

### 3. Crude Oil Statistics

The United States had 22,446 million barrels of crude oil proved reserves as of December 31, 2001. This is 1.8 percent (401 million barrels) more than in 2000, and marks the third year in a row that crude oil proved reserves have increased.

Total discoveries of crude oil in 2001 resulted mainly from exploration in the deepwater Gulf of Mexico Federal Offshore and the Alaskan North Slope. Operators replaced 121 percent of 2001 oil production with proved reserves additions (Figure 15).

#### Proved Reserves

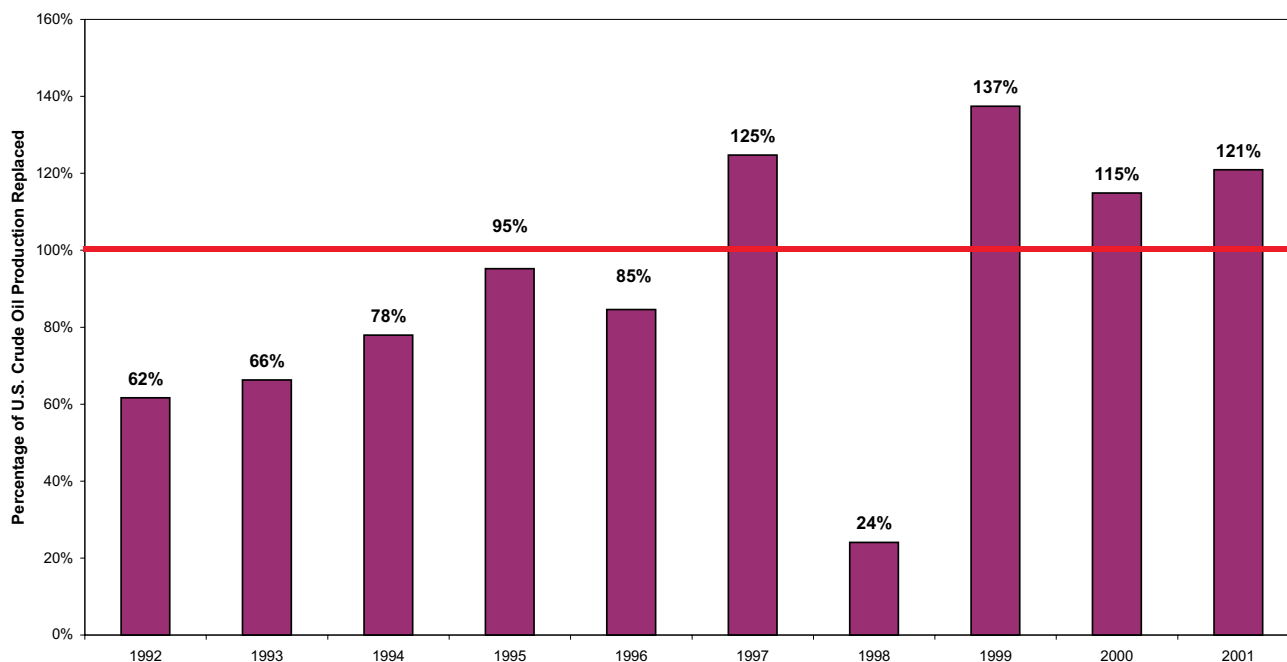
Table 6 presents the U.S. proved reserves of crude oil as of December 31, 2001, by selected States and State subdivisions.

Figure 16 maps 2001 crude oil proved reserves by area. The following four areas account for 79 percent of U.S. crude oil proved reserves:

Area	Percent of U.S. Oil Reserves
Texas	22
Alaska	22
Gulf of Mexico Federal Offshore	19
California	16
<b>Area Total</b>	<b>79</b>

Of these four areas, only the Gulf of Mexico had an increase in crude oil proved reserves in 2001.

Figure 15. Reserve Additions Replace 121% of 2001 U.S. Crude Oil Production.



Source: Energy Information Administration, Office of Oil and Gas.

