U.S. DEPARTMENT OF ENERGY

STRATEGIC PETROLEUM RESERVE

TECHNICAL AND PERFORMANCE CRITERIA

LEVEL I

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Approved by:

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Deputy Assistant Secretary (Acting)
Strategic Petroleum Reserve

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1.0 INTRODUCTION

1.1 Objective

This document establishes the Strategic Petroleum Reserve (SPR) Program top-level technical and performance criteria against which design, construction, performance and test criteria for the SPR shall be developed at successive levels of detail.

1.2 Scope

The requirements of this document shall apply to all elements of the SPR over which the Department of Energy (DOE) has purview. These requirements shall serve as the baseline for subordinate technical criteria documentation and related specifications governing:

- -- Configuration of the total SPR;
- -- Design, construction, maintenance and operations of SPR sites and distribution facilities; and
- -- SPR systems performance, test and evaluation.

2.0 APPLICABLE DOCUMENTS

2.1 Enabling Authority

The authority to establish the SPR is contained in Public Law 94-163, the Energy Policy and Conservation Act (EPCA) Title I, Part B, Section 154, Strategic Petroleum Reserve, December 22, 1975, as amended. The plan to implement this law is contained in Energy Publication No. 95-2, Strategic Petroleum Reserve Plan, January 1977, amended as follows:

-- Amendment No. l, Acceleration of the Development Schedule, Federal Energy Administration, May 25, 1977;

-- Amendment No. 2, Expansion of the Strategic Petroleum Reserve, Department of Energy, June 1978;

-- Amendment No. 3, Distribution Plan for the Strategic Petroleum Reserve, Department of Energy, October 1979; and

-- Amendment No. 4, Strategic Petroleum Reserve Drawdown Plan, Department of Energy, December 1, 1982.

-- Amendment No. 5, Use of Federal Royalty Oil Department of Energy February 11, 1999.

2.2 Federal, State and Local Codes, Statutes and Regulations

All aspects of this program shall conform to the applicable codes and regulations of the appropriate Federal, State and local agencies or authorities. Specific reference documents shall be identified in subordinate technical criteria documents.

2.3 Industry Standards

All elements of the SPR shall conform to applicable, nationally recognized industry codes and standards except where nonconformance is required by DOE Regulations or Directives, or the requirements of Paragraph 2.2. The specific standards, codes and practices to be followed shall

be identified in subordinate technical criteria documents.

2.4 Department of Energy and SPR Directives

All aspects of this program shall conform to the latest editions of DOE and SPR Directives whether or not such Directives are specifically referenced herein.

2.5 Conflict and Resolution

Where two or more applicable documents apply, the more stringent requirements shall govern. In case of conflict between two or more applicable regulations, codes or standards, resolution shall be made by the SPR Project Manager, or his authorized representative, and documented in the appropriate subordinate SPR criteria documents and specifications.

2.6 Waivers and Deviations

Waivers and deviations to the criteria contained in this document shall be subject to the written approval of the Deputy Assistant Secretary for Strategic Petroleum Reserve.

3.0 TECHNICAL AND PERFORMANCE REQUIREMENTS

The objective of the SPR is to provide for the storage and distribution, when required, of substantial quantities of crude oil in order to diminish U.S. vulnerability to the effects of a severe national energy emergency, such as a petroleum supply disruption. The following paragraphs identify the program technical and performance requirements which apply to design, development and operation of the SPR.

3.1 System Requirements

The SPR system shall have the capability to receive, store and draw down crude oil and, to the maximum extent practicable, interface with existing major commercial distribution networks. The primary configuration and performance requirements for the three SPR storage and distribution groups are provided in Appendices A and B.

3.1.1 Storage Quantities and Quality

The Reserve shall provide storage for that quantity of crude oil as prescribed by law and approved for implementation by the Secretary of Energy. Crude oil acquired for storage shall meet the specifications for SPR sweet and SPR sour shown in Appendix C. Acquisition of any other crude oils require the express approval of the Deputy Assistant Secretary for Strategic Petroleum Reserve.

