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

2002 Annual Report

December 2003

Energy Information Administration
Office of Oil and Gas
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Washington, DC 20585

Preface

The *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2002 Annual Report* is the 26th 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, 2002, as well as production volumes for the United States and selected States and State subdivisions for the year 2002. 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 2002 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 2002; 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).

Authors were John H. Wood, Steven G. Grape, Rafi Zeinalpour, and Rhonda S. Green. Technical contributions were made by Jack Perrin, Dewayne Cravens, Paul Chapman, and Gwen Cox. Technical editing was provided by David F. Morehouse.

Address questions on specific sections of the publication to the following analyst/author:

- Executive Summary and Appendices F and G
  John H. Wood
  Phone: 214·720·6160
  E–mail: jwood@eia.doe.gov
  Fax: 214·720·6155

- Chapters 1, 2, 3, 4, 5
  Steven G. Grape
  Phone: 214·720·6174
  E–mail: sgrape@eia.doe.gov
  Fax: 214·720·6155

- Appendices A, B, C, D, E, H, and I
  Rhonda S. Green
  Phone: 214·720·6161
  E–mail: rgreen@eia.doe.gov
  Fax 214·720·6155

- Field-level Reserves Quality Assurance
  Rafi M. Zeinalpour
  Phone: 214·720·6191
  E–mail: rzeinalp@eia.doe.gov
  Fax 214·720·6155

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Executive Summary: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2002 Annual Report

Proved reserves of natural gas and crude oil have increased for the fourth year in a row. In fact, natural gas proved reserves have increased in eight of the past nine years.

U.S. crude oil proved reserves increased by 1 percent in 2002. Reserves additions were 112 percent of production. Ninety-seven percent of all new field discoveries of crude oil reported in 2002 were in the Gulf of Mexico Federal Offshore.

As of December 31, 2002 proved reserves were:	
Crude Oil (million barrels)	
2001	22,446
2002	22,677
Increase	1.0%
Dry Natural Gas (billion cubic feet)	
2001	183,460
2002	186,946
Increase	1.9%
Natural Gas Liquids (million barrels)	
2001	7,993
2002	7,994
Increase	0.0%

U.S. natural gas reserves increased by 2 percent in 2002. Reserves additions were 118 percent of production. However, gas production declined 2 percent in 2002. Sharp production declines in the Gulf of Mexico were partially offset by large production increases in the Rocky Mountain States.

In 2002, the Rocky Mountain States and Texas had large gas reserves additions. These additions highlight a shift from conventional gas fields to unconventional gas fields, i.e., tight sands, shales, and coalbeds. Eleven of the top 20 natural gas fields of 2002 are located in the Rocky Mountain States. Significant reserves were added in the Powder River Basin coalbed methane fields and the Pinedale Field (deep and tight sand) in Wyoming, and the Wattenberg Field (tight sand) and coalbed methane fields in Colorado. In Texas, significant reserves were added in the Newark East Field (Barnett Shale), the Nation's tenth largest natural gas field.

When gas reserves increase the natural gas liquids reserves usually do too, but natural gas liquids reserves remained level in 2002. That was because coalbed methane, which usually has no natural gas liquids content, accounted for a large portion of new gas reserves in 2002.

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 2002 U.S. proved reserves of crude oil, natural gas, and natural gas liquids is the 26th in an annual series prepared by the Energy Information Administration.

Crude Oil

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 946 million barrels in 2002, 7 percent less than the prior 10-year average and 63 percent less than 2001's discoveries of 2,565 million barrels. This is not surprising because 2001, which featured new proved reserves from bp's Thunder Horse Field, was an unusually successful year. Domestic field discoveries of that magnitude are no longer common.

The majority of crude oil total discoveries in 2002 were extensions, particularly in Texas, California, and the Gulf of Mexico Federal Offshore. The north slope of Alaska (normally a major contributor to total discoveries) had no significant impact on the Nation's total discoveries in 2002. Operators discovered 492 million barrels in extensions in 2002, 1 percent more than the prior 10-year average.

New field discoveries accounted for 300 million barrels of crude oil reserves additions. Almost all were in the Gulf of Mexico Federal Offshore (290 of 300 million). This was 15 percent less than the prior 10-year average.

New reservoir discoveries in old fields were 154 million barrels, 47 percent less than in 2001 and 10 percent less than the prior 10-year average.

Reserves additions are the sum of total discoveries, revisions and adjustments, and sales and acquisitions. In 2002 the net of revisions and adjustments (1,136 million barrels) contributed more to crude oil reserves additions than did total discoveries, accounting for 54 percent of total reserves additions.

The sales component of the crude oil reserves changes (804 million barrels) was less than the revision decreases component in 2002 and acquisitions (828 million barrels) were less than revision increases. The net of sales and acquisitions of crude oil proved reserves was 24 million barrels.

Other 2002 crude oil events of note:

- Exploratory and developmental oil completions were down 38 percent from 2001.
- The annual average domestic first purchase price for crude oil increased 3 percent from the 2001 level to $22.51 per barrel.

Natural Gas

Total discoveries of dry gas reserves were 17,795 billion cubic feet in 2002. This was 36 percent more than the prior 10-year average but 22 percent less than in 2001. The majority of natural gas total discoveries in 2002 were from extensions of existing conventional and unconventional gas fields.

Field extensions were 14,769 billion cubic feet, 10 percent less than extensions in 2001 but 65 percent more than the prior 10-year average of 8,931 billion cubic feet.

New field discoveries were 1,332 billion cubic feet, 63 percent less than the volume discovered in 2001 and 24 percent less than the prior 10-year average.

New reservoir discoveries in old fields were 1,694 billion cubic feet, down 40 percent from 2001 and 31 percent less than the prior 10-year average.

Natural gas net revisions and adjustments were 4,664 billion cubic feet. The net of sales and acquisitions of dry natural gas proved reserves was 380 billion cubic feet.

Coalbed methane proved reserves and production continued to grow in 2002. Coalbed methane proved reserves were 18,491 billion cubic feet, an increase of 5 percent from 2001 and accounted for 10 percent of U.S. dry gas proved reserves. Coalbed methane production was 1,614 billion cubic feet, an increase of 3 percent from 2001 and accounted for 8 percent of U.S. dry gas production.

Other 2002 natural gas events of note:

- Exploratory gas well completions decreased 30 percent in 2002 and development well drilling was down 28 percent. Operators drilled 28 percent less wells for gas in 2002 than in 2001.
- Natural gas prices were down 27 percent in 2002 to an average of $2.95 per thousand cubic feet at the wellhead, as compared to $4.02 per thousand cubic feet in 2001. Prices did, however, steadily rise in the winter months of 2002 to a monthly average of $3.84 per thousand cubic feet in December.
- U.S. gas production decreased by 2 percent in 2002. Two severe hurricanes, Isadore and Lilly, caused shutins of Gulf of Mexico production in September and October of 2002.

Natural Gas Liquids

U.S. natural gas liquids proved reserves remained level in 2002 (7,994 million barrels). 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 30,671 million barrels in 2002, a 0.8 percent increase from the 2001 level. Natural gas liquids represented 26 percent of total liquid hydrocarbon proved reserves in 2002.

Data

These estimates are based upon analysis of data from Form EIA-23, Annual Survey of Domestic Oil and Gas Reserves, filed by 1,577 operators of oil and gas wells, and Form EIA-64A, Annual Report of the Origin of Natural Gas Liquids Production, filed by operators of 527 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.

Almost 97 percent of the total natural gas production estimate was reported on the EIA-23 survey, 3 percent came from State or commercial sources, and only 0.2 percent was imputed from sampling data. Over 94 percent of the total crude oil production data was reported on the EIA-23 survey, 5 percent came from State or commercial sources, and only 0.4 percent was imputed from sampling data.

1. Introduction

Background

The primary focus of EIA's reserves program is providing 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 2002. 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:

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

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.

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 22,823 probable active operators and the Form EIA-64A plant frame contained 515 probable active natural gas processing plants in the United States when the 2002 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 2002. For more details on the survey process, see Appendix E, Summary of Data Collection Operations.

The 2002 survey sample consisted of 1,577 operators. EIA sampled 1,044 operators with certainty; 176 Category I operators, 480 Category II operators, and 388 smaller operators that were selected with certainty because of their size in relation to the area or areas in which they operated. EIA also chose 533 Noncertainty operators as a systematic random sample of the remaining operators. There were no Successor operators in 2002. Sixty (60) of the 1,577 ceased operating oil and/or gas properties (became non-operator) during the survey year. Thirty five (35) operators changed size in 2002; 34 reduced in size from Category II to Category III, and one operator increased in size from Category II to Category I.

EIA mailed EIA-64A forms to all known natural gas processing plant operators as of February 1, 2003. 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 514 unique active natural gas processing plants in 2002.

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 2002, the Form EIA-23 National production estimates were less than 1 percent lower than the comparable *Petroleum Supply Annual (PSA) 2002* volumes for crude oil and lease condensate combined, and were less than 2 percent higher than the comparable *Natural Gas Monthly, November 2003* volume for 2002 dry natural gas. For report year 2002, the Form EIA-64A National estimates were less than 2 percent lower than the *PSA 2002* volume for natural gas plant liquids production.

Accuracy in reserves reporting is EIA's first and foremost goal for this report. Because of differences in timing and data availability, the estimates of oil and gas production presented in this report may differ from those presented in other EIA reports.

2. Overview

National Summary

The United States had the following proved reserves as of December 31, 2002:

- **Crude Oil — 22,677 million barrels**
- **Dry Natural Gas — 186,946 billion cubic feet**
- **Natural Gas Liquids — 7,994 million barrels.**

This Overview summarizes the 2002 proved reserves balances of crude oil, dry natural gas, and natural gas liquids on a National level and provides historical comparisons between 2002 and prior years. **Table 1** lists the estimated annual reserve balances since 1992 for crude oil, dry natural gas, and natural gas liquids.

Crude Oil

Proved reserves of crude oil increased by 231 million barrels in 2002. **Figure 1** shows the crude oil proved reserves levels by major region and **Figure 2** shows the components of reserves changes from 1992 through 2002.

As indicated in **Figure 1**, U.S. crude oil proved reserves increased in 2002 due to reserves additions in the Lower 48 States onshore.

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.

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 946 million barrels in 2002, 7 percent less than the prior 10-year average and 63 percent less than 2001's discoveries of 2,565 million barrels. This is not surprising because 2001, which featured new proved reserves from bp's Thunder Horse Field, was an unusually successful year. Domestic field discoveries of that magnitude are not common.

The majority of crude oil total discoveries in 2002 were extensions, particularly in Texas, California, and the Gulf of Mexico Federal Offshore. The North Slope of Alaska (normally a major contributor to total discoveries) had no significant impact on the Nation's total discoveries in 2002. Operators discovered 492 million barrels of extensions in 2002, 1 percent more than the prior 10-year average.

New field discoveries accounted for 300 million barrels of crude oil reserves additions. Almost all were in the Gulf of Mexico Federal Offshore (290 of 300 million). This was 15 percent less than the prior 10-year average.

New reservoir discoveries in old fields were 154 million barrels, 47 percent less than in 2001 and 10 percent less than the prior 10-year average.

Reserves additions are the sum of total discoveries, revisions and adjustments, and sales and acquisitions. In 2002, there were 2,106 million barrels of reserves additions. As usual, the net of revisions and adjustments (1,136 million barrels) contributed more to crude oil reserves additions than did total discoveries, accounting for 54 percent of total reserves additions.

The sales component of crude oil reserves changes (804 million barrels) was less than the revision decreases component in 2002 and acquisitions (828 million barrels) were less than revision increases. The net of sales and acquisitions of crude oil proved reserves was 24 million barrels

Production of crude oil was an estimated 1,875 million barrels in 2002 (lease condensate not included, see Natural Gas Liquids section below for condensate volumes). This was down 2 percent from 2001's level (1,915 million barrels) and down 12 percent from the prior 10-year average (2,132 million barrels). Operators replaced 112% of crude oil production with reserves additions in 2002.

Natural Gas

Dry natural gas proved reserves increased by 3,486 billion cubic feet in 2002. **Figure 3** shows dry natural gas proved reserves levels by major region. **Figure 4** shows the components of reserves changes from 1992 through 2002.

Total discoveries of dry gas reserves were 17,795 billion cubic feet in 2002. This was 36 percent more than the

Table 1. Total U.S. Proved Reserves of Crude Oil, Dry Natural Gas, and Natural Gas Liquids, 1992-2002

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)										
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
2002	416	720	1,136	24	492	300	154	946	1,875	22,677	+231
	Dry Natural Gas (billion cubic feet, 14.73 psia, 60° Fahrenheit)										
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
2002	3,727	937	4,664	380	14,769	1,332	1,694	17,795	19,353	186,946	+3,486
	Natural Gas Liquids (million barrels of 42 U.S. gallons)										
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
2002	62	31	93	54	612	48	78	738	884	7,994	+1

[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 2002 contained in the *Petroleum Supply Annual 2002*, DOE/EIA-0340(02) and the *Natural Gas Annual 2002*, DOE/EIA-0131(02).

Figure 1. U.S. Crude Oil Proved Reserves, 1992-2002

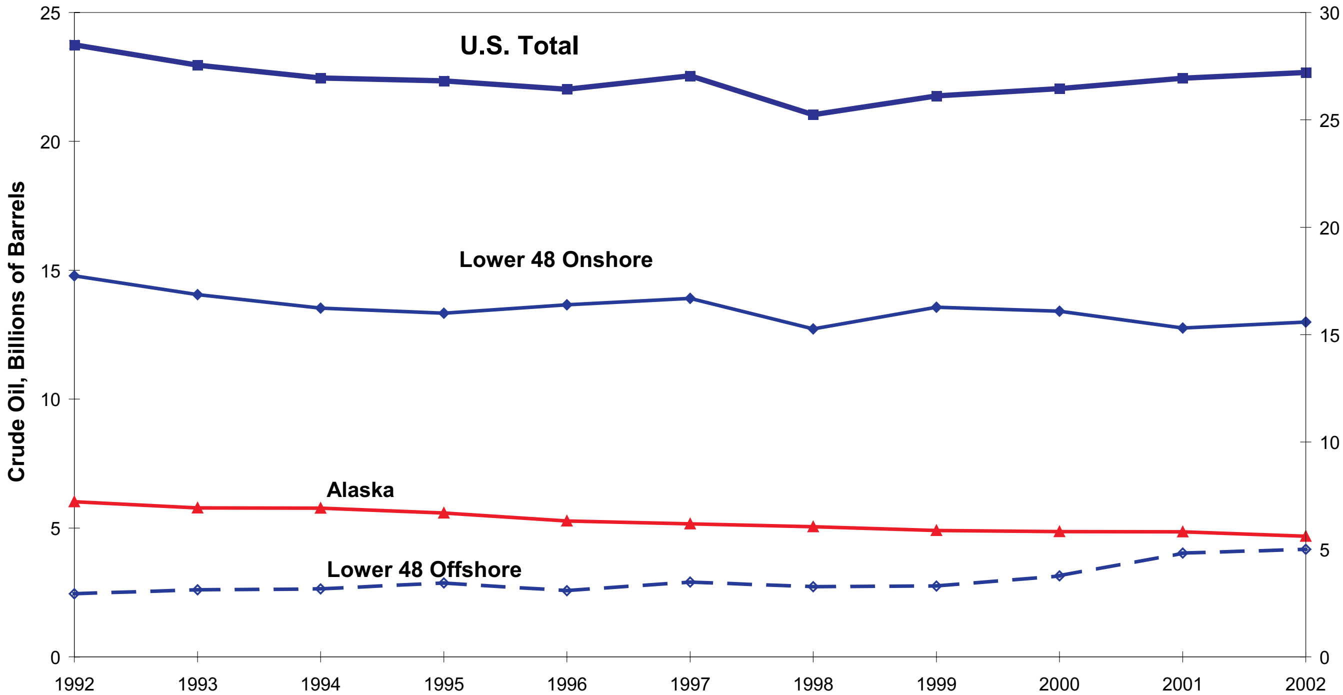
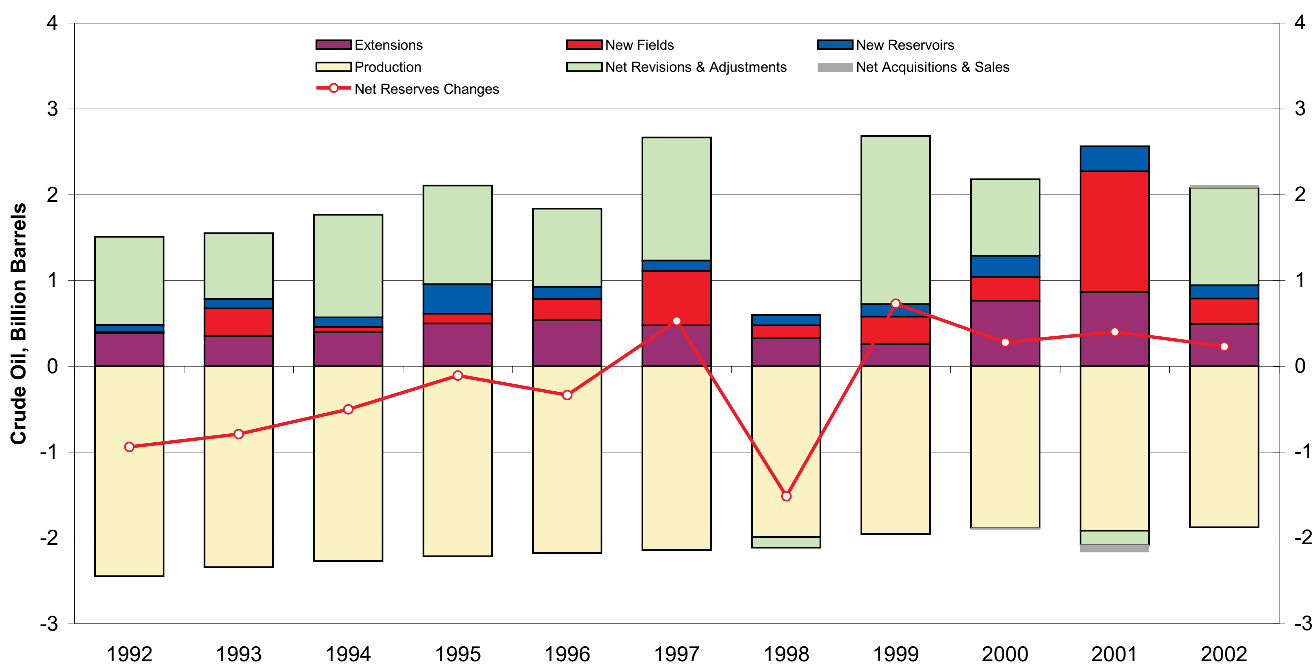


Figure 2. Components of Reserves Changes for Crude Oil, 1992-2002



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1992-2001 annual reports, DOE/EIA-0216.{16-25}