**Table 6. Crude Oil Proved Reserves, Reserves Changes, and Production, 2001**  
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Published Proved Reserves 12/31/00	Changes in Reserves During 2001							New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (-)	Proved Reserves 12/31/01
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Sales (-)	Acquisitions (+)	Extensions (+)					
Alaska	4,861	1	128	215	0	0	150	281	0	355	4,851	
<b>Lower 48 States</b>	<b>17,184</b>	<b>-5</b>	<b>1,473</b>	<b>1,544</b>	<b>529</b>	<b>442</b>	<b>716</b>	<b>1,126</b>	<b>292</b>	<b>1,560</b>	<b>17,595</b>	
Alabama	34	-4	13	1	1	1	1	0	3	4	42	
Arkansas	48	9	2	7	3	1	0	0	0	<sup>a</sup> 7	<sup>a</sup> 43	
California	3,813	5	232	253	3	5	99	0	0	271	3,627	
Coastal Region Onshore	455	-2	6	56	0	0	0	0	0	18	385	
Los Angeles Basin Onshore	292	-2	25	28	1	1	26	0	0	16	297	
San Joaquin Basin Onshore	2,870	10	188	151	2	4	67	0	0	220	2,766	
State Offshore	196	-1	13	18	0	0	6	0	0	17	179	
Colorado	217	0	7	18	16	14	8	0	0	16	196	
Florida	76	1	3	1	0	0	0	0	0	4	75	
Illinois	111	-1	3	11	2	0	2	0	0	10	92	
Indiana	15	1	1	2	1	0	0	0	0	<sup>a</sup> 2	<sup>a</sup> 12	
Kansas	237	-9	17	22	7	17	4	1	8	30	216	
Kentucky	24	1	1	2	5	0	0	0	0	2	<sup>a</sup> 17	
Louisiana	529	48	52	60	50	67	40	0	13	75	564	
North	97	2	10	14	10	15	1	0	0	14	87	
South Onshore	310	43	37	37	32	39	19	0	7	45	341	
State Offshore	122	3	5	9	8	13	20	0	6	16	136	
Michigan	56	-1	4	6	1	0	0	0	0	6	46	
Mississippi	182	5	5	22	5	17	3	0	0	18	167	
Montana	235	16	8	19	6	6	35	0	1	16	260	
Nebraska	18	-1	2	1	1	0	0	0	0	2	<sup>a</sup> 15	
New Mexico	719	1	143	119	19	13	37	0	2	62	715	
East	705	1	142	117	19	13	37	0	2	61	703	
West	14	0	1	2	0	0	0	0	0	1	12	
North Dakota	270	4	17	22	5	5	8	0	81	30	328	
Ohio	59	6	6	18	2	0	0	0	1	6	46	
Oklahoma	610	12	50	64	28	15	13	0	1	53	556	
Pennsylvania	15	-3	1	2	0	0	0	0	0	1	10	
Texas	5,273	-90	376	466	203	143	288	2	10	389	4,944	
RRC District 1	87	-26	3	8	7	5	0	0	0	8	46	
RRC District 2 Onshore	54	0	2	5	5	5	5	0	0	8	48	
RRC District 3 Onshore	213	8	15	21	41	45	6	0	1	31	195	
RRC District 4 Onshore	34	1	5	5	2	2	0	0	2	5	32	
RRC District 5	44	1	2	17	1	4	1	0	0	5	29	
RRC District 6	213	4	10	16	21	17	14	0	0	21	200	
RRC District 7B	124	-10	6	15	4	2	1	0	0	13	91	
RRC District 7C	206	-22	20	19	8	9	18	0	1	17	188	
RRC District 8	2,073	-19	116	178	69	33	43	1	3	123	1,880	
RRC District 8A	2,022	-15	176	157	36	17	195	1	2	135	2,070	
RRC District 9	131	-7	13	16	6	2	2	0	1	16	104	
RRC District 10	67	-5	7	9	3	2	3	0	0	7	55	
State Offshore	5	0	1	0	0	0	0	0	0	0	6	
Utah	283	-2	17	15	8	9	0	0	0	13	271	
West Virginia	12	-3	1	1	0	0	0	0	0	1	8	
Wyoming	561	-1	23	71	20	23	19	0	3	48	489	
Federal Offshore	3,770	-3	487	340	143	106	158	1,123	169	492	4,835	
Pacific (California)	596	-1	33	51	0	0	3	0	0	33	547	
Gulf of Mexico (Louisiana)	2,751	-2	400	236	94	105	153	1,051	166	417	3,877	
Gulf of Mexico (Texas)	423	0	54	53	49	1	2	72	3	42	411	
Miscellaneous <sup>b</sup>	17	4	2	1	0	0	1	0	0	2	21	
<b>U.S. Total</b>	<b>22,045</b>	<b>-4</b>	<b>1,601</b>	<b>1,759</b>	<b>529</b>	<b>442</b>	<b>866</b>	<b>1,407</b>	<b>292</b>	<b>1,915</b>	<b>22,446</b>	

<sup>a</sup>Indicates the estimate is associated with a sampling error (95 percent confidence interval) that exceeds 20 percent of the estimated value.