3.1.2 Drawdown

The SPR system shall provide the capability to draw down and deliver crude oil from SPR storage sites to designated distribution terminals with further access to commercial pipeline distribution networks and marine docks. Each SPR site shall be capable of drawing down and delivering crude oil to the designated distribution terminals and pipelines for custody transfer at rates prescribed by Appendix A, until 90 percent of its inventory has been depleted.

3.1.3 Distribution

The SPR's physical distribution system shall make use of the commercial petroleum distribution infrastructure to the maximum extent feasible. SPR terminal facilities, both DOE-owned and commercial, shall be capable of meeting the distribution rates specified in Appendix B, and shall have the facilities to draw down the oils conforming to different specifications on a segregated basis. Each SPR group shall have a distribution capability equal to 120 percent of the combined site drawdown rates to provide sufficient allowance for terminal operational delays and commercial demand variances.

3.2 Site Requirements

The specific site configurations, performance requirements, and quantities and types of crude oil to be stored within designated storage sites shall be as set forth in Appendix A.

3.3 Site Development

The conceptual design for each site shall be subject to the approval of the Deputy Assistant Secretary for Strategic Petroleum Reserve. Facilities development shall conform to the applicable provisions of DOE Order 430.1, Life Cycle Asset Management. All SPR sites and facilities, including improvements thereto, shall be designed and constructed for an initial operational life of 25 years. The storage capacity of each site shall be sufficient to sustain its specified inventories for 25 years upon completion of development, assuming no drawdown occurs. Site Development Plans shall be prepared and maintained in accordance with DOE Order 430.1. Departmental initiatives, regarding energy conservation in building and industrial type facilities, shall be considered in the design of facilities.

3.3.1 Real Property Interests

All SPR sites, including the underground salt mass in which storage cavities are developed, shall be Government-owned fee simple. Alternative methods of acquisition, such as leasing, require written delegation or other express approval of the Deputy Assistant Secretary for Strategic Petroleum Reserve. The boundary of any storage cavity,

at its maximum projected size following five fill and drawdown cycles, shall maintain any legally mandated distance from adjoining property, but in no event shall it be less than the distance necessary to assure the integrity, safety and security of the SPR site and adjacent property.

3.3.2 Storage Facilities

Crude oil shall be stored in underground solution-mined salt caverns constructed, tested and, prior to initiation of fill, certified to ensure structural integrity and containment of crude oil.

3.3.2.1 Existing Caverns

Prior to initiation of fill, existing storage caverns which are acquired and converted to crude oil storage, as well as their casings, shall be certified as to structural integrity against roof or pillar failure that could lead to loss of stored crude oil.

3.3.2.2 New Solution-Mined Caverns

New solution-mined storage caverns in salt formations shall be designed for a net useable storage capacity of 10 million barrels and an operational capability of five complete fill/drawdown cycles, except as otherwise approved by the Deputy Assistant Secretary for Strategic Petroleum Reserve. Caverns shall maintain a pillar to diameter ratio that ensures structural integrity.

3.3.3 Crude Oil Logistics

SPR sites shall have the capability to receive crude oil from distribution terminals and maintain it in storage, remove or draw down crude oil from storage, and deliver it to distribution terminals or transfer stations which connect to major distribution networks.

All SPR crude oil pipelines shall have a method of leak detection to assure crude oil accountability.

3.3.4 Brine Disposal

Brine shall be sold, disposed of into coastal ocean waters and/or injected into subsurface disposal wells. Brine disposal systems shall be designed, constructed, operated and maintained in an environmentally acceptable manner and in strict accordance with State and Federal laws, regulations and permits. Disposal wells shall be completed in porous and permeable formations sufficiently clear of the salt dome to preclude the dissolution of the salt dome edge, and sufficiently deep or isolated by aquicludes to preclude contamination of potable water aquifers.