Figure 3. U.S. Dry Natural Gas Proved Reserves, 1992-2002

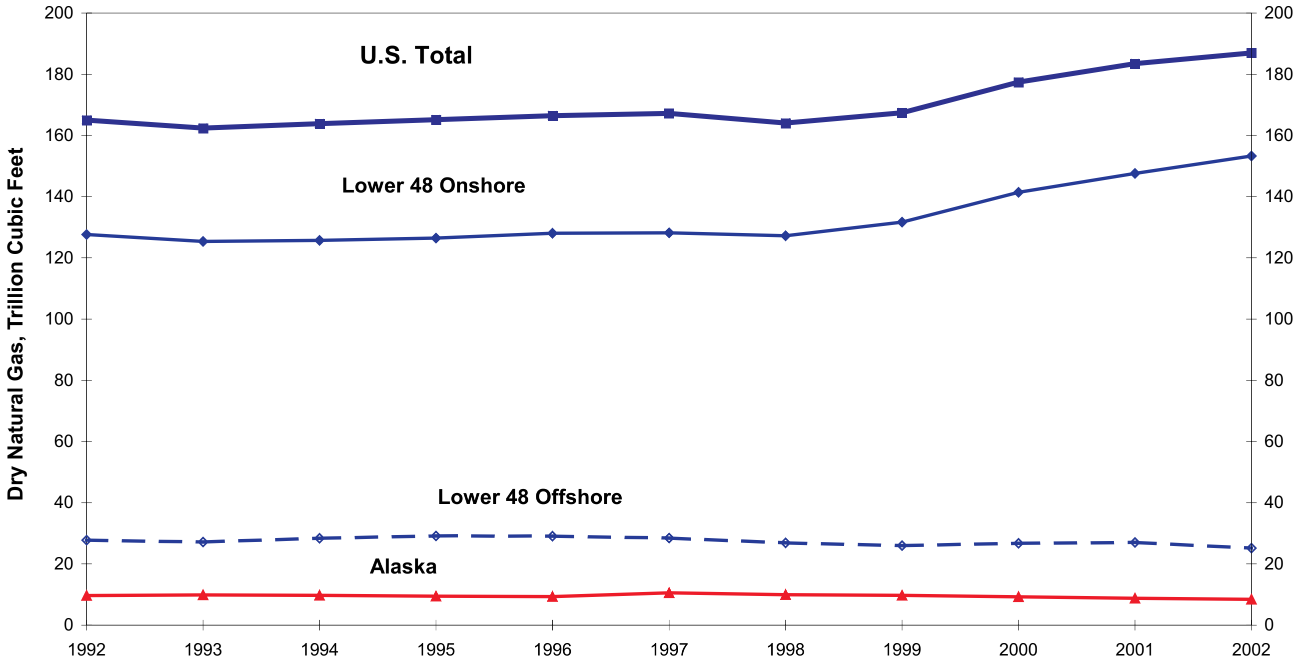
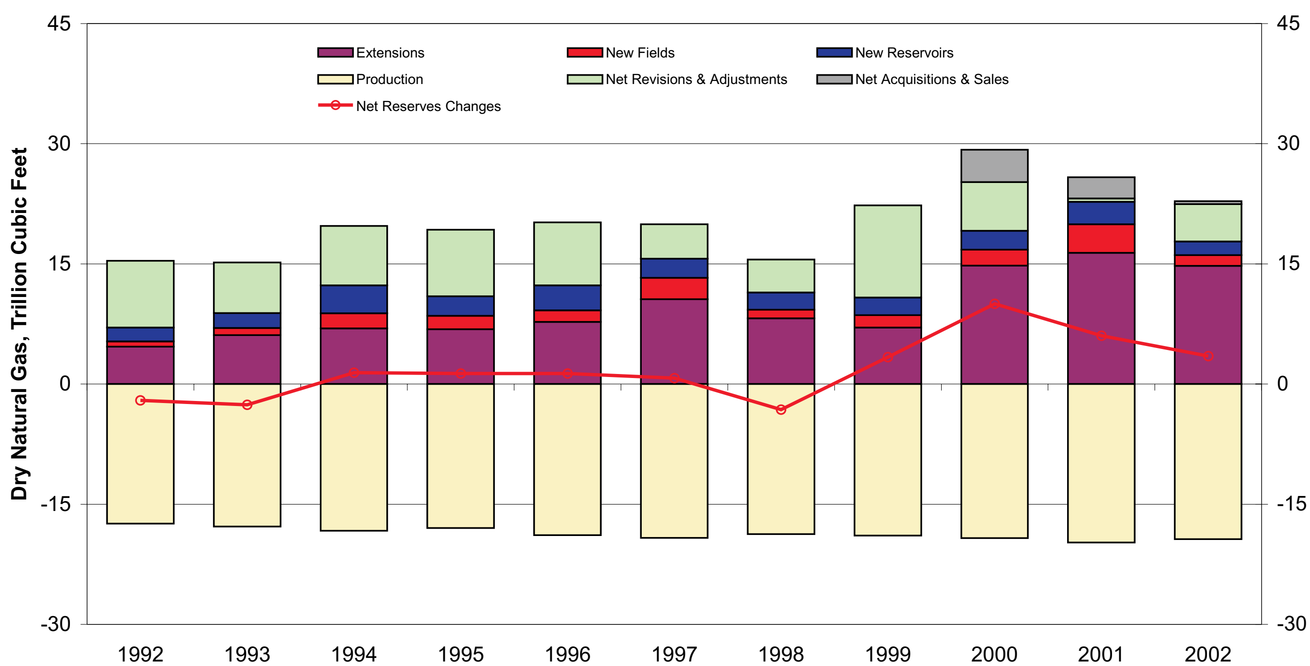


Figure 4. Components of Reserves Changes for Dry Natural Gas, 1992-2002



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1992-2001 annual reports, DOE/EIA-0216.{16-25}

prior 10-year average but 22 percent less than in 2001. The majority of natural gas total discoveries in 2002 were from extensions of existing gas fields.

Field extensions were 14,769 billion cubic feet, 10 percent less than extensions in 2001 but 65 percent more than the prior 10-year average of 8,931 billion cubic feet.

New field discoveries were 1,332 billion cubic feet, 63 percent less than the volume discovered in 2001 and 24 percent less than the prior 10-year average.

New reservoir discoveries in old fields were 1,694 billion cubic feet, down 40 percent from 2001 and 31 percent less than the prior 10-year average.

Dry natural gas net revisions and adjustments were 4,664 billion cubic feet. The net of sales and acquisitions of dry natural gas proved reserves was 380 billion cubic feet.

Production removed an estimated 19,353 billion cubic feet of proved reserves from the National total. Dry gas production decreased by 2 percent compared to 2001. Operators replaced 118 percent of dry natural gas production with reserves additions.

Coalbed methane proved reserves and production are included in the 2002 totals. However, EIA tracks these reserves in order to record the development and performance of this unconventional gas source.

Coalbed methane proved reserves and production continued to grow in 2002. Coalbed methane proved reserves were 18,491 billion cubic feet, representing an increase of 5 percent over 2001 and accounting for 10 percent of U.S. dry gas proved reserves. Coalbed methane production was 1,614 billion cubic feet, representing an increase of 3 percent over 2001 and accounting for 8 percent of U.S. dry gas production.

Natural Gas Liquids

Proved reserves of natural gas liquids increased 1 million barrels to 7,994 million barrels during 2002—essentially level with 2001. **Figure 5** shows the natural gas liquids proved reserves levels by major region and **Figure 6** shows the components of reserves changes from 1992 through 2002.

Operators replaced 100 percent of their 2002 natural gas liquids production with reserve additions. Total discoveries added 738 million barrels (primarily from extensions), net revisions and adjustments added 93 million barrels, and net sales and acquisitions added 54 million barrels.

Total proved reserves of liquid hydrocarbons (crude oil plus natural gas liquids) were 30,671 million barrels in 2002—a 1 percent increase from the 2001 level. Natural gas liquids represented 26 percent of total liquid hydrocarbon proved reserves in 2002.

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 2002. The table has two sections, one for the lower 48 States and another for the entire United States. 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.

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

- Discovered an average of 892 million barrels per year of new reserves
- Had proved reserves additions averaging 2,132 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 416 million barrels (the difference between post-1976 average annual production and post-1976 average annual 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.) The 23,195 million barrels of total discoveries since 1977 accounted for 42 percent of reserves additions in the 1977-2002 period.

Compared to the averages of reserves changes since 1977, 2002 was an up year for crude oil discoveries. Total discoveries of crude oil (946 million barrels) in 2002 were 6 percent greater than the post-1976 U.S. average (892 million barrels per year).

Figure 5. U.S. Natural Gas Liquids Proved Reserves, 1992-2002

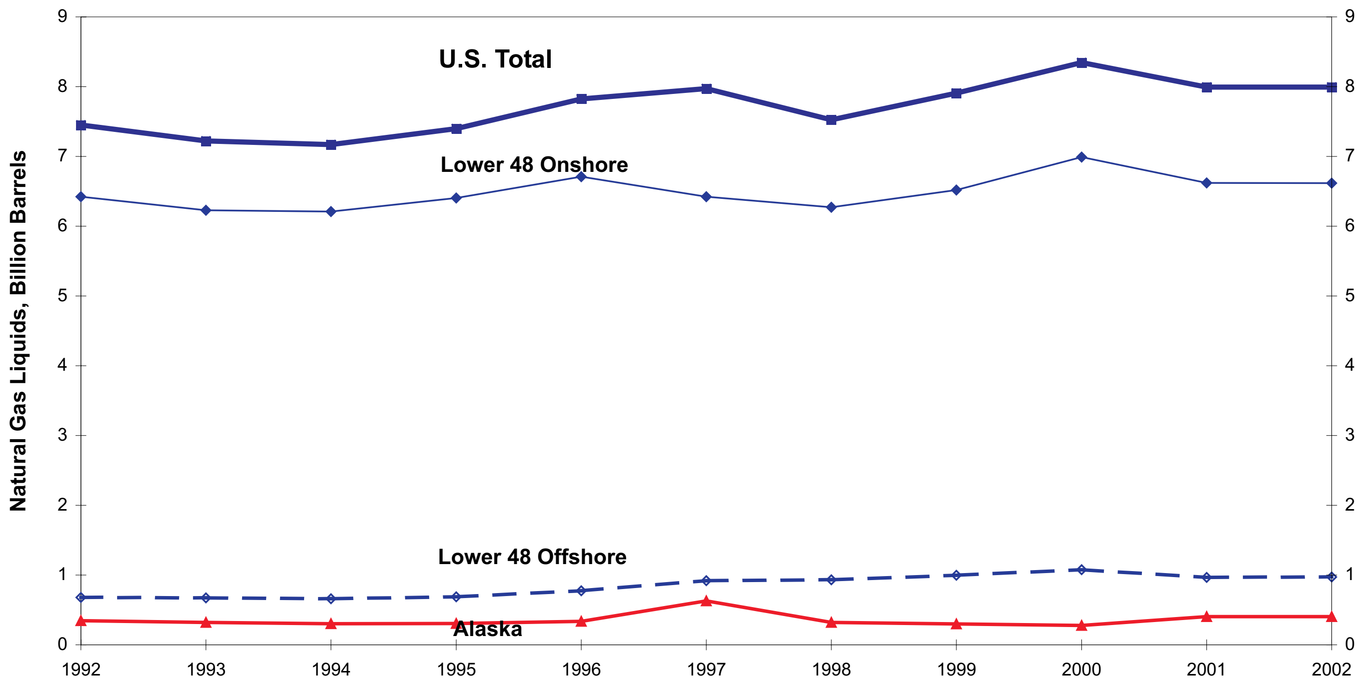
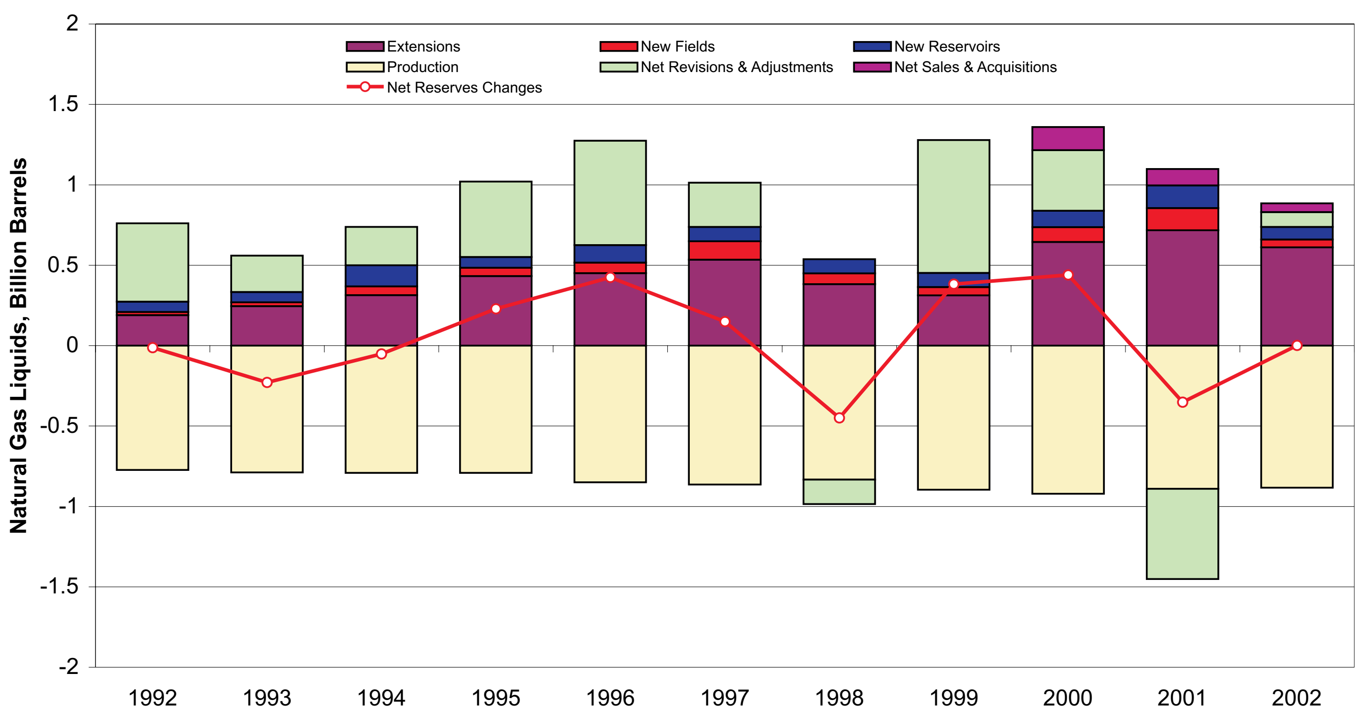


Figure 6. Components of Reserves Changes for Natural Gas Liquids, 1992-2002



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1992-2001 annual reports, DOE/EIA-0216.{16-25}

Table 2. Reserves Changes, 1977-2002

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	4,987	192	11.0	5,938	228	10.7
New Reservoir Discoveries in Old Fields	3,739	144	8.3	3,869	149	7.0
Extensions	11,832	455	26.2	13,388	515	24.2
Total Discoveries	**20,558**	**791**	**45.5**	**23,195**	**892**	**41.8**
Revisions, Adjustments, Sales & Acquisitions[a]	24,647	948	54.5	32,238	1,240	58.2
Total Reserves Additions	**45,205**	**1,739**	**100.0**	**55,433**	**2,132**	**100.0**
Production	**52,070**	**2,003**	**115.2**	**66,258**	**2,548**	**119.5**
Net Reserves Change	**-6,865**	**-264**	**-15.2**	**-10,825**	**-416**	**-19.5**
	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	50,968	1,960	11.2	51,190	1,969	11.6
New Reservoir Discoveries in Old Fields	65,310	2,512	14.4	65,723	2,528	14.9
Extensions	215,162	8,275	47.3	218,151	8,390	49.6
Total Discoveries	**331,440**	**12,748**	**72.9**	**335,064**	**12,887**	**76.2**
Revisions, Adjustments, Sales & Acquisitions[a]	123,016	4,731	27.1	104,800	4,031	23.8
Total Reserves Additions	**454,456**	**17,479**	**100.0**	**439,864**	**16,918**	**100.0**
Production	**456,816**	**17,570**	**100.5**	**466,196**	**17,931**	**106.0**
Net Reserves Change	**-2,360**	**-91**	**-0.5**	**-26,332**	**-1,013**	**-6.0**

[a] EIA did not separately collect data on sales and acquisitions of proved reserves until the year 2000.
Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves* 1977-2002 annual reports, DOE/EIA-0216.{1-25}

Looking at the components of total discoveries in 2002:

- 2002's new field discoveries (300 million barrels) were 32 percent greater than the post-1976 average for crude oil,
- New reservoir discoveries in old fields were 3 percent greater than the post-1976 average, and
- Extensions in 2002 were 4 percent less than the post-1976 average for crude oil.

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

- Discovered an average of 12,887 billion cubic feet per year of new reserves
- Had proved reserves additions averaging 16,918 billion cubic feet per year from total discoveries, net revisions and adjustments, and net sales and acquisitions
- Had an average net reduction in U.S. reserves of 1,013 billion cubic feet per year.

Like crude oil reserves, natural gas reserves have been sustained primarily by proved ultimate recovery appreciation since 1977. However, extensions rather than net revisions and adjustments are usually the largest component. Extensions account for 50 percent while net revisions and adjustments account for only 24 percent of all reserves additions since 1977. In 2002, the net of revisions, adjustments, sales, and acquisitions was 22 percent of all reserves additions, and extensions were 65 percent of all reserves additions.

Compared to the averages of reserves changes since 1977, 2002 was an up year for natural gas reserves additions from total discoveries. Operators reported 17,795 billion cubic feet of total discoveries of dry natural gas proved reserves, 38 percent more than the post-1976 average (12,887 billion cubic feet). Also, the net of revisions, adjustments, sales, and acquisitions was 25 percent higher in 2002 (5,044 billion cubic feet) as compared to the post-1976 U.S. average (4,031 billion cubic feet per year).

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, 1977-2002

Year		Crude Oil		Natural Gas		
		Current	2002 Constant	Current	2002 Constant	
		(dollars per barrel)		(dollars per thousand cubic feet)		Number of Rigs
1977		8.57	21.07	0.79	1.94	2,001
1978		9.00	20.65	0.91	2.09	2,259
1979		12.64	26.77	1.18	2.50	2,177
1980		21.59	41.88	1.59	3.08	2,909
1981		31.77	56.37	1.98	3.51	3,970
1982		28.52	47.63	2.46	4.11	3,105
1983		26.19	42.08	2.59	4.16	2,232
1984		25.88	40.09	2.66	4.12	2,428
1985		24.09	36.17	2.51	3.77	1,980
1986		12.51	18.38	1.94	2.85	964
1987		15.40	21.97	1.67	2.38	936
1988		12.58	17.35	1.69	2.33	936
1989		15.86	21.08	1.69	2.25	869
1990		20.03	25.62	1.71	2.19	1,010
1991		16.54	20.41	1.64	2.02	860
1992		15.99	19.26	1.74	2.10	721
1993		14.25	16.77	2.04	2.40	754
1994		13.19	15.20	1.85	2.13	775
1995		14.62	16.49	1.55	1.75	723
1996		18.46	20.43	2.17	2.40	779
1997		17.23	18.70	2.32	2.52	943
1998		10.87	11.65	1.96	2.10	827
1999		15.56	16.45	2.19	2.31	625
2000		26.72	27.66	3.69	3.82	918
2001	January	24.64	25.16	6.82	6.96	1,118
	February	25.27	25.73	5.08	5.17	1,136
	March	22.98	23.34	4.37	4.44	1,163
	April	23.39	23.72	4.52	4.58	1,206
	May	24.06	24.35	4.36	4.41	1,234
	June	23.43	23.67	3.80	3.84	1,270
	July	22.82	22.99	3.36	3.39	1,278
	August	23.08	23.23	3.34	3.36	1,252
	September	22.37	22.51	2.94	2.96	1,193
	October	18.73	18.88	2.81	2.83	1,111
	November	16.40	16.53	3.42	3.45	1,000
	December	15.54	15.66	3.44	3.47	901
2001		**21.84**	**22.09**	**4.02**	**4.07**	**1,156**
2002	January	15.89	15.98	2.35	2.36	867
	February	16.93	17.01	2.14	2.15	825
	March	20.28	20.35	2.52	2.53	763
	April	22.52	22.58	3.02	3.03	750
	May	23.51	23.55	3.01	3.01	826
	June	22.59	22.61	2.94	2.94	842
	July	23.51	23.51	2.89	2.89	851
	August	24.76	24.74	2.77	2.77	848
	September	26.08	26.02	2.98	2.97	860
	October	25.29	25.20	3.35	3.34	851
	November	23.38	23.26	3.59	3.57	834
	December	25.29	25.11	3.84	3.81	856
2002		**22.51**	**22.51**	**2.95**	**2.95**	**830**

=Revised data.

