused by a recent fire at the Strategic Petroleum Reserve site at West Hackberry, Louisiana.

DOE is contacting property owners in the surrounding community whose property may have been damaged by particles and smoke plumes caused by the fire. Individuals with potential claims for damages should send the claims directly to:

Robert C. Cottrell
Area Constructon Manager
c/o Department of Energy
MRH Box 220
Hackberry, Louisiana 70645
318/762-5141

Last Saturday, oil technology specialists replaced the permanent control cap on a pipeline where the fire broke out on September 21. The pipe had been temporarily plugged on September 26.

One man was burned fatally and another sustained serious injuries as a result of the accident.

DOE estimates that approximately 68,000 barrels of oil gushed out of the pipe while the fire was burning. Of this, about 33,000 barrels burned and DOE is now determining how much of the 35,000 barrels being recovered will be reinjected into storage or sold as waste oil.

(MORE)

R-78-387

About one-half hour after the oil release began, a series of booms was laid on the lake. The booms contained the oil in a relatively small area along the shore. Studies are underway to determine the best methods for cleaning up the remaining oil on both lake and shore.

"The mobilization of both men and equipment was accomplished quickly and professionally," said Donald W. Mazur, SPR New Orleans Project Office Manager, who directed much of the oil recovery effort. "The oil was contained and picked up with great efficiency. We are particularly grateful for all the assistance which we received from various Federal, state and local agencies, as well as the DOE contractor personnel."

A DOE-appointed five-man investigation board is conducting a study of the causes of the fire, and ways to prevent similar accidents from occurring. Its report is due to be delivered to DOE within a month.

DOE has also arranged with the Department of Commerce for speedy reimbursement of fire-fighting costs to the six voluntary and two paid fire departments which helped fight the fire. The Claims Office is also coordinating this activity.

- DOE -

News Media Contact: Jim Griffin or John Donnelly,
202/566-9418

R-78-387



Department of Energy
Washington, D.C. 20585

September 13, 1978

MEMORANDUM FOR

THE PRESIDENT

FROM

JIM SCHLESINGER *JS*

SUBJECT: Strategic Petroleum Reserve
Development Status

This is to inform you of the progress in developing the Strategic Petroleum Reserve (SPR).

Status of Storage -- First 250 Million Barrels

Four underground salt dome sites (three in Louisiana and one in Texas) have been purchased, and negotiations are proceeding to acquire a fifth site. These sites have existing caverns which have been created by industry over the years. We plan to store about 250 million barrels of oil in these caverns by the end of 1979, and this amount will comprise total SPR storage at that date.

Use of the caverns for SPR oil storage and withdrawal requires a major construction effort, including (1) drilling into the caverns, (2) testing the caverns, (3) repairing or converting the caverns, (4) installing large pumps, electrical motors, electrical power sources, and instrumentation, (5) laying large oil pipelines to connect the sites to tanker ports, (6) expanding facilities at tanker ports, (7) drilling injection wells into deep sands to dispose of the salt water (brine) that is now in most of the caverns, and (8) laying brine disposal pipelines from some sites to the Gulf of Mexico. Except for the brine disposal pipelines, this construction is well underway at the first four sites.

Pending completion of this construction, we have started to store oil at the sites using temporary fill systems. Over 41 million barrels of oil are now in storage. The fill rate -- now averaging over 185,000 barrels per day -- is to increase to about 400,000 barrels per day in October, and to 700,000 barrels per day by December. We expect to have between 90 and 100 million barrels in storage by the end of 1978, depending on the exact timing of construction completion and the rate at which we are able to dispose of salt water in the new wells.

As you know, we had established previously an ambitious target -- with a 50-50 probability of success -- of 250 million barrels in storage by the end of 1978. This target anticipated smooth operation of all aspects of

the program. However, the program has encountered a number of obstacles that have resulted in a slippage of the date for the 250 million barrels goal by one year. Among these obstacles are the following:

- ° Technical problems have caused a reduction of over 80 million barrels of usable capacity in existing caverns, so that our capability to respond to construction and operating problems has been limited.
- ° Unanticipated construction problems of a technical and managerial nature (geological problems, strikes, injunctions) have occurred.
- ° A six-month delay (which is just being resolved) has been encountered in receiving an EPA permit to dispose of brine to the Gulf of Mexico. This environmental problem stems from objections raised by shrimp fishermen that brine disposal in the Gulf would destroy shrimp spawning beds. To overcome these objections, DOE has agreed to extend the disposal pipeline to 12 miles into the Gulf (instead of 5) and to install a monitoring system to measure the impact of brine salinity on marine life.
- ° An attempt to avoid unemployment at the Weeks Island Louisiana site has caused the greatest delay, accounting for a 75 million barrel reduction in our 1978 estimate. This site has a large cavern created by salt mining by the Morton Salt Company. To avoid a shutdown of mining and associated unemployment, we are working with Morton to let it continue to use the existing mine and shafts while it develops a new mine nearby. This has slowed the planned construction schedule at Weeks Island by about 10 months.
- ° Delays have also been encountered in securing site access and state and local environmental and construction permits, because of concerns relating to impacts on industry, landowners, and workers. In response, we had to agree with the Louisiana Governor not to condemn private operations at several current and potential sites in order to avoid potential reductions in employment.