3.3.5 Raw Water Supply

Raw water for leaching (solution mining) or displacing crude oil from storage shall be obtained from the nearest environmentally and logistically acceptable source. The raw water system shall be of sufficient capacity to achieve the specified site leaching and drawdown requirements. Selection of a water source shall take potential seasonal or periodic supply restrictions into account.

3.3.6 Buildings and Structures

All site buildings and structures shall be designed to withstand their natural environment, including weathering forces, over a 25 year life-cycle, and comply with applicable standards, codes and regulations.

3.3.7 Electrical Power

The primary source of electrical power shall be the nearest available electric utility company. Redundancy shall be considered in critical subsystems or components of the facility power system, including the on-site substation and switchgear. Agreements with electric power companies shall serve the SPR sites at the most economical rate structures consistent with SPR operations and mission requirements.

3.3.7.1 Primary Power

The primary "on-site" electrical power distribution system shall provide the network necessary to power the site including its safety and security systems, in all its operational modes.

3.3.7.2 Emergency Power

Emergency electrical power shall be provided for vital lighting, computer systems, communications, safety, and security systems during a failure of primary power. Emergency power shall be adequate to shut down and maintain the site in a safe and secure manner. Transferring to emergency power equipment shall be accomplished automatically. Emergency power equipment shall be equipped with automatic start-up and shutdown devices, and provisions for periodic exercises.

3.3.7.3 Uninterruptible Power Supply (UPS)

Uninterruptible power supplies (UPS) shall be provided to protect vital computer, control, communications, safety, and security monitoring systems during an interruption or failure of power.

3.3.8 Communications

Use of commercial and Federal telecommunications systems, with dedicated lines or microwave links, shall be provided for voice and data transmission as necessary to ensure reliable intersite and intrasite communications, as well as reliable communications to appropriate points external to the SPR. For data transmission, the use of electronic transfer shall be maximized. A backup communications system shall be provided for use during an SPR drawdown or operational emergency.

3.3.9 Monitoring and Control

At each site, the monitoring and control system shall be housed in a centrally located

structure. The control system shall have functional control over all fluid transfer subsystems. The control system shall be designed to handle data processing and operational control. The system shall be capable of acquiring and storing a minimum of 24 hours of operating data.

3.3.10 Other Utilities

The means of obtaining other utilities, such as water supply and sewage disposal, shall be determined by economic trade-off analyses, degree of hazard and environmental considerations.

3.4 Site Operations and Maintenance

Simplicity and reliability of operations and maintenance, consistent with personnel safety and environmental protection, is the underlying philosophy. All sites shall be continuously manned 24 hours a day, for security purposes and as needed during operations and transfers.

3.4.1 Operational Modes

SPR sites shall be designed to support three modes of operation: fill, drawdown and operational readiness.

3.4.1.1 Fill

The fill rate capabilities of SPR storage sites shall be as specified in Appendix A. Factors influencing fill rates, including but not limited to system reliability, terminal and transportation logistics, and surge capacity, shall be taken into account.

3.4.1.2 Drawdown

The Drawdown Management Plan provides the basis for operational readiness planning and actions necessary to meet drawdown requirements as set forth in policy documentation. The Drawdown Implementation Manual contains

drawdown implementation instruction for the Strategic Petroleum Reserve (SPR) during an energy emergency.

Provisions for the sale and delivery of SPR oil in the nominal process would give the SPR up to 15 days after the presidential decision to use the SPR to achieve maximum drawdown rates using the following timetable:

- Within the first 11 days, commence awarding contracts for oil delivery.
- Within the first 13 days, begin the flow of oil (not necessarily at maximum flow)
- Within the first 15 days , achieve maximum rates (if required by sales and delivery parameters

Sustainable drawdown rate capabilities of individual storage sites shall be as specified in Appendix A. When a storage site contains at least 15 percent of its total planned inventory, the site's permanent drawdown systems shall be in place and operationally capable of achieving the specified drawdown rate. However, the actual site drawdown rate shall be determined by the crude type inventory level.

