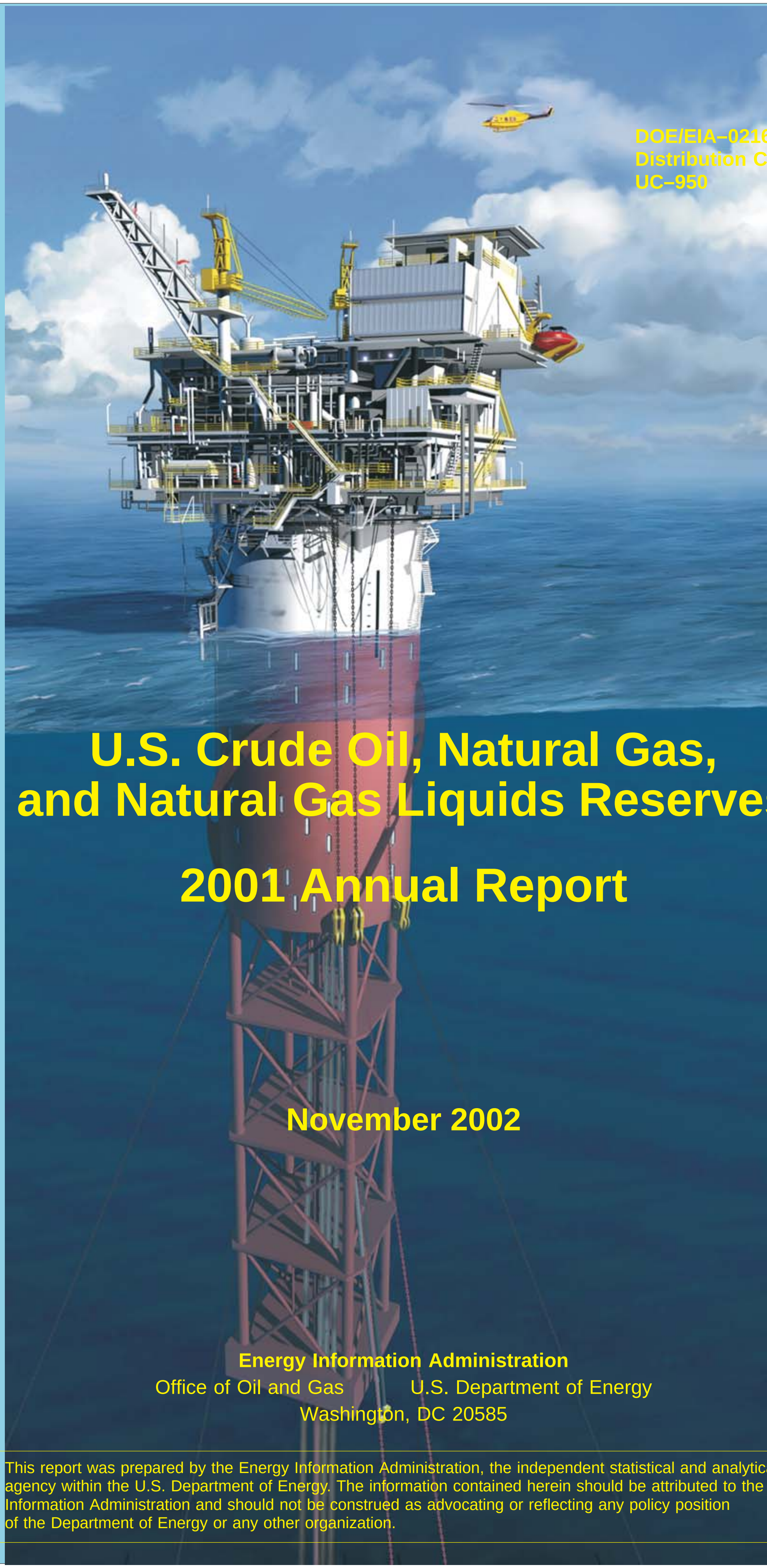

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U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves

2001 Annual Report

November 2002

Energy Information Administration
Office of Oil and Gas U.S. Department of Energy
Washington, DC 20585

Preface

The *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2001 Annual Report* is the 25th prepared by the Energy Information Administration (EIA) to fulfill its responsibility to gather and report annual proved reserves estimates. The EIA annual reserves report series is the only source of comprehensive domestic proved reserves estimates. This publication is used by the Congress, Federal and State agencies, industry, and other interested parties to obtain accurate estimates of the Nation's proved reserves of crude oil, natural gas, and natural gas liquids. These data are essential to the development, implementation, and evaluation of energy policy and legislation.

This report presents estimates of proved reserves of crude oil, natural gas, and natural gas liquids as of December 31, 2001, as well as production volumes for the United States and selected States and State subdivisions for the year 2001. Estimates are presented for the following four categories of natural gas: total gas (wet after lease separation), nonassociated gas and associated–dissolved gas (which are the two major types of wet natural gas), and total dry gas (wet gas adjusted for the removal of liquids at natural gas processing plants). In addition, reserve estimates for two types of natural gas liquids, lease condensate and natural gas plant liquids, are presented. The estimates are based upon data obtained from two annual EIA surveys: Form EIA–23, "Annual Survey of Domestic Oil and Gas Reserves" and Form EIA–64A, "Annual Report of the Origin of Natural Gas Liquids Production." Also included is information on indicated additional crude oil reserves and crude oil, natural gas, and lease condensate reserves in nonproducing reservoirs. A discussion of notable oil and gas exploration and development activities during 2001 is provided.

The appendices contain data by operator production size class for crude oil and natural gas reserves and production; the top 100 U.S. fields ranked within an oil or gas proved reserves group for 2001; Table 1 converted to metric units; historical State data; a summary of survey operations; a discussion of statistical considerations; methods used to develop the estimates provided in this report; maps of selected State subdivisions; and examples of the survey forms. A glossary of the terms used in this report and in survey Forms EIA–23 and EIA–64A is provided to assist readers in more fully understanding the data.

This annual reserves report was prepared by the Reserves and Production Division (located in Dallas, Texas), Office of Oil and Gas, Energy Information Administration. General information regarding preparation of the report may be obtained from Kenneth A. Vagts, Director, Office of Oil and Gas and John H. Wood, Director, Reserves and Production Division (214·720·6160).

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COVER PHOTO:

We would like to thank Ocean Energy, Incorporated of Houston, Texas for permission to print an illustration of Ocean's Nansen Truss Spar, the first of its kind installed in the world. Construction of the Nansen Truss Spar platform was completed in 4th quarter of 2001 in the deep water of the East Breaks region of the Gulf of Mexico. A second Truss Spar platform was installed at Ocean's Boomvang Field, also in the East Breaks region. Combined, these platforms have a production capacity of up to 80,000 barrels of oil and 400 million cubic feet of gas.

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Executive Summary: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2001 Annual Report

U.S. crude oil and natural gas proved reserves increased in 2001, replacing production by substantial margins. 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. Developing this field in water over a mile deep will be another technical achievement in the Federal Offshore.

As of December 31, 2001 proved reserves were:

Crude Oil (million barrels)	
2000	22,045
2001	22,446
Increase	1.8%
Dry Natural Gas (billion cubic feet)	
2000	177,427
2001	183,460
Increase	3.4%
Natural Gas Liquids (million barrels)	
2000	8,345
2001	7,993
Decrease	-4.2%

U.S. crude oil proved reserves increased by almost 2 percent. Reserves additions in 2001 were 121 percent of domestic oil production. From 1977 through 1996, proved reserves of crude oil declined 17 out of 19 years. In striking contrast, they increased 4 out of the last 5 years. New field discoveries of oil in 2001 were at the highest level since Alaska's Prudhoe Bay Field was booked in the 1970s. The majority of crude oil proved reserves additions came from the deepwater Gulf of Mexico Federal Offshore and Alaska, both of which are frontier areas.

The majority of natural gas proved reserves additions were in Wyoming, Colorado, and Texas. Significant reserves were added in the Powder River Basin coalbed methane fields and the Pinedale Field in Wyoming, the Lobo Trend and Barnett Shale gas fields in Texas, and the Wattenberg Field and the coalbed methane fields in Colorado.

Natural gas liquids reserves decreased in 2001. Usually, when gas reserves increase, the natural gas liquids associated with that gas also increase. However, coalbed methane was a large portion of the new gas reserves in 2001, and coalbed methane has effectively no natural gas liquids content. As a result, reserves of natural gas liquids declined in 2001 when production outpaced reserves additions in conventional gas reservoirs.

Proved reserves are the estimated quantities which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. Petroleum engineering and geological judgment are required in estimating proved reserves, therefore the results are not precise measurements. This report of 2001 U.S. proved reserves of crude oil, natural gas, and natural gas liquids is the 25th in an annual series prepared by the Energy Information Administration.

Crude Oil

Total discoveries of crude oil in 2001 resulted mainly from exploration in the deepwater Gulf of Mexico Federal Offshore and on the Alaskan North Slope.

Total discoveries are those reserves attributable to field extensions, 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, almost twice the year 2000 discoveries and greater than three times the prior 10-year average.

The majority of crude oil total discoveries in 2001 were new field discoveries, particularly in the Gulf of Mexico Federal Offshore and Alaska. Operators discovered 1,407 million barrels in new fields in 2001 -- four times as much as in 2000 and over six times as much as the prior 10-year average.

Extensions to existing fields accounted for 866 million barrels of crude oil reserves additions. This was a 13 percent increase over 2000 extensions, and almost twice as much as the prior 10-year average.

New reservoir discoveries in old fields were 292 million barrels, 17 percent more than in 2000 and 93 percent more than the prior 10-year average.

Reserves additions are the sum of total discoveries, revisions and adjustments, and sales and acquisitions. The net of revisions and adjustments was a very small component of crude oil reserves additions in 2001 (-162 million barrels). In past years, net revisions and adjustments have been as much as 54 percent of annual crude oil reserves additions.

The sales component of the crude oil reserves changes (529 million barrels) was less than the revision decreases component in 2001 and acquisitions (442 million barrels) were less than revision increases. The net of sales and acquisitions of crude oil proved reserves was -87 million barrels.

Other 2001 crude oil events of note:

- The annual average domestic first purchase price for crude oil decreased 18 percent from the 2000 level to $21.84 per barrel.
- Exploratory and developmental oil completions were up 8 percent from 2000.
- In May 2000, BP Amoco contracted Mustang Engineering to provide preliminary front-end engineering/design services for topside facilities to produce Thunder Horse Field. It will be developed in a phased approach. Initial production is expected by 2005 from a floating production facility that will be capable of producing 250,000 barrels of oil per day.

Natural Gas

Operators added 3.4 percent to proved reserves of dry natural gas in 2001. Reserves additions were 131 percent of domestic dry natural gas production. U.S. natural gas proved reserves have increased in seven of the last eight years. Most of the reserve increases were in Texas, Wyoming, and Colorado. The Gulf of Mexico and New Mexico had a slight increase, and Oklahoma had a slight decrease.

U.S. total discoveries of dry gas reserves were 22,758 billion cubic feet in 2001. This was 96 percent more than the prior 10-year average and 19 percent more than in 2000.

New field discoveries were 3,578 billion cubic feet, 80 percent more than the volume discovered in 2000 and 140 percent more than the prior 10-year average. Field extensions were 16,380 billion cubic feet, 11 percent more than extensions in 2000 and also more than twice the prior 10-year average of 7,802 billion cubic feet.

New reservoir discoveries in old fields were 2,800 billion cubic feet, up 18 percent from 2000 and 20 percent more than the prior 10-year average.

Natural gas net revisions and adjustments were 424 billion cubic feet. The net of sales and acquisitions of dry natural gas proved reserves was 2,630 billion cubic feet.

Coalbed methane proved reserves and production continued to grow in 2001. Coalbed methane accounted for 9.6 percent of proved dry gas reserves and 7.9 percent of dry gas production.

Other 2001 natural gas events of note:

- Natural gas prices were up 12 percent in 2001 to an average of $4.12 per thousand cubic feet (MCF) at the wellhead, as compared to $3.69 per MCF in 2000. However, the prices started high in January 2001 ($8.06 per MCF) and declined to an annual low of $2.38 per MCF in December.
- Exploratory gas well completions increased 54 percent in 2001 and development well drilling was up 39 percent. Operators drilled 25 percent more wells for gas in 2001 than in 2000.
- U.S. gas production increased by 2 percent in 2001 to the highest level since 1977, the year EIA initiated its proved reserves report series.

Natural Gas Liquids

U.S. natural gas liquids proved reserves decreased 4.2 percent to 7,993 million barrels in 2001. Natural gas liquids reserves are the sum of natural gas plant liquids and lease condensate reserves.

Total proved reserves of liquid hydrocarbons (crude oil plus natural gas liquids) were 30,439 million barrels in 2001, a slight increase from the 2000 level. Natural gas liquids represented 26 percent of total liquid hydrocarbon proved reserves in 2001.

Data

These estimates are based upon analysis of data from Form EIA-23, Annual Survey of Domestic Oil and Gas Reserves, filed by 1,439 operators of oil and gas wells, and Form EIA-64A, Annual Report of the Origin of Natural Gas Liquids Production, filed by operators of 525 active natural gas processing plants. The U.S. proved reserves estimates for crude oil and natural gas are associated with sampling errors of less than 1 percent.

1. Introduction

Background

The principal focus of this report is to provide accurate annual estimates of U.S. proved reserves of crude oil, natural gas, and natural gas liquids. These estimates are essential to the development, implementation, and evaluation of national energy policy and legislation. In the past, the Government and the public relied upon industry estimates of proved reserves. However, the industry ceased publication of reserve estimates after its 1979 report.

In response to a recognized need for credible annual proved reserves estimates, Congress, in 1977, required the Department of Energy to prepare such estimates. To meet this requirement, the Energy Information Administration (EIA) developed a program that established a unified, verifiable, comprehensive, and continuing annual statistical series for proved reserves of crude oil and natural gas. It was expanded to include proved reserves of natural gas liquids for the 1979 and subsequent reports.

Survey Overview

EIA defines proved reserves, the major topic of this report, as those volumes of oil and gas that geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. There are other categories of reserves, but by definition they are more speculative and less precise than proved reserves. Readers who are unfamiliar with the distinctions between types of reserves or with how reserves fit in the description of overall oil and gas resources should see Appendix G.

This report provides proved reserves estimates for calendar year 2001. It is based on data filed by large, intermediate, and a select group of small operators of oil and gas wells on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," and by operators of all natural gas processing plants on Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." The U.S. crude oil and natural gas proved reserves estimates are associated with sampling errors of less than 1 percent at a 95-percent confidence level.

Form EIA-23

On Form EIA-23, an operator is defined as an organization or person responsible for the management and day-to-day operation of oil and/or gas wells. This definition eliminates responses from royalty owners, working interest owners (unless they are also operators), and others not directly responsible for oil and gas production operations.

Operator size categories are based upon operator annual production as indicated in various Federal, State, and commercial records. Large operators are those that produced at least 1.5 million barrels of crude oil or 15 billion cubic feet of natural gas, or both, during the report year. Intermediate operators produced less than large operators, but more than 400,000 barrels of crude oil or 2 billion cubic feet of natural gas, or both during the report year. Small operators are those that produced less than intermediate operators. All data are reported on a total operated basis, encompassing all proved reserves and production associated with wells operated by an individual operator within a field. This concept is also called the "gross operated" or "8/8ths" basis.

Large operators (Category I) and most intermediate size operators (Category II) report reserves balance data on Form EIA-23 to show how and why reserves components changed during the year on a field-by-field basis. Intermediate size operators who do not keep reserves data were not asked to provide estimates of reserves at the beginning of the year or annual changes to proved reserves by component of change; i.e., revisions, extensions, and new discoveries. These volumes were estimated using statistical calculations that preserved the relative relationships between these items within each State or State subdivision, as reported by large and intermediate operators.

A sample selected from the large group of small (Category III) operators are requested to provide annual production and, if available, year ending reserves volumes. Details on the selection of these operators and the determination of the reserves volumes is found in Appendix F.

The published reserve estimates include an additional term, adjustments, calculated by the EIA, that preserves an exact annual reserves balance of the form: Adjustments are the annual changes in the published reserve estimates that cannot be attributed to the estimates for other reserve change categories. They result from the survey and statistical estimation methods employed. For example, variations caused by changes in the operator frame, different random samples, different timing of reporting, incorrectly reported data, or imputations for missing or unreported reserve changes can contribute to adjustments.

Published Proved Reserves at End of Previous Report Year
+ Adjustments
+ Revision Increases
– Revision Decreases
– Sales
+ Acquisitions
+ Extensions
+ New Field Discoveries
+ New Reservoir Discoveries in Old Fields
– Report Year Production
= Published Proved Reserves at End of Report Year

Form EIA-64A

Form EIA-64A data were first collected for the 1979 survey year in order to develop estimates for total natural gas liquids reserves. Data on liquids recovered from natural gas, as reported by natural gas processing plant operators, are combined with lease condensate data collected on Form EIA-23 to provide the total natural gas liquids reserves estimates.

Data Collection Operations

An intensive effort is made each year to maintain an accurate and complete survey frame consisting of operators of oil and gas wells and of natural gas processing plants. The Form EIA-23 operator frame contained 22,519 probable active operators and the Form EIA-64A plant frame contained 525 probable active natural gas processing plants in the United States when the 2001 surveys were initiated. As usual, additional operators were added to the survey as it progressed, and many operators initially in the sample frame were found to be inactive in 2001.

For the report year 2001, EIA mailed 672 EIA-23 forms to known large and intermediate size oil and gas well operators that were believed to be active during 2001. Eight (8) of the 672 companies were additions or new companies. Thirty-nine (39) of the 672 ceased operating oil and/or gas properties (became non-operator) during the survey year. In addition, 40 of the 672 operators were reduced in size from Category I or II to Category III. An additional 18 companies (over and above the 672) increased in size from Category III to Category II.

EIA mailed 525 EIA-64A forms to natural gas processing plant operators. More than one form is received for a plant that has more than one operator during the year. Forms were received from 100 percent of the operators of the 525 unique active natural gas processing plants in the Form EIA-64A survey.

National estimates of the production volumes for crude oil, lease condensate, natural gas liquids, and dry natural gas based on Form EIA-23 and Form EIA-64A were compared with corresponding official production volumes published by EIA, which are obtained from non-survey based State sources. For report year 2001, the Form EIA-23 National production estimates were less than 1 percent higher than the comparable *Petroleum Supply Annual (PSA) 2001* volumes for crude oil and lease condensate combined, and were less than 2 percent higher than the comparable *Natural Gas Monthly, October 2002* volume for 2001 dry natural gas. For report year 2001, the Form EIA-64A National estimates were less than 2 percent lower than the *PSA 2001* volume for natural gas plant liquids production.

Accuracy in reserves reporting is EIA's first and foremost goal for this report. Estimates of production within this report may differ from those made specifically to estimate oil or gas production like those in the *PSA*.

2. Overview

National Summary

The United States had the following proved reserves as of December 31, 2001:

- **Crude Oil — 22,446 million barrels**
- **Dry Natural Gas — 183,460 billion cubic feet**
- **Natural Gas Liquids — 7,993 million barrels.**

This Overview summarizes the 2001 proved reserves balances of crude oil, dry natural gas, and natural gas liquids on a National level and provides historical comparisons between 2001 and prior years. **Table 1** lists the estimated annual reserve balances since 1991 for crude oil, dry natural gas, and natural gas liquids.

Crude Oil

Proved reserves of crude oil increased by 401 million barrels in 2001. **Figure 1** shows the crude oil proved reserves levels by major region and **Figure 2** shows the components of reserves changes from 1991 through 2001.

As indicated in **Figure 1**, U.S. crude oil proved reserves increased in 2001 due to reserves additions in the Lower 48 States offshore.

The components of reserves changes for crude oil are shown in **Figure 2**. EIA tracks the components of reserves changes; *adjustments*, *revision increases*, *revision decreases*, *sales, acquisitions, extensions*, *new field discoveries*, *new reservoir discoveries in old fields*, and *estimated production*. These components are discussed below.

Total discoveries are those reserves attributable to *field extensions, 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, over three times the prior 10-year average (813 million barrels) and almost twice those in 2000 (1,291 million barrels).

Most crude oil *total discoveries* in 2001 were from *new field discoveries,* rather than *extensions* to existing fields. New fields accounted for 1,407 million barrels of crude oil reserves additions. This was over five times the volume of 2000 *new field discoveries* (276 million barrels).

Extensions of 866 million barrels were 13 percent higher than those of 2000 (766 million barrels) and almost twice the prior 10-year average (438 million barrels).

New reservoir discoveries in old fields were 292 million barrels, 17 percent more than in 2000 (249 million barrels) and 93 percent more than the prior 10-year average (152 million barrels).

Reserves additions are the sum of total discoveries, revisions and adjustments, and sales and acquisitions. In 2001, there were -4 million barrels of *adjustments*, 1,601 million barrels of *revision increases* and 1,759 million barrels of *revision decreases*. The 2001 net of *revisions* and *adjustments* was -162 million barrels.

The *sales* component of the crude oil reserves changes (529 million barrels) was smaller than the *revision decreases* component in 2001, and *acquisitions* (442 million barrels) were smaller than *revision increases*. The net of sales and acquisitions of crude oil proved reserves was -87 million barrels.

Production of crude oil was an estimated 1,915 million barrels in 2001 (lease condensate not included, see Natural Gas Liquids section below for condensate volumes). This was up 2 percent from 2000's level (1,880 million barrels) and down 13 percent from the prior 10-year average (2,191 million barrels). Operators replaced 121% of crude oil production with reserves additions in 2001.

Natural Gas

Dry natural gas proved reserves increased by 6,033 billion cubic feet in 2001. **Figure 3** shows the dry natural gas proved reserves levels by major region. **Figure 4** shows the components of reserves changes from 1991 through 2001.

U.S. *total discoveries* of dry gas reserves were 22,758 billion cubic feet in 2001. This was almost twice the prior 10-year average (11,608 billion cubic feet) and 19 percent more than in 2000 (19,138 billion cubic feet).

Field *extensions* were 16,380 billion cubic feet, 11 percent more than the extensions in 2000 and also more than twice the prior 10-year average of 7,802 billion cubic feet.

Table 1. Total U.S. Proved Reserves of Crude Oil, Dry Natural Gas, and Natural Gas Liquids, 1990-2000

Year	Adjustments (1)	Net Revisions (2)	Revisions[a] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[b] Discoveries (8)	Estimated Production (9)	Proved[c] Reserves 12/31 (10)	Change from Prior Year (11)
					Crude Oil (million barrels of 42 U.S. gallons)						
1991	163	223	386	NA	365	97	92	554	2,512	24,682	-1,572
1992	290	735	1,025	NA	391	8	85	484	2,446	23,745	-937
1993	271	495	766	NA	356	319	110	785	2,339	22,957	-788
1994	189	1,007	1,196	NA	397	64	111	572	2,268	22,457	-500
1995	122	1,028	1,150	NA	500	114	343	957	2,213	22,351	-106
1996	175	737	912	NA	543	243	141	927	2,173	22,017	-334
1997	520	914	1,434	NA	477	637	119	1,233	2,138	22,546	+529
1998	-638	518	-120	NA	327	152	120	599	1,991	21,034	-1,512
1999	139	1,819	1958	NA	259	321	145	725	1,952	21,765	+731
2000	143	746	889	-20	766	276	249	1,291	1,880	22,045	+280
2001	-4	-158	-162	-87	866	1,407	292	2,565	1,915	22,446	+401
					Dry Natural Gas (billion cubic feet, 14.73 psia, 60° Fahrenheit)						
1991	2,960	4,416	7,376	NA	5,090	848	1,604	7,542	17,202	167,062	-2,284
1992	2,235	6,093	8,328	NA	4,675	649	1,724	7,048	17,423	165,015	-2,047
1993	972	5,349	6,321	NA	6,103	899	1,866	8,868	17,789	162,415	-2,600
1994	1,945	5,484	7,429	NA	6,941	1,894	3,480	12,315	18,322	163,837	+1,422
1995	580	7,734	8,314	NA	6,843	1,666	2,452	10,961	17,966	165,146	+1,309
1996	3,785	4,086	7,871	NA	7,757	1,451	3,110	12,318	18,861	166,474	+1,328
1997	-590	4,902	4,312	NA	10,585	2,681	2,382	15,648	19,211	167,223	+749
1998	-1,635	5,740	4,105	NA	8,197	1,074	2,162	11,433	18,720	164,041	-3,182
1999	982	10,504	11,486	NA	7,043	1,568	2,196	10,807	18,928	167,406	+3,365
2000	-891	6,962	6,071	4,031	14,787	1,983	2,368	19,138	19,219	177,427	+10,021
2001	2,742	-2,318	424	2,630	16,380	3,578	2,800	22,758	19,779	183,460	+6,033
					Natural Gas Liquids (million barrels of 42 U.S. gallons)						
1991	233	130	363	NA	189	25	55	269	754	7,464	-122
1992	225	261	486	NA	190	20	64	274	773	7,451	-13
1993	102	124	226	NA	245	24	64	333	788	7,222	-229
1994	43	197	240	NA	314	54	131	499	791	7,170	-52
1995	192	277	469	NA	432	52	67	551	791	7,399	+229
1996	474	175	649	NA	451	65	109	625	850	7,823	+424
1997	-15	289	274	NA	535	114	90	739	864	7,973	+150
1998	-361	208	-153	NA	383	66	88	537	833	7,524	-449
1999	99	727	826	NA	313	51	88	452	896	7,906	+382
2000	-83	459	376	145	645	92	102	839	921	8,345	+439
2001	-429	-132	-561	102	717	138	142	997	890	7,993	-352

[a]Revisions and adjustments = Col. 1 + Col. 2.
[b]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[c]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
NA=Not available.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production.” They may differ from the official EIA production data for crude oil, natural gas, and natural gas liquids for 2001 contained in the *Petroleum Supply Annual 2001*, DOE/EIA-0340(01) and the *Natural Gas Annual 2001*, DOE/EIA-0131(01).

Figure 1. U.S. Crude Oil Proved Reserves, 1991-2001

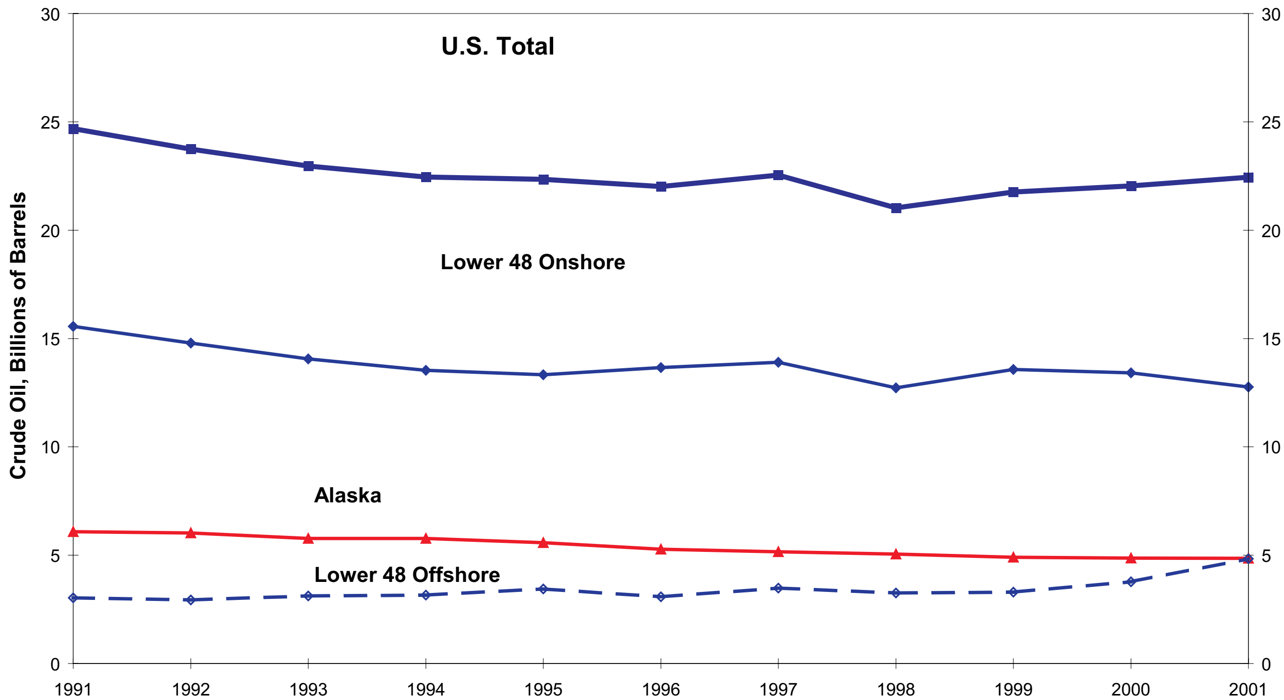
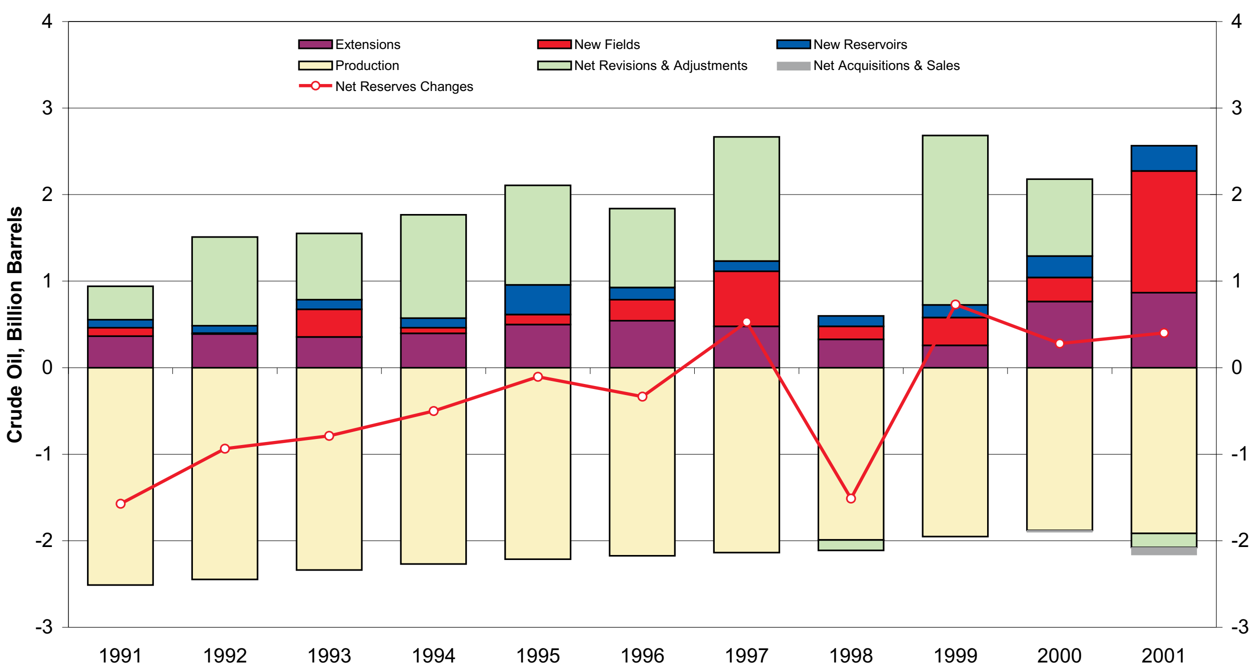


Figure 2. Components of Reserves Changes for Crude Oil, 1991-2001



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1991-2001 annual reports, DOE/EIA-0216.{14-24}

Figure 3. U.S. Dry Natural Gas Proved Reserves, 1991-2001

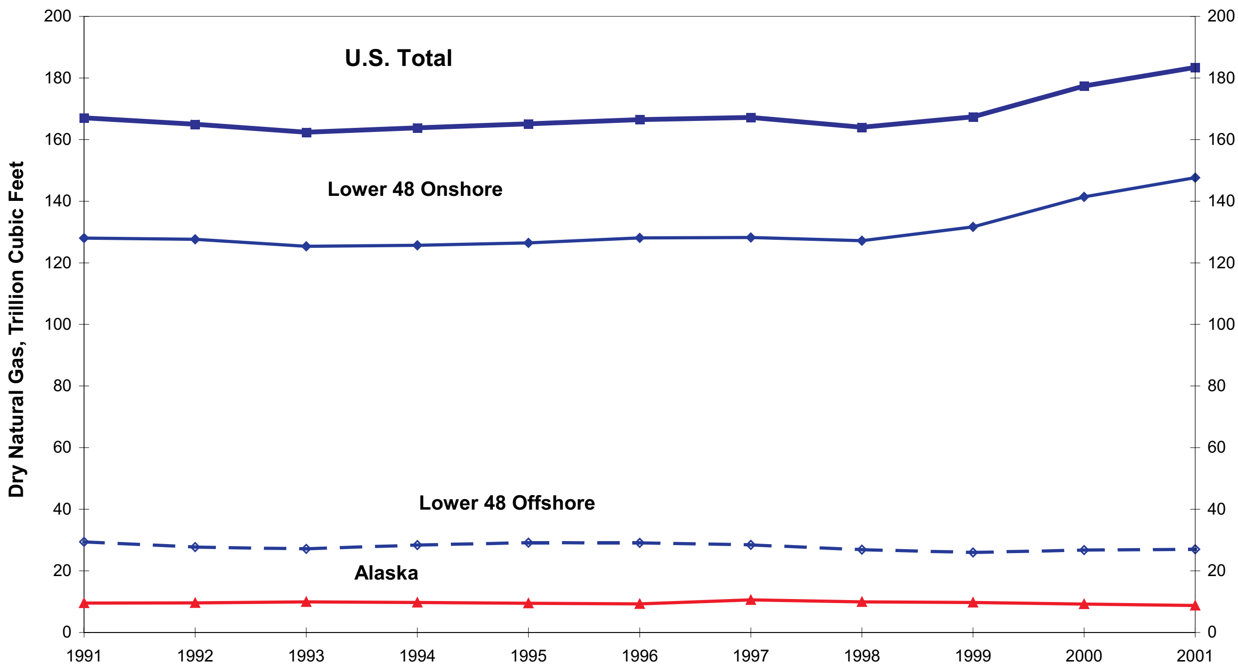
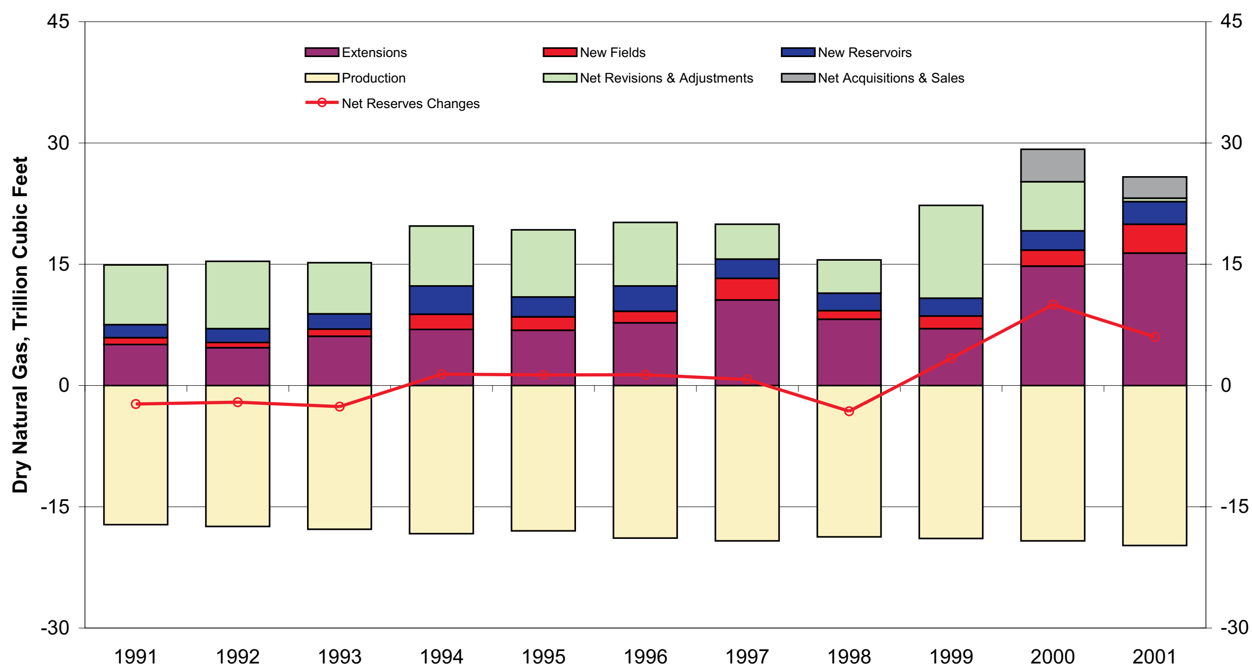


Figure 4. Components of Reserves Changes for Dry Natural Gas, 1991-2001



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1990-2000 annual reports, DOE/EIA-0216.{14-24}

New field discoveries were 3,578 billion cubic feet, 80 percent more than the volume discovered in 2000 (1,983 billion cubic feet) and more than twice the prior 10-year average (1,471 billion cubic feet).

New reservoir discoveries in old fields were 2,800 billion cubic feet, up 18 percent from 2000 (2,368 billion cubic feet) and 20 percent more than the prior 10-year average (2,334 billion cubic feet).

Natural gas net *revisions* and *adjustments* were 424 billion cubic feet. The net of *sales* and *acquisitions* of dry natural gas proved reserves was 2,630 billion cubic feet.

Production removed an estimated 19,779 billion cubic feet of proved reserves from the National total. Dry gas production increased by 3 percent compared to 2000. Operators replaced 131 percent of dry natural gas production with reserves additions.

Coalbed methane production and reserves are included in the 2001 totals. However, EIA tracks these reserves in order to record the development and performance of this gas source. Coalbed methane proved reserves increased in 2001 to a volume of 17,531 billion cubic feet. Coalbed methane accounted for 9.5 percent of 2001 U.S. dry natural gas reserves and 8 percent of 2001 U.S. dry gas production.

Natural Gas Liquids

Proved reserves of natural gas liquids decreased 352 million barrels to 7,993 million barrels during 2001— a 4 percent decrease from 2000 levels. **Figure 5** shows the natural gas liquids proved reserves levels by major region and **Figure 6** shows the components of reserves changes from 1991 through 2001.

Operators replaced 60 percent of their 2001 natural gas liquids production with reserve additions. *Total discoveries* added 997 million barrels (primarily from *extensions*), net *revisions and adjustments* subtracted 561 million barrels, and net *sales and acquisitions* added 102 million barrels.

Total proved reserves of liquid hydrocarbons (crude oil plus natural gas liquids) were 30,439 million barrels in 2001—a slight increase from the 2000 level. Natural gas liquids represented 26 percent of total liquid hydrocarbon proved reserves in 2001.

Reserves Changes Since 1977

EIA has collected oil and gas reserves estimates annually since 1977. **Table 2** lists the cumulative totals of the components of reserves changes for crude oil and dry natural gas from 1977 through 2001. **Table 2** has two sections, one for the lower 48 States and another for the U.S. total (which includes Alaska's contribution). Annual averages for each component of reserves changes are also listed, along with the percentage of that particular component's impact on total U.S. proved reserves. In this section, we compare these averages to the 2001 proved reserves estimates as a means of gauging the past year against history.

Crude Oil: Since 1977 U.S. operators have:

- discovered an average of 890 million barrels per year of new reserves
- had proved reserves additions of an average 2,133 million barrels per year from *total discoveries, net revisions and adjustments, and net sales and acquisitions.*
- ended each year with an average net reduction in U.S. proved reserves of 442 million barrels (the difference between post-1976 average annual production and post-1976 average annual reserve additions) because production has outpaced reserve additions.

Since 1977, crude oil reserves have been primarily sustained by proved ultimate recovery appreciation in existing fields rather than the discovery of new oil fields. Only 11 percent of reserves additions since 1976 were booked as *new field discoveries*. Proved ultimate recovery appreciation is the sum of net revisions, adjustments, net sales and acquisitions, extensions, and new reservoir discoveries in old fields (see the Proved Ultimate Recovery section later in this chapter.) Since 1977, the 22,249 million barrels of *total discoveries* accounted for 42 percent of reserves additions.

Compared to the averages of reserves changes since 1977, 2001 was a major up year for crude oil discoveries. *Total discoveries* of crude oil (2,565 million barrels) in 2001 were almost three times greater than the post-1976 U.S. average (890 million barrels per year).

Looking at the components of *total discoveries* in 2001:

- 2001's *new field discoveries* greatly exceeded the post-1976 average. *New field discoveries* in 2001 accounted for 55 percent of reserves additions, and were 6 times larger than the historical average, and

Figure 5. U.S. Natural Gas Liquids Proved Reserves, 1991-2001

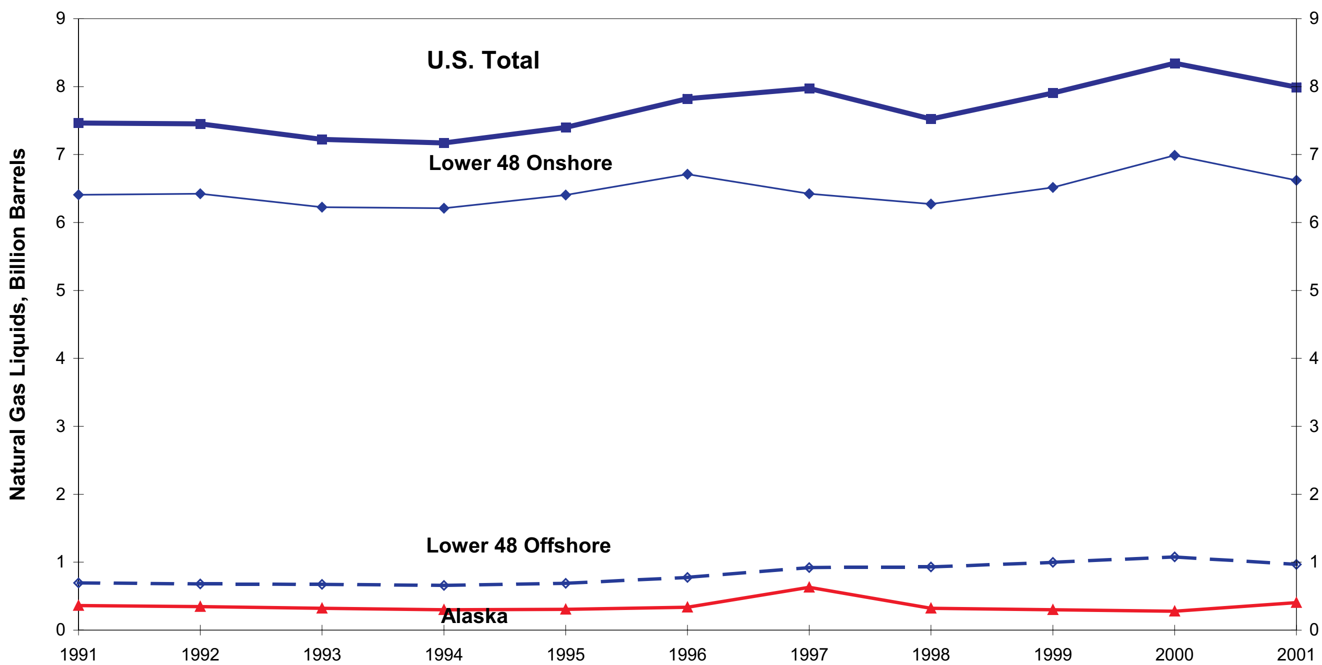
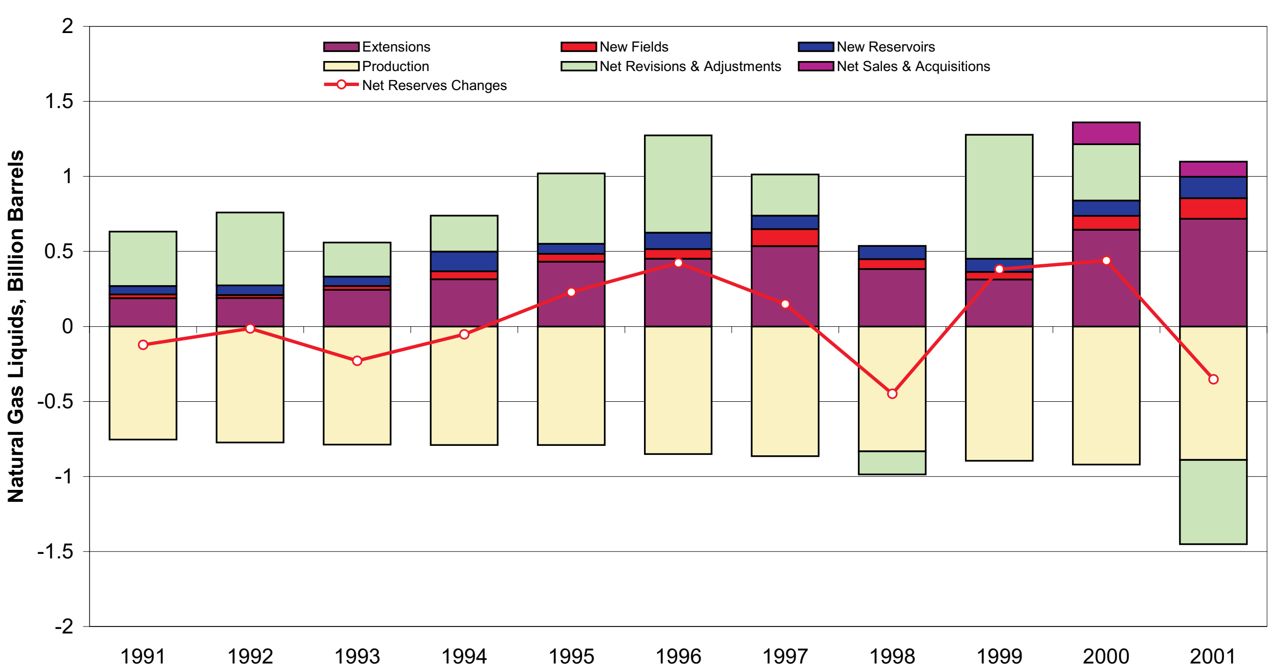


Figure 6. Components of Reserves Changes for Natural Gas Liquids, 1991-2001



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1990-2000 annual reports, DOE/EIA-0216.{14-24}

Table 2. Reserves Changes, 1977-2001

Components of Change	Lower 48 States Volume	Lower 48 States Average per Year	Lower 48 States Percent of Reserves Additions	U.S. Total Volume	U.S. Total Average per Year	U.S. Total Percent of Reserves Additions
	Crude Oil (million barrels of 42 U.S. gallons)					
Proved Reserves as of 12/31/76	**24,928**	**––**	**––**	**33,502**	**––**	**––**
New Field Discoveries	4,687	187	10.8	5,638	226	10.6
New Reservoir Discoveries in Old Fields	3,593	144	8.3	3,715	149	7.0
Extensions	11,365	455	26.3	12,896	516	24.2
Total Discoveries	**19,645**	**786**	**45.4**	**22,249**	**890**	**41.7**
Revisions, Adjustments, Sales & Acquisitions	23,642	946	54.6	31,078	1,243	58.3
Total Reserves Additions	**43,287**	**1,731**	**100.0**	**53,327**	**2,133**	**100.0**
Production	**50,556**	**2,022**	**116.8**	**64,383**	**2,575**	**120.7**
Net Reserves Change	**-7,269**	**-291**	**-16.8**	**-11,056**	**-442**	**-20.7**
	Dry Natural Gas (billion cubic feet at 14.73 psia and 60° Fahrenheit)					
Proved Reserves as of 12/31/76	**180,838**	**––**	**––**	**213,278**	**––**	**––**
New Field Discoveries	49,636	1,985	11.5	49,858	1,994	12.0
New Reservoir Discoveries in Old Fields	63,624	2,545	14.7	64,029	2,561	15.4
Extensions	200,455	8,018	46.4	203,382	8,135	48.8
Total Discoveries	**313,715**	**12,549**	**72.7**	**317,269**	**12,691**	**76.1**
Revisions, Adjustments, Sales & Acquisitions	118,030	4,721	27.3	99,756	3,990	23.9
Total Reserves Additions	**431,745**	**17,270**	**100.0**	**417,025**	**16,681**	**100.0**
Production	**437,923**	**17,517**	**101.4**	**446,843**	**17,874**	**107.2**
Net Reserves Change	**-6,178**	**-247**	**-1.4**	**-29,818**	**-1,193**	**-7.2**

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves* 1977-2001 annual reports, DOE/EIA-0216.{1-24}

- *extensions* and *new reservoir discoveries in old fields* exceeded the post-1976 averages for crude oil.

Dry Natural Gas: Since 1977 U.S. operators have:

- discovered an average of 12,691 billion cubic feet per year of new reserves,
- had proved reserves additions of an average 16,681 billion cubic feet per year from *total discoveries, net revisions and adjustments, and net sales and acquisitions*, and
- had an average net reduction in U.S. reserves of 1,193 billion cubic feet per year.

Like crude oil reserves, natural gas reserves have been sustained primarily by proved ultimate recovery appreciation since 1977. Usually *extensions* rather than net *revisions and adjustments* are the largest component. *Extensions* account for 49 percent while net *revisions and adjustments* account for only 24 percent of all reserves additions since 1977. In 2001, net *revisions, adjustments, sales, and acquisitions* were 12 percent of all reserves additions. In 2001, *extensions* were 63 percent of all reserves additions.

Compared to the averages of reserves changes since 1977, 2001 was an up year for natural gas reserves additions from *total discoveries*. Operators reported 22,758 billion cubic feet of *total discoveries* of dry natural gas proved reserves, 79 percent more than the post-1976 average (12,691 billion cubic feet). Also, the net of *revisions, adjustments, sales,* and *acquisitions* was 23 percent lower in 2001 (3,054 billion cubic feet) compared to the post-1976 U.S. average (3,990 billion cubic feet per year).

Economics and Drilling

Economics: This section describes the price behavior in 2001 and the following section addresses drilling.

Table 3 lists the average annual domestic wellhead prices of crude oil and natural gas, as well as the average number of active rotary drilling rigs, from 1977 to 2001.

Table 3. U.S. Average Annual Domestic First Purchase Prices for Crude Oil, Wellhead Prices for Natural Gas, and the Average Number of Active Rotary Drilling Rigs, 1977-2001

Year		Crude Oil		Natural Gas		
		Current	2001 Constant	Current	2001 Constant	
		(dollars per barrel)		(dollars per thousand cubic feet)		Number of Rigs
1977		8.57	20.83	0.79	1.92	2,001
1978		9.00	20.42	0.91	2.06	2,259
1979		12.64	26.48	1.18	2.47	2,177
1980		21.59	41.41	1.59	3.05	2,909
1981		31.77	55.74	1.98	3.47	3,970
1982		28.52	47.10	2.46	4.06	3,105
1983		26.19	41.61	2.59	4.11	2,232
1984		25.88	39.64	2.66	4.07	2,428
1985		24.09	35.77	2.51	3.73	1,980
1986		12.51	18.17	1.94	2.82	964
1987		15.40	21.72	1.67	2.36	936
1988		12.58	17.16	1.69	2.31	936
1989		15.86	20.84	1.69	2.22	869
1990		20.03	25.33	1.71	2.16	1,010
1991		16.54	20.18	1.64	2.00	860
1992		15.99	19.05	1.74	2.07	721
1993		14.25	16.58	2.04	2.37	754
1994		13.19	15.03	1.85	2.11	775
1995		14.62	16.31	1.55	1.73	723
1996		18.46	20.20	2.17	2.37	779
1997		17.23	18.49	2.32	2.49	943
1998		10.87	11.52	1.96	2.08	827
1999		15.56	16.26	2.19	2.29	625
2000	January	23.53	24.33	2.60	2.69	775
	February	25.48	26.28	2.73	2.82	763
	March	26.19	26.96	2.66	2.74	773
	April	23.20	23.83	2.86	2.94	805
	May	25.58	26.23	3.04	3.12	844
	June	27.62	28.28	3.77	3.86	878
	July	26.81	27.43	3.84	3.93	942
	August	27.91	28.51	3.73	3.81	987
	September	29.72	30.31	4.26	4.34	1,011
	October	29.65	30.20	4.58	4.66	1,055
	November	30.36	30.86	4.40	4.47	1,067
	December	24.46	24.80	5.77	5.85	1,097
2000		**26.72**	**27.35**	**3.69**	**3.78**	**918**
2001	January	24.58	24.82	8.06	8.14	1,118
	February	25.27	25.44	5.84	5.88	1,136
	March	23.02	23.12	5.15	5.17	1,166
	April	23.41	23.48	5.21	5.22	1,206
	May	24.06	24.08	4.56	4.56	1,234
	June	23.43	23.41	3.88	3.88	1,270
	July	22.94	22.85	3.39	3.38	1,278
	August	23.08	22.97	3.23	3.21	1,252
	September	22.37	22.26	2.55	2.54	1,193
	October	18.73	18.67	2.40	2.39	1,111
	November	16.49	16.44	2.74	2.73	1,000
	December	15.54	15.48	3.93	3.92	901
2001		**21.84**	**21.84**	**4.12**	**4.12**	**1,155**

=Revised data.

Sources: Current dollars and number of rigs: *Monthly Energy Review October 2002*, DOE/EIA-0035(2001/10). 2001 constant dollars: U.S. Department of Commerce, Bureau of Economic Analysis, Gross Domestic Product Implicit Price Deflators, October 2002.

The U.S. crude oil first purchase price started at an average of $24.46 per barrel in December 2000, rose to $25.27 in February 2001, then declined to $15.54 per barrel in December 2001. The average U.S. crude oil first purchase price decreased from $26.72 in 2000 to $21.84 per barrel in 2001.

Oil prices vary by region. In Texas the average 2001 crude oil first purchase price was $23.41 per barrel, $20.11 per barrel in California, $24.82 per barrel in Colorado, $22.55 per barrel in Ohio, and $18.38 per barrel in the California Federal Offshore. The lowest average crude oil first purchase price in 2001 was $18.18 per barrel for the Alaska North Slope oil.{25}

The average annual wellhead natural gas price increased from $3.69 in 2000 to $4.12 per thousand cubic feet in 2001. Natural gas prices started at $8.06 per thousand cubic feet in January 2001 and declined to $3.93 per thousand cubic feet by December 2001. The lowest average price of the year was $2.40 per thousand cubic feet in October 2001. {26}

Drilling: From 2000 to 2001, the annual average active rig count increased from 918 to 1,155 (**Table 3**), a 26 percent increase in active rigs.

Looking first at exploratory wells, there were 2,715 exploratory wells drilled in 2001 (**Table 4**). Of these, 11 percent were completed as oil wells, 35 percent were completed as gas wells, and 54 percent were dry holes. The total (which includes dry holes) was 26 percent more than the revised 2000 total. Exploratory oil and gas completions in 2001 were 36 percent higher (**Figures 7 and 8**) than in 2000.

Figures 9 and 10 show the average volume of discoveries per exploratory well for dry natural gas and oil, respectively, since 1977. The average volume of oil discoveries per exploratory well increased significantly in 2001. The 2001 average volume of gas discoveries per exploratory well decreased, as would be expected given the large increase in the number of wells drilled in search of gas.

The numbers of successful development wells increased 10 percent for oil and 34 percent for gas from their 2000 levels. Altogether there were an estimated 34,139 exploratory and development wells drilled in 2001. This is 23 percent more than in 2000 and 43 percent more than the average number of wells drilled annually in the prior 10 years (23,914).

For the ninth year in a row, the number of gas well completions exceeded the number of oil well completions in both the exploratory and development categories.