<sup>b</sup>Includes Arizona, Missouri, Nevada, New York, South Dakota, Tennessee, and Virginia.

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for crude oil for 2001 contained in the *Petroleum Supply Annual 2001*, DOE/EIA-0340(01).

Source: Energy Information Administration, Office of Oil and Gas.

Figure 16. 2001 Crude Oil Proved Reserves by Area

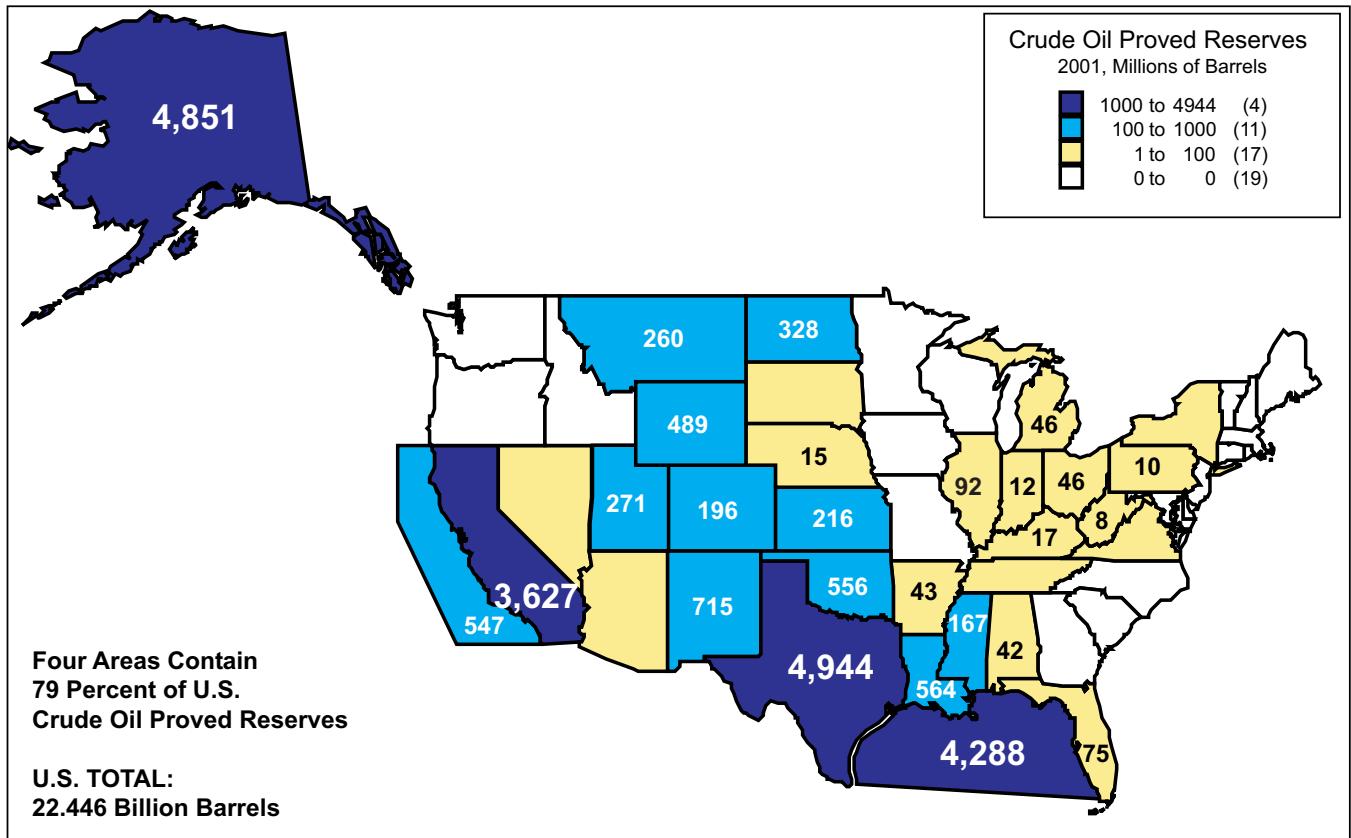
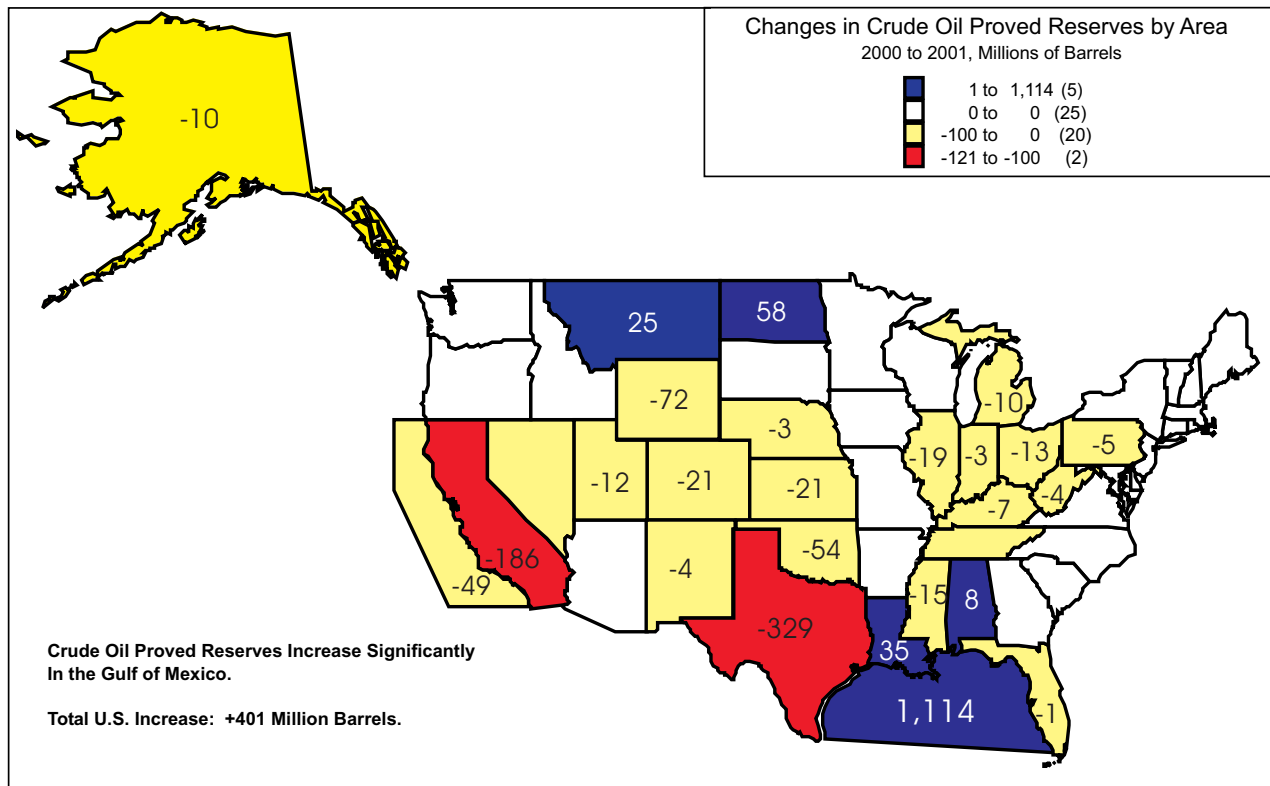


Figure 17. Changes in Crude Oil Proved Reserves by Area, 2000 to 2001



Source: Energy Information Administration, Office of Oil and Gas.

## Discussion of Reserves Changes

Figure 17 maps the change in crude oil proved reserves from 2000 to 2001 by area. Here's how the top four areas fared compared to the total United States:

Area	Change in U.S. Oil Reserves (million barrels)
Texas	-329
Alaska	-10
Gulf of Mexico Federal Offshore	+1,114
California	-186
<b>Area Total</b>	<b>+589</b>
<b>U.S. Total</b>	<b>+401</b>

Figure 2 in Chapter 2 shows the components of the changes in crude oil proved reserves for 2001 and the preceding 10 years.

