Chapter 5. Irreversible and Irretrievable Commitment of Resources

This section describes the amounts and types of resources that would be irreversibly and irretrievably committed if the proposed expansion of the SPR is undertaken. The principal resource that would be would be committed to SPR expansion is the land that would be required for the construction and expansion of the proposed sites, pipeline ROWs, and marine terminals. Construction of storage caverns in the salt domes at the proposed new and expansion sites would also result in the irretrievable loss of the salt, which would be either discharged as brine to the Gulf of Mexico or disposed of by underground injection, and irretrievable use of the water needed to dissolve the salt. Additional water would be used during drawdown. Other resources that would be committed to the proposed new and expansion sites include construction materials (e.g., steel, concrete) and energy (e.g., electricity, fuel) used for construction and operation.

5.1 LAND RESOURCES

The amount of land that would be committed during construction of the proposed new and expansion sites would include land used for the SPR site construction, pipeline construction ROWs, RWI structure construction, tank farm, and other terminal construction, and, to a lesser extent, road construction. While not all the acreage required for SPR construction would actually be developed, standard security measures require that the entire site be enclosed in fencing. This would effectively preclude use of the fenced-in land for the duration of the operation.

The land required for proposed new and expansion site and pipeline construction would include both uplands and wetlands. Temporary easements would be required during pipeline construction, and permanent easements would be maintained for the pipeline ROWs. Permanent easement lands would be considered to be irretrievable resources. Temporary easement lands would not ordinarily be considered as irretrievable resources; however, impacts to temporary easement lands during construction would be degraded for the duration of the SPR operation. The total acreage that would be committed for each proposed new and expansion site, including both temporary and permanent easements, is shown in table 5.1-1, and the total acreage that would be committed for each alternative is shown in table 5.1-2. (See chapter 2 for more information on the alternatives). The land area of the temporary easements for pipeline construction would be approximately 50 percent of the total area of the crude oil, brine, and raw water pipeline ROWs.

For the Bayou Choctaw and Big Hill sites, the land required for expansion would be the same regardless of the additional storage capacity and number of additional storage caverns. The West Hackberry site would either be expanded through acquisition of three existing storage caverns or not expanded at all. The total area of the West Hackberry site shown in tables 5.1-1 and 5.1-2 includes the disturbed areas and buffer for the proposed expansion but does not include an additional 240 acres (97 hectares) of land adjacent to the existing West Hackberry site that would be purchased by DOE but not developed.

Table 5.1-1: Commitment of Land for Proposed New and Expansion SPR Sites (acres)

Site	MMB	SPR Site Construction and Buffer	Terminal, Pump Station, and Tank Farm	RWI Structure and Security Buffer	Power Line ROW	Crude Oil Pipeline ROW	Brine Pipeline ROW	Brine Injection Well Area	Raw Water Pipeline ROW	Access Road Area	Total Land Area
Bayou Choctaw	20	0	0	0	0	0	7	96	0	2	105
Big Hill	96	206	0	0	0	278	16	0	0	0	500
	80	206	0	0	0	278	16	0	0	0	500
Bruinsburg	160	365	141	16	194	1,742	214	73	7	47	2,795
Chacahoula	160	320	0	16	382	899	553	0	28	15	2,213
Richton	160	350	116	16	201	3,060	0	0	56	10	3,778
Stratton Ridge	160	371	39	16	45	911	9	0	125	4	1,505
West Hackberry	0	0	0	0	0	0	0	0	0	0	0
	15	81	0	80	0	0	0	0	0	0	81

Notes:

1 acre = 0.405 hectare

Table 5.1-2: Commitment of Land for Proposed New and Expansion SPR Alternatives (acres)

Alternative	SPR Site Construction and Buffer	Terminal, Pump Station, and Tank Farm	RWI Structure	Power Line ROW	Crude Oil Pipeline ROW	Brine Pipeline ROW	Brine Injection Well Area	Raw Water Pipeline ROW	Access Road Area	Total Land Area
Bruinsburg w/3 Expansion Sites	652	141	16	194	2,020	237	169	7	49	3,485
Bruinsburg w/2 Expansion Sites	571	141	16	194	2,020	237	169	7	49	3,405
Chacahoula w/3 Expansion Sites	607	0	16	382	1,177	576	96	28	17	2,999
Chacahoula w/2 Expansion Sites	526	0	16	382	1,177	576	96	28	17	2,818
Richton w/3 Expansion Sites	637	116	16	201	3,338	23	96	56	12	4,495
Richton w/2 Expansion Sites	556	116	16	201	3,338	23	96	56	12	4,414
Stratton Ridge w/3 Expansion Sites	658	39	16	45	1,189	32	96	125	6	2,206
Stratton Ridge w/2 Expansion Sites	577	39	16	45	1,189	32	96	125	6	2,125
No Action	0	0	0	0	0	0	0	0	0	0