Mergers and Acquisitions

The following large mergers were announced in 2001, and are expected to have a major impact on the energy industry in the future:

On August 1, 2001, Kerr-McGee Corporation announced completion of its acquisition of HS Resources, Incorporated. Through this transaction Kerr-McGee will acquire proved reserves of 1.3 trillion cubic feet of natural gas equivalent, and gas gathering systems, undeveloped acreage and other assets valued at approximately $300 million. The acquired reserves are predominately natural gas located in northeastern Colorado in the Denver-Julesburg Basin. {27}

On September 10, 2001, Dominion and Louis Dreyfus Natural Gas Corporation jointly announced that Dominion agreed to acquire Louis Dreyfus Natural Gas for $2.3 billion in cash, stock and assumed debt. On November 1, 2001, the transaction was completed. {28}

On October 9, 2001, Chevron Corporation and Texaco Incorporated announced that their merger had been completed following stockholder approvals. The new company changed its name to ChevronTexaco Corporation. {29}

On November 18, 2001, Conoco Incorporated and Phillips Petroleum Company announced their intention to merge and filed a joint proxy statement/prospectus with the Securities and Exchange Commission. {30}

In December 2001, Unocal announced a 50-50 venture with Forest Oil Corporation for exploration and production operations in the Gulf of Mexico. {31}

Reserve-to-Production Ratio and Ultimate Recovery

R/P Ratios

The relationship between proved reserves and production levels, expressed as the ratio of reserves to production (R/P ratio) is often used in analyses. For a mature producing area, the R/P ratio tends to be reasonably stable, so that the proved reserves at the end

Table 4. U.S. Exploratory and Development Well Completions,[a] 1970-2001

	Exploratory				Total Exploratory and Development			
Year	Oil	Gas	Dry	Total	Oil	Gas	Dry	Total
1970	763	478	6,193	7,434	13,043	4,031	11,099	28,173
1971	664	472	5,995	7,131	11,903	3,983	10,382	26,268
1972	690	659	6,202	7,551	11,437	5,484	11,013	27,934
1973	642	1,067	5,952	7,661	10,167	6,933	10,320	27,420
1974	859	1,190	6,833	8,882	13,647	7,138	12,116	32,901
1975	982	1,248	7,129	9,359	16,948	8,127	13,646	38,721
1976	1,086	1,346	6,772	9,204	17,688	9,409	13,758	40,855
1977	1,164	1,548	7,283	9,995	18,745	12,122	14,985	45,852
1978	1,171	1,771	7,965	10,907	19,181	14,413	16,551	50,145
1979	1,321	1,907	7,437	10,665	20,851	15,254	16,099	52,204
1980	1,764	2,081	9,039	12,884	32,639	17,333	20,638	70,610
1981	2,636	2,514	12,349	17,499	43,598	20,166	27,789	91,553
1982	2,431	2,125	11,247	15,803	39,199	18,979	26,219	84,397
1983	2,023	1,593	10,148	13,764	37,120	14,564	24,153	75,837
1984	2,198	1,521	11,278	14,997	42,605	17,127	25,681	85,413
1985	1,679	1,190	8,924	11,793	35,118	14,168	21,056	70,342
1986	1,084	793	5,549	7,426	19,097	8,516	12,678	40,291
1987	925	754	5,049	6,728	16,164	8,055	11,112	35,331
1988	855	732	4,693	6,280	13,636	8,555	10,041	32,232
1989	607	705	3,924	5,236	10,204	9,539	8,188	27,931
1990	654	689	3,715	5,058	12,198	11,044	8,313	31,555
1991	592	534	3,314	4,440	11,770	9,526	7,596	28,892
1992	493	423	2,513	3,429	8,757	8,209	6,118	23,084
1993	502	548	2,469	3,519	8,407	10,017	6,328	24,752
1994	570	726	2,405	3,701	6,721	9,538	5,307	21,566
1995	542	570	2,198	3,310	7,627	8,354	5,075	21,056
1996	483	570	2,136	3,189	8,314	9,302	5,282	22,898
1997	428	536	2,110	3,074	10,436	11,327	5,702	27,465
1998	R 291	R 504	R 1,647	R 2,442	7,064	R 11,308	R 4,840	R 23,212
1999	R 154	R 530	R 1,195	R 1,879	4,136	R 10,877	R 3,364	R 18,377
2000	R 261	R 609	R 1,288	R 2,158	R 7,358	R 16,455	R 4,025	R 27,838
2001	310	961	1,444	2,715	8,060	22,083	3,996	34,139

[a]Excludes service wells and stratigraphic and core testing.
R = Revised Data.
Notes: Estimates include only the original drilling of a hole intended to discover of further develop already discovered oil or gas resources. Other drilling activities, such as drilling an old well deeper, drilling of laterals from the original well, drilling of service and injection wells, and drilling for resources other than oil and gas are excluded.
Sources: Years 1970-1972: Energy Information Administration, Office of Oil and Gas. Years 1973-2000: EIA *Monthly Energy Review October 2002*, DOE/EIA-0035(2002/10).

Figure 7. U.S. Exploratory Gas Well Completions, 1977-2001

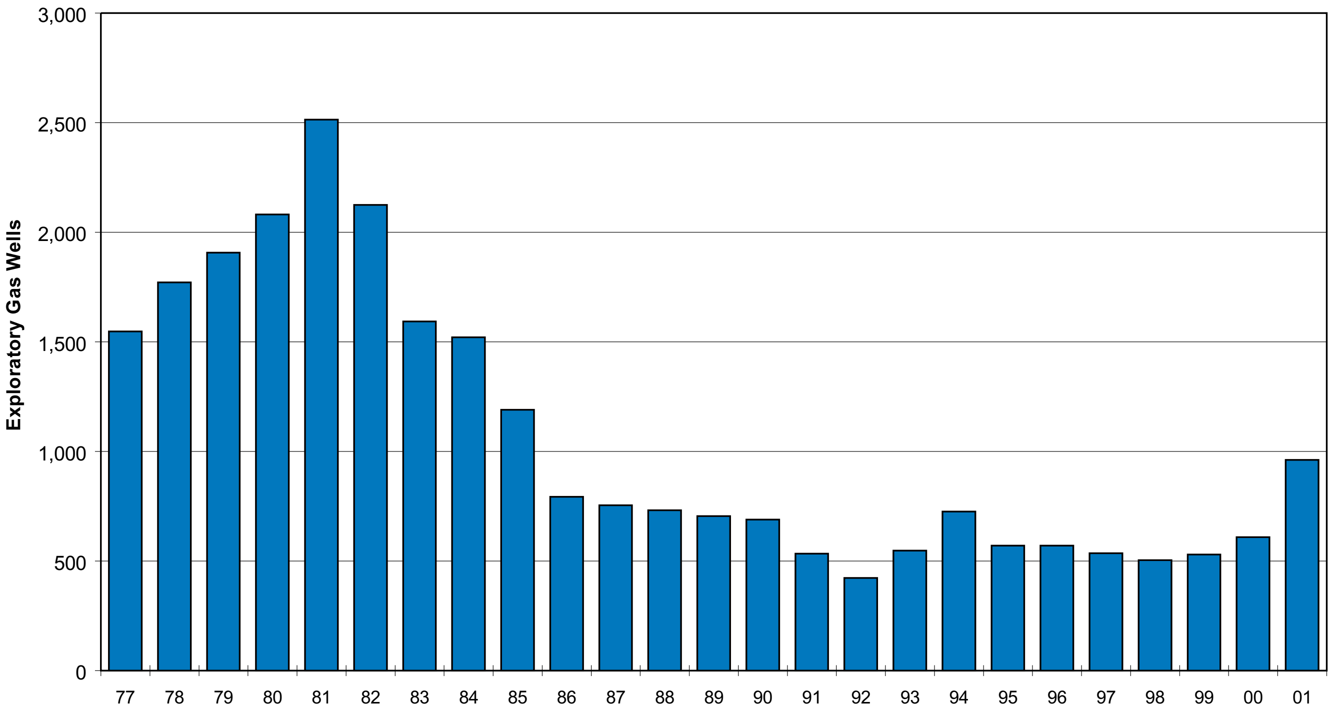
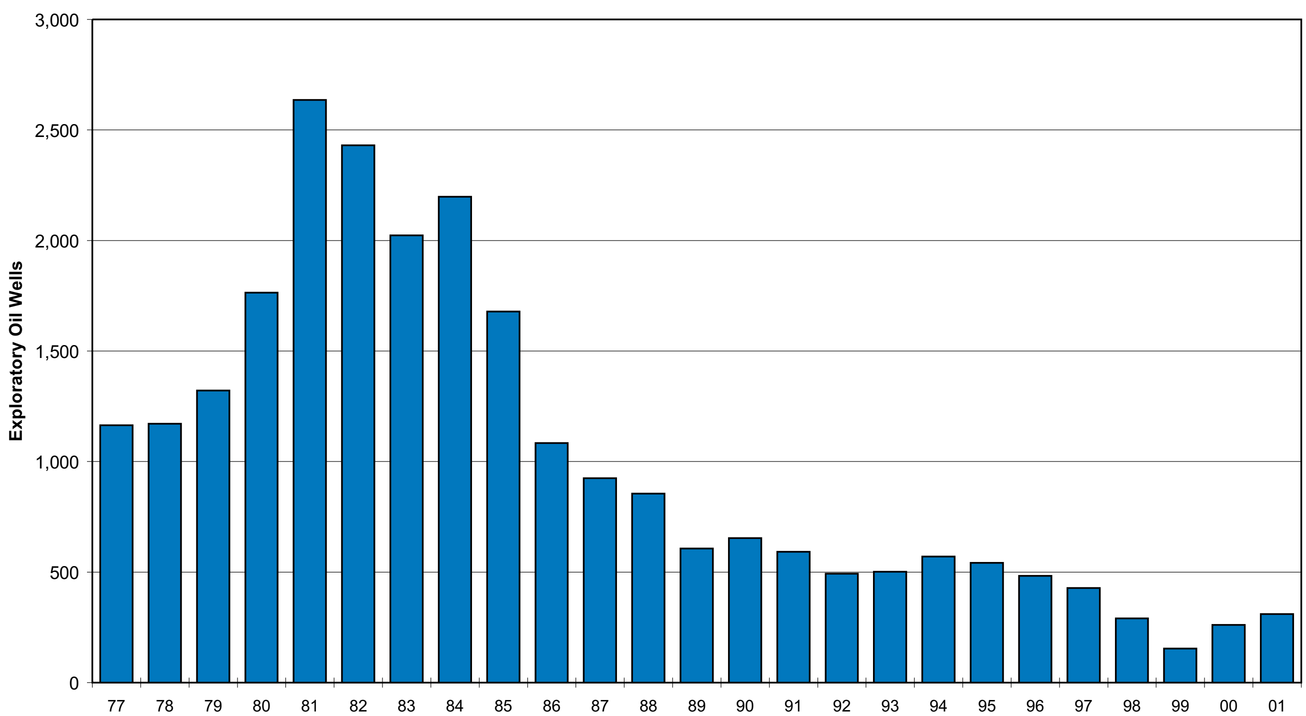


Figure 8. U.S. Exploratory Oil Well Completions, 1977-2001



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

Figure 9. U.S. Total Discoveries of Dry Natural Gas per Exploratory Gas Well Completion, 1977-2001

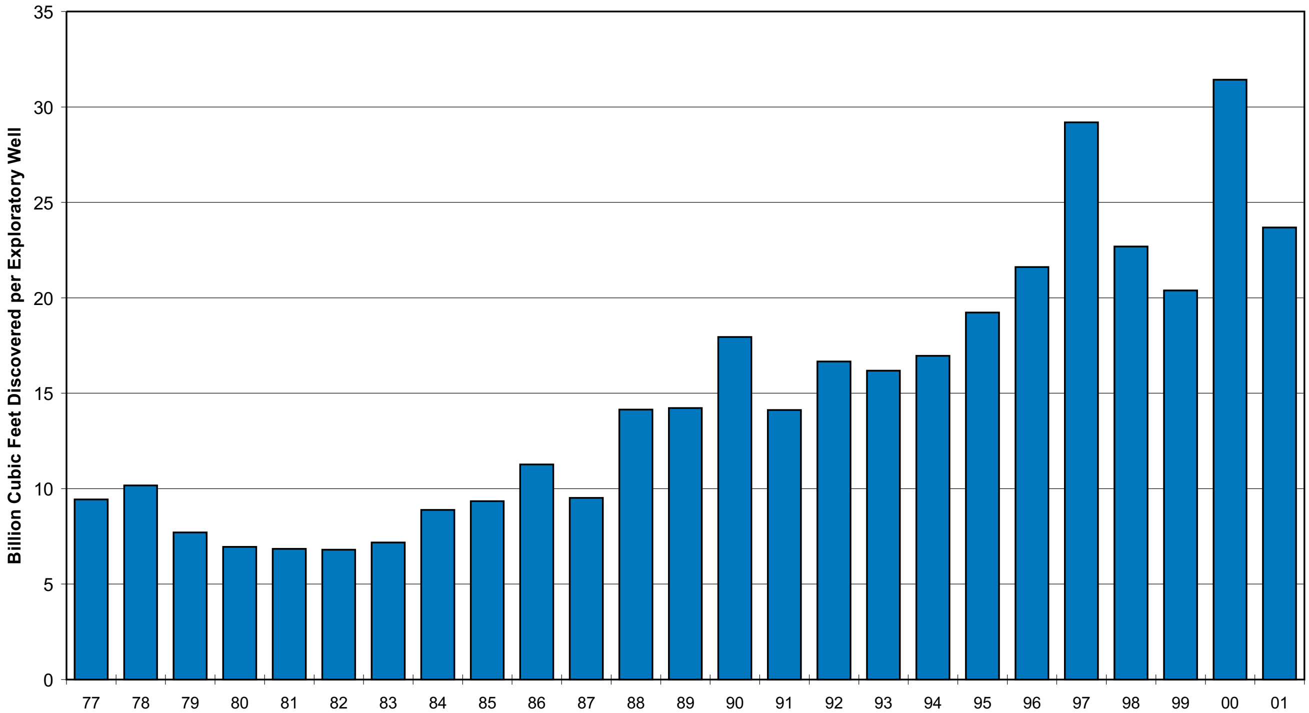
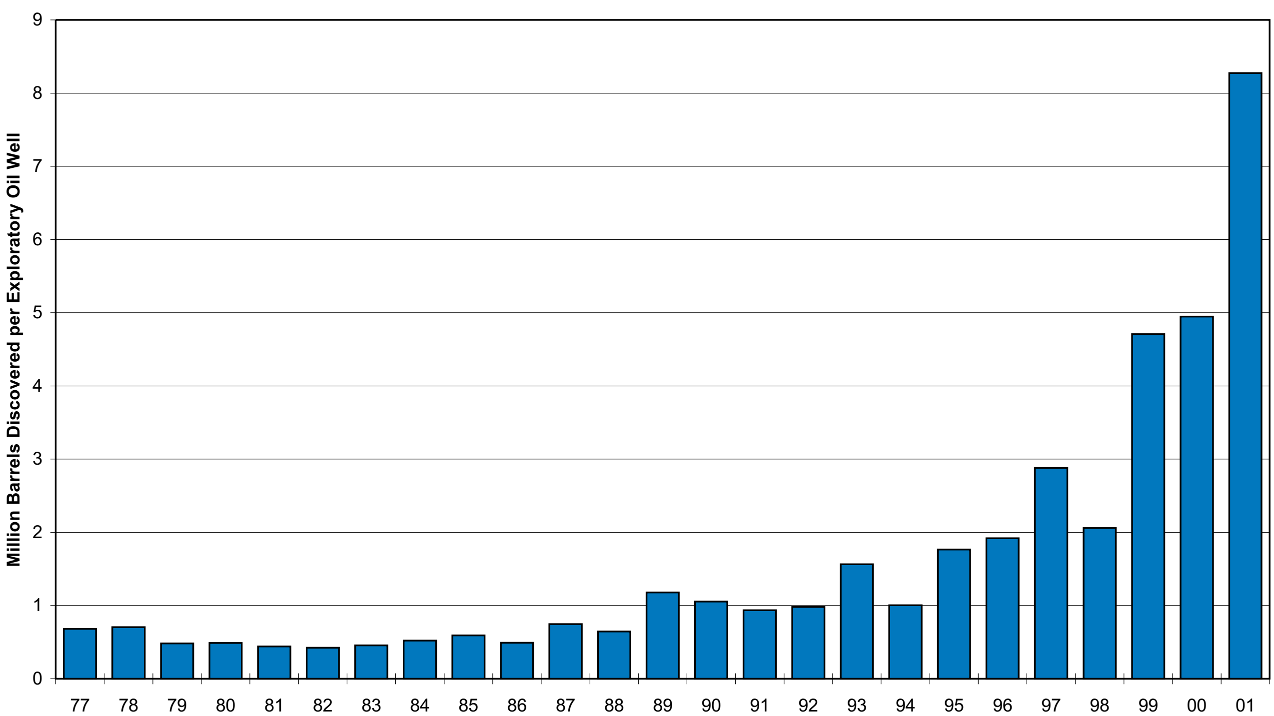


Figure 10. U.S. Total Discoveries of Crude Oil per Exploratory Oil Well Completion, 1977-2001



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

of a year serve as a rough guide to the production level that can be maintained during the following year. Operators report data which yield R/P ratios that vary widely by area depending upon:

- category of operator
- geology and economics
- number and size of new discoveries
- amount of drilling that has occurred.

R/P ratios are an indication of the state of development in an area and, over time, the ratios change. For example, when the Alaskan North Slope oil reserves were booked, the U.S. R/P ratio for crude oil increased because significant production from these reserves did not begin until 7 years after booking due to the need to first build the Trans Alaska pipeline. The U.S. R/P ratio for crude oil decreased from 11.1-to-1 to 9.4-to-1 between 1977 and 1982, as Alaskan North Slope oil production reached high levels.

In 2001, U.S. crude oil proved reserves and oil production increased, resulting in no significant change to the National average R/P ratio of 11.7.

Figure 11 shows the U.S. R/P ratio trend for crude oil since 1945. After World War II, increased drilling and discoveries led to a greater R/P ratio. Later, when drilling found fewer reserves than were produced, the ratio became smaller. R/P ratios also vary geographically, because of differences in development history and reservoir conditions. The 2001 National average R/P ratio for crude oil was 11.7-to-1. Areas with relatively high R/P ratios are the Permian Basin of Texas and New Mexico, and California, where enhanced oil recovery techniques such as carbon dioxide (CO_2) injection or steamflooding have improved recoverability of oil in old, mature fields. Areas that have the lowest R/P ratios, like the Mid-Continent region, usually have many older fields. There, new technologies such as horizontal drilling have helped add reserves equivalent to the annual production, keeping the regional reserves and R/P ratio for oil relatively stable.

Figure 12 shows the historical R/P ratio for wet natural gas since 1945. Prior to 1945, R/P ratios were very high since the interstate pipeline infrastructure was not well developed. The market for natural gas grew rapidly after World War II, lowering the R/P ratio. From 2000 to 2001 the U.S. average R/P ratio for natural gas remained unchanged from 9.2 since both proved reserves and production increased in 2001.

Different marketing, transportation, and production characteristics for gas are seen when looking at regional average R/P ratios, compared to the 2001 U.S. average R/P ratio of about 9.2-to-1. Areas with a higher range of R/P ratios than the National average were the Pacific offshore and the Rockies, and also include areas such as Alabama and Colorado where considerable booking of coalbed methane reserves has recently occurred. Several major gas producing areas have R/P ratios below the National average, particularly Texas, the Gulf of Mexico Federal Offshore, and Oklahoma.

Proved Ultimate Recovery

EIA has in past reports defined Ultimate Recovery as the sum of proved reserves and cumulative production. However, despite EIA's definition, the volume presented by EIA has often been misinterpreted as the maximum recoverable volume of resources for an area. This neglects the addition of proved reserves over time through ultimate recovery appreciation (a.k.a. reserves growth or field growth) and has led some to make overly-pessimistic resource assessments for the United States. EIA therefore introduced the term, *Proved Ultimate Recovery*:

> **Proved Ultimate Recovery** is the sum of proved reserves and cumulative production. It is expected to change over time for any field, group of fields, State, or Country. Proved Ultimate Recovery does not represent the maximum recoverable volume of resources for an area. It is instead a gauge of how much has already been produced plus proved reserves. Proved reserves of crude oil or natural gas are the estimated quantities of petroleum which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. When deterministic proved reserves estimation methods are used, the term reasonable certainty is intended to express a high degree of confidence that the estimated quantities will be recovered. When probabilistic methods are used there should be at least a 90 percent probability that the actual quantities recovered will exceed the estimate.

Figures 13 and 14 show successive estimates of proved ultimate recovery and its components (proved reserves and cumulative production) for both *crude oil plus lease condensate* and *wet natural gas*, over the period 1977 through 2001. They illustrate the continued

Figure 11. Reserves-to-Production Ratios for Crude Oil, 1945-2001

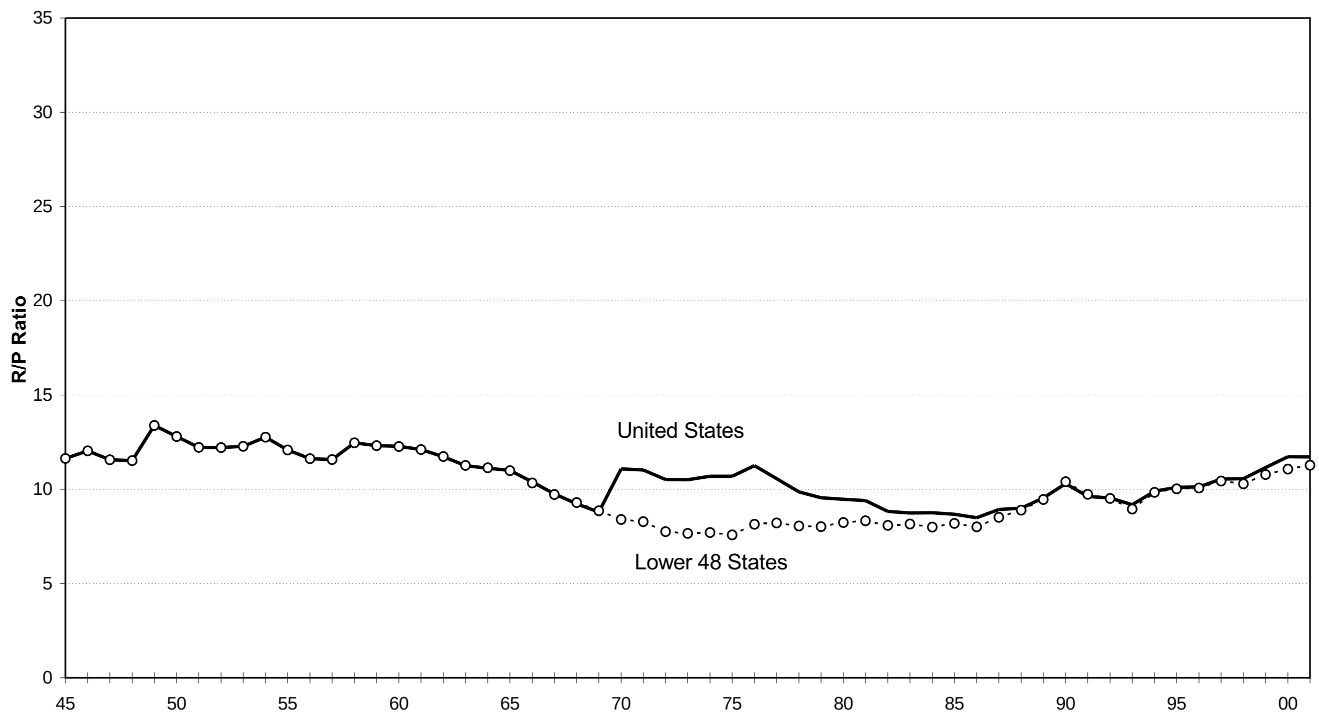
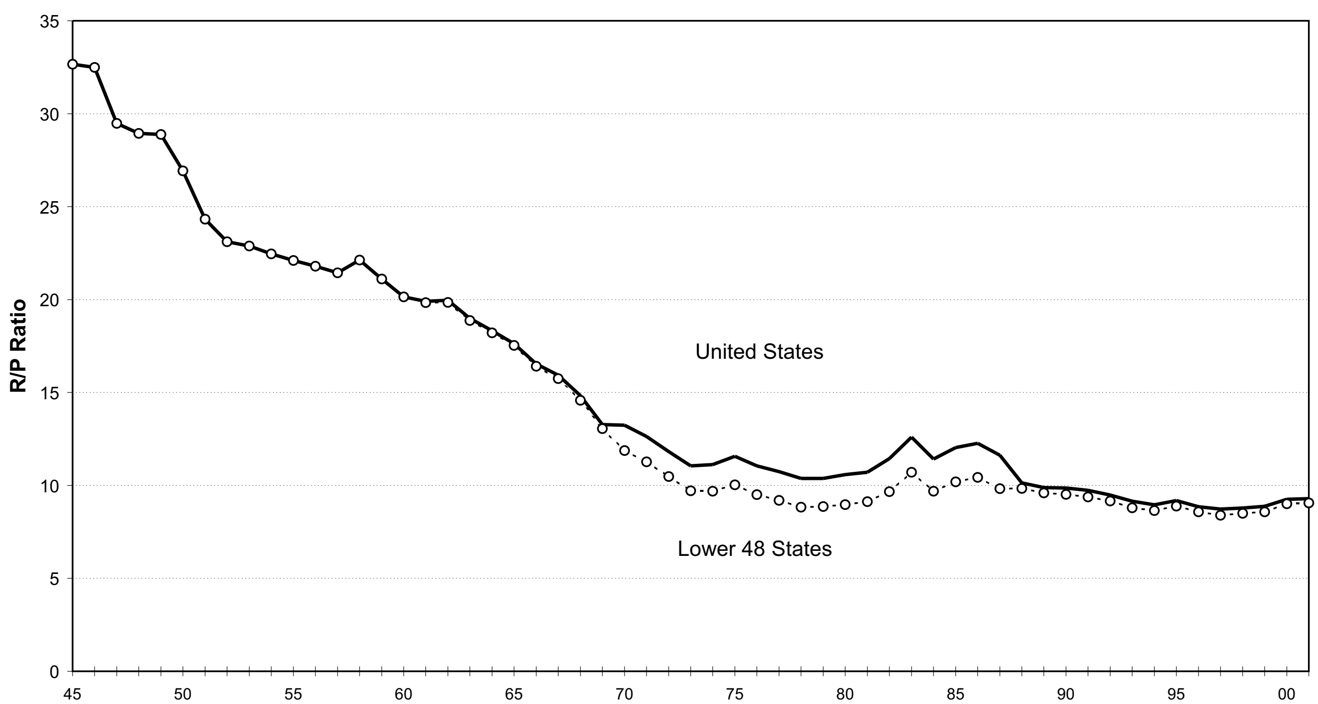


Figure 12. Reserves-to-Production Ratios for Wet Natural Gas, 1945-2001



Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {32} and Energy Information Administration, Office of Oil and Gas (1977–2000){1-24}. Cumulative production: *U.S. Oil and Gas Reserves by Year of Field Discovery* (1977-1988).{33}

Figure 13. Components of Proved Ultimate Recovery for Crude Oil and Lease Condensate, 1977-2001

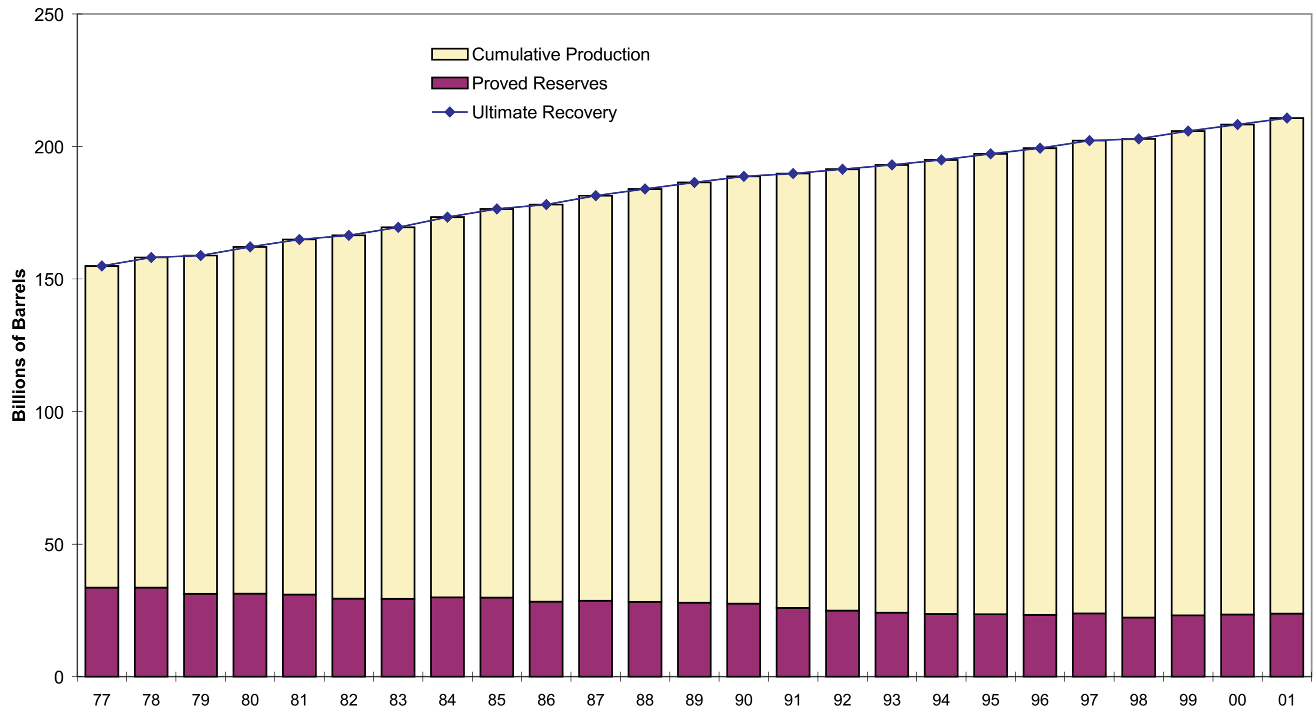
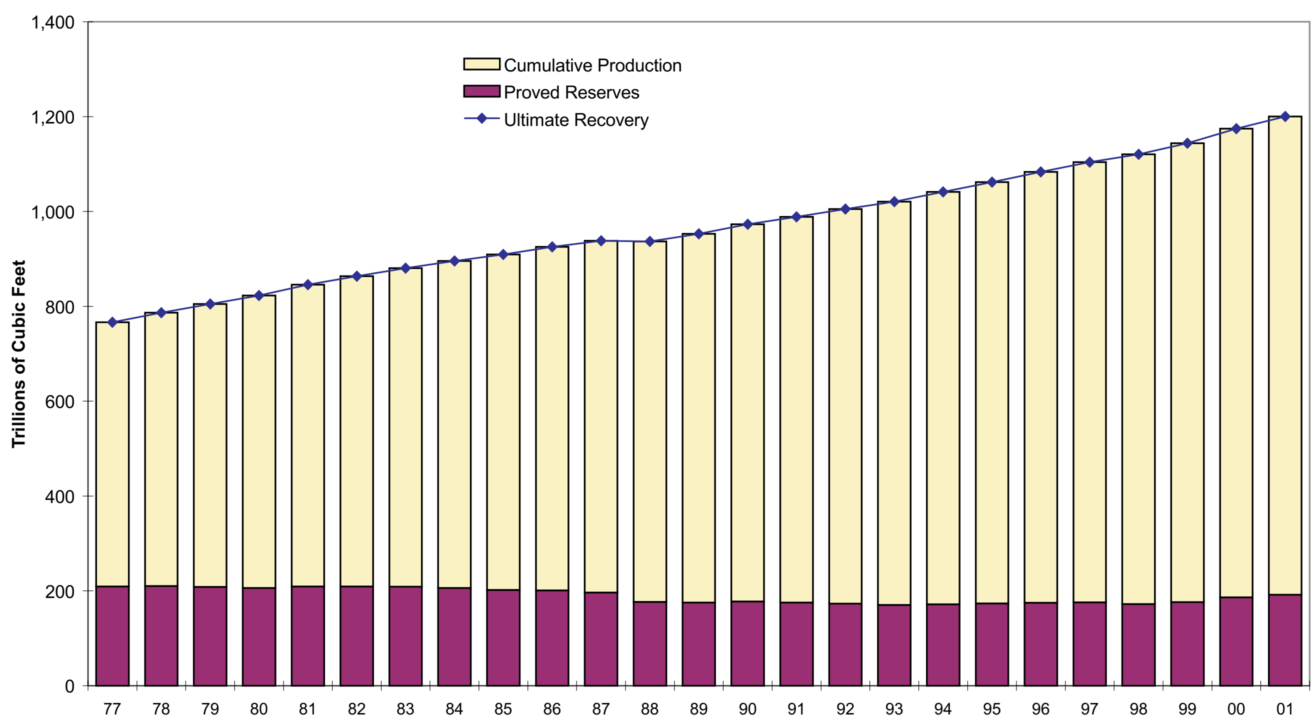


Figure 14. Components of Proved Ultimate Recovery for Wet Natural Gas, 1977-2001



Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {32} and Energy Information Administration, Office of Oil and Gas (1977–2000){1-24}. Cumulative production: *U.S. Oil and Gas Reserves by Year of Field Discovery* (1977-1988).{33}

Table 5. International Oil and Natural Gas Reserves as of December 31, 2001

Oil (million barrels)				Natural Gas (billion cubic feet)			
Rank[a]	Country	Oil & Gas Journal	World Oil	Rank[b]	Country	Oil & Gas Journal	World Oil
1	Saudi Arabia[c]	[d]261,750	[d]261,650	1	Former U.S.S.R.	1,959,231	1,935,243
2	Iraq[c]	112,500	115,000	2	Iran[c]	812,300	939,371
3	Kuwait[c]	[d]96,500	[d]98,850	3	Qatar[c]	508,540	757,700
4	Iran[c]	89,700	99,083	4	Saudi Arabia[c]	[d]219,500	[d]228,200
5	United Arab Emirates[c]	97,800	62,815	5	United Arab Emirates[c]	212,100	204,050
6	Venezuela[c]	76,862	47,620	**6**	**United States**	**[e]177,427**	**172,635**
7	Former U.S.S.R.	57,086	65,364	7	Algeria[c]	159,700	175,000
8	Libya[c]	29,500	30,000	8	Venezuela[c]	147,585	149,207
9	Nigeria[c]	24,000	30,000	9	Nigeria[c]	124,000	159,000
10	China	24,000	29,500	10	Iraq[c]	109,800	112,600
Top 10 Total		**870,521**	**842,482**	**Top 10 Total**		**4,430,183**	**4,833,006**
11	Mexico	26,941	23,114	11	Indonesia[c]	92,500	87,500
12	**United States**	**[e]22,045**	**21,500**	12	Australia	90,000	80,000
13	Qatar	15,207	13,817	13	Malaysia	75,000	82,519
14	Algeria[c]	9,200	17,000	14	Norway	44,037	77,194
15	Norway	9,447	10,271	15	Netherlands	62,542	57,045
16	Brazil	8,465	8,550	16	Canada	59,733	59,700
17	Indonesia[c]	5,000	9,165	17	Kuwait[c]	[d]52,700	[d]56,600
18	Oman	5,506	5,900	18	Libya[c]	46,400	46,900
19	Angola	5,412	5,970	19	China	48,300	42,796
20	Canada	4,858	5,365	20	Egypt	35,180	54,126
21	United Kingdom	4,930	4,551	21	Mexico	29,505	38,950
22	India	4,840	3,819	22	Oman	29,280	30,500
23	Malaysia	3,000	4,457	23	Argentina	27,460	26,780
24	Australia	3,500	3,828	24	Bolivia	24,000	27,361
25	Egypt	2,948	3,668	25	United Kingdom	25,956	24,534
Top 25 Total		**1,001,820**	**983,457**	**Top 25 Total**		**5,172,776**	**5,625,511**
OPEC Total		**818,842**	**787,600**	**OPEC Total**		**2,485,125**	**2,916,128**
World Total		**1,031,553**	**1,017,763**	**World Total**		**5,451,065**	**5,919,369**

[a]Rank is based on an average of oil reserves reported by *Oil & Gas Journal* and *World Oil*.
[b]Rank is based on an average of natural gas reserves reported by *Oil & Gas Journal* and *World Oil*.
[c]Member of the Organization of Petroleum Exporting Countries (OPEC).
[d]Includes one-half of the reserves in the Neutral Zone.
[e]Energy Information Administration proved reserves as of December 31, 2000 were published by the *Oil & Gas Journal* as its estimates as of December 31, 2001.

Note: The Energy Information Administration does not certify these international reserves data, but reproduces the information as a matter of convenience for the reader.

Sources: PennWell Publishing Company, *Oil and Gas Journal*, December 24, 2001, pp. 126-127. Gulf Publishing Company, *World Oil*, August, 2002, pp. 31-35.

appreciation (growth) of proved ultimate recovery over time.

In 1977, U.S. *crude oil plus lease condensate* proved reserves were 33,615 million barrels. Cumulative production of *crude oil plus lease condensate* for 1977 through 2001 was 65,582 million barrels. This substantially exceeds the 1977 proved reserves, but at the end of 2001 there were still 23,846 million barrels of *crude oil plus lease condensate* proved reserves. Therefore, the Nation's estimated proved ultimate recovery of crude oil was fundamentally increased during this period owing to the *proved ultimate recovery appreciation* process (continued development of old fields). In fact, only 10.6 percent of proved reserves additions of crude oil were booked as *new field discoveries* from 1976 through 2001. The rest came from the proved reserves categories related to the proved ultimate recovery appreciation process.

Similarly, the 1977 *wet natural gas* proved reserves were 209,490 billion cubic feet, but more than twice this amount of gas was produced from 1977 through 2001 and there were still 191,743 billion cubic feet of *wet natural gas* proved reserves in 2001. Only 12 percent of proved reserve additions of natural gas were booked as *new field discoveries* from 1976 through 2001.

International Perspective

International Reserves

The EIA estimates domestic oil and gas reserves but does not systematically estimate worldwide reserves. As shown in **Table 5**, international reserves estimates are presented in two widely circulated trade publications. The world's total reserves are estimated to be roughly 1 trillion barrels of oil and 5.7 quadrillion cubic feet of gas.

The United States ranked 12th in the world for proved reserves of crude oil and 6th for natural gas in 2001. A comparison of EIA's U.S. proved reserves estimates with worldwide estimates obtained from other sources shows that the United States had 2 percent of the world's total crude oil proved reserves and 3 percent of the world's total natural gas proved reserves at the end of 2001. There are sometimes substantial differences between the estimates from these sources. The *Oil & Gas Journal* reported oil reserves for the United Arab Emirates at about 98 billion barrels. This is about 56 percent higher than the *World Oil* estimate of 63 billion. One reason (among many) for these differences is that condensate is often included in foreign oil reserve estimates.

The *Oil & Gas Journal*{34} estimate for world oil reserves increased 0.3 percent in 2001, while the *World Oil*{35} estimate increased 1.4 percent. For world gas reserves, the *Oil & Gas Journal* reported a 3.3 percent increase, while *World Oil* reported a 8.7 percent increase.

Several foreign countries have oil reserves considerably larger than those of the United States. Saudi Arabian oil reserves are the largest in the world, dwarfing U.S. oil reserves. Iraqi oil reserves are almost 5 times U.S. reserves. Closer to home, Venezuela has triple and Mexico has around 15 percent more than the United States' oil reserves. (Based on averages of the World Oil and Oil & Gas Journal estimates).

Petroleum Consumption

The United States is the world's largest energy consumer. The EIA estimates energy consumption and publishes it in its *Annual Energy Review.*{36} In 2001:

- The U.S. consumed 96,950,000,000,000,000 Btu of energy (96.9 quadrillion Btu). This was a decrease of 1.5 quadrillion Btu from the 2000 level of consumption.
- 63 percent of U.S. energy consumption was provided by petroleum and natural gas—crude oil and natural gas liquids combined (39 percent), and natural gas (24 percent).
- U.S. petroleum consumption was about 19.6 million barrels of oil and natural gas liquids and 62.0 billion cubic feet of dry gas per day.

Dependence on Imports

The United States remains heavily dependent on imported oil and gas to satisfy its ever-increasing appetite for energy. In 2001, crude oil imports made up 61 percent of the U.S. crude oil supply.

Net gas imports increased slightly from the revised 2000 total of 3.54 trillion cubic feet to 3.65 trillion cubic feet in 2001. Imports were used for approximately 17 percent of consumption. Almost all of this gas was pipelined from Canada. Some came from Mexico, though Mexico remains a net importer of natural gas from the U.S., and liquefied natural gas was imported from Algeria and Australia.

Canada, Saudi Arabia, Venezuela, and Mexico were the primary foreign suppliers of petroleum to the United States.{37}

List Of Appendices

Appendix A: Reserves by Operator Production Size Class - How much of the National total of proved reserves are owned and operated by the large oil and gas corporations? Appendix A separates the large operators from the small and presents reserves data according to operator production size classes.

Appendix B: Top 100 Oil and Gas Fields - What fields have the most reserves and production in the United States? The top 100 fields for oil and natural gas out of the inventory of more than 45,000 oil and gas fields are listed in Appendix B. These fields hold two-thirds of U.S. crude oil proved reserves. Table B3 in Appendix B lists the top U.S. operators by reported 2001 production and indicates pending mergers announced in 2001 with linked arrows.

Appendix C: Conversion to the Metric System - To simplify international comparisons, a summary of U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves expressed in metric units is included as Appendix C.

Appendix D: Historical Reserves Statistics - Appendix D contains selected historical reserves data presented at the State and National level. Readers interested in a historical look at one specific State or region can review these tables. We have again included Table D9, Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore 1992-2001, due to expressed interest from the industry regarding this area. Table D9 contains the production and proved reserves for 1992-2001 for the Gulf of Mexico Federal Offshore region by water depths greater than 200 meters, and less than 200 meters.

Appendix E: Summary of Data Collection Operations - This report is based on two EIA surveys. Proved reserves data is collected annually from U.S. oil and gas field operators on Form EIA-23. Natural gas liquids production data is collected annually from U.S. natural gas plant operators on Form EIA-64A. Appendix E describes survey designs, response statistics, reporting requirements, and sampling frame maintenance.

Appendix F: Statistical Considerations - The EIA strives to maintain or improve the accuracy of its reports. Since complete coverage of all oil and gas operators is impractical, the EIA has adopted sound statistical methods to impute data for those operators not sampled and for those data elements that smaller operators are not required to file. These methods are described in Appendix F.

Appendix G: Estimation of Reserves and Resources - Reserves are not measured directly. Reserves are estimated on the basis of the best geological, engineering, and economic data available to the estimator. Appendix G describes reserve estimation techniques commonly used by oil and gas field operators and EIA personnel when in the field performing quality assurance checks. A discussion of the relationship of reserves to overall U.S. oil and gas resources is also included.

Appendix H: Maps of Selected State Subdivisions - Certain large producing States have been subdivided into smaller regions to allow more specific reporting of reserves data. Maps of these States identifying the smaller regions are provided in Appendix H.

Appendix I: Annual Survey Forms of Domestic Oil and Gas Reserves - Samples of Form EIA-23 and Form EIA-64A are presented in Appendix I.

Glossary - Contains definitions of many of the technical terms used in this report.

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

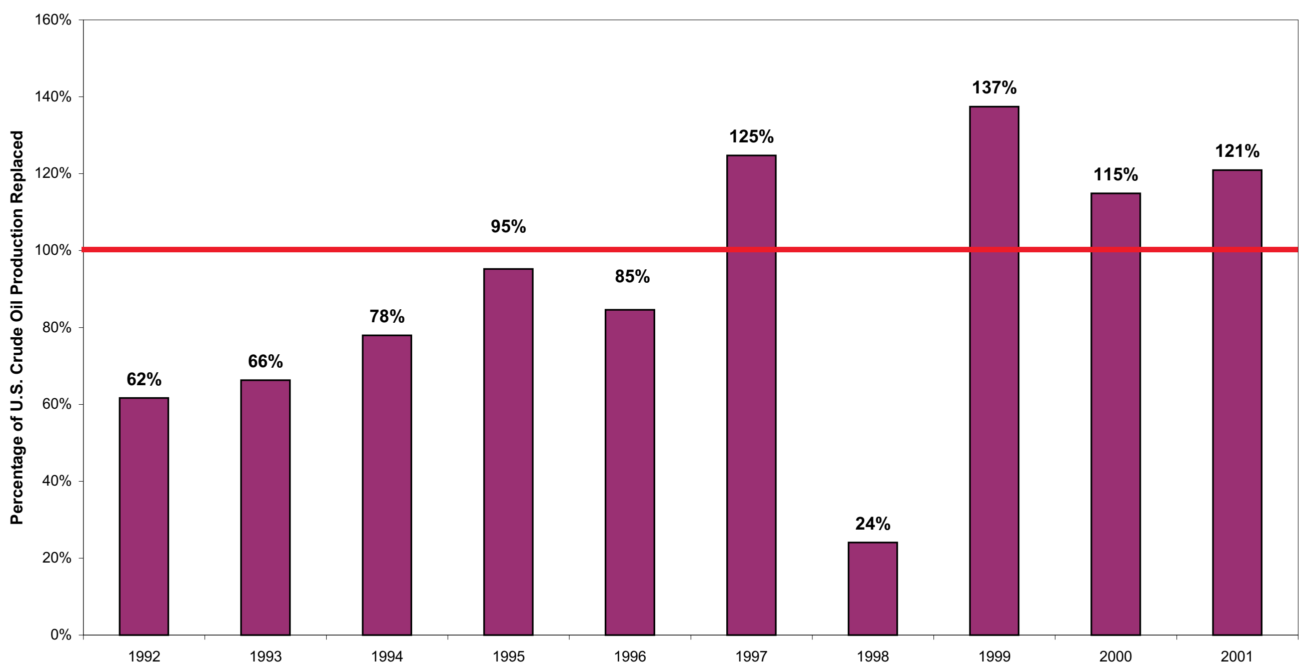
Table 6 presents the U.S. proved reserves of crude oil as of December 31, 2001, by selected States and State subdivisions.

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
Area Total	**79**

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									Proved Reserves 12/31/01
		Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	
Alaska	4,861	1	128	215	0	0	150	281	0	355	4,851
Lower 48 States	**17,184**	**-5**	**1,473**	**1,544**	**529**	**442**	**716**	**1,126**	**292**	**1,560**	**17,595**
Alabama	34	-4	13	1	1	1	1	0	3	4	42
Arkansas	48	9	2	7	3	1	0	0	0	[a]7	[a]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	[a]2	[a]12
Kansas	237	-9	17	22	7	17	4	1	8	30	216
Kentucky	24	1	1	2	5	0	0	0	0	2	[a]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	[a]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[b]	17	4	2	1	0	0	1	0	0	2	21
U.S. Total	**22,045**	**-4**	**1,601**	**1,759**	**529**	**442**	**866**	**1,407**	**292**	**1,915**	**22,446**

[a]Indicates the estimate is associated with a sampling error (95 percent confidence interval) that exceeds 20 percent of the estimated value.
[b]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

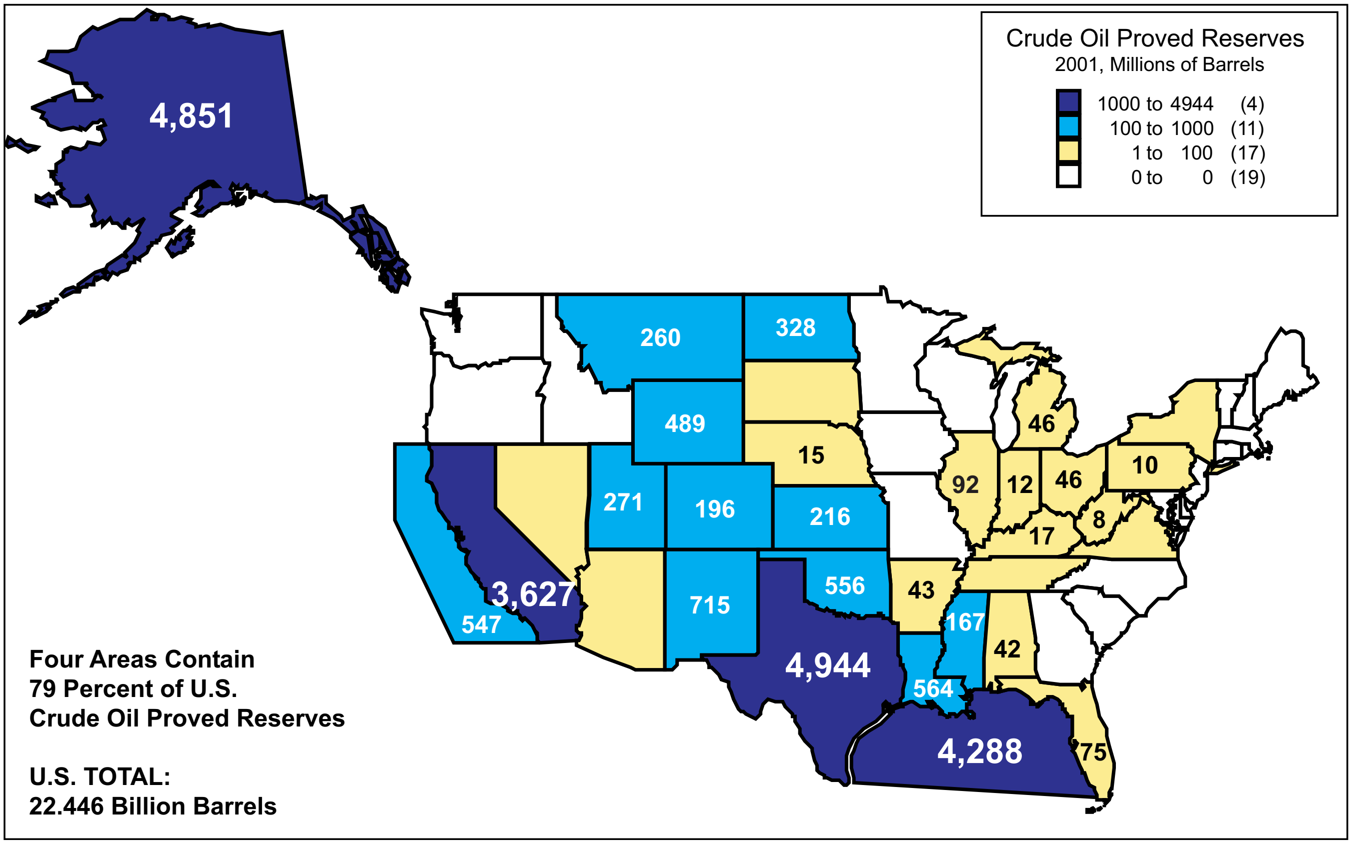
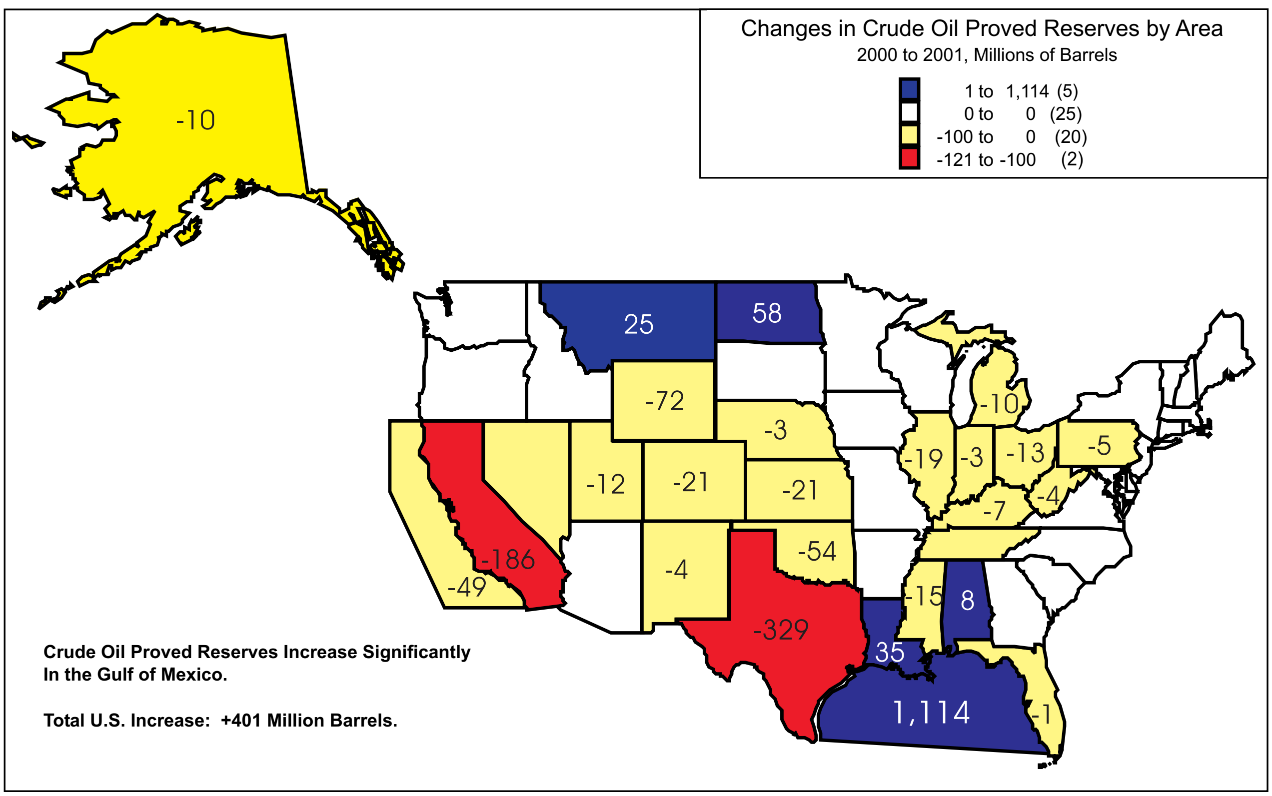


Figure 17. Changes in Crude Oil Proved Reserves by Area, 2000 to 2001



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
Area Total	**+589**
U.S. Total	**+401**

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. {38} 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 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 [a]
(Million Barrels of 42 U.S. Gallons)

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

[a]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).
[b]Includes Arizona, Missouri, Nevada, South Dakota, and Tennessee.
Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2001.

4. Natural Gas Statistics

Dry Natural Gas

Proved Reserves

The United States had 183,460 billion cubic feet of dry natural gas reserves as of December 31, 2001, a 3 percent increase over the 2000 level (**Table 8**). All natural gas proved reserves data shown in this report exclude natural gas held in underground storage.

Most of the reserve increases were in Wyoming, Colorado, and Texas, owing to drilling and/or improved stimulation technology used in the Madden, Wattenberg, and Pinedale Fields of Wyoming, coalbed methane fields in Wyoming and Colorado, and the Barnett Shale and Lobo Trend gas areas in Texas. Utah and New Mexico, which had significant gas reserves increases in 2000, had smaller gains in 2001. California's and Oklahoma's reserves declined in 2001, despite last year's reserves increases.

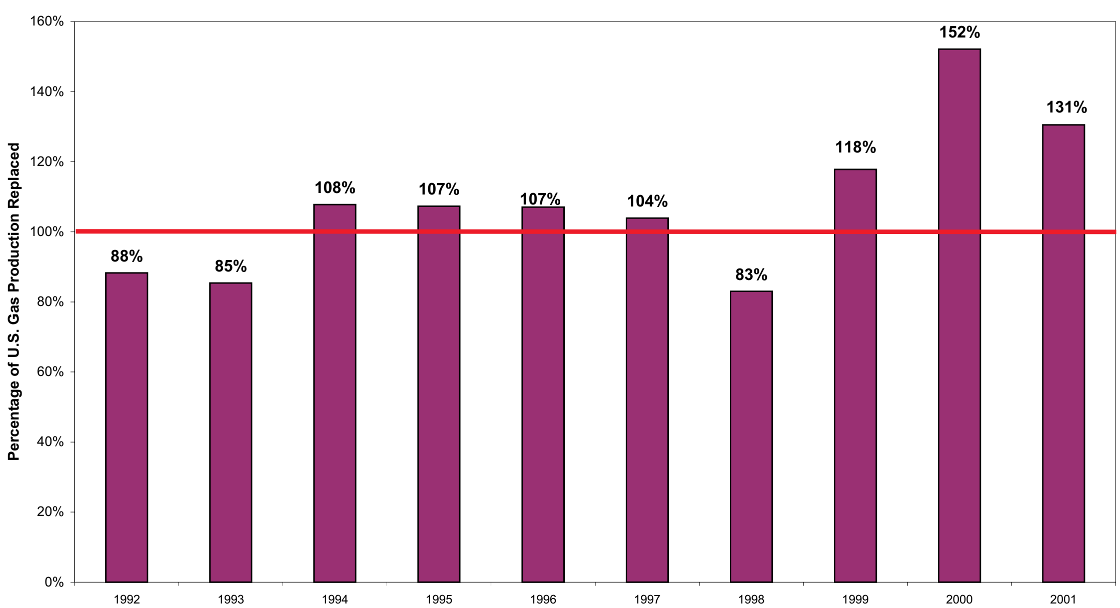
Additions to dry gas reserves in 2001 were 25,812 billion cubic feet, 11 percent less than in 2000. Operators replaced 131 percent of dry gas production (**Figure 18**). U.S. *total discoveries* of dry natural gas reserves were 22,758 billion cubic feet in 2001, up 19 percent from 2000 (19,138 billion cubic feet).

Proved reserves by State are shown on the map in **Figure 19**. Six areas account for 71 percent of the Nation's dry natural gas proved reserves:

Area	Percent of U.S. Gas Reserves
Texas	24
Gulf of Mexico Federal Offshore	14
Wyoming	10
New Mexico	9
Oklahoma	7
Colorado	7
Area Total	**71**

For the first time, proved reserves of dry natural gas in Wyoming exceeded those in New Mexico. However,

Figure 18. Reserve Additions Replace 131% of 2001 U.S. Dry Natural Gas Production.