### Total Discoveries

*Total discoveries* are those new reserves attributable to *extensions* of existing fields, *new field discoveries*, and *new reservoir discoveries in old fields*. They result from the drilling of exploratory wells.

*Total discoveries* of crude oil were 2,565 million barrels in 2001, 99 percent more than those of 2000. Only six areas had *total discoveries* exceeding 50 million barrels:

- The Gulf of Mexico Federal Offshore had 1,447 million barrels of *total discoveries*, 56 percent of the National total.
- Alaska had 431 million barrels of *total discoveries*, 17 percent of the National total.
- Texas had 300 million barrels of *total discoveries*, 12 percent of the National total.
- California had 99 million barrels of *total discoveries*, 4 percent of the National total.
- North Dakota had 89 million barrels of *total discoveries*, 3 percent of the National total.
- Louisiana had 53 million barrels of *total discoveries*, 2 percent of the National total.

The United States discovered an average of 813 million barrels of new crude oil proved reserves per year in the prior 10 years (1991 through 2000). *Total discoveries* in 2001 were three times larger than that average.

## Extensions

Operators reported 866 million barrels of *extensions* in 2001. The highest volume of *extensions* was reported in Texas (288 million barrels). Operators in the Gulf of Mexico Federal Offshore reported 155 million barrels of *extensions*. Alaska was third with 150 million barrels of *extensions* in 2001.

In the prior 10 years, U.S. operators reported an average of 438 million barrels of *extensions* per year. The 2001 *extensions* were almost twice that average.

### New Field Discoveries

There were 1,407 million barrels of *new field discoveries* reported in 2001. Only four areas in the United States reported any *new field discoveries*, and only two contributed large volumes:

- Gulf of Mexico Federal Offshore (80 percent; 1,123 million barrels)
- Alaska (20 percent; 281 million barrels).

In the prior 10 years, U.S. operators reported an average of 223 million barrels of reserves from *new field discoveries* per year. Reserves from *new field discoveries* in 2001 were more than 6 times that average volume.

### New Reservoir Discoveries in Old Fields

Operators in the United States reported 292 million barrels of crude oil reserves from *new reservoir discoveries in old fields* in 2001. As with *new field discoveries*, the most significant portion of the *new reservoir discoveries in old fields* came from the Gulf of Mexico Federal Offshore—169 million barrels or 58 percent of the total. North Dakota had 81 million barrels (28 percent). Louisiana had 13 million barrels (4 percent) and Texas had 10 million barrels (3 percent). In the prior 10 years, U.S. operators reported an average of 152 million barrels of reserves from *new reservoir discoveries in old fields* per year. Reserves from *new reservoir discoveries in old fields* in 2001 were almost twice that average.

### Revisions and Adjustments

Thousands of positive and negative *revisions* to proved reserves occur each year as infill wells are drilled, well performance is analyzed, new technology is applied, or economic conditions change. *Adjustments* are the annual changes in the published reserve estimates that cannot be directly attributed to the estimates for other

reserve change categories because of the survey and statistical estimation methods employed.

There were 1,601 million barrels of revision increases, 1,759 million barrels of revision decreases, and -4 million barrels of adjustments in 2001. Combined, there were -162 million barrels of net *revisions and adjustments* for crude oil in 2001.

## Sales and Acquisitions

*Sales* represents that volume of crude oil proved reserves deducted from an operator's total by selling or transferring operations of existing oil fields or properties to another operator (not a volume of production "sold" at the wellhead). Similarly, *acquisitions* are that volume of proved reserves added to an operator's total through purchase or operations transfer of an existing oil field or properties.

Fundamentally, tracking *sales* and *acquisitions* seems like an exercise in accounting, but it is not that simple. Since operators have different engineering staffs and resources, or different development plans or schedules, the estimate of proved reserves for a field can change with a change in ownership. Timing of the transfer of operations can also impact these values.

In 2001, there were 529 million barrels of sales transactions between operators, and 442 million barrels of acquisitions -- yielding a net difference of -87 million barrels in 2001.

## Production

U.S. *production* of crude oil in 2001 was an estimated 1,915 million barrels. This volume does not include lease condensate. This was 2 percent higher than 2000's production of 1,880 million barrels. This increase ends a 9 year trend of production declines. The Gulf of Mexico Federal Offshore remains the largest producing area in the United States in 2001 with 459 million barrels of production (24 percent of the National total). Texas and Alaska are second and third with 20 percent and 19 percent of the total, respectively. California is fourth with 14 percent.