Sources: Current dollars and number of rigs: *Monthly Energy Review October 2003*, DOE/EIA-0035(2003/10). 2002 constant dollars: U.S. Department of Commerce, Bureau of Economic Analysis, Gross Domestic Product Implicit Price Deflators, October 2003.

Prices and Drilling

Prices: 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 through 2002.

The U.S. crude oil first purchase price started at an average of $15.54 per barrel in December 2001, rose to $26.08 in September 2002, then declined to $25.29 per barrel in December 2002. The average U.S. crude oil first purchase price increased from $21.84 in 2001 to $22.51 per barrel in 2002.

Oil prices vary by region. The average 2002 crude oil first purchase price was $23.41 per barrel in Texas, $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 2002 was $18.18 per barrel for Alaskan North Slope crude.{26}

The average annual wellhead natural gas price decreased from $4.07 in 2001 to $2.95 per thousand cubic feet in 2002. Natural gas prices started at $2.36 per thousand cubic feet in January 2002 and fluctuated between $2.15 and $3.03 until October, then increased steadily from $3.35 to a high of $3.81 per thousand cubic feet in December 2002.{27}

Drilling: The annual average active rig count decreased from 1,156 in 2001 to 830 in 2002 (**Table 3**), a 28 percent decrease in active rigs.

Looking first at exploratory wells, 2,068 were drilled in 2002 (**Table 4**). Of these, 11 percent were completed as oil wells, 32 percent were completed as gas wells, and 57 percent were dry holes. Exploratory oil and gas completions (excluding dry holes) in 2002 were 32 percent less (**Figures 7 and 8**) than the revised 2001 total.

Figures 9 and 10 show the average volume of discoveries per exploratory well for dry natural gas and oil, respectively, since 1977. The 2002 average volume of oil discoveries per exploratory well decreased 47 percent as compared to 2001, while the 2002 average volume of gas discoveries per exploratory well increased 16 percent as compared to 2001.

The number of successful development wells decreased 26 percent for oil and 28 percent for gas from their 2001 levels. Including dry holes, there were an estimated 23,406 exploratory and development wells drilled in 2002. This is 26 percent less than in 2001 and 3 percent less than the average number of wells drilled annually in the prior 10 years (24,177).

For the tenth 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 and acquisitions were announced in 2002, and are expected to have a major impact on the energy industry in the future:

On March 12, 2002, Shareholders of Conoco Incorporated and Phillips Petroleum Company approved the proposed $15.6 billion merger. The new company ConocoPhillips, is assuming Conoco's home in Houston. The combined firm is the third largest U.S. petroleum company in terms of proved reserves. The U.S. Federal Trade Commission approved the merger in February 2003.{28}

On September 5, 2002, Unocal Corporation commenced its previously announced exchange offer to acquire all outstanding shares of Pure Resources common stock that it did not already own. Unocal, through its subsidiary Union Oil Company of California, already owned approximately 65 percent of Pure's outstanding common stock. In accordance with the final October 9, 2002 agreement, Unocal's Union Oil Company of California subsidiary exchanged 0.74 shares of Unocal common stock for each share of Pure's common stock.{29}

On July 29, 2002, MidAmerican Energy Holdings Company reached a definitive agreement with Dynegy Incorporated to acquire 100 percent ownership of Northern Natural Gas Company for $928 million in cash and the assumption of $950 million in debt. The sale closed in August 2002. With its acquisition of Kern River Gas Transmission Company in March 2002, the Kern River pipeline expansion, and completion of the Northern Natural Gas transaction, MidAmerican has become a leading owner of interstate natural gas pipeline systems. Northern Natural Gas is a 16,600-mile interstate pipeline transporting 4.3 billion cubic feet of natural gas per day from the Permian Basin in Texas to the upper Midwest.{30}

On August 1, 2002, Enterprise Products Partners L.P. announced that its operating partnership had completed the acquisition of Mid-America Pipeline

Table 4. U.S. Exploratory and Development Well Completions,[a] 1970-2002

Year	Exploratory Oil	Exploratory Gas	Exploratory Dry	Exploratory Total	Total Exploratory and Development Oil	Total Exploratory and Development Gas	Total Exploratory and Development Dry	Total Exploratory and Development 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	291	504	1,647	2,442	7,604	11,308	4,840	23,212
1999	R 154	R 539	R 1,195	R 1,888	R 4,176	R 10,877	R 3,364	R 18,417
2000	R 264	R 609	R 1,288	R 2,161	R 7,358	R 16,455	R 4,025	R 27,838
2001	R 317	R 988	R 1,444	R 2,749	R 8,060	R 22,083	R 2,640	R 31,478
2002	220	668	1,180	2,068	5,996	15,947	2,351	23,406

[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.

Figure 7. U.S. Exploratory Gas Well Completions, 1977-2002

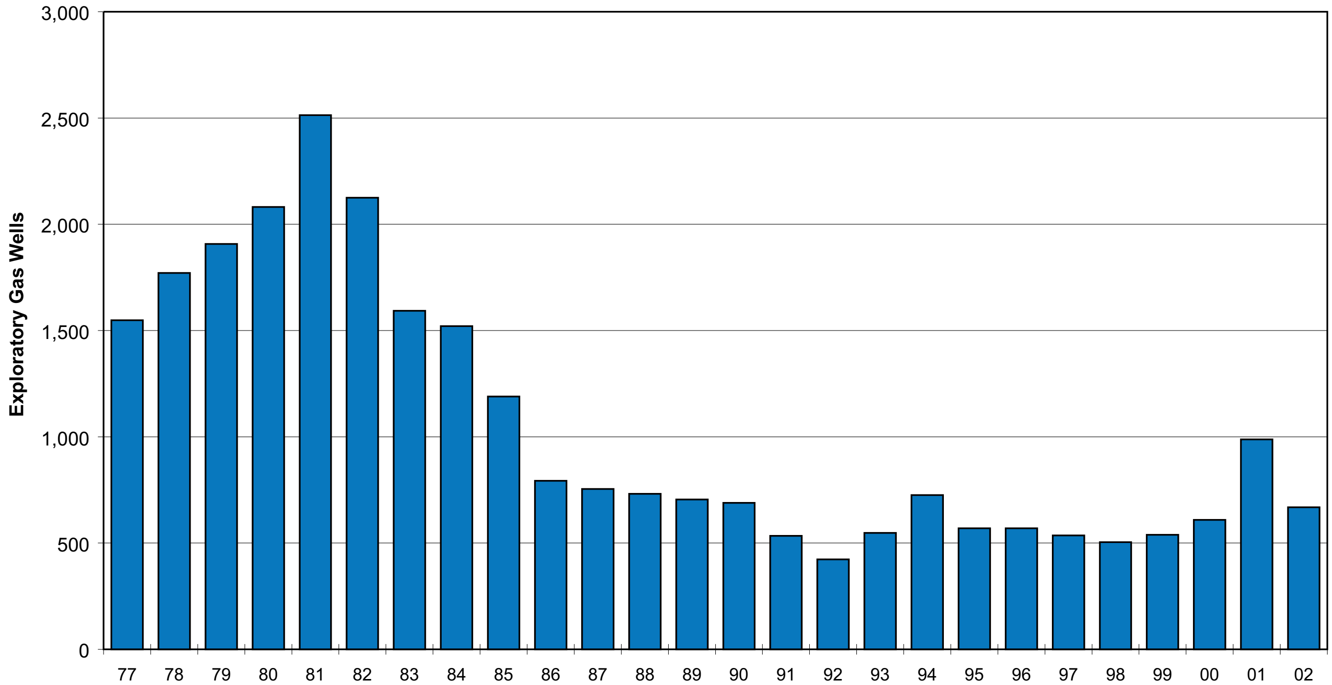
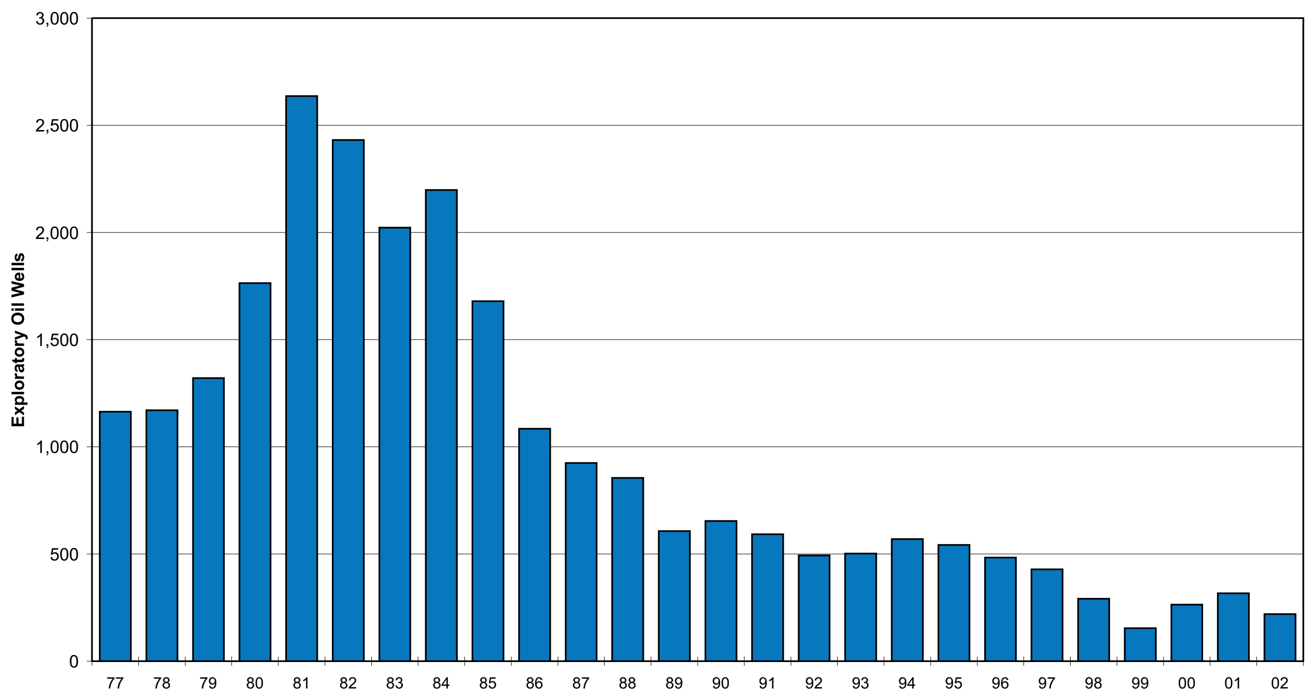


Figure 8. U.S. Exploratory Oil Well Completions, 1977-2002



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

Figure 9. U.S. Total Discoveries of Dry Natural Gas per Exploratory Gas Well Completion, 1977-2002

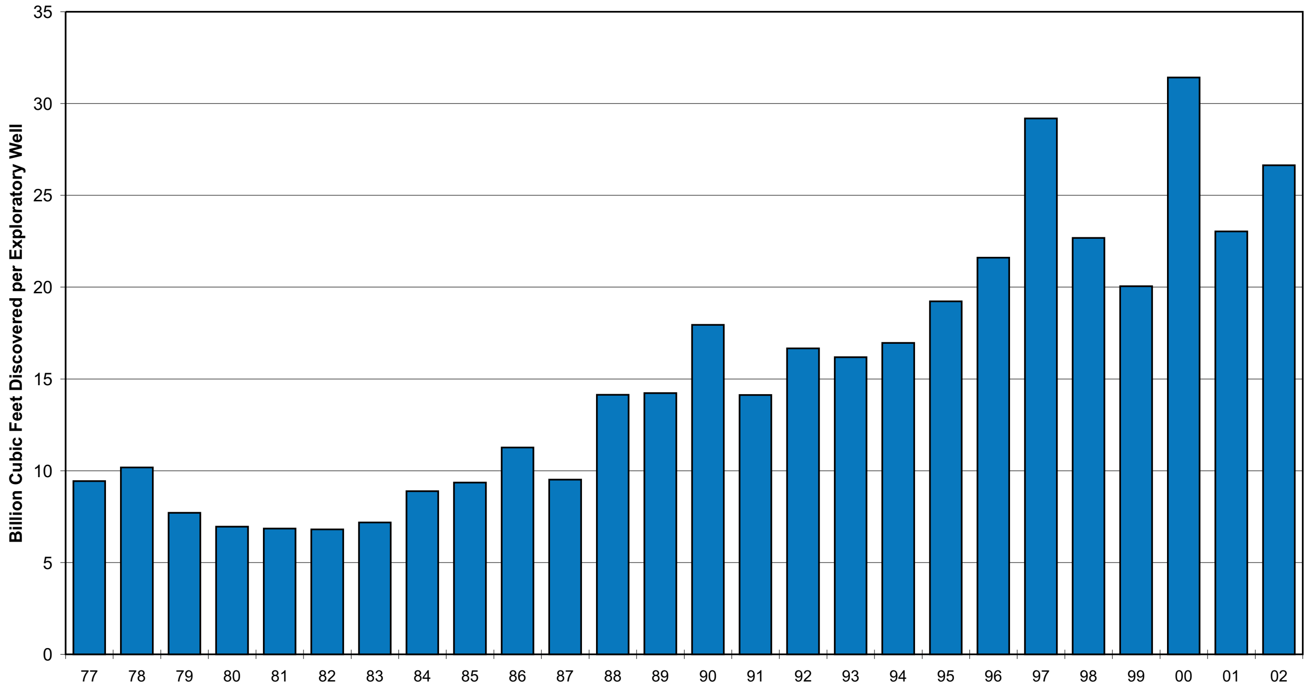
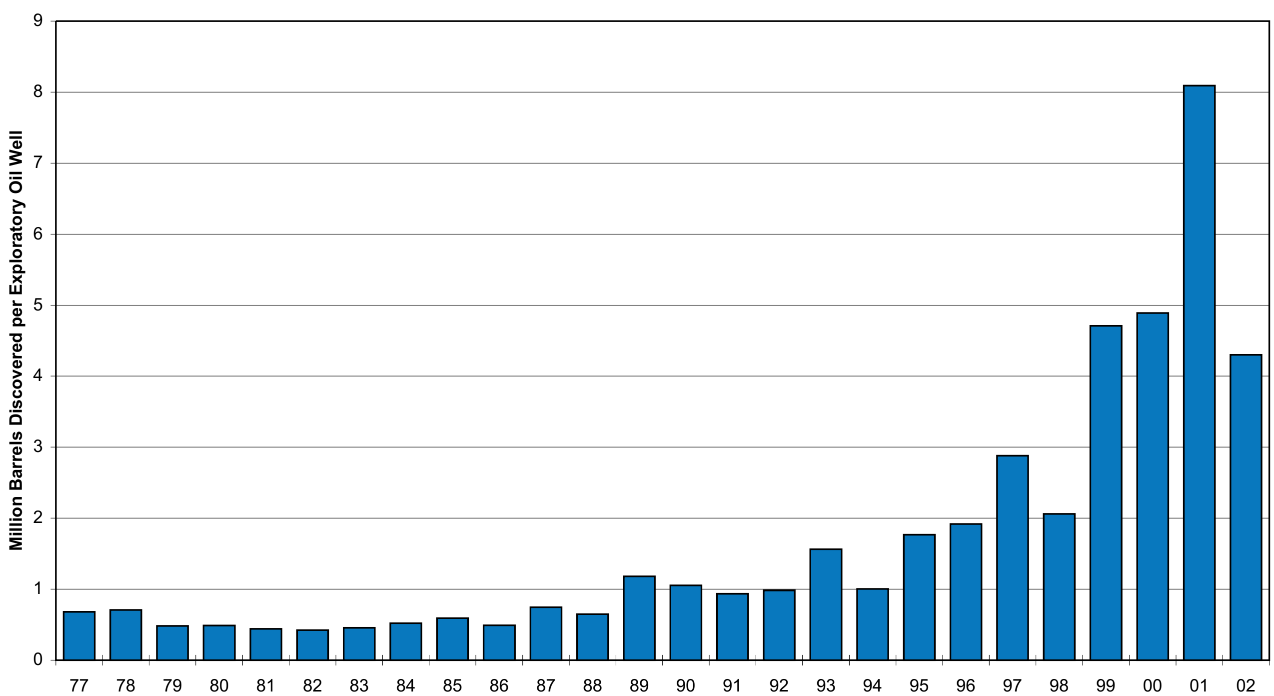


Figure 10. U.S. Total Discoveries of Crude Oil per Exploratory Oil Well Completion, 1977-2002



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

Company and Seminole Pipeline Company from affiliates of The Williams Companies Inc. for approximately $1.2 billion in cash. Mid-America Pipeline is a major natural gas liquids pipeline system with 7,226 miles of pipe and average transportation volumes of approximately 850,000 barrels per day. The Seminole Pipeline, a 1,281-mile pipeline, transports mixed NGLs and NGL products from Hobbs, New Mexico and the Permian Basin to Mont Belvieu, Texas, the largest NGL market hub in the United States. The average volume transported on Seminole is approximately 260,000 barrels per day.{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 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
- 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 2002, U.S. crude oil proved reserves increased and oil production decreased, increasing the National average R/P ratio from 11.7 to 12.1.

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 2002 National average R/P ratio for crude oil was 12.1-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 2001 to 2002 the U.S. average R/P ratio for natural gas increased from 9.2 to 9.4 since proved reserves increased and production decreased.