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

Table 8. Dry Natural Gas Proved Reserves, Reserves Changes, and Production, 2001
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/00	Changes in Reserves During 2001: Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/01
Alaska	9,237	-11	233	335	0	0	59	74	4	461	8,800
Lower 48 States	**168,190**	**2,753**	**18,125**	**20,341**	**11,380**	**14,010**	**16,321**	**3,504**	**2,796**	**19,318**	**174,660**
Alabama	4,149	36	78	218	1	3	169	42	2	345	3,915
Arkansas	1,581	28	128	88	8	5	119	0	11	160	1,616
California	2,849	36	162	255	7	20	210	0	2	336	2,681
Coastal Region Onshore	234	2	14	61	0	0	0	0	0	12	177
Los Angeles Basin Onshore	193	6	17	27	1	0	8	0	0	9	187
San Joaquin Basin Onshore	2,331	28	125	161	6	20	200	0	2	307	2,232
State Offshore	91	0	6	6	0	0	2	0	0	8	85
Colorado	10,428	155	1,882	1,513	2,468	2,794	2,120	4	7	882	12,527
Florida	82	0	7	0	0	0	0	0	0	5	84
Kansas	5,299	60	279	220	259	331	46	2	1	438	5,101
Kentucky	1,760	158	348	397	50	49	42	0	23	73	1,860
Louisiana	9,239	322	1,013	1,696	496	888	1,427	27	566	1,479	9,811
North	3,298	49	298	522	58	189	993	1	23	390	3,881
South Onshore	5,245	267	648	1,091	370	524	366	17	510	931	5,185
State Offshore	696	6	67	83	68	175	68	9	33	158	745
Michigan	2,729	653	263	524	24	2	63	50	3	239	2,976
Mississippi	618	53	70	43	34	29	43	0	19	94	661
Montana	885	51	82	90	57	59	36	1	4	73	898
New Mexico	17,322	9	1,599	1,244	312	307	1,216	21	32	1,536	17,414
East	3,537	136	470	548	201	126	479	20	17	518	3,518
West	13,785	-127	1,129	696	111	181	737	1	15	1,018	13,896
New York	322	-18	29	51	1	0	47	1	17	28	318
North Dakota	433	17	48	32	8	5	3	0	18	41	443
Ohio	1,185	31	129	287	87	62	9	0	12	84	970
Oklahoma	13,699	196	1,458	1,895	480	671	1,325	13	52	1,481	13,558
Pennsylvania	1,741	3	201	219	11	32	108	33	1	114	1,775
Texas	42,082	658	3,594	5,191	2,902	4,297	4,944	603	580	5,138	43,527
RRC District 1	1,032	17	87	120	30	44	84	7	1	104	1,018
RRC District 2 Onshore	1,980	-231	146	246	93	270	175	14	108	322	1,801
RRC District 3 Onshore	3,873	54	422	498	563	639	413	86	85	741	3,770
RRC District 4 Onshore	9,645	228	809	1,211	674	712	1,284	300	258	1,395	9,956
RRC District 5	3,168	15	398	650	22	822	779	51	5	335	4,231
RRC District 6	5,976	159	408	419	886	1,110	404	5	15	644	6,128
RRC District 7B	312	-7	21	42	15	10	24	0	0	51	252
RRC District 7C	3,504	175	285	790	425	449	413	0	24	315	3,320
RRC District 8	5,388	58	431	569	111	117	340	67	67	533	5,255
RRC District 8A	1101	5	81	90	13	13	62	0	1	75	1,085
RRC District 9	1626	77	109	127	18	16	790	0	1	185	2,289
RRC District 10	4,079	82	381	404	46	75	152	1	8	373	3,955
State Offshore	398	26	16	25	6	20	24	72	7	65	467
Utah	4,235	135	805	606	17	37	269	4	5	288	4,579
Virginia	1704	19	90	145	718	842	31	0	7	78	1,752
West Virginia	2,900	-225	315	279	29	32	96	0	26	158	2,678
Wyoming	16,158	306	1,860	1,488	1,845	2,026	2,574	44	49	1,286	18,398
Federal Offshore[a]	26,748	60	3,682	3,856	1,565	1,519	1,387	2,659	1,359	4,957	27,036
Pacific (California)	576	1	95	101	0	0	13	0	0	44	540
Gulf of Mexico (Louisiana)[a]	19,788	40	2,663	2,877	1,309	1,415	1,085	1,471	1,180	3,735	19,721
Gulf of Mexico (Texas)	6,384	19	924	878	256	104	289	1,188	179	1,178	6,775
Miscellaneous[b]	42	10	3	4	1	0	37	0	0	5	82
U.S. Total	**177,427**	**2,742**	**18,358**	**20,676**	**11,380**	**14,010**	**16,380**	**3,578**	**2,800**	**19,779**	**183,460**

[a]Includes Federal offshore Alabama.
[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.
Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." They may differ from the official Energy Information Administration production data for natural gas for 2000 contained in the *Natural Gas Annual 2001*, DOE/EIA-0131(01).
Source: Energy Information Administration, Office of Oil and Gas.

Figure 19. 2001 Dry Natural Gas Proved Reserves by Area

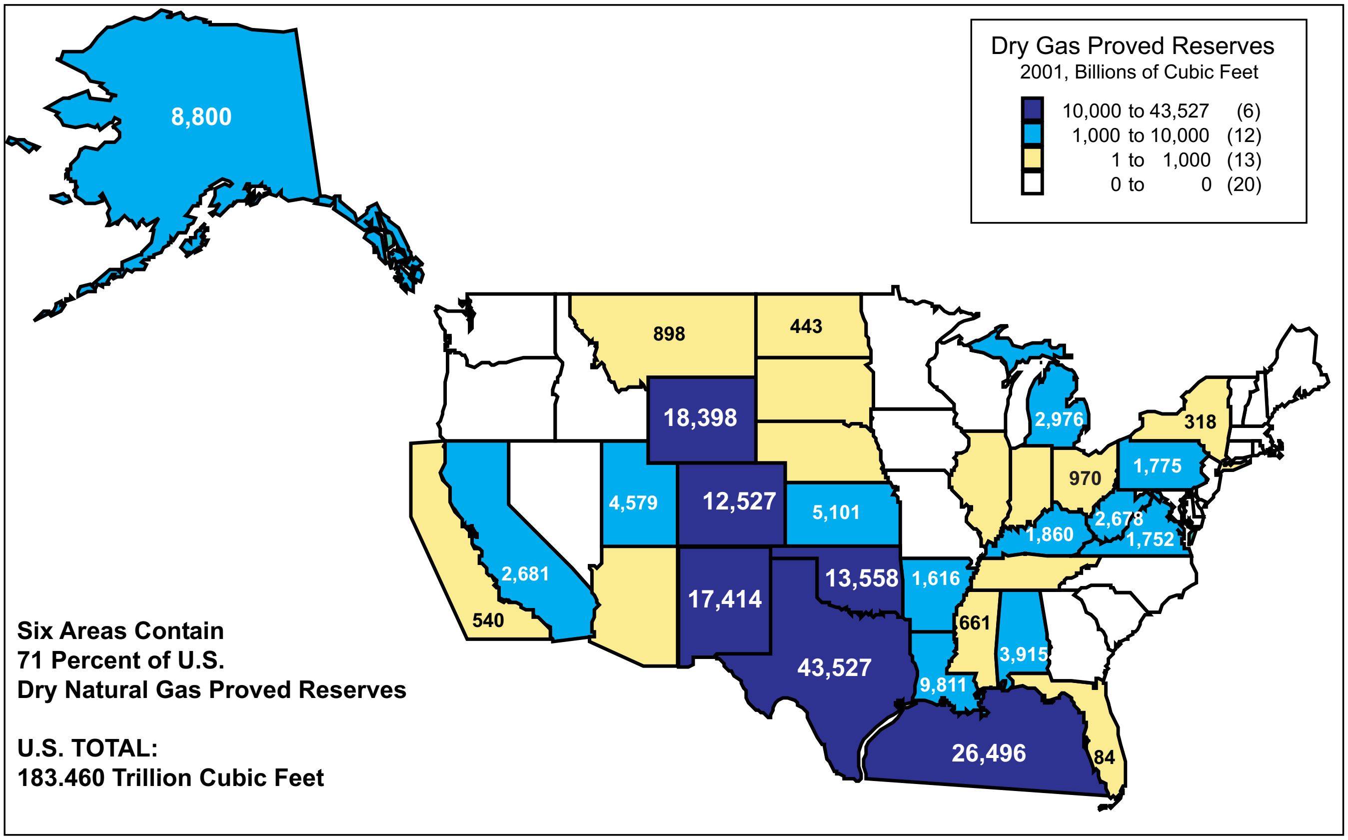
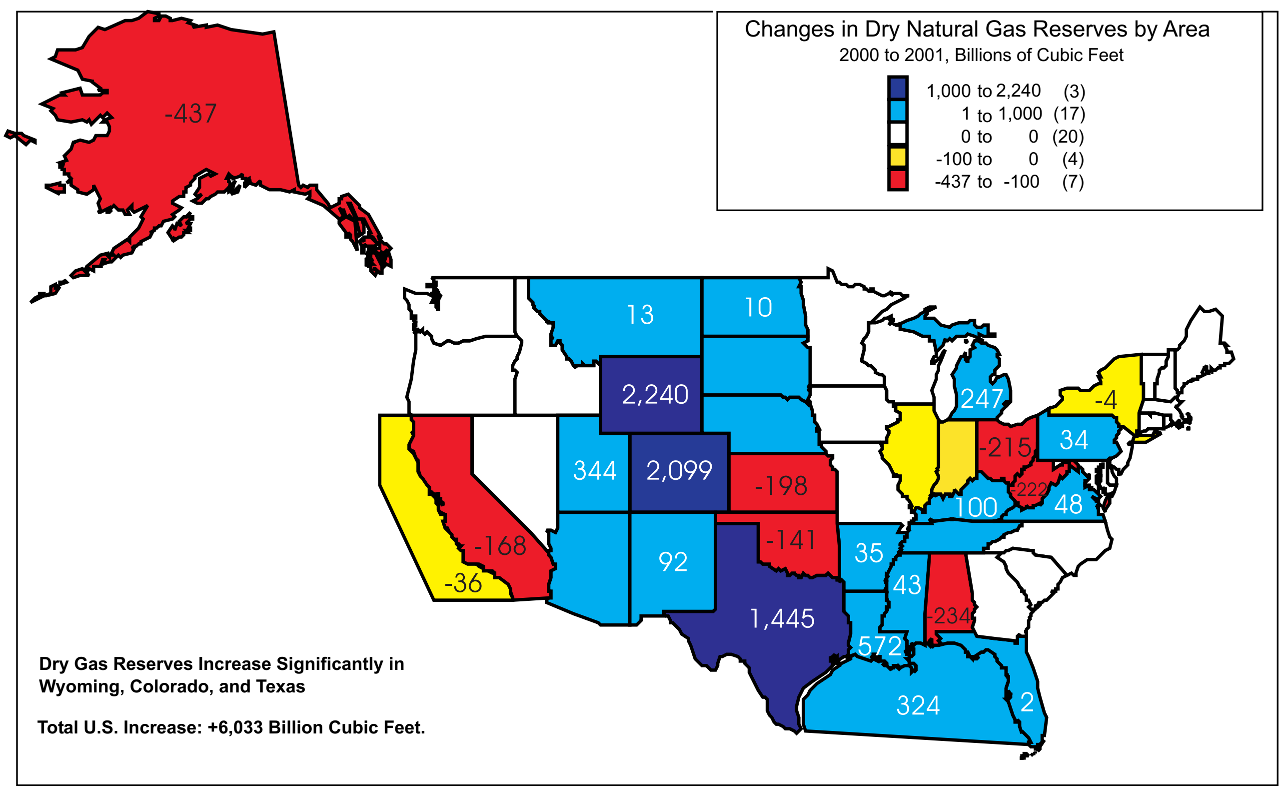


Figure 20. Changes in Dry Natural Gas Proved Reserves by Area, 2000 to 2001



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

New Mexico still reported higher production than did Wyoming.

Discussion of Reserves Changes

Figure 20 maps the change in dry gas proved reserves from 2000 to 2001 by area. Here's how the top six areas fared, compared to the total United States:

Area	Change in U.S. Gas Reserves (billion cubic feet)
Texas	+1,445
Gulf of Mexico Federal Offshore	+324
Wyoming	+2,240
New Mexico	+92
Oklahoma	-141
Colorado	+2,099
Area Total	**+6,059**
U.S. Total	**+6,033**

Figure 4 in Chapter 2 shows the components of change in dry natural gas proved reserves for 2001 and the preceding 10 years.

Discoveries

Total discoveries are those reserves attributable to field *extensions*, *new field discoveries*, and *new reservoir discoveries in old fields*; they result from drilling exploratory wells. *Total discoveries* of dry natural gas reserves were 22,758 billion cubic feet in 2001, a 19 percent increase from the level reported in 2000. About 27 percent of the *total discoveries* were in Texas, 24 percent were in the Gulf of Mexico Federal Offshore, 12 percent were in Wyoming, and 9 percent were in Colorado.

Extensions were 16,380 billion cubic feet, 11 percent more than 2000 and more than twice the prior 10-year average (7,802 billion cubic feet). Areas with the largest *extensions* and their percentage of total *extensions* were:

- Texas had 4,944 billion cubic feet of extensions (30 percent of the total)
- Wyoming had 2,574 billion cubic feet (16 percent)
- Colorado had 2,120 billion cubic feet (13 percent)
- Louisiana had 1,427 billion cubic feet (9 percent).

New field discoveries were 3,578 billion cubic feet in 2001—80 percent more than in 2000. The areas with the largest *new field discoveries* were the Gulf of Mexico Federal Offshore (with 2,659 billion cubic feet of new field discoveries, 74 percent of the total), Texas (603 billion cubic feet, 17 percent), and Alaska (74 billion cubic feet, 2 percent). In the prior 10 years, U.S. operators reported an average of 1,471 billion cubic feet of reserves from *new field discoveries* per year. Reserves from *new field discoveries* in 2001 were more than twice that average.

New reservoir discoveries in old fields were 2,800 billion cubic feet, 18 percent higher than 2000. Among the areas with the largest *new reservoir discoveries in old fields* and their percentage of the total were:

- Gulf of Mexico Federal Offshore (1,359 billion cubic feet, 49 percent)
- Texas (580 billion cubic feet, 21 percent)
- Louisiana (566 billion cubic feet, 20 percent).

In the prior 10 years, U.S. operators reported an average of 2,334 billion cubic feet of reserves from *new reservoirs discovered in old fields* per year. Reserves from *new reservoirs discovered in old fields* in 2001 were 20 percent higher than that average.

Revisions and Adjustments

There were 18,358 billion cubic feet of *revision increases*, 20,676 billion cubic feet of *revision decreases*, and 2,742 billion cubic feet of *adjustments* in 2001. Combined, there were 424 billion cubic feet of net revisions and adjustments in 2001, excluding reserves additions from net *sales* and *acquisitions*. This is significantly less than the average volume of net revisions and adjustments of the prior 10 years (7,161 billion cubic feet).

Sales and Acquisitions

Sales represents that volume of dry natural gas proved reserves deducted from an operator's total through sale or transfer of operations of an existing gas field 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 by purchase or operations transfer of an existing gas field or properties.

In 2001, there were 11,380 billion cubic feet of sales transactions between operators, and 14,010 billion cubic feet of acquisitions. The net difference of 2,630 billion cubic feet was added to the National total of dry natural gas reserves in 2001.

Table 9. Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2001 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/00	Changes in Reserves During 2001										Proved Reserves 12/31/01
		Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	
Alaska	9,331	0	236	338	0	0	60	75	4	467	8,901
Lower 48 States	**177,179**	**1849**	**18943**	**21279**	**11885**	**14,600**	**17,123**	**3,593**	**2,894**	**20,175**	**182,842**
Alabama	4,269	-39	80	225	1	3	174	43	3	349	3,958
Arkansas	1,584	28	128	88	8	5	120	0	11	161	1,619
California	2,952	22	168	264	7	21	216	0	2	347	2,763
Coastal Region Onshore	244	3	15	64	0	0	0	0	0	13	185
Los Angeles Basin Onshore	204	3	18	28	1	0	8	0	0	9	195
San Joaquin Basin Onshore	2,413	16	129	166	6	21	206	0	2	317	2,298
State Offshore	91	0	6	6	0	0	2	0	0	8	85
Colorado	10,837	102	1,945	1,564	2,551	2,888	2,191	4	8	911	12,949
Florida	93	0	9	0	0	0	0	0	0	6	96
Kansas	5,682	50	299	235	277	355	50	3	1	468	5,460
Kentucky	1,837	175	365	417	52	51	44	0	24	77	1,950
Louisiana	9,512	278	1,040	1,737	511	913	1,451	29	582	1,517	10,040
North	3,344	43	302	528	59	191	1,004	1	23	394	3,927
South Onshore	5,447	230	668	1,123	381	540	377	18	525	960	5,341
State Offshore	721	5	70	86	71	182	70	10	34	163	772
Michigan	2,772	675	268	534	25	2	64	51	3	244	3,032
Mississippi	620	53	70	43	34	29	43	0	19	94	663
Montana	892	53	82	91	57	60	37	1	4	74	907
New Mexico	18,509	-29	1,712	1,343	341	332	1,310	23	35	1,649	18,559
East	3,998	92	523	610	224	141	534	22	19	576	3,919
West	14,511	-121	1,189	733	117	191	776	1	16	1,073	14,640
New York	322	-18	29	51	1	0	47	1	17	28	[a]318
North Dakota	487	15	54	36	9	6	3	0	21	46	495
Ohio	1,186	31	129	287	87	62	9	0	12	84	971
Oklahoma	14,543	181	1,545	2,008	509	711	1,404	14	55	1,570	14,366
Pennsylvania	1,740	9	202	220	11	32	109	34	1	114	1,782
Texas	45,419	274	3,833	5,550	3,086	4,520	5,268	632	612	5,460	46,462
RRC District 1	1,106	-9	91	126	31	47	88	8	1	109	1,066
RRC District 2 Onshore	2,045	-237	151	254	96	279	181	15	112	333	1,863
RRC District 3 Onshore	4,042	65	441	521	589	669	432	90	89	775	3,943
RRC District 4 Onshore	10,118	138	841	1,258	700	740	1,335	312	268	1,449	10,345
RRC District 5	3,217	9	404	659	23	834	789	52	5	339	4,289
RRC District 6	6,365	74	428	440	930	1,164	423	5	16	676	6,429
RRC District 7B	356	-5	24	49	17	12	28	0	0	59	290
RRC District 7C	4,132	30	322	893	481	509	467	0	27	356	3,757
RRC District 8	6,136	87	493	650	127	134	389	77	77	609	6,007
RRC District 8A	1,215	-1	89	99	15	14	68	0	1	82	1,190
RRC District 9	1,854	46	122	141	21	17	880	0	1	206	2,552
RRC District 10	4,433	52	411	435	50	81	164	1	8	402	4,263
State Offshore	400	25	16	25	6	20	24	72	7	65	468
Utah	4,472	66	835	629	18	38	279	4	5	299	4,753
Virginia	1,704	19	90	145	718	842	31	0	7	78	1,752
West Virginia	3,062	-239	333	295	30	33	101	0	27	167	2,825
Wyoming	17,211	151	1,961	1,569	1,946	2,136	2,714	46	51	1,356	19,399
Federal Offshore[b]	27,467	-54	3,763	3,944	1,605	1,561	1,421	2,708	1,394	5,071	27,640
Pacific (California)	576	1	95	101	0	0	13	0	0	44	540
Gulf of Mexico (Louisiana)[b]	20,466	-66	2,739	2,960	1,347	1,456	1,117	1,514	1,214	3,843	20,290
Gulf of Mexico (Texas)	6,425	11	929	883	258	105	291	1,194	180	1,184	6,810
Miscellaneous[c]	42	11	3	4	1	0	37	0	0	5	83
U.S. Total	**186,510**	**1,849**	**19,179**	**21,617**	**11,885**	**14,600**	**17,183**	**3,668**	**2,898**	**20,642**	**191,743**

[a]Indicates the estimate is associated with a sampling error (95 percent confidence interval) that exceeds 20 percent of the estimated value.
[b]Includes Federal offshore Alabama.
[c]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.

Note: The prouction 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 natural gas for 2001 contained in the *Natural Gas Annual 2001,* DOE/EIA-0131(01).

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

Table 10. Nonassociated Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2001 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

		Changes in Reserves During 2001									
State and Subdivision	Published Proved Reserves 12/31/00	Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/01
Alaska	2,564	-1	65	206	0	0	40	56	4	213	2,309
Lower 48 States	**154,113**	**1,356**	**15,852**	**18,179**	**10,733**	**13,756**	**15,947**	**2,322**	**2,416**	**17,238**	**159,612**
Alabama	4,241	-35	77	224	1	2	173	43	0	345	3,931
Arkansas	1,545	28	127	87	3	5	120	0	11	157	1,589
California	754	9	80	43	5	16	123	0	2	94	842
Coastal Region Onshore	0	0	0	0	0	0	0	0	0	0	0
Los Angeles Basin Onshore	1	0	0	0	0	0	0	0	0	0	1
San Joaquin Basin Onshore	748	9	78	42	5	16	123	0	2	93	836
State Offshore	5	0	2	1	0	0	0	0	0	1	5
Colorado	9,877	65	1,882	1,530	2,524	2,865	2,113	4	6	834	11,924
Florida	0	0	0	0	0	0	0	0	0	0	0
Kansas	5,641	33	290	231	274	304	48	3	1	460	5,355
Kentucky	1,810	176	365	416	52	51	44	0	24	77	1,925
Louisiana	8,704	238	914	1,582	423	782	1,402	26	563	1,379	9,245
North	3,158	39	273	484	23	134	1,002	0	23	363	3,759
South Onshore	4,954	197	586	1,021	339	484	345	18	511	876	4,859
State Offshore	592	2	55	77	61	164	55	8	29	140	627
Michigan	2,558	687	246	493	23	2	61	50	3	218	2,873
Mississippi	585	55	66	36	31	28	41	0	19	90	637
Montana	822	48	70	82	52	56	22	1	4	67	822
New Mexico	16,922	-65	1,492	1,071	301	292	1,207	21	30	1,415	17,112
East	2,526	46	311	349	185	103	435	20	16	352	2,571
West	14,396	-111	1,181	722	116	189	772	1	14	1,063	14,541
New York	320	-19	25	51	1	0	47	1	17	28	311
North Dakota	223	5	4	8	1	0	1	0	16	15	225
Ohio	717	-51	102	145	12	62	2	0	4	48	631
Oklahoma	13,430	-31	1,417	1,743	423	689	1,271	14	52	1,420	13,256
Pennsylvania	1,583	7	184	212	10	32	100	34	1	105	1,614
Texas	38,585	255	3,276	4,625	2,634	4,134	4,940	627	594	4,776	40,376
RRC District 1	1,037	-7	84	120	8	44	88	8	1	103	1,024
RRC District 2 Onshore	1,930	-209	138	230	81	275	161	15	110	311	1,798
RRC District 3 Onshore	3,404	50	358	420	410	504	392	89	83	639	3,411
RRC District 4 Onshore	9,942	137	830	1,227	692	735	1,330	312	266	1,427	10,206
RRC District 5	3,089	8	398	604	22	828	781	52	5	329	4,206
RRC District 6	5,901	58	408	423	890	1,152	422	5	16	633	6,016
RRC District 7B	242	1	17	37	13	10	27	0	0	44	203
RRC District 7C	3,439	76	260	791	448	441	406	0	26	286	3,123
RRC District 8	3,345	26	277	303	22	37	275	73	72	375	3,405
RRC District 8A	69	17	12	8	2	2	2	0	0	10	82
RRC District 9	1,645	43	104	58	15	15	879	0	1	186	2,428
RRC District 10	4,143	30	374	379	25	71	153	1	8	368	4,008
State Offshore	399	25	16	25	6	20	24	72	6	65	466
Utah	4,125	58	790	554	1	20	279	4	5	276	4,450
Virginia	1,704	19	90	145	718	842	31	0	7	78	1,752
West Virginia	2,929	-218	330	255	6	33	101	0	27	164	2,777
Wyoming	16,559	131	1,872	1,386	1,919	2,120	2,713	46	50	1,275	18,911
Federal Offshore[a]	20,456	-46	2,150	3,258	1,319	1,421	1,071	1,448	980	3,913	18,990
Pacific (California)	76	0	0	22	0	0	0	0	0	4	50
Gulf of Mexico (Louisiana)[a]	15,350	-58	1,473	2,423	1,190	1,319	783	401	809	2,928	13,536
Gulf of Mexico (Texas)	5,030	12	677	813	129	102	288	1,047	171	981	5,404
Miscellaneous[b]	23	7	3	2	0	0	37	0	0	4	64
U.S. Total	**156,677**	**1,355**	**15,917**	**18,385**	**10,733**	**13,756**	**15,987**	**2,378**	**2,420**	**17,451**	**161,921**

[a]Includes Federal offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.

Note: The prouction 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 natural gas for 2001 contained in the *Natural Gas Annual 2001,* DOE/EIA-0131(01).

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

Table 11. Associated-Dissolved Natural Gas Proved Reserves, Reserves Changes, and Production, 2001
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/00	Changes in Reserves During 2001 Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/01
Alaska	6,768	0	171	133	0	0	20	19	0	253	6,592
Lower 48 States	**23,065**	**499**	**3,088**	**3,099**	**1,145**	**845**	**1,174**	**1,268**	**477**	**2,940**	**23,232**
Alabama	29	-4	3	1	1	1	1	0	2	4	26
Arkansas	39	-1	1	1	5	0	0	0	0	3	30
California	2,198	16	87	222	2	5	93	0	0	253	1,922
Coastal Region Onshore	244	3	15	64	0	0	0	0	0	13	185
Los Angeles Basin Onshore	203	3	18	28	1	0	8	0	0	9	194
San Joaquin Basin Onshore	1,665	9	50	124	1	5	83	0	0	224	1,463
State Offshore	86	1	4	6	0	0	2	0	0	7	80
Colorado	960	37	63	34	27	24	78	0	1	77	1,025
Florida	93	0	9	0	0	0	0	0	0	6	96
Kansas	40	19	9	4	3	51	2	0	0	9	105
Kentucky	27	-2	0	0	0	0	0	0	0	0	25
Louisiana	807	43	126	155	88	131	49	2	19	138	796
North	186	4	29	44	36	57	2	1	0	31	168
South Onshore	492	35	82	102	42	56	32	0	14	84	483
State Offshore	129	4	15	9	10	18	15	1	5	23	145
Michigan	214	-12	22	41	2	0	3	1	0	26	159
Mississippi	35	-3	4	7	3	2	2	0	0	4	26
Montana	70	4	12	9	5	4	15	0	1	7	85
New Mexico	1,588	35	220	272	39	39	103	2	5	234	1,447
East	1,473	46	212	261	39	37	99	2	3	224	1,348
West	115	-11	8	11	0	2	4	0	2	10	99
New York	2	2	4	0	0	0	0	0	0	1	7
North Dakota	264	10	49	28	7	6	2	0	5	31	270
Ohio	469	83	27	143	75	0	7	0	8	36	340
Oklahoma	1,113	211	128	265	86	22	133	0	3	150	1,109
Pennsylvania	157	3	18	8	1	0	8	0	0	9	168
Texas	6,833	21	556	924	448	386	328	4	18	685	6,089
RRC District 1	69	1	7	6	23	2	0	0	0	7	43
RRC District 2 Onshore	115	-26	13	24	16	4	20	0	1	22	65
RRC District 3 Onshore	638	16	83	101	178	165	39	1	6	136	533
RRC District 4 Onshore	176	2	11	31	8	5	5	0	2	22	140
RRC District 5	128	0	6	55	0	6	8	0	0	10	83
RRC District 6	464	13	20	16	39	12	1	0	0	43	412
RRC District 7B	114	-4	6	12	4	2	1	0	0	15	88
RRC District 7C	693	-45	62	102	33	67	61	0	1	70	634
RRC District 8	2,791	62	216	347	105	97	114	3	5	234	2,602
RRC District 8A	1,146	-21	77	91	12	13	67	0	1	72	1,108
RRC District 9	209	1	18	83	5	2	2	0	0	20	124
RRC District 10	289	22	37	56	25	11	10	0	1	34	255
State Offshore	1	0	0	0	0	0	0	0	1	0	2
Utah	348	6	46	75	17	18	0	0	0	23	303
Virginia	0	0	0	0	0	0	0	0	0	0	0
West Virginia	98	14	2	39	24	0	0	0	0	3	48
Wyoming	652	20	89	183	27	16	1	0	1	81	488
Federal Offshore[a]	7,010	-7	1,613	686	285	140	349	1,259	414	1,158	8,649
Pacific (California)	500	1	95	79	0	0	13	0	0	40	490
Gulf of Mexico (Louisiana)[a]	5,115	-7	1,266	537	156	137	333	1,112	405	915	6,753
Gulf of Mexico (Texas)	1,395	-1	252	70	129	3	3	147	9	203	1,406
Miscellaneous[b]	19	4	0	2	0	0	0	0	0	2	19
U.S. Total	**29,833**	**499**	**3,259**	**3,232**	**1,145**	**845**	**1,194**	**1,287**	**477**	**3,193**	**29,824**

[a]Includes Federal offshore Alabama.
[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.
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 natural gas for 2001 contained in the *Natural Gas Annual 2001*, DOE/EIA-0131(01).
Source: Energy Information Administration, Office of Oil and Gas.

Production

The estimated 2001 U.S. dry natural gas production was 19,779 billion cubic feet, an increase of almost 3 percent from 2000 (**Table 8**). Areas with the largest production and their percentage of total *production* were:

- Texas produced 5,138 billion cubic feet (BCF) of dry natural gas (26 percent of the total)
- Gulf of Mexico Federal Offshore produced 4,913 BCF (25 percent)
- New Mexico produced 1,536 BCF (8 percent)
- Oklahoma produced 1,481 BCF (7 percent)
- Louisiana produced 1,479 BCF (7 percent)
- Wyoming produced 1,286 BCF (7 percent).

Wet Natural Gas

U. S. proved reserves of wet natural gas as of December 31, 2001 were 191,743 billion cubic feet, a 3 percent increase from the volume reported in 2000 (**Table 9**). At year-end 2001, proved wet natural gas reserves for the lower 48 States had increased by 3 percent compared to 2000, while those of Alaska had decreased by 5 percent.

The volumetric differences between the estimates reported in **Table 8** (dry) and **Table 9** (wet) result from the removal of natural gas liquids at natural gas processing plants. A discussion of the methodology used to generate wet and dry natural gas reserves tables in this report appears in Appendix F.

Nonassociated Natural Gas

Proved Reserves

Proved reserves of nonassociated (NA) natural gas, wet after lease separation, in the United States increased by 3 percent (5,244 billion cubic feet) in 2001 to 161,921 billion cubic feet (**Table 10**). The lower 48 States' NA wet natural gas proved reserves increased 4 percent to a level of 159,612 billion cubic feet, while Alaska had a 10 percent decline to a level of 2,309 billion cubic feet. Those States with the largest increases in NA wet natural gas reserves were Wyoming, Colorado, Texas, and Louisiana.

Discoveries

NA wet natural gas *total discoveries* of 20,785 billion cubic feet in 2001 increased 24 percent compared to 2000's total of 16,741 billion cubic feet. Areas with the most *total discoveries* in 2001 were Texas (6,161 billion cubic feet), the Gulf of Mexico Federal Offshore (3,499 billion cubic feet), Wyoming (2,809 billion cubic feet), and Colorado (2,123 billion cubic feet).

Production

U.S. production of NA wet natural gas increased 3 percent from an estimated 16,863 billion cubic feet in 2000 to 17,451 billion cubic feet in 2001. The five leading producing areas were: Texas (27 percent), the Gulf of Mexico Federal Offshore (22 percent), Oklahoma (8 percent), New Mexico (8 percent), and Louisiana (8 percent).

Associated-Dissolved Natural Gas

Proved Reserves

Proved reserves of associated-dissolved (AD) natural gas, wet after lease separation, in the United States declined very slightly (-9 billion cubic feet) to 29,824 billion cubic feet in 2001 (**Table 11**). Proved reserves of AD wet natural gas in the lower 48 States increased less than 1 percent (+167 billion cubic feet) to 23,232 billion cubic feet, and in Alaska declined 3 percent (-176 billion cubic feet) to 6,592 billion cubic feet in 2001. The areas of the country with the largest AD wet natural gas reserves and their percentage of the total were:

- Gulf of Mexico Federal Offshore (27 percent)
- Alaska (22 percent)
- Texas (20 percent)
- California (6 percent)
- New Mexico (5 percent).

These areas logically correspond to the areas of the country with the largest volumes of crude oil reserves.

Production

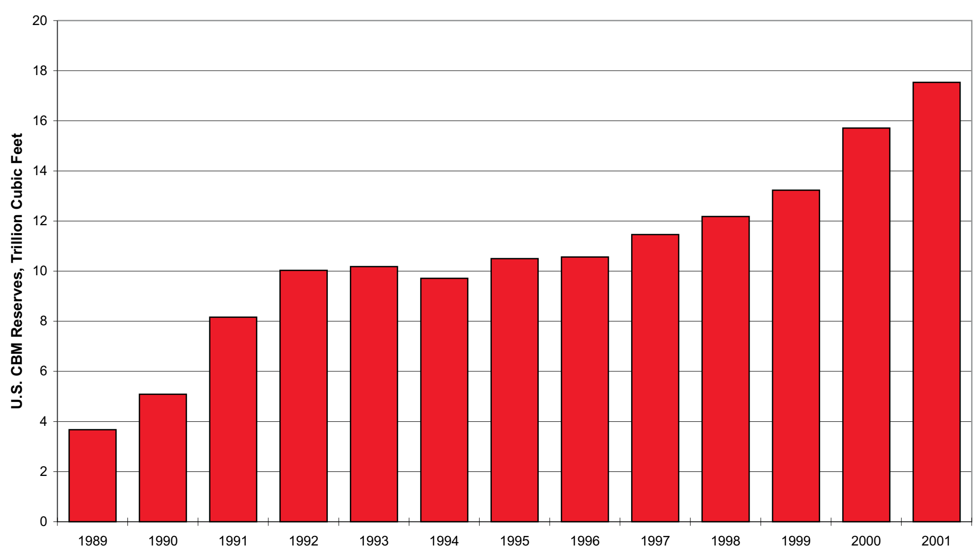
U.S. production of AD wet natural gas decreased slightly from an estimated 3,299 billion cubic feet in 2000 to 3,193 billion cubic feet in 2001 (**Table 11**). Production of AD wet natural gas in the lower 48 States decreased from 2,987 billion cubic feet to 2,940 billion

Table 12. Coalbed Methane Proved Reserves and Production for 1989–2001
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Year	Alabama	Colorado	New Mexico	Utah	Wyoming	Eastern States[a]	Western States[b]	Others[c]	United States
					Reserves				
1989	537	1,117	2,022	NA	NA	NA	NA	0	3,676
1990	1,224	1,320	2,510	NA	NA	NA	NA	33	5,087
1991	1,714	2,076	4,206	NA	NA	NA	NA	167	8,163
1992	1,968	2,716	4,724	NA	NA	NA	NA	626	10,034
1993	1,237	3,107	4,775	NA	NA	NA	NA	1,065	10,184
1994	976	2,913	4,137	NA	NA	NA	NA	1,686	9,712
1995	972	3,461	4,299	NA	NA	NA	NA	1,767	10,499
1996	823	3,711	4,180	NA	NA	NA	NA	1,852	10,566
1997	1,077	3,890	4,351	NA	NA	NA	NA	2,144	11,462
1998	1,029	4,211	4,232	NA	NA	NA	NA	2,707	12,179
1999	1,060	4,826	4,080	NA	NA	NA	NA	3,263	13,229
2000	1,241	5,617	4,278	1,592	1,540	1,399	41	--	15,708
2001	1,162	6,252	4,324	1,685	2,297	1,453	358	--	17,531
					Production				
1989	23	12	56	NA	NA	NA	NA	0	91
1990	36	26	133	NA	NA	NA	NA	1	196
1991	68	48	229	NA	NA	NA	NA	3	348
1992	89	82	358	NA	NA	NA	NA	10	539
1993	103	125	486	NA	NA	NA	NA	18	752
1994	108	179	530	NA	NA	NA	NA	34	851
1995	109	226	574	NA	NA	NA	NA	47	956
1996	98	274	575	NA	NA	NA	NA	56	1,003
1997	111	312	597	NA	NA	NA	NA	70	1,090
1998	123	401	571	NA	NA	NA	NA	99	1,194
1999	108	432	582	NA	NA	NA	NA	130	1,252
2000	109	451	550	74	133	58	4	NA	1,379
2001	111	490	517	83	278	69	14	NA	1,562

[a]Includes Pennsylvania, Virginia, and West Virginia.
[b]Includes Kansas, Montana, and Oklahoma.
[c]Includes Oklahoma, Pennsylvania, Utah, Virginia, West Virginia, and Wyoming; these states are individually listed or grouped in Eastern States and Western States after 1999.
NA = Not available.
Source: Energy Information Administration, Office of Oil and Gas.

Figure 21. Coalbed Methane Proved Reserves 1989-2001



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

cubic feet in 2001, a decline of 2 percent. The areas of the country with the largest AD wet natural gas production and their percentage of the total were:

- Gulf of Mexico Federal Offshore (35 percent)
- Texas (21 percent)
- Alaska (8 percent)
- California (8 percent)
- New Mexico (7 percent).

Again, these areas logically correspond to the areas of the country with the largest volumes of crude oil production.

Coalbed Methane

Proved Reserves

In 2001, proved reserves of coalbed methane increased to 17,531 billion cubic feet, a 12 percent increase from 2000's level (15,708 billion cubic feet). Coalbed methane accounted for 9.6 percent of all 2001 dry natural gas reserves (**Table 12**). EIA estimates that the 2001 proved gas reserves of fields identified as having coalbed methane are now more than quadruple the volume reported in 1989 (**Figure 21**). Five States (Colorado, New Mexico, Wyoming, Utah, and Alabama) currently have the majority (90 percent) of U.S. Coalbed methane proved reserves. Estimates of proved coalbed methane reserves increased 11 percent in Colorado, 1 percent in New Mexico, 49 percent in Wyoming, 6 percent in Utah, and declined 6 percent in Alabama in 2001.

Production

U.S. coalbed methane production grew by 13 percent in 2001 to 1,562 billion cubic feet. It accounted for about 8 percent of U.S. dry gas production.

Areas of Note: Large Discoveries and Reserves Additions

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

Wyoming

Wyoming's dry natural gas reserves increased by 2,240 billion cubic feet in 2001, the largest increase of any State. This was the result of development in the Pinedale and Madden Fields, and in coalbed methane fields located in the Powder River Basin.

- **Powder River Basin:** This basin is located in northeastern Wyoming and southeastern Montana. The U.S. Geologic Survey (USGS) has increased its estimate of the basin's technically recoverable CBM resources to 14.26 TCF, up from 1.11 TCF in 1995. The coal beds are near the surface and are up to 300 feet thick. These factors tend to make the wells inexpensive to drill and operate yet highly productive relative to other CBM wells. Given these fundamentals, the basin has seen a boom as producers have increased their understanding of the techniques needed to produce the gas. The number of producing wells increased from 515 in July 1998 to 6,469 in July 2001, the latest month for which statistics were available. Output in July 2001 in the Wyoming portion of the basin reached 784 million cubic feet per day. This was an almost 40 percent increase over July 2000 and a 190 percent increase over July 1999. Production would have been even higher if it were not for the fact that over 2,200 wells were shut in, dewatering, or awaiting dewatering permits. As of July 2001 the basin had less than 15 percent of the 50,000 wells that are believed necessary to fully tap the resource. Based on the productivity of the wells drilled to date this would mean that the basin could produce over 5 billion cubic feet per day, more than the proposed capacity of the pipeline that would bring gas from Prudhoe Bay to the Lower 48 States. A current impediment to attaining the full potential of the basin is a delay in the completion of the Powder River Basin Coalbed Methane Environmental Impact Statement (EIS). It is not clear that even the release of the EIS would minimize all of the current limitations on drilling in the basin. For example, the U.S. Environmental Protection Agency has received complaints of groundwater well contamination that are alleged to be the result of the hydraulic fracturing needed to enhance release of the methane from the coal.{41}

Colorado

Colorado had a net increase of 2,099 billion cubic feet of dry natural gas proved reserves in 2001. This was the result of development of the Wattenberg Field and coalbed methane fields and gas fields within the San Juan, Piceance, and Raton Basins.

Texas

Texas had a net increase of 1,445 billion cubic feet of dry natural gas proved reserves in 2001. Development of gas fields in the Barnett Shale and the Lobo Trend boosted reserves additions for this State. Texas could have had the largest increase in dry gas proved reserves in 2001, but a decrease in its associated dissolved gas reserves volume offset reserves additions of nonassociated gas.

Areas of Note: Large Reserves Declines

The following areas had large declines in dry natural gas proved reserves due to downward revisions or unreplaced production.

Alaska

Alaska's proved dry natural gas reserves decreased by 5 percent (437 billion cubic feet) in 2001. Production decreased from 506 billion cubic feet in 2000 to 461 billion cubic feet in 2001.

Alabama

Alabama's proved dry natural gas reserves decreased by 6 percent (234 billion cubic feet) in 2001. Production in Alabama decreased 4 percent in 2001.

West Virginia

West Virginia's proved dry natural gas reserves decreased by 8 percent (222 billion cubic feet) in 2001. Production in West Virginia decreased 10 percent in 2001.

Reserves in Nonproducing Reservoirs

Nonproducing proved natural gas reserves (wet after lease separation) of 52,948 billion cubic feet were reported in 2001, 24 percent more than the 42,834 billion cubic feet reported in 2000 (**Appendix D, Table D10**). About 26 percent of the reserves in nonproducing reservoirs are located in the Gulf of Mexico Federal Offshore area. Much of the new deepwater reserves are in the nonproducing category. Wells or reservoirs are nonproducing due to any of several operational reasons. These include:

- waiting for well workovers
- waiting for additional development or replacement wells to be drilled
- production or pipeline facilities not yet installed
- awaiting depletion of other zones or reservoirs before recompletion in reservoirs not currently open to production (called "behind pipe" reserves).

5. Natural Gas Liquids Statistics

Natural Gas Liquids

Proved Reserves

U.S. natural gas liquids proved reserves decreased 4 percent to 7,993 million barrels in 2001 (**Table 13**). Reserve additions replaced 60 percent of 2001 natural gas liquids production.

The reserves of six areas account for 81 percent of the Nation's natural gas liquids proved reserves.

Area	Percent of U.S. NGL Reserves
Texas	33
Gulf of Mexico Federal Offshore	12
Utah - Wyoming	11
New Mexico	11
Oklahoma	9
Louisiana	5
Area Total	**81**

The volumes of natural gas liquids proved reserves and production shown in **Table 13** are the sum of the natural gas plant liquid volumes listed in **Table 14** and the lease condensate volumes listed in **Table 15.**

Discoveries

Total discoveries of natural gas liquids reserves were 997 million barrels in 2001, an increase of 19 percent from 2000 (839 million barrels). Areas with the largest *total discoveries* were:

- Texas (34 percent)
- Gulf of Mexico Federal Offshore (21 percent)
- Utah & Wyoming (12 percent)
- Louisiana (8 percent)
- Oklahoma (8 percent)
- New Mexico (7 percent).

New field discoveries in 2001 (138 million barrels) were 50 percent higher than in 2000. Areas with the largest *new field discoveries* were the Gulf of Mexico Federal Offshore (68 percent of 2001 new field discoveries) and Texas (25 percent).

New reservoir discoveries in old fields (142 million barrels) were 39 percent higher than they were in 2000. Areas with the largest *new reservoir discoveries in old fields* were the Gulf of Mexico Federal Offshore (40 percent of 2001 new reservoir discoveries in old fields), Louisiana (30 percent), and Texas (22 percent).

Extensions were 717 million barrels in 2001, 11 percent higher than the 2000 volume of extensions (645 million). Areas with the largest *extensions* were Texas (39 percent), Utah & Wyoming (16 percent), and Oklahoma (10 percent).

Revisions and Adjustments

In 2001, there were 957 million barrels of *revision increases*, 1,089 million barrels of *revision decreases* and -429 million barrels of *adjustments*. The net of *revisions* and *adjustments* was 561 million barrels.

Sales and Acquisitions

There were 550 million barrels of *acquisitions*, and 448 million barrels of *sales* in 2001. The net of these transactions added 102 million barrels of natural gas liquids proved reserves.

Production

Natural gas liquids production was an estimated 890 million barrels in 2001, a decrease of 3 percent from 2000. Alaska production decreased 9 percent to 20 million barrels in 2001, while lower 48 States production decreased 3 percent to 860 million barrels in 2001.

Six areas accounted for about 87 percent of the Nation's natural gas liquids production.

- Texas (33 percent)
- Gulf of Mexico Federal Offshore (22 percent)
- New Mexico (9 percent)
- Oklahoma (8 percent)
- Louisiana (8 percent)
- Utah-Wyoming (7 percent).

Table 13. Natural Gas Liquids Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2001 (Million Barrels of 42 U.S. Gallons)

		Changes in Reserves During 2001									
State and Subdivision	Published Proved Reserves 12/31/00	Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/01
Alaska	277	0	148	0	0	0	0	0	0	20	405
Lower 48 States	**8,068**	**-429**	**809**	**1,089**	**448**	**550**	**717**	**138**	**142**	**870**	**7,588**
Alabama	150	-71	3	16	0	0	4	1	0	7	64
Arkansas	5	0	1	0	0	0	0	0	0	1	5
California	101	-18	5	10	0	1	5	0	0	8	76
Coastal Region Onshore	27	-6	1	5	0	0	0	0	0	1	16
Los Angeles Basin Onshore	10	-2	1	1	0	0	0	0	0	0	8
San Joaquin Basin Onshore	64	-10	3	4	0	1	5	0	0	7	52
State Offshore	0	0	0	0	0	0	0	0	0	0	0
Colorado	316	-34	49	38	59	76	60	0	0	25	345
Florida	11	1	1	0	0	0	0	0	0	1	12
Kansas	306	10	17	13	15	20	3	0	0	26	302
Kentucky	56	18	13	15	2	2	2	0	1	3	72
Louisiana	436	-29	43	93	42	62	37	2	43	68	391
North	61	-4	9	13	2	6	11	0	1	7	62
South Onshore	337	-39	27	72	35	42	20	1	37	49	269
State Offshore	38	14	7	8	5	14	6	1	5	12	60
Michigan	35	14	4	8	0	0	1	1	0	4	43
Mississippi	8	3	2	1	1	1	0	0	0	2	10
Montana	4	1	1	1	0	0	0	0	0	0	5
New Mexico	896	-10	90	86	25	18	70	2	2	84	873
East	333	-32	42	52	21	11	38	2	1	43	279
West	563	22	48	34	4	7	32	0	1	41	594
North Dakota	54	4	6	4	1	1	0	0	2	5	57
Oklahoma	734	-14	74	109	27	35	72	1	3	75	694
Texas	2,819	-128	246	365	151	187	277	35	31	298	2,653
RRC District 1	55	-12	3	6	1	2	3	0	0	4	40
RRC District 2 Onshore	72	-8	7	10	3	10	6	1	4	12	67
RRC District 3 Onshore	209	16	33	29	30	36	24	6	5	44	226
RRC District 4 Onshore	406	-37	32	48	24	25	47	19	11	53	378
RRC District 5	49	-6	5	13	0	9	8	1	0	4	49
RRC District 6	283	-15	26	24	32	42	16	0	1	28	269
RRC District 7B	34	2	2	5	2	1	3	0	0	6	29
RRC District 7C	434	-95	28	93	38	40	41	0	2	29	290
RRC District 8	526	22	49	68	11	11	36	7	7	54	525
RRC District 8A	217	39	19	21	3	3	14	0	0	17	251
RRC District 9	161	-22	10	11	2	2	66	0	0	15	189
RRC District 10	369	-13	32	37	5	6	13	0	1	31	335
State Offshore	4	1	0	0	0	0	0	1	0	1	5
Utah and Wyoming	947	-147	104	78	73	87	118	2	2	65	897
West Virginia	105	1	12	11	1	1	4	0	1	6	106
Federal Offshore[a]	1,078	-30	137	240	51	59	64	94	57	192	976
Pacific (California)	4	0	0	0	0	0	5	0	0	0	9
Gulf of Mexico (Louisiana)[a]	921	-27	103	224	50	57	52	47	53	147	785
Gulf of Mexico (Texas)	153	-3	34	16	1	2	7	47	4	45	182
Miscellaneous[b]	7	0	1	1	0	0	0	0	0	0	7
U.S. Total	**8,345**	**-429**	**957**	**1,089**	**448**	**550**	**717**	**138**	**142**	**890**	**7,993**

[a]Includes Federal offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, New York, Ohio, Oregon, Pennsylvania, 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,” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production.” They may differ from the official Energy Information Administration production data for natural gas and natural gas liquids for 2001 contained in the publications *Petroleum Supply Annual 2001*, DOE/EIA-0340(01) and *Natural Gas Annual 2001* DOE/EIA-0131(01).

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

Table 14. Natural Gas Plant Liquids Proved Reserves and Production, 2001
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2001 Reserves	2001 Production
Alaska	405	20
Lower 48 States	**6,190**	**655**
Alabama	32	3
Arkansas	3	1
California	75	8
Coastal Region Onshore	16	1
Los Angeles Basin Onshore	8	0
San Joaquin Basin Onshore	51	7
State Offshore	0	0
Colorado	298	22
Florida	12	1
Kansas	300	26
Kentucky	72	3
Louisiana	204	35
North	35	3
South Onshore	128	23
State Offshore	41	9
Michigan	41	4
Mississippi	2	1
Montana	5	0
New Mexico	794	77
East	259	38
West	535	39
North Dakota	50	5
Oklahoma	605	66
Texas	2,318	252
RRC District 1	35	4
RRC District 2 Onshore	53	9
RRC District 3 Onshore	144	28
RRC District 4 Onshore	281	40
RRC District 5	43	3
RRC District 6	215	23
RRC District 7B	28	6
RRC District 7C	271	26
RRC District 8	504	52
RRC District 8A	250	17
RRC District 9	182	14
RRC District 10	311	30
State Offshore	1	0
Utah and Wyoming	782	54
West Virginia	105	6
Federal Offshore[a]	486	91
Pacific (California)	1	0
Gulf of Mexico (Louisiana)[a]	460	87
Gulf of Mexico (Texas)	25	4
Miscellaneous[b]	6	0
U.S. Total	**6,595**	**675**

[a]Includes Federal Offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, New York, Ohio, Oregon, Pennsylvania, 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," and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." They may differ from the official Energy Information Administration production data for natural gas plant liquids for 2001 contained in the publications *Petroleum Supply Annual 2001*, DOE/EIA-0340(2001) and *Natural Gas Annual 2001*, DOE/EIA-0131(2001).

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

Table 15. Lease Condensate Proved Reserves and Production, 2001
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2001 Reserves	2001 Production
Alaska	0	0
Lower 48 States	**1,398**	**215**
Alabama	32	4
Arkansas	2	0
California	1	0
Coastal Region Onshore	0	0
Los Angeles Basin Onshore	0	0
San Joaquin Basin Onshore	1	0
State Offshore	0	0
Colorado	47	3
Florida	0	0
Kansas	2	0
Kentucky	0	0
Louisiana	187	33
North	27	4
South Onshore	141	26
State Offshore	19	3
Michigan	2	0
Mississippi	8	1
Montana	0	0
New Mexico	79	7
East	20	5
West	59	2
North Dakota	7	0
Oklahoma	89	9
Texas	335	46
RRC District 1	5	0
RRC District 2 Onshore	14	3
RRC District 3 Onshore	82	16
RRC District 4 Onshore	97	13
RRC District 5	6	1
RRC District 6	54	5
RRC District 7B	1	0
RRC District 7C	19	3
RRC District 8	21	2
RRC District 8A	1	0
RRC District 9	7	1
RRC District 10	24	1
State Offshore	4	1
Utah and Wyoming	115	11
West Virginia	1	0
Federal Offshore[a]	490	101
Pacific (California)	8	0
Gulf of Mexico (Louisiana)[a]	325	60
Gulf of Mexico (Texas)	157	41
Miscellaneous[b]	1	0
U.S. Total	**1,398**	**215**

[a]Includes Federal Offshore Alabama.
[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, New York, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, and Virginia.
Note: The estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves" 2001.
Source: Energy Information Administration, Office of Oil and Gas.

Natural Gas Plant Liquids

Proved Reserves

Natural gas plant liquids proved reserves decreased in 2001 to 6,595 million barrels, a 4 percent drop from the 2000 level (6,873 million barrels) (**Table 14**). Six areas accounted for about 80 percent of the Nation's natural gas plant liquids proved reserves:

Area	Percent of U.S. Gas Plant Liquids
Texas	35
Utah-Wyoming	12
New Mexico	12
Oklahoma	9
Gulf of Mexico Federal Offshore	7
Kansas	5
Area Total	**80**

Production

Natural gas plant liquids production decreased 5 percent in 2001—from 710 million barrels in 2000 to 675 million barrels of production (**Table 14**). The top six areas for proved reserves of natural gas plant liquids accounted for about 84 percent of the Nation's natural gas plant liquids production:

- Texas (37 percent)
- Gulf of Mexico Federal Offshore (14 percent)
- New Mexico (11 percent)
- Oklahoma (10 percent)
- Utah and Wyoming (8 percent)
- Kansas (4 percent).

Natural gas processing plants are usually located in the same general area where the natural gas is produced. Table E4 in Appendix E lists the volumes of natural gas produced and processed in the same State, and the volumes of liquids extracted.

Lease Condensate

Proved Reserves

Proved reserves of lease condensate in the United States were 1,398 million barrels in 2001 (**Table 15**). This was 5 percent less than the volume reported in 2000 (1,472 million barrels). The reserves of five areas account for about 85 percent of the Nation's lease condensate proved reserves.

Area	Percent of U.S. Condensate Reserves
Gulf of Mexico Federal Offshore	34
Texas	24
Louisiana	13
Utah-Wyoming	8
Oklahoma	6
Area Total	**85**

Production

Production of lease condensate was 215 million barrels in 2001, an increase of 3 percent from 2000's production (208 million barrels). The production of five areas account for about 92 percent of the Nation's lease condensate production.

- Gulf of Mexico Federal Offshore (47 percent)
- Texas (21 percent)
- Louisiana (15 percent)
- Utah and Wyoming (5 percent)
- Oklahoma (4 percent).

Reserves in Nonproducing Reservoirs

Like crude oil and natural gas, not all lease condensate proved reserves were contained in reservoirs that were producing during 2001. Proved reserves of 562 million barrels of lease condensate, an increase of 13 percent from 2000, were reported in nonproducing reservoirs in 2001 (**Appendix D, Table D10**). About 48 percent of the nonproducing lease condensate reserves were located in the Gulf of Mexico Federal Offshore.

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Appendix A

Operator Data by Size Class

Operator Data by Size Class

Appendix A provides a series of tables of the proved reserves and production by production size class for the years 1996 through 2001 for oil and gas well operators. The tables show the volumetric change and percent change from the previous year and from 1996. In addition they show the 2001 average per operator in each class. All companies that reported to EIA were ranked by production size for each of the 6 years. We computed company production size classes as the sum of the barrel oil equivalent of the crude oil production, lease condensate production, and wet gas production for each operator. The companies were then placed in the following production size classes: 1–10, 11–20, 21–100, 101–500, and all "other" oil and gas operators. The "other" category contains 22,019 small operators. We estimated production and reserves for small operators for 2001 from a sample of approximately 3 percent.

Class 1–10 contains the 10 highest producing companies each year on a barrel oil equivalent basis. These companies are not necessarily the same 10 companies each year.

We also include statistics for operator Category sizes at the bottom portion of tables in this appendix. These are the categories used by EIA in processing and assessing reserves surveys and are presented here as additional perspective. For further explanation of categories sizes see definitions and descriptions in Appendix E.

Natural Gas

Proved Reserves

The wet natural gas proved reserves reported for 1996 through 2001 have changed from 175,147 billion cubic feet to 191,743 billion cubic feet (Table A1). These proved reserves are highly concentrated in the larger companies. In 2001, the top 20 operators (Class 1–10 and Class 11–20) producing companies had 59 percent of the proved reserves of natural gas. The next two size classes contain 80 and 400 companies and account for 26 and 10 percent of the U.S. natural gas proved reserves, respectively. The top 20 operators had an increase of 16 percent in their natural gas proved reserves from 1996 to 2001. Tthe rest of the operators in (Class 21–100, Class 101–500, and Class Other) had an increase of 5 percent in their reserves. In 2001, the top 20 operators' natural gas reserves increased by 9 percent from 2000.