In 2001, the Form EIA-23 National production estimates were less than 1 percent greater than the comparable *Petroleum Supply Annual (PSA) 2001* volumes for crude oil and lease condensate production combined (2,118 million barrels).

## Areas of Note: Large Discoveries and Reserves Additions

The following State and area discussions summarize notable activities during 2001 concerning expected new field reserves, development plans, and possible production rates as reported in various trade publications. The citations do not necessarily reflect EIA's concurrence, but are considered important enough to be brought to the reader's attention.

The following areas were the major success stories for crude oil reserves and production for 2001.

### Gulf of Mexico Federal Offshore

The Gulf of Mexico Federal Offshore led the Nation in *total discoveries* of crude oil proved reserves in 2001, 702 million barrels of *total discoveries* which is 55 percent of the National total.

- **Thunder Horse Field:** One new deepwater field accounted for a significant portion of all new oil reserves. Thunder Horse Field is located in Mississippi Canyon Blocks 776, 777, and 778, 125 miles south-east of New Orleans at a water depth of 6,000 feet. After full development, Thunder Horse is expected to be the largest field in the Gulf of Mexico. BP Amoco is the operator of Thunder Horse Field, the development of which in water over a mile deep will be yet another extraordinary technical achievement in the Federal Offshore. The Thunder Horse platform will be the largest production semisubmersible platform ever built. The topsides, which will be principally built at McDermott's construction yard in Morgan City, Louisiana, consist of a two-level deck measuring about 140 meters long and 110 meters wide composed of three of the largest modules fabricated to date for the Gulf of Mexico. These modules will house the crew and handle up to 250,000 barrels of oil per day, 5.6 million cubic meters of gas per day, and 140,000 barrels per day of produced water. Total topside weight is over 50,000 metric tons. The topsides are to be mounted on a four-column floating hull designed by GVA of Sweden which is likely to be built in the Far East and transported to the Gulf of Mexico aboard a specialized carrier vessel. The platform will be held on station by 16 mooring lines made of chain and steel wire rope almost 6 inches in diameter with a breaking strength of over 1,000 metric tons. Each



line will be anchored to the seabed by suction piles, giving the platform the ability to survive the Gulf of Mexico's hurricanes.

- **Manatee Field:** On September 19, 2001, Shell Exploration & Production Company (SEPCo) announced plans to develop Manatee Field, a two-well subsea production system set in 1,940 feet of water approximately 160 miles southwest of New Orleans in Green Canyon Block 155. The production system will be tied back five miles to Shell's Angus Field subsea manifold in Green Canyon Block 113, which carries production 17 miles to Shell's Bullwinkle Field platform in Green Canyon 65 for processing. Manatee Field is the fourth subsea production system utilizing Bullwinkle as its processing hub. Previous tiebacks to Bullwinkle include Rocky Field in 1996, Troika Field in 1997 and Angus Field in 1999. Production of Manatee Field is expected to begin during the third quarter of 2002 and it is expected to recover in excess of 12 million barrels of oil equivalent, with peak production rates potentially reaching up to 25,000 barrels of oil per day. With the addition of Manatee Field, Shell now holds an interest in 28 deepwater fields in the Gulf of Mexico, the largest number of any company. Fact Sheets, maps and a schematic can be found at: <http://www.shellus.com/sepco>. {39}

## Other Gain Areas

**Alaska:** Alaska reported a net decline of 10 million barrels of proved oil reserves in 2001, but had the second largest volume of new field discoveries in 2001 (281 million barrels). Operators discovered new satellite fields on the North Slope of Alaska.

**North Dakota and Montana (Cedar Creek Anticline):** Proved oil reserves in North Dakota increased by 18 percent (58 million barrels) in 2001 compared to 2000. Montana's proved oil reserves increased by 10 percent (25 million barrels). Burlington Resources Incorporated continued development of the world's largest horizontally drilled waterflood in the East Lookout Butte Field. Burlington also received permission in 2001 to unitize the southern portion of the Cedar Hills Field and have initiated a waterflood to increase production there. These programs have tripled recoverable oil reserves in the two fields. {40}

**Louisiana:** Louisiana's proved oil reserves increased by 6 percent (35 million barrels).

## Areas of Note: Large Reserves Declines

The following areas had large declines in crude oil proved reserves due to downward revisions or unreplaced production.