Different marketing, transportation, and production characteristics for gas are seen when looking at regional average R/P ratios, compared to the 2002 U.S. average R/P ratio of about 9.4-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 had 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

Figure 11. Reserves-to-Production Ratios for Crude Oil, 1945-2002

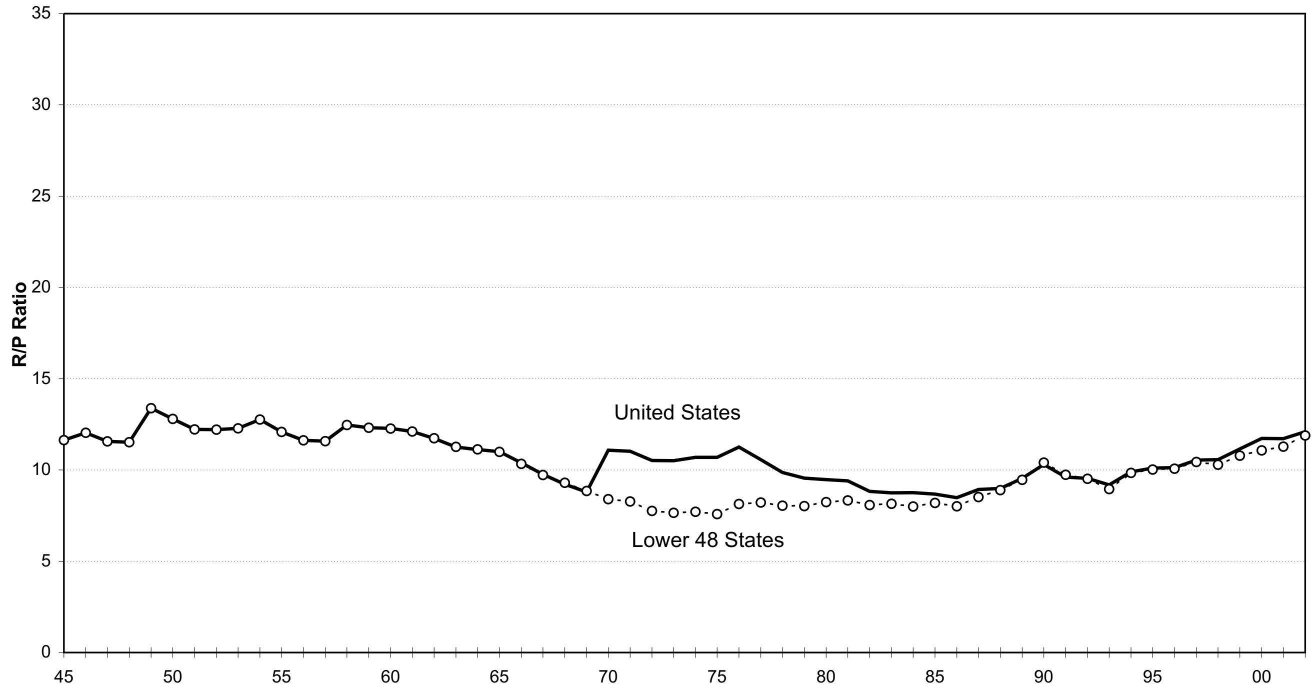
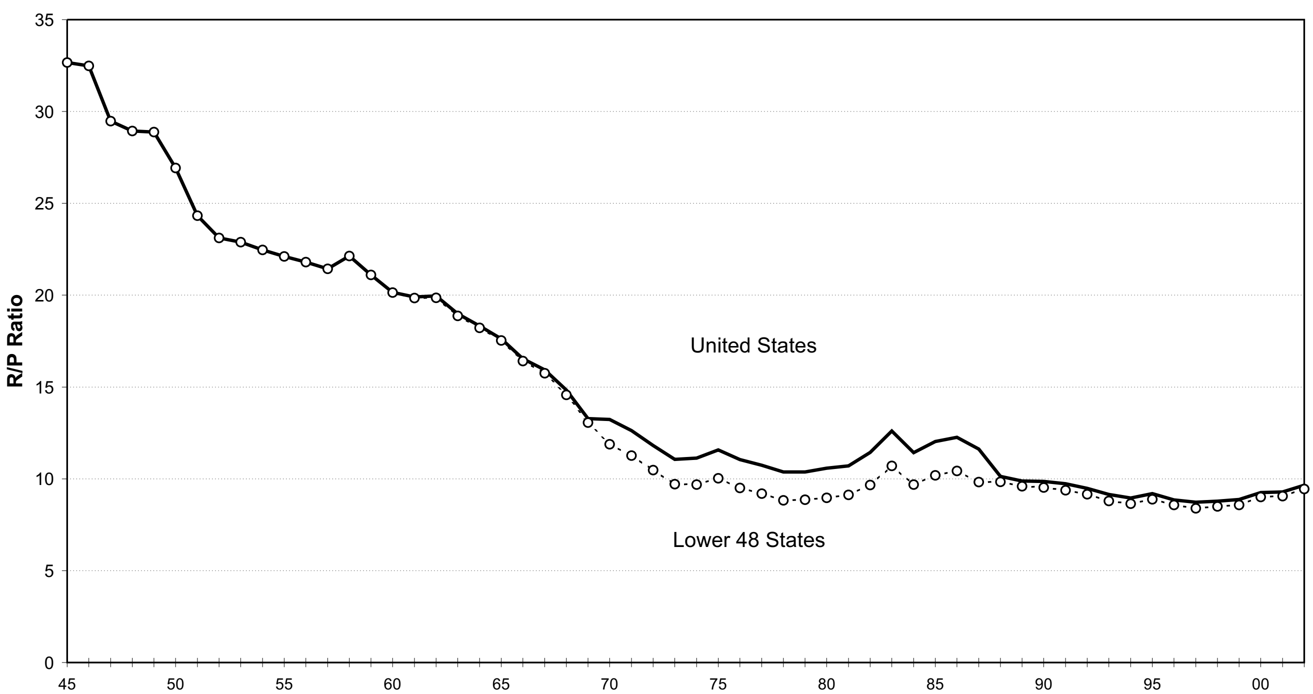


Figure 12. Reserves-to-Production Ratios for Wet Natural Gas, 1945-2002



Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {32} and Energy Information Administration, Office of Oil and Gas (1977–2001){1-25}. 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, 1977-2002

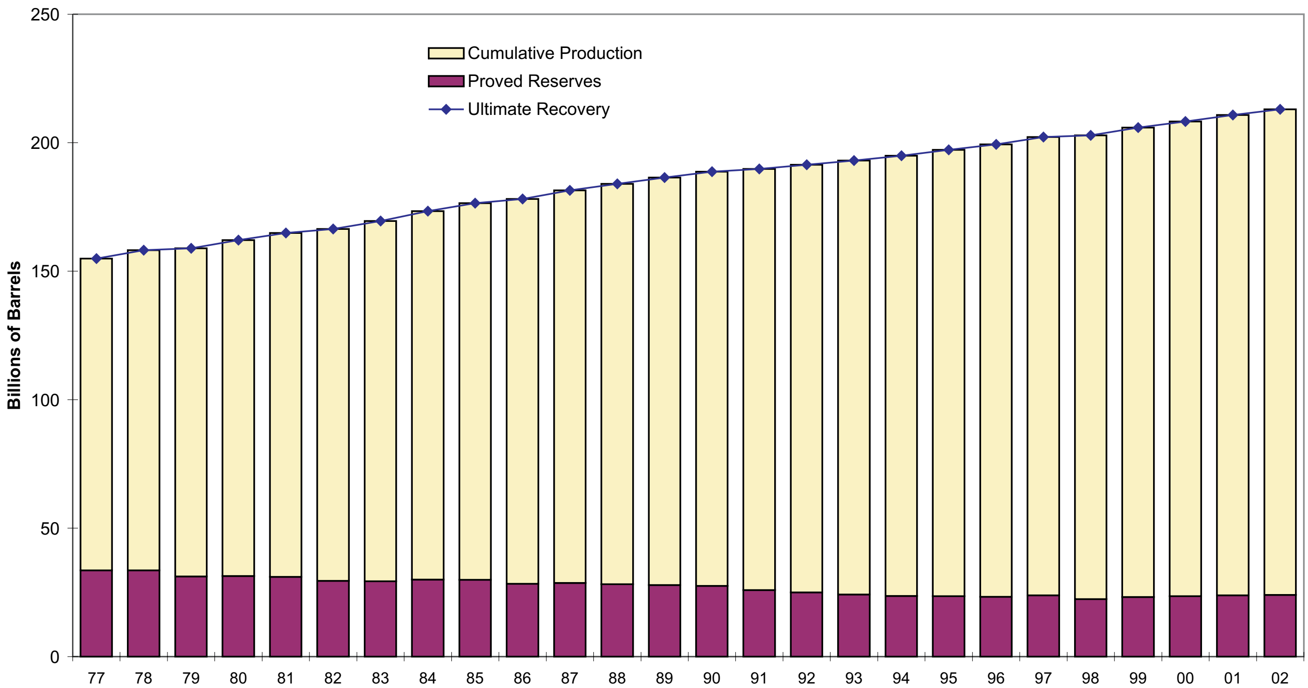
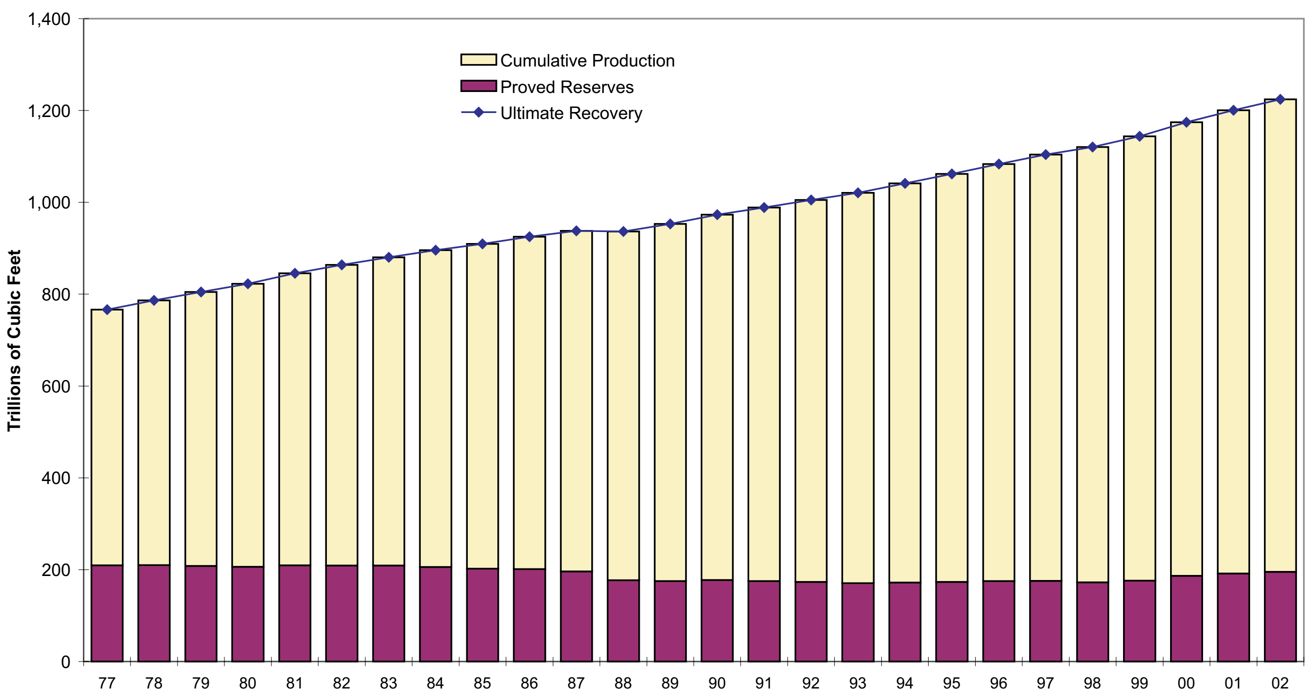


Figure 14. Components of Proved Ultimate Recovery for Wet Natural Gas, 1977-2002



Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {32} and Energy Information Administration, Office of Oil and Gas (1977–2001){1-25}. 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, 2002

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	Saudia Arabia[c]	[d]261,800	[d]261,750	1	Russia	1,680,000	1,700,000
2	Iraq[c]	112,500	115,000	2	Iran[c]	812,300	913,591
3	Kuwait[c]	[d]96,500	[d]98,850	3	Qatar[c]	508,540	915,992
4	Iran[c]	89,700	100,060	4	Saudia Arabia[c]	[d]224,700	[d]234,600
5	Canada	180,021	5,485	5	United Arab Emirates[c]	212,100	204,050
6	United Arab Emirates[c]	97,800	63,010	6	**United States**	183,460	188,965
7	Venezuela[c]	77,800	53,130	7	Algeria[c]	159,700	170,000
8	Russia	60,000	58,765	8	Nigeria[c]	124,000	178,500
9	Libya[c]	29,500	30,000	9	Venezuela[c]	148,000	149,207
10	Nigeria[c]	24,000	32,000	10	Iraq[c]	109,800	112,600
Top 10 Total		**1,029,621**	**818,050**	**Top 10 Total**		**4,162,600**	**4,767,505**
11	**United States**	22,677	21,997	11	Australia	90,000	85,000
12	China	18,250	23,700	12	Indonesia[c]	92,500	73,500
13	Qatar[c]	15,207	19,559	13	Malaysia	75,000	88,000
14	Mexico	12,622	17,197	14	Norway	77,300	74,730
15	Algeria[c]	9,200	13,000	15	Canada	60,118	60,126
16	Norway	10,265	9,018	16	Netherlands	62,000	55,315
17	Brazil	8,322	9,813	17	Egypt	58,500	58,600
18	Angola	5,412	8,900	18	Kuwait[c]	[d]52,200	[d]56,600
19	Oman	5,506	5,735	19	China	53,325	46,650
20	Indonesia[c]	5,000	5,945	20	Libya[c]	46,400	46,000
21	India	5,367	4,595	21	Oman	29,280	31,000
22	United Kingdom	4,715	4,476	22	Bolivia	24,000	28,061
23	Malaysia	3,000	4,328	23	India	26,943	23,550
24	Egypt	3,700	3,535	24	Argentina	26,960	23,431
25	Australia	3,500	3,700	25	United Kingdom	24,600	22,239
Top 25 Total		**1,162,364**	**973,548**	**Top 25 Total**		**4,962,226**	**5,540,307**
OPEC Total		**819,007**	**792,304**	**OPEC Total**		**2,490,740**	**3,054,640**
World Total		**1,212,881**	**1,033,993**	**World Total**		**5,501,424**	**6,128,653**

[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, 2001 were published by the *Oil & Gas Journal* as its estimates as of December 31, 2002.

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 22, 2002, pp. 113-115. Gulf Publishing Company, *World Oil*, August, 2003, p 23.

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 U.S. proved ultimate recovery and its components (proved reserves and cumulative production) for crude oil plus lease condensate and for wet natural gas, during 1977 - 2002. These estimates illustrate the continued 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 from 1977 - 2002 was 67,664 million barrels, a volume that substantially exceeds 1977 proved reserves. However, at the end of 2002, there were still 24,023 million barrels of crude oil plus lease condensate proved reserves. This reflects the fact that the Nation's estimated proved ultimate recovery of crude oil was fundamentally increased during this period owing to the proved ultimate recovery appreciation process (the continued development of old fields). In fact, only 11 percent of proved reserves additions of crude oil were booked as new field discoveries from 1976 through 2002. The rest came from the proved reserves categories related to the proved ultimate recovery appreciation process.

Similarly, the 1977 proved reserves of wet natural gas were 209,490 billion cubic feet, but more than twice this amount of gas was produced from 1977 through 2002 and there were still 195,561 billion cubic feet of wet natural gas proved reserves in 2002. Only 12 percent of proved reserve additions of natural gas were booked as new field discoveries from 1976 through 2002.

International Perspective

International Reserves

The EIA does not currently collect its own data on international oil and gas reserves. However, international reserves estimates are presented in two widely circulated trade publications and are shown in **Table 5** as a service to our readers. The world's total reserves are estimated to be roughly 1 trillion barrels of oil and 6 quadrillion cubic feet of gas.

The United States ranked 11th in the world for reserves of crude oil and 6th for reserves of natural gas in 2002. 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 2002. There are sometimes substantial differences between the estimates from these sources. For example, the *Oil & Gas Journal* reported oil reserves for the United Arab Emirates of 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 estimates of oil reserve.

The *Oil & Gas Journal*{34} estimate for world oil reserves increased 18 percent in 2002, due to its addition of large reserves of heavy oil from Canadian tar sands; an addition not shared by *World Oil*{35} who's estimate increased only 2 percent. The addition of large Canadian oil reserves in 2002 moves it up in rank from 20th in the world in 2001 to 5th in the world in 2002. For world gas reserves, the *Oil & Gas Journal* reported a 1 percent increase, while *World Oil* reported a 3 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. Based on averages of the *World Oil* and *Oil & Gas Journal* estimates, Iraqi oil reserves are almost 5 times U.S. reserves. Venezuela and Canada have about 3 times U.S. reserves.

Petroleum Consumption

The United States is the world's largest energy consumer. The EIA's estimates of energy consumption are published in its *Annual Energy Review*.{36} In 2002:

- The U.S. consumed 97,350,000,000,000,000 Btu of energy (97.35 quadrillion Btu). This was an increase of 1.03 quadrillion Btu from the 2001 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 19.8 million barrels of oil and natural gas liquids and 62.7 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 2002, crude oil imports made up 61 percent of the U.S. crude oil supply. Saudi Arabia, Mexico, Canada, and Venezuela were the primary foreign suppliers of petroleum to the United States.{37}

Net gas imports increased slightly from the revised 2001 total of 3.73 trillion cubic feet to 3.78 trillion cubic feet in 2002. Imports were used for approximately 19 percent of consumption, and almost all of it was pipelined from Canada. Some came from Mexico, though Mexico remains a net importer of natural gas from the U.S., and some liquefied natural gas was imported from Algeria and Australia.

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 2002 production and indicates pending mergers announced in 2002 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 1992-2002, due to expressed interest from the industry regarding this area. Table D9 contains the production and proved reserves for 1992-2002 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 22,667 million barrels of crude oil proved reserves as of December 31, 2002. This is 1 percent (231 million barrels) more than in 2001, and marks the fourth year in a row that crude oil proved reserves have increased.

The majority of crude oil total discoveries in 2002 were extensions, primarily in Texas, California, and the Gulf of Mexico Federal Offshore. The North Slope of Alaska, a key area for discoveries, had no significant impact on the National total in 2002. Operators replaced 112 percent of 2002 oil production with proved reserves additions (**Figure 15**).

Proved Reserves

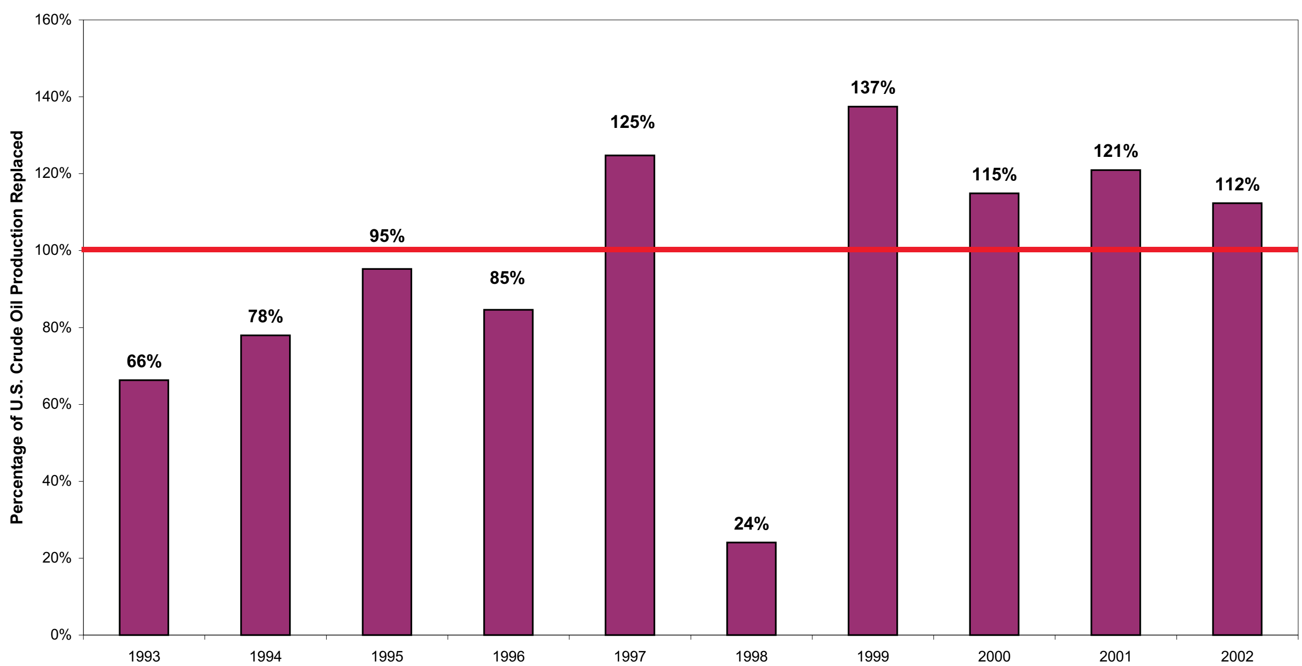
Table 6 presents the U.S. proved reserves of crude oil as of December 31, 2002, by selected States and State subdivisions.