3.4.1.3 Operational Readiness

The operational readiness mode is the steady-state period during which no major storage capacity development (leaching) is occurring and the site is configured and ready for fill and drawdown operations. During this period, the site must maintain a readiness to begin drawdown within 13 days of receiving such direction. Each storage site shall be capable of internal cycling of crude oil for

the purpose of periodic testing of subsystems and exercising of the facility.

3.4.2 Crude Oil Accountability and Quality Control

Measurement of the quantity and quality of crude oil received, maintained in storage, and distributed during drawdown shall be conducted for purposes of accountability, control, and custody and title transfer. Crude oil accountability and inventory control shall conform to SPR Manual M 434.1-1A Crude oil quality control shall be in accordance with SPR Order 413.1A Custody and/or title transfer equipment shall conform to the American Petroleum Institute's Manual of Petroleum Measurement Standards, and shall meet the accuracy requirements specified below.

3.4.2.l Quantity Determination

The Reserve shall have the operational capability of measuring the quantity of crude oil at each custody transfer point by means of either tank gauging or metering. Tank gauging shall be performed in accordance with API-approved procedures. Metering systems for custody or title transfer shall have an accuracy of within plus or minus 0.25 percent by volume.

3.4.2.2 Quality Determination

The quality of the crude oil during fill, storage and drawdown shall be determined through both on-site and off-site laboratory tests, and periodic sampling and testing.

3.4.2.3 Commingling of Crude Oil

Different generic crude oils conforming to the same specification may be commingled in any single storage cavern or container. Commingling of crudes of different specifications is not permitted, except for the minimum incidental commingling required to effect normal terminal, tank or pipeline batching and site operations, in which case, the volume of the minority crude oil commingled

in any storage cavern shall not exceed 0.25 percent of the total full cavern volumetric capacity. Any waiver or deviation to this 0.25 percent criterion requires express approval of the Deputy Assistant Secretary for Strategic Petroleum Reserve.

3.4.3 Conduct of Operations

All SPR sites shall conform to DOE Order 5480.19, Conduct of Operations.

3.4.4 Maintenance Management

A maintenance management program shall be established in accordance with DOE Order 430.1 to promote cost-effective maintenance. The maintenance program shall ensure that equipment and facilities meet or exceed their designed life requirements. It shall specify performance indicators and criteria to measure workload, equipment, systems, and personnel performance and efficiency. The maintenance backlog will be controlled to assure operational readiness and the capability to complete essential maintenance on all drawdown-critical equipment within 13 days (not necessarily at maximum rates) and 15 days for maximum rates; in the case of essential maintenance requirements which exceed 13 and 15 days respectively, the capability shall be provided for acceleration or work-around in the event of a drawdown requirement. The maintenance program shall include a review and analysis capability for evaluation of maintenance performance and effectiveness.

3.5 Interface Requirements

3.5.1 Communications

All SPR sites shall be linked with the SPR Headquarters Office, DOE Emergency Operations Center, and the PMO Operations Center for transmission of written and voice communications and data. Electronic data transfer shall be used to the maximum extent practical.

3.5.2 Functional Groups

Each SPR group shall consist of specific storage sites, interconnecting pipelines and one or more distribution terminals with access to both marine and pipeline facilities as indicated in Appendices A and B. All sites and terminals within a group must be capable of simultaneous coordinated operations.

3.5.3 Distribution Terminals

Terminals shall be physically capable of accommodating the fill, refill, drawdown and distribution requirements of the groups served, as defined in Appendices A and B.

3.5.4 Commercial Pipeline Tie-ins

All SPR tie-ins to commercial pipeline systems shall provide for custody measurement at the point of connection; except when such pipelines are dedicated to the SPR use during drawdowns and do not provide take-off connections between the SPR and the pipeline's downstream terminus, custody measurement may be provided at the downstream terminus. Engineering parameters of SPR systems and subsystems shall be compatible with the interfacing commercial pipeline systems.

3.6 Integrated Logistics Support

Integrated Logistics Support (ILS) shall be an integral part of system and equipment design for all elements of the SPR and shall conform to SPR Order 4000.1. Commonality and interchangeability of parts throughout the SPR system shall be maximized, while maintaining consistency with regional industrial usage.