Production

Wet natural gas production has increased from 20,164 billion cubic feet in 2000 to 20,642 billion cubic feet in 2001 (Table A2). In 2001, the top 20 producing companies had 59 percent of the proved reserves and production of wet natural gas. The next two size classes have 24 and 13 percent of the wet natural gas production, respectively. The top 20 operators had an increase of 16 percent in their wet natural gas production from 1996 to 2001. The rest of the operators had a decrease of 9 percent from 1996 to 2001. The top 20 operators' wet natural gas production had a increase of 6 percent in 2001 from 2000.

Crude Oil

Proved Reserves

Proved reserves of crude oil are more highly concentrated in a few companies than those of natural gas. The 20 largest oil and gas producing companies in 2001 had 73 percent of U.S. proved reserves of crude oil (Table A3), in contrast to wet natural gas where these same companies operated 59 percent of the total proved reserves.

U.S. proved reserves of crude oil increased 2 percent in 2001. The top 20 producing companies proved reserves of crude oil during 2001 increased 6 percent. The top 20 class had an increase of 7 percent in their crude oil proved reserves from 1996 to 2001.

Production

Crude oil production reported for 1996 to 2001 has decreased from 2,173 million barrels to 1,915 million barrels (Table A4). The 20 largest oil and gas producing companies had 68 percent of U.S. production of crude oil in 2001. In 1996 they accounted for 65 percent of production. This is in contrast to wet natural gas where these same companies produced only 59 percent of the total. U.S. production of crude oil declined by 12 percent from 1996 to 2001. The top 20 operators had a decline of 7 percent in their oil production during the same period. U.S. production of crude oil increased by 2 percent from 2000 to 2001, while the top 20 operators production increased by 3 percent.

Fields

The number of fields in which Category I and Category II operators were active dropped during the 1996–2001 period (Table A5). From 1996-2001, the number of fields in which the top 20 operators were active increased by 765 (15 percent), while in 2001 the number increased by 639 (12 percent) from 2000.

Table A1. Natural Gas Proved Reserves, Wet After Lease Separation, by Operator Production Size Class, 1996–2001
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Size Class	1996	1997	1998	1999	2000	2001	2000–2001 Volume and Percent Change	1996–2001 Volume and Percent Change	2001 Average Reserves per Operator
Class 1-10	72,606	68,876	64,336	64,320	81,437	88,936	7,499	16,330	8,893.630
Percent of Total	41.5%	39.2%	37.3%	36.5%	43.7%	46.4%	9.2%	22.5%	
Class 11-20	25,416	27,705	28,338	24,925	22,590	24,588	1,998	-828	2,458.787
Percent of Total	14.5%	15.8%	16.4%	14.1%	12.1%	12.8%	8.8%	-3.3%	
Class 21-100	43,300	45,593	47,009	52,160	48,832	50,055	1,223	6,755	625.690
Percent of Total	24.7%	25.9%	27.3%	29.6%	26.2%	26.1%	2.5%	15.6%	
Class 101-500	22,483	23,338	24,471	25,967	22,620	19,046	-3,575	-3,437	47.614
Percent of Total	12.8%	13.3%	14.2%	14.7%	12.1%	9.9%	-15.8%	-15.3%	
Class Other (22,019)	11,342	10,209	8,289	8,289	11,030	9,118	-1,912	-2,224	0.414
Percent of Total	6.5%	5.8%	4.8%	5.0%	5.9%	4.8%	-17.3%	-19.6%	
Category I (179)	146,601	147,491	146,458	146,458	162,144	169,056	6,912	22,455	944.445
Percent of Total	83.7%	83.9%	84.9%	82.8%	86.9%	88.2%	4.3%	15.3%	
Category II (430)	18,382	17,764	18,033	18,033	13,123	13,346	222	-5,036	31.037
Percent of Total	10.5%	10.1%	10.5%	12.5%	7.0%	7.0%	1.7%	-27.4%	
Category III (22,519)	10,164	10,467	7,952	7,952	R11,243	9,342	-1,901	-822	0.426
Percent of Total	5.8%	6.0%	4.6%	4.7%	R6.0%	4.9%	-16.9%	-8.1%	
Total Published	**175,147**	**175,721**	**172,443**	**176,159**	**186,510**	**191,743**	**5,233**	**16,596**	**8.515**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**2.8%**	**9.5%**	

Note: There were 21,910 active Category III operators in the 2001 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 1,797 Category III operators (Table E2). The "other" size class represents 22,019 operators in the 2001 frame (22,519 active operators minus the 500 largest operators).
Source: Energy Information Administration, Office of Oil and Gas.

Table A2. Natural Gas Production, Wet After Lease Separation, by Operator Production Size Class, 1996–2001

(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Size Class	1996	1997	1998	1999	2000	2001	2000–2001 Volume and Percent Change	1996–2001 Volume and Percent Change	2001 Average Production per Operator
Class 1-10	7,448	7,178	6,954	6,881	8,495	9,019	525	1,571	901.934
Percent of Total	37.5%	35.7%	35.4%	34.7%	42.1%	43.7%	6.2%	21.1%	
Class 11-20	3,002	3,286	3,317	3,560	2,886	3,064	178	62	306.430
Percent of Total	14.5%	15.8%	16.4%	14.1%	14.3%	14.8%	6.2%	2.1%	
Class 21-100	5,316	5,729	5,595	5,523	4,965	4,949	-16	-367	61.865
Percent of Total	24.7%	25.9%	27.3%	29.6%	24.6%	24.0%	-0.3%	-6.9%	
Class 101-500	2,623	2,665	2,721	2,793	2,780	2,609	-171	-14	6.523
Percent of Total	12.8%	13.3%	14.2%	14.7%	13.8%	12.6%	-6.2%	-0.5%	
Class Other (22,019)	1,484	1,276	1,035	1,099	1,038	1,000	-38	-484	0.045
Percent of Total	6.5%	5.8%	4.8%	5.0%	5.1%	4.8%	-3.7%	-32.6%	
Category I (179)	16,381	16,897	16,619	16,248	17,096	17,672	576	1,2919	8.725
Percent of Total	83.7%	83.9%	84.9%	82.8%	84.8%	85.6%	3.4%	7.9%	
Category II (430)	2,128	1,979	2,019	2,556	1,921	1,932	11	-196	4.493
Percent of Total	10.5%	10.1%	10.5%	12.5%	9.5%	9.4%	0.6%	-9.2%	
Category III (22,519)	1,364	1,258	984	1,052	R1,147	1,038	-109	-326	0.047
Percent of Total	5.8%	6.0%	4.6%	4.7%	R5.7%	5.0%	-9.5%	-23.9%	
Total Published	**19,873**	**20,134**	**19,622**	**19,856**	**20,164**	**20,642**	**478**	**769**	**0.917**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**2.4%**	**3.9%**	

Note: There were 21,910 active Category III operators in the 2001 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 1,797 Category III operators (Table E2). The "other" size class represents 22,019 operators in the 2001 frame (22,519 active operators minus the 500 largest operators).

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

Table A3. Crude Oil Proved Reserves by Operator Production Size Class, 1996–2001
(Million Barrels of 42 U.S. Gallons)

Size Class	1996	1997	1998	1999	2000	2001	2000–2001 Volume and Percent Change	1996–2001 Volume and Percent Change	2001 Average Reserves per Operator
Class 1-10	13,362	11,434	11,501	11,121	12,367	13,590	1,223	228	1,359.041
Percent of Total	60.7%	50.7%	54.7%	51.1%	56.1%	60.5%	9.9%	1.7%	
Class 11-20	2,013	2,977	2,894	2,585	3,172	2,901	-270	888	290.146
Percent of Total	9.1%	13.2%	13.8%	11.9%	14.4%	12.9%	-8.5%	44.1%	
Class 21-100	3,155	4,384	3,677	4,338	2,505	2,856	351	-299	35.696
Percent of Total	14.3%	19.4%	17.5%	19.9%	11.4%	12.7%	14.0%	-9.5%	
Class 101-500	1,838	2,111	1,754	2,379	2,286	1,794	-492	-44	4.485
Percent of Total	8.3%	9.4%	8.3%	10.9%	10.4%	8.0%	-21.5%	-2.4%	
Class Other (22,019)	1,649	1,640	1,208	1,342	1,716	1,305	-411	-344	0.059
Percent of Total	7.5%	7.3%	5.7%	6.2%	7.8%	5.8%	-24.0%	-20.9%	
Category I (179)	19,312	19,461	18,819	18,952	19,421	20,325	904	1,013	113.549
Percent of Total	87.7%	86.3%	89.5%	87.1%	88.1%	90.6%	4.7%	5.2%	
Category II (430)	1,117	1,400	1,018	1,521	873	794	-78	-323	1.848
Percent of Total	5.1%	6.2%	4.8%	7.0%	4.0%	3.5%	-8.9%	-28.9%	
Category III (22,519)	1,588	1,685	1,197	1,293	R1,751	1,326	-425	-262	0.061
Percent of Total	7.2%	7.5%	5.7%	5.9%	R7.9%	5.9%	-24.3%	-16.5%	
Total Published	**22,017**	**22,546**	**21,034**	**21,765**	**22,045**	**22,446**	**401**	**429**	**0.997**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**1.8%**	**1.9%**	

Note: There were 21,910 active Category III operators in the 2001 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 1,797 Category III operators (Table E2). The "other" size class represents 22,019 operators in the 2001 frame (22,519 active operators minus the 500 largest operators).

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

Table A4. Crude Oil Production by Operator Production Size Class, 1996–2001
(Million Barrels of 42 U.S. Gallons)

Size Class	1996	1997	1998	1999	2000	2001	2000–2001 Volume and Percent Change	1996–2001 Volume and Percent Change	2001 Average Production per Operator
Class 1-10	1,220	1,047	1,025	974	961	1,061	99	-159	106.050
Percent of Total	56.1%	49.0%	51.5%	49.9%	51.1%	55.4%	10.4%	-13.1%	
Class 11-20	185	262	255	241	304	240	-64	55	24.032
Percent of Total	8.5%	12.3%	12.8%	12.3%	16.2%	12.5%	-21.1%	29.9%	
Class 21-100	307	373	342	350	214	233	19	-74	2.912
Percent of Total	14.1%	17.4%	17.2%	17.9%	11.4%	12.2%	8.9%	-24.1%	
Class 101-500	213	237	206	208	211	195	-15	-18	0.488
Percent of Total	9.8%	11.1%	10.3%	10.7%	11.2%	10.2%	-7.3%	-8.3%	
Class Other (22,019)	248	219	163	179	190	186	-4	-62	0.008
Percent of Total	11.4%	10.2%	8.2%	9.2%	10.1%	9.7%	-2.1%	-25.1%	
Category I (179)	1,791	1,760	1,714	1,617	1,572	1,612	40	-179	9.007
Percent of Total	82.4%	82.3%	86.1%	82.8%	83.6%	84.2%	2.6%	-10.0%	
Category II (430)	143	157	118	160	111	112	1	-31	0.260
Percent of Total	6.6%	7.3%	5.9%	8.2%	5.9%	5.8%	0.9%	-21.8%	
Category III (22,519)	239	221	159	175	R197	191	-6	-48	0.009
Percent of Total	11.0%	10.3%	8.0%	9.0%	R10.5%	10.0%	-3.3%	-20.1%	
Total Published	**2,173**	**2,138**	**1,991**	**1,952**	**1,880**	**1,915**	**35**	**-258**	**0.085**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**1.9%**	**-11.9%**	

Note: There were 22,519 active Category III operators in the 2001 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 2,136 Category III operators (Table E2). The "other" size class represents 21,910 operators in the 2001 frame (22,019 active operators minus the 500 largest operators).

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

Table A5. Operator Field Count by Operator Production Size Class, 1996–2001

Size Class	1996	1997	1998	1999	2000	2001	2000–2001 Number and Percent Change	1996–2001 Number and Percent Change	2001 Average Number of Fields per Operator
Class 1-10	2,800	2,566	2,475	2,559	3,444	3,794	350	994	379.400
Percent of Total	10.7%	10.4%	9.5%	10.0%	13.0%	14.0%	10.2%	35.5%	
Class 11-20	2,441	2,257	1,822	1,514	1,923	2,212	289	-229	221.200
Percent of Total	9.3%	9.1%	7.0%	5.9%	7.2%	8.2%	15.0%	-9.4%	
Class 21-100	7,526	7,159	7,526	8,180	7,084	7,195	111	-331	89.938
Percent of Total	28.7%	28.9%	29.0%	32.0%	26.7%	26.5%	1.6%	-4.4%	
Class 101-500	12,492	12,878	12,817	12,344	12,580	12,435	-145	-57	31.088
Percent of Total	47.7%	52.0%	49.4%	48.2%	47.4%	45.9%	-1.2%	-0.5%	
Rest	[a]952	1,332	1,524	1,287	1,529	1,480	-49	528	13.578
Percent of Total	3.6%	5.4%	5.9%	5.0%	5.8%	5.5%	-3.2%	55.5%	
Category I	15,635	15,232	15,666	15,120	16,174	16,196	22	561	90.480
Percent of Total	59.7%	61.5%	60.4%	59.1%	60.9%	59.7%	0.1%	3.6%	
Category II	10,576	R9,530	10,271	10,467	10,146	10,764	618	188	25.033
Percent of Total	40.3%	38.5%	39.6%	40.9%	38.2%	39.7%	6.1%	1.8%	
Total	**26,211**	**R24,762**	**25,937**	**25,587**	**26,560**	**27,116**	**556**	**905**	**44.525**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**2.1%**	**3.5%**	

[a]The reduced 1996 survey had fewer operators and fields in the “rest” class.
R = Revised
Note: Includes only data from Category I and Category II operators. In 2001, there were 179 Category I operators and 430 Category II operators. The “rest” size class had 109 operators in 2001.
Source: Energy Information Administration, Office of Oil and Gas.

Appendix B

Top 100 Oil and Gas Fields for 2001

Appendix B

Top 100 Oil and Gas Fields for 2001

This appendix presents estimates of the proved reserves and production of the top 100 oil and gas fields. The oil field production and reserve data include both crude oil and lease condensate. The gas field production and reserve data is total wet natural gas (associated-dissolved natural gas and nonassociated natural gas, wet after lease separation). Several of the same fields are in both tables B1 and B2.

Table B1. Top 100 Oil Fields for 2001

The top 100 oil fields in the United States as of December 31, 2001, had 15,382 million barrels of **proved reserves** accounting for 69 percent of the total United States (**Table 6 and Table 14**). Although there is considerable grouping of field–level statistics within the tables, rough orders of magnitude can be estimated for the proved reserves and production of most fields. Many of the fields in the top 100 group are operated by only one or two operators, therefore, the totals for proved reserves are grouped as top 10, top 20, top 50, and top 100 to avoid revealing company proprietary data.

In the top 20 oil fields for 2001 there are four fields, Mississippi Canyon Block 778 (Thunder Horse), Mississippi Canyon Block 807 (Mars), Green Canyon Block 644 (Holstein), and Mississippi Canyon Block 810 (Ursa) which are in the deep water of the Gulf of Mexico Federal Offshore.

The top 100 oil fields in the United States as of December 31, 2001, had 1,030 million barrels of **production**, or 54 percent of the total (**Table 6 and Table 14**). Many of the oil fields in the top 100 are very old. The oldest reported field to EIA, Coalinga in California, was discovered in 1887. The newest reported field was Mississippi Canyon Block 778 in the Gulf of Mexico Federal Offshore. The oil fields with newer discovery dates are typically located in the Gulf of Mexico Offshore and Alaska.

Table B2. Top 100 Gas Fields for 2001

The top 100 gas fields in the United States as of December 31, 2001, had 92,354 billion cubic feet of wet natural gas **proved reserves**, or 48 percent of the total (**Table 9**).

The top 100 gas fields in the United States as of December 31, 2001, had 6,965 billion cubic feet of **production**, or 32 percent of the total (**Table 9**). Fewer of the gas fields in the top 100 are as old as the top100 oil fields. There were 22 gas fields in Table B2 that were discovered prior to 1950. Gas fields in the top 100 are newer than the oil fields, 57 gas fields were discovered after 1967. The oldest, Big Sandy in Kentucky, was discovered in 1881. The gas fields with newer discovery dates are located in the Gulf of Mexico Offshore, New Mexico, and Colorado.

Table B3. Top U.S. Operators Ranked by Reported 2001 Operated Production Data

Table B3 lists the top U.S. oil and gas operators ranked by reported 2001 operated production data.

Table B1. Top 100 U.S. Fields Ranked by Oil[a] Proved Reserves from Reported 2001 Field Level Data
(Million Barrels of 42 U.S. Gallons)

	Field Name	Location	Discovery Year	Proved Reserves Rank Group	2001 Reported Production Volume
1	PRUDHOE BAY	AK	1967	1-10	167.2
2	MISSISSIPPI CANYON BLK 778	FG	1999	1-10	0.0
3	KUPARUK RIVER	AK	1969	1-10	68.4
4	BELRIDGE SOUTH	CA	1911	1-10	38.9
5	MIDWAY-SUNSET	CA	1901	1-10	51.8
6	WASSON	TX	1937	1-10	26.3
7	YATES	TX	1926	1-10	8.1
8	KERN RIVER	CA	1899	1-10	40.6
9	ELK HILLS	CA	1919	1-10	30.3
10	MISSISSIPPI CANYON BLK 807	FG	1989	1-10	58.4
Top 10 Volume Subtotal				**7,611.4**	**490.0**
Top 10 Percentage of U.S. Total				**31.9%**	**23.0%**
11	ALPINE	AK	1994	11-20	31.2
12	MILNE POINT	AK	1982	11-20	19.6
13	SPRABERRY TREND AREA	TX	1952	11-20	17.6
14	SLAUGHTER	TX	1937	11-20	14.8
15	HONDO	FP	1969	11-20	10.0
16	GREEN CANYON BLK 644	FG	1999	11-20	0.0
17	CYMRIC	CA	1916	11-20	21.4
18	LEVELLAND	TX	1945	11-20	9.4
19	ENDICOTT	AK	1978	11-20	9.7
20	MISSISSIPPI CANYON BLK 810	FG	1996	11-20	38.7
Top 20 Volume Subtotal				**10,050.4**	**662.2**
Top 20 Percentage of U.S. Total				**42.2%**	**31.1%**
21	LOST HILLS	CA	1953	21-50	10.9
22	PESCADO	FP	1970	21-50	5.8
23	NORTHSTAR	AK	1984	21-50	1.7
24	WILMINGTON	CA	1935	21-50	15.3
25	COWDEN NORTH	TX	1930	21-50	8.3
26	HOBBS	NM	1928	21-50	3.0
27	SAN ARDO	CA	1947	21-50	4.7
28	MISSISSIPPI CANYON BLK 127	FG	2000	21-50	0.0
29	CEDAR HILLS	ND & MT & SD	1954	21-50	3.4
30	SHO-VEL-TUM	OK	1905	21-50	6.2
31	POINT MCINTYRE	AK	1988	21-50	19.0
32	VACUUM	NM	1973	21-50	7.4
33	KELLY-SNYDER	TX	1948	21-50	3.4
34	WATTENBERG	CO	1970	21-50	6.2
35	ALAMINOS CANYON BLK 25	FG	1997	21-50	8.6
36	VENTURA	CA	1916	21-50	4.5
37	GREATER ANETH	UT	1956	21-50	3.6
38	GREEN CANYON BLK 338	FG	2001	21-50	0.0
39	COALINGA	CA	1887	21-50	7.2
40	MCELROY	TX	1926	21-50	5.5
41	RANGELY	CO	1902	21-50	5.7
42	INGLEWOOD	CA	1924	21-50	2.5
43	HAWKINS	TX	1940	21-50	3.6
44	MONUMENT BUTTE	UT	1964	21-50	1.9
45	VIOSCA KNOLL BLK 990	FG	1981	21-50	10.2
46	MISSISSIPPI CANYON BLK 383	FG	1987	21-50	0.0
47	GREEN CANYON BLK 158	FG	1992	21-50	5.0
48	FULLERTON	TX	1971	21-50	4.8
49	GOLDSMITH	TX	1935	21-50	4.1
50	ROBERTSON NORTH	TX	1956	21-50	3.5
Top 50 Volume Subtotal				**13,059.4**	**828.0**
Top 50 Percentage of U.S. Total				**54.8%**	**38.9%**

Table B1. Top 100 U.S. Fields Ranked by Oil[a] Proved Reserves from Reported 2001 Field Level Data (Continued)

(Million Barrels of 42 U.S. Gallons)

	Field Name	Location	Discovery Year	Proved Reserves Rank Group	2001 Reported Production Volume
51	VIOSCA KNOLL BLK 786	FG	1996	51-100	17.7
52	GREEN CANYON BLK 244	FG	1994	51-100	27.2
53	POLARIS	AK	1998	51-100	0.5
54	SACATE	FP	1970	51-100	3.0
55	ARROYO GRANDE	CA	1906	51-100	0.7
56	SALT CREEK	TX	1950	51-100	5.5
57	MISSISSIPPI CANYON BLK 773	FG	2000	51-100	0.0
58	WEST SAK	AK	1969	51-100	2.0
59	JAY	AL & FL	1970	51-100	3.7
60	REDOUBT SHOAL	AK	1968	51-100	0.0
61	SEMINOLE	TX	1936	51-100	9.5
62	MONUMENT	NM	1999	51-100	2.7
63	PENNEL	MT	1955	51-100	2.0
64	MISSISSIPPI CANYON BLK 899	FG	1998	51-100	0.0
65	GREEN CANYON BLK 205	FG	1988	51-100	18.5
66	MEANS	TX	1934	51-100	3.8
67	GIDDINGS	TX	1973	51-100	11.0
68	BEVERLY HILLS	CA	1965	51-100	1.3
69	MISSISSIPPI CANYON BLK 582	FG	2000	51-100	0.0
70	WEST DELTA BLK 30	FG	1949	51-100	5.0
71	MISSISSIPPI CANYON BLK 84	FG	1993	51-100	0.0
72	JO-MILL	TX	1954	51-100	2.4
73	CEDAR LAKE	TX	1939	51-100	2.5
74	MISSISSIPPI CANYON BLK 935	FG	1994	51-100	8.1
75	ANTON-IRISH	TX	1944	51-100	3.9
76	TARN	AK	1991	51-100	8.1
77	EUGENE ISLAND SA BLK 330	FG	1971	51-100	9.7
78	HOWARD-GLASSCOCK	TX	1925	51-100	3.2
79	BELRIDGE NORTH	CA	1912	51-100	3.0
80	EAST BREAKS BLK 602	FG	1999	51-100	0.0
81	BOREALIS	AK	2001	51-100	0.2
82	WESTBROOK	TX	1920	51-100	1.2
83	EWING BANK BLK 873	FG	1991	51-100	10.2
84	KERN FRONT	CA	1925	51-100	1.2
85	GOLDEN TREND	OK	1947	51-100	2.0
86	EUNICE MONUMENT	NM	1929	51-100	1.1
87	GARDEN BANKS BLK 559	FG	1999	51-100	0.7
88	GREEN CANYON BLK 6	FG	1985	51-100	0.0
89	LOOKOUT BUTTE EAST	MT	1986	51-100	1.2
90	ALTAMONT-BLUEBELL	UT	1949	51-100	2.9
91	GARDEN BANKS BLK 668	FG	2000	51-100	0.0
92	WASSON 72	TX	1940	51-100	1.5
93	DOLLARHIDE	NM & TX	1945	51-100	3.0
94	NIAKUK	AK	1984	51-100	7.2
95	MAIN PASS BLK 61	LA	2000	51-100	0.0
96	SOUTH PASS EA BLK 62	FG	1974	51-100	2.5
97	GARDEN BANKS BLK 215	FG	1995	51-100	7.9
98	BREA-OLINDA	CA	1897	51-100	1.0
99	AURORA	AK	1999	51-100	1.8
100	ELWOOD SOUTH OFFSHORE	CA	1966	51-100	1.2
Top 100 Volume Subtotal				**15,381.6**	**1,029.8**
Top 100 Percentage of U.S. Total				**64.5%**	**48.3%**

[a]Includes lease condensate.

Notes: The U.S. total production estimate of 2,130 million barrels and the U.S. total reserves estimate of 23,844 million barrels, used to calculate the percentages in this table, are from the combined totals of Table 6 and Table 15 in this publication. Column totals may not add due to independent rounding.

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

Table B2. Top 100 U.S. Fields Ranked by Gas[a] Proved Reserves, from Reported 2001 Field Level Data
(Billion Cubic Feet)

	Field Name	Location	Discovery Year	Proved Reserves Rank Group	2001 Reported Production Volume
1	BLANCO / IGNACIO-BLANCO	NM & CO	1927	1-10	812.0
2	BASIN	NM	1947	1-10	616.9
3	PRUDHOE BAY	AK	1967	1-10	192.0
4	HUGOTON GAS AREA	KS & OK & TX	1922	1-10	383.1
5	MADDEN	WY	1968	1-10	92.0
6	WATTENBERG	CO	1970	1-10	143.1
7	CARTHAGE	TX	1944	1-10	203.0
8	JONAH	WY	1977	1-10	176.5
9	RATON BASIN GAS AREA	CO & NM	1999	1-10	40.4
10	NEWARK EAST	TX	1981	1-10	114.0
Top 10 Volume Subtotal				**41,920.0**	**2,772.9**
Top 10 Percentage of U.S. Total				**21.9%**	**13.4%**
11	PRB COALBED	WY	1999	11-20	224.0
12	NATURAL BUTTES	UT	1952	11-20	76.3
13	PINEDALE	WY	1955	11-20	8.4
14	MOBILE BAY FIELDS	AL	1979	11-20	133.8
15	FOGARTY CREEK	WY	1975	11-20	32.1
16	DRUNKARDS WASH	UT	1989	11-20	71.4
17	BIG SANDY	KY & WV	1881	11-20	37.9
18	OAKWOOD	VA	1990	11-20	49.4
19	PANHANDLE WEST	TX	1918	11-20	96.3
20	ANTRIM	MI	1965	11-20	68.4
Top 20 Volume Subtotal				**56,074.3**	**3,570.9**
Top 20 Percentage of U.S. Total				**29.2%**	**17.3%**
21	SPRABERRY TREND AREA	TX	1952	21-50	64.3
22	MISSISSIPPI CANYON BLK 778	FG	1999	21-50	0.0
23	RED OAK-NORRIS	OK	1910	21-50	63.1
24	ELK HILLS	CA	1919	21-50	166.7
25	VERNON	LA	1967	21-50	16.2
26	SAWYER	TX	1975	21-50	48.4
27	LAKE RIDGE	WY	1981	21-50	16.6
28	GOMEZ	TX	1977	21-50	55.9
29	OAK HILL	TX	1980	21-50	67.1
30	COOK INLET NORTH	AK	1962	21-50	54.3
31	BELUGA RIVER	AK	1962	21-50	41.6
32	MONTE CHRISTO NORTH	TX	1982	21-50	74.1
33	GRAND VALLEY	CO	1985	21-50	29.4
34	RULISON	CO	1958	21-50	30.5
35	STRONG CITY DISTRICT	OK	1966	21-50	65.9
36	MISSISSIPPI CANYON BLK 810	FG	1996	21-50	62.2
37	MOCANE-LAVERNE GAS AREA	KS & OK & TX	1947	21-50	69.2
38	VIOSCA KNOLL BLK 956	FG	1985	21-50	91.4
39	WHITNEY CANYON-CARTER CRK	WY	1978	21-50	71.5
40	DEW	TX	1982	21-50	68.4
41	GOLDEN TREND	OK	1947	21-50	44.4
42	PANOMA GAS AREA	KS	1956	21-50	55.3
43	KINTA	OK	1926	21-50	33.4
44	GIDDINGS	TX	1973	21-50	152.5
45	WATONGA-CHICKASHA TREND	OK	1962	21-50	50.8
46	EAST BREAKS BLK 945	FG	1994	21-50	72.7
47	FREESTONE	TX	1949	21-50	25.7
48	EAST BREAKS BLK 602	FG	1999	21-50	0.0
49	LOWER MOBILE BAY-MARY ANN	AL	1979	21-50	28.1
50	MOBILE BLK 823	FG	1983	21-50	58.5
Top 50 Volume Subtotal				**76,543.2**	**5,249.2**
Top 50 Percentage of U.S. Total				**39.9%**	**25.4%**

Table B2. Top 100 U.S. Fields Ranked by Gas[a] Proved Reserves, from Reported 2001 Field Level Data (Continued)
(Billion Cubic Feet)

	Field Name	Location	Discovery Year	Proved Reserves Rank Group	2001 Reported Production Volume
51	MISSISSIPPI CANYON BLK 807	FG	1989	51-100	68.8
52	NORA	VA	1949	51-100	23.9
53	WASSON	TX	1973	51-100	20.7
54	BRUFF	WY	1969	51-100	40.9
55	MESA UNIT	WY	1981	51-100	9.5
56	WAMSUTTER	WY	1958	51-100	27.3
57	MAMM CREEK	CO	1959	51-100	22.0
58	WILBURTON	OK	1960	51-100	81.9
59	ELK CITY	OK	1947	51-100	63.0
60	DOWDY RANCH	TX	1999	51-100	23.2
61	BLUE CREEK COAL DEGAS	AL	1988	51-100	19.2
62	PARACHUTE	CO	1985	51-100	9.2
63	STRATTON	TX	1981	51-100	21.3
64	GRAND ISLE SA BLK 116	FG	1999	51-100	60.7
65	BOB WEST	TX	1990	51-100	37.5
66	BALD PRAIRIE	TX	1976	51-100	12.7
67	BELRIDGE SOUTH	CA	1911	51-100	19.5
68	ECHO SPRINGS	WY	1977	51-100	29.8
69	MIMMS CREEK	TX	1978	51-100	24.5
70	LA PERLA	TX	1958	51-100	76.6
71	MISSISSIPPI CANYON BLK 731	FG	1987	51-100	75.0
72	OZONA	TX	1971	51-100	22.7
73	MCALLEN RANCH	TX	1986	51-100	60.9
74	KUPARUK RIVER	AK	1969	51-100	26.1
75	VIOSCA KNOLL BLK 915	FG	1993	51-100	68.3
76	WILD ROSE	WY	1975	51-100	21.7
77	INDIAN BASIN	NM	1971	51-100	130.6
78	VERDEN	OK	1948	51-100	30.4
79	DOUBLE A WELLS	TX	1980	51-100	33.3
80	GARDEN BANKS BLK 668	FG	2000	51-100	0.0
81	GARDEN BANKS BLK 877	FG	2001	51-100	0.0
82	WILLOW SPRINGS	TX	1954	51-100	29.0
83	STANDARD DRAW	WY	1979	51-100	25.4
84	MATAGORDA ISLAND BLK 623	FG	1980	51-100	71.3
85	VAQUILLAS RANCH	TX	1978	51-100	56.9
86	WONSITS VALLEY	UT	1965	51-100	13.2
87	BLANCO SOUTH	NM	1952	51-100	16.7
88	FAIRWAY	AL	1986	51-100	28.1
89	CEMENT	OK	1917	51-100	29.5
90	JUDGE DIGBY	LA	1977	51-100	70.2
91	DESOTO CANYON BLK 133	FG	1993	51-100	0.0
92	RIO VISTA	CA	1936	51-100	17.4
93	KNOX	OK	1916	51-100	53.2
94	MAYFIELD NE	OK	1951	51-100	28.9
95	BLOCK 16	TX	1969	51-100	30.6
96	A W P	TX	1981	51-100	16.2
97	CEDAR COVE COAL DEGAS	AL	1983	51-100	18.7
98	CEDARDALE NE	OK	1957	51-100	19.6
99	TABLE ROCK	WY	1946	51-100	9.5
100	KENAI	AK	1959	51-100	20.0
Top 100 Volume Subtotal				**92,354.1**	**6,964.9**
Top 100 Percentage of U.S. Total				**48.2%**	**33.7%**

[a]Total wet gas after lease separation.

Note: The U.S. total production estimate of 20,642 billion cubic feet and the U.S. total reserves estimate of 191,743 billion cubic feet, used to calculate the percentages in this table, are from Table 9 in this publication. Column totals may not add due to independent rounding.

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

Table B3. Top U.S. Operators Ranked by Reported 2001 Operated Production Data

Rank	Company Name	Crude Oil Production (thousand barrels/day)	Rank	Company Name	Total Natural Gas Production (million cubic feet/day)
1	BP AMOCO PLC	854	1	BP AMOCO PLC	5,362
2	CHEVRONTEXACO INC.	649	2	CHEVRONTEXACO INC	3,403
3	SHELL OIL CO	463	3	EXXON-MOBIL CORPORATION	3,385
4	PHILLIPS PETROLEUM CO	330	4	SHELL OIL CO.	2,388
5	EXXON-MOBIL CORPORATION	305	5	BURLINGTON RESOURCES OIL & GAS CO	2,114
6	OCCIDENTAL PETROLEUM CORPORATION	290	6	EL PASO ENERGY	2,040
7	AERA ENERGY LLC	236	7	ANADARKO PETROLEUM CORP	1,944
8	AMERADA HESS CORP.	125	8	UNOCAL CORPORATION	1,629
9	MARATHON OIL CO	108	9	DEVON ENERGY CORP	1,605
10	ANADARKO PETROLEUM CORP	106	10	PHILLIPS PETROLEUM CO	1,535
Top 10 Volume Subtotal		***3,466***	***Top 10 Volume Subtotal***		***25,405***
Top 10 Percentage of U.S. Total		***59%***	***Top 10 Percentage of U.S. Total***		***45%***
11	UNOCAL CORPORATION	98	11	CONOCO INC.	984
12	DEVON ENERGY CORP	76	12	DOMINION RESOURCES INC.	947
13	APACHE CORP.	68	13	EOG RESOURCES INC	932
14	KERR MCGEE OIL & GAS CORPORATION	60	14	APACHE CORP	927
15	NUEVO ENERGY CO	48	15	OCCIDENTAL PETROLEUM CORPORATION.	912
16	EL PASO ENERGY	38	16	MARATHON OIL CO.	910
17	CITY OF LONG BEACH	35	17	KERR MCGEE OIL & GAS CORPORATION	728
18	BURLINGTON RESOURCES OIL & GAS CO	32	18	AMERADA HESS CORP.	710
19	PIONEER NATURAL RESOURCES USA	31	19	WILLIAMS ENERGY INC	666
20	OCEAN ENERGY INC.	30	20	XTO ENERGY INC	614
Top 20 Volume Subtotal		***3,982***	***Top 20 Volume Subtotal***		***33,735***
Top 20 Percentage of U.S. Total		***68%***	***Top 20 Percentage of U.S. Total***		***60%***
21	CONOCO INC	29	21	NEWFIELD EXPLORATION COMPANY	564
22	WESTPORT RESOURCES CORPORATION	29	22	OCEAN ENERGY INC	561
23	VINTAGE PETROLEUM INC.	28	23	CHESAPEAKE ENERGY CORP	534
24	EOG RESOURCES INC	26	24	MITCHELL ENERGY & DEVELOPMENT CORP	526
25	MERIT ENERGY CO	26	25	SAMSON INVESTMENT COMPANY	392
26	NEWFIELD EXPLORATION COMPANY	25	26	PIONEER NATURAL RESOURCES USA.	376
27	CITATION OIL & GAS CORP	22	27	NOBLE AFFILIATES INC	366
28	DENBURY RESOURCES INC	20	28	QUESTAR CORPORATION	363
29	DOMINION RESOURCES INC	19	29	A E C OIL & GAS (USA) INC	349
30	NOBLE AFFILIATES INC	19	30	HOUSTON EXPLORATION	312
31	ENI SPA.	19	31	FOREST OIL CORP	301
32	HUNT OIL CO	18	32	WALTER OIL & GAS CORP	292
33	PLAINS RESOURCES INC.	18	33	EQUITABLE RESOURCES INC	281
34	ARGUELLO INC	18	34	STONE ENERGY CORPORATION	269
35	STONE ENERGY CORPORATION.	17	35	QUICKSILVER RESOURCES INC	253
36	XTO ENERGY INC	17	36	CABOT OIL & GAS CORP	251
37	NATIONAL FUEL GAS	16	37	TOTALFINAELF SA	248
38	FOREST OIL CORP	16	38	SPINNAKER EXPLORATION CO LLC	239
39	HILCORP ENERGY CO	16	39	WESTPORT RESOURCES CORPORATION.	229
40	ENCORE OPERATING LP	15	40	HUNT OIL CO	228
41	BERRY PETROLEUM CO.	14	41	TOM BROWN INC	225
42	MARINER ENERGY INC.	14	42	HILCORP ENERGY CO	220
43	HOWELL CORPORATION	13	43	KAISER-FRANCIS OIL CO	211
44	COHO RESOURCES INC.	13	44	YATES PETROLEUM CORP	202
45	WALTER OIL & GAS CORP	13	45	VINTAGE PETROLEUM INC	191
46	POGO PRODUCING CO.	12	46	POGO PRODUCING CO	179
47	PRIZE OPERATING CO	12	47	DENBURY RESOURCES INC	178
48	SWIFT ENERGY CO	11	48	HELMERICH & PAYNE INC	171
49	CONTINENTAL RESOURCES INC	11	49	MURPHY OIL CORPORATION.	150
50	CHESAPEAKE ENERGY CORP	11	50	NEXEN ENERGY INC.	149
Top 50 Volume Subtotal		***4,519***	***Top 50 Volume Subtotal***		***42,545***
Top 50 Percentage of U.S. Total		***77%***	***Top 50 Percentage of U.S. Total***		***75%***

Note: Crude oil production includes production of lease condensate and total natural gas production is wet after lease separation.

Appendix C

Conversion to the Metric System

Conversion to the Metric System

Public Law 100–418, the Omnibus Trade and Competitiveness Act of 1988, states: "It is the declared policy of the United States—

> (1) to designate the metric system of measurement as the preferred system of weights and measures for United States trade and commerce. . . .
>
> (2) to require that each Federal agency, by the end of Fiscal Year 1992, use the metric system of measurement in its procurements, grants, and other business–related activities."{43}

Table C1 is in keeping with the spirit of this law. The petroleum industry in the United States is slowly moving in the direction prescribed by this law and the data collected by EIA are collected in the units that are still common to the U.S. petroleum industry, namely barrels and cubic feet. Standard metric conversion factors were used to convert the National level volumes in **Table 1** to the metric equivalents in **Table C1**. Barrels were multiplied by 0.1589873 to convert to cubic meters and cubic feet were multiplied by 0.02831685 to convert to cubic meters.

Table C1. U.S. Proved Reserves of Crude Oil, Dry Natural Gas, and Natural Gas Liquids, in Metric Units, 1991 – 2001

Year	Adjustments (1)	Net Revisions (2)	Revisions[a] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[b] Discoveries (8)	Estimated Production (9)	Proved[c] Reserves 12/31 (10)	Change from Prior Year (11)
	Crude Oil (million cubic meters)										
1991	25.9	35.5	61.4	NA	58.0	15.4	14.6	88.0	399.4	3,924.1	-250.0
1992	46.2	116.8	163.0	NA	62.2	1.3	13.5	77.0	388.9	3,775.2	-148.9
1993	43.1	78.7	121.8	NA	56.6	50.7	17.5	124.8	371.9	3,649.9	-125.3
1994	30.1	160.1	190.2	NA	63.1	10.2	17.6	90.9	360.6	3,570.4	-79.5
1995	19.4	163.4	182.8	NA	79.5	18.1	54.5	152.1	351.8	3,553.5	-16.9
1996	28.0	117.1	145.1	NA	86.3	38.6	22.4	147.3	345.5	3,500.4	-53.1
1997	82.6	145.4	228.0	NA	75.8	101.3	18.9	196.0	339.9	3,584.5	84.1
1998	-101.5	82.3	-19.2	NA	52.0	24.2	19.1	95.3	316.5	3,344.1	-240.4
1999	22.1	289.2	311.3	NA	41.2	51.0	23.1	115.3	310.3	3,460.4	116.3
2000	22.7	118.6	141.3	-3.2	121.8	43.9	39.6	205.3	298.9	3,504.9	44.5
2001	-0.6	-25.1	-25.8	-13.8	137.7	223.7	46.4	407.8	304.5	3,568.6	63.7
	Dry Natural Gas (billion cubic meters)										
1991	83.82	125.05	208.87	NA	144.13	24.01	45.42	213.56	487.11	4,730.67	-64.68
1992	63.29	172.53	235.82	NA	132.38	18.38	48.82	199.58	493.36	4,672.71	-57.96
1993	27.51	151.47	178.98	NA	172.82	25.46	52.84	251.12	503.73	4,599.08	-73.63
1994	55.08	155.29	210.37	NA	196.55	53.63	98.54	348.72	518.82	4,639.35	40.27
1995	16.42	219.00	235.42	NA	193.77	47.18	69.43	310.38	508.74	4,676.41	37.06
1996	107.18	115.70	222.88	NA	219.65	41.09	88.07	348.81	534.08	4,714.02	37.61
1997	-16.70	138.81	122.11	NA	299.73	75.92	67.45	443.10	544.00	4,735.23	21.21
1998	-46.30	162.54	116.24	NA	232.11	30.41	61.22	323.74	530.09	4,645.12	-90.11
1999	27.81	297.44	325.25	NA	199.44	44.40	62.18	306.02	535.98	4,740.41	95.29
2000	-25.23	197.14	171.91	114.15	418.72	56.15	67.05	541.93	544.22	5,024.17	283.76
2001	77.64	-65.64	12.01	74.47	463.83	101.32	79.29	644.44	560.08	5,195.01	170.84
	Natural Gas Liquids (million cubic meters)										
1991	37.1	20.7	57.8	NA	30.0	4.0	8.7	42.7	119.9	1,186.7	-19.4
1992	35.7	41.5	77.2	NA	30.2	3.2	10.2	43.6	122.9	1,184.6	-2.1
1993	16.2	19.7	35.9	NA	39.0	3.8	10.2	53.0	125.3	1,148.2	-36.4
1994	6.9	31.3	38.2	NA	49.9	8.6	20.8	79.3	125.8	1,139.9	-8.3
1995	30.6	44.0	74.6	NA	68.7	8.1	10.7	87.6	125.8	1,176.3	36.4
1996	75.4	27.8	103.2	NA	71.7	10.3	17.3	99.4	135.1	1,243.8	67.4
1997	-2.2	45.9	43.7	NA	85.1	18.1	14.3	117.5	137.4	1,267.6	23.8
1998	-57.4	33.1	-24.3	NA	60.9	10.5	14.0	85.4	132.4	1,196.2	-71.4
1999	15.8	115.6	131.4	NA	49.8	8.1	14.0	71.9	142.5	1,257.0	60.8
2000	-13.2	73.0	59.8	23.1	102.5	14.6	16.2	133.4	146.4	1,326.7	69.7
2001	-68.2	-21.0	-89.2	16.2	114.0	21.9	22.6	158.5	141.5	1,270.8	-55.9

[a]Revisions and adjustments = Col. 1 + Col. 2.
[b]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[c]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA–23, “Annual Survey of Domestic Oil and Gas Reserves” and Form EIA–64A, “Annual Report of the Origin of Natural Gas Liquids Production.” The following conversion factors were used to convert data: barrels = 0.1589873 per cubic meter and cubic feet = 0.02831685 per cubic meter. Number of decimal digits varies in order to accurately reproduce corresponding equivalents shown on Table 1 in Chapter 2.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1991–2001 annual reports, DOE/EIA–0216.{15–24}

Appendix D

Historical Reserves Statistics

Appendix D

Historical Reserves Statistics

These are selected historical data presented at the State and National level. All historical statistics included have previously been published in the annual reports of 1977 through 2001 of the EIA publication *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, DOE EIA-0216.{1-24}

Liquid volumes are in million barrels of 42 U.S. gallons. Gas volumes are in billion cubic feet (Bcf), at 14.73 psia and 60° Fahrenheit. NA appears in this appendix wherever data are not available or are withheld to avoid disclosure of data which may be proprietary. An asterisk (*) marks those estimates associated with sampling errors (95 percent confidence interval) greater than 20 percent of the value estimated.

Alabama

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	85	0	530	NA
1978	*74	0	514	NA
1979	45	NA	652	213
1980	54	NA	636	226
1981	55	NA	648	192
1982	54	NA	[a]648	193
1983	51	NA	[a]785	216
1984	*68	NA	[a]961	200
1985	69	NA	[a]821	182
1986	55	20	[b]951	177
1987	55	20	[b]842	166
1988	54	20	[b]809	166
1989	43	20	[b]819	168
1990	44	<1	[c]4,125	170
1991	43	<1	[c]5,414	145
1992	41	0	[c]5,802	171
1993	41	0	[c]5,140	158
1994	44	0	[c]4,830	142
1995	43	0	[c]4,868	120
1996	45	0	[c]5,033	119
1997	47	0	[c]4,968	93
1998	39	0	[c]4,604	81
1999	49	0	[c]4,287	107
2000	34	NA	[c]4,149	150
2001	42	NA	[c]3,915	64

[a]Onshore only; offshore included in Louisiana.
[b]Onshore only; offshore included in Federal Offshore - Gulf of Mexico (Louisiana).
[c]Includes State Offshore: 2,519 Bcf in 1990; 3,191 Bcf in 1991; 3,233 Bcf in 1992; 3,364 Bcf in 1993; 3,297 Bcf in 1994; 3,432 Bcf in 1995; 3,509 Bcf in 1996; 3,422 Bcf in 1997; 3,144 Bcf in 1998; 2,853 Bcf in 1999; 2,645 in 2000; 1,461 Bcf in 2001.

Alaska

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	8,413	846	32,243	NA
1978	9,384	398	32,045	NA
1979	8,875	398	32,259	23
1980	8,751	0	33,382	11
1981	8,283	0	33,037	10
1982	7,406	60	34,990	9
1983	7,307	576	34,283	8
1984	7,563	369	34,476	19
1985	7,056	379	33,847	383
1986	6,875	902	32,664	381
1987	7,378	566	33,225	418
1988	6,959	431	9,078	401
1989	6,674	750	8,939	380
1990	6,524	969	9,300	340
1991	6,083	1,456	9,553	360
1992	6,022	1,331	9,638	347
1993	5,775	1,161	9,907	321
1994	5,767	1,022	9,733	301
1995	5,580	582	9,497	306
1996	5,274	952	9,294	337
1997	5,161	832	10,562	631
1998	5,052	832	9,927	320
1999	4,900	464	9,734	299
2000	4,861	NA	9,237	277
2001	4,851	NA	8,800	405

Note: See 1988 Chapter 4 discussion "Alaskan North Slope Natural Gas Reserves".

Arkansas

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	116	17	1,660	NA
1978	111	8	1,681	NA
1979	107	8	1,703	17
1980	107	11	1,774	16
1981	113	11	1,801	16
1982	107	4	1,958	15
1983	120	4	2,069	11
1984	114	6	2,227	12
1985	97	11	2,019	11
1986	88	9	1,992	16
1987	82	0	1,997	16
1988	77	<1	1,986	13
1989	66	1	1,772	9
1990	60	1	1,731	9
1991	*70	0	1,669	5
1992	58	<1	1,750	4
1993	65	0	1,552	4
1994	51	0	1,607	6
1995	48	0	1,563	6
1996	58	0	1,470	4
1997	45	0	1,475	7
1998	47	0	1,328	5
1999	48	0	1,542	5
2000	48	NA	1,581	5
2001	43	NA	1,616	5

California - Coastal Region Onshore

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	679	NA	334	NA
1978	602	NA	350	NA
1979	578	NA	365	22
1980	652	NA	299	23
1981	621	NA	306	14
1982	580	NA	362	16
1983	559	NA	381	17
1984	628	140	265	15
1985	631	152	256	16
1986	592	164	255	15
1987	625	298	238	13
1988	576	299	215	13
1989	731	361	224	11
1990	588	310	217	12
1991	554	327	216	12
1992	522	317	203	10
1993	528	313	189	12
1994	480	238	194	11
1995	456	234	153	8
1996	425	261	156	9
1997	430	43	164	9
1998	354	40	106	9
1999	491	40	192	31
2000	455	NA	234	27
2001	385	NA	177	16

California - Total

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	5,005	1,047	4,737	NA
1978	4,974	968	4,947	NA
1979	5,265	960	5,022	111
1980	5,470	891	5,414	120
1981	5,441	660	5,617	82
1982	5,405	616	5,552	154
1983	5,348	576	5,781	151
1984	5,707	674	5,554	141
1985	[d]4,810	590	[d]4,325	[d]146
1986	[d]4,734	[d]616	[d]3,928	[d]134
1987	[d]4,709	[d]1,493	[d]3,740	[d]130
1988	[d]4,879	[d]1,440	[d]3,519	[d]123
1989	[d]4,816	[d]1,608	[d]3,374	[d]113
1990	[d]4,658	[d]1,425	[d]3,185	[d]105
1991	[d]4,217	[d]1,471	[d]3,004	[d]92
1992	[d]3,893	[d]1,299	[d]2,778	[d]99
1993	[d]3,764	[d]965	[d]2,682	[d]104
1994	[d]3,573	[d]835	[d]2,402	[d]92
1995	[d]3,462	[d]823	[d]2,243	[d]92
1996	[d]3,437	[d]905	[d]2,082	[d]92
1997	[d]3,750	[d]1,264	[d]2,273	[d]95
1998	[d]3,843	[d]1,297	[d]2,244	[d]72
1999	[d]3,934	[d]1,400	[d]2,387	[d]98
2000	[d]3,813	NA	[d]2,849	[d]101
2001	[d]3,627	NA	[d]2,681	[d]76

[d]Excludes Federal offshore; now included in Federal Offshore-Pacific (California).

California - Los Angeles Basin Onshore

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	910	NA	255	NA
1978	493	NA	178	NA
1979	513	NA	163	10
1980	454	NA	193	15
1981	412	NA	154	6
1982	370	NA	96	6
1983	343	NA	107	6
1984	373	126	156	5
1985	420	86	181	6
1986	330	66	142	8
1987	361	105	148	8
1988	391	106	151	7
1989	342	32	137	4
1990	316	3	106	5
1991	272	4	115	4
1992	236	4	97	5
1993	238	4	102	6
1994	221	4	103	5
1995	227	4	111	4
1996	234	0	109	3
1997	268	0	141	4
1998	207	0	149	5
1999	297	0	168	7
2000	292	NA	193	10
2001	297	NA	187	8

California - San Joaquin Basin Onshore

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	2,965	NA	3,784	NA
1978	3,099	NA	3,960	NA
1979	3,294	NA	3,941	77
1980	3,360	NA	4,344	81
1981	3,225	NA	4,163	57
1982	3,081	NA	3,901	124
1983	3,032	NA	3,819	117
1984	3,197	384	3,685	105
1985	3,258	350	3,574	120
1986	3,270	368	3,277	109
1987	3,208	1,070	3,102	107
1988	3,439	1,029	2,912	101
1989	3,301	1,210	2,782	95
1990	3,334	1,109	2,670	86
1991	3,126	1,139	2,614	75
1992	2,898	977	2,415	83
1993	2,772	648	2,327	85
1994	2,647	593	2,044	75
1995	2,577	585	1,920	80
1996	2,597	644	1,768	80
1997	2,871	1,221	1,912	82
1998	3,127	1,257	1,945	58
1999	2,949	1,330	1,951	60
2000	2,870	NA	2,331	64
2001	2,766	NA	2,232	52

California - State Offshore

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	181	NA	114	NA
1978	519	NA	213	NA
1979	632	NA	231	2
1980	604	NA	164	1
1981	NA	NA	NA	NA
1982	NA	NA	NA	NA
1983	NA	NA	NA	NA
1984	NA	25	NA	NA
1985	501	0	314	4
1986	542	18	254	2
1987	515	18	252	2
1988	473	6	241	2
1989	442	5	231	3
1990	420	3	192	2
1991	265	1	59	1
1992	237	1	63	1
1993	226	0	64	1
1994	225	0	61	1
1995	202	0	59	0
1996	181	0	49	0
1997	181	0	56	0
1998	155	0	44	0
1999	197	30	76	0
2000	196	NA	91	0
2001	179	NA	85	0

California-State and Federal Offshore

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	451	NA	364	NA
1978	780	NA	457	NA
1979	880	NA	553	2
1980	1,004	NA	578	1
1981	1,183	NA	994	5
1982	1,374	NA	1,193	8
1983	1,414	NA	1,474	11
1984	1,509	25	1,448	16
1985	1,492	2	1,433	16
1986	1,516	19	1,579	17
1987	1,552	20	1,704	19
1988	1,497	6	1,793	23
1989	1,429	5	1,727	28
1990	1,382	3	1,646	20
1991	1,050	1	1,221	19
1992	971	1	1,181	21
1993	899	0	1,163	26
1994	878	0	1,231	22
1995	773	0	1,324	25
1996	699	0	1,293	23
1997	709	0	600	14
1998	623	0	524	12
1999	750	30	612	4
2000	792	NA	667	4
2001	726	NA	625	9

California - Federal Offshore

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	270	NA	250	NA
1978	261	NA	246	NA
1979	248	NA	322	0
1980	400	NA	414	0
1981	NA	NA	NA	NA
1982	NA	NA	NA	NA
1983	NA	NA	NA	NA
1984	NA	0	NA	NA
1985	991	2	1,119	12
1986	974	1	1,325	15
1987	1,037	2	1,452	17
1988	1,024	0	1,552	21
1989	987	0	1,496	25
1990	962	0	1,454	18
1991	785	0	1,162	18
1992	734	<1	1,118	20
1993	673	0	1,099	25
1994	653	0	1,170	21
1995	571	0	1,265	25
1996	518	0	1,244	23
1997	528	0	544	14
1998	468	0	480	12
1999	553	0	536	4
2000	596	NA	576	4
2001	547	NA	540	9

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Colorado				
1977	230	73	2,512	NA
1978	194	75	2,765	NA
1979	159	43	2,608	177
1980	*183	46	2,922	194
1981	147	47	2,961	204
1982	169	100	3,314	186
1983	186	113	3,148	183
1984	198	119	*2,943	155
1985	198	119	2,881	173
1986	207	95	3,027	148
1987	272	67	2,942	166
1988	257	67	3,535	181
1989	359	8	4,274	209
1990	305	8	4,555	169
1991	329	33	5,767	197
1992	304	34	6,198	226
1993	284	22	6,722	214
1994	271	22	6,753	248
1995	252	24	7,256	273
1996	231	22	7,710	287
1997	198	22	6,828	264
1998	212	21	7,881	260
1999	203	21	8,987	303
2000	217	NA	10,428	316
2001	196	NA	12,527	345
Florida				
1977	213	1	151	NA
1978	168	1	119	NA
1979	128	1	77	21
1980	134	1	84	27
1981	109	1	69	NA
1982	97	1	64	17
1983	78	4	49	11
1984	82	2	65	17
1985	77	2	55	17
1986	67	2	49	14
1987	61	0	49	9
1988	59	0	51	16
1989	50	0	46	10
1990	42	0	45	8
1991	37	0	38	7
1992	36	0	47	8
1993	40	0	50	9
1994	71	0	98	18
1995	71	0	92	17
1996	97	0	96	22
1997	91	0	96	17
1998	71	0	88	18
1999	85	0	84	16
2000	76	NA	82	11
2001	75	NA	84	12

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Illinois				
1977	*150	1	NA	NA
1978	*158	1	NA	NA
1979	*136	1	NA	NA
1980	113	2	NA	NA
1981	129	1	NA	NA
1982	150	1	NA	NA
1983	135	1	NA	NA
1984	153	1	NA	NA
1985	136	1	NA	NA
1986	135	1	NA	NA
1987	153	5	NA	NA
1988	143	<1	NA	NA
1989	123	<1	NA	NA
1990	131	0	NA	NA
1991	128	52	NA	NA
1992	138	0	NA	NA
1993	116	0	NA	NA
1994	117	0	NA	NA
1995	119	0	NA	NA
1996	94	0	NA	NA
1997	92	0	NA	NA
1998	81	0	NA	NA
1999	100	0	NA	NA
2000	111	NA	NA	NA
2001	92	NA	NA	NA
Indiana				
1977	*20	0	NA	NA
1978	*29	0	NA	NA
1979	*40	0	NA	NA
1980	23	0	NA	NA
1981	23	0	NA	NA
1982	28	1	NA	NA
1983	34	3	NA	NA
1984	*33	2	NA	NA
1985	*35	2	NA	NA
1986	*32	2	NA	NA
1987	23	2	NA	NA
1988	*22	0	NA	NA
1989	*16	0	NA	NA
1990	12	0	NA	NA
1991	*16	0	NA	NA
1992	17	0	NA	NA
1993	15	0	NA	NA
1994	15	0	NA	NA
1995	13	0	NA	NA
1996	11	0	NA	NA
1997	*10	0	NA	NA
1998	13	0	NA	NA
1999	10	0	NA	NA
2000	15	NA	NA	NA
2001	12	NA	NA	NA

Kansas

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	*349	3	11,457	NA
1978	303	3	10,992	NA
1979	*377	3	10,243	402
1980	310	2	9,508	389
1981	371	2	9,860	409
1982	378	13	9,724	302
1983	344	13	9,553	443
1984	377	2	9,387	424
1985	423	<1	9,337	373
1986	312	<1	10,509	440
1987	357	<1	10,494	462
1988	327	<1	10,104	345
1989	338	3	10,091	329
1990	321	<1	9,614	313
1991	300	<1	9,358	428
1992	310	0	9,681	444
1993	271	0	9,348	380
1994	260	0	9,156	398
1995	275	<1	8,571	369
1996	266	<1	7,694	338
1997	238	0	6,989	271
1998	246	0	6,402	334
1999	175	0	5,753	358
2000	237	NA	5,299	306
2001	216	NA	5,101	302

Louisiana - Total

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	3,600	139	57,010	NA
1978	3,448	143	55,725	NA
1979	2,780	76	50,042	1,424
1980	2,751	62	47,325	1,346
1981	2,985	50	47,377	1,327
1982	2,728	49	[e]44,916	1,295
1983	2,707	45	[e]42,561	1,332
1984	2,661	55	[e]41,399	1,188
1985	[f]883	35	[f]14,038	[f]546
1986	[f]826	[f]47	[f]12,930	[f]524
1987	[f]807	[f]56	[f]12,430	[f]525
1988	[f]800	[f]69	[f]12,224	[f]517
1989	[f]745	[f]63	[f]12,516	[f]522
1990	[f]705	[f]22	[f]11,728	[f]538
1991	[f]679	[f]44	[f]10,912	[f]526
1992	[f]668	[f]35	[f]9,780	[f]495
1993	[f]639	[f]338	[f]9,174	[f]421
1994	[f]649	[f]340	[f]9,748	[f]434
1995	[f]637	[f]475	[f]9,274	[f]601
1996	[f]658	[f]331	[f]9,543	[f]543
1997	[f]714	[f]313	[f]9,673	[f]437
1998	[f]551	[f]316	[f]9,147	[f]411
1999	[f]600	[f]278	[f]9,242	[f]457
2000	[f]529	NA	[f]9,239	[f]436
2001	[f]564	NA	[f]9,811	[f]391

[e]Includes State and Federal offshore Alabama.
[f]Excludes Federal offshore; now included in Federal Offshore-Gulf of Mexico (Louisiana).