Figure 16 maps 2002 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	21
Gulf of Mexico Federal Offshore	20
California	16
Area Total	**79**

Of these four areas, Texas, the Gulf of Mexico Federal Offshore, and California had increases in crude oil proved reserves in 2002. Alaska reported a decline in crude oil proved reserves.

Figure 15. Replacement of U.S. Crude Oil Production by Reserves Additions, 1993-2002.



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

Table 6. Crude Oil Proved Reserves, Reserves Changes, and Production, 2002
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Published Proved Reserves 12/31/01	Changes in Reserves During 2002: Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/02
Alaska	4,851	2	192	39	0	0	25	0	8	361	4,678
Lower 48 States	**17,595**	**414**	**1,733**	**1,166**	**804**	**828**	**467**	**300**	**146**	**1,514**	**17,999**
Alabama	42	3	8	2	1	0	1	0	5	5	51
Arkansas	[a]43	11	9	5	4	2	0	0	0	7	49
California	3,627	18	223	85	6	25	88	0	0	257	3,633
Coastal Region Onshore	385	3	19	2	4	12	9	0	0	18	404
Los Angeles Basin Onshore	297	4	48	16	1	0	15	0	0	17	330
San Joaquin Basin Onshore	2,766	14	130	66	1	0	64	0	0	205	2,702
State Offshore	179	-3	26	1	0	13	0	0	0	17	197
Colorado	196	18	30	13	1	0	1	0	0	17	214
Florida	75	1	2	1	0	0	0	0	0	4	73
Illinois	92	22	17	15	0	0	0	0	0	9	107
Indiana	[a]12	2	3	0	0	0	0	0	0	2	15
Kansas	216	44	37	40	4	3	11	2	0	32	237
Kentucky	[a]17	-5	2	0	0	15	0	0	0	2	27[a]
Louisiana	564	18	59	140	18	22	35	2	19	60	501
North	87	6	15	26	2	1	5	0	0	11	75
South Onshore	341	12	33	58	16	20	20	2	17	36	335
State Offshore	136	0	11	56	0	1	10	0	2	13	91
Michigan	46	11	13	6	2	3	2	0	0	6	61
Mississippi	167	12	23	14	40	44	3	1	1	18	179
Montana	260	0	22	9	13	14	27	5	0	18	288
Nebraska	[a]15	5	3	2	0	0	0	0	0	3	18
New Mexico	715	16	80	75	31	38	27	0	4	64	710
East	703	16	79	72	30	35	27	0	4	63	699
West	12	0	1	3	1	3	0	0	0	1	11
North Dakota	328	-2	52	13	57	58	9	0	0	33	342
Ohio	46	19	11	2	3	0	1	0	0	5	67
Oklahoma	556	43	79	68	176	199	23	0	0	58	598
Pennsylvania	10	2	3	1	0	0	0	0	0	2[a]	12a
Texas	4,944	188	427	232	331	289	91	0	7	368	5,015
RRC District 1	46	7	13	9	13	12	1	0	0	7	50
RRC District 2 Onshore	48	3	8	6	2	5	4	0	1	7	54
RRC District 3 Onshore	195	22	37	22	7	4	16	0	1	28	218
RRC District 4 Onshore	32	2	5	7	4	3	2	0	0	5	28
RRC District 5	29	0	3	5	0	1	0	0	0	4	24
RRC District 6	200	27	19	22	10	1	3	0	0	20	198
RRC District 7B	91	31	10	9	36	5	1	0	0	11	82
RRC District 7C	188	15	23	13	30	6	4	0	0	16	177
RRC District 8	1,880	28	156	74	158	164	29	0	1	113	1,913
RRC District 8A	2,070	25	132	41	61	74	27	0	2	135	2,093
RRC District 9	104	17	13	14	10	14	3	0	1	15	113
RRC District 10	55	11	7	9	0	0	1	0	0	6	59
State Offshore	6	0	1	1	0	0	0	0	1	1	6
Utah	271	-18	12	16	0	0	4	0	0	12	241
West Virginia	8	2	4	0	0	0	0	0	0	1	13[a]
Wyoming	489	5	92	22	93	81	18	0	0	46	524
Federal Offshore	4,835	3	521	403	24	35	125	290	110	483	5,009
Pacific (California)	547	1	24	8	0	0	32	0	0	31	565
Gulf of Mexico (Louisiana)	3,877	-2	401	264	23	32	92	260	110	395	4,088
Gulf of Mexico (Texas)	411	4	96	131	1	3	1	30	0	57	356
Miscellaneous[b]	21	-4	1	2	0	0	1	0	0	2	15
U.S. Total	**22,446**	**416**	**1,925**	**1,205**	**804**	**828**	**492**	**300**	**154**	**1,875**	**22,677**

[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 2002 contained in the *Petroleum Supply Annual 2002*, DOE/EIA-0340(02).

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

Figure 16. Crude Oil Proved Reserves by Area, 2002

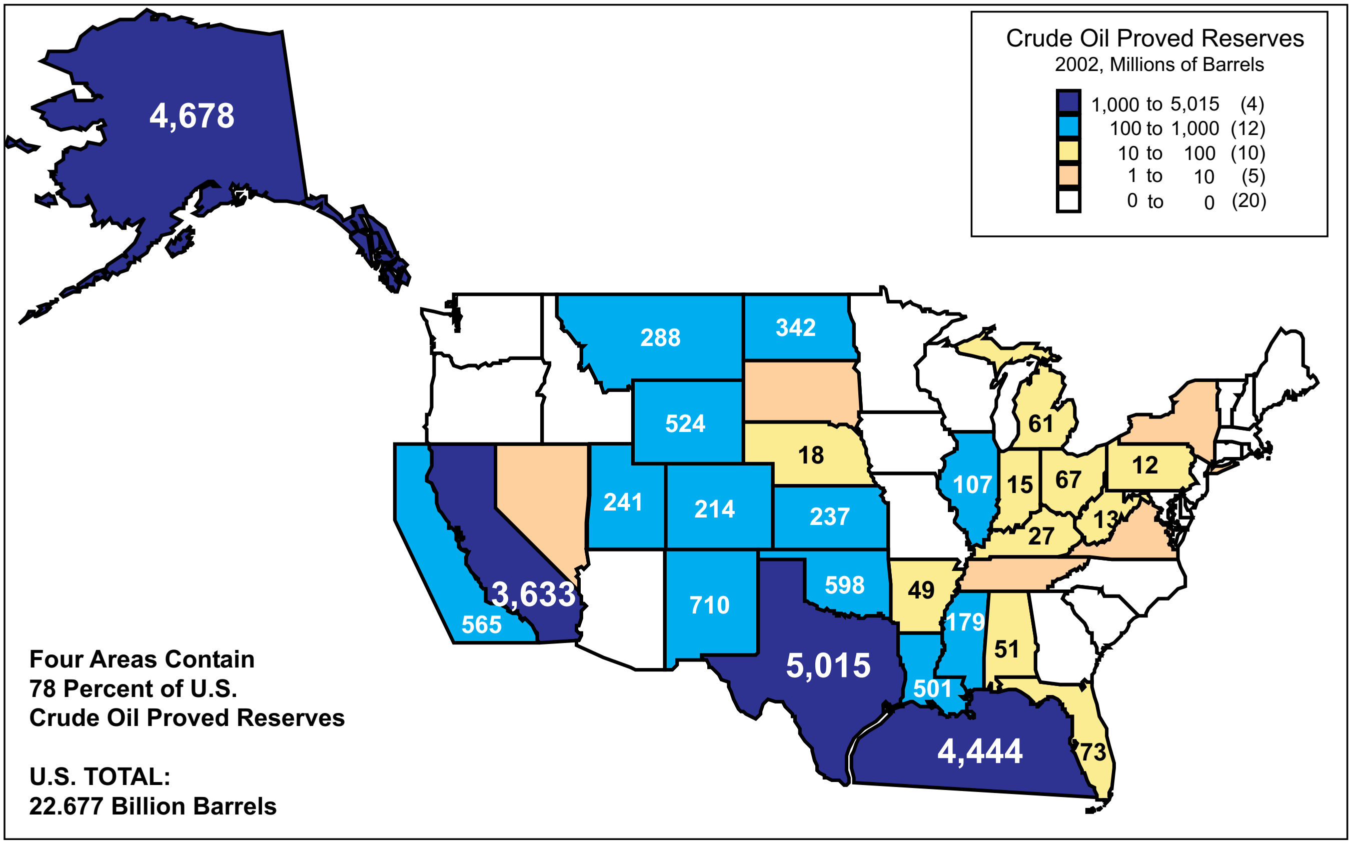
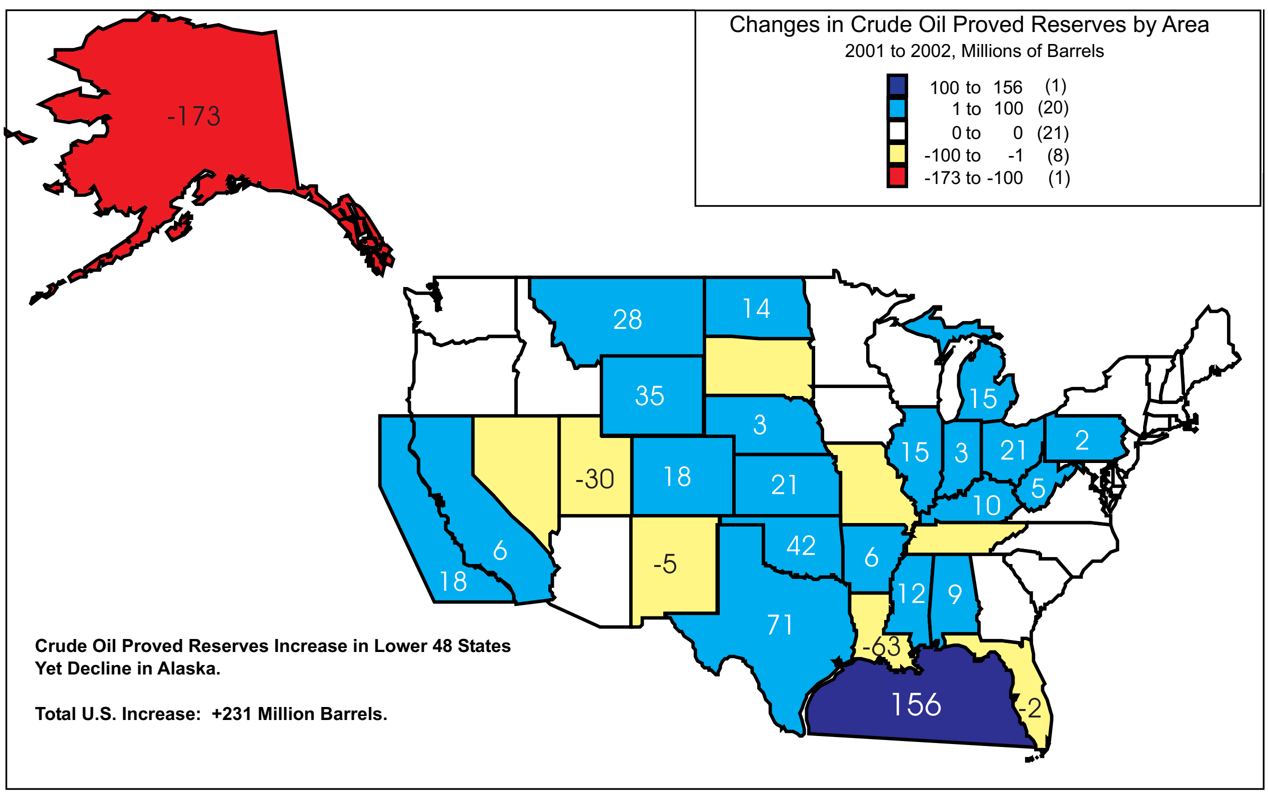


Figure 17. Changes in Crude Oil Proved Reserves by Area, 2001 to 2002



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

Discussion of Reserves Changes

Figure 17 maps the change in crude oil proved reserves from 2001 to 2002 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	+71
Alaska	-173
Gulf of Mexico Federal Offshore	+156
California	+6
Area Total	**+60**
U.S. Total	**+231**

Figure 2 in Chapter 2 shows the components of the changes in crude oil proved reserves for 2002 and the preceding 10 years.

Total Discoveries

Total discoveries are those 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 946 million barrels in 2002, 63 percent less than those of 2001. This is not surprising because 2001, which featured new proved reserves from bp's Thunder Horse Field, was an unusually successful year. Domestic field discoveries of that magnitude are not common. Only four areas had total discoveries exceeding 50 million barrels:

- The Gulf of Mexico Federal Offshore had 493 million barrels of total discoveries, 52 percent of the National total.
- Texas had 98 million barrels of total discoveries, 10 percent of the National total.
- California had 88 million barrels of total discoveries, 9 percent of the National total.
- Louisiana had 56 million barrels of total discoveries, 6 percent of the National total.

The United States discovered an average of 1,014 million barrels of new crude oil proved reserves per year in the prior 10 years (1992 through 2001). Total discoveries in 2002 (946 million barrels) were 7 percent less than that average.

Extensions

Operators reported 492 million barrels of extensions in 2002. The highest volume of extensions was reported in the Gulf of Mexico Federal Offshore (93 million barrels). Texas reported 91 million barrels of extensions. California was third with 88 million barrels of extensions in 2002.

In the prior 10 years, U.S. operators reported an average of 488 million barrels of extensions per year. The 2002 extensions were 1 percent more than that average.

New Field Discoveries

There were 300 million barrels of new field discoveries of crude oil reported in 2002. Only five areas in the United States reported any new field discoveries, and only the Gulf of Mexico Federal Offshore contributed a significant volume (97 percent; 290 million barrels).

In the prior 10 years, U.S operators reported an average of 354 million barrels of reserves from new field discoveries per year. Reserves from new field discoveries in 2002 were 15 percent less than that average volume.

New Reservoir Discoveries in Old Fields

Operators reported 154 million barrels of crude oil reserves from new reservoir discoveries in old fields in 2002. As with new field discoveries, the most significant portion of new reservoir discoveries in old fields was in the Gulf of Mexico Federal Offshore—110 million barrels or 71 percent of the total. Louisiana had 19 million barrels (12 percent), Alaska had 8 million barrels (5 percent), and Texas had 7 million barrels (5 percent).

In the prior 10 years, U.S. operators reported an average of 172 million barrels of reserves from new reservoir discoveries in old fields per year. Reserves from new reservoir discoveries in old fields in 2002 were 10 percent less than 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 1,925 million barrels of revision increases, 1,205 million barrels of revision decreases, and 416 million barrels of adjustments in 2002. Combined, there were 1,136 million barrels of net revisions and adjustments for crude oil in 2002.

Sales and Acquisitions

Sales represents that volume of crude oil proved reserves deducted from an operator's total by selling or transferring operations in existing oil fields 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 in existing oil fields.

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, 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 2002, there were 804 million barrels of sales transactions between operators, and 828 million barrels of acquisitions -- yielding a net difference of 24 million barrels in 2002.

Production

U.S. production of crude oil in 2002 was an estimated 1,875 million barrels. This volume does not include lease condensate. This was 2 percent lower than 2001's production of 1,915 million barrels. The Gulf of Mexico Federal Offshore remained the largest crude oil producing area in 2002 with 452 million barrels of production (24 percent of the National total). Texas and Alaska were second and third with 20 percent and 19 percent of the total, respectively. California was fourth with 14 percent.

In 2002, the Form EIA-23 National production estimates (2,082 million barrels of crude oil and lease condensate) were 1 percent less than the comparable Petroleum Supply Annual (PSA) 2002 production volumes for crude oil and lease condensate combined (2,097 million barrels).

Areas of Note: Large Discoveries and Reserves Additions

The following State and Area discussions summarize notable activities during 2002 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 2002.

Gulf of Mexico Federal Offshore

The Gulf of Mexico Federal Offshore led the Nation in total discoveries of crude oil proved reserves in 2002 with 493 million barrels of total discoveries, 52 percent of the National total.

On February 12, 2003, the Minerals Management Service (MMS) released information about 2002 deepwater Gulf of Mexico activity levels. "Calendar year 2002 was a year of significant deepwater activity in the Gulf of Mexico despite the general downturn in drilling. Twelve new deepwater discoveries were made and three of these were in 8,000 feet or greater water depths," said MMS's Gulf of Mexico Regional Director Chris C. Oynes. Fourteen new deepwater projects began production in 2002. These joined the 51 that were already in production for a new total of 65. "Deepwater development projects continue at a fast pace and the 14 new projects in the Gulf of Mexico, include 11 that were subsea production systems that tied back to another project," said Oynes. This raised the total number of subsea projects to 41 out of the 65 total deepwater projects. Three of the new deepwater starts utilized a spar as a production system. Oynes noted that "we expect a significant rise in the number of deepwater projects that will start production in the year 2003 – perhaps as many as 19." {38}

- **Mad Dog Field:** On February 13, 2002 BHP Billiton announced details about the development of the Mad Dog field, located in Green Canyon Block 826 of the Gulf of Mexico. BHP Billiton holds a 23.9 per cent working interest in Mad Dog with partners bp (the designated operator) 60.5 per cent interest, and Unocal 15.6 per cent. The Mad Dog field has estimated reserves in the range of 200-450 million barrels of oil equivalent. Mad Dog is located in water depths of 4,500 to 6,800 feet and will be developed using proven technology - a truss SPAR with an integrated drilling rig, dry trees, and 16 well slots. The gross design capacity of the facility will be 80,000 barrels of oil per day and 40 million standard cubic feet of gas per day. First production is expected by the end of calendar year 2004, with production at full design capacity expected to occur within 12 months thereafter. The field has an estimated life of 20 years. The Mad Dog field is situated in the Atwater Foldbelt, 125 miles from the Louisiana coast. It is a very large structure, with over 4,000 feet of structural closure covering 26,500 acres.{39}

- **Crosby Field:** As of January 18, 2002, Shell Exploration & Production Company's Crosby subsea field is now online and sending production to the Ursa hub platform. The first subsea tieback to Ursa, the 3-well Crosby development, is located in Mississippi Canyon Blocks 898 and 899 in the Gulf of Mexico. Production from Crosby's first well began on Dec.17, 2001. Currently, all three wells are online and producing 20,000 barrels of oil per day. Peak production for Crosby was expected to be approximately 60,000 barrels of oil per day and 90 million cubic feet of gas per day by the end of the first quarter of 2002. Crosby is located about 160 miles southeast of New Orleans in approximately 4,400 feet of water. Crosby's production is carried from a six-slot manifold to Shell's Ursa tension leg platform, 10 miles away on Mississippi Canyon Block 809 in 3,950 feet of water. Once all of Crosby's wells are at peak production, Shell expects Ursa's total platform production to increase to 170,000 barrels of oil per day."Like other subsea production systems that recently came online, Crosby is another example of SEPCo's growth in the Gulf of Mexico and its aggressive development of its Mars Basin discoveries," said Dave Lawrence, SEPCo vice president, Exploration & Development. "But, Crosby is the first field to begin production in the southern part of the Mars Basin. Ursa, Mars, King, and ultimately, Princess, are all located in the northern part of the Basin." {40}

Other Gain Areas

Texas: Texas reported a net increase of 71 million barrels of proved oil reserves in 2002, and had the second largest volume of new field discoveries in 2002 (98 million barrels). Operators in the Permian Basin developed extensions of their existing fields in 2002.