4.0 SYSTEM ASSURANCE AND READINESS

4.1 Quality Assurance

A Quality Assurance (QA) program shall be developed and implemented in accordance with DOE Order 414.1

4.2 Systems Effectiveness

4.2.l Reliability

The SPR shall be constructed to achieve a reliability of operations which ensures that availability objectives are achieved. A reliability program shall be conducted in accordance with DOE Order 430.1 to maintain operational readiness to meet drawdown requirements.

4.2.2 Maintainability

A maintainability program shall be implemented in accordance with DOE Order 430.1 to ensure that SPR availability objectives are achieved.

4.2.3 Operational Readiness

Each site and distribution terminal (DOE-owned or commercial) of the Reserve shall be maintained in a state of readiness that will ensure the capability of transitioning from operational readiness to beginning the flow of oil within 13 days and to increase the flow of oil to full drawdown and distribution rates, as specified in Appendix A, within 15 days of receiving such direction. Contract provisions with commercial terminal owners/operators shall include provisions to meet required drawdown and distribution rates on a sustained basis.

4.2.4 Availability

Each SPR site and terminal shall be designed, constructed and operated with a minimum

availability of 0.95. Each SPR site and distribution terminal shall be capable of meeting, under its availability, the performance requirements for fill, drawdown and distribution as specified in Appendix A on an average daily basis. These performance requirements apply over the duration of a complete fill mission and to the drawdown of 90 percent of a site's total inventory. Achievement of requisite system availability shall be verified by analytical means.

4.2.5 Readiness Exercises

The SPR drawdown systems shall be exercised periodically to assure an acceptable state of readiness. These exercises shall be at the site, group or integrated group levels.

4.3 Recovery Program

A Recovery Program shall be maintained to provide a reasonable level of assurance that the SPR can sufficiently recover from damage resulting from natural events and a defined range of deliberate acts to meet the drawdown rates indicated in Appendix A, except as otherwise specified, within the period of time specified below. Specific recovery procedures shall be documented in a comprehensive recovery plan.

4.3.1 Recovery Criteria

A Recovery Program shall be maintained to provide a reasonable level of assurance that the SPR can recover from damage resulting from natural or manmade events.

The Recovery Program shall provide the capability to restore all drawdown critical systems at a single site to above 85 percent of the site's full drawdown capability status within 15 days. The Recovery program shall provide capability to restore any two drawdown-critical systems at any two sites to above 65 percent of the full drawdown capability of each site within 30 days . The SPR shall have the capability to recover from multiple pipeline damage scenarios within 15 days.

4.3.2 Recovery Program Assurance

Specific recovery procedures shall be documented in the Recovery Plan. Site-specific recovery capabilities shall be demonstrated by a combination of analytical methods and physically exercising the system.

4.4 Environment Safety and Health (ES&H)

Design, construction, operation and maintenance activities shall comply with all Federal, State and local ES&H laws and regulations, permits, and DOE ES&H policies and directives. The SPR shall be active in ES&H areas, continually striving to reduce risk and provide greater protection of DOE property, personnel, and the environment. Assessment programs shall be developed to ensure that questionable and inadequate operating conditions are identified, reported and corrected to acceptable levels.

4.4.1 Fire Protection

SPR facilities and systems shall be designed and maintained to meet "Improved Risk" or "Highly Protected Risk" criteria as specified in DOE Order 440.1. The SPR Fire Protection Program shall ensure that the SPR's operational readiness is not compromised due to fire or related peril. Mission protection provided through the SPR's Recovery Plan may be considered toward meeting this requirement. Fire protection engineering and programs shall meet or exceed industrial protection standards, specifications, codes and regulations. SPR sites shall have emergency contingency plans, and, whenever possible, mutual aid agreements developed in cooperation with Federal, State and local authorities. When fire safety systems are malfunctioning or inoperative, and suitable backups are not in place, petroleum movements and other potentially hazardous operations shall cease in the affected area until deficiencies are corrected and resumption of activities is authorized by the SPR Project Manager or designated representative.