Notes:

1 acre = 0.405 hectare

5.2 WATER RESOURCES

There are three primary uses of water during site construction and operation: cavern leaching, cavern fill, and drawdown. Water used for both leaching and drawdown would be discharged or disposed of as brine into a different waterbody from the source. Such water use would be considered an irretrievably committed resource for each of the proposed new and expansion sites. No significant water resources would be required for construction of the pipelines or terminals or for SPR operations other than fill and drawdown. Leaching requires a volume of water equal to approximately seven times the potential storage capacity of the leached cavern, in other words, seven barrels of water would create storage capacity for one barrel of oil. In the case of the Richton alternatives, this 7:1 ratio may be higher if salt water from the Gulf of Mexico is used for solution mining. Quantities of water that would be required for leaching storage caverns for each site and for each alternative are shown in table 5.2-1 and table 5.2-2. Storage cavern fill and drawdown cycles require a water volume approximately equal to the displaced volume of oil (i.e., one barrel of water/one barrel of oil). Water requirements for fill/withdrawal for each alternative are also shown in table 5.2-1 and table 5.2-2, assuming five drawdown/fill cycles over the operating life of each proposed new and expansion SPR site.

5.3 MATERIAL AND ENERGY RESOURCES

Material and energy resources committed for development of the SPR expansion sites would include construction materials (e.g., steel and concrete), electricity, fuel (e.g., diesel and gasoline), salt, and crude oil through evaporation losses during cavern fill, storage, and drawdown. All energy used during construction and operation would be irretrievable. Relative to the potential energy stored in the form of crude oil in the caverns, the energy consumed during construction and operation would be very small. In addition, the amount of crude oil lost to evaporation during fill, storage, and drawdown would be small.

The amount of construction materials used in constructing the proposed new and expansion SPR sites would also be small as compared to overall consumption of construction materials.

Salt, which is potentially economically valuable, would be leached from the caverns and disposed of as brine and its economic value would be irreversibly lost. Although salt is an inexhaustible resource found in sea water, its economic value is higher when the salt is in a concentrated form, such as in a salt dome. The amount of salt lost during cavern leaching would have a volume equal to the storage capacity of the oil storage caverns. The volume of salt that would be lost during leaching may be estimated from the cavern volume using an average density of 2.16 grams per cubic centimeter (135 pounds per cubic foot). For a single 10 MMB storage cavern, the volume of salt is equivalent to 3.4 million metric tons (3.7 million short tons) of salt, which is equivalent to approximately 7% of annual U.S. salt production (USGS 2006b). For any of the alternatives, the amount of salt lost would be approximately 95 million metric tons (105 million short tons).

While there is a potential economic value in any salt that would be lost through cavern development, the salt that would be lost at the Stratton Ridge would represent a real economic loss because the Dow Chemical Company uses salt from the Stratton Ridge salt dome in chemical manufacturing. The salt that would be removed from the dome through SPR development and disposed of as brine would not be available for use as a raw material in chemical manufacturing. Although the economic value of a given amount of salt is theoretically the same for any of the new and expansion sites, the other sites do not have existing infrastructure in place to use the salt, and such infrastructure would need to be constructed to realize the economic value of the salt. Therefore, the potential to realize the economic value of the salt is lower for the other sites than for the Stratton Ridge site.

Table 5.2-1: Water Required for Construction and Operation of Proposed New and Expansion SPR Sites (MMB)

Site	Capacity	Leaching	Fill/Withdrawal	Total
Bruinsburg	160	1,120	800	1,920
Chacahoula	160	1,120	800	1,920
Richton	160	1,120*	800	1,920
Stratton Ridge	160	1,120	800	1,920
Bayou Choctaw	20	140	100	240
Big Hill	96	672	480	1,152
	80	560	400	960
West Hackberry	0	0	0	0
	15	0	75	75

*Would be higher if salt water from the Gulf is used due to withdrawal limitations in the Leaf River.

Table 5.2-2: Water Required for Construction and Operation of SPR Expansion Alternatives (MMB)

Alternative	Capacity	Leaching	Fill/Withdrawal	Total
Bruinsburg w/3 Expansion Sites	275	1,820	1,375	3,195
Bruinsburg w/2 Expansion Sites	276	1,932	1,380	3,312
Chacahoula w/3 Expansion Sites	275	1,820	1,375	3,195
Chacahoula w/2 Expansion Sites	276	1,932	1,380	3,312
Richton w/3 Expansion Sites	275	1,820	1,375	3,195
Richton w/2 Expansion Sites	276	1,932	1,380	3,312
Stratton Ridge w/3 Expansion Sites	275	1,820	1,375	3,195
Stratton Ridge w/2 Expansion Sites	276	1,932	1,380	3,312
No-Action	0	0	0	0

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