Oklahoma: Proved oil reserves in Oklahoma increased by 8 percent (42 million barrels) in 2002 compared to 2001. Production in Oklahoma increased by 9 percent (5 million barrels).

Wyoming: Wyoming's proved oil reserves increased by 7 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.

Alaska

Alaskan crude oil proved reserves declined 4 percent (-173 million barrels) in 2002. Alaskan operators reported revision increases and extensions in 2002, but this did not offset Alaska's oil production—an estimated 361 million barrels in 2002. Alaska production increased 2 percent (+6 million barrels) from its 2001 level.

Louisiana

Louisiana's crude oil proved reserves declined 11 percent (-63 million barrels) in 2002. Operators also reported a production decrease of 20 percent (-15 million barrels) over the 2001 level. Hurricanes Isadore and Lili swept up through the Gulf of Mexico came ashore in Louisiana in October of 2002, disrupting operations.

Utah

There was a net decline of 11 percent (-30 million barrels) in Utah's crude oil proved reserves in 2002. Utah's crude oil production declined 8 percent (-1 million barrels) from its 2001 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.

New Mexico: Proved oil reserves decreased by 1 percent (-5 million barrels).

Florida: Proved oil reserves decreased by 3 percent (-2 million barrels).

Reserves in Nonproducing Status

Not all proved reserves of crude oil reported in 2002 were producing. Operators reported 5,195 million barrels of proved reserves in nonproducing status, 29 percent more than reported in 2001 (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 Status for Crude Oil, 2002 [a]
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Nonproducing Crude Oil Reserves
Alaska	546
Lower 48 States	4,725
Alabama	1
Arkansas	5
California	336
Coastal Region Onshore	61
Los Angeles Basin Onshore	122
San Joaquin Basin Onshore	111
State Offshore	42
Colorado	56
Florida	7
Illinois	15
Indiana	0
Kansas	23
Kentucky	4
Louisiana	185
North	16
South Onshore	139
State Offshore	30
Michigan	4
Mississippi	42
Montana	65
Nebraska	0
New Mexico	146
East	146
West	0
New York	0
North Dakota	62
Ohio	8
Oklahoma	105
Pennsylvania	1
Texas	753
RRC District 1	11
RRC District 2 Onshore	14
RRC District 3 Onshore	41
RRC District 4 Onshore	5
RRC District 5	4
RRC District 6	14
RRC District 7B	2
RRC District 7C	36
RRC District 8	258
RRC District 8A	345
RRC District 9	16
RRC District 10	7
State Offshore	0
Utah	91
Virginia	0
West Virginia	0
Wyoming	69
Federal Offshore	2,746
Pacific (California)	62
Gulf of Mexico (Louisiana)	2,530
Gulf of Mexico (Texas)	154
Miscellaneous[b]	1
U.S. Total	**5,271**

[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," 2002.

4. Natural Gas Statistics

Dry Natural Gas

Proved Reserves

The United States had 186,946 billion cubic feet of dry natural gas reserves as of December 31, 2002, a 2 percent increase over the 2001 level (**Table 8**). All natural gas proved reserves data shown in this report exclude natural gas held in underground storage.

Reserves additions replaced 118 percent of production (**Figure 18**), however, gas production declined 2 percent in 2002. Sharp production declines in the Gulf of Mexico were partially offset by large production increases in the Rocky Mountain States.

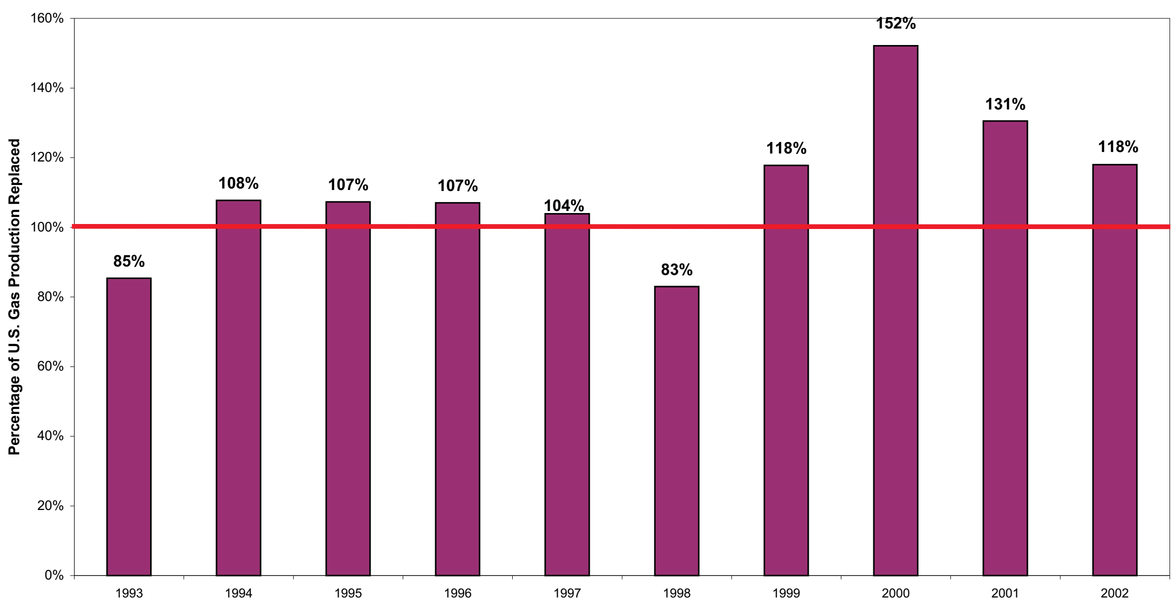
In 2002, the Rocky Mountain States and Texas dominated gas reserves additions. These additions highlight a shift from conventional gas fields to unconventional gas fields, i.e., tight sands, shales, and coalbeds. As measured by proved reserves, 11 of the top 20 natural gas fields of 2002 are located in Rocky Mountain states.

Additions to dry gas reserves in 2002 were 22,839 billion cubic feet, 12 percent less than in 2001. U.S. total discoveries of dry natural gas reserves were 17,795 billion cubic feet in 2002, down 22 percent from 2001 (22,758 billion cubic feet).

Proved reserves by State are shown on the map in **Figure 19**. Six areas account for 72 percent of the Nation's dry natural gas proved reserves:

Area	Percent of U.S. Gas Reserves
Texas	24
Gulf of Mexico Federal Offshore	13
Wyoming	11
New Mexico	9
Oklahoma	8
Colorado	7
Area Total	**72**

Figure 18. Replacement of U.S. Dry Natural Gas Production by Reserves Additions, 1993-2002.



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

Table 8. Dry Natural Gas Proved Reserves, Reserves Changes, and Production, 2002
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/01	Changes in Reserves During 2002: Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/02
Alaska	8,800	35	141	118	13	13	62	0	8	460	8,468
Lower 48 States	**174,660**	**3,692**	**20,114**	**19,200**	**10,153**	**10,533**	**14,707**	**1,332**	**1,686**	**18,893**	**178,478**
Alabama	3,915	72	130	155	6	0	289	0	4	365	3,884
Arkansas	1,616	27	114	107	66	80	111	24	8	157	1,650
California	2,681	29	202	127	49	48	93	0	5	291	2,591
Coastal Region Onshore	177	2	21	4	3	5	3	0	0	11	190
Los Angeles Basin Onshore	187	0	24	6	0	0	11	0	0	9	207
San Joaquin Basin Onshore	2,232	29	146	114	46	35	79	0	5	264	2,102
State Offshore	85	-2	11	3	0	8	0	0	0	7	92
Colorado	12,527	202	2,029	962	1,059	891	1,222	1	1	964	13,888
Florida	84	9	5	3	0	0	0	0	0	4	91
Kansas	5,101	210	436	350	43	22	71	5	2	471	4,983
Kentucky	1,860	-24	377	383	2	66	92	0	0	79	1,907
Louisiana	9,811	72	1,206	1,853	594	686	647	68	255	1,338	8,960
North	3,881	90	587	293	229	254	317	9	24	395	4,245
South Onshore	5,185	1	558	1,278	362	416	288	49	188	821	4,224
State Offshore	745	-19	61	282	3	16	42	10	43	122	491
Michigan	2,976	82	383	276	35	71	287	8	0	242	3,254
Mississippi	661	81	89	75	29	33	54	1	27	98	744
Montana	898	58	40	109	10	6	96	4	0	77	906
New Mexico	17,414	199	2,262	2,239	1,029	1,052	1,161	6	18	1,524	17,320
East	3,518	98	1,271	1,047	144	159	279	6	18	526	3,632
West	13,896	101	991	1,192	885	893	882	0	0	998	13,688
New York	[a]318	-23	63	22	23	21	13	3	0	35	315
North Dakota	443	18	79	20	46	42	8	0	0	53	471
Ohio	970	148	186	139	19	2	53	2	1	87	1,117
Oklahoma	13,558	904	2,159	1,513	767	845	1,186	14	18	1,518	14,886
Pennsylvania	1,775	206	330	151	5	6	170	0	18	133	2,216
Texas	43,527	765	4,734	4,904	3,889	4,249	4,404	84	365	5,038	44,297
RRC District 1	1,018	28	91	47	242	264	31	0	0	98	1,045
RRC District 2 Onshore	1,801	21	222	245	124	139	203	2	51	288	1,782
RRC District 3 Onshore	3,770	43	460	567	493	449	462	6	42	588	3,584
RRC District 4 Onshore	9,956	91	1,218	1,655	1,389	1,319	1,159	53	115	1,398	9,469
RRC District 5	4,231	57	539	785	374	467	800	5	39	377	4,602
RRC District 6	6,128	148	342	342	289	289	566	0	38	624	6,256
RRC District 7B	252	147	54	42	108	15	0	0	1	59	260
RRC District 7C	3,320	-25	391	224	388	548	399	0	8	327	3,702
RRC District 8	5,255	86	745	548	209	206	326	2	22	524	5,361
RRC District 8A	1,085	46	99	77	17	26	15	0	0	93	1,084
RRC District 9	2,289	231	167	43	51	229	312	1	0	258	2,877
RRC District 10	3,955	-106	365	262	203	294	129	2	1	337	3,838
State Offshore	467	-2	41	67	2	4	2	13	48	67	437
Utah	4,579	13	207	490	978	720	368	0	2	286	4,135
Virginia	1,752	1	127	166	0	0	34	0	0	75	1,673
West Virginia	2,678	423	445	250	1	0	255	0	4	194	3,360
Wyoming	18,398	164	1,295	1,161	772	850	3,069	15	57	1,388	20,527
Federal Offshore[b]	27,036	53	3,210	3,744	731	839	1,012	1,097	901	4,469	25,204
Pacific (California)	540	-1	35	23	0	0	10	0	0	46	515
Gulf of Mexico (Louisiana)[b]	19,721	26	1,843	2,343	415	543	864	889	799	3,427	18,500
Gulf of Mexico (Texas)	6,775	28	1,332	1,378	316	296	138	208	102	996	6,189
Miscellaneous[c]	82	3	6	1	0	4	12	0	0	7	99
U.S. Total	**183,460**	**3,727**	**20,255**	**19,318**	**10,166**	**10,546**	**14,769**	**1,332**	**1,694**	**19,353**	**186,946**

[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 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 2002 contained in the *Natural Gas Annual 2002*, DOE/EIA-0131(02).

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

Figure 19. Dry Natural Gas Proved Reserves by Area, 2002

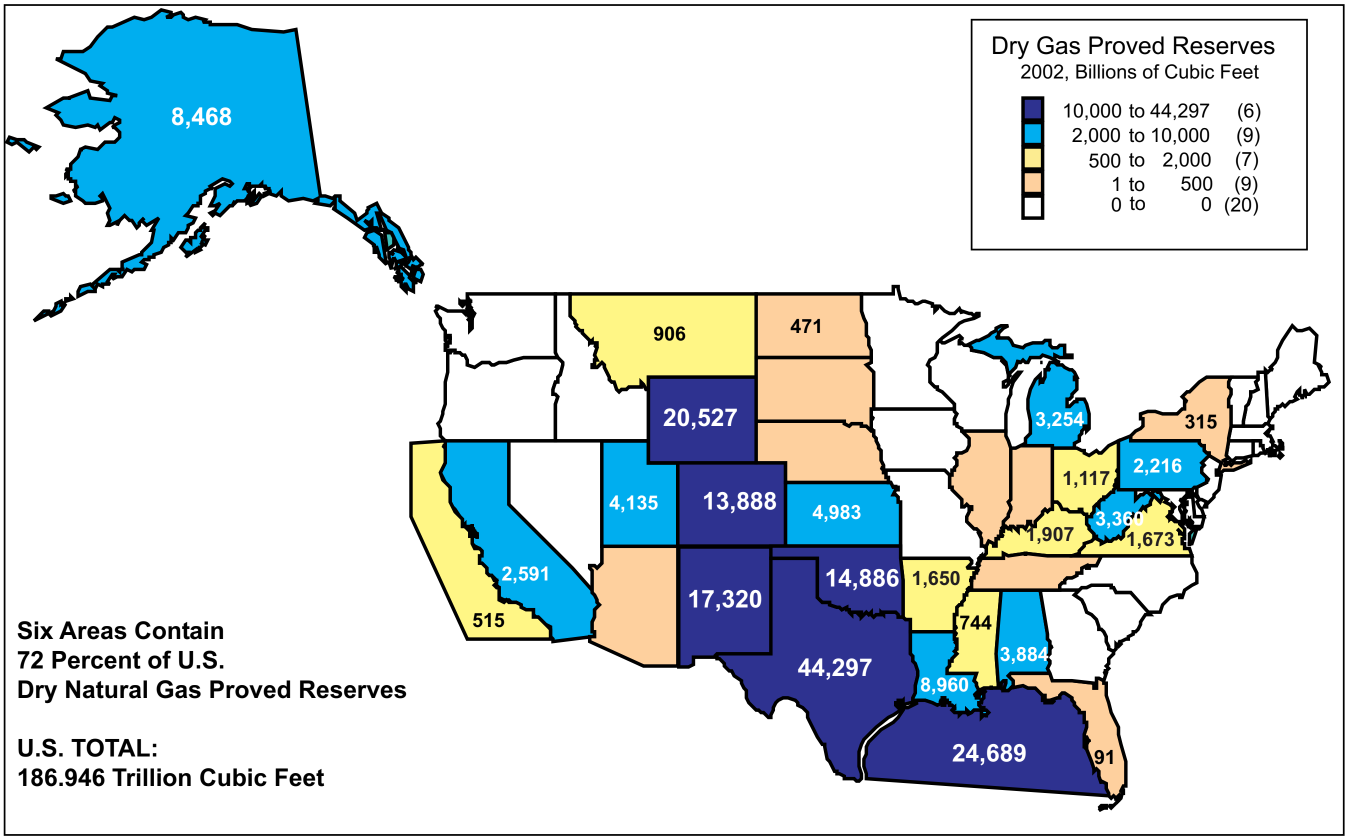
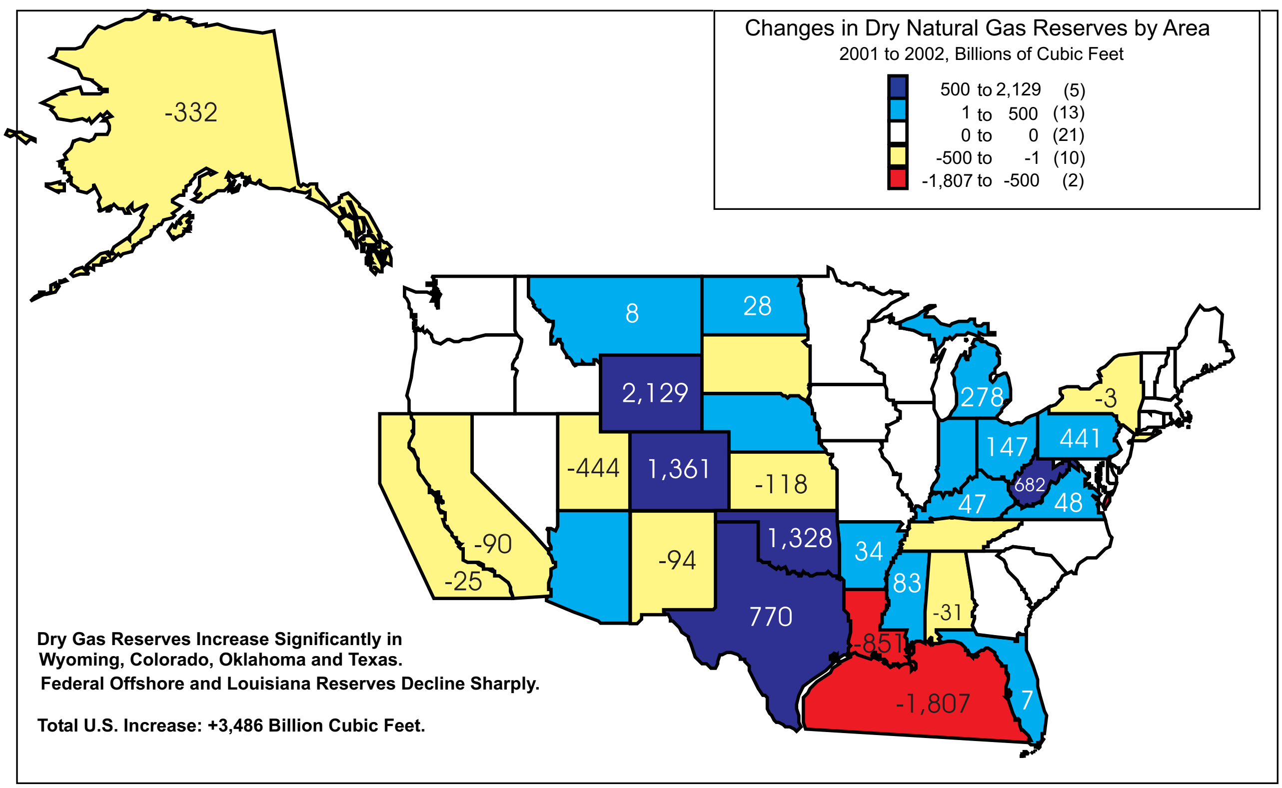


Figure 20. Changes in Dry Natural Gas Proved Reserves by Area, 2001 to 2002



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

Discussion of Reserves Changes

Figure 20 maps the change in dry gas proved reserves from 2001 to 2002 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	+770
Gulf of Mexico Federal Offshore	-1,807
Wyoming	+2,129
New Mexico	-94
Oklahoma	+1,328
Colorado	+1,361
Area Total	**+3,687**
U.S. Total	**+3,486**

Figure 4 in Chapter 2 shows the components of change in dry natural gas proved reserves for 2002 and the preceding 10 years.