Kentucky

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	30	0	451	NA
1978	*40	0	545	NA
1979	25	0	468	26
1980	*35	12	508	25
1981	29	13	530	25
1982	*36	13	551	35
1983	35	12	554	31
1984	*41	0	613	24
1985	*42	0	766	27
1986	*31	0	841	29
1987	25	0	909	23
1988	*34	0	923	24
1989	33	0	992	16
1990	33	0	1,016	25
1991	*31	0	1,155	24
1992	34	0	1,084	32
1993	26	0	1,003	26
1994	26	0	969	39
1995	24	0	1,044	43
1996	21	0	983	46
1997	*20	0	1,364	48
1998	23	0	1,222	54
1999	24	0	1,435	69
2000	24	NA	1,760	56
2001	17	NA	1,860	72

Louisiana - North

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	244	78	3,135	NA
1978	255	78	3,203	NA
1979	216	NA	2,798	96
1980	248	NA	3,076	95
1981	*317	NA	3,270	99
1982	*240	NA	2,912	85
1983	223	NA	2,939	74
1984	165	9	2,494	57
1985	196	5	2,587	65
1986	160	7	2,515	57
1987	175	3	2,306	50
1988	154	23	2,398	56
1989	123	22	2,652	60
1990	120	<1	2,588	58
1991	127	<1	2,384	59
1992	125	<1	2,311	60
1993	108	0	2,325	57
1994	108	0	2,537	69
1995	108	0	2,788	79
1996	128	0	3,105	85
1997	136	<1	3,093	80
1998	101	0	2,898	57
1999	108	0	3,079	61
2000	97	NA	3,298	61
2001	87	NA	3,881	62

Louisiana - South Onshore

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	1,382	46	18,580	NA
1978	1,242	38	17,755	NA
1979	682	NA	13,994	676
1980	682	NA	13,026	540
1981	642	NA	12,645	544
1982	611	NA	11,801	501
1983	569	NA	11,142	527
1984	585	20	10,331	454
1985	565	16	9,808	442
1986	547	30	9,103	428
1987	505	22	8,693	429
1988	511	35	8,654	421
1989	479	30	8,645	411
1990	435	11	8,171	431
1991	408	33	7,504	417
1992	417	26	6,693	380
1993	382	329	5,932	334
1994	391	331	6,251	337
1995	387	324	5,648	495
1996	382	322	5,704	411
1997	427	309	5,855	333
1998	353	307	5,698	325
1999	384	278	5,535	364
2000	310	NA	5,245	337
2001	341	NA	5,185	269

Louisiana - State Offshore

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	1,974	15	35,295	NA
1978	1,951	27	34,767	NA
1979	1,882	14	33,250	652
1980	1,821	13	31,223	711
1981	2,026	16	31,462	684
1982	1,877	21	[e]30,203	709
1983	1,915	15	[e]28,480	731
1984	1,911	27	[e]28,574	677
1985	[f]122	2	[f]1,643	[f]39
1986	[f]119	[f]10	[f]1,312	[f]39
1987	[f]127	[f]22	[f]1,431	[f]46
1988	[f]135	[f]11	[f]1,172	[f]40
1989	[f]143	[f]11	[f]1,219	[f]51
1990	[f]150	[f]11	[f]969	[f]49
1991	[f]144	[f]11	[f]1,024	[f]50
1992	[f]126	[f]9	[f]776	[f]55
1993	[f]149	[f]9	[f]917	[f]30
1994	[f]150	[f]9	[f]960	[f]28
1995	[f]142	[f]151	[f]838	[f]27
1996	[f]148	[f]9	[f]734	[f]47
1997	[f]151	[f]4	[f]725	[f]24
1998	[f]97	[f]2	[f]551	[f]29
1999	[f]108	[f]0	[f]628	[f]32
2000	[f]122	NA	[f]696	[f]38
2001	[f]136	NA	[f]745	[f]60

[e]Includes State and Federal offshore Alabama.
[f]Excludes Federal offshore; now included in Federal Offshore-Gulf of Mexico (Louisiana).

Michigan

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	*233	0	*1,386	NA
1978	*220	9	*1,422	NA
1979	159	23	1,204	112
1980	*205	14	*1,406	112
1981	*240	17	1,118	102
1982	184	34	1,084	97
1983	209	48	1,219	105
1984	180	46	1,112	84
1985	191	37	985	67
1986	146	34	1,139	88
1987	151	27	1,451	111
1988	132	27	1,323	99
1989	128	8	1,342	97
1990	124	3	1,243	81
1991	119	0	1,334	72
1992	102	0	1,223	68
1993	90	0	1,160	57
1994	91	1	1,323	54
1995	76	1	1,294	45
1996	74	0	2,061	53
1997	68	2	2,195	50
1998	44	0	2,328	51
1999	52	0	2,255	48
2000	56	NA	2,729	35
2001	46	NA	2,976	43

Mississippi

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	241	9	1,437	NA
1978	*250	27	1,635	NA
1979	238	24	1,504	16
1980	202	36	1,769	20
1981	209	93	2,035	18
1982	223	85	1,796	18
1983	205	77	1,596	19
1984	201	50	1,491	15
1985	184	53	1,360	12
1986	199	16	1,300	11
1987	202	12	1,220	11
1988	221	10	1,143	12
1989	218	6	1,104	12
1990	227	8	1,126	11
1991	194	8	1,057	10
1992	165	7	869	9
1993	133	44	797	11
1994	151	40	650	9
1995	140	6	663	8
1996	164	6	631	7
1997	183	0	582	6
1998	141	0	658	8
1999	163	0	677	10
2000	182	NA	618	8
2001	167	NA	661	10

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Montana				
1977	175	27	*887	NA
1978	158	27	926	NA
1979	152	38	825	10
1980	179	13	*1,287	16
1981	186	11	*1,321	11
1982	216	6	847	18
1983	234	8	896	19
1984	224	4	802	18
1985	232	3	857	21
1986	248	27	803	16
1987	246	<1	780	16
1988	241	0	819	11
1989	225	<1	867	16
1990	221	0	899	15
1991	201	0	831	14
1992	193	0	859	12
1993	171	0	673	8
1994	175	0	717	8
1995	178	0	782	8
1996	168	0	796	7
1997	159	1	762	5
1998	167	0	782	5
1999	207	0	841	8
2000	235	NA	885	4
2001	260	NA	898	5
Nebraska				
1977	22	0	NA	NA
1978	30	1	NA	NA
1979	25	0	NA	NA
1980	*46	0	NA	NA
1981	41	0	NA	NA
1982	*32	0	NA	NA
1983	44	0	NA	NA
1984	*46	0	NA	NA
1985	42	0	NA	NA
1986	*45	7	NA	NA
1987	33	0	NA	NA
1988	42	0	NA	NA
1989	32	0	NA	NA
1990	26	0	NA	NA
1991	26	0	NA	NA
1992	26	0	NA	NA
1993	20	0	NA	NA
1994	22	0	NA	NA
1995	25	0	NA	NA
1996	28	0	NA	NA
1997	*21	0	NA	NA
1998	18	0	NA	NA
1999	17	0	NA	NA
2000	18	NA	NA	NA
2001	15	NA	NA	NA

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
New Mexico - Total				
1977	605	97	12,000	NA
1978	579	90	12,688	NA
1979	563	77	13,724	530
1980	547	58	13,287	541
1981	555	93	13,870	560
1982	563	76	12,418	531
1983	576	75	11,676	551
1984	660	87	11,364	511
1985	688	99	10,900	445
1986	644	225	11,808	577
1987	654	235	11,620	771
1988	661	241	17,166	1,023
1989	665	256	15,434	933
1990	687	256	17,260	990
1991	721	275	18,539	908
1992	757	293	18,998	1,066
1993	707	211	18,619	996
1994	718	215	17,228	1,011
1995	732	185	17,491	943
1996	744	148	16,485	1,059
1997	735	146	15,514	869
1998	620	168	14,987	929
1999	718	165	15,449	954
2000	719	NA	17,322	896
2001	715	NA	17,414	873
New Mexico - East				
1977	576	95	3,848	NA
1978	554	88	3,889	NA
1979	542	77	4,031	209
1980	518	58	3,530	209
1981	522	93	3,598	214
1982	537	76	3,432	209
1983	542	75	3,230	232
1984	625	87	3,197	221
1985	643	98	3,034	209
1986	593	225	2,694	217
1987	608	230	2,881	192
1988	621	235	2,945	208
1989	619	252	3,075	196
1990	633	253	3,256	222
1991	694	275	3,206	205
1992	731	293	3,130	223
1993	688	211	3,034	233
1994	702	215	3,021	234
1995	713	185	2,867	247
1996	731	148	2,790	299
1997	719	146	2,642	273
1998	610	168	2,693	262
1999	705	165	3,037	255
2000	705	NA	3,537	333
2001	703	NA	3,518	279

New Mexico - West

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	*29	2	8,152	NA
1978	*25	2	8,799	NA
1979	21	0	9,693	321
1980	*29	0	9,757	332
1981	*33	0	10,272	346
1982	26	0	8,986	322
1983	34	0	8,446	319
1984	35	0	8,167	290
1985	45	1	7,866	236
1986	51	0	9,114	360
1987	46	5	8,739	579
1988	40	6	14,221	815
1989	46	4	12,359	737
1990	54	3	14,004	768
1991	27	0	15,333	703
1992	26	0	15,868	843
1993	19	0	15,585	763
1994	16	0	14,207	777
1995	19	0	14,624	696
1996	13	0	13,695	760
1997	16	0	12,872	596
1998	10	0	12,294	667
1999	13	0	12,412	699
2000	14	NA	13,785	563
2001	12	NA	13,896	594

North Dakota

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	155	10	361	NA
1978	162	4	374	NA
1979	211	6	439	47
1980	214	6	537	61
1981	223	8	581	68
1982	237	8	629	71
1983	258	53	600	69
1984	260	54	566	73
1985	255	34	569	74
1986	218	35	541	69
1987	215	33	508	67
1988	216	39	541	52
1989	246	31	561	59
1990	285	0	586	60
1991	232	4	472	56
1992	237	3	496	64
1993	226	7	525	55
1994	226	2	507	55
1995	233	6	463	53
1996	248	6	462	48
1997	279	6	479	47
1998	245	1	447	48
1999	262	1	416	53
2000	270	NA	433	54
2001	328	NA	443	57

New York

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	NA	NA	165	NA
1978	NA	NA	193	NA
1979	NA	NA	211	0
1980	NA	NA	208	0
1981	NA	NA	*264	0
1982	NA	NA	229	NA
1983	NA	NA	295	NA
1984	NA	NA	389	NA
1985	NA	NA	*369	NA
1986	NA	NA	*457	NA
1987	NA	NA	410	NA
1988	NA	NA	351	NA
1989	NA	NA	368	NA
1990	NA	NA	354	NA
1991	NA	NA	331	NA
1992	NA	NA	329	NA
1993	NA	NA	*264	NA
1994	NA	NA	242	NA
1995	NA	NA	197	NA
1996	NA	NA	232	NA
1997	NA	NA	*224	NA
1998	NA	NA	218	NA
1999	NA	NA	221	NA
2000	NA	NA	322	NA
2001	NA	NA	318	NA

Ohio

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	*74	0	495	NA
1978	69	0	684	NA
1979	*82	0	*1,479	0
1980	*116	0	*1,699	0
1981	*112	0	965	0
1982	111	0	1,141	NA
1983	130	0	2,030	NA
1984	*116	0	1,541	NA
1985	79	0	1,331	NA
1986	72	0	1,420	NA
1987	66	0	1,069	NA
1988	64	0	1,229	NA
1989	56	0	1,275	NA
1990	65	0	1,214	NA
1991	66	0	1,181	NA
1992	58	0	1,161	NA
1993	54	0	1,104	NA
1994	58	0	1,094	NA
1995	53	0	1,054	NA
1996	53	0	1,113	NA
1997	*43	0	985	NA
1998	40	0	890	NA
1999	51	0	1,179	NA
2000	59	NA	1,185	NA
2001	46	NA	970	NA

Oklahoma

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	1,109	69	13,889	NA
1978	979	33	14,417	NA
1979	1,014	35	13,816	583
1980	930	27	13,138	604
1981	950	43	14,699	631
1982	971	25	16,207	745
1983	931	27	16,211	829
1984	940	40	16,126	769
1985	935	37	16,040	826
1986	874	35	16,685	857
1987	788	56	16,711	781
1988	796	79	16,495	765
1989	789	63	15,916	654
1990	734	37	16,151	657
1991	700	54	14,725	628
1992	698	54	13,926	629
1993	680	40	13,289	643
1994	689	47	13,487	652
1995	676	48	13,438	674
1996	632	43	13,074	684
1997	605	20	13,439	685
1998	599	59	13,645	698
1999	621	58	12,543	749
2000	610	NA	13,699	734
2001	556	NA	13,558	694

Texas - Total

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	9,751	637	56,422	NA
1978	8,911	533	55,583	NA
1979	8,284	471	53,021	2,482
1980	8,206	384	50,287	2,452
1981	8,093	459	50,469	2,646
1982	7,616	377	49,757	2,771
1983	7,539	421	50,052	3,038
1984	7,557	735	49,883	3,048
1985	[g]7,782	609	[g]41,775	[g]2,981
1986	[g]7,152	1,270	[g]40,574	[g]2,964
1987	[g]7,112	1,028	[g]38,711	[g]2,822
1988	[g]7,043	1,099	[g]38,167	[g]2,617
1989	[g]6,966	805	[g]38,381	[g]2,563
1990	[g]7,106	618	[g]38,192	[g]2,575
1991	[g]6,797	756	[g]36,174	[g]2,493
1992	[g]6,441	[g]612	[g]35,093	[g]2,402
1993	[g]6,171	[g]581	[g]34,718	[g]2,469
1994	[g]5,847	[g]491	[g]35,974	[g]2,414
1995	[g]5,743	[g]395	[g]36,542	[g]2,524
1996	[g]5,736	[g]358	[g]38,270	[g]2,606
1997	[g]5,687	[g]479	[g]37,761	[g]2,687
1998	[g]4,927	[g]400	[g]37,584	[g]2,544
1999	[g]5,339	[g]426	[g]40,157	[g]2,584
2000	[g]5,273	NA	[g]40,082	[g]2,819
2001	[g]4,944	NA	[g]43,527	[g]2,653

[g]Excludes Federal offshore; now included in Federal Offshore-Gulf of Mexico (Texas).

Pennsylvania

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	*57	0	769	NA
1978	27	0	899	NA
1979	33	0	*1,515	1
1980	35	0	951	0
1981	32	0	*1,264	0
1982	37	0	1,429	NA
1983	41	0	1,882	NA
1984	*40	0	1,575	NA
1985	*38	0	*1,617	NA
1986	*26	0	*1,560	1
1987	26	0	1,647	NA
1988	*27	0	2,072	NA
1989	26	0	1,642	NA
1990	22	0	1,720	NA
1991	15	0	1,629	NA
1992	16	0	1,528	NA
1993	14	0	1,717	NA
1994	15	0	1,800	NA
1995	11	0	1,482	NA
1996	10	0	1,696	NA
1997	17	0	1,852	NA
1998	15	0	1,840	NA
1999	16	0	1,772	NA
2000	15	NA	1,741	NA
2001	10	NA	1,775	NA

Texas - RRC District 1

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	*174	0	1,319	NA
1978	111	2	986	NA
1979	110	0	919	23
1980	*150	0	829	24
1981	127	5	*1,022	26
1982	129	6	892	29
1983	165	6	1,087	43
1984	173	4	838	39
1985	177	8	967	40
1986	144	1	913	35
1987	143	1	812	27
1988	136	1	1,173	30
1989	139	1	1,267	25
1990	252	0	1,048	26
1991	227	0	1,030	28
1992	185	0	933	27
1993	133	0	698	26
1994	100	1	703	26
1995	90	6	712	26
1996	86	1	906	46
1997	83	<1	953	54
1998	61	0	1,104	38
1999	66	0	1,008	167
2000	87	NA	1,032	55
2001	46	NA	1,018	40

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Texas - RRC District 2 Onshore				
1977	395	80	3,162	NA
1978	334	1	2,976	NA
1979	292	1	2,974	64
1980	252	1	2,502	64
1981	229	1	2,629	88
1982	206	0	2,493	75
1983	192	0	2,534	99
1984	192	<1	2,512	103
1985	168	0	2,358	100
1986	148	<1	2,180	89
1987	137	0	2,273	102
1988	117	0	2,037	92
1989	107	0	1,770	72
1990	91	0	1,737	80
1991	90	0	1,393	75
1992	86	0	1,389	80
1993	77	0	1,321	86
1994	74	0	1,360	86
1995	61	0	1,251	93
1996	63	<1	1,322	93
1997	66	0	1,634	87
1998	45	<1	1,614	85
1999	53	0	1,881	76
2000	54	NA	1,980	72
2001	48	NA	1,801	67
Texas - RRC District 3 Onshore				
1977	937	33	7,518	NA
1978	794	22	7,186	NA
1979	630	32	6,315	231
1980	581	11	5,531	216
1981	552	11	5,292	230
1982	509	22	4,756	265
1983	517	27	4,680	285
1984	522	25	4,708	270
1985	471	6	4,180	260
1986	420	3	3,753	237
1987	386	4	3,632	241
1988	360	16	3,422	208
1989	307	11	3,233	213
1990	275	13	2,894	181
1991	300	28	2,885	208
1992	304	27	2,684	211
1993	327	31	2,972	253
1994	330	61	3,366	254
1995	267	27	3,866	272
1996	281	27	4,349	289
1997	259	28	4,172	286
1998	211	28	3,961	246
1999	221	25	3,913	226
2000	213	NA	3,873	209
2001	195	NA	3,770	226

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Texas - RRC District 4 Onshore				
1977	145	7	9,621	NA
1978	123	3	9,031	NA
1979	113	4	8,326	248
1980	96	3	8,130	252
1981	97	6	8,004	260
1982	87	7	8,410	289
1983	96	3	8,316	292
1984	99	3	8,525	295
1985	98	2	8,250	269
1986	87	2	8,274	281
1987	80	2	7,490	277
1988	65	1	7,029	260
1989	77	<1	7,111	260
1990	67	<1	7,475	279
1991	52	<1	7,048	273
1992	50	<1	6,739	272
1993	59	<1	7,038	278
1994	41	<1	7,547	290
1995	50	<1	7,709	287
1996	51	0	7,769	323
1997	70	<1	8,099	347
1998	40	0	8,429	363
1999	42	0	8,915	422
2000	34	NA	9,645	406
2001	32	NA	9,956	378
Texas - RRC District 5				
1977	68	0	931	NA
1978	*68	0	*1,298	NA
1979	55	1	1,155	34
1980	52	0	1,147	44
1981	49	0	1,250	49
1982	45	0	1,308	53
1983	42	0	1,448	73
1984	36	<1	1,874	74
1985	*59	1	2,058	77
1986	*53	1	2,141	86
1987	54	0	2,119	88
1988	48	0	1,996	81
1989	46	0	1,845	80
1990	47	0	1,875	81
1991	46	0	1,863	71
1992	56	0	1,747	71
1993	52	0	1,867	64
1994	49	0	2,011	59
1995	34	0	1,862	54
1996	29	0	2,079	54
1997	54	0	1,710	35
1998	40	0	1,953	35
1999	37	0	2,319	32
2000	44	NA	3,168	49
2001	29	NA	4,231	49

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Texas - RRC District 6				
1977	1,568	12	3,214	NA
1978	1,444	3	3,240	NA
1979	1,177	6	3,258	272
1980	1,115	6	4,230	321
1981	1,040	7	4,177	308
1982	947	6	4,326	278
1983	918	5	4,857	342
1984	889	5	4,703	298
1985	851	4	4,822	293
1986	750	2	4,854	277
1987	733	3	4,682	264
1988	685	5	4,961	263
1989	631	4	5,614	266
1990	605	6	5,753	247
1991	504	7	5,233	243
1992	442	7	5,317	251
1993	406	<1	5,508	248
1994	424	<1	5,381	265
1995	409	1	5,726	271
1996	359	1	5,899	290
1997	348	1	5,887	260
1998	308	0	5,949	276
1999	245	4	5,857	223
2000	213	NA	5,976	283
2001	200	NA	6,128	269

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Texas - RRC District 7B				
1977	250	NA	699	NA
1978	190	NA	743	NA
1979	208	NA	*751	64
1980	196	NA	*745	85
1981	254	NA	804	102
1982	199	NA	805	105
1983	217	NA	1,027	133
1984	218	62	794	106
1985	239	63	708	104
1986	193	64	684	109
1987	200	46	697	92
1988	205	42	704	98
1989	204	11	459	73
1990	198	8	522	76
1991	184	8	423	82
1992	163	11	455	68
1993	*171	7	477	79
1994	145	5	425	62
1995	126	4	440	70
1996	136	4	520	65
1997	155	3	478	59
1998	115	0	442	51
1999	123	0	416	36
2000	124	NA	312	34
2001	91	NA	252	29

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Texas - RRC District 7C				
1977	191	NA	2,831	NA
1978	202	NA	2,821	NA
1979	206	NA	2,842	182
1980	207	NA	2,378	135
1981	230	NA	2,503	186
1982	229	NA	2,659	199
1983	228	NA	2,568	219
1984	240	24	2,866	233
1985	243	21	2,914	256
1986	213	22	2,721	246
1987	220	25	2,708	243
1988	212	31	2,781	238
1989	247	16	3,180	238
1990	274	8	3,514	256
1991	253	9	3,291	241
1992	255	33	3,239	289
1993	199	15	3,215	273
1994	221	14	3,316	265
1995	204	8	3,107	274
1996	219	5	3,655	303
1997	227	4	3,407	327
1998	173	1	3,113	282
1999	209	3	3,178	305
2000	206	NA	3,504	434
2001	188	NA	3,320	290

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Texas - RRC District 8				
1977	2,915	127	11,728	NA
1978	2,795	102	11,093	NA
1979	2,686	88	10,077	505
1980	2,597	86	9,144	498
1981	2,503	105	8,546	537
1982	2,312	75	8,196	588
1983	2,350	99	8,156	681
1984	2,342	363	7,343	691
1985	2,333	325	7,330	665
1986	2,183	592	7,333	717
1987	2,108	399	6,999	640
1988	2,107	412	7,058	547
1989	2,151	366	6,753	554
1990	2,152	282	6,614	558
1991	2,114	328	6,133	477
1992	2,013	260	5,924	444
1993	2,057	262	5,516	439
1994	2,002	256	5,442	414
1995	2,032	187	5,441	444
1996	2,079	217	5,452	429
1997	2,100	308	5,397	459
1998	1,865	272	4,857	491
1999	2,067	279	5,434	495
2000	2,073	NA	5,388	526
2001	1,880	NA	5,255	525

Texas - RRC District 8A

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	2,626	291	1,630	NA
1978	2,439	330	1,473	NA
1979	2,371	270	1,055	351
1980	2,504	196	1,057	290
1981	2,538	247	1,071	335
1982	2,481	200	1,041	296
1983	2,366	203	966	262
1984	2,413	217	907	282
1985	2,711	147	958	283
1986	2,618	559	845	331
1987	2,735	525	876	307
1988	2,800	569	832	326
1989	2,754	377	1,074	332
1990	2,847	285	1,036	354
1991	2,763	363	1,073	333
1992	2,599	273	1,239	257
1993	2,435	264	1,043	298
1994	2,223	154	1,219	267
1995	2,233	156	941	284
1996	2,207	99	931	262
1997	2,098	131	847	290
1998	1,895	99	807	226
1999	2,089	115	1,257	223
2000	2,022	NA	1,101	217
2001	2,070	NA	1,085	251

Texas - RRC District 10

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	*120	4	7,744	NA
1978	90	0	7,406	NA
1979	97	2	6,784	375
1980	89	2	6,435	369
1981	107	2	6,229	364
1982	112	2	6,210	391
1983	105	6	5,919	413
1984	108	6	5,461	440
1985	*140	5	5,469	433
1986	*104	5	5,276	428
1987	102	2	4,962	417
1988	99	4	4,830	363
1989	97	3	4,767	342
1990	99	3	4,490	328
1991	95	2	4,589	356
1992	89	<1	4,409	336
1993	83	<1	4,040	329
1994	75	<1	4,246	326
1995	80	6	4,436	353
1996	74	4	4,391	332
1997	79	4	4,094	382
1998	62	0	4,273	354
1999	61	0	4,424	217
2000	67	NA	4,079	369
2001	55	NA	3,955	335

Texas - RRC District 9

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	260	28	724	NA
1978	190	27	*908	NA
1979	200	30	*700	79
1980	218	37	649	92
1981	225	34	953	86
1982	219	17	*1,103	119
1983	220	18	932	121
1984	214	25	900	119
1985	285	27	892	111
1986	237	19	868	119
1987	206	21	834	115
1988	202	18	783	106
1989	200	16	703	94
1990	193	12	776	104
1991	162	11	738	101
1992	176	1	670	92
1993	168	2	688	92
1994	159	<1	728	98
1995	149	<1	738	94
1996	144	0	705	119
1997	144	0	794	98
1998	111	0	734	93
1999	123	0	1,137	158
2000	131	NA	1,626	161
2001	104	NA	2,289	189

Texas - State and Federal Offshore

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	102	0	5,301	NA
1978	131	1	6,422	NA
1979	139	0	7,865	54
1980	149	0	7,510	62
1981	142	0	7,989	75
1982	141	0	7,558	84
1983	123	0	7,562	75
1984	111	0	8,452	98
1985	119	0	8,129	90
1986	103	0	8,176	109
1987	96	0	7,846	98
1988	85	0	7,802	94
1989	75	0	7,573	84
1990	77	0	7,758	87
1991	67	0	7,150	84
1992	197	0	7,344	122
1993	196	0	6,996	119
1994	209	10	6,613	105
1995	257	16	6,838	136
1996	218	5	6,288	133
1997	366	5	6,277	124
1998	311	0	5,996	147
1999	305	0	6,271	165
2000	428	NA	6,782	157
2001	417	NA	7,242	187

Texas - State Offshore

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	NA	NA	NA	NA
1978	NA	NA	NA	NA
1979	NA	NA	NA	NA
1980	NA	NA	NA	12
1981	NA	NA	NA	13
1982	NA	NA	NA	18
1983	NA	NA	NA	11
1984	NA	NA	NA	10
1985	7	0	869	10
1986	2	0	732	9
1987	8	0	627	9
1988	7	0	561	5
1989	6	0	605	6
1990	6	0	458	5
1991	7	0	475	5
1992	5	0	348	4
1993	4	0	335	4
1994	4	0	230	2
1995	8	0	313	2
1996	8	0	292	1
1997	4	0	289	3
1998	1	0	348	4
1999	3	0	418	4
2000	5	NA	398	4
2001	6	NA	467	5

Virginia

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	NA	NA	NA	NA
1978	NA	NA	NA	NA
1979	NA	NA	NA	NA
1980	NA	NA	NA	NA
1981	NA	NA	118	NA
1982	NA	NA	122	NA
1983	NA	NA	175	NA
1984	NA	NA	216	NA
1985	NA	NA	235	NA
1986	NA	NA	253	NA
1987	NA	NA	248	NA
1988	NA	NA	230	NA
1989	NA	NA	217	NA
1990	NA	NA	138	NA
1991	NA	NA	225	NA
1992	NA	NA	904	NA
1993	NA	NA	1,322	NA
1994	NA	NA	1,833	NA
1995	NA	NA	1,836	NA
1996	NA	NA	1,930	NA
1997	NA	NA	2,446	NA
1998	NA	NA	1,973	NA
1999	NA	NA	2,017	NA
2000	NA	NA	1,704	NA
2001	NA	NA	1,752	NA

Utah

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	252	6	877	NA
1978	188	7	925	NA
1979	201	NA	948	59
1980	198	NA	1,201	127
1981	190	NA	1,912	277
1982	173	NA	2,161	(h)
1983	187	NA	2,333	(h)
1984	172	8	2,080	(h)
1985	276	13	1,999	(h)
1986	269	14	1,895	(h)
1987	284	22	1,947	(h)
1988	260	21	1,298	(h)
1989	246	50	1,507	(h)
1990	249	44	1,510	(h)
1991	233	66	1,702	(h)
1992	217	65	1,830	(h)
1993	228	54	2,040	(h)
1994	231	70	1,789	(h)
1995	216	50	1,580	(h)
1996	237	46	1,633	(h)
1997	234	70	1,839	(h)
1998	201	56	2,388	(h)
1999	268	42	3,213	(h)
2000	283	NA	4,235	(h)
2001	271	NA	4,579	(h)

[h]Included with Wyoming.

West Virginia

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	21	0	1,567	NA
1978	*30	0	1,634	NA
1979	*48	0	1,558	74
1980	30	8	*2,422	97
1981	30	8	1,834	85
1982	48	8	2,148	79
1983	49	0	2,194	91
1984	*76	0	2,136	80
1985	40	0	2,058	85
1986	37	0	2,148	87
1987	34	0	2,242	87
1988	33	0	2,306	92
1989	30	0	2,201	100
1990	*31	0	2,207	86
1991	26	0	2,528	103
1992	27	0	2,356	97
1993	24	0	2,439	108
1994	25	0	2,565	93
1995	28	0	2,499	62
1996	25	0	2,703	61
1997	26	0	2,846	71
1998	17	0	2,868	72
1999	21	0	2,936	73
2000	12	NA	2,900	105
2001	8	NA	2,678	106

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Wyoming				
1977	851	31	6,305	NA
1978	845	36	7,211	NA
1979	841	40	7,526	285
1980	928	28	9,100	341
1981	840	53	9,307	384
1982	856	58	9,758	[i]681
1983	957	61	10,227	[i]789
1984	954	71	10,482	[i]860
1985	951	18	10,617	[i]949
1986	849	126	9,756	[i]950
1987	854	27	10,023	[i]924
1988	815	35	10,308	[i]1,154
1989	825	46	10,744	[i]896
1990	794	42	9,944	[i]812
1991	757	24	9,941	[i]748
1992	689	18	10,826	[i]660
1993	624	12	10,933	[i]600
1994	565	13	10,879	[i]564
1995	605	12	12,166	[i]593
1996	603	14	12,320	[i]727
1997	627	11	13,562	[i]761
1998	547	10	13,650	[i]675
1999	590	5	14,226	[i]615
2000	561	NA	16,158	[i]947
2001	489	NA	18,398	[i]897

[i]Utah and Wyoming are combined.

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Federal Offshore - Pacific (California)				
1985	991	NA	1,119	12
1986	974	2	1,325	15
1987	1,037	2	1,452	17
1988	1,024	0	1,552	21
1989	987	0	1,496	25
1990	962	0	1,454	18
1991	785	0	1,162	16
1992	734	0	1,118	20
1993	673	0	1,099	25
1994	653	0	1,170	21
1995	571	0	1,265	25
1996	518	0	1,244	23
1997	528	0	544	14
1998	468	0	480	12
1999	553	0	536	4
2000	596	NA	576	4
2001	547	NA	540	9

Note: Data not tabulated for years 1977-1984.

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Federal Offshore - Total				
1985	2,862	11	[j]34,492	702
1986	2,715	16	[j]34,223	681
1987	2,639	21	[j]31,931	638
1988	2,629	21	[j]32,264	622
1989	2,747	32	[j]32,651	678
1990	2,805	49	31,433	619
1991	2,620	18	29,448	640
1992	2,569	31	27,767	610
1993	2,745	18	27,143	630
1994	2,780	53	28,388	624
1995	3,089	62	29,182	655
1996	3,085	45	29,096	776
1997	3,477	41	28,466	920
1998	3,261	7	26,902	931
1999	3,297	5	25,987	998
2000	3,770	NA	26,748	1,078
2001	4,835	NA	27,036	976

[j]Includes State offshore Alabama.
Note: Data not tabulated for years 1977-1984.

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Federal Offshore - Gulf of Mexico (Louisiana)				
1985	1,759	11	[f]26,113	610
1986	1,640	14	[f]25,454	566
1987	1,514	19	[f]23,260	532
1988	1,527	21	[f]23,471	512
1989	1,691	32	[f]24,187	575
1990	1,772	49	[k]22,679	[k]519
1991	1,775	18	[k]21,611	[k]545
1992	1,643	31	[k]19,653	[k]472
1993	1,880	18	[k]19,383	[k]490
1994	1,922	43	[k]20,835	[k]500
1995	2,269	46	[k]21,392	[k]496
1996	2,357	40	[k]21,856	[k]621
1997	2,587	36	[k]21,934	[k]785
1998	2,483	7	[k]20,774	[k]776
1999	2,442	5	[k]19,598	[k]833
2000	2,751	NA	[k]19,788	[k]921
2001	3,877	NA	[k]19,721	[k]785

[f]Includes State and Federal offshore Alabama.
[k]Includes Federal offshore Alabama.
Note: Data not tabulated for years 1977-1984.

Federal Offshore - Gulf of Mexico (Texas)

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1985	112	0	7,260	80
1986	101	0	7,444	100
1987	88	0	7,219	89
1988	78	0	7,241	89
1989	69	0	6,968	78
1990	71	0	7,300	82
1991	60	0	6,675	79
1992	192	0	6,996	118
1993	192	0	6,661	115
1994	205	10	6,383	103
1995	249	16	6,525	134
1996	210	5	5,996	132
1997	362	5	5,988	121
1998	310	0	5,648	143
1999	302	0	5,853	161
2000	423	NA	6,384	153
2001	411	NA	6,775	182

Note: Data not tabulated for years 1977-1984.

Miscellaneous

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	23	0	102	NA
1978	24	0	109	NA
1979	22	1	*153	2
1980	*38	0	176	3
1981	40	7	191	21
1982	33	0	69	4
1983	30	8	78	5
1984	23	0	75	5
1985	35	0	76	3
1986	33	0	133	2
1987	30	0	65	4
1988	34	0	83	5
1989	39	0	83	5
1990	43	1	*70	3
1991	42	5	75	8
1992	29	0	92	8
1993	34	0	94	8
1994	20	0	65	8
1995	*22	0	*69	7
1996	18	0	67	7
1997	19	0	*43	9
1998	14	0	38	8
1999	15	0	66	10
2000	17	NA	42	7
2001	21	NA	82	7

Note: States included may vary for different report years and hydrocarbon types.

Lower 48 States

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	23,367	2,168	175,170	NA
1978	21,971	1,964	175,988	NA
1979	20,935	1,878	168,738	6,592
1980	21,054	1,622	165,639	6,717
1981	21,143	1,594	168,693	7,058
1982	20,452	1,478	166,522	7,212
1983	20,428	1,548	165,964	7,893
1984	20,883	1,956	162,987	7,624
1985	21,360	1,662	159,522	7,561
1986	20,014	2,597	158,922	7,784
1987	19,878	3,084	153,986	7,729
1988	19,866	3,169	158,946	7,837
1989	19,827	2,999	158,177	7,389
1990	19,730	2,514	160,046	7,246
1991	18,599	2,810	157,509	7,104
1992	17,723	2,451	155,377	7,104
1993	17,182	2,292	152,508	6,901
1994	16,690	2,129	154,104	6,869
1995	16,771	2,087	155,649	7,093
1996	16,743	1,924	157,180	7,486
1997	17,385	2,375	156,661	7,342
1998	15,982	2,328	154,114	7,204
1999	16,865	2,400	157,672	7,515
2000	17,184	NA	168,190	8,068
2001	17,595	NA	174,660	7,588

U.S. Total

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
1977	31,780	3,014	207,413	NA
1978	31,355	2,362	208,033	NA
1979	29,810	2,276	200,997	6,615
1980	29,805	1,622	199,021	6,728
1981	29,426	1,594	201,730	7,068
1982	27,858	1,478	201,512	7,221
1983	27,735	2,124	200,247	7,901
1984	28,446	2,325	197,463	7,643
1985	28,416	2,041	193,369	7,944
1986	26,889	3,499	191,586	8,165
1987	27,256	3,649	187,211	8,147
1988	26,825	3,600	168,024	8,238
1989	26,501	3,749	167,116	7,769
1990	26,254	3,483	169,346	7,586
1991	24,682	4,266	167,062	7,464
1992	23,745	3,782	165,015	7,451
1993	22,957	3,453	162,415	7,222
1994	22,457	3,151	163,837	7,170
1995	22,351	2,669	165,146	7,399
1996	22,017	2,876	166,474	7,823
1997	22,546	3,207	167,223	7,973
1998	21,034	3,160	164,041	7,524
1999	21,765	2,865	167,406	7,906
2000	22,045	NA	177,427	8,345
2001	22,446	NA	183,460	7,993

Table D1. U.S. Proved Reserves of Crude Oil, 1976–2001
(Million Barrels of 42 U.S. Gallons)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1976	–	–	–	–	–	–	–	–	–	[e]33,502	–
1977	[f]-40	386	346	NA	496	168	130	794	2,862	31,780	-1,722
1978	366	1,390	1,756	NA	444	267	116	827	3,008	31,355	-425
1979	337	437	774	NA	424	108	104	636	2,955	29,810	-1,545
1980	219	1,889	2,108	NA	572	143	147	862	2,975	29,805	-5
1981	138	1,271	1,409	NA	750	254	157	1,161	2,949	29,426	-379
1982	-83	434	351	NA	634	204	193	1,031	2,950	27,858	-1,568
1983	462	1,511	1,973	NA	629	105	190	924	3,020	27,735	-123
1984	159	2,445	2,604	NA	744	242	158	1,144	3,037	28,446	711
1985	429	1,598	2,027	NA	742	84	169	995	3,052	28,416	-30
1986	57	855	912	NA	405	48	81	534	2,973	26,889	-1,527
1987	233	2,316	2,549	NA	484	96	111	691	2,873	27,256	367
1988	364	1,463	1,827	NA	355	71	127	553	2,811	26,825	-431
1989	213	1,333	1,546	NA	514	112	90	716	2,586	26,501	-324
1990	86	1,483	1,569	NA	456	98	135	689	2,505	26,254	-247
1991	163	223	386	NA	365	97	92	554	2,512	24,682	-1,572
1992	290	735	1,025	NA	391	8	85	484	2,446	23,745	-937
1993	271	495	766	NA	356	319	110	785	2,339	22,957	-788
1994	189	1,007	1,196	NA	397	64	111	572	2,268	22,457	-500
1995	122	1,028	1,150	NA	500	114	343	957	2,213	22,351	-106
1996	175	737	912	NA	543	243	141	927	2,173	22,017	-334
1997	520	914	1,434	NA	477	637	119	1,233	2,138	22,546	529
1998	-638	518	-120	NA	327	152	120	599	1,991	21,034	-1,512
1999	139	1,819	1,958	NA	259	321	145	725	1,952	21,765	731
2000	143	746	889	-20	766	276	249	1,291	1,880	22,045	280
2001	-4	-158	-162	-87	866	1,407	292	2,565	1,915	22,446	401

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. 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 contained in the *Petroleum Supply Annual*, DOE/EIA-0340.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1977 through 2001 annual reports, DOE/EIA-0216.{1-24}

Table D2. U.S. Lower 48 Proved Reserves of Crude Oil, 1976–2001
(Million Barrels of 42 U.S. Gallons)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1976	–	–	–	–	–	–	–	–	–	[e]24,928	–
1977	[f]–40	383	343	NA	496	168	130	794	2,698	23,367	-1,561
1978	-48	509	461	NA	444	142	116	702	2,559	21,971	-1,396
1979	342	429	771	NA	424	108	104	636	2,443	20,935	-1,036
1980	210	1,524	1,734	NA	479	143	147	769	2,384	21,054	119
1981	276	1,009	1,285	NA	750	254	157	1,161	2,357	21,143	89
1982	-82	684	602	NA	633	204	193	1,030	2,323	20,452	-691
1983	462	949	1,411	NA	625	105	190	920	2,355	20,428	-24
1984	160	1,587	1,747	NA	742	207	158	1,107	2,399	20,883	455
1985	361	1,667	2,028	NA	581	84	169	834	2,385	21,360	477
1986	70	359	429	NA	399	48	81	528	2,303	20,014	-1,346
1987	233	1,353	1,586	NA	294	38	101	433	2,155	19,878	-136
1988	359	1,181	1,540	NA	340	43	127	510	2,062	19,866	-12
1989	214	1,113	1,327	NA	342	108	87	537	1,903	19,827	-39
1990	151	1,001	1,152	NA	371	98	135	604	1,853	19,730	-97
1991	164	50	214	NA	327	97	87	511	1,856	18,599	-1,131
1992	297	277	574	NA	279	8	84	371	1,821	17,723	-876
1993	250	198	448	NA	343	319	109	771	1,760	17,182	-541
1994	187	527	714	NA	316	64	111	491	1,697	16,690	-492
1995	117	756	873	NA	434	114	333	881	1,673	16,771	81
1996	172	728	900	NA	479	115	141	735	1,663	16,743	-28
1997	514	695	1,209	NA	459	520	119	1,098	1,665	17,385	642
1998	-639	315	-324	NA	299	56	120	475	1,554	15,982	-1,403
1999	138	1,669	1,807	NA	253	242	145	640	1,564	16,865	883
2000	144	622	766	132	540	276	157	973	1,552	17,184	319
2001	-5	-71	-76	-87	716	1,126	292	2,134	1,560	17,595	411

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. 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 contained in the *Petroleum Supply Annual*, DOE/EIA-0340.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1977 through 2001 annual reports, DOE/EIA-0216.{1-24}

Table D3. U.S. Proved Reserves of Dry Natural Gas, 1976–2001
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1976	–	–	–	–	–	–	–	–	–	[e]213,278	–
1977	[f]–20	-1,605	-1,625	NA	8,129	3,173	3,301	14,603	18,843	207,413	-5,865
1978	2,429	-1,025	1,404	NA	9,582	3,860	4,579	18,021	18,805	208,033	620
1979	-2,264	-219	-2,483	NA	8,950	3,188	2,566	14,704	19,257	200,997	-7,036
1980	1,201	1,049	2,250	NA	9,357	2,539	2,577	14,473	18,699	199,021	-1,976
1981	1,627	2,599	4,226	NA	10,491	3,731	2,998	17,220	18,737	201,730	2,709
1982	2,378	455	2,833	NA	8,349	2,687	3,419	14,455	17,506	201,512	-218
1983	3,090	-15	3,075	NA	6,909	1,574	2,965	11,448	15,788	200,247	-1,265
1984	-2,241	3,129	888	NA	8,299	2,536	2,686	13,521	17,193	197,463	-2,784
1985	-1,708	2,471	763	NA	7,169	999	2,960	11,128	15,985	193,369	-4,094
1986	1,320	3,572	4,892	NA	6,065	1,099	1,771	8,935	15,610	191,586	-1,783
1987	1,268	3,296	4,564	NA	4,587	1,089	1,499	7,175	16,114	187,211	-4,375
1988	2,193	-15,060	-12,867	NA	6,803	1,638	1,909	10,350	16,670	168,024	-19,187
1989	3,013	3,030	6,043	NA	6,339	1,450	2,243	10,032	16,983	167,116	-908
1990	1,557	5,538	7,095	NA	7,952	2,004	2,412	12,368	17,233	169,346	2,230
1991	2,960	4,416	7,376	NA	5,090	848	1,604	7,542	17,202	167,062	-2,284
1992	2,235	6,093	8,328	NA	4,675	649	1,724	7,048	17,423	165,015	-2,047
1993	972	5,349	6,321	NA	6,103	899	1,866	8,868	17,789	162,415	-2,600
1994	1,945	5,484	7,429	NA	6,941	1,894	3,480	12,315	18,322	163,837	1,422
1995	580	7,734	8,314	NA	6,843	1,666	2,452	10,961	17,966	165,146	1,309
1996	3,785	4,086	7,871	NA	7,757	1,451	3,110	12,318	18,861	166,474	1,328
1997	-590	4,902	4,312	NA	10,585	2,681	2,382	15,648	19,211	167,223	749
1998	-1,635	5,740	4,105	NA	8,197	1,074	2,162	11,433	18,720	164,041	-3,182
1999	982	10,504	11,486	NA	7,043	1,568	2,196	10,807	18,928	167,406	3,365
2000	-891	6,962	6,071	4,031	14,787	1,983	2,368	19,138	19,219	177,427	10,021
2001	2,742	-2,318	424	2,630	16,380	3,578	2,800	22,758	19,779	183,460	6,033

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
[g]An unusually large revision decrease to North Slope dry natural gas reserves was made in 1988. It recognizes some 24.6 trillion cubic feet of downward revisions reported during the last few years by operators because of economic and market conditions. EIA in previous years carried these reserves in the proved category.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production". They may differ from the official Energy Information Administration production data for natural gas contained in the *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1977 through 2001 annual reports, DOE/EIA-0216.{1-24}

Table D4. U.S. Lower 48 Proved Reserves of Dry Natural Gas, 1976–2001

(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1976	–	–	–	–	–	–	–	–	–	[e]180,838	–
1977	[f]–21	-1,540	-1,561	NA	8,056	3,173	3,301	14,530	18,637	175,170	-5,668
1978	2,446	-758	1,688	NA	9,582	3,860	4,277	17,719	18,589	175,988	818
1979	-2,202	-707	-2,909	NA	8,949	3,173	2,566	14,688	19,029	168,738	-7,250
1980	1,163	62	1,225	NA	9,046	2,539	2,577	14,162	18,486	165,639	-3,099
1981	1,840	2,506	4,346	NA	10,485	3,731	2,994	17,210	18,502	168,693	3,054
1982	2,367	-1,748	619	NA	8,349	2,687	3,419	14,455	17,245	166,522	-2,171
1983	3,089	421	3,510	NA	6,908	1,574	2,965	11,447	15,515	165,964	-558
1984	-2,245	2,617	372	NA	8,298	2,536	2,686	13,520	16,869	162,987	-2,977
1985	-1,349	2,500	1,151	NA	7,098	999	2,960	11,057	15,673	159,522	-3,465
1986	1,618	4,144	5,762	NA	6,064	1,099	1,761	8,924	15,286	158,922	-600
1987	1,066	2,645	3,711	NA	4,542	1,077	1,499	7,118	15,765	153,986	-4,936
1988	2,017	8,895	10,912	NA	6,771	1,638	1,909	10,318	16,270	158,946	4,960
1989	2,997	2,939	5,936	NA	6,184	1,450	2,243	9,877	16,582	158,177	-769
1990	1,877	4,572	6,449	NA	7,898	2,004	2,412	12,314	16,894	160,046	1,869
1991	2,967	3,860	6,827	NA	5,074	848	1,563	7,485	16,849	157,509	-2,537
1992	1,946	5,937	7,883	NA	4,621	649	1,724	6,994	17,009	155,377	-2,132
1993	915	4,779	5,694	NA	6,076	899	1,858	8,833	17,396	152,508	-2,869
1994	1,896	5,289	7,185	NA	6,936	1,894	3,480	12,310	17,899	154,104	1,596
1995	973	7,223	8,196	NA	6,801	1,666	2,452	10,919	17,570	155,649	1,545
1996	3,640	4,055	7,695	NA	7,751	1,390	3,110	12,251	18,415	157,180	1,531
1997	-609	3,192	2,583	NA	10,571	2,681	2,382	15,634	18,736	156,661	-519
1998	-1,463	5,696	4,233	NA	8,195	1,070	2,162	11,427	18,207	154,114	-2,547
1999	849	10,452	11,301	NA	7,041	1,512	2,173	10,726	18,469	157,672	3,558
2000	-914	8,755	7,841	4,214	12,838	1,983	2,355	17,176	18,713	168,190	10,518
2001	2,753	-2,216	537	2,630	16,321	3,504	2,796	21,621	19,318	174,660	6,470

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production”. They may differ from the official Energy Information Administration production data for natural gas contained in the *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1977 through 2001 annual reports, DOE/EIA-0216.{1-24}

Table D5. U.S. Proved Reserves of Wet Natural Gas, After Lease Separation, 1978–2001
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1978	–	–	–	–	–	–	–	–	–	[e]208,033	–
1979	5,356	-223	5,133	NA	9,332	3,279	2,637	15,248	20,079	208,335	302
1980	1,253	1,137	2,390	NA	9,757	2,629	2,648	15,034	19,500	206,259	-2,076
1981	2,057	2,743	4,800	NA	10,979	3,870	3,080	17,929	19,554	209,434	3,175
1982	2,598	455	3,053	NA	8,754	2,785	3,520	15,059	18,292	209,254	-180
1983	4,363	57	4,420	NA	7,263	1,628	3,071	11,962	16,590	209,046	-208
1984	-2,413	3,333	920	NA	8,688	2,584	2,778	14,050	18,032	205,984	-3,062
1985	-1,299	2,687	1,388	NA	7,535	1,040	3,053	11,628	16,798	202,202	-3,782
1986	2,137	3,835	5,972	NA	6,359	1,122	1,855	9,336	16,401	201,109	-1,093
1987	1,199	3,522	4,721	NA	4,818	1,128	1,556	7,502	16,904	196,428	-4,681
1988	2,180	-14,931	[f]-12,751	NA	7,132	1,677	1,979	10,788	17,466	[f]176,999	–19,429
1989	2,537	3,220	5,757	NA	6,623	1,488	2,313	10,424	17,752	175,428	-1,571
1990	1,494	5,837	7,331	NA	8,287	2,041	2,492	12,820	18,003	177,576	2,148
1991	3,368	4,569	7,937	NA	5,298	871	1,655	7,824	18,012	175,325	-2,251
1992	2,543	6,374	8,917	NA	4,895	668	1,773	7,336	18,269	173,309	-2,016
1993	1,048	5,541	6,589	NA	6,376	927	1,930	9,233	18,641	170,490	-2,819
1994	1,977	5,836	7,813	NA	7,299	1,941	3,606	12,846	19,210	171,939	1,449
1995	889	8,091	8,980	NA	7,204	1,709	2,518	11,431	18,874	173,476	1,537
1996	4,288	4,277	8,565	NA	8,189	1,491	3,209	12,889	19,783	175,147	1,671
1997	-730	5,057	4,327	NA	11,179	2,747	2,455	16,381	20,134	175,721	574
1998	-1,624	5,982	4,358	NA	8,630	1,116	2,240	11,986	19,622	172,433	-3,288
1999	1,102	11,182	12,284	NA	7,401	1,622	2,265	11,288	19,856	176,159	3,726
2000	-1,295	7,456	6,161	4,286	15,550	2,055	2,463	20,068	20,164	186,510	10,351
2001	1,849	-2,438	-589	2,715	17,183	3,668	2,898	23,749	20,642	191,743	5,233

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]An unusually large revision decrease to North Slope wet natural gas reserves was made in 1988. It recognizes some 25 trillion cubic feet of downward revisions reported during the last few years by operators because of economic and market conditions. EIA in previous years carried these reserves in the proved category.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. 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 natural gas contained in the *Natural Gas Annual,* DOE/EIA-013.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1979 through 2001 annual reports, DOE/EIA-0216.{3-24}

Table D6. U.S. Lower 48 Proved Reserves of Wet Natural Gas, After Lease Separation, 1978–2001
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1978	–	–	–	–	–	–	–	–	–	[e]175,988	–
1979	5,402	-711	4,691	NA	9,331	3,264	2,637	15,232	19,851	176,060	72
1980	1,218	150	1,368	NA	9,446	2,629	2,648	14,723	19,287	172,864	-3,196
1981	2,270	2,650	4,920	NA	10,973	3,870	3,076	17,919	19,318	176,385	3,521
1982	2,586	-1,748	838	NA	8,754	2,785	3,520	15,059	18,030	174,252	-2,133
1983	4,366	493	4,859	NA	7,262	1,628	3,071	11,961	16,317	174,755	503
1984	-2,409	2,821	412	NA	8,687	2,584	2,778	14,049	17,708	171,508	-3,247
1985	-1,313	2,713	1,400	NA	7,463	1,040	3,053	11,556	16,485	167,979	-3,529
1986	2,114	4,410	6,524	NA	6,357	1,122	1,845	9,324	16,073	167,754	-225
1987	1,200	2,868	4,068	NA	4,772	1,116	1,556	7,444	16,553	162,713	-5,041
1988	2,025	9,390	11,415	NA	7,099	1,677	1,979	10,755	17,063	167,820	5,107
1989	2,545	3,128	5,673	NA	6,467	1,485	2,313	10,265	17,349	166,409	-1,411
1990	1,811	4,859	6,670	NA	8,232	2,041	2,492	12,765	17,661	168,183	1,774
1991	3,367	4,013	7,380	NA	5,281	871	1,614	7,766	17,657	165,672	-2,511
1992	2,265	6,217	8,482	NA	4,840	668	1,773	7,281	17,851	163,584	-2,088
1993	996	4,971	5,967	NA	6,349	927	1,922	9,198	18,245	160,504	-3,080
1994	1,924	5,613	7,537	NA	7,294	1,941	3,606	12,841	18,756	162,126	1,622
1995	1,304	7,525	8,829	NA	7,162	1,709	2,518	11,389	18,443	163,901	1,775
1996	4,219	4,246	8,465	NA	8,183	1,430	3,209	12,822	19,337	165,851	1,950
1997	-835	3,322	2,487	NA	11,165	2,747	2,455	16,367	19,657	165,048	-803
1998	-1,461	5,937	4,476	NA	8,628	1,112	2,240	11,980	19,104	162,400	-2,648
1999	958	11,130	12,088	NA	7,399	1,566	2,242	11,207	19,391	166,304	3,904
2000	-1,294	9,273	7,979	4,471	13,574	2,055	2,450	18,079	19,654	177,179	10,875
2001	1,849	-2,336	-487	2,715	17,123	3,593	2,894	23,610	20,175	182,842	5,663

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. 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 natural gas contained in the *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1979 through 2001 annual reports, DOE/EIA-0216.{3-24}

Table D7. U.S. Proved Reserves of Natural Gas Liquids, 1978–2001
(Million Barrels of 42 U.S. Gallons)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1978	–	–	–	–	–	–	–	–	–	[e]6,772	–
1979	[f]64	-49	15	NA	364	94	97	555	727	6,615	-157
1980	153	104	257	NA	418	90	79	587	731	6,728	113
1981	231	86	317	NA	542	131	91	764	741	7,068	340
1982	299	-21	278	NA	375	112	109	596	721	7,221	153
1983	849	66	915	NA	321	70	99	490	725	7,901	680
1984	-123	142	19	NA	348	55	96	499	776	7,643	-258
1985	426	162	588	NA	337	44	85	466	753	7,944	301
1986	367	223	590	NA	263	34	72	369	738	8,165	221
1987	231	191	422	NA	213	39	55	307	747	8,147	-18
1988	11	453	464	NA	268	41	72	381	754	8,238	91
1989	-277	123	-154	NA	259	83	74	416	731	7,769	-469
1990	-83	221	138	NA	299	39	73	411	732	7,586	-183
1991	233	130	363	NA	189	25	55	269	754	7,464	-122
1992	225	261	486	NA	190	20	64	274	773	7,451	-13
1993	102	124	226	NA	245	24	64	333	788	7,222	-229
1994	43	197	240	NA	314	54	131	499	791	7,170	-52
1995	192	277	469	NA	432	52	67	551	791	7,399	229
1996	474	175	649	NA	451	65	109	625	850	7,823	424
1997	-14	289	275	NA	535	114	90	739	864	7,973	150
1998	-361	208	-153	NA	383	66	88	537	833	7,524	-449
1999	99	727	826	NA	313	51	88	452	896	7,906	382
2000	-83	459	376	145	645	92	102	839	921	8,345	439
2001	-429	-132	-561	102	717	138	142	997	890	7,993	-352