4.5 Security

A Security Program shall be maintained in accordance with DOE Order 470.1 which is designed to protect SPR personnel and assets. The Security Program shall incorporate the mitigative

features of the SPR Recovery Program. An approved Site Security Plan shall be maintained which is consistent with threat and vulnerability assessments.

4.6 System Acceptance

System acceptance shall consist of multiple levels of acceptance testing starting with vendor product acceptance up to site acceptance.

4.6.l Acceptance Testing

All SPR-constructed storage and terminal sites, pipelines, subsystems and components shall be tested prior to Government use and possession. All tests to be performed shall verify that (l) construction is in accordance with design, and (2) the design meets the requirements of this Level I Criteria document and subordinate specifications.

4.6.2 Certification

Certification shall be required for each vessel and cavern intended for crude oil storage or shipment. Certification/recertification requirements shall meet the best practices of the industry and criteria established by local, State and Federal regulations. SPR solution-mined caverns shall be evaluated to determine recertification requirements following the transfer or removal of a cumulative volume of crude oil exceeding 10 percent of the stored volume of crude oil. Recertification of solution-mined cavern shall be performed whenever a cumulative volume of crude oil withdrawn from a cavern exceeds 50 percent of its total storage capacity.

4.7 Training and Certification of Personnel

All SPR personnel, including DOE and contractor personnel, shall receive sufficient training and, as applicable, formal qualification, to ensure the most efficient utilization of resources and the safe, reliable and environmentally responsible operations and maintenance of the physical system. The SPR will utilize a systematic approach to training to develop and implement performance based training programs. The SPR shall identify and designate critical positions for certification.

5.0 CONFIGURATION MANAGEMENT

A Configuration Management Program shall be implemented consistent with DOE Order 430.1, Life Cycle Asset Management. A Configuration Management Plan shall be established to provide overall guidance for managing, maintaining, controlling and documenting changes to the configuration baseline through design, construction and operation phases of the SPR facility. Configuration Control Boards will be established at the SPR Headquarters Office for Level I configuration control and at the Project Management Office for Level II configuration control. The SPR shall maintain up-to-date "as-built" documentation on each of its facilities, and shall develop standardized product specifications for systems and equipments requiring reprocurement, as appropriate, to assure that the system configuration baseline is maintained throughout the facilities life.

6.0 DEFINITIONS

Availability - The fraction of the design flow rate which the system or site can achieve on an average basis for a specified period of time with a specified system configuration.

Cavern - A cavity developed within a salt mass, accessible by one or more wells for the purpose of storing crude oil.

Component Availability - The fraction of the total mission time the component is in a fully operational state, given a repairable system with a constant failure rate.

Distribution Networks - Terminals, pipelines and marine transportation systems having access to SPR crude oil.

Drawdown - The act by which crude oil stored at SPR sites is removed from storage and conveyed into distribution networks.

Fill - The process of placing crude oil into storage.

Group - One or more storage sites within a particular geographic area and/or connected by pipeline to a common distribution network. A Group may also be referred to as a "Complex".

Internal Cycling – The act of transferring crude oil from one SPR site to another, or between storage containers within a site.

Leaching - The process of injecting water into a subsurface salt mass to dissolve the salt and develop a cavern.

Maintainability - A measure of the degree to which a component is capable of being restored to performance of its function after failure under specified maintenance conditions and procedures, normally expressed as Mean Time To Repair (MTTR).

Marine Terminal - That portion of a distribution terminal containing marine vessel petroleum

loading and unloading systems.

P/D Ratio - The ratio of the thickness of the salt pillar or web between adjacent caverns to the average diameter of the two caverns.

Reliability - The probability that a system or equipment will function as designed for the duration of a specific mission profile within specified operating limits and operating environments, normally expressed as Mean Time Between Failure (MTBF).

Site - Any specific and bounded land area, the use of which has been purchased, leased, rented or otherwise secured for SPR use.