Total 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 17,795 billion cubic feet in 2002, a 22 percent decrease from the level reported in 2001. About 27 percent of the total discoveries were in Texas, 18 percent were in Wyoming, 17 percent were in the Gulf of Mexico Federal Offshore, 7 percent were in Colorado, and 7 percent were in New Mexico.

The largest component of total discoveries in 2002 were extensions of existing gas fields. Extensions were 14,769 billion cubic feet, 10 percent less than 2001 and 65 percent more than the prior 10-year average (8,931 billion cubic feet). Areas with the largest extensions and their percentage of total extensions were:

- Texas had 4,044 billion cubic feet of extensions (30 percent of the total)
- Wyoming had 3,069 billion cubic feet (21 percent)
- Colorado had 1,222 billion cubic feet (8 percent)
- Oklahoma had 1,186 billion cubic feet (8 percent).

New field discoveries were 1,332 billion cubic feet in 2002—63 percent less than in 2001. The areas with the largest new field discoveries were the Gulf of Mexico Federal Offshore (with 1,097 billion cubic feet of new field discoveries, 82 percent of the total), Texas (84 billion cubic feet, 6 percent), and Louisiana (68 billion cubic feet, 5 percent). In the prior 10 years, U.S. operators reported an average of 1,744 billion cubic feet of reserves from new field discoveries per year. Reserves from new field discoveries in 2002 were 24 percent less than that average.

New reservoir discoveries in old fields were 1,694 billion cubic feet, 40 percent less than 2001. Among the areas with the largest new reservoir discoveries in old fields and their percentage of the total were:

- Gulf of Mexico Federal Offshore (901 billion cubic feet, 53 percent)
- Texas (365 billion cubic feet, 22 percent)
- Louisiana (255 billion cubic feet, 15 percent).

In the prior 10 years, U.S. operators reported an average of 2,454 billion cubic feet of reserves from new reservoirs discovered in old fields per year. Reserves from new reservoirs discovered in old fields in 2002 were 69 percent of that average.

Revisions and Adjustments

There were 20,255 billion cubic feet of revision increases, 19,318 billion cubic feet of revision decreases, and 3,727 billion cubic feet of adjustments in 2002. Combined, there were 4,664 billion cubic feet of net revisions and adjustments in 2002, excluding reserves additions from net sales and acquisitions. This is 28 percent less than the average volume of net revisions and adjustments of the prior 10 years (6,466 billion cubic feet).

Sales and Acquisitions

Sales represents that volume of dry natural gas proved reserves deducted from an operator's total by selling or transferring operations in existing gas fields 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 in existing gas fields.

In 2002, there were 10,166 billion cubic feet of sales transactions between operators, and 10,546 billion cubic feet of acquisitions. The net difference was 380 billion cubic feet of dry natural gas reserves.

Table 9. Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2002 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/01	Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/02
		Changes in Reserves During 2002									
Alaska	8,901	1	142	119	13	13	62	0	8	462	8,533
Lower 48 States	**182,842**	**4,005**	**21,098**	**20,083**	**10,652**	**11,080**	**15,406**	**1,374**	**1,744**	**19,786**	**187,028**
Alabama	3,958	66	133	157	6	0	293	0	4	369	3922
Arkansas	1,619	29	114	107	66	80	111	24	8	158	1,654
California	2,763	60	209	131	51	49	96	0	5	304	2,696
Coastal Region Onshore	185	2	21	4	3	5	3	0	0	12	197
Los Angeles Basin Onshore	195	2	25	5	0	0	11	0	0	10	218
San Joaquin Basin Onshore	2,298	59	152	119	48	36	82	0	5	275	2,190
State Offshore	85	-3	11	3	0	8	0	0	0	7	91
Colorado	12,949	202	2,096	994	1,094	921	1,263	1	1	997	14,348
Florida	96	9	5	3	0	0	0	0	0	5	102
Kansas	5,460	219	466	374	46	24	76	5	2	503	5,329
Kentucky	1,950	-25	395	402	2	69	96	1	0	83	1,999
Louisiana	10,040	116	1,236	1,918	610	706	664	71	265	1,380	9,190
North	3,927	78	593	295	231	256	320	9	24	398	4,283
South Onshore	5,341	54	580	1,329	376	433	300	51	196	855	4,395
State Offshore	772	-16	63	294	3	17	44	11	45	127	512
Michigan	3,032	79	390	281	36	72	293	8	0	246	3,311
Mississippi	663	81	89	76	28	33	55	1	27	99	746
Montana	907	57	41	110	10	6	97	4	0	78	914
New Mexico	18,559	203	2,449	2,415	1,092	1,118	1,239	6	20	1,634	18,453
East	3,919	75	1,404	1,157	159	176	308	6	20	581	4,011
West	14,640	128	1,045	1,258	933	942	931	0	0	1,053	14,442
New York	[a]318	-23	63	22	23	21	13	3	0	35	315[a]
North Dakota	495	18	88	22	51	46	9	0	0	59	524
Ohio	971	147	186	139	18	2	53	2	1	87[a]	1,118[a]
Oklahoma	14,366	937	2,285	1,601	811	894	1,255	15	19	1,606	15,753
Pennsylvania	1,782	206	331	151	5	6	171	0	18	133	2,225
Texas	46,462	998	5,075	5,198	4,134	4,532	4,672	88	381	5,385	47,491
RRC District 1	1,066	26	96	48	252	276	33	0	0	103	1,094
RRC District 2 Onshore	1,863	48	232	257	131	146	212	3	53	302	1,867
RRC District 3 Onshore	3,943	130	491	606	526	480	492	6	44	628	3,826
RRC District 4 Onshore	10,345	117	1,268	1,724	1,446	1,374	1,207	56	120	1456	9,861
RRC District 5	4,289	47	545	793	378	472	809	5	39	382	4,653
RRC District 6	6,429	153	359	359	302	303	593	0	40	655	6,561
RRC District 7B	290	162	61	48	123	17	0	0	1	66	294
RRC District 7C	3,757	-48	440	252	436	617	448	0	9	368	4,167
RRC District 8	6,007	27	841	619	237	232	369	2	26	592	6,056
RRC District 8A	1,190	28	106	82	19	28	16	0	0	100	1,167
RRC District 9	2,552	262	186	48	56	255	347	1	0	289	3,210
RRC District 10	4,263	49	409	294	226	328	144	2	1	377	4,299
State Offshore	468	-3	41	68	2	4	2	13	48	67	436
Utah	4,753	-6	214	507	1011	745	380	0	2	296	4,274
Virginia	1,752	1	127	166	0	0	34	0	0	75	1,673
West Virginia	2,825	404	463	260	1	0	265	0	4	202	3,498
Wyoming	19,399	71	1,358	1,217	810	892	3,218	16	60	1,456	21,531
Federal Offshore[b]	27,640	153	3,280	3,831	747	860	1,041	1,129	927	4,590	25,862
Pacific (California)	540	-1	35	23	0	0	10	0	0	46	515
Gulf of Mexico (Louisiana)[b]	20,290	109	1,904	2,420	428	561	893	919	825	3,540	19,113
Gulf of Mexico (Texas)	6,810	45	1,341	1,388	319	299	138	210	102	1,004	6,234
Miscellaneous[c]	83	3	5	1	0	4	12	0	0	6	100
U.S. Total	**191,743**	**4,006**	**21,240**	**20,202**	**10,665**	**11,093**	**15,468**	**1,374**	**1,752**	**20,248**	**195,561**

[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 2002 contained in the *Natural Gas Annual 2002,* DOE/EIA-0131(02).

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

Table 10. Nonassociated Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2002 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/01	Changes in Reserves During 2002 Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/02
Alaska	2,309	1	58	77	13	13	62	0	4	200	2,157
Lower 48 States	**159,612**	**3,504**	**17,595**	**17,488**	**9,588**	**10,172**	**14,554**	**1,145**	**1,417**	**17,060**	**163,863**
Alabama	3,931	63	126	156	1	0	291	0	2	365	3,891
Arkansas	1,589	25	104	106	64	78	111	24	8	153	1,616
California	842	32	64	58	47	36	10	0	5	88	796
Coastal Region Onshore	0	0	0	0	0	0	0	0	0	0	0
Los Angeles Basin Onshore	1	-1	0	0	0	0	0	0	0	0	0
San Joaquin Basin Onshore	836	34	61	58	47	36	10	0	5	87	790
State Offshore	5	-1	3	0	0	0	0	0	0	1	6
Colorado	11,924	213	1,929	986	1,091	921	1,254	0	1	914	13,251
Florida	0	0	0	0	0	0	0	0	0	0	0
Kansas	5,355	219	452	327	45	23	75	5	1	495	5,263
Kentucky	1,925	-25	395	402	2	69	96	1	0	83	1,974
Louisiana	9,245	139	1,113	1,723	591	669	627	69	255	1,283	8,520
North	3,759	89	564	267	228	247	304	9	24	377	4,124
South Onshore	4,859	53	503	1,216	360	405	285	49	187	797	3,968
State Offshore	627	-3	46	240	3	17	38	11	44	109	428
Michigan	2,873	60	311	248	24	49	286	8	0	218	3,097
Mississippi	637	76	83	71	21	24	52	0	27	94	713
Montana	822	49	34	96	2	0	83	0	0	70	820
New Mexico	17,112	176	2,124	2,252	975	993	1,176	5	9	1,397	16,971
East	2,571	51	1,095	1,000	71	80	246	5	9	354	2,632
West	14,541	125	1,029	1,252	904	913	930	0	0	1,043	14,339
New York	311	-21	63	18	22	21	13	3	0	35	315
North Dakota	225	-2	7	2	4	0	0	0	0	15	209
Ohio	631	110	130	67	2	2	28	0	0	60	772
Oklahoma	13,256	762	2,076	1,414	664	766	1,204	13	19	1,442	14,576
Pennsylvania	1,614	215	324	128	1	6	167	0	18	127	2,088
Texas	40,376	806	3,960	4,630	3,775	4,289	4,358	85	362	4,727	41,104
RRC District 1	1,024	25	87	45	249	270	32	0	0	97	1,047
RRC District 2 Onshore	1,798	44	206	244	128	140	207	3	52	281	1,797
RRC District 3 Onshore	3,411	102	376	514	508	469	372	6	36	531	3,219
RRC District 4 Onshore	10,206	118	1,225	1,699	1,440	1,372	1,192	56	120	1,439	9,711
RRC District 5	4,206	46	540	775	378	472	806	5	39	373	4,588
RRC District 6	6,016	145	311	340	286	298	590	0	38	611	6,161
RRC District 7B	203	73	48	37	2	4	0	0	1	53	237
RRC District 7C	3,123	-60	244	190	404	591	407	0	5	286	3,430
RRC District 8	3,405	18	343	412	102	99	269	0	25	361	3,284
RRC District 8A	82	23	19	13	0	0	6	0	0	16	101
RRC District 9	2,428	244	158	34	52	252	342	1	0	269	3,070
RRC District 10	4,008	31	363	260	224	318	135	1	1	345	4,028
State Offshore	466	-3	40	67	2	4	0	13	45	65	431
Utah	4,450	-9	141	483	1,007	730	366	0	2	275	3,915
Virginia	1,752	1	127	166	0	0	34	0	0	75	1,673
West Virginia	2,777	402	460	229	1	0	265	0	4	201	3,477
Wyoming	18,911	59	1,113	1,162	556	691	3,214	15	60	1,375	20,970
Federal Offshore[a]	18,990	152	2,455	2,763	693	801	832	917	644	3,563	17,772
Pacific (California)	50	0	7	0	0	0	2	0	0	3	56
Gulf of Mexico (Louisiana)[a]	13,536	117	1,349	1,724	377	511	692	801	542	2,698	12,749
Gulf of Mexico (Texas)	5,404	35	1,099	1,039	316	290	138	116	102	862	4,967
Miscellaneous[b]	64	2	4	1	0	4	12	0	0	5	80
U.S. Total	**161,921**	**3,505**	**17,653**	**17,565**	**9,601**	**10,185**	**14,616**	**1,145**	**1,421**	**17,260**	**166,020**

[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 2002 contained in the *Natural Gas Annual 2002,* DOE/EIA-0131(02).
Source: Energy Information Administration, Office of Oil and Gas.

Table 11. Associated-Dissolved Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2002 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/01	Changes in Reserves During 2002: Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/02
Alaska	6,592	0	84	42	0	0	0	0	4	262	6,376
Lower 48 States	**23,232**	**499**	**3,503**	**2,595**	**1,064**	**908**	**852**	**229**	**327**	**2,726**	**23,165**
Alabama	26	4	7	1	5	0	2	0	2	4	31
Arkansas	30	4	10	1	2	2	0	0	0	5	38
California	1,922	27	145	73	4	13	86	0	0	216	1,900
Coastal Region Onshore	185	2	21	4	3	5	3	0	0	12	197
Los Angeles Basin Onshore	194	3	25	5	0	0	11	0	0	10	218
San Joaquin Basin Onshore	1,463	24	91	61	1	0	72	0	0	188	1,400
State Offshore	80	-2	8	3	0	8	0	0	0	6	85
Colorado	1,025	-11	167	8	3	0	9	1	0	83	1,097
Florida	96	9	5	3	0	0	0	0	0	5	102
Kansas	105	0	14	47	1	1	1	0	1	8	66
Kentucky	25	0	0	0	0	0	0	0	0	0	25
Louisiana	796	-24	123	195	19	37	37	2	10	97	670
North	168	-11	29	28	3	9	16	0	0	21	159
South Onshore	483	0	77	113	16	28	15	2	9	58	427
State Offshore	145	-13	17	54	0	0	6	0	1	18	84
Michigan	159	19	79	33	12	23	7	0	0	28	214
Mississippi	26	5	6	5	7	9	3	1	0	5	33
Montana	85	8	7	14	8	6	14	4	0	8	94
New Mexico	1,447	27	325	163	117	125	63	1	11	237	1,482
East	1,348	24	309	157	88	96	62	1	11	227	1,379
West	99	3	16	6	29	29	1	0	0	10	103
New York	7	-2	0	4	1	0	0	0	0	0	0
North Dakota	270	20	81	20	47	46	9	0	0	44	315
Ohio	340	37	56	72	16	0	25	2	1	27	346
Oklahoma	1,109	176	209	187	147	128	51	2	0	164	1,177
Pennsylvania	168	-9	7	23	4	0	4	0	0	6	137
Texas	6,089	189	1,115	568	359	243	314	3	19	658	6,387
RRC District 1	43	0	9	3	3	6	1	0	0	6	47
RRC District 2 Onshore	65	4	26	13	3	6	5	0	1	21	70
RRC District 3 Onshore	533	27	115	92	18	11	120	0	8	97	607
RRC District 4 Onshore	140	-2	43	25	6	2	15	0	0	17	150
RRC District 5	83	1	5	18	0	0	3	0	0	9	65
RRC District 6	412	9	48	19	16	5	3	0	2	44	400
RRC District 7B	88	88	13	11	121	13	0	0	0	13	57
RRC District 7C	634	12	196	62	32	26	41	0	4	82	737
RRC District 8	2,602	9	498	207	135	133	100	2	1	231	2,772
RRC District 8A	1,108	5	87	69	19	28	10	0	0	84	1,066
RRC District 9	124	18	28	14	4	3	5	0	0	20	140
RRC District 10	255	18	46	34	2	10	9	1	0	32	271
State Offshore	2	0	1	1	0	0	2	0	3	2	5
Utah	303	3	73	24	4	15	14	0	0	21	359
Virginia	0	0	0	0	0	0	0	0	0	0	0
West Virginia	48	2	3	31	0	0	0	0	0	1	21
Wyoming	488	12	245	55	254	201	4	1	0	81	561
Federal Offshore[a]	8,649	2	825	1,068	54	59	209	212	283	1,027	8,090
Pacific (California)	490	-1	28	23	0	0	8	0	0	43	459
Gulf of Mexico (Louisiana)[a]	6,753	-7	555	696	51	50	201	118	283	842	6,364
Gulf of Mexico (Texas)	1,406	10	242	349	3	9	0	94	0	142	1,267
Miscellaneous[b]	19	1	1	0	0	0	0	0	0	1	20
U.S. Total	**29,824**	**499**	**3,587**	**2,637**	**1,064**	**908**	**852**	**229**	**331**	**2,988**	**29,541**

[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 2002 contained in the *Natural Gas Annual 2002*, DOE/EIA-0131(02).

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

Production

The estimated 2002 U.S. dry natural gas production was 19,353 billion cubic feet, a decrease of 2 percent from 2001 (**Table 8**). Areas with the largest production and their percentage of total production were:

- Texas produced 5,038 billion cubic feet (BCF) of dry natural gas (26 percent of the total)
- Gulf of Mexico Federal Offshore produced 4,423 BCF (23 percent)
- New Mexico produced 1,524 BCF (8 percent)
- Oklahoma produced 1,518 BCF (8 percent)
- Wyoming produced 1,388 BCF (7 percent)
- Louisiana produced 1,338 BCF (7 percent).

In 2002, Wyoming's reported dry natural gas production exceeded that of Louisiana for the first time.

Wet Natural Gas

U. S. proved reserves of wet natural gas as of December 31, 2002 were 195,561 billion cubic feet, a 2 percent increase from the volume reported in 2001 (**Table 9**). At year-end 2002, proved wet natural gas reserves for the lower 48 States had increased by 2 percent compared to 2001, while those of Alaska had decreased by 4 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 (4,099 billion cubic feet) in 2002 to 166,020 billion cubic feet (**Table 10**). The lower 48 States' NA wet natural gas proved reserves increased 3 percent to a level of 163,863 billion cubic feet, while Alaska had a 7 percent decline to a level of 2,157 billion cubic feet. Those States with the largest increases in NA wet natural gas reserves were Wyoming, Colorado, Oklahoma, and Texas.

Total Discoveries

NA wet natural gas *total discoveries* of 17,182 billion cubic feet in 2002 decreased 17 percent compared to 2001's total of 20,785 billion cubic feet. Areas with the most *total discoveries* in 2002 were Texas (4,805 billion cubic feet), Wyoming (3,289 billion cubic feet), the Gulf of Mexico Federal Offshore (2,391 billion cubic feet), Colorado (1,255 billion cubic feet), and Oklahoma (1,236 billion cubic feet).

Production

U.S. production of NA wet natural gas decreased 1 percent from an estimated 17,451 billion cubic feet in 2001 to 17,260 billion cubic feet in 2002. The five leading producing areas were: Texas (27 percent), the Gulf of Mexico Federal Offshore (21 percent), Oklahoma (8 percent), New Mexico (8 percent), and Louisiana (7 percent).