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production”. They may differ from the official Energy Information Administration production data for natural gas liquids contained in the *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1979 through 2001 annual reports, DOE/EIA-0216.{3-24}

Table D8. U.S. Lower 48 Proved Reserves of Natural Gas Liquids, 1978–2001
(Million Barrels of 42 U.S. Gallons)

Year	Adjustments[a] (1)	Net Revisions (2)	Revisions[b] and Adjustments (3)	Net of Sales and Acquisitions (4)	Extensions (5)	New Field Discoveries (6)	New Reservoir Discoveries in Old Fields (7)	Total[c] Discoveries (8)	Estimated Production (9)	Proved[d] Reserves 12/31 (10)	Change from Prior Year (11)
1978	–	–	–	–	–	–	–	–	–	[e]6,749	–
1979	[f]63	-49	14	NA	364	94	97	555	726	6,592	-157
1980	165	104	269	NA	418	90	79	587	731	6,717	125
1981	233	85	318	NA	542	131	91	764	741	7,058	341
1982	300	-21	279	NA	375	112	109	596	721	7,212	154
1983	850	66	916	NA	321	70	99	490	725	7,893	681
1984	-115	123	8	NA	348	55	96	499	776	7,624	-269
1985	70	152	222	NA	334	44	85	463	748	7,561	-63
1986	363	226	589	NA	263	34	72	369	735	7,784	223
1987	179	191	370	NA	212	39	55	306	731	7,729	-55
1988	10	452	462	NA	267	41	72	380	734	7,837	108
1989	-273	123	-150	NA	259	83	74	416	714	7,389	-448
1990	-60	221	161	NA	298	39	73	410	714	7,246	-143
1991	183	138	321	NA	187	25	55	267	730	7,104	-142
1992	225	254	479	NA	183	20	64	267	746	7,104	0
1993	101	124	225	NA	245	24	64	333	761	6,901	-203
1994	38	196	234	NA	314	54	131	499	765	6,869	-32
1995	204	230	434	NA	432	52	67	551	761	7,093	224
1996	417	178	595	NA	450	56	109	615	817	7,486	393
1997	-107	55	-52	NA	533	114	90	737	829	7,342	-144
1998	-74	208	134	NA	383	66	88	537	809	7,204	-138
1999	102	617	719	NA	304	50	86	440	848	7,515	311
2000	9	459	468	145	645	92	102	839	899	8,068	553
2001	-429	-280	-709	-102	717	138	142	997	870	7,588	-480

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” and Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production”. They may differ from the official Energy Information Administration production natural gas liquids contained in the *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1979 through 2001 annual reports, DOE/EIA-0216.{3-24}

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2001

Year	Gulf of Mexico Total	Gulf of Mexico Louisiana[a]	Gulf of Mexico Texas	Depth Greater than 200 meters	Depth Less than 200 meters	Deepwater Percentage
	Crude Oil (million barrels of 42 U.S. gallons)					
Production						
1992	267	253	14	46	221	17.2
1993	266	252	14	46	220	17.3
1994	265	245	20	53	212	20.1
1995	292	262	30	77	215	26.4
1996	303	265	38	90	213	29.7
1997	342	298	44	123	219	36.0
1998	372	336	36	171	201	46.0
1999	421	376	45	228	193	54.2
2000	419	381	38	234	185	55.8
2001	459	417	42	286	173	62.2
Reserves						
1992	1,835	1,643	192	557	1,278	30.4
1993	2,072	1,880	192	824	1,248	39.8
1994	2,127	1,922	205	877	1,250	41.2
1995	2,518	2,269	249	1,241	1,277	49.3
1996	2,567	2,357	210	1,311	1,256	51.1
1997	2,949	2,587	362	1,682	1,267	57.0
1998	2,793	2,483	310	1,611	1,182	57.8
1999	2,744	2,442	302	1,626	1,118	59.3
2000	3,174	2,751	423	2,021	1,153	63.7
2001	4,288	3,877	411	3,208	1,080	74.8
	Natural Gas, Wet After Lease Separation (billion cubic feet at 14.73 psia and 60° Fahrenheit)					
Production						
1992	4,576	3,292	1,284	166	4,410	3.6
1993	4,651	3,383	1,268	229	4,422	4.9
1994	4,797	3,505	1,292	294	4,503	6.1
1995	4,679	3,421	1,258	354	4,315	7.8
1996	5,045	3,752	1,293	549	4,496	10.9
1997	5,230	3,984	1,246	577	4,653	11.0
1998	4,967	3,817	1,150	724	4,243	14.6
1999	5,000	3,829	1,171	1,124	3,876	22.5
2000	4,901	3,747	1,154	1,196	3,705	24.4
2001	5,027	3,843	1,184	1,367	3,660	27.2
Reserves						
1992	27,050	20,006	7,044	3,273	23,777	12.1
1993	26,463	19,751	6,712	3,495	22,968	13.2
1994	27,626	21,208	6,418	4,772	22,854	17.3
1995	28,229	21,664	6,565	5,811	22,418	20.6
1996	28,153	22,119	6,034	6,389	21,764	22.7
1997	28,455	22,428	6,027	7,491	20,964	26.3
1998	26,937	21,261	5,676	7,575	19,362	28.1
1999	26,062	20,172	5,890	7,726	18,336	29.6
2000	26,891	20,466	6,425	8,731	18,160	32.5
2001	27,100	20,290	6,810	11,229	15,871	41.4

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2000 (continued)

Year	Gulf of Mexico Total	Gulf of Mexico Louisiana[a]	Gulf of Mexico Texas	Depth Greater than 200 meters	Depth Less than 200 meters	Deepwater Percentage
	Natural Gas Liquids (million barrels of 42 U.S. gallons)					
Production						
1992	91	76	15	4	87	4.4
1993	97	80	17	6	91	6.2
1994	98	83	15	6	92	6.1
1995	85	71	14	12	73	14.1
1996	101	84	17	13	88	12.9
1997	140	123	17	17	123	12.1
1998	139	120	19	26	113	18.7
1999	167	136	31	51	116	30.5
2000	199	164	35	84	115	42.2
2001	192	147	45	96	96	50.0
Reserves						
1992	590	472	118	91	499	15.4
1993	605	490	115	97	508	16.0
1994	603	500	103	110	493	18.2
1995	630	496	134	294	336	46.7
1996	753	621	132	300	456	39.8
1997	906	785	121	349	557	38.5
1998	919	776	143	387	532	42.1
1999	994	833	161	411	583	41.3
2000	1,074	921	153	468	606	43.6
2001	967	785	182	443	524	45.8

Year	Total	Louisiana[a]	Texas	Greater than 200 meters	Less than 200 meters	Deepwater Percentage
	Dry Natural Gas (billion cubic feet at 14.73 psia and 60° Fahrenheit)					
Production						
1992	4,508	3,233	1,275	162	4,346	3.6
1993	4,577	3,319	1,258	224	4,353	4.9
1994	4,725	3,440	1,285	288	4,437	6.1
1995	4,627	3,376	1,251	361	4,266	7.8
1996	4,991	3,706	1,285	544	4,447	10.9
1997	5,133	3,895	1,238	565	4,568	11.0
1998	4,872	3,728	1,144	711	4,161	14.6
1999	4,885	3,721	1,164	1,099	3,786	22.5
2000	4,773	3,626	1,147	1,165	3,608	24.4
2001	4,913	3,735	1,178	1,334	3,578	27.4
Reserves						
1992	26,649	19,653	6,996	3,225	23,424	12.1
1993	26,044	19,383	6,661	3,438	22,606	13.2
1994	27,218	20,835	6,383	4,709	22,509	17.3
1995	27,917	21,392	6,525	5,751	22,166	20.6
1996	27,852	21,856	5,996	6,322	21,530	22.7
1997	27,922	21,934	5,988	7,343	20,579	26.3
1998	26,422	20,774	5,648	7,425	18,997	28.1
1999	25,451	19,598	5,853	7,533	17,918	29.6
2000	26,172	19,788	6,384	8,506	17,666	32.5
2001	26,456	19,721	6,735	10,943	15,513	41.4

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2000 (continued)

Year	Gulf of Mexico Total	Gulf of Mexico Louisiana[a]	Gulf of Mexico Texas	Depth Greater than 200 meters	Depth Less than 200 meters	Deepwater Percentage
	Lease Condensate (million barrels of 42 U.S. gallons)					
Production						
1992	44	35	9	2	42	4.4
1993	46	35	11	3	43	6.2
1994	47	37	10	3	44	6.1
1995	49	40	9	7	42	14.1
1996	60	49	11	8	52	12.9
1997	70	59	11	8	62	12.1
1998	72	57	15	13	59	18.7
1999	87	61	26	27	60	30.5
2000	106	76	30	45	61	42.2
2001	101	60	41	51	50	50.2
Reserves						
1992	310	226	84	48	262	15.4
1993	316	235	81	51	265	16.0
1994	311	233	78	57	254	18.2
1995	412	305	107	192	220	46.7
1996	527	422	105	210	317	39.8
1997	527	433	94	203	324	38.5
1998	557	435	122	234	323	42.1
1999	567	430	137	234	333	41.3
2000	560	433	127	244	316	43.6
2001	482	325	157	221	261	45.8

[a]Includes Federal Offshore Alabama.
[b]Revisions result from reclassing all field depths to match Minerals Management Service assignments.
Source: Based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves."

Table D10. 2001 Reported Reserves in Nonproducing Reservoirs for Crude Oil, Lease Condensate, and Natural Gas[a]

State and Subdivision	Crude Oil (mbbls)	Lease Condensate (mbbls)	Nonassociated Gas (bcf)	Associated Dissolved Gas (bcf)	Total Gas (bcf)
Alaska	389	0	584	37	620
Lower 48 States	**4,806**	**562**	**45,737**	**6,591**	**52,328**
Alabama	4	4	200	8	208
Arkansas	4	0	247	9	257
California	508	0	301	217	518
Coastal Region Onshore	148	0	0	54	54
Los Angeles Basin Onshore	97	0	0	77	77
San Joaquin Basin Onshore	233	0	301	73	373
State Offshore	30	0	0	14	14
Colorado	44	16	3,519	443	3,962
Florida	7	0	0	0	0
Illinois	15	0	0	1	1
Indiana	0	0	6	0	6
Kansas	21	0	112	4	116
Kentucky	0	0	56	0	56
Louisiana	227	77	3,986	330	4,316
North	28	12	1,753	63	1,816
South Onshore	134	62	2,009	217	2,226
State Offshore	66	3	223	51	274
Michigan	6	0	468	17	485
Mississippi	71	2	109	12	120
Montana	43	0	93	11	104
Nebraska	0	0	0	0	0
New Mexico	161	13	3,350	126	3,476
East	161	4	805	125	930
West	0	10	2,546	1	2,547
New York	0	0	60	0	60
North Dakota	91	3	43	15	57
Ohio	6	0	102	3	105
Oklahoma	109	30	2,731	198	2,929
Pennsylvania	1	0	305	69	374
Texas	719	110	11,771	1,087	12,858
RRC District 1	9	2	305	9	313
RRC District 2 Onshore	12	4	587	20	607
RRC District 3 Onshore	29	29	903	57	961
RRC District 4 Onshore	8	34	3,585	53	3,638
RRC District 5	4	1	1,907	35	1,943
RRC District 6	20	14	1,282	18	1,300
RRC District 7B	1	0	90	1	91
RRC District 7C	45	6	521	123	644
RRC District 8	237	6	762	353	1,115
RRC District 8A	333	0	29	371	400
RRC District 9	11	3	1,264	21	1,285
RRC District 10	8	8	465	26	491
State Offshore	0	2	72	1	72
Utah	100	1	1,423	155	1,578
Virginia	0	0	776	0	776
West Virginia	0	0	202	0	202
Wyoming	74	29	5,817	43	5,860
Federal Offshore[b]	2,595	275	10,060	3,845	13,905
Pacific (California)	62	8	48	110	158
Gulf of Mexico (Louisiana)[b]	2,352	178	6,889	3,311	10,200
Gulf of Mexico (Texas)	180	89	3,122	424	3,546
Miscellaneous[c]	1	0	0	0	0
U.S. Total	**5,195**	**562**	**46,321**	**6,628**	**52,948**

[a]Includes only those operators who produced during the report year 400,000 barrels of crude oil or 2 billion cubic feet of wet natural gas, or more (Category I and Category II operators).

[b]Includes Federal offshore Alabama.

[c]Includes Arizona, Maryland, Missouri, Nevada, Oregon, South Dakota and Tennessee.

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

Appendix E

Summary of Data Collection Operations

Appendix E

Summary of Data Collection Operations

Form EIA-23 Survey Design

The data collected on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," were used to produce this report. This section provides information concerning the survey design, response statistics, reporting requirements, and frame maintenance.

Form EIA-23 is mailed annually to all known large and intermediate size operators, and a scientifically selected sample of small operators. Operator size categories were based upon their annual production as indicated in various Federal, State, and commercial records. The term **State/subdivision** refers to an individual subdivision within a State or an individual State that is not subdivided. Operators were divided into the three size categories shown below.

- **Category I** - ***Large Operators**:* Operators who produced 1.5 million barrels or more of crude oil, or 15 billion cubic feet or more of natural gas, or both.
- **Category II** - ***Intermediate Operators**:* Operators who produced at least 400,000 barrels of crude oil or 2 billion cubic feet of natural gas, or both, but less than Category I operators.
- **Category III** - ***Small Operators:*** Operators who produced less than the Category II operators.

Category III operators were further subdivided into operators sampled with Certainty (**Certainty**) and operators that were randomly sampled (**Noncertainty**).

Data were filed for calendar year 2001 by crude oil or natural gas well operators who were active as of December 31, 2001. EIA defines an operator as an organization or person responsible for the management and day-to-day operation of crude oil or natural gas wells. The purpose of this definition is to eliminate responses from royalty owners, working interest owners (unless they are also operators), and others not directly responsible for operations. An operator need not be a separately incorporated entity. To minimize reporting burden, corporations are permitted to report on the basis of operating units of the company convenient for them. A large corporation may be represented by a single form or by several forms.

Table E1 shows a comparison of the EIA-23 sample and sampling frame between 1994 and 2001, and depicts the number of active operators, with 1994 showing the largest in the series. The 2001 sampling frame consisted of 179 Category I, 485 Category II, 559 Category III Certainty, and 21,296 Category III Noncertainty operators, for a total of 22,519 active operators. The survey sample consisted of 1,223 operators selected with certainty that included all of the Category I and II Certainty operators, the 559 smaller operators that were selected with certainty because of their size in relation to the area or areas in which they operated, and 644 Noncertainty operators selected as a systematic random sample of the remaining operators.

Form EIA-23 Response Statistics

Each company and its parent company or subsidiaries were required to file Form EIA-23 if they met the survey specifications. Response to the 2001 survey is summarized in **Table E2**. EIA makes a considerable effort to gain responses from all operators. About 4.3 percent of those selected turned out to be nonoperators (those that reported being nonoperators during the report year and operators that could not be located). Of the 81 nonoperators, 11 had successor operators that had taken over the production of the nonoperator. These successor operators were subsequently sampled. The overall response rate for the 2001 survey was 97.7 percent. For the 42 operators that did not respond, production data was obtained from State or other sources.

Form EIA-23 Reporting Requirements

The collection format for Form EIA-23 actually consists of two forms. The form the respondent is required to file is dependent upon the annual production levels of crude oil, natural gas, and lease condensate. Category I and Category II operators file a more detailed field

Table E1. Comparison of the EIA-23 Sample and Sampling Frame, 1994-2001

Operator Category	Number of Operators							
	1994	1995	1996	1997	1998	1999	2000	2001
Certainty								
Category I	161	161	176	180	178	177	175	179
Category II	482	476	486	461	420	399	436	485
Category III	1,694	1,596	3	1,194	862	648	854	559
Sampled	2,337	2,233	665	1,835	1,460	1,224	1,465	1,223
Percent Sampled	100	100	100	100	100	100	100	100
Noncertainty								
Sampled	1,737	1,632	0	1,645	1,459	1,305	1,311	644
Percent Sampled	8	8	0	8	7	6	6	3
Total								
Active Operators	R24,222	22,766	23,410	22,678	23,620	22,089	22,102	22,519
Not Sampled	20,148	18,901	22,745	19,198	20,701	19,560	19,326	20,652
Sampled	4,074	3,865	665	3,480	2,919	R2,529	2,776	1,867
Percent Sampled	17	17	3	15	12	R11	13	8

R=Revised data.

Table E2. Form EIA-23 Survey Response Statistics, 2001

Operator Category	Original Sample Selected	Successor[a] Operators	Net[b] Category Changes	Non-[c] operators	Adjusted[d] Sample	Responding Operators		Nonresponding Operators	
						Number	Percent	Number	Percent
Certainty									
Category I	180	0	+2	-10	172	172	100.0	0	0.0
Category II	484	8	-24	-29	439	439	100.0	0	0.0
Category III	559	3	+22	-20	564	553	98.0	[e]11	2.0
Subtotal	1,223	11	0	-59	1,175	1,164	99.1	[e]11	0.9
Noncertainty	644	0	0	-22	622	591	95.0	[e]31	5.0
Total	1,867	11	0	-81	1,797	1,755	97.7	[e]42	2.3

[a]Successor operators are those, not initially sampled, that have taken over the production of a sampled operator.
[b]Net of recategorized operators in the sample (excluding nonoperators).
[c]Includes former operators reporting that they were not operators during the report year and operators that could not be located who are treated as nonoperators.
[d]Adjusted sample equals original sample plus successor operators plus net category changes minus nonoperators.
[e]For the 42 operators (11 Category III operators and 31 Noncertainty operators) that did not respond, production data was obtained from State or other sources.
Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves" 2001.

level data form. Category III operators file a summary report which is aggregated at a State/subdivision level.

The cover page required of all respondents identifies each operator by name and address (**Figure I1**, Appendix I). The oil and gas producing industry includes a large number of small enterprises. To minimize reporting burden, only a sample of small operators were required to file a summary report of Form EIA-23 (**Figures I2 and I3**, Appendix I). Report year production data were required by State/subdivision areas for crude oil, natural gas, and lease condensate. Proved reserves data for operators were required only for those properties where estimates existed in the respondent's records.

All Category I and Category II operators were required to file field level data on Schedule A, "Operated Proved Reserves, Production, and Related Data by Field," for each oil and/or gas field in which the respondent operated properties (**Figure I4**, Appendix I). All Category I and those Category II operators who had reserve estimates were required to file on a total operated basis for crude oil, nonassociated natural gas, associated-dissolved natural gas, and lease condensate. The following data items were required to be filed: proved reserves at the beginning and the end of the report year, revision increases and revision decreases, sales and acquisitions, extensions, new field discoveries, new reservoirs in old fields, production, indicated additional reserves of crude oil, nonproducing reserves, field discovery year, water depth, and field location information.

Category II operators who did not have reserves estimates were required to file the field location information and report year production for the four hydrocarbon types from properties where reserves were not estimated. These respondents used Schedule B, "Footnotes," to provide clarification of reported data items when required in the instructions, or electively to provide narrative or detail to explain any data item filed (**Figure I5**, Appendix I).

Crude oil and lease condensate volumes were reported rounded to thousands of barrels of 42 U.S. gallons at 60 Fahrenheit, and natural gas volumes were reported rounded to millions of cubic feet. All natural gas volumes were requested to be reported at 60 Fahrenheit and a pressure base of 14.73 pounds per square inch absolute. Other minor report preparation standards were specified to assure that the filed data could be readily processed.

Oil and Gas Field Coding

A major effort to create standardized codes for all identified oil or gas fields throughout the United States was implemented during the 1982 survey year. Information from previous lists was reviewed and reconciled with State lists and a consolidated list was created. The publication of the *Oil and Gas Field Code Master List 2001*, in January of 2002, was the 20th annual report and reflected data collected through November 2001. This list was made available to operators to assist in identifying the field code data necessary for the preparation of Form EIA-23.

Form EIA-23 Comparison with Other Data Series

Estimated crude oil, lease condensate, and natural gas production volumes from Form EIA-23 were compared with official EIA production data supplied by Federal and State oil and natural gas regulatory agencies and published in EIA's monthly and annual reports. Reports published by the Federal and State oil and natural gas regulatory agencies were used to compare specific operator production responses to these agencies with Form EIA-23 responses. When significant differences were found, responses were researched to detect and reconcile possible reporting errors.

For 2001, Form EIA-23 National estimates of production were 2,130 million barrels for crude oil and lease condensate or 12 million barrels (1 percent) higher than that reported in the *Petroleum Supply Annual 2001* for crude oil and lease condensate (2,118 million barrels). Form EIA-23 National estimates of production for dry natural gas were 19,779 billion cubic feet, 330 billion cubic feet (2 percent) higher than the *Natural Gas Monthly, October 2002* for 2001 dry natural gas production (19,449 billion cubic feet).

Form EIA-23 Frame Maintenance

Operator frame maintenance is a major data quality control effort. Extensive effort is expended to keep the frame as current as possible. The Form EIA-23 frame contains a listing of all crude oil and natural gas well operators in the United States and must be maintained and updated regularly in order to ensure an accurate frame from which to draw the sample for the annual crude oil and natural gas reserves survey. The original frame, created in 1977, is revised annually. In addition, outside sources, such as State publications and electronic data, and commercial information data bases such as IHS Energy Group, are used to obtain information on operator status and to update addresses for the frame each year.

A maintenance procedure is utilized in conjunction with State production records and commercial information data bases to update possible crude oil and natural gas well operators presently listed on EIA's master frame and add new operators to the master frame. This procedure identifies active operators and nonoperators which improves the frame for future sample selections for the annual survey. **Table E3** provides a summary of changes made to the Form EIA-23 frame of crude oil and natural gas well operators for the 2001 survey mailing. These changes resulted from all frame maintenance activities.

The Form EIA-23 operator frame contained a total of 68,616 entries as of December 14, 2001. Of these, 22,519 were confirmed operators. These are operators who have filed in the past or for whom the EIA has recent production data from an outside source. The remaining operators (including both definite and probable

Table E3. Summary of the 2001 Operator Frame Activity, Form EIA-23

Total 2000 Operator Frame	68,527
Operators	22,102
Nonoperators	46,425
Changes to 2000 Operator Status	690
From Nonoperator to Operator[a]	456
From Operator to Nonoperator	234
No Changes to 2000 Operator Status	67,837
Operators	21,901
Nonoperators	45,936
Additions to 2000 Operator Frame	89
Operator	88
Nonoperator	1
Total 2001 Operator Frame	**68,616**
Operators	22,519
Nonoperators	46,097

[a]Includes operator frame activity through December 14, 2001.
[b]Relatively few additions were made since EIA ID numbers are now being recycled when no useable data is available with a specific EIA ID number. This procedure will increase the number of Nonoperator to Operator changes more than usual.
Source: Energy Information Administration, Office of Oil and Gas.

nonoperators) exist as a pool of names and addresses that may be added to the active list if review indicates activity.

Form EIA-64A Survey Design

The data for this report are also collected on Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." This section provides information concerning the survey design, response statistics, reporting requirements, and frame maintenance for Form EIA-64A.

Form EIA-23 for report years 1977 and 1978 required natural gas well operators to report their natural gas data on a fully dry basis. It was discovered in the course of those surveys that many operators had little or no knowledge of the extraction of liquids from their produced natural gas streams once custody transfer had taken place. Therefore, these operators reverted to reporting the only natural gas volume data they had in their possession. These volume data were for dryer natural gas than that which had passed through the wellhead, but wetter than fully dry natural gas. With reference to **Figure E1**, they reported their volumes either at the wellhead or after removal of lease condensate in their lease or field separation facilities.

Some of the larger operators, however, also owned or operated natural gas processing plants. They reported their volumes after removal of both lease condensate and plant liquids, as required by Form EIA-23. The aggregate volumes resulting from the 1977 and 1978 surveys, therefore, were neither fully dry (as was intended) nor fully wet. They do appear to have been more dry than wet simply because the operators who reported fully dry volumes also operated properties that contained the bulk of proved natural gas reserves.

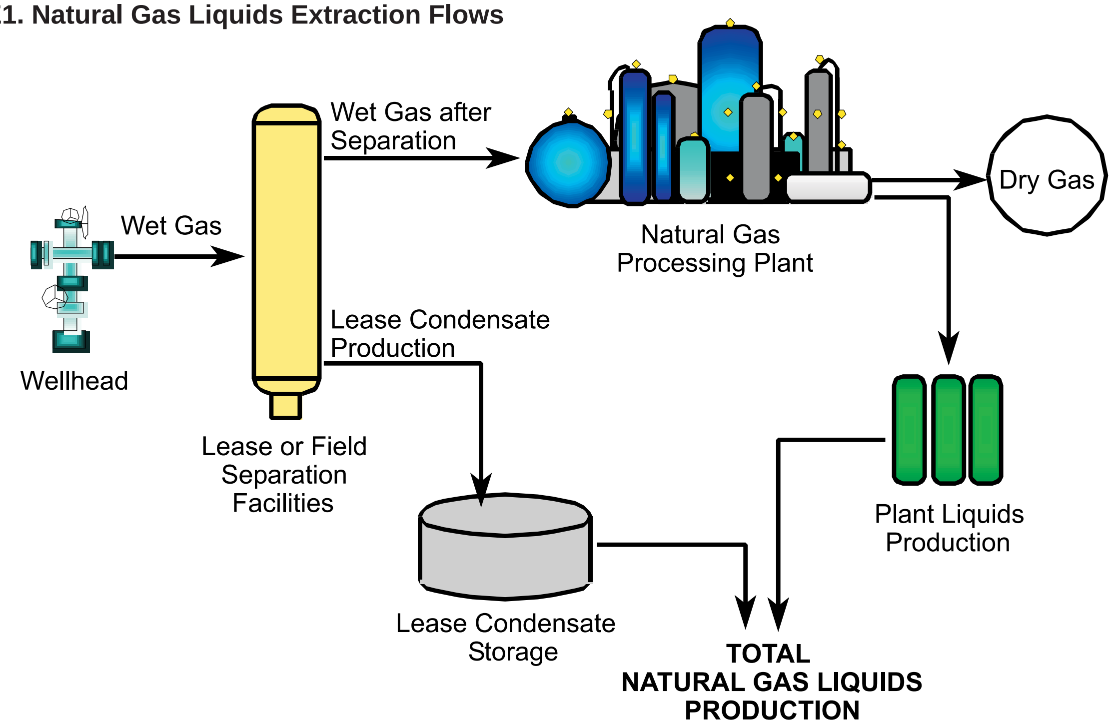
The EIA recognized that its estimates of proved reserves of natural gas liquids (NGL) had to reflect not only those volumes extractable in the future under current economic and operating conditions at the lease or field (lease condensate), but also volumes (plant liquids) extractable downstream at existing natural gas processing plants. Form EIA-64, which already canvassed these processing plants, did not request that the plants' production volumes be attributed to source areas. Beginning with the 1979 survey, a new form to collect plant liquids production according to the area or areas where their input natural gas stream had been produced was mailed to all of the operating plants. The instructions for filing the Form EIA-23 were altered to collect data from natural gas well operators that reflected those volumes of natural gas dried only through the lease or field separation facilities. The reporting basis of these volumes are referred to as "wet after lease separation." The methodology used to estimate NGL reserves by State and State subdivision is provided in Appendix F.

Form EIA-64A Response Statistics

EIA mailed EIA-64A forms to all known natural gas processing plant operators as of February 1, 2002. In addition, plant operators whose plants were shut down or dismantled during 2001 were required to complete forms for the portion of 2001 when the plants were in operation.

Natural gas processing plant operators were requested to file a Form EIA-64A for each of their plants. A total of 214 operators of 516 plants were sent forms. This number included no new plants, no reactivated plants, and no successor plants identified after the initial 2001 survey mailing. A total of 9 plants were reported as nonoperating according to the Form EIA-64A

Figure E1. Natural Gas Liquids Extraction Flows



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

definition. For the 14th consecutive year the response rate was 100 percent.

Form EIA-64A respondents were requested to report natural gas liquids production data by area of origin. **Table E4** summarizes the responses by plant operators of the volume and origin of natural gas delivered to the processing plants and the volume of the natural gas liquids extracted by the plants by State. The majority of the plant operators reported only one area of origin for the natural gas that was processed by a plant. The State or area of origin reported is generally also the plant's location.

Form EIA-64A Reporting Requirements

Form EIA-64A consisted of the reporting schedule shown in **Figure I6**, Appendix I. The form identifies the plant, its geographic location, the plant operator's name and address, and the parent company name. The certification was signed by a responsible official of the operating entity. The form pertains to the volume of natural gas received and of natural gas liquids produced at the plant, allocated to each area of origin. Operators also filed the data pertaining to the amount of natural gas shrinkage that resulted from extraction of natural gas liquids at the plant, and the amount of fuel used in processing.

Natural gas liquids volumes were reported rounded to thousands of barrels of 42 U.S. gallons at 60 Fahrenheit, and natural gas volumes were reported rounded to millions of cubic feet. All natural gas volumes were requested to be reported at 60 Fahrenheit and a pressure base of 14.73 pounds per square inch absolute. Other minor report preparation standards were specified to assure that the filed data could be readily processed.

Form EIA-64A Comparison with Other Data Series

Form EIA-64A plant liquids production data were compared with data collected on Form EIA-816, "Monthly Natural Gas Liquids Report." Aggregated production from Form EIA-816 represents the net volume of natural gas processing plant liquid output less input for the report year. These data are published in EIA's *Petroleum Supply Annual* reports. The Form EIA-64A annual responses reflect all corrections and revisions to EIA's monthly estimates. Differences,

Table E4. Natural Gas Processed and Liquids Extracted at Natural Gas Processing Plants, 2001

Plant Location	Volume of Natural Gas Delivered to Processing Plants: State Production	Out of State Production	Natural Gas Processed	Total Liquids Extracted
	(million cubic feet)			(thousand barrels)
Alaska	2,984,807	0	2,984,807	30,334
Alabama	284,569	1,384	285,953	9,880
Arkansas	207,352	0	207,352	296
California	258,271	0	258,271	8,625
Colorado	497,385	0	497,385	21,006
Florida	4,364	2,822	7,186	1,186
Kansas	445,640	130,591	576,231	27,754
Kentucky	36,901	0	36,901	1,097
Louisiana	4,000,748	205,722	4,206,470	108,367
Michigan	50,734	0	50,734	3,316
Mississippi	2,809	237,021	239,830	11,088
Montana	5,691	0	5,691	364
North Dakota	58,536	0	58,536	4,712
New Mexico	966,882	0	966,882	77,237
Oklahoma	956,019	1,646	957,665	61,780
Texas	3,833,272	43,127	3,876,399	253,587
Utah	160,889	5,616	166,505	7,930
West Virginia	95,870	29,667	125,537	7,774
Wyoming	988,184	411	988,595	45,923
Miscellanous[a]	11,160	3,337	14,497	617
Total	**15,850,083**	**661,344**	**16,511,427**	**682,873**

[a]Includes Illinois, Ohio, and Pennsylvania.
Source: Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production,” 2001

when found, were reconciled in both sources. For 2001, the Form EIA-64A National estimates were 2 percent (11 million barrels) lower than the *Petroleum Supply Annual 2001* volume for natural gas plant liquids production.

Table E5. Form EIA-64A 2001 Plant Frame Activity

Frame as of 2000 survey mailing	574
Additions	98
Deletions	–147
Frame as of 2001 survey mailing	525

Note: Includes operator frame activity through January 31, 2002.
Source: Energy Information Administration, Office of Oil and Gas.

Form EIA-64A Frame Maintenance

The Form EIA-64A plant frame contains data on all known active and inactive natural gas processing plants in the United States. The 2001 plant frame was compared to listings of natural gas processing plants from Form EIA-816, “Monthly Natural Gas Liquids Report”; the *LPG Almanac*; and the *Oil and Gas Journal*. A list of possible additions to the plant frame was compiled. **Table E5** summarizes the Form EIA-64A plant frame changes made as a result of the comparisons as of January 31, 2002.

Appendix F

Statistical Considerations

Statistical Considerations

Survey Methodology

The Form EIA-23 survey is designed to provide reliable estimates for reserves and production of crude oil, natural gas, and lease condensate for the United States. Operators of crude oil and natural gas wells were selected as the appropriate respondent population because they have access to the most current and detailed information, and therefore, presumably have better reserve estimates than do other possible classes of respondents, such as working interest or royalty owners.

While large operators are quite well known, they comprise only a small portion of all operators. The small operators are not well known and are difficult to identify because they go into and out of business, alter their corporate identities, and change addresses frequently. As a result, EIA conducts extensive frame maintenance activities each year to identify all current operators of crude oil and natural gas wells in the country.

Sampling Strategy

EIA publishes data on reserves and production for crude oil, natural gas, and lease condensate by State for most States, and by State subdivision for the States of California, Louisiana, New Mexico, and Texas. To meet the survey objectives, while minimizing respondent burden, a random sampling strategy has been used since 1977. Each operator reporting on the survey is asked to report production for crude oil, natural gas, and lease condensate for each State/subdivision in which he operates. The term **State/subdivision** refers to an individual subdivision within a State or an individual State that is not subdivided.

The total volume of production varies among the State/subdivisions. To meet the survey objectives while controlling total respondent burden, EIA selected the following target sampling error for the 2001 survey for each product class.

- 1.0 percent for National estimates.
- 1.0 percent for each of the 5 States having subdivisions: Alaska, California, Louisiana, New Mexico, and Texas. For selected subdivisions within these States, targets of 1.0 percent or 1.5 percent as required to meet the State target.
- 2.5 percent for each State/subdivision having 1 percent or more of estimated U.S. reserves or production in 2000 (lower 48 States) for any product class.
- 4 percent for each State/subdivision having less than 1 percent of estimated U.S. reserves or production in 2000 (lower 48 States) for all 3 product classes.
- 8 percent for States not published separately. The combined production from these States was less than 0.2 percent of the U.S. total in 2000 for crude oil and for natural gas.

The volume of production defining the Certainty stratum, referred to as the **cutoff**, varies by product or State/subdivision. The cutoff criteria and sampling rates are shown in **Table F1**. The Certainty stratum, therefore, has three components.

- **Category I** - *Large Operators:* Operators who produced a total of 1.5 million barrels or more of crude, or 15 billion cubic feet or more of natural gas, or both in 2000.
- **Category II** - *Intermediate Operators:* Operators who produced a total of at least 400,000 barrels of crude oil or 2 billion cubic feet of natural gas, or both, but less than Category I operators in 2000.
- **Category III** - *Small Operators:* Operators who produced less than the Category II operators in 2000, but which were selected with certainty. Category III operators were subdivided into operators sampled with certainty (**Certainty**) and operators that were randomly sampled (**Noncertainty**).
  - **Certainty** - A small operators who satisfied any of the following criteria based upon their production shown in the operator frame:
    - Operators with annual crude oil production of 200 thousand barrels or more, or reserves of 4 million barrels or more; or annual natural gas production of 1 billion cubic feet or more, or reserves of 20 billion cubic feet or more.

Table F1. 2001 EIA–23 Survey Initial Sample Criteria

State and Subdivision	Production Cutoffs Crude Oil (mbbls)	Production Cutoffs Gas (mmcf)	Certainty Operators	Noncertainty Sample Number of Single State Operators	Noncertainty Sample Number of Multi–State Operators
Alabama Onshore	107	1,000	46	1	3
Alaska	-	-	5	-	-
Arkansas	21	1,000	93	13	8
California Unspecified	17	88	-	-	-
California Coastal Region Onshore	200	1,000	16	-	-
California Los Angeles Basin Onshore	200	25	17	-	-
California San Joaquin Basin Onshore	200	1,000	43	-	-
Colorado	200	1,000	128	1	16
Florida Onshore	200	1,000	2	-	-
Illinois	200	27	29	12	30
Indiana	12	1	14	2	21
Kansas	85	1,000	168	50	48
Kentucky	37	1,000	22	11	16
Louisiana Unspecified	73	183	-	-	-
Louisiana North	13	633	138	-	7
Louisiana South Onshore	70	1,000	190	-	4
Michigan	200	1,000	39	5	3
Mississippi Onshore	200	1,000	89	3	5
Montana	200	1,000	69	1	12
Nebraska	13	2	24	-	19
New Mexico Unspecified	10	13	-	-	-
New Mexico East	200	1,000	178	-	1
New Mexico West	21	1,000	64	-	-
New York	3	1,000	15	12	3
North Dakota	200	1,000	72	1	8
Ohio	92	1,000	25	46	5
Oklahoma	143	1,000	306	101	54
Pennsylvania	4	1,000	32	-	3
Texas Unspecified	7	118	-	-	-
Texas-RRC District 1	23	800	142	-	-
Texas-RRC District 2 Onshore	200	1,000	166	-	1
Texas-RRC District 3 Onshore	200	1,000	247	-	3
Texas-RRC District 4 Onshore	91	1,000	182	-	1
Texas-RRC District 5	38	630	96	-	3
Texas-RRC District 6	200	1,000	176	-	4
Texas-RRC District 7B	34	82	136	-	7
Texas-RRC District 7C	200	1,000	178	-	4
Texas-RRC District 8	200	1,000	233	-	5
Texas-RRC District 8A	200	1,000	206	-	6
Texas-RRC District 9	52	1,000	139	-	4
Texas-RRC District 10	200	1,000	161	-	12
Utah	200	1,000	48	3	2
Virginia	200	1,000	12	-	-
West Virginia	5	1,000	30	12	6
Wyoming	200	1,000	140	3	12
Offshore Areas	-	-	273	-	
Other States[a]	125	49	24	2	3
Total	**-**	**-**	**[b]899**	**277**	**[b]137**

[a]Includes Arizona, Connecticut, Delaware, Georgia, Idaho, Iowa, Massachusetts, Maryland, Minnesota, Missouri, North Carolina, New Hampshire, Nevada, New Jersey, Oregon, Rhode Island, South Carolina, South Dakota, Tennessee, Washington, and Wisconsin.

[b]Nonduplicative count of operators by States.

Note: Sampling rate was 8 percent except in Alaska, Florida Onshore, Virginia, and Offshore areas where sampling rate was 100 percent.

— = Not applicable.

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

- All other operators with production or reserves in a State/subdivision that exceed selected cutoff levels for that State/subdivision.
- The largest operator in each State/subdivision regardless of level of production or reserves.
- Operators with production or reserves of oil or gas for six or more State/subdivisions.

- **Noncertainties** - Small operators not in the certainty stratum were classified in a noncertainty stratum.
  - In most areas, data from the noncertainty operators were sampled at a rate of 3 percent.
  - In these States (Texas, California, Colorado, Louisiana, Montana, New Mexico, South Dakota, Utah, and Wyoming) EIA did not survey the noncertainty operators in 2001. Instead, an imputation function was applied to estimate reserve volumes. The function used EIA historic production and reserves data, State and commercially available production data, and the size classifications of reporting operators.

In each State/subdivision the balance between the number of small certainty operators and the sample size was determined in an iterative procedure designed to minimize the number of total respondents. The iteration for each State/subdivision began with only the Category I and Category II operators in the certainty stratum. The size of the sample of small operators required to meet the target variance was calculated based on the variance of the volumes of those operators. For a number of State/subdivisions with high correlations between frame values across pairs of consecutive years, an adjusted target variance was calculated, that utilized the information about the correlations. This allowed the selection of a smaller sample that still met the target sampling error criteria. At each iteration a small operator, beginning with the largest of the Category III operators, was added to the certainty group and the required sample size was again calculated. The procedure of adding one operator at a time stopped when the proportion of operators to be sampled at random dropped below 3 percent. Independent samples of single location operators (operators who, according to the sampling frame, operate in only one State/subdivision) were selected from each State/subdivision using systematic random sampling.

An additional complexity is introduced because some small operators selected for the sample in another region or regions, sometimes report production volumes in a region in which EIA has no previous record of production.

State/subdivision volume estimates are calculated as the sum of the certainty strata and all of the estimates for the sampling strata in that region. The sampling variance of the estimated total is the sum of the sampling variances for the sampling strata. There is no sampling error associated with the certainty stratum. The square root of the sampling variance is the standard error. It can be used to provide confidence intervals for the State/subdivision totals.

For the States in which subdivision volume estimates are published, the State total is the sum of the individual volume estimates for the subdivisions. The U.S. total is the sum of the State estimates. A sampling variance is calculated for each State subdivision, State, and for the U.S. total.

Total U.S. Reserve Estimates

Conceptually, the estimates of U.S. reserves and production can be thought of as the sum of the estimates for the individual States. Correspondingly, the estimates for the four States for which estimates are published separately by subdivision (California, Louisiana, New Mexico, and Texas) can be thought of as the sum of the estimates by subdivision. The remaining States are not subdivided and may be considered as a single subdivision.

The estimates of year-end proved reserves and annual production for any State/subdivision is the sum of the volumes in the State/subdivision reported by the certainty stratum operators and an estimate of the total volume in the State/subdivision by the noncertainty stratum operators. Mathematically, this may be stated as the following sum:

$$\hat{V}_s = V_{sc} + \hat{V}_{sr}$$

where

$\hat{V}_s$ = estimated total volume in the State/subdivision

V_{sc} = total volume in the State/subdivision reported by Certainty operators

$\hat{V}_{sr}$ = estimated total volume in the State/subdivision of Noncertainty operators.

The total volume of Certainty operators in the State/subdivision is simply the sum of individual operator's volumes:

$$V_{sc} = \sum_{m=1}^{n_{sc}} V_{scm}$$

where

n_{sc} = number of Certainty operators reporting production in the State/subdivision

V_{scm} = volume reported by the *m*-th certainty stratum operator in the State/subdivision.

The estimated total volume of Noncertainty operators in the State/subdivision is the weighted sum of the reports of the noncertainty sample operators:

$$\hat{V}_{sr} = \sum_{m=1}^{n_{sr}} W_{srm} V_{srm}$$

where

n_{sr} = number of Noncertainty operators reporting production in the State/subdivision

V_{srm} = volume reported by the *m*-th Noncertainty sample operator in the State/subdivision

W_{srm} = weight for the report by the *m*-th Noncertainty sample operator reporting production in the State/subdivision.

In many State/ subdivisions, the accuracy of the oil and gas estimates was improved by using the probability proportional to size procedure. This procedure took advantage of the correlation between year-to-year production reports. The weights used for estimating the oil production for a State / subdivision were different from the weights used for estimating the gas production.

The weight used for the estimation is the reciprocal of the probability of selection for the stratum from which the sample operator was selected. In making estimates for a State/ subdivision, separate weights are applied as appropriate for noncertainty operators shown in the frame as having had production in only the State/ subdivision, for those shown as having had production in that State/subdivision and up to four other State/ subdivisions, and for operators with no previous record of production in the State/subdivision. National totals were then obtained by summation of the component totals.

Imputation for Operator Nonresponse

The nonresponse rate for Certainty operators for the 2001 survey was 2 percent and for the Noncertainty operators 5 percent. An imputation was made for the production and reserves for these 42 nonresponding operators.

Imputation and Estimation for Reserves Data

In order to estimate reserve balances for National and State/subdivision levels, a series of imputation and estimation steps at the operator level must be carried out. Year-end reserves for operators who provided production data only were imputed on the basis of their production volumes. Imputation was also applied to the small and intermediate operators as necessary to provide data on each of the reserve balance categories (i.e., revisions, extensions, or new discoveries). Finally, an imputation was required for the natural gas data of the small operators to estimate their volumes of associated-dissolved and nonassociated natural gas. The final manipulation of the data accounts for the differences caused by different sample frames from year to year. Each of these imputations generated only a small percentage of the total estimates. The methods used are discussed in the following sections.

The data reported by operator category by Form EIA-23 respondents for the report year 2001 are summarized in **Tables F2, F3, F4, and F5**. The reported data in **Table F2** shows that those responding operators accounted for 97.5 percent of the published production for wet natural gas and 96.0 percent of the reserves shown in **Table 9**. Data shown in **Table F3** indicate that those responding operators accounted for 97.7 percent of the nonassociated natural gas production and 96.0 percent of the reserves published in **Table 10**. The reported data shown in **Table F4** indicate that those responding operators accounted for 95.4 percent of published crude oil production and 95.8 percent of the reserves shown in **Table 6**. Additionally, **Table F5** indicates that those responding operators accounted for 99.1 percent of the published production and 96.9 percent of the published proved reserves for lease condensate shown in **Table 15**.

Table F2. Summary of Total Natural Gas, Wet After Lease Separation, Used in Estimation Process, Form EIA-23 (Million Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

Level of Reporting	Operator Category I	II	Non-certainty III	Certainty III	Total
Field Level Reported and Imputed Data					
Proved Reserves as of 12/31/00	163,533,701	14,123,379	-	55,553	177,712,633
(+) Revision Increases	17,087,596	1,369,692	-	-	18,457,288
(–) Revision Decreases	18,559,737	1,935,360	-	-	20,495,097
(–) Sales	9,436,158	1,321,055	-	-	10,757,213
(+) Acquisitions	13,240,881	819,413	-	30,615	14,090,909
(+) Extensions	14,456,240	2,577,036	-	-	17,033,276
(+) New Field Discoveries	3,437,563	239,626	-	-	3,677,189
(+) New Reservoirs in Old Fields	2,162,227	631,797	-	-	2,794,024
(–) Production with Reserves in 2001	17,546,614	1,674,533	-	13,554	19,234,701
Proved Reserves Reported as of 12/31/01	168,386,067	14,123,379	-	164,833	182,674,279
Production Without Proved Reserves	20,192	543,159	-	-	563,351
Reserves Imputed for Production Without Proved Reserves	141,691	3,430,877	-	-	3,572,568
Subtotal Production	**17,566,806**	**2,217,692**	**-**	**13,554**	**19,798,052**
Subtotal Proved Reserves 2001	**168,527,758**	**17,554,256**	**-**	**164,833**	**186,246,847**
State Level Reported and Imputed Data					
Production with Reported Proved Reserves	-	6,093	74,952	74,881	155,926
Production without Reported Proved Reserves	41	9,311	92,938	59,637	161,927
Production Estimated from Auxillary data	-	-	4,728	-	4,728
Subtotal Production	41	15,404	172,618	134,518	322,581
Weighted Subtotal Production	**41**	**15,404**	**177,346**	**134,518**	**327,309**
Proved Reserves Reported	-	27,806	763,682	632,394	1,423,882
Reserves Imputed for Reported Production Without Proved Reserves	231	40,768	618,141	318,543	977,683
Reserves Estimated from Auxillary data	-	-	-	71,617	71,617
Subtotal Proved Reserves	231	68,574	1,381,823	1,022,554	2,473,182
Weighted Subtotal Proved Reserves	**231**	**68,574**	**1,453,440**	**950,937**	**2,473,182**
Total Production in 2001	**17,566,847**	**2,233,096**	**177,346**	**148,072**	**20,642,000**
Total Proved Reserves as of 12/31/01	**168,527,989**	**17,622,830**	**1,453,440**	**1,115,770**	**191,743,000**

– = Not applicable.

Notes: Table 9 totals include imputed and estimated wet natural gas proved reserves rounded at the State/subdivision level. Field level data are reported volumes and may not balance due to submission of incomplete reserve component records.

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

Table F3. Summary of Nonassociated Natural Gas, Wet After Lease Separation, Used in Estimation Process, Form EIA-23 (Million Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

Level of Reporting	Operator Category I	II	Non-certainty III	Certainty III	Total
Field Level Detail Report					
Proved Reserves as of 12/31/00	136,979,364	12,405,232	-	53,492	149,438,088
(+) Revision Increases	14,154,267	1,171,328	-	-	15,325,595
(–) Revision Decreases	15,844,085	1,636,258	-	-	17,480,343
(–) Sales	8,841,726	1,084,332	-	-	9,926,058
(+) Acquisitions	12,564,006	715,503	-	30,615	13,310,124
(+) Extensions	13,458,797	2,406,818	-	-	15,865,615
(+) New Field Discoveries	2,161,311	228,662	-	-	2,389,973
(+) New Reservoirs in Old Fields	1,735,830	593,702	-	-	2,329,532
(–) Production with Reserves in 2001	14,803,691	1,483,558	-	13,368	16,300,617
Proved Reserves Reported as of 12/31/01	141,574,359	12,405,232	-	162,958	154,142,549
Production Without Proved Reserves	1,339	472,313	-	-	473,652
Reserves Imputed for Production Without Proved Reserves	9,674	2,998,338	-	-	3,008,012
Subtotal Production	**14,805,030**	**1,955,871**	**-**	**13,368**	**16,774,269**
Subtotal Proved Reserves 2001	**141,584,033**	**15,403,570**	**-**	**162,958**	**157,150,561**
State Level Reported and Imputed Data					
Production with Reported Proved Reserves	-	5,161	64,280	65,054	134,495
Production without Reported Proved Reserves	40	8,118	77,157	52,184	137,499
Production Estimated from Auxillary data	-	-	3,791	-	3,791
Subtotal Production	40	13,279	145,228	117,238	275,785
Weighted Subtotal Production	**40**	**13,279**	**149,019**	**117,238**	**279,576**
Proved Reserves Reported	-	22,775	672,559	556,775	1,252,109
Reserves Imputed for Reported Production Without Proved Reserves	225	35,167	496,371	274,462	806,225
Reserves Estimated from Auxillary data	-	-	-	70,761	70,761
Subtotal Proved Reserves	225	57,942	1,168,930	901,998	2,129,095
Weighted Subtotal Proved Reserves	**225**	**57,942**	**1,239,691**	**831,237**	**2,129,095**
Total Production in 2001	**14,805,070**	**1,969,150**	**546,174**	**130,606**	**17,451,000**
Total Proved Reserves as of 12/31/01	**141,584,258**	**15,461,512**	**1,239,691**	**994,195**	**161,921,000**

– = Not applicable.

Notes: Table 10 totals include imputed and estimated nonassociated wet natural gas proved reserves rounded at the State/subdivision level. Field level data are reported volumes and may not balance due to submission of incomplete reserve component records.

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

Table F4. Summary of Crude Oil Used in Estimation Process, Form EIA-23
(Thousand Barrels of 42 U.S. Gallons)

Level of Reporting	Operator Category I	II	Non-certainty III	Certainty III	Total
Field Level Detail Report					
Proved Reserves as of 12/31/00	19,475,088	955,696	-	316	20,431,100
(+) Revision Increases	1,409,850	96,954	-	-	1,506,804
(–) Revision Decreases	1,488,743	104,203	-	-	1,592,946
(–) Sales	293,309	70,370	-	318	363,997
(+) Acquisitions	330,065	56,993	-	327	387,385
(+) Extensions	742,781	61,854	-	-	804,635
(+) New Field Discoveries	1,403,732	4,317	-	-	1,408,049
(+) New Reservoirs in Old Fields	268,259	16,106	-	-	284,365
(–) Production with Reserves in 2001	1,606,681	99,160	-	35	1,705,876
Proved Reserves Reported as of 12/31/01	20,241,101	955,696	-	290	21,197,087
Production Without Proved Reserves	2,010	31,511	-	-	33,521
Reserves Imputed for Production Without Proved Reserves	15,610	203,086	-	-	218,696
Subtotal Production	**1,608,691**	**130,671**	**-**	**35**	**1,739,397**
Subtotal Proved Reserves 2001	**20,256,711**	**1,158,782**	**-**	**290**	**21,415,783**
State Level Reported and Imputed Data					
Production with Reported Proved Reserves	-	1,188	15,268	15,485	31,941
Production without Reported Proved Reserves	-	1,144	35,897	17,584	54,625
Production Estimated from Auxillary data	-	-	1,105	-	1,105
Subtotal Production	0	2,332	52,270	33,069	87,671
Weighted Subtotal Production	**0**	**2,332**	**53,375**	**33,069**	**88,776**
Proved Reserves Reported	-	7,540	171,370	129,198	308,108
Reserves Imputed for Reported Production Without Proved Reserves	-	6,267	173,740	98,575	278,582
Reserves Estimated from Auxillary data	-	-	-	60,695	60,695
Subtotal Proved Reserves	-	13,807	345,110	288,468	647,385
Weighted Subtotal Proved Reserves	**0**	**13,807**	**405,805**	**227,773**	**647,385**
Total Production in 2001	**1,608,691**	**133,003**	**140,202**	**33,104**	**1,915,000**
Total Proved Reserves as of 12/31/01	**20,256,711**	**1,172,589**	**405,805**	**228,063**	**22,446,000**

– = Not applicable.

Notes: Table 6 totals include imputed and estimated crude oil proved reserves rounded at the State/subdivision level. Field level data are reported volumes and may not balance due to submission of incomplete reserve component records.

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

Table F5. Summary of Lease Condensate Used in Estimation Process, Form EIA-23
(Thousand Barrels of 42 U.S. Gallons)

Level of Reporting	I	II	Non-certainty III	Certainty III	Total
Field Level Detail Report					
Proved Reserves as of 12/31/00	1,308,649	119,271	-	99	1,428,019
(+) Revision Increases	169,732	16,747	-	-	186,479
(–) Revision Decreases	334,968	42,243	-	-	377,211
(–) Sales	65,180	9,914	-	-	75,094
(+) Acquisitions	104,744	8,738	-	874	114,356
(+) Extensions	110,739	24,658	-	-	135,397
(+) New Field Discoveries	68,495	4,782	-	-	73,277
(+) New Reservoirs in Old Fields	55,798	9,296	-	-	65,094
(–) Production with Reserves in 2001	190,036	16,695	-	76	206,807
Proved Reserves Reported as of 12/31/01	1,227,998	119,271	-	897	1,348,166
Production Without Proved Reserves	99	3,911	-	-	4,010
Reserves Imputed for Production Without Proved Reserves	771	19,289	-	-	20,060
Subtotal Production	**190,135**	**20,606**	**-**	**76**	**210,817**
Subtotal Proved Reserves 2001	**1,228,769**	**138,560**	**-**	**897**	**1,368,226**
State Level Reported and Imputed Data					
Production with Reported Proved Reserves	-	29	448	700	1,177
Production without Reported Proved Reserves	1	40	523	327	891
Production Estimated from Auxillary data	-	-	121	-	121
Subtotal Production	1	69	1,092	1,027	2,189
Weighted Subtotal Production	**1**	**69**	**1,213**	**1,027**	**2,310**
Proved Reserves Reported	-	104	2,795	4,564	7,463
Reserves Imputed for Reported Production Without Proved Reserves	4	136	3,363	1,468	4,971
Reserves Estimated from Auxillary data	-	-	-	174	174
Subtotal Proved Reserves	4	240	6,158	6,206	12,608
Weighted Subtotal Proved Reserves	**4**	**240**	**6,332**	**6,032**	**12,608**
Total Production in 2001	**190,136**	**20,675**	**3,086**	**1,103**	**215,000**
Total Proved Reserves as of 12/31/01	**1,228,773**	**138,800**	**6,332**	**6,929**	**1,398,000**

– = Not applicable.

Notes: Table 15 totals include imputed and estimated lease condensate proved reserves rounded at the State/subdivision level. Field level data are reported volumes and may not balance due to submission of incomplete reserve component records.

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

Imputation of Year-End Proved Reserves

Category I operators were required to submit year-end estimates of proved reserves. Category II and Category III operators were required to provide year-end estimates of proved reserves only if such estimates existed in their records. Some of these respondents provided estimates for all of their operated properties, others provided estimates for only a portion of their properties, and still others provided no estimates for any of their properties. All respondents did, however, provide annual production data. The production reported by Noncertainty sample operators and the corresponding imputed reserves were weighted to estimate the full noncertainty stratum when calculating reserves and production as previously described in the section "Total U.S. Reserves Estimates" in this appendix.

R/P Function

A year-end proved reserves estimate was imputed from reported production data in each case where an estimate was not provided by the respondent. A R/P function was derived and used to calculate a reserves-to-production (R/P) ratio, based on operator size and the geographic region where the operator's properties were located. The R/P function has the following functional form for each geographic region:

*Calculated P/[P+R] = Beta * EXP(Alpha * ln (1 + MOS))*

- *Alpha, Beta* = Regional Coefficients (calculated).
- *MOS = Measure of size* for a respondent, which is equal to the barrel oil equivalent volume of a respondent's 2001 oil, gas, and condensate production (in units of thousand barrels per year).

Table F6 lists the coefficients used for each region and the number of observations on which it was based. The regional areas used are similar to the National Petroleum Council Regions (**Figure F1**). These regions generally follow the boundaries of geologic provinces wherein the stage of resource development tends to be somewhat similar.

Once the R/P ratio was obtained for an operator, it could be multiplied by the reported or estimated production to give a proved reserves estimate. Operators that had production plus end of year reserves equal to zero were excluded from the respondents selected to calculate the R/P coefficients.