### Texas

Texas' crude oil proved reserves declined 6 percent (329 million barrels) in 2001. Texas was first in the Nation with *extensions* (288 million barrels) in 2001, but this did not offset Texas' oil production—an estimated 389 million barrels in 2001. Texas production declined 5 percent (20 million barrels) from its 2000 level.

### California

California's crude oil proved reserves declined 5 percent (186 million barrels) in 2001. Operators also reported a production increase of 1 percent (3 million barrels) over the 2000 level.

### Wyoming

There was a net decline of 13 percent (72 million barrels) in Wyoming's crude oil proved reserves in 2001. Wyoming's crude oil production correspondingly declined 12 percent (6 million barrels) from its 2000 level.

## Other Decline Areas

Discovery and development of new or existing oil fields was also outpaced by crude oil production in the following areas of the United States.

**Oklahoma:** Proved oil reserves decreased by 9 percent (54 million barrels).

**Pacific Federal Offshore:** Proved oil reserves decreased by 8 percent (49 million barrels).

## Reserves in Nonproducing Reservoirs

Not all proved reserves of crude oil were contained in reservoirs that were producing. Operators reported 5,195 million barrels of proved reserves in nonproducing reservoirs, 29 percent more than reported in 2000 (4,019 million barrels). Nonproducing crude oil reserves (not including lease condensate) are listed in **Table 7**.

Nonproducing reserves are those waiting for well workovers, drilling additional development or replacement wells, installing production or pipeline facilities, and awaiting depletion of other zones or reservoirs before recompletion in reservoirs not currently open to production.

**Table 7. Reported Reserves in Nonproducing Reservoirs for Crude Oil, 2001<sup>a</sup>**  
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Nonproducing Crude Oil Reserves	State and Subdivision	Nonproducing Crude Oil Reserves
Alaska . . . . .	389	North Dakota . . . . .	91
Lower 48 States . . . . .	4,806	Ohio . . . . .	6
Alabama . . . . .	4	Oklahoma . . . . .	109
Arkansas . . . . .	4	Pennsylvania . . . . .	1
California . . . . .	508	Texas . . . . .	719
Coastal Region Onshore . . . . .	148	RRC District 1 . . . . .	9
Los Angeles Basin Onshore . . . . .	97	RRC District 2 Onshore . . . . .	12
San Joaquin Basin Onshore . . . . .	233	RRC District 3 Onshore . . . . .	29
State Offshore . . . . .	30	RRC District 4 Onshore . . . . .	8
Colorado . . . . .	44	RRC District 5 . . . . .	4
Florida . . . . .	7	RRC District 6 . . . . .	20
Illinois . . . . .	15	RRC District 7B . . . . .	1
Indiana . . . . .	0	RRC District 7C . . . . .	45
Kansas . . . . .	21	RRC District 8 . . . . .	237
Kentucky . . . . .	0	RRC District 8A . . . . .	333
Louisiana . . . . .	228	RRC District 9 . . . . .	11
North . . . . .	28	RRC District 10 . . . . .	8
South Onshore . . . . .	134	State Offshore . . . . .	0
State Offshore . . . . .	66	Utah . . . . .	100
Michigan . . . . .	6	Virginia . . . . .	0
Mississippi . . . . .	71	West Virginia . . . . .	0
Montana . . . . .	43	Wyoming . . . . .	74
Nebraska . . . . .	0	Federal Offshore . . . . .	2,595
New Mexico . . . . .	161	Pacific (California) . . . . .	62
East . . . . .	161	Gulf of Mexico (Louisiana) . . . . .	2,352
West . . . . .	0	Gulf of Mexico (Texas) . . . . .	180
New York . . . . .	0	Miscellaneous <sup>b</sup> . . . . .	1
		<b>U.S. Total . . . . .</b>	<b>5,195</b>

<sup>a</sup>Includes only those operators who produced 400,000 barrels of crude oil or 2 billion cubic feet of natural gas, or both, during the report year (Category I or Category II operators).

<sup>b</sup>Includes Arizona, Missouri, Nevada, South Dakota, and Tennessee.

Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2001.