Solution-Mining - Synonym for leaching.

Well - The hole drilled into subsurface formations and subsequently used to leach (solution-mine) a cavern in a salt mass for storing, injecting or withdrawing crude oil; or the hole drilled into permeable sand formations for the purpose of disposing of (injecting) brine.

APPENDICES

APPENDIX A

STRATEGIC PETROLEUM RESERVE STORAGE AND DRAWDOWN REQUIREMENTS

Storage Complex	Storage Facility	Storage Capacity (MMB)	Crude Type	Crude Quantity (MMB)	Crude Type %	Design Fill Rate (MB/D)	Sustained Drawdown Rate (MB/D)
Seaway Complex	Bryan Mound Freeport, TX	254	Sour Sweet	176.0 78.0	69.3 30.7	225	1,500 (Sour) 1,000 (Sweet) 1,500[1]
Texoma Complex	West Hackberry Hackberry, LA	227	Sour Sweet	108.0 119.0	47.6 52.4	225	1,300 (Sour) 1,300 (Sweet) 1,300 [1]
	Big Hill Winnie, TX	170	Sour Sweet	98.0 72.0	57.6 42.4	225	1,100 (Sour) 1,000 (Sweet)
Capline Complex	Bayou Choctaw Plaquemine, LA	76	Sour Sweet	52.0 24.0	68.4 31.6	110	515 (Sour) 300 (Sweet)
Total Reserve		727	Sour Sweet	434.0 293.0	59.7 40.3	785	4,415

Notes:1. Combined drawdown rate for simultaneous Sour/Sweet crudes.

APPENDIX B

STRATEGIC PETROLEUM RESERVE GROUP DISTRIBUTION REQUIREMENTS

Storage Complex	Distribution Points	Distribution Rates (MBD)		
		Marine[1]	Pipeline	Total
Seaway Group				
	Seaway Freeport Docks	400	-	400
	Seaway Jones Creek	-	400	400
	Seaway Texas City	300	880	1000
				1800
Texoma Group				
	Sunoco Terminal	1175	775	1950
	Equilon 22" Pipeline (Lake Charles)	-	520	520
	Unocal Terminal	200	30	230
	Equilon 20" Pipeline (East Houston)	-	180	180
				2880
Capline Group				
	Equilon Sugarland Terminal (St. James)	400	620	620
	Equilon 24" Pipeline (Baton Rouge)	-	200	200
				620[2]

Notes:

1. Marine distribution based on 60 percent dock utilization assumption.
2. Bayou Choctaw distribution to St. James and Baton Rouge are not additive.

APPENDIX C

STRATEGIC PETROLEUM RESERVE CRUDE OIL SPECIFICATIONS

CHARACTERISTIC	SPR SWEET	SPR SOUR	ASTM TEST METHOD(S)
API Gravity	30-45	30-45	D 1298 or D5002
Total Sulfur [mass %], Max.	0.50	1.99	D 1552
Pour Point [^{o}F(^{o}C)], Max.	50 (10)	50 (10)	D 97
Salt content [mass %], Max	$\leq$ 0.050	$\leq$ 0.050	D 3230
Viscosity cSt @ 15.6^{o}C, Max. cSt @ 37.8^{o}C, Max.	 32 13	 32 13	D 445
Reid Vapor Pressure [psia @ 100^{o}F], Max.	11.0	11.0	D 323 or D 5191
Total Acid Number [mg KOH/g], Max.	1.00	1.00	D 664
Water and Sediment [Vol%], Max.	1.0	1.0	D 473 & D 4006 or D 4928
Yields [Vol%] Naphtha [82-375^{o}F (28-191^{o}C)] Distillate [375-620 ^{o}F (191-327^{o}C)] Gas Oil [620-1050 ^{o}F (327-566^{o}C)] Residuum [>1050 ^{o}F (>566^{o}C)]	 21 - 42 19 - 45 20 - 42 14 Max.	 24 - 30 17 - 31 26 - 38 10 - 19	D 2892 & D 1160