Status of Storage -- Remaining 750 Million Barrels

Because of a lack of existing storage capacity, most of the remainder of the 750 million barrels of the SPR will be stored in newly mined salt caverns. These caverns are to be created by "solution mining" or "leaching." This requires pumping large volumes of water into many separate drill holes, and disposing of the resulting salt water. (Seven barrels of brine must be disposed of to create one new barrel of storage capacity.) The Department plans to leach new caverns at four of the five sites already selected, and to add three or four new sites. Before leaching can begin, it is necessary to drill wells, install large pumping systems, lay pipelines to rivers or other water sources, and develop

brine disposal systems -- injection wells and pipelines into the Gulf of Mexico. It now appears that it will require six years to leach capacity to store the remaining 750 million barrels of oil in these particular sites.

Our previous target had been storage of 500 million barrels by the end of 1980. It now appears that this goal will be reached by mid-1982. Our end of 1980 goal is now projected at 325 million barrels of storage. Despite this slippage, however, we still believe that one billion barrels can be in storage by the end of 1985, which is consistent with original planning for the SPRO. We regard the 1980 goal as realistic because we have included contingencies in our planning estimates in the event further problems are encountered. For example, we intend to acquire a ninth site, not previously considered, to assure our reaching the 325-million-barrel goal by the end of CY 1980. A limestone mine at Ironton, Ohio, could contribute up to 20 MMB by the end of 1980 depending on the speed of mine conversion. The cost of the site, pipelines, and mine conversion will total about \$60 million.

We are also including in our plans the option for securing facilities in Rotterdam capable of containing 30 MMB to serve logistical needs, which would give us a buffer to match rate-of-purchase to rate-of-fill. This would not be treated as part of the SPR-counted storage. In addition, access to this facility might provide important support for our USAREUR/NATO forces.

The primary reasons for the revised fill schedule are (1) new, more precise, estimates of the speed at which we can "solution mine" new storage caverns, as the engineers develop more detailed plans for this process, which has never been proven at this scale and speed; (2) problems in initiating the leaching construction effort resulting from permitting and site acquisition difficulties similar to those encountered in executing storage of the first 250 million barrels; and (3) difficulty in assembling personnel (both Federal employees and contractors) with the expertise to design, construct, and manage the system on an accelerated basis.

Outlook

The Department is making a maximum effort to develop the SPR as fast as possible, while controlling program costs. The SPR program we are recommending will result in FY 1980 outlays of \$2.3 billion. This spending estimate falls within overall OMB budget guidance targets. By the end of 1980, with 325 million barrels in storage, we would have approximately 100 days protection against a moderately severe OAPEC supply interruption (i.e., a loss of about 3 million barrels per day in foreign oil).

We have already taken several management actions to anticipate and avoid further problems including creation of a regional project office, reorganization and augmentation of SPR staff, and changes in construction management and contracting approaches.

We are also examining whether application of the Defense Production Act possibly could speed construction by exempting the SPR from a variety of legal requirements.

Finally, capability to dispose of brine to the Gulf of Mexico is essential to meet our revised schedules. To reduce the times involved in obtaining certain permits at the state and federal levels -- which have been lengthened by certain procedural obstacles that have been encountered in the environmental permitting process -- we are reviewing the question of whether to request a Presidential waiver of such procedural requirements to permit early activation of brine disposal pipelines. We have not as yet made a determination as to whether to seek such a waiver.

EXECUTIVE OFFICE OF THE PRESIDENT
ENERGY POLICY AND PLANNING
WASHINGTON, D.C. 20500

May 27, 1977

MEMORANDUM FOR: James Schlesinger
FROM: Frank R. Pagnotta 
SUBJECT: Strategic Petroleum Reserve ✓

Dave Freeman has reviewed the attached memo from Jack O'Leary regarding authorization problems for the Strategic Petroleum Reserve and he is in complete agreement with O'Leary's memo.

DOE NEWS:

spur file
R

FOR IMMEDIATE RELEASE
JANUARY 21, 1980

JONES NAMED AS HEAD OF DOE'S OIL RESERVE PROGRAM

Harry A. Jones has been appointed Deputy Assistant Secretary for the Strategic Petroleum Reserve in the U.S. Department of Energy, Dr. Ruth M. Davis, Assistant Secretary for Resource Applications, announced today.

Jones, whose appointment was effective January 13, 1980, had been serving in an acting capacity. He replaces Jay R. Brill, who resigned for health reasons.

Jones joined the Strategic Petroleum Reserve (SPR) Office at the Federal Energy Administration (merged into DOE) in November 1976. Since that time, he held various positions in the program including director of site operations, chief of storage operations and distribution, chief of logistics and director of the systems division.

The SPR is a program designed to create a reserve of up to one billion barrels of oil, stored in underground caverns, to protect the nation against severe oil supply interruptions.

Prior to joining the SPR program, Jones served as a logistics staff analyst with Esso Eastern, Inc., in Houston, Texas. In 1972, he assumed the dual positions of manager, planning division, and manager, operations division, for Esso Asia Services, Inc., in Singapore. From 1959 to 1970, he was an officer in the U.S. Army with assignments including various management positions in the petroleum field.

Jones, born in Ryan, Oklahoma in 1935, was graduated from the University of Texas in 1959 with a bachelor of science degree in petroleum engineering. He received a master of science degree in petroleum engineering from the University of Pittsburgh in 1966.

(MORE)

R-80-008

- 2 -

He is married to the former Linda Askew. They have two sons, Kevin and Harry Jr., and a daughter, Karen.

- DOE -

News Media Contact: Jim Griffin, 202/252-5806

R-80-008