In 2001, the R/P function was used to estimate the proved reserves of all noncertainty operators in these States -- Texas, California, Colorado, Louisiana, Montana, New Mexico, South Dakota, Utah, and Wyoming, rather than rely on a weighted sample. These States were chosen for this new procedure because of the many years of historical production and reserves data within EIA and availability of reliable State government and commercial production data for these States. This technique improved the correlation of EIA data with State and commercial production data, and reduced the burden of reporting and analysis on both EIA and the noncertainty operators in these States.

Table F6. Statistical Parameters of Reserves Estimation Equation by Region for 2001

Region Number	Region	Number of Nonzero R/P Pairs: Oil	Gas	LC	Equation Coefficients: Oil Alpha	Oil Beta	Gas Alpha	Gas Beta	LC Alpha	LC Beta
1	Alaska	7	7	0	-0.1331	0.3956	-0.1170	0.3465	-0.0816	0.3921
2	Pacific Coast States	45	58	4	-0.1331	0.3426	-0.1170	0.4123	-0.0816	0.6527
2A	Federal Offshore Pacific	5	5	0	-0.1331	0.2644	-0.1170	0.2979	-0.0816	0.3921
3	Western Rocky Mountains	83	131	53	-0.1331	0.3169	-0.1170	0.2873	-0.0816	0.2201
4	Northern Rocky Mountains	174	150	44	-0.1331	0.3169	-0.1170	0.2873	-0.0816	0.2201
5	West Texas and East New Mexico	529	529	161	-0.1331	0.3127	-0.1170	0.3456	-0.0816	0.3853
6	Western Gulf Basin	542	859	555	-0.1331	0.4273	-0.1170	0.4223	-0.0816	0.3541
6A	Gulf of Mexico	70	137	112	-0.1331	0.6948	-0.1170	0.6550	-0.0816	0.5103
7	Mid-Continent	347	438	173	-0.1331	0.3333	-0.1170	0.3201	-0.0816	0.2234
8 + 9	Michigan Basin and Eastern Interior	83	59	11	-0.1331	0.2933	-0.1170	0.1863	-0.0816	0.2595
10 + 11	Appalachians	28	70	4	-0.1331	0.2933	-0.1170	0.1863	-0.0816	0.2595
	United States	1,913	2,443	1,117	-0.1331	0.4062	-0.1170	0.3944	-0.0816	0.3921

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

Imputation of Annual Changes to Proved Reserves by Component of Change

Category II and Category III operators that do not keep reserves data were not asked to provide estimates of beginning-of-year reserves or annual changes to proved reserves by component of change, i.e., revisions, extensions, and discoveries. When they did not provide estimates, these volumes were estimated by either:

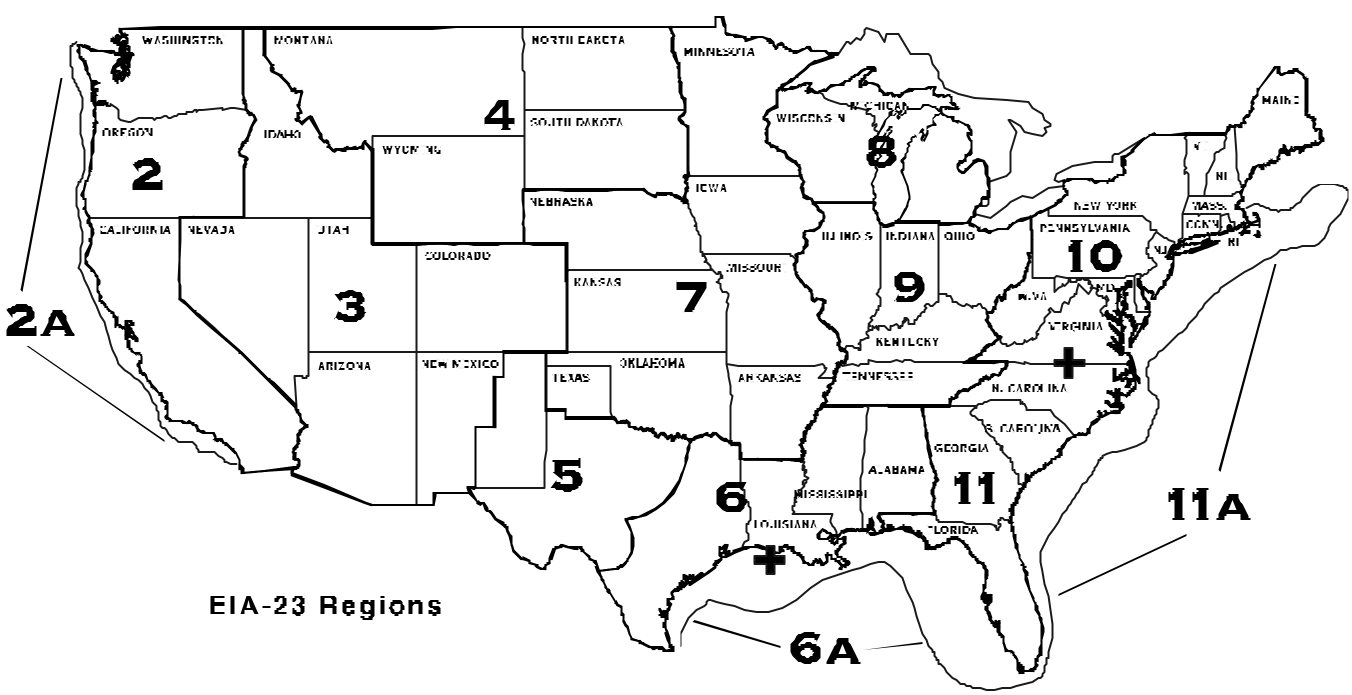
- applying an algebraic allocation scheme which preserved the relative relationships between these items within each State/subdivision, as reported by Category I and Category II operators, or
- applying a modified version of the R/P function to each separate component of change, calculated with its own set of geographically dependent coefficients. This method was used in all four states where the R/P Function was applied to calculate end of year reserves.

Both methods preserved an exact annual reserves balance of the following form:

Published Proved Reserves at End of Previous Report Year
+ Adjustments
+ Revision Increases
– Revision Decreases
– Sales
+ Acquisitions
+ Extensions
+ New Field Discoveries
+ New Reservoir Discoveries in Old Fields
– Report Year Production
= Published Proved Reserves at End of Report Year

The algebraic allocation method used for all but nine states in the 2001 survey worked as follows: A ratio was calculated as the sum of the annual production and year-end proved reserves of those respondents who did not provide the reserves balance components, divided by the sum of year-end proved reserves and annual production of those respondents of similar size who did provide these quantities. This ratio was then

Figure F1. Form EIA-23 Regional Boundaries



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

multiplied by each of the reserves balance components reported by Category I and some Category II operators, to obtain imputed volumes for the reserves balances of the other Category II operators and Certainty and Noncertainty operators. These were then added to the State/subdivision totals.

Imputation of Natural Gas Type Volumes

Operators in the State/subdivision certainty and noncertainty strata were not asked to segregate their natural gas volumes by type of natural gas, i.e., nonassociated natural gas (NA) and associated-dissolved natural gas (AD). The total estimated year-end proved reserves of natural gas and the total annual production of natural gas reported by, or imputed to, operators in the State/subdivision certainty and noncertainty strata were, therefore, subdivided into the NA and AD categories, by State/subdivision, in the same proportion as was reported by Category I and Category II operators in the same area.

Adjustments

The instructions for Schedule A of Form EIA-23 specify that, when reporting reserves balance data, the following arithmetic equation must hold:

Proved Reserves at End of Previous Year
+ Revision Increases
– Revision Decreases
– Sales
+ Acquisitions
+ Extensions
+ New Field Discoveries
+ New Reservoir Discoveries in Old Fields
– Report Year Production
= Proved Reserves at End of Report Year

Any remaining difference in the State/subdivision annual reserves balance between the published previous year-end proved reserves and current year-end proved reserves not accounted for by the imputed reserves changes was included in the adjustments for the area. One of the primary reasons that adjustments are necessary is the instability of the Noncertainty operators sampled each year. There is no guarantee that in the smaller producing States/subdivision the same number of small operators will be selected each year, or that the operators selected will be of comparable sizes when paired with operators selected in a prior year. Thus, some instability of this stratum from year to year is unavoidable, resulting in minor adjustments.

Some of the adjustments are, however, more substantial, and could be required for any one or more of the following reasons:

- The frame coverage may or may not have improved between survey years, such that more or fewer Certainty operators were included in 2001 than in 2000.
- One or more operators may have reported data incorrectly on Schedule A in 2000 or 2001, but not both, and the error was not detected by edit processing.
- Operation of properties was transferred during 2001 from operators not in the frame or Noncertainty operators not selected for the sample to Certainty operators or Noncertainty operators selected for the sample.
- Respondent changed classification of natural gas from NA to AD or vice versa.
- The trend in reserve changes imputed for the small operators, that was based on the trend reported by the large operators, did not reflect the actual trend for the small operators.
- Noncertainty operators, who have grown substantially in size since they were added to the frame, occasionally cause a larger standard error than expected.
- The Noncertainty sample for either year in a state may have been an unusual one.

The causes of adjustments are known for some but not all areas. The only problems whose effects cannot be expected to balance over a period of several years are those associated with an inadequate frame or those associated with any actual trend in reserves changes for small operators not being the same as those for large operators. EIA continues to attempt to improve sources of operator data to resolve problems in frame completeness.

Sampling Reliability of the Estimates

The sample of Noncertainty operators selected is only one of the large number of possible samples that could have been selected and each would have resulted in different estimates. The standard error or sampling error of the estimates provides a measure of this variability. When probability sampling methods are used, as in the EIA-23 survey, the sampling error of estimates can also be estimated from the survey data.

The estimated sampling error can be used to compute a confidence interval around the survey estimate, with a prescribed degree of confidence that the interval covers the value that would have been obtained if all operators in the frame had been surveyed. If the estimated volume is denoted by $\hat{V}_s$ and its sampling error by S.E. ($\hat{V}_s$), the confidence interval can be expressed as:

$$\hat{V}_s \pm k\, S.E.(\hat{V}_s)$$

where k is a multiple selected to provide the desired level of confidence. For this survey, k was taken equal to 2. Then there is approximately 95 percent confidence that the interval:

$$\hat{V}_s \pm 2S.E.(\hat{V}_s)$$

includes the universe value, for both the estimates of reserves and production volumes. Correspondingly, for approximately 95 percent of the estimates in this report, the difference between the published estimate and the value that would be found from a complete survey of all operators is expected to be less than twice the sampling error of the estimate. **Tables F7 and F8** provide estimates for 2S.E. ($\hat{V}_s$) by product. These estimates are directly applicable for constructing approximate 95 percent confidence intervals. For example, the 95 percent confidence interval for dry natural gas proved reserves is 183,460 ± 1,037 billion cubic feet. The sampling error of $\hat{V}_s$ is equal to the sampling error of the noncertainty estimate $\hat{V}_{sr}$, because the certainty total is not subject to sampling error. The estimated sampling error of a noncertainty estimate is the square root of its estimated sampling variance.

The noncertainty estimate for a given State/subdivision had two separately weighted components based on reports of:

- **Type 1 Operators** shown in the frame as having crude oil or natural gas production in the State/subdivision.
- **Type 2 Operators** shown in the frame as having no crude oil or natural gas production in the State/subdivision.

Correspondingly, the sampling variance had two components associated with the estimated production from each component:

$$Var(\hat{V}_{sr}) = Var(\hat{V}_{sr1}) + Var(\hat{V}_{sr2})$$

The *Var(Vsr)* was estimated as the sum of the estimated variances of the two component estimates. The variance for any component, say component *j*, was estimated from the formula:

$$Var(\hat{V}_{srj}) = n_{srj}\left(\frac{W_{srj}-1}{W_{srj}}\right)S^2_{srj}$$

In general, $\hat{V}_{srj}$ denotes the production estimate from component *j* for each of the two types of operator, and $Var\left(\hat{V}_{srj}\right)$ denotes its variance where:

n_{srj} = Number of operators in sample in component *j*

w_{srj} = Weight for operator reports in component *j*

S^2_{srj} = variance between operator reports in component *j*.

If the subscripts *sr* are dropped, S^2_{srj} can be expressed as:

$$S_j^2 = \frac{\sum_i^{n_j} V_{ji}'^2 - \left(\sum_i^{n_j} V_{ji}'\right)^2 / n_j}{n_j - 1}$$

Where

V_{ji}' = Weighted production or reserves volume for the *i*-th sample operator in the component *j*.

The variance of the estimated total volume for a State having subdivisions is the sum of corresponding Type 1 and Type 2 components where the classification of operators by type is with regard to the State as a whole; e.g. Type 2 operators at the State level are those that were not shown in the sample frame as having production anywhere in the State.

Since there are no operators in the frame who would be classified as Type 2 at the U.S. level, there would be no Type 2 components at the U.S. Level. Therefore, at the U.S. Level, there was only one sample variance component calculated for Type 1 operators.

Nonsampling Errors

Several sources of possible error, apart from sampling error, are associated with the Form EIA-23 survey. These include bias due to nonresponse of operators in the sample, proved reserve estimation errors, and reporting errors on the part of the respondents to the survey. On the part of EIA, possible errors include inadequate frame coverage, data processing error, and errors associated with statistical estimates. Each of these sources is discussed below. An estimate of the

Table F7. Factors for Confidence Intervals (2S.E.) for Crude Oil Proved Reserves and Production, 2001
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2001 Reserves	2001 Production
United States	33	5
Alabama	2	0
Alaska[a]	0	0
Arkansas	12	2
California[b]	0	0
Coastal Region Onshore[b]	0	0
Los Angeles Basin Onshore[b]	0	0
San Joaquin Basin Onshore[b]	0	0
State Offshore[a]	0	0
Colorado[b]	0	0
Florida[a]	0	0
Kansas	15	1
Kentucky	10	1
Louisiana[b]	0	0
North[b]	0	0
South Onshore[b]	0	0
State Offshore[a]	0	0
Michigan	0	0
Mississippi	4	1
Montana[b]	0	0
New Mexico[b]	0	0
East[b]	0	0
West[b]	0	0
New York	0	0
North Dakota	24	5
Ohio	7	0
Oklahoma	12	1
Pennsylvania	0	0
Texas[b]	0	0
RRC District 1[b]	0	0
RRC District 2 Onshore[b]	0	0
RRC District 3 Onshore[b]	0	0
RRC District 4 Onshore[b]	0	0
RRC District 5[b]	0	0
RRC District 6[b]	0	0
RRC District 7B[b]	0	0
RRC District 7C[b]	0	0
RRC District 8[b]	0	0
RRC District 8A[b]	0	0
RRC District 9[b]	0	0
RRC District 10[b]	0	0
State Offshore[a]	0	0
Utah[b]	7	1
Virginia[a]	0	0
West Virginia	1	0
Wyoming[b]	0	0
Federal Offshore[a]	0	0
Pacific (California)[a]	0	0
Gulf of Mexico (Louisiana)[a]	0	0
Gulf of Mexico (Texas)[a]	0	0
Miscellaneous[d]	11	1

[a]Sampling rate was 100 percent in Alaska, Florida Onshore, Virginia, and Offshore areas.
[b]Sampling was not used. Estimates for each operator were made using an imputation function.
[c]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.

Notes: Confidence intervals are associated with Table 6 reserves and production data. Factors for confidence intervals for each State and the United States are independently estimated and do not add.

Source: Factor estimates based on data filed on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” 2001.

Table F8. Factors for Confidence Intervals (2S.E.) for Natural Gas Proved Reserves and Production, Wet After Lease Separation, 2001 (Billion Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

State and Subdivision	2001 Reserves	2001 Production
United States	213	22
Alabama	0	0
Alaska[a]	0	0
Arkansas	35	6
California[b]	0	0
Coastal Region Onshore[b]	0	0
Los Angeles Basin Onshore[b]	0	0
San Joaquin Basin Onshore[b]	0	0
State Offshore[b]	0	0
Colorado[b]	0	0
Florida[a]	0	0
Kansas	58	7
Kentucky	23	3
Louisiana[b]	0	0
North[b]	0	0
South Onshore[b]	0	0
State Offshore[a]	0	0
Michigan	108	11
Mississippi	52	6
Montana[b]	0	0
New Mexico[b]	0	0
East[b]	0	0
West[b]	0	0
New York	102	4
North Dakota	27	7
Ohio	116	13
Oklahoma	70	9
Pennsylvania	0	0
Texas[b]	0	0
RRC District 1[b]	0	0
RRC District 2 Onshore[b]	0	0
RRC District 3 Onshore[b]	0	0
RRC District 4 Onshore[b]	0	0
RRC District 5[b]	0	0
RRC District 6[b]	0	0
RRC District 7B[b]	0	0
RRC District 7C[b]	0	0
RRC District 8[b]	0	0
RRC District 8A[b]	0	0
RRC District 9[b]	0	0
RRC District 10[b]	0	0
State Offshore[a]	0	0
Utah[b]	0	0
Virginia[a]	0	0
West Virginia	55	3
Wyoming[b]	0	0
Federal Offshore[a c]	0	0
Pacific (California)[a]	0	0
Gulf of Mexico (Louisiana)[a c]	0	0
Gulf of Mexico (Texas)[a]	0	0
Miscellaneous[d]	1	0

[a]Sampling rate was 100 percent in Alaska, Florida Onshore, Virginia, and Offshore areas.
[b]Sampling was not used. Estimates for each operator were made using an imputation function.
[c]Includes Federal offshore Alabama.
[d]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.

Notes: Confidence intervals are associated with Table 8 reserves and production data. Factors for confidence intervals for each State and the United States are independently estimated and do not add.

Source: Factor estimates based on data filed on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” 2001 bias from nonresponse is presented in the section on adjustment for operator nonresponse.

Assessing the Accuracy of the Reserve Data

The EIA maintains an evaluation program to assess the accuracy and quality of proved reserve estimates gathered on Form EIA-23. Field teams consisting of petroleum engineers from EIA's Reserves and Production Division conduct technical reviews of reserve estimates and independently estimate the proved reserves of a statistically selected sample of operator properties. The results of these reviews are used to evaluate the accuracy of reported reserve estimates. Operators are apprized of the team's findings to assist them in completing future filings. The magnitude of errors due to differences between reserve volumes submitted by operators on the Form EIA-23 and those estimated by EIA petroleum engineers on their field trips were generally within accepted professional engineering standards.

Respondent Estimation Errors

The principal data elements of the Form EIA-23 survey consist of respondent estimates of proved reserves of crude oil, natural gas, and lease condensate. Unavoidably, the respondents are bound to make some estimation errors, i.e., until a particular reservoir has been fully produced to its economic limit and abandoned, its reserves are not subject to direct measurement but must be inferred from limited, imperfect, or indirect evidence. A more complete discussion of the several techniques of estimating proved reserves, and the many problems inherent in the task, appears in Appendix G.

Reporting Errors and Data Processing Errors

Reporting errors on the part of respondents are of definite concern in a survey of the magnitude and complexity of the Form EIA-23 program. Several steps were taken by EIA to minimize and detect such problems. The survey instrument itself was carefully developed, and included a detailed set of instructions for filing data, subject to a common set of definitions similar to those already used by the industry. Editing software is continually developed to detect different kinds of probable reporting errors and flag them for resolution by analysts, either through confirmation of the data by the respondent or through submission of amendments to the filed data. Data processing errors, consisting primarily of random keypunch errors, are detected by the same software.

Imputation Errors

Some error, generally expected to be small, is an inevitable result of the various estimations outlined. These imputation errors have not yet been completely addressed by EIA and it is possible that estimation methods may be altered in future surveys. Nationally, 4 percent of the crude oil proved reserve estimates, 4 percent of the wet natural gas proved reserve estimates, and 3 percent of the lease condensate proved reserve estimates resulted from the imputation and estimation of reserves for those Certainty and Noncertainty operators who did not provide estimates for all of their properties, in combination with the expansion of the sample of Noncertainty operators to the full population. Errors for the latter were quantitatively calculated, as discussed in the previous section. Standard errors, for the former, would tend to cancel each other from operator to operator, and are, therefore, expected to be negligible, especially at the National level of aggregation. In States where a large share of total reserves is accounted for by Category III and smaller Category II operators, the errors are expected to be somewhat larger than in States where a large share of total reserves is accounted for by Category I and larger Category II operators.

Frame Coverage Errors

Of all the sources of controllable error connected with the Form EIA-23 survey, errors in the operator frame were expected to be the most important. If the frame does not list all operators in a given State, the sample selected from the frame for the State will not represent the entire operator population, a condition called under coverage. Under coverage is a problem with certain States, but it does not appear to be a problem with respect to the National proved reserve estimates for either crude oil or natural gas. While it is relatively straightforward to use existing sources to identify large operators and find addresses for them, such is not the case for small operators. A frame such as that used in the 1999 survey is particularly likely to be deficient in States where a large portion of total reserves and production is accounted for by small operators. These States are not likely to allocate sufficient resources to keep track of all operators on a current basis. Some under coverage of this type seems to exist, particularly, with reference to natural gas operators. EIA is continuing to work to remedy the under coverage problem in those States where it occurred.

Calculation of Reserves of Natural Gas Liquids and Dry Natural Gas

Natural Gas Liquids Reserve Balance

The published reserves, production, and reserves change statistics for crude oil, lease condensate, and natural gas, wet after lease separation, were derived from the data reported on Form EIA-23 and the application of the imputation methods discussed previously. The information collected on Form EIA-64A was then utilized in converting the estimates of the wet natural gas reserves into two components: plant liquids reserve data and dry natural gas reserve data. The total natural gas liquids reserve estimates presented in **Table 14** were computed as the sum of plant liquids estimates (**Table 15**) and lease condensate (**Table 16**) estimates.

To generate estimates for each element in the reserves balance for plant liquids in a given producing area, the first step was to group all natural gas processing plants that reported this area as an area-of-origin on their Form EIA-64A, and then sum the liquids production attributed to this area over all respondents. Next, the ratio of the liquids production to the total wet natural gas production for the area was determined. This ratio represented the percentage of the wet natural gas that was recovered as natural gas liquids. Finally, it was assumed that this ratio was applicable to the reserves and each component of reserve changes (except adjustments), as well as production. Therefore, each element in the wet natural gas reserves balance was multiplied by this recovery factor to yield the corresponding estimate for plant liquids. Adjustments of natural gas liquids were set equal to the difference between the end of previous year reserve estimates, based upon the current report year Form EIA-23 and Form EIA-64A surveys, and the end of current year reserve estimates published in the preceding year's annual reserves report.

Natural Gas Reserve Balance

This procedure involved downward adjustments of the natural gas data, wet after lease separation, in estimating the volumes of natural gas on a fully dry basis. These reductions were based on estimates of the gaseous equivalents of the liquids removed (in the case of production), or expected to be removed (in the case of reserves), from the natural gas stream at natural gas processing plants. Form EIA-64A collected the volumetric reduction, or **shrinkage**, of the input natural gas stream that resulted from the removal of the NGL at each natural gas processing plant.

The shrinkage volume was then allocated to the plant's reported area or areas of origin. Because shrinkage is, by definition, roughly in proportion to the NGL recovered, i.e. the NGL produced, the allocation was in proportion to the reported NGL volumes for each area of origin. However, these derived shrinkage volumes were rejected if the ratio between the shrinkage and the NGL production (gas equivalents ratio) fell outside certain limits of physical accuracy. The ratio was expected to range between 1,558 cubic feet per barrel (where NGL consists primarily of ethane) and 900 cubic feet per barrel (where NGL consists primarily of natural gasolines). When the computed gas equivalents ratio fell outside these limits, an imputed ratio was utilized to estimate the plant's natural gas shrinkage allocation to each reported area of origin.

This imputed ratio was that calculated for the aggregate of all other plants reporting production and shrinkage, and having a gas equivalent ratio within the aforesaid limits, from the area in question. The imputed area ratio was applied only if there were at least five plants to base its computation on. If there were less than five plants, the imputed ratio was calculated based on all plants in the survey whose individual gas equivalents ratio was within the acceptable limits. Less than one percent of the liquids production was associated with shrinkage volumes imputed in this manner. Based on the 2001 Form EIA-64A survey, the national weighted average gas equivalents ratio was computed to be 1,397 cubic feet of natural gas shrinkage per barrel of NGL recovered. The total shrinkage volume (reported plus imputed) for all plants reporting a given area of origin was then subtracted from the estimated value of natural gas production, wet after lease separation, yielding dry natural gas production for the area. The amount of the reduction in the wet natural gas production was then expressed as a percentage of the wet natural gas production. Dry natural gas reserves and reserve changes were determined by reducing the wet natural gas reserves and reserve changes by the same percentage reduction factor.

A further refinement of the estimation process was used to generate an estimate of the natural gas liquids reserves in those States with coalbed methane fields. The States where this procedure was applied were Alabama, Colorado, Kansas, New Mexico, Oklahoma, Pennsylvania, Utah, Virginia, West Virginia, and Wyoming. The first step in the process was to identify all Form EIA-23 reported coalbed methane fields. The assumption was made that coalbed methane fields contained little or no extractable natural gas liquids. Therefore, when the normal shrinkage procedure was applied to the wet gas volume reserve components, the estimate of State coalbed methane volumes were excluded and were not reduced for liquid extraction. Following the computation for shrinkage, each coalbed field gas volume reserve components was added back to each of the dry gas volume reserve components in a State. The effect of this is that the large increases in reserves in some States from coalbed methane fields did not cause corresponding increases in the State natural gas liquids proved reserves.

Adjustments of dry natural gas were set equal to the difference between the end of previous year reserves estimates, based upon the current report year Form EIA-23 and Form EIA-64A surveys, and the end of current year reserve estimates published in the preceding year's annual reserves report.

Each estimate of end of year reserves and report year production has associated with it an estimated sampling error. The standard errors for dry natural gas were computed by multiplying the wet natural gas standard errors by these same percentage reduction factors. **Table F7** provides estimates for 2 times the $S.E.(\hat{V}_s)$ for dry natural gas.

Appendix G

Estimation of Reserves and Resources

Estimation of Reserves and Resources

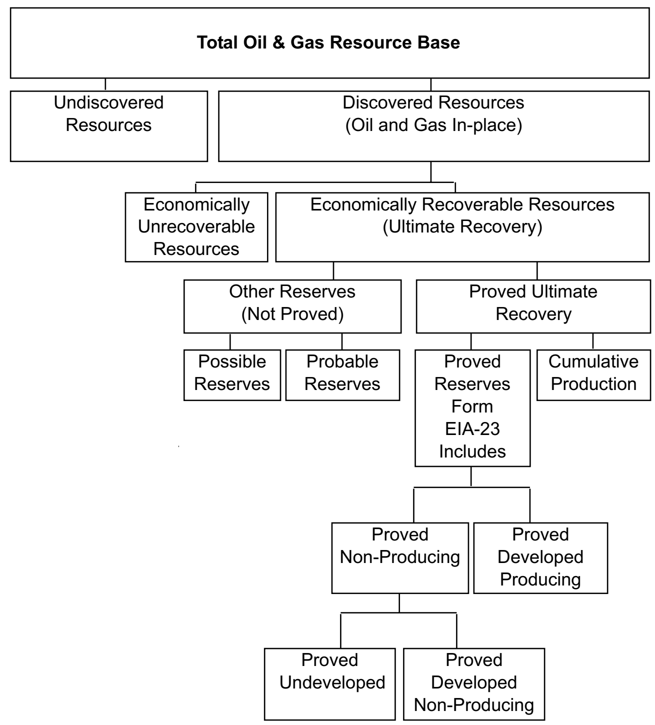
Oil and Gas Resource Base

Universally accepted definitions have not been developed for the many terms used by geologists, engineers, accountants and others to denote various components of overall oil and gas resources. In part, this is because most of these terms describe estimated and therefore uncertain, rather than measured, quantities. The lack of standardized terminology sometimes leads to inaccurate understanding of the meaning and/or import of estimates. Particularly common is an apparently widespread lack of understanding of the substantial difference between the terms "reserves" and "resources", as indicated by the frequent misuse of either term in place of the other.

The total resource base of oil and gas is the entire volume formed and trapped in–place within the Earth before any production. The largest portion of this total resource base is nonrecoverable by current or foreseeable technology. Most of the nonrecoverable volume occurs at very low concentrations throughout the earth's crust and cannot be extracted short of mining the rock or the application of some other approach that would consume more energy than it produced. An additional portion of the total resource base cannot be recovered because currently available production techniques cannot extract all of the in–place oil and gas even when present in commercially viable concentrations. The inability to recover all of the in–place oil and gas from a producible deposit occurs because of unfavorable economics, intractable physical forces, or a combination of both. Recoverable resources, the subset of the total resource base that is of societal and economic interest, are defined so as to exclude these nonrecoverable portions of the total resource base.

The structure presented in **Figure G1** outlines the total resource base and its components. The total resource base first consists of the recoverable and nonrecoverable portions discussed above. The next level down divides recoverable resources into discovered and undiscovered segments. Discovered resources are further separated into cumulative (i.e., all past) production, and reserves. Reserves are additionally subdivided into proved reserves and "other reserves".

Figure G1. Components of the Oil and Gas Resource Base



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

Recoverable Resources

Discovered recoverable resources are those economically recoverable quantities of oil and gas for which specific locations are known. While the specific locations of estimated undiscovered recoverable resources are not yet known, they are believed to exist in geologically favorable settings.

Current estimates of undiscovered recoverable resources merit discussion in order to provide a useful sense of scale relative to proved reserves. The sources of official estimates of domestic undiscovered recoverable resources are two agencies of the Department of the Interior (DOI), the United States Geological Survey (USGS) for onshore areas and those offshore waters subject to State jurisdiction, and the Minerals Management Service (MMS) for those offshore waters under Federal jurisdiction.

The USGS defines undiscovered recoverable conventional resources as those expected to be resident in accumulations of sufficient size and quality that they could be produced using conventional recovery technologies, without regard to present economic viability. Therefore, only part of the USGS undiscovered recoverable conventional resource is economically recoverable now. The USGS also defines a class of resources that occur in "continuous–type" accumulations. Unlike conventional oil and gas accumulations, continuous–type accumulations do not occur in discrete reservoirs of limited areal extent. They include accumulations in low–permeability (tight) sandstones, shales, and chalks, and those in coal beds. Again, only part of the continuous–type technically recoverable resource is economically recoverable now. In fact, only a small portion of the in–place continuous–type resource accumulations are estimated to be technically recoverable now. **Table G1** presents a compilation of USGS and MMS estimates.

Technically recoverable resources of dry natural gas (discovered, unproved, and undiscovered) are estimated at 1,431 trillion cubic feet (**Table G1**). Adding the 2001 U.S. proved reserves of 183 trillion cubic feet yields a technically recoverable resource target of 1,614 trillion cubic feet. This is about 82 times the 2001 dry gas production level.

Other organizations have also estimated unproven technically recoverable gas resources. For example, the Potential Gas Committee (PGC), an industry sponsored group, provides detailed geology–based gas resource estimates every 2 years. In 2000 the PGC mean estimate of potential gas resources was 1,091 trillion cubic feet, about 340 trillion cubic feet less than the estimates in **Table G1**. Another recent estimate was made by the National Petroleum Council (NPC), an industry–based group that serves in an advisory capacity to the U.S. Secretary of Energy. The NPC's estimate, based on data available at year–end 1999, was 1,555 trillion cubic feet, 124 trillion cubic feet more than the estimates summarized in **Table G1**. The differences among these estimates are usually due to the availability of newer data, differences in coverage or resource category definitions, and legitimate but differing data interpretations.

While the estimation of undiscovered resources is certainly a more imprecise endeavor than is the estimation of proved reserves, it is clear that substantial volumes of technically recoverable oil and gas resources remain to be found and produced domestically. Current estimates indicate that as much domestic gas remains to be found and then produced as has been to date. Of course, much effort, investment and time will be required to bring this gas to market.

There is a perception that the oil resource base has been more intensively developed than the gas resource base. And in fact, more oil has been produced in the United States than is estimated as remaining recoverable. Nevertheless, the ratio of unproven technically recoverable oil resources to 2001 oil production (**Table G1**) was about 91 to 1, higher than the comparable gas ratio.

Federal Land Resources

Estimates of technically recoverable resources that underlie Federal jurisdiction lands are listed in **Table G1**. These estimates are based on National assessments performed by the USGS and the MMS. It is estimated that 60 percent of the technically recoverable resources of crude oil, 52.4 percent of the dry gas resources, and 34.7 percent of the natural gas liquids resources underlie Federal lands.

Discovered Resources

In addition to cumulative production, which is the sum of current year production and the production in all prior years, estimates of discovered recoverable resources include estimates of reserves. Broadly, reserves are those volumes that are believed to be recoverable in the future from known deposits through the eventual application of present or anticipated technology.

Reserves

Reserves include both **proved reserves** and **other reserves**. Several different reserve classification systems are in use by different organizations, as preferred for operational reasons. These systems utilize and incorporate various definitions of terms such as *measured reserves*, *indicated reserves*, *inferred reserves*,

Table G1. Mean Estimates of Technically Recoverable Oil and Gas Resources by Deposit Type and Location

Area	Jurisdiction	Crude Oil[a] (billion barrels)	Natural Gas (Dry) (trillion cubic feet)	Natural Gas Liquids (billion barrels)
Undiscovered Conventionally Reservoired Fields				
Alaska Onshore + State Offshore	Federal	3.75	33.97	0.54
Alaska Onshore + State Offshore	Other	4.68	95.37	0.61
Alaska Federal Offshore	Federal	24.90	122.60	0.00
Lower 48 States Onshore + State Offshore	Federal	3.79	23.97	1.26
Lower 48 States Onshore + State Offshore	Other	17.83	166.41	5.64
Lower 48 States Federal Offshore	Federal	50.10	239.60	0.00
Alaska Subtotal		33.33	251.94	1.15
Alaska Percentage Federal		86.0%	62.1%	47.0%
Lower 48 States Subtotal		71.72	429.98	6.90
Lower 48 States Percentage Federal		75.1%	61.3%	18.3%
Technically Recoverable Resources in U.S. Undiscovered Conventionally Reservoired Fields		**105.05**	**681.92**	**8.05**
Percentage Federal		**78.6%**	**61.6%**	**22.4%**
Ultimate Recovery Appreciation				
U.S. Onshore + State Offshore	Federal	14.33	118.70	4.94
U.S. Onshore + State Offshore	Other	45.67	203.30	8.46
U.S. Federal Offshore	Federal	7.70	68.00	0.00
Technically Recoverable Resources in U.S. from Ultimate Recovery Appreciation in Discovered Conventionally Reservoired Fields		**67.70**	**390.00**	**13.40**
U.S. Percentage Federal		**32.5%**	**47.9%**	**36.9%**
Continuous Type Deposits				
Non-coal bed	Federal	0.32	127.08	1.45
Non-coal bed	Other	1.75	181.72	0.67
Coal bed	Federal	0.00	16.08	0.00
Coal bed	Other	0.00	33.83	0.00
Non-coal bed Subtotal		2.07	308.80	2.12
Non-coal bed Percentage Federal		15.5%	41.2%	68.4%
Coal bed Subtotal		0.00	49.91	0.00
Coal bed Percentage Federal		0.0%	32.2%	0.0%
Technically Recoverable Resources in U.S. from Continuous Type Deposits		**2.07**	**358.71**	**2.12**
Continuous Type Percentage Federal		**15.5%**	**39.9%**	**68.4%**
U.S. Totals All Sources				
U.S. Onshore + State Offshore	Federal	22.19	319.80	8.19
U.S. Onshore + State Offshore	Other	69.93	680.63	15.38
Federal Offshore	Federal	82.70	430.20	0.00
Federal Subtotal		104.89	750.00	8.19
U.S. Technically Recoverable Resources		**174.82**	**1,430.63**	**23.57**
Percentage Federal		**60.0%**	**52.4%**	**34.7%**

Notes:
Proved Reserves are not included in these estimates.
Federal Onshore excludes Indian and Native lands even when Federally managed in trust.
Zero (0) indicates either that none exists in this area or that no estimate of this resource has been made for this area.

Table G1. Mean Estimates of Technically Recoverable Oil and Gas Resources by Deposit Type and Location (continued)

Notes (continued): Federal Offshore indicates MMS estimates for Federal Offshore jurisdictions (Outer Continental Shelf and deeper water areas seaward of State Offshore).

Probable and Possible reserves are considered by USGS definition to be part of USGS Reserve Growth, but are separately considered by the MMS as its Unproved Reserves term. The USGS did not set a time limit for the duration of Reserve Growth; the MMS set the year 2020 as the time limit in its estimates of Reserve Growth in existing fields of the Gulf of Mexico.

Excluded from the estimates are undiscovered oil resources in tar deposits and oil shales, and undiscovered gas resources in geopressured brines and gas hydrates.

Data Sources: National Oil and Gas Resource Assessment Team, *1996 National Assessment of United States Oil and Gas Resources,* Circular 1118, United States Geological Survey, Washington DC, 1995.

D.L Gautier, G.L. Dolton, and E.D. Atanasi, *1995 National Oil and Gas Assessment and Onshore Federal Lands,* Open File Report 95-75-N, United States Geological Survey, Washington DC, January 1998.

Resource Evaluation Program, *Outer Continental Shelf Petroleum Assessment 2000,* Brochure 7, Minerals Management Service, Washington, DC, January 2001 at <http://www.mms.gov/revaldiv/RedNatAssessment.htm>.

Resource Evaluation Program, *An Assessment of the Undiscovered Hydrocarbon Potential of the Nation's Outer Continental Shelf,* OCS Report MMS 96-0034, Minerals Management Service, Washington, DC, 1996.

Minerals Management Service, *Mineral Revenues 1996,* U.S. Department of the Interior, Washington, DC, 1997, Table 12 on p. 33 and Table 23 on p. 70.

Energy Information Administration, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 1996 Annual Report,* Washington, DC, December 1997, Table 15 on p. 39.

Energy Information Administration, *Petroleum Supply Annual 1996,* Washington, DC, June 1997, Volume 1, Table 14 on p. 96.

Energy Information Administration, *Natural Gas Annual 1996,* Washington, DC, September 1997, Table 3 on p. 12.

probable reserves, and *possible reserves*. As used by the different organizations, the definitions that attach to these terms sometimes overlap, or the terms may require a slightly different interpretation from one organization to the next. Nevertheless, all kinds of "other reserves" are generally less well known and therefore less precisely quantifiable than proved reserves, and their eventual recovery is less assured.

Measured reserves are defined by the USGS as that part of the identified (i.e., discovered) economically recoverable resource that is estimated from geologic evidence and supported directly by engineering data.{43} They are similarly defined by the MMS, although its system also subdivides them by degree of development and producing status.{44} Measured reserves are demonstrated with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions, and are essentially equivalent to proved reserves as defined by the EIA. Effectively, estimates of proved reserves may be thought of as reasonable estimates (as opposed to exact measures) of "on–the–shelf inventory".

Inferred reserves and indicated reserves, due to their more uncertain economic or technical recoverability, are included in the "other reserves" category. The USGS defines inferred reserves as that part of the identified economically recoverable resource, over and above both measured and indicated (see below) reserves, that will be added to proved reserves in the future through extensions, revisions, and the discovery of new pay zones in already discovered fields.{43} Inferred reserves are considered equivalent to "probable reserves" by many analysts, for example, those of the PGC.

Proved Reserves

The EIA defines proved reserves as those volumes of oil and gas that geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

When deterministic proved reserves estimation methods are used, the term reasonable certainty is intended to express a high degree of confidence that the estimated quantities will be recovered. When probabilistic methods are used there should be at least a 90 percent probability that the actual quantities recovered will exceed the estimate.

Proved reserves are either proved producing or proved nonproducing (i.e., resident in reservoirs that did not produce during the report year). The latter may represent a substantial fraction of total proved reserves.

Reserve Estimation Methodologies

The adoption of a standard definition of proved reserves for each type of hydrocarbon surveyed by the Form EIA–23 program provided a far more consistent response from operators than if each operator had used their own definition. Such standards, however, do not guarantee that the resulting estimates themselves are determinate. Regardless of the definition selected, proved reserves cannot be measured directly. They are estimated quantities that are inferred on the basis of the best geological, engineering, and economic data available to the estimator, who generally uses considerable judgment in the analysis and interpretation of the data. Consequently, the accuracy of a given estimate varies with and depends on the quality and quantity of raw data available, the estimation method used, and the training and experience of the estimator. The element of judgment commonly accounts for the differences among independent estimates for the same reservoir or field.

Data Used in Making Reserve Estimates

The raw data used in estimating proved reserves include the engineering and geological data for reservoir rock and its fluid content. These data are obtained from direct and indirect measurements. The data available for a given reservoir vary in kind, quality, and quantity. When a reservoir is first discovered only data from a single well are available, and prior to flow testing or actual production, proved reserves can only be inferred. As development of the reservoir proceeds, and flow tests are made or actual production commences, more and more data become available, enabling proved reserves estimates to become more accurate.

Many different kinds of data are useful in making reserves estimates. They may include: data on porosity, permeability, and fluid saturations of the reservoir rocks (obtained directly from core analysis or from various types of electrical measurements taken in a well or several wells); data on the production of fluids from a well or several wells; geologic maps of the areal extent, thickness, and continuity of the reservoir rocks (inferred from well logs, geophysical, and geological data); and reservoir pressure and temperature data. Also involved are economic data including the current price of crude oil and natural gas, and various developmental and operating costs.

Reserve Estimation Techniques

Depending on the kinds and amounts of data available, and a judgment on the reliability of those data, the estimator will select one of several methods of making a proved reserves estimate. Methods based on production performance data are generally more accurate than those based strictly on inference from geological and engineering data. Such methods include the *Production Decline* method (for crude oil or natural gas reservoirs), the *Material Balance* method (for crude oil reservoirs), the *Pressure Decline* method (which is actually a material balance, for natural gas reservoirs), and the *Reservoir Simulation* method (for crude oil or natural gas reservoirs). The reservoir type and production mechanisms and the types and amounts of reliable data available determine which of these methods is more appropriate for a given reservoir. These methods are of comparable accuracy.

Methods not based upon production data include the *Volumetric* method (for crude oil or natural gas reservoirs) and the *Nominal* method. Of these, the *Volumetric* method is the more accurate. Both methods, however, are less accurate than those based on production data. **Table G2** summarizes the various methods.

Table G2. Reserve Estimation Techniques

Method	Comments
Volumetric	Applies to crude oil and natural gas reservoirs. Based on raw engineering and geologic data.
Material Balance	Applies to crude oil and natural gas reservoirs. Is used in estimating reserves. Usually of more value in predicting reserves, and reservoir performance.
Pressure Decline	Applies to nonassociated and associated gas reservoirs. The method is a special case of material balance equation in the absence of water influx.
Production Decline	Applies to crude oil and natural gas reservoirs during production decline (usually in the later stages of reservoir life).
Reservoir Simulation	Applies to crude oil and natural gas reservoirs. Is used in estimating reserves. Usually of more value in predicting reservoir performance. Accuracy increases when matched with past pressure and production data.
Nominal	Applied to crude oil and natural gas reservoirs. Based on rule of thumb or analogy with another reservoir or reservoirs believed to be similar; least accurate of methods used.

Judgmental Factors in Reserve Estimation

The determination of rock and hydrocarbon fluid properties involves judgment and is subject to some uncertainty; however, the construction of the geologic maps and cross sections and the determination of the size of the reservoir are the major judgmental steps in the *Volumetric* method, and are subject to the greatest uncertainty. Estimates made using the *Material Balance* method, the *Reservoir Simulation* method, or the *Pressure Decline* method are based on the estimator's judgment that the type of reservoir drive mechanism has been identified and on the specification of abandonment conditions. Estimates based on the *Production Decline* method are subject to judgment in constructing the trend line, and are based on the estimator's assumption of reservoir performance through abandonment.

Contributing to the degree of uncertainty inherent in the above methods for estimating reserves are other factors associated with economic considerations and the perceived reservoir limits, which together influence the final reserves estimate. A brief discussion of these other factors follows.

Economic considerations: There has been continuing debate about the effects of prices on proved reserves. Although no all–inclusive statement can be made on the impact of price, the points at issue can be discussed and some general remarks can be made about some circumstances where price may be a factor.

- *Developed gas fields* – In a gas reservoir, price affects the economic limit (i.e., the production rate required to meet operating costs) and, therefore, the abandonment pressure. Thus, price change has some effect on the conversion of noneconomic hydrocarbon resources to the category of proved reserves. In both nearly depleted reservoirs and newly developed reservoirs, the actual increase in the quantity of proved reserves resulting from price rises is generally limited in terms of national volumes (even though the percentage increase for a given reservoir may be great).

- *Developed oil fields* – In developed crude oil reservoirs many of the same comments apply; however, there is an additional consideration. If the price is raised to a level sufficient to justify initiation of an improved recovery project, and if the improved recovery technique is effective, then the addition to ultimate recovery from the reservoir can be significant. Because of the speculative nature of predicting prices and costs many years into the future, proved reserves are estimated on the basis of current prices, costs, and operating practices in effect as of the date the estimation was made.

- *Successful exploration efforts* – Price can have a major impact on whether a new discovery is produced or abandoned. For example, the decision to set casing in a new onshore discovery, or to install a platform as the result of an offshore discovery, are both price–sensitive. If the decision is made to set pipe or to install a platform, the discoveries in both cases will add to the proved reserves total. If such projects are abandoned, they will make no contribution to the proved reserves total.

Effect of operating conditions: Operating conditions are subject to change caused by changes in economic conditions, unforeseen production problems, new production practices or methods, and the operator's financial position. As with economic conditions, operating conditions to be expected at the time of abandonment are speculative. Thus, current operating conditions are used in estimating proved reserves. In considering the effect of operating conditions, a distinction must be made between processes and techniques that would normally be applied by a prudent operator in producing his oil and gas, and initiation of changes in operating conditions that would require substantial new investment.

- *Compression* – Compression facilities are normally installed when the productive capacity or deliverability of a natural gas reservoir or its individual wells declines. In other cases compression is used in producing shallow, low–pressure reservoirs or reservoirs in which the pressure has declined to a level too low for the gas to flow into a higher pressure pipeline. The application of compression increases the pressure and, when economical, is used to make production into the higher pressure pipeline possible. Compression facilities normally require a significant investment and result in a change in operating conditions. It increases the proved reserves of a reservoir, and reasonably accurate estimates of the increase can be made.

- *Well stimulation* – Procedures that increase productive capacity (workovers, such as acidizing or fracturing, and other types of production practices) are routine field operations. The procedures accelerate the rate of production from the reservoir, or extend its life, and they have only small effect on proved reserves. Reasonable estimates of their effectiveness can be made.

- *Improved recovery techniques* – These techniques involve the injection of a fluid or fluids into a reservoir to augment natural reservoir energy. Because the response of a given reservoir to the application of an improved recovery technique cannot be accurately predicted, crude oil production that may ultimately result from the application of these techniques is classified as "indicated additional reserves of crude oil" rather than as proved reserves until response of the reservoir to the technique has been demonstrated. In addition, improved recovery methods are not applicable to all crude oil reservoirs. Initiation of improved recovery techniques may require significant investment.

- *Infill drilling* – Infill drilling (drilling of additional wells within a field/reservoir) may result in a higher recovery factor, and, therefore, be economically justified. Predictions of whether infill drilling will be justified under current economic conditions are generally based on the expected production behavior of the infill wells.

Reservoir limits: The initial proved reserves estimate made from the discovery well is subject to significant uncertainty because one well provides little information on the size of the reservoir. The area proved by a discovery well is frequently estimated on the basis of experience in a given producing region. Where there is continuity of the producing formation over wide geographic areas, a relatively large proved area may be assigned. In some cases where reliable geophysical and geological data are available, a reasonable estimate of the extent of the reservoir can be made by drilling a relatively small number of delineation wells. Conversely, a relatively small proved area may be assigned when the producing formation is of limited continuity, owing to either structural or lithological factors.

Additional wells provide more information and reduce the uncertainty of the reserves estimate. As additional wells are drilled, the geometry of the reservoir and, consequently, its bulk volume, become more clearly defined. This process accounts for the large extensions to proved reserves typical of the early stages of most reservoir development.

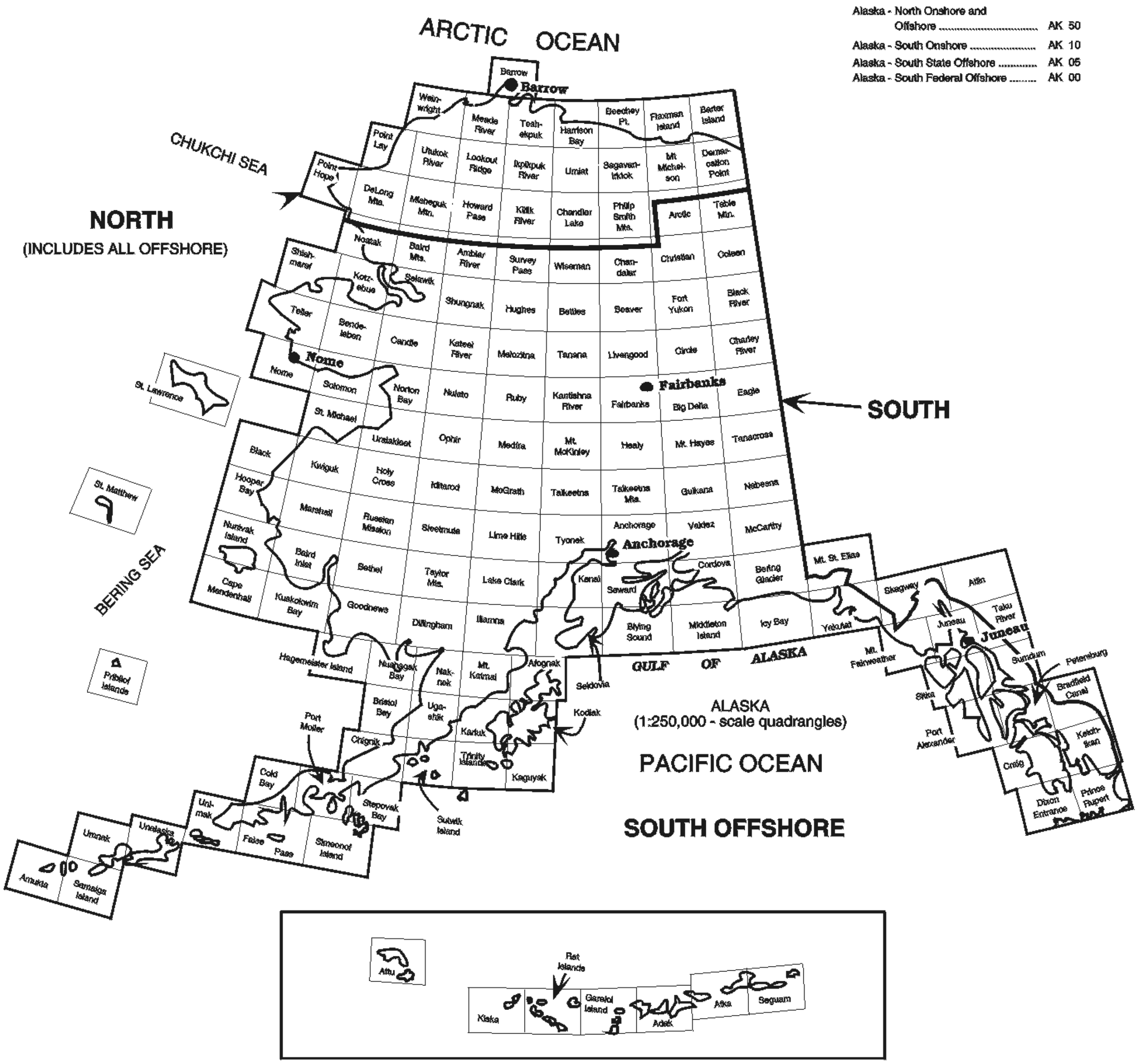
Appendix H

Maps of Selected State Subdivisions

Appendix H

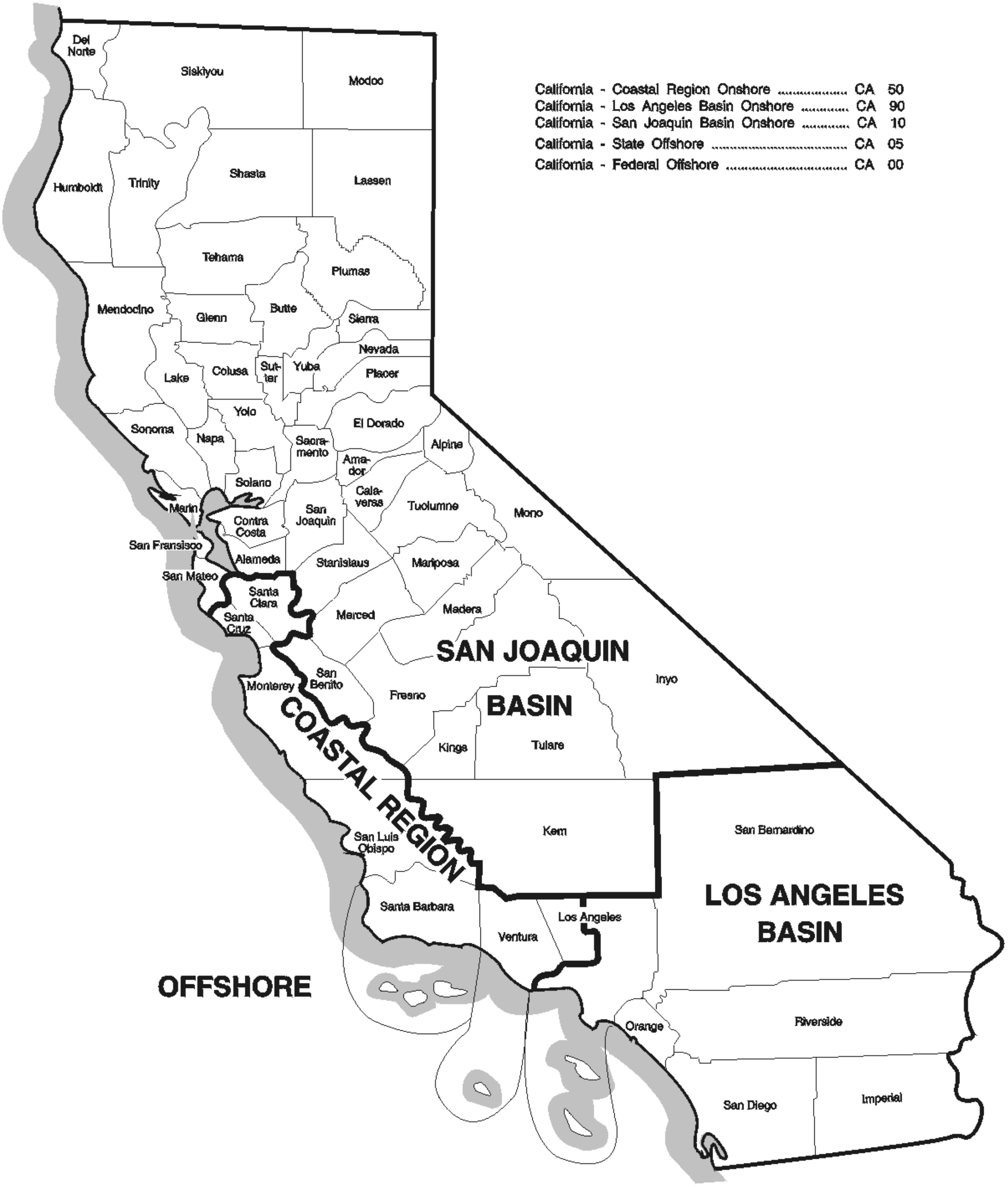
Maps of Selected State Subdivisions

Figure H1. Subdivisions of Alaska



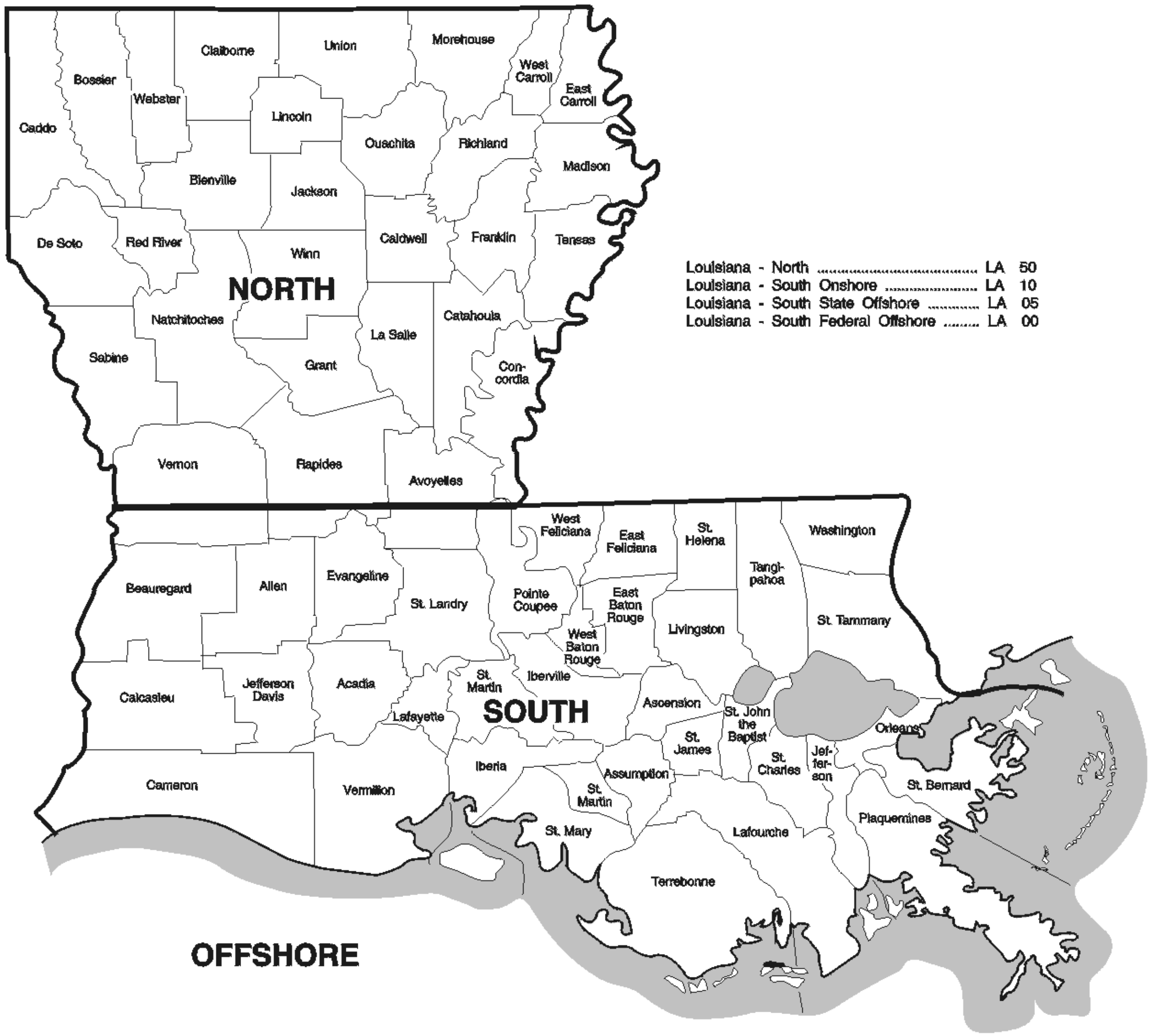
Source: After U.S. Geological Survey.

Figure H2. Subdivisions of California



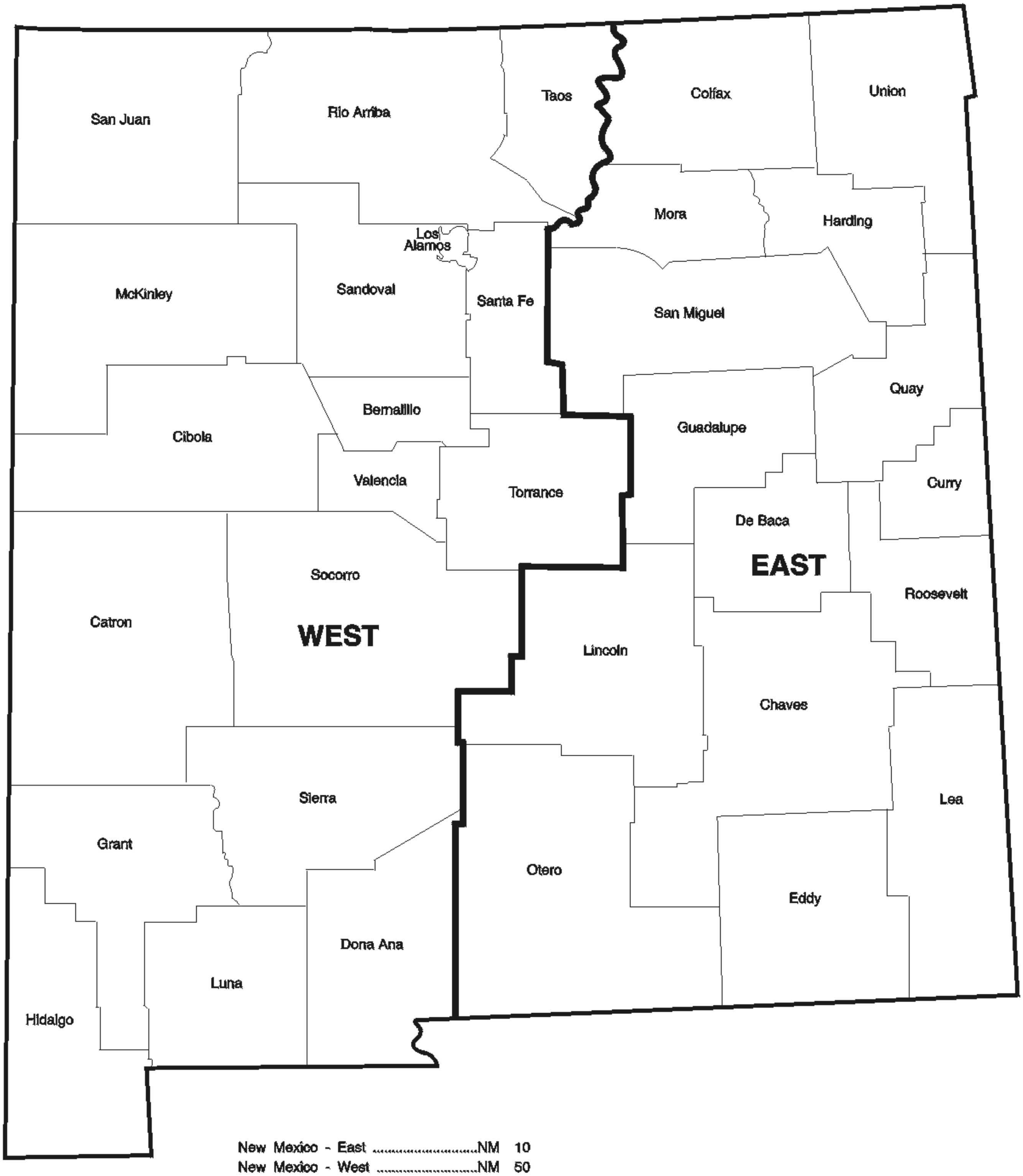
Source: Energy Information Administration, Office of Oil and Gas.

Figure H3. Subdivisions of Louisiana



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

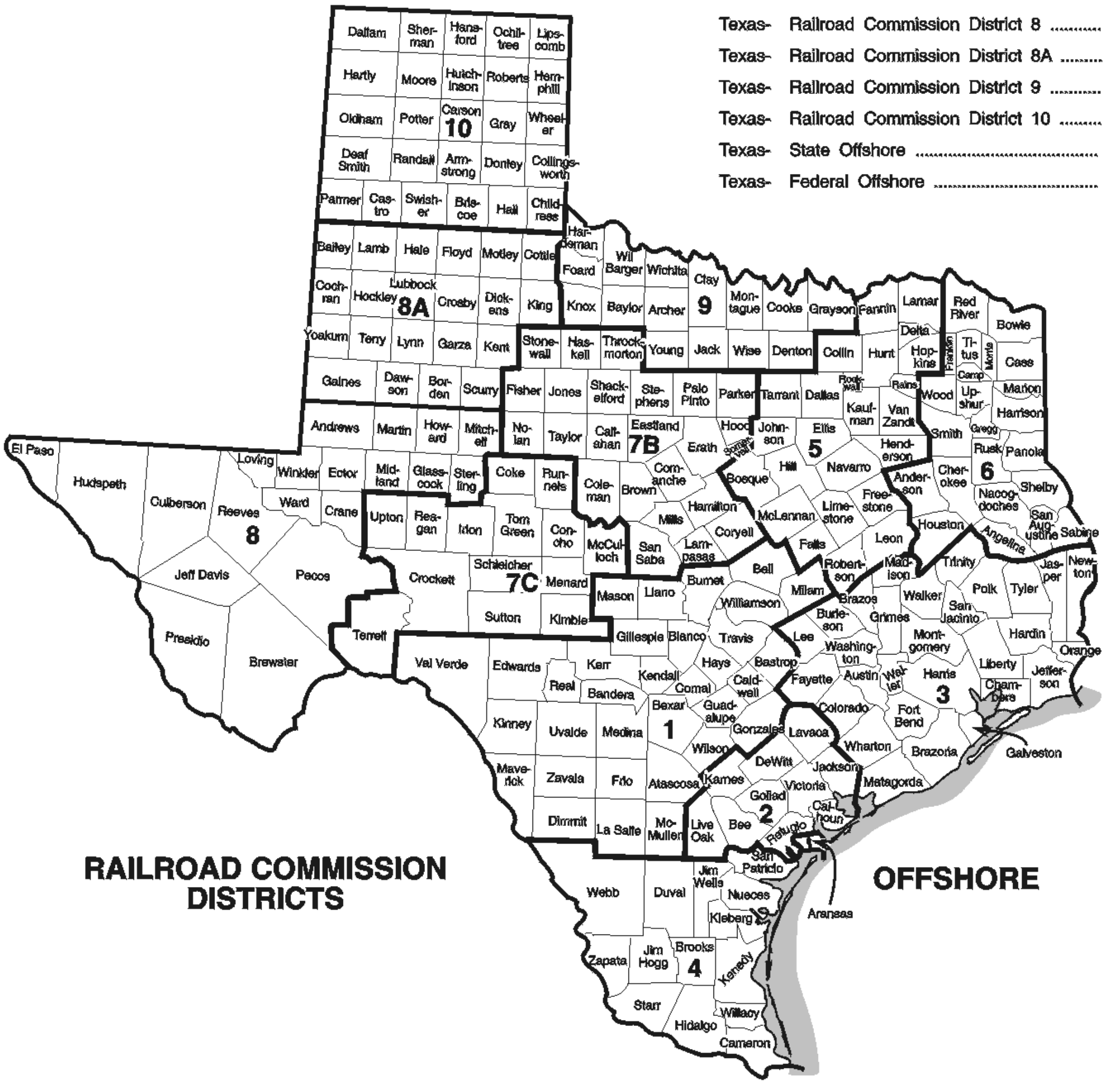
Figure H4. Subdivisions of New Mexico



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

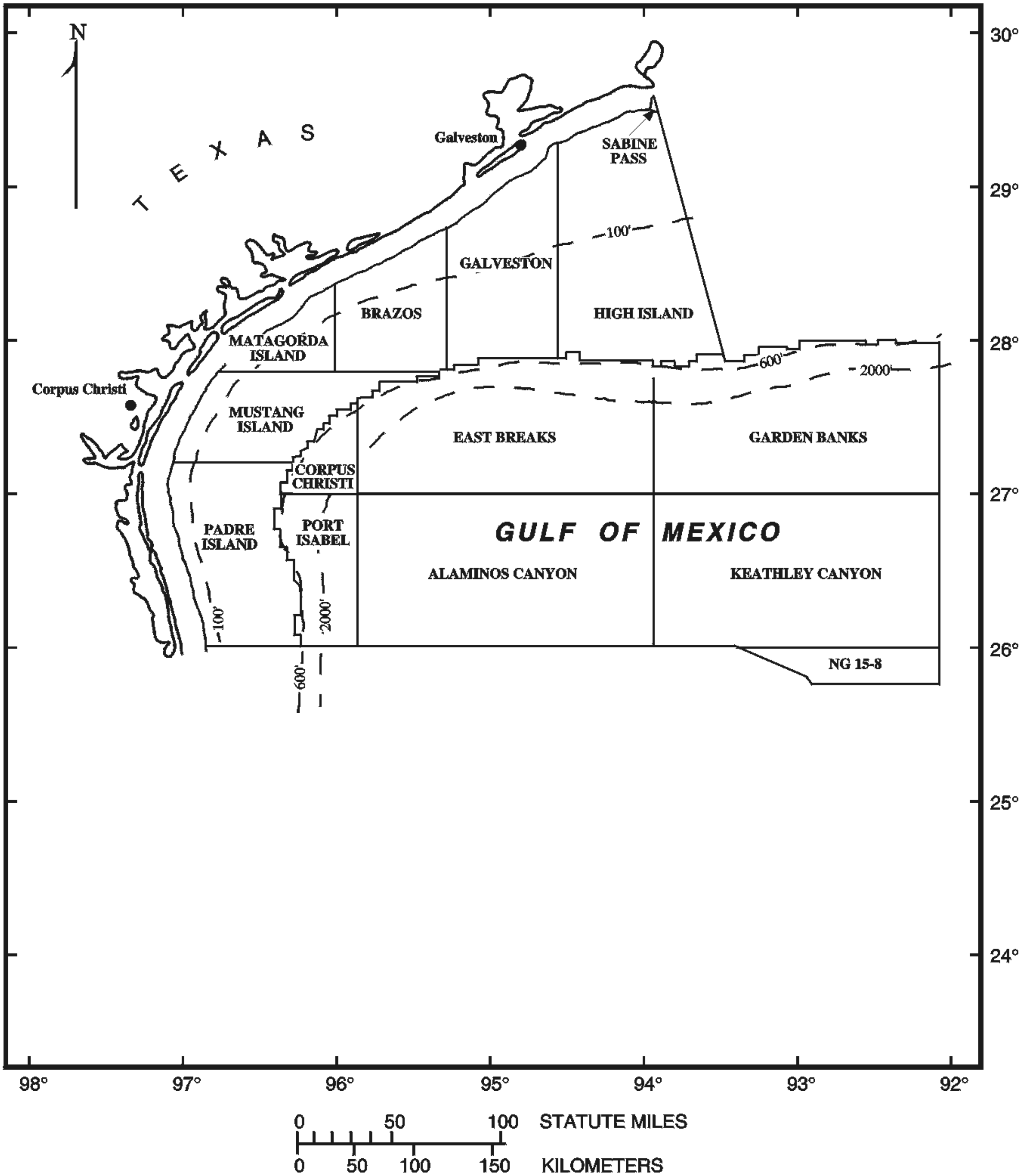
Figure H5. Subdivisions of Texas

Texas-	Railroad Commission District 1	TX 10
Texas-	Railroad Commission District 2 Onshore	TX 20
Texas-	Railroad Commission District 3 Onshore	TX 30
Texas-	Railroad Commission District 4 Onshore	TX 40
Texas-	Railroad Commission District 5	TX 50
Texas-	Railroad Commission District 6	TX 60
Texas-	Railroad Commission District 7B	TX 70
Texas-	Railroad Commission District 7C	TX 75
Texas-	Railroad Commission District 8	TX 80
Texas-	Railroad Commission District 8A	TX 85
Texas-	Railroad Commission District 9	TX 90
Texas-	Railroad Commission District 10	TX 95
Texas-	State Offshore	TX 05
Texas-	Federal Offshore	TX 00



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

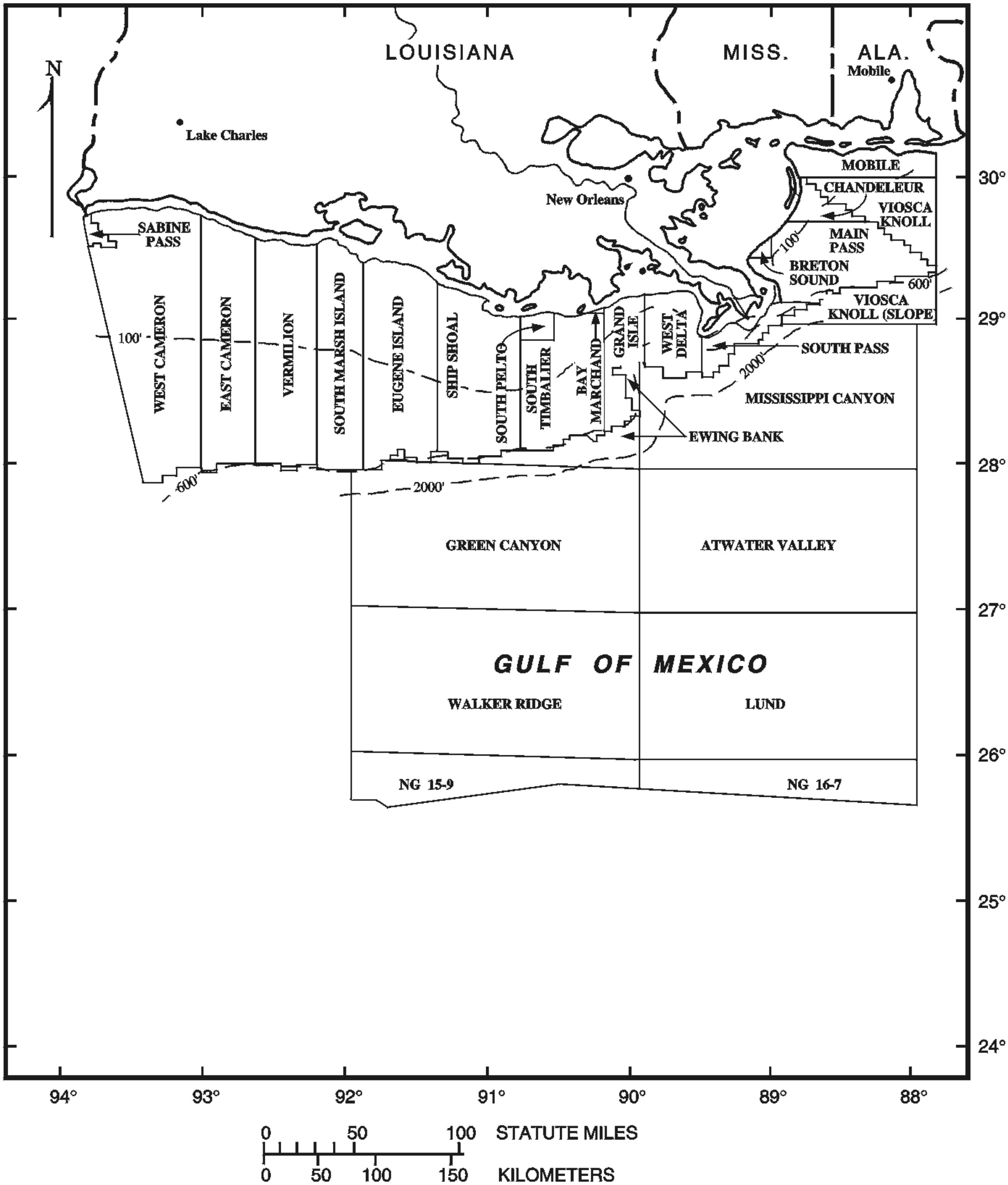
Figure H6. Western Planning Area, Gulf of Mexico Outer Continental Shelf Region



(Dashed lines indicate water depths in feet.)

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

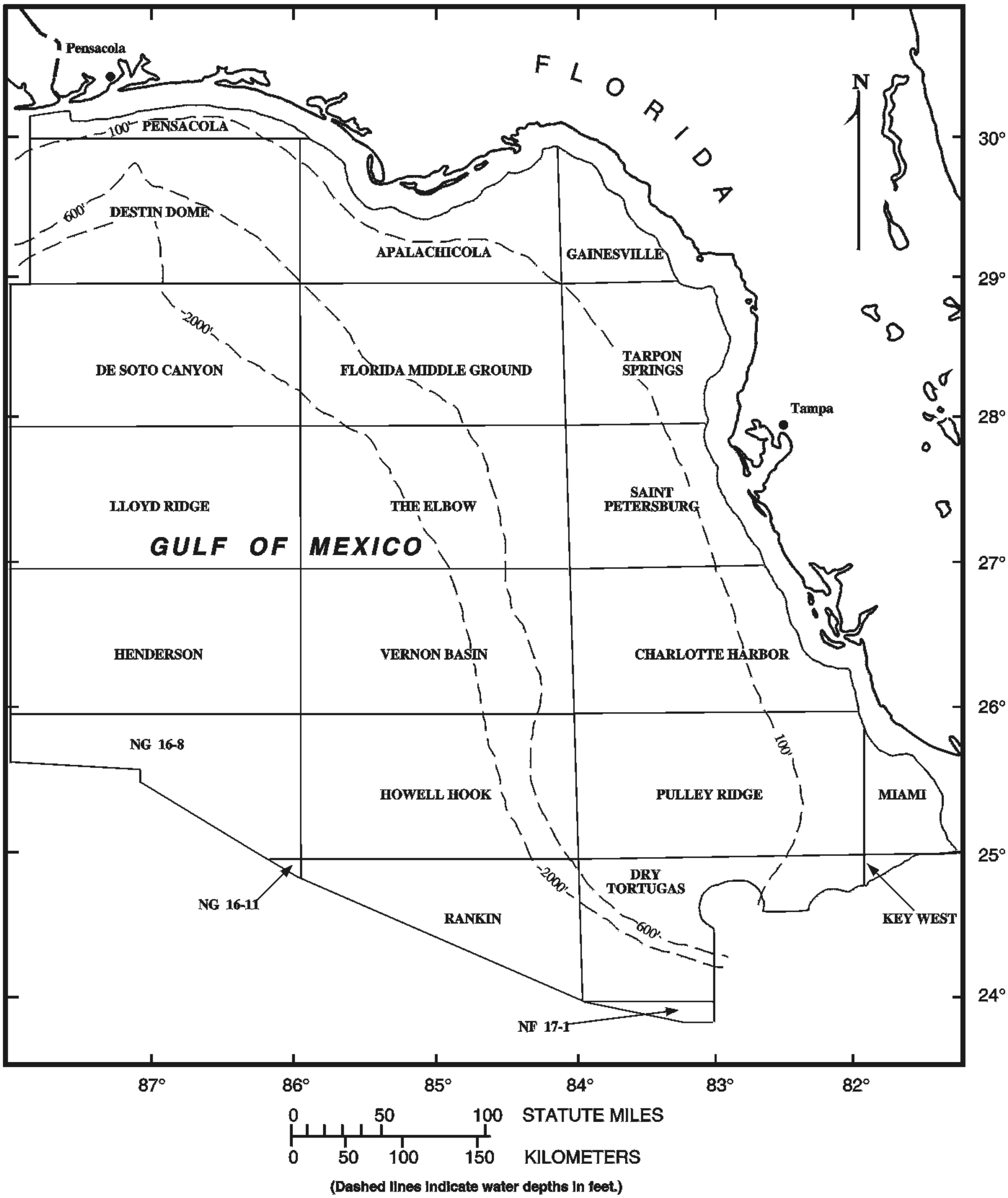
Figure H7. Central Planning Area, Gulf of Mexico Outer Continental Shelf Region



(Dashed lines indicate water depths in feet.)

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

Figure H8. Eastern Planning Area, Gulf of Mexico Outer Continental Shelf Region



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

Appendix I

Annual Survey Forms for Domestic Oil and Gas Reserves

Figure I1. Form EIA-23, Cover Page

www.eia.doe.gov Energy Information Administration

U.S. DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION
Washington, DC 20585

Form Approved
OMB No. 1905-0057
Expiration Date: 12/31/03
(Revised 2000)

FORM EIA-23
ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES
REPORT YEAR 2 0 0 1

This report is mandatory under the Federal Energy Administration Act of 1974 (Public Law 93-275). For the provisions concerning the confidentiality of information and sanction statements, see Section VII and VIII of the instructions. **Resubmission?** ☐

PART I. IDENTIFICATION

Complete and return by April 15, 2002 to:

Energy Information Administration
U.S. Department of Energy
P O Box 20907
Silver Spring, MD 20907
Attn: Form EIA-23
OR
Fax to: (202) 586-1076/ATTN: FORM EIA-23

Questions? Call 1-800-879-1470

Affix mailing label or enter mailing address

EIA Identification Number: ☐☐☐☐☐☐ 0 0 0 0

Company Name:

Street or P.O Box:

City, State, Zip Code:

EIN:

1. Contact Information *(person most knowledgeable about the reported data)*

Contact Person (*Please Print*):

Phone Number: (   )   -   Ext.

Fax Number: (   )   -

E-mail Address:

2. Was your company an oil and gas field operator at any time during calendar year 2001? *(See definition of an operator, page 1)*

(1) ☐ No... *Complete only items 3 through15 below and return this page.*

(2) ☐ Yes... *Complete rest of form.*

3. Company Status, Name, and/or Address Change or Correction. (Check appropriate box.)

☐ Name and address on mailing label are correct.

☐ Change company name, contact person, and/or mailing address,as indicated below.

☐ Company was sold to or merged with company entered below.

☐ Company went out of business. Operations transferred to company entered below.

4. Change Company Name, Address, Employer Identification Number (EIN) and/or Contact Information to:

Company Name:

Street or P. O. Box:

City, State, Zip Code:

EIN:

Contact Person (*Please Print*):

Phone Number: (   )   -   Ext. | Fax number: (   )   - | E-Mail Address:

Comments:

SAMPLE

PART II. PARENT COMPANY IDENTIFICATION

5. Is there a parent company which exercises ultimate control over your company?

(1) ☐ No… Answer 12 through 15.

(2) ☐ Yes... Answer 6 through 15.

6. Company Name | **7.** Parent Company EIN

8. Address

9. City | **10.** State | **11.** Zip Code

PART III. ATTESTATION **(I hereby swear or affirm that I have reviewed this Form EIA-23 report and am familiar with its contents, and that to the best of my knowledge, information, and belief, the information provided and appended is true and complete.)**

12. Attestor (*Please Print*) | **13.** Title

14. Signature | **15.** Date

Title 18 USC 1001 makes it a criminal offense for any person knowingly and willingly to make to any Agency or Department of the United States any false, fictitious, or fraudulent statements as to any matter within its jurisdiction.

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

Figure I2. Form EIA-23, Summary Report – Page 1

2001

ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES
SUMMARY REPORT
PAGE 1 OF 2

Report All Volumes of Crude Oil and Lease Condensate in Thousands of Barrels [MBbls] at 60°F
Report All Volumes of Natural Gas in Millions of Cubic Feet [MMCF] at 14.73 psia and 60°F

Form Approved
OMB No. 1905-0057
Expiration Date: 12/31/03
(Revised 2000)

1.0 OPERATOR AND REPORT IDENTIFICATION DATA

1.1 OPERATOR I.D. CODE	1.2 OPERATOR NAME	REPORT DATE	1.3 ORIGINAL	1.4 RESUBMISSION
		12 31 01		

2.0 PRODUCTION AND RESERVES DATA

STATE OR GEOGRAPHIC SUBDIVISION		CRUDE OIL RESERVES	CRUDE OIL 2001 PRODUCTION		NATURAL GAS RESERVES	NATURAL GAS 2001 PRODUCTION		LEASE CONDENSATE RESERVES	LEASE CONDENSATE 2001 PRODUCTION	
		Proved Reserves Dec. 31, 2001 (MBbls) (A)	(From properties for which reserves were Estimated) (MBbls) (B)	(From properties for which reserves were Not Estimated) (MBbls) (C)	Proved Reserves Dec. 31, 2001 (MMCF) (D)	(From properties for which reserves were Estimated) (MMCF) (E)	(From properties for which reserves were Not Estimated) (MMCF) (F)	Proved Reserves Dec. 31, 2001 (MBbls) (G)	(From properties for which reserves were Estimated) (MBbls) (H)	(From properties for which reserves were Not Estimated) (MBbls) (I)
ALABAMA-ONSHORE	AL									
ALABAMA-STATE OFFSHORE	AL05									
ALASKA-NORTH ONSHORE AND OFFSHORE	AK50									
ALASKA-SOUTH ONSHORE	AK10									
ALASKA-SOUTH STATE OFFSHORE	AK05									
ARIZONA	AZ									
ARKANSAS	AR									
CALIFORNIA-COASTAL REGION ONSHORE	CA50									
CALIFORNIA-LOS ANGELES BASIN ONSHORE	CA90									
CALIFORNIA-SAN JOAQUIN BASIN ONSHORE	CA10									
CALIFORNIA-STATE OFFSHORE	CA05									
COLORADO	CO									
FLORIDA-ONSHORE	FL									
FLORIDA-STATE OFFSHORE	FL05									
ILLINOIS	IL									
INDIANA	IN									
KANSAS	KS									
KENTUCKY	KY									
LOUISIANA-NORTH	LA50									
LOUISIANA-SOUTH ONSHORE	LA10									
LOUISIANA-SOUTH STATE ONSHORE	LA05									
MARYLAND	MD									
MICHIGAN	MI									
MISSISSIPPI-ONSHORE	MS									
MISSISSIPPI-STATE OFFSHORE	MS05									
MISSOURI	MO									
MONTANA	MT									
NEBRASKA	NE									
NEVADA	NV									
NEW MEXICO-EAST	NM10									
NEW MEXICO-WEST	NM50									
NEW YORK	NY									
NORTH DAKOTA	ND									
OHIO	OH									

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

Figure I3. Form EIA-23, Summary Report – Page 2

2001

ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES

Form Approved
OMB No. 1905-0057
Expiration Date: 12/31/03
(Revised 2000)

SUMMARY REPORT
PAGE 2 OF 2

Report All Volumes of Crude Oil and Lease Condensate in Thousands of Barrels [MBbls] at 60°F
Report All Volumes of Natural Gas in Millions of Cubic Feet [MMCF] at 14.73 psia and 60°F

1.0 OPERATOR AND REPORT IDENTIFICATION DATA

1.1 OPERATOR I.D. CODE	1.2 OPERATOR NAME	REPORT DATE	1.3 ORIGINAL	1.4 AMENDED
		12 31 01		

2.0 PRODUCTION AND RESERVES DATA

STATE OR GEOGRAPHIC SUBDIVISION		CRUDE OIL RESERVES: Proved Reserves Dec. 31, 2001 (MBbls) (A)	CRUDE OIL 2001 PRODUCTION: (From properties for which reserves were Estimated) (MBbls) (B)	CRUDE OIL 2001 PRODUCTION: (From properties for which reserves were Not Estimated) (MBbls) (C)	NATURAL GAS RESERVES: Proved Reserves Dec. 31, 2001 (MMCF) (D)	NATURAL GAS 2001 PRODUCTION: (From properties for which reserves were Estimated) (MMCF) (E)	NATURAL GAS 2001 PRODUCTION: (From properties for which reserves were Not Estimated (MMCF) (F)	LEASE CONDENSATE RESERVES: Proved Reserves Dec. 31, 2001 (MBbls) (G)	LEASE CONDENSATE 2001 PRODUCTION: (From properties for which reserves were Estimated) (MBbls) (H)	LEASE CONDENSATE 2001 PRODUCTION: (From properties for which reserves were Not Estimated) (MBbls) (I)
OKLAHOMA	OK									
PENNSYLVANIA	PA									
SOUTH DAKOTA	SD									
TENNESSEE	TN									
TEXAS-RRC DISTRICT 1	TX10									
TEXAS-RRC DISTRICT 2 ONSHORE	TX20									
TEXAS-RRC DISTRICT 3 ONSHORE	TX30									
TEXAS-RRC DISTRICT 4 ONSHORE	TX40									
TEXAS-RRC DISTRICT 5	TX50									
TEXAS-RRC DISTRICT 6	TX60									
TEXAS-RRC DISTRICT 7B	TX70									
TEXAS-RRC DISTRICT 7C	TX75									
TEXAS-RRC DISTRICT 8	TX80									
TEXAS-RRC DISTRICT 8A	TX85									
TEXAS-RRC DISTRICT 9	TX90									
TEXAS-RRC DISTRICT 10	TX95									
TEXAS-STATE OFFSHORE	TX05									
UTAH	UT									
VIRGINIA	VA									
WEST VIRGINIA	WV									
WYOMING	WY									
FEDERAL OFFSHORE-GULF OF MEXICO (ALABAMA)	AL00									
FEDERAL OFFSHORE-GULF OF MEXICO (FLORIDA)	FL00									
FEDERAL OFFSHORE-GULF OF MEXICO (LOUISIANA)	LA00									
FEDERAL OFFSHORE-GULF OF MEXICO (MISSISSIPPI)	MS00									
FEDERAL OFFSHORE-GULF OF MEXICO (TEXAS)	TX00									
FEDERAL OFFSHORE-PACIFIC (ALASKA)	AK00									
FEDERAL OFFSHORE-PACIFIC (CALIFORNIA)	CA00									
FEDERAL OFFSHORE-PACIFIC (OREGON)	OR00									
OTHER STATE (SPECIFY)										
TOTAL (SUM EACH COLUMN)	US									

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

Figure I4. Form EIA-23, Detail Report – Schedule A

2001	ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES	Form Approved OMB No. 1905-0057 Expiration Date: 12/31/03 (Revised 2000)
	SCHEDULE A - OPERATED PROVED RESERVES, PRODUCTION, AND RELATED DATA BY FIELD **Report All Liquid Volumes in Thousands of Barrels [MBbls] at 60°F;** **Report All Volumes of Natural Gas in Millions of Cubic Feet [MMCF] at 60°F and 14.73 psia**	

1.0 OPERATOR AND REPORT IDENTIFICATION DATA

1.1 OPERATOR I.D. CODE	1.2 OPERATOR NAME	REPORT DATE	1.3 ORIGINAL	1.4 AMENDED	1.5 PAGE
		12 31 01			_____ OF _____

2.0 FIELD DATA (OPERATED BASIS)

2.1

1. STATE ABBR.	2. SUBDIV. CODE	3. COUNTY CODE	4. FIELD CODE	5. MMS CODE	6. FIELD NAME	7. PROVED NONPRODUCING RESERVES (a) CRUDE OIL (MBbls)	(b) ASSOC-DISSOLVED GAS (MMCF)	(c) NONASSOCIATED GAS (MMCF)	(d) LEASE CON-DENSATE (MBbls)	8. FOOTNOTE

9. WATER DEPTH		10. FIELD DISCOVERY YEAR		11. INDICATED ADDITIONAL RESERVES OF CRUDE OIL (MBbls)	

TYPE OF HYDROCARBON	TOTAL PROVED RESERVES DECEMBER 31, 2000 (A)	REVISION INCREASES (B)	REVISION DECREASES (C)	SALES (D)	ACQUISITIONS (E)	EXTENSIONS (F)	NEW FIELD DISCOVERIES (G)	NEW RESERVOIRS IN OLD FIELDS (H)	CALENDAR YEAR PRODUCTION (I)	TOTAL PROVED RESERVES DECEMBER 31, 2001 (J)
12. CRUDE OIL (MBbls)										
13. ASSOCIATED-DISSOLVED GAS (MMCF)										
14. NONASSOCIATED GAS (MMCF)										
15. LEASE CONDENSATE (MBbls)										

2.2

1. STATE ABBR.	2. SUBDIV. CODE	3. COUNTY CODE	4. FIELD CODE	5. MMS CODE	6. FIELD NAME	7. PROVED NONPRODUCING RESERVES (a) CRUDE OIL (MBbls)	(b) ASSOC-DISSOLVED GAS (MMCF)	(c) NONASSOCIATED GAS (MMCF)	(d) LEASE CON-DENSATE (MBbls)	8. FOOTNOTE

9. WATER DEPTH		10. FIELD DISCOVERY YEAR		11. INDICATED ADDITIONAL RESERVES OF CRUDE OIL (MBbls)	

TYPE OF HYDROCARBON	TOTAL PROVED RESERVES DECEMBER 31, 2000 (A)	REVISION INCREASES (B)	REVISION DECREASES (C)	SALES (D)	ACQUISITIONS (E)	EXTENSIONS (F)	NEW FIELD DISCOVERIES (G)	NEW RESERVOIRS IN OLD FIELDS (H)	CALENDAR YEAR PRODUCTION (I)	TOTAL PROVED RESERVES DECEMBER 31, 2001 (J)
12. CRUDE OIL (MBbls)										
13. ASSOCIATED-DISSOLVED GAS (MMCF)										
14. NONASSOCIATED GAS (MMCF)										
15. LEASE CONDENSATE (MBbls)										

2.3

1. STATE ABBR.	2. SUBDIV. CODE	3. COUNTY CODE	4. FIELD CODE	5. MMS CODE	6. FIELD NAME	7. PROVED NONPRODUCING RESERVES (a) CRUDE OIL (MBbls)	(b) ASSOC-DISSOLVED GAS (MMCF)	(c) NONASSOCIATED GAS (MMCF)	(d) LEASE CON-DENSATE (MBbls)	8. FOOTNOTE

9. WATER DEPTH		10. FIELD DISCOVERY YEAR		11. INDICATED ADDITIONAL RESERVES OF CRUDE OIL (MBbls)	

TYPE OF HYDROCARBON	TOTAL PROVED RESERVES **DECEMBER 31, 2000** (A)	REVISION INCREASES (B)	REVISION DECREASES (C)	SALES (D)	ACQUISITIONS (E)	EXTENSIONS (F)	NEW FIELD DISCOVERIES (G)	NEW RESERVOIRS IN OLD FIELDS (H)	CALENDAR YEAR PRODUCTION (I)	TOTAL PROVED RESERVES DECEMBER 31, 2001 (J)
12. CRUDE OIL (MBbls)										
13. ASSOCIATED-DISSOLVED GAS (MMCF)										
14. NONASSOCIATED GAS (MMCF)										
15. LEASE CONDENSATE (MBbls)										

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

Figure I5. Form EIA-23, Detail Report – Schedule B

2001

ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES
SCHEDULE B – FOOTNOTES

Form Approved
OMB No. 1905-0057
Expiration Date:12/31/03
(Revised 2000)

1.1 OPERATOR I.D. CODE		REPORT DATE			1.3 ORIGINAL		1.4 AMENDED		1.5 PAGE	
		12	31	01						

Page Number (a)	Field Designation (i.e., 2.1, 2.2 or 2.3) (b)	Item Number (c)	Column Designation (d)	Footnote (e)	FOR DOE USE ONLY

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

Figure I6. Form EIA-64A

www.eia.doe.gov
Energy Information Administration

U.S. DEPARTMENT OF ENERGY
ENERGY INFORMATION ADMINISTRATION
Washington, DC 20585

Form Approved
OMB No. 1905-0057
Expiration Date: 12/31/03

ANNUAL REPORT OF THE ORIGIN OF NATURAL GAS LIQUIDS PRODUCTION
FORM EIA-64A
CALENDAR YEAR 2001

This report is mandatory under Public Law 93-275. Failure to comply may result in criminal fines, civil penalties and other sanctions as provided by law. For the sanctions and the provisions concerning the confidentiality of information submitted on this form, see Page 2 of the Instructions.

Complete and return by April 1, 2002 to:

Energy Information Administration
P O Box 8279
Silver Spring, MD 20907
Attn: EIA-64A
OR
Fax to (202) 586-1076 (Attn: EIA-64A)

Questions?: Call 1-800-879-1470

Affix Mailing Label

PART I. PLANT AND PRODUCTION REPORT IDENTIFICATION

1.0 Does this report reflect active natural gas processing at the facility for the entire year? ☐ Yes ☐ No (indicate number of months below)

Months covered by this report____________ through ____________ , 2001 (Include Explanatory Notes in Section 7.0)

2.0 Submission Status ☐ Original ☐ Amended

3.0 Label Information **(If label is incorrect or information is missing or no label is given, enter correct information below).**

3.1 Parent Company's Name

3.2 Operator's Name

3.3 Plant Name

3.4 Geographic Location (Use Area of Origin Codes, Page 6) ☐☐☐☐

3.5 Street Address/PO Box

3.6 City | 3.7 State | 3.8 Zip Code

3.9 Contact Name | 3.10 Title | 3.11 Date

3.12 Telephone Number ( ) Ext | 3.13 Fax Number ( ) | 3.14 E-mail Address:

SAMPLE

PART II. ORIGIN OF NATURAL GAS RECEIVED AND NATURAL GAS LIQUIDS PRODUCED

Line	Area of Origin Code (A)	Natural Gas Received Report in millions of cubic feet (MMCF) (B)	Natural Gas Liquids Production Report in thousands of barrels (MBbl) (C)
4.1			
4.2			
4.3			
4.4			
4.5			
4.6			
4.7			
4.8	TOTAL		

5.0 Gas Shrinkage Resulting from Natural Gas Liquids Extracted (MMCF):

6.0 Natural Gas Used as Fuel in Processing (MMCF):

7.0 Explanatory Notes:

Title 18 USC 1001 makes it a criminal offense for any person knowingly and willingly to make to any Agency or Department of the United States any false, fictitious, or fraudulent statements as to any matter within its jurisdiction.

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

Glossary

Glossary

This glossary contains definitions of the technical terms used in this report and employed by respondents in completing Form EIA--23, "Annual Survey of Domestic Oil and Gas Reserves," or Form EIA--64A, "Annual Report of the Origin of Natural Gas Liquids Production," for the report year 2001.

Acquisitions: The volume of proved reserves gained by the purchase of an existing fields or properties, from the date of purchase or transfer.

Adjustments: The quantity which preserves an exact annual reserves balance within each State or State subdivision of the following form:

Published Proved Reserves at End of Previous Report Year
+ Adjustments
+ Revision Increases
− Revision Decreases
− Sales
+ Acquisitions
+ Extensions
+ New Field Discoveries
+ New Reservoir Discoveries in Old Fields
− Report Year Production
= Published Proved Reserves at End of Report Year

These adjustments are the yearly changes in the published reserve estimates that cannot be attributed to the estimates for other reserve change categories because of the survey and statistical estimation methods employed. For example, variations as a result of changes in the operator frame, different random samples or imputations for missing or unreported reserve changes, could contribute to adjustments.

Affiliated (**Associated**) **Company:** An "affiliate" of, or a person "affiliated" with, a specific person is a person that directly, or indirectly through one or more intermediaries: controls; or is controlled by; or is under common control with, the person specified. (See **Person and Control**)

Control: The term "control" (including the terms "controlling," "controlled by," and "under common control with") means the possession, direct or indirect, of the power to direct or cause the direction of the management and policies of a person, whether through the ownership of voting shares, by contract, or otherwise. (See **Person**)

Corrections: (See **Revisions**)

Crude Oil: A mixture of hydrocarbons that exists in the liquid phase in natural underground reservoirs and remains liquid at atmospheric pressure after passing through surface separating facilities. Crude oil may also include:

1. Small amounts of hydrocarbons that exist in the gaseous phase in natural underground reservoirs but are liquid at atmospheric pressure after being recovered from oil well (casinghead) gas in lease separators, and that subsequently are comingled with the crude stream without being separately measured
2. Small amounts of nonhydrocarbons produced with the oil.

When a State regulatory agency specifies a definition of crude oil which differs from that set forth above, the State definition is to be followed and its use footnoted on Schedule B of Form EIA--23.

Extensions: The reserves credited to a reservoir because of enlargement of its proved area. Normally the ultimate size of newly discovered fields, or newly discovered reservoirs in old fields, is determined by wells drilled in years subsequent to discovery. When such wells add to the proved area of a previously discovered reservoir, the increase in proved reserves is classified as an extension.

Field: An area consisting of a single reservoir or multiple reservoirs all grouped on, or related to, the same individual geological structural feature and/or stratigraphic condition. There may be two or more reservoirs in a field that are separated vertically by intervening impervious strata, or laterally by local geologic barriers, or by both.

Field Area: A geographic area encompassing two or more pools that have a common gathering and metering system, the reserves of which are reported as a single unit. This concept applies primarily to the Appalachian region. (See **Pool**)

Field Discovery Year: The calendar year in which a field was first recognized as containing economically recoverable accumulations of oil and/or gas.

Field Separation Facility: A surface installation designed to recover lease condensate from a produced natural gas stream frequently originating from more than one lease, and managed by the operator of one or more of these leases. (See **Lease Condensate**)

Gross Working Interest Ownership Basis: Gross working interest ownership is the respondent's working interest in a given property plus the proportionate share of any royalty interest, including overriding royalty interest, associated with the working interest. (See **Working Interest** and **Royalty** (including **Overriding Royalty**) **Interest**)

Indicated Additional Reserves of Crude Oil: Quantities of crude oil (other than proved reserves) which may become economically recoverable from existing productive reservoirs through the application of improved recovery techniques using current technology. These recovery techniques may:

1. Already be installed in the reservoir, but their effects are not yet known to the degree necessary to classify the additional reserves as proved
2. Be installed in another similar reservoir, where the results of that installation can be used to estimate the indicated additional reserves.

Indicated additional reserves are not included in proved reserves due to their uncertain economic recoverability. When economic recoverability is demonstrated, the indicated additional reserves must be transferred to proved reserves as positive revisions.

Lease Condensate: A mixture consisting primarily of pentanes and heavier hydrocarbons which is recovered as a liquid from natural gas in lease or field separation facilities, exclusive of products recovered at natural gas processing plants or facilities.

Lease Separator: A lease separator is a facility installed at the surface for the purpose of (a) separating gases from produced crude oil and water at the temperature and pressure conditions of the separator, and/or (b) separating gases from that portion of the produced natural gas stream which liquefies at the temperature and pressure conditions of the separator.

Natural Gas: A mixture of hydrocarbon compounds and small quantities of various nonhydrocarbons existing in the gaseous phase or in solution with crude oil in natural underground reservoirs at reservoir conditions. The principal hydrocarbons normally contained in the mixture are methane, ethane, propane, butane, and pentanes. Typical nonhydrocarbon gases which may be present in reservoir natural gas are water vapor, carbon dioxide, helium, hydrogen sulfide, and nitrogen. Under reservoir conditions, natural gas and the liquefiable portions occur either in a single gaseous phase in the reservoir or in solution with crude oil, and are not distinguishable at the time as separate substances. (See **Natural Gas, Associated--Dissolved** and **Natural Gas, Nonassociated**)

Natural Gas, Associated--Dissolved: The combined volume of natural gas which occurs in crude oil reservoirs either as free gas (associated) or as gas in solution with crude oil (dissolved).

Natural Gas, "Dry": The actual or calculated volumes of natural gas which remain after:

1. The liquefiable hydrocarbon portion has been removed from the gas stream (i.e., gas after lease, field, and/or plant separation)
2. Any volumes of nonhydrocarbon gases have been removed where they occur in sufficient quantity to render the gas unmarketable.

Natural Gas, Nonassociated: Natural gas not in contact with significant quantities of crude oil in a reservoir.

Natural Gas Liquids: Those hydrocarbons in natural gas which are separated from the gas through the processes of absorption, condensation, adsorption, or other methods in gas processing or cycling plants. Generally such liquids consist of propane and heavier hydrocarbons and are commonly referred to as condensate, natural gasoline, or liquefied petroleum gases. Where hydrocarbon components lighter than propane are recovered as liquids, these components are included with natural gas liquids.

Natural Gas Processing Plant: A facility designed to recover natural gas liquids from a stream of natural gas which may or may not have passed through lease separators and/or field separation facilities. Another function of the facility is to control the quality of the processed natural gas stream. Cycling plants are considered natural gas processing plants.

Natural Gas, Wet After Lease Separation: The volume of natural gas remaining after removal of lease condensate in lease and/or field separation facilities, if any, and after exclusion of nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable. Natural gas liquids may be recovered from volumes of natural gas, wet after lease separation, at natural gas processing plants. (See **Lease Condensate, Lease Separator,** and **Field Separation Facility**)

Net Revisions: (See **Revisions**)

New Field: A field discovered during the report year.

New Field Discoveries: The volumes of proved reserves of crude oil, natural gas and/or natural gas liquids discovered in new fields during the report year.

New Reservoir: A reservoir discovered during the report year.

New Reservoir Discoveries in Old Fields: The volumes of proved reserves of crude oil, natural gas, and/or natural gas liquids discovered during the report year in new reservoir(s) located in old fields.

Nonproducing Reservoirs: Reservoirs in which proved liquid or gaseous hydrocarbon reserves have been identified, but which did not produce during the last calendar year regardless of the availability and/or operation of production, gathering, or transportation facilities.

Old Field: A field discovered prior to the report year.

Old Reservoir: A reservoir discovered prior to the report year.

Operator, Gas Plant: The person responsible for the management and day--to--day operation of one or more natural gas processing plants as of December 31 of the report year. The operator is generally a working interest owner or a company under contract to the working interest owner(s). Plants shut down during the report year are also to be considered "operated" as of December 31. (See **Person**)

Operator, Oil and/or Gas Well: The person responsible for the management and day--to--day operation of one or more crude oil and/or natural gas wells as of December 31 of the report year. The operator is generally a working interest owner or a company under contract to the working interest owner(s). Wells included are those which have proved reserves of crude oil, natural gas, and/or lease condensate in the reservoirs associated with them, whether or not they are producing. Wells abandoned during the report year are also to be considered "operated" as of December 31. (See **Person**, **Proved Reserves of Crude Oil**, **Proved Reserves of Natural Gas**, **Proved Reserves of Lease Condensate**, **Report Year**, and **Reservoir**)

Ownership: (See **Gross Working Interest Ownershi p Basis**)

Parent Company: The parent company of a business entity is an affiliated company which exercises ultimate control over that entity, either directly or indirectly through one or more intermediaries. (See **Affiliated** (**Associated**) **Company and Control**)

Person: An individual, a corporation, a partnership, an association, a joint--stock company, a business trust, or an unincorporated organization.

Pool: In general, a reservoir. In certain situations a pool may consist of more than one reservoir. (See **Field Area**)

Plant Liquids: Those volumes of natural gas liquids recovered in natural gas processing plants.

Production, Crude Oil: The volumes of crude oil which are extracted from oil reservoirs during the report year. These volumes are determined through measurement of the volumes delivered from lease storage tanks, (i.e., at the point of custody transfer) with adjustment for (1) net differences between opening and closing lease inventories, and for (2) basic sediment and water. Oil used on the lease is considered production.

Production, Lease Condensate: The volume of lease condensate produced during the report year. Lease condensate volumes include only those volumes recovered from lease or field separation facilities. (See **Lease Condensate**)

Production, Natural Gas, Dry: The volume of natural gas withdrawn from reservoirs during the report year less (1) the volume returned to such reservoirs in cycling, repressuring of oil reservoirs and conservation operations; less (2) shrinkage resulting from the removal of lease condensate and plant liquids; and less (3) nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable. Volumes of gas withdrawn from gas storage reservoirs and native gas, which has been transferred to the storage category, are not considered production. This is not the same as marketed production, since the latter also excludes vented and flared gas, but contains plant liquids.

Production, Natural Gas, Wet after Lease Separation: The volume of natural gas withdrawn from reservoirs during the report year less (1) the volume returned to such reservoirs in cycling, repressuring of oil reservoirs and conservation operations; less (2) shrinkage resulting from the removal of lease condensate; and less (3) nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable. Volumes of gas withdrawn from gas storage reservoirs and native gas, which has been transferred to the storage category, are not considered production. This is not the same as marketed production, since the latter excludes vented and flared gas.

Production, Natural Gas Liquids: The volume of natural gas liquids removed from natural gas in lease separators, field facilities, gas processing plants or cycling plants during the report year.

Production, Plant Liquids: The volume of liquids removed from natural gas in natural gas processing plants or cycling plants during the report year.

Proved Reserves of Crude Oil: Proved reserves of crude oil as of December 31 of the report year are the estimated quantities of all liquids defined as crude oil, which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Reservoirs are considered proved if economic producibility is supported by actual production or conclusive formation test (drill stem or wire line), or if economic producibility is supported by core analyses and/or electric or other log interpretations. The area of an oil reservoir considered proved includes (1) that portion delineated by drilling and defined by gas--oil and/or oil--water contacts, if any; and (2) the immediately adjoining portions not yet drilled, but which can be reasonably judged as economically productive on the basis of available geological and engineering data. In the absence of information on fluid contacts, the lowest known structural occurrence of hydrocarbons is considered to be the lower proved limit of the reservoir.

Volumes of crude oil placed in underground storage are not to be considered proved reserves.

Reserves of crude oil which can be produced economically through application of improved recovery techniques (such as fluid injection) are included in the "proved" classification when successful testing by a pilot project, or the operation of an installed program in the reservoir, provides support for the engineering analysis on which the project or program was based.

Estimates of proved crude oil reserves do not include the following: (1) oil that may become available from known reservoirs but is reported separately as "indicated additional reserves"; (2) natural gas liquids (including lease condensate); (3) oil, the recovery of which is subject to reasonable doubt because of uncertainty as to geology, reservoir characteristics, or economic factors; (4) oil that may occur in undrilled prospects; and (5) oil that may be recovered from oil shales, coal, gilsonite, and other such sources. It is not necessary that production, gathering or transportation facilities be installed or operative for a reservoir to be considered proved.

Proved Reserves of Lease Condensate: Proved reserves of lease condensate as of December 31 of the report year are the volumes of lease condensate expected to be recovered in future years in conjunction with the production of proved reserves of natural gas as of December 31 of the report year, based on the recovery efficiency of lease and/or field separation facilities installed as of December 31 of the report year. (See **Lease Condensate** and **Proved Reserves of Natural Gas**)

Proved Reserves of Natural Gas: Proved reserves of natural gas as of December 31 of the report year are the estimated quantities which analysis of geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Reservoirs are considered proved if economic producibility is supported by actual production or conclusive formation test (drill stem or wire line), or if economic producibility is supported by core analyses and/or electric or other log interpretations.

The area of a gas reservoir considered proved includes: (1) that portion delineated by drilling and defined by gas--oil and/or gas--water contacts, if any; and (2) the immediately adjoining portions not yet drilled, but which can be reasonably judged as economically productive on the basis of available geological and engineering data. In the absence of information on fluid contacts, the lowest known structural occurrence of hydrocarbons is considered to be the lower proved limit of the reservoir.

Volumes of natural gas placed in underground storage are not to be considered proved reserves.

For natural gas, wet after lease separation, an appropriate reduction in the reservoir gas volume has been made to cover the removal of the liquefiable portions of the gas in lease and/or field separation facilities and the exclusion of nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable.

For dry natural gas, an appropriate reduction in the gas volume has been made to cover the removal of the liquefiable portions of the gas in lease and/or field separation facilities, and in natural gas processing plants, and the exclusion of nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable.

It is not necessary that production, gathering, or transportation facilities be installed or operative for a reservoir to be considered proved. It is to be assumed that compression will be initiated if and when economically justified.

Proved Reserves of Natural Gas Liquids: Proved reserves of natural gas liquids as of December 31 of the report year are those volumes of natural gas liquids (including lease condensate) demonstrated with reasonable certainty to be separable in the future from proved natural gas reserves, under existing economic and operating conditions.

Proved Ultimate Recovery: The sum of proved reserves and cumulative production. It is expected to change over time for any field, group of fields, State, or Country. Proved Ultimate Recovery does not represent the maximum recoverable volume of resources for an area. It is instead a gauge of how much has already been produced plus proved reserves. Proved reserves of crude oil or natural gas are the estimated quantities of petroleum which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. When deterministic proved reserves estimation methods are used, the term reasonable certainty is intended to express a high degree of confidence that the estimated quantities will be recovered. When probabilistic methods are used there should be at least a 90 percent probability that the actual quantities recovered will exceed the estimate.

Report Year: The calendar year to which data reported in this publication pertain.

Reserves: (See **Proved Reserves**)

Reserve Additions: Consist of adjustments, net revisions, extensions to old reservoirs, new reservoir discoveries in old fields, and new field discoveries.

Reserves Changes: Positive and negative revisions, extensions, new reservoir discoveries in old fields, and new field discoveries, which occurred during the report year.

Reservoir: A porous and permeable underground formation containing an individual and separate natural accumulation of producible hydrocarbons (oil and/or gas) which is confined by impermeable rock or water barriers and is characterized by a single natural pressure system.

Revisions: Changes to prior year--end proved reserves estimates, either positive or negative, resulting from new information other than an increase in proved acreage (extension). Revisions include increases of proved reserves associated with the installation of improved recovery techniques or equipment. They also include correction of prior report year arithmetical or clerical errors and adjustments to prior year--end production volumes to the extent that these alter reported prior year reserves estimates.

Royalty (Including Overriding Royalty) Interests: These interests entitle their owner(s) to a share of the mineral production from a property or to a share of the proceeds therefrom. They do not contain the rights and obligations of operating the property, and normally do not bear any of the costs of exploration, development, and operation of the property.

Sales: The volume of proved reserves deducted from an operator's total reserves when selling an existing field or property, during the calendar year.

Subdivision: A prescribed portion of a given State or other geographical region defined in this publication for statistical reporting purposes.

Subsidiary Company: A company which is controlled through the ownership of voting stock, or a corporate joint venture in which a corporation is owned by a small group of businesses as a separate and specific business or project for the mutual benefit of the members of the group. (See **Control**)

Total Discoveries: The sum of extensions, new reservoir discoveries in old fields, and new field discoveries, which occurred during the report year.

Total Liquid Hydrocarbon Reserves: The sum of crude oil and natural gas liquids reserves volumes.

Total Operated Basis: The total reserves or production associated with the wells operated by an individual operator. This is also commonly known as the "gross operated" or "8/8ths" basis.

Working Interest: A working interest permits the owner(s) to explore, develop and operate a property. The working interest owner(s) bear(s) the costs of exploration, development and operation of the property, and in return is (are) entitled to a share of the mineral production from the property or to a share of the proceeds therefrom.