Associated-Dissolved Natural Gas

Proved Reserves

Proved reserves of associated-dissolved (AD) natural gas, wet after lease separation, in the United States declined 1 percent to 29,541 billion cubic feet in 2002 (**Table 11**). Proved reserves of AD wet natural gas in the lower 48 States decreased less than 1 percent (-67 billion cubic feet) to 23,165 billion cubic feet, and in Alaska declined 3 percent (-216 billion cubic feet) to 6,376 billion cubic feet in 2002. 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 (26 percent)
- Texas (22 percent)
- Alaska (22 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 3,193 billion cubic feet in 2001 to 2,988 billion cubic feet in 2002 (**Table 11**). Production of AD wet natural gas in the lower 48 States decreased from 2,940 billion cubic feet to 2,726 billion cubic feet in 2002, a decline of 7 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 (33 percent)
- Texas (22 percent)
- Alaska (9 percent)
- New Mexico (8 percent)
- California (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

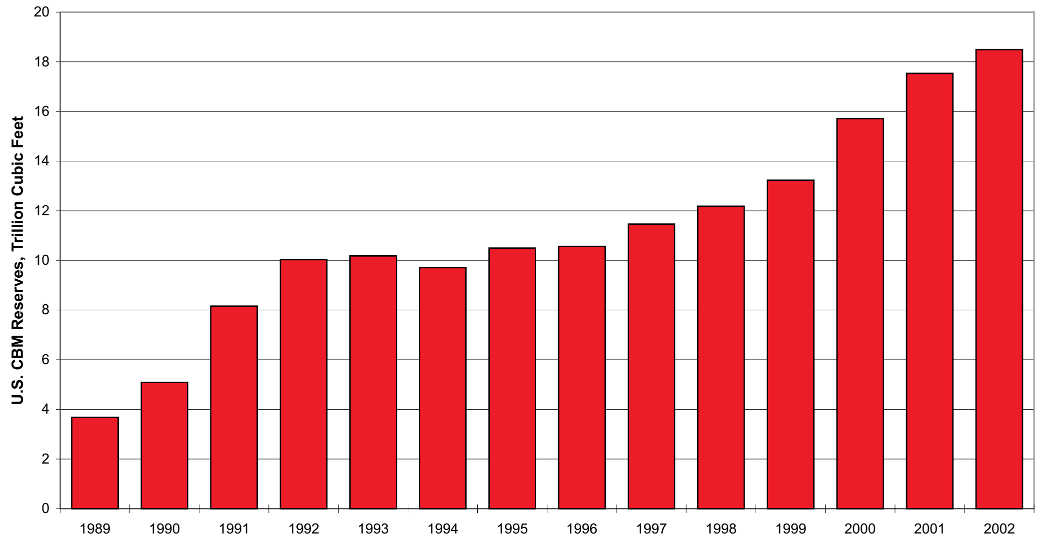
In 2002, proved reserves of coalbed methane increased to 18,491 billion cubic feet, a 5 percent increase from the 2001 level (17,531 billion cubic feet). Coalbed methane accounted for 10 percent of all 2002 dry natural gas reserves (**Table 12**). EIA estimates that the 2002 proved gas reserves of fields 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 (89 percent) of U.S. Coalbed methane proved reserves. Estimates of proved coalbed methane reserves increased 7 percent in Colorado, 1 percent in New Mexico, 3 percent in Wyoming, 2 percent in Utah, and 10 percent in Alabama in 2002.

Table 12. Coalbed Methane Proved Reserves and Production, 1989–2002
(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
2002	1,283	6,691	4,380	1,725	2,371	1,488	553	--	18,491
					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	--	1,379
2001	111	490	517	83	278	69	14	--	1,562
2002	117	520	471	103	302	68	33	--	1,614

[a]Includes Ohio, Pennsylvania, Virginia, and West Virginia.
[b]Includes Arkansas, 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 for 2000-2002.
NA = Not applicable.
Source: Energy Information Administration, Office of Oil and Gas.

Figure 21. Coalbed Methane Proved Reserves, 1989-2002



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

Production

U.S. coalbed methane production grew by 3 percent in 2002 to 1,614 billion cubic feet. It accounted for 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 2,129 billion cubic feet in 2002, the largest increase of any State. This was the result of development in the Pinedale and Jonah fields, and in coalbed methane fields located in the Powder River Basin.

- **Pinedale Anticline:** On March 4, 2003, Williams announced that its midstream business has been selected by Shell Exploration & Production Company affiliates to process incremental natural gas produced by Shell from the Pinedale Anticline in southwestern Wyoming. Williams plans to add a fourth cryogenic processing train at Williams' gas plant in Opal, Wyoming. The new cryogenic turbo expander plant will have a processing capacity of 350 MMcf/d and be capable of extracting more than 7,000 barrels per day of natural gas liquids. This project will boost Opal's overall processing capacity from 750 MMcf/d to more than 1.1 billion cubic feet per day, with the ability to recover in excess of 50,000 barrels per day of NGL products.{41}
- **Powder River Basin:** This basin is located in northeastern Wyoming and southeastern Montana. Western Gas Resources, Inc. experienced double-digit net production growth from the Powder River Basin coalbed methane play for the fifth straight year in 2002, with an increase of 33 percent over 2001 to an average of 118 MMcf/d net. Western participated in 909 gross wells in 2002 and experienced a 98 percent success rate. Western plans to drill 845 gross wells during 2003 and anticipates increasing net

production five to ten percent compared to 2002 as they transition from the relatively mature Wyodak coal on the eastern side of the basin to the more prolific Big George coal to the west. The Big George coal is located on Federal lands and is deeper, thicker, and at higher pressure than the Wyodak coal. As a result, reserves and production rates from a Big George coal well are expected to be higher. Wells within the Big George coal are expected to take twelve to twenty-four months to dewater versus six to nine months for a typical Wyodak well.{42}

Colorado

Colorado had a net increase of 1,361 billion cubic feet of dry natural gas proved reserves in 2002. This was primarily from development of the Mamm Creek Field in the Piceance Basin (northwestern Colorado).

In 2002, EnCana added production and reserves in the Piceance Basin. This multi-zone, tight gas region is one of EnCana's leading growth engines, and it is early in its life. Wells typically intersect 3,000 feet of gas-charged, multi-formation reservoir. With an inventory of more than 1,000 known well locations, the area has great potential.{43}

Development of coalbed methane fields and gas fields within the San Juan, Piceance, and Raton Basins continued. Coalbed methane fields now account for about half of Colorado's dry gas production.

Oklahoma

Oklahoma had a 10 percent increase in dry natural gas proved reserves in 2002 (+1,328 billion cubic feet). Production increased 2 percent (+37 billion cubic feet).

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.

Gulf of Mexico Federal Offshore

Proved dry natural gas reserves in the Gulf of Mexico Federal Offshore decreased by 5 percent (-1,807 billion cubic feet) in 2002. Production decreased 10 percent from 4,913 billion cubic feet in 2001 to 4,423 billion cubic feet in 2002.

Louisiana

Louisiana's proved dry natural gas reserves decreased by 9 percent (-851 billion cubic feet) in 2002. Production in Louisiana decreased 10 percent (-141 billion cubic feet) in 2002.

Utah

Utah's proved dry natural gas reserves decreased by 10 percent (-444 billion cubic feet) in 2002. Production in Utah decreased 1 percent (-2 billion cubic feet) in 2002.

Reserves in Nonproducing Status

Nonproducing proved natural gas reserves (wet after lease separation) of 49,974 billion cubic feet were reported in 2002, 6 percent less than the 52,948 billion cubic feet reported in 2001 (**Appendix D, Table D10**). About 25 percent of the reserves in nonproducing status are located in Texas. Another 24 percent are in the Gulf of Mexico Federal Offshore, as most 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 increased 1 million barrels to 7,994 million barrels in 2002 (**Table 13**). Reserve additions replaced 100 percent of 2002 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	34
Gulf of Mexico Federal Offshore	12
Utah - Wyoming	12
New Mexico	10
Oklahoma	9
Alaska	5
Area Total	**82**

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 738 million barrels in 2002, a decrease of 26 percent from 2001 (997 million barrels). Areas with the largest total discoveries were:

- Texas (34 percent)
- Utah & Wyoming (19 percent)
- Gulf of Mexico Federal Offshore (17 percent)
- New Mexico (8 percent)
- Oklahoma (8 percent)
- Louisiana (6 percent).

New field discoveries in 2002 (48 million barrels) were 65 percent lower than in 2001(138 million barrels). Areas with the largest new field discoveries were the Gulf of Mexico Federal Offshore (81 percent), Texas (6 percent), and Louisiana (6 percent).

New reservoir discoveries in old fields (78 million barrels) were 45 percent lower than they were in 2001 (142 million barrels). Areas with the largest new reservoir discoveries in old fields were the Gulf of Mexico Federal Offshore (54 percent), Texas (23 percent), and Louisiana (18 percent).

Extensions were 612 million barrels in 2002, 15 percent lower than the 2001 volume of extensions (717 million barrels). Areas with the largest extensions were Texas (37 percent), Utah & Wyoming (23 percent), and New Mexico (9 percent).

Revisions and Adjustments

In 2002, there were 982 million barrels of revision increases, 951 million barrels of revision decreases and 62 million barrels of adjustments. The net of revisions and adjustments was 93 million barrels.

Sales and Acquisitions

There were 512 million barrels of acquisitions, and 458 million barrels of sales in 2002. The net of these transactions added 54 million barrels of natural gas liquids proved reserves.

Production

Natural gas liquids production was an estimated 884 million barrels in 2002, a decrease of less than 1 percent from 2001. Alaska production stayed level at 20 million barrels in 2002.

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

- Texas (34 percent)
- Gulf of Mexico Federal Offshore (21 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, 2002
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Published Proved Reserves 12/31/01	Changes in Reserves During 2002: Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/02
Alaska	405	20	0	0	0	0	0	0	0	20	405
Lower 48 States	**7,588**	**42**	**982**	**951**	**458**	**512**	**612**	**48**	**78**	**864**	**7,589**
Alabama	64	-3	3	2	1	0	3	0	0	7	57
Arkansas	5	-1	1	1	0	0	0	0	0	0	4
California	76	21	8	4	1	1	4	0	0	10	95
Coastal Region Onshore	16	0	2	0	0	0	0	0	0	1	17
Los Angeles Basin Onshore	8	0	1	0	0	0	1	0	0	0	10
San Joaquin Basin Onshore	52	21	5	4	1	1	3	0	0	9	68
State Offshore	0	0	0	0	0	0	0	0	0	0	0
Colorado	345	3	65	31	26	32	35	0	0	27	396
Florida	12	2	1	0	0	0	0	0	0	1	14
Kansas	302	-22	25	20	2	1	4	0	0	25	263
Kentucky	72	-8	13	13	0	2	3	0	0	3	66
Louisiana	391	25	57	125	21	23	24	3	14	68	323
North	62	-6	8	12	3	3	3	0	0	6	49
South Onshore	269	18	43	81	18	18	16	2	9	50	226
State Offshore	60	13	6	32	0	2	5	1	5	12	48
Michigan	43	-1	8	4	2	2	5	0	0	4	47
Mississippi	10	3	1	4	2	2	0	0	0	2	8
Montana	5	2	0	1	0	0	1	0	0	1	6
New Mexico	873	-4	142	156	48	53	58	1	1	82	838
East	279	5	102	83	12	17	23	1	1	43	290
West	594	-9	40	73	36	36	35	0	0	39	548
North Dakota	57	-10	7	2	5	4	1	0	0	5	47
Oklahoma	694	-18	107	80	38	44	56	1	1	72	695
Texas	2,653	38	315	271	209	238	227	3	18	301	2,711
RRC District 1	40	0	4	2	9	9	1	0	0	4	39
RRC District 2 Onshore	67	8	10	11	7	7	7	0	2	12	71
RRC District 3 Onshore	226	38	29	43	33	31	31	0	4	42	241
RRC District 4 Onshore	378	15	51	66	50	47	44	3	5	57	370
RRC District 5	49	-6	10	7	4	5	7	0	0	4	50
RRC District 6	269	-2	26	15	12	11	24	0	2	26	277
RRC District 7B	29	10	5	4	10	1	0	0	0	6	25
RRC District 7C	290	19	38	23	36	55	38	0	1	31	351
RRC District 8	525	-17	74	57	21	20	34	0	2	50	510
RRC District 8A	251	-62	17	13	3	4	3	0	0	16	181
RRC District 9	189	20	14	5	5	21	26	0	0	22	238
RRC District 10	335	16	36	24	19	27	12	0	0	30	353
State Offshore	5	-1	1	1	0	0	0	0	2	1	5
Utah and Wyoming	897	-36	65	66	54	55	140	1	2	66	938
West Virginia	106	-14	13	7	0	0	7	0	0	6	99
Federal Offshore[a]	976	65	149	163	49	55	43	39	42	184	973
Pacific (California)	9	-1	0	0	0	0	0	0	0	0	8
Gulf of Mexico (Louisiana)[a]	785	59	105	133	14	21	34	38	37	149	783
Gulf of Mexico (Texas)	182	7	44	30	35	34	9	1	5	35	182
Miscellaneous[b]	7	0	2	1	0	0	1	0	0	0	9
U.S. Total	**7,993**	**62**	**982**	**951**	**458**	**512**	**612**	**48**	**78**	**884**	**7,994**

[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 2002 contained in the publications *Petroleum Supply Annual 2002*, DOE/EIA-0340(02) and *Natural Gas Annual 2002* DOE/EIA-0131(02).

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

Table 14. Natural Gas Plant Liquids Proved Reserves and Production, 2002
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2002 Reserves	2002 Production
Alaska	405	20
Lower 48 States	**6,243**	**657**
Alabama	28	3
Arkansas	3	0
California	95	10
Coastal Region Onshore	17	1
Los Angeles Basin Onshore	10	0
San Joaquin Basin Onshore	68	9
State Offshore	0	0
Colorado	329	23
Florida	14	1
Kansas	261	25
Kentucky	65	3
Louisiana	186	35
North	30	3
South Onshore	119	23
State Offshore	37	9
Michigan	42	3
Mississippi	2	1
Montana	6	1
New Mexico	779	75
East	266	38
West	513	37
North Dakota	41	5
Oklahoma	601	61
Texas	2,368	256
RRC District 1	34	4
RRC District 2 Onshore	60	10
RRC District 3 Onshore	170	28
RRC District 4 Onshore	279	41
RRC District 5	39	3
RRC District 6	213	21
RRC District 7B	24	6
RRC District 7C	326	29
RRC District 8	488	48
RRC District 8A	180	16
RRC District 9	229	21
RRC District 10	326	29
State Offshore	0	0
Utah and Wyoming	806	55
West Virginia	98	6
Federal Offshore[a]	511	94
Pacific (California)	0	0
Gulf of Mexico (Louisiana)[a]	483	89
Gulf of Mexico (Texas)	28	5
Miscellaneous[b]	8	0
U.S. Total	**6,648**	**677**

[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 2002 contained in the publications *Petroleum Supply Annual 2002*, DOE/EIA-0340(2002) and *Natural Gas Annual 2002*, DOE/EIA-0131(2002).

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

Table 15. Lease Condensate Proved Reserves and Production, 2002
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2002 Reserves	2002 Production
Alaska	0	0
Lower 48 States	**1,346**	**207**
Alabama	29	4
Arkansas	1	0
California	0	0
Coastal Region Onshore	0	0
Los Angeles Basin Onshore	0	0
San Joaquin Basin Onshore	0	0
State Offshore	0	0
Colorado	67	4
Florida	0	0
Kansas	2	0
Kentucky	1	0
Louisiana	137	33
North	19	3
South Onshore	107	27
State Offshore	11	3
Michigan	5	1
Mississippi	6	1
Montana	0	0
New Mexico	59	7
East	24	5
West	35	2
North Dakota	6	0
Oklahoma	94	11
Texas	343	45
RRC District 1	5	0
RRC District 2 Onshore	11	2
RRC District 3 Onshore	71	14
RRC District 4 Onshore	91	16
RRC District 5	11	1
RRC District 6	64	5
RRC District 7B	1	0
RRC District 7C	25	2
RRC District 8	22	2
RRC District 8A	1	0
RRC District 9	9	1
RRC District 10	27	1
State Offshore	5	1
Utah and Wyoming	132	11
West Virginia	1	0
Federal Offshore[a]	462	90
Pacific (California)	1	0
Gulf of Mexico (Louisiana)[a]	300	60
Gulf of Mexico (Texas)	154	30
Miscellaneous[b]	1	0
U.S. Total	**1,346**	**207**

[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” 2002.
Source: Energy Information Administration, Office of Oil and Gas.

Natural Gas Plant Liquids

Proved Reserves

Natural gas plant liquids proved reserves increased in 2002 to 6,648 million barrels, a 1 percent increase from the 2001 level (6,595 million barrels) (**Table 14**). Six areas accounted for about 83 percent of the Nation's natural gas plant liquids proved reserves:

Area	Percent of U.S. Gas Plant Liquids
Texas	36
Utah-Wyoming	12
New Mexico	12
Oklahoma	9
Gulf of Mexico Federal Offshore	8
Alaska	6
Area Total	**83**

Production

Natural gas plant liquids production increased less than 1 percent in 2002—from 675 million barrels in 2001 to 677 million barrels of production (**Table 14**). The top six areas for proved reserves of natural gas plant liquids accounted for about 83 percent of the Nation's natural gas plant liquids production:

- Texas (38 percent)
- Gulf of Mexico Federal Offshore (14 percent)
- New Mexico (11 percent)
- Oklahoma (9 percent)
- Utah and Wyoming (8 percent)
- Alaska (3 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 1,346 million barrels in 2002 (**Table 15**). This was 4 percent less than the volume reported in 2001 (1,398 million barrels). The reserves of five areas account for about 86 percent of the Nation's lease condensate proved reserves.

Area	Percent of U.S. Condensate Reserves
Gulf of Mexico Federal Offshore	34
Texas	25
Louisiana	10
Utah-Wyoming	10
Oklahoma	7
Area Total	**86**

Production

Production of lease condensate was 207 million barrels in 2002, a decrease of 4 percent from 2001's production (215 million barrels). The production of five areas account for about 91 percent of the Nation's lease condensate production.

- Gulf of Mexico Federal Offshore (43 percent)
- Texas (22 percent)
- Louisiana (16 percent)
- Utah and Wyoming (5 percent)
- Oklahoma (5 percent).

Reserves in Nonproducing Status

Like crude oil and natural gas, not all lease condensate proved reserves were producing during 2002. Proved reserves of 489 million barrels of lease condensate, a decrease of 13 percent from 2001's level (562 million barrels), were reported in nonproducing status in 2002 (**Appendix D, Table D10**). About 51 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 1997 through 2002 for oil and gas well operators. The tables show the volumetric change and percent change from the previous year and from 1997. In addition they show the 2002 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 22,323 small operators. We estimated production and reserves for small operators for 2002 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 1997 through 2002 have changed from 175,721 billion cubic feet to 195,561 billion cubic feet (Table A1). These proved reserves are highly concentrated in the larger companies. In 2002, the top 20 operators (Class 1–10 and Class 11–20) producing companies had 58 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 18 percent in their natural gas proved reserves from 1997 to 2002. The rest of the operators in (Class 21–100, Class 101–500, and Class Other) had an increase of 2 percent in their reserves in the same period. In 2002, the top 20 operators' natural gas reserves had no percentage change from 2001.

Production

Wet natural gas production has decreased from 20,642 billion cubic feet in 2001 to 20,248 billion cubic feet in 2002 (Table A2). In 2002, the top 20 producing companies had 59 percent of the production of wet natural gas. The next two size classes have 24 and 12 percent of the wet natural gas production, respectively. The top 20 operators had an increase of 13 percent in their wet natural gas production from 1997 to 2002. The rest of the operators had a decrease of 13 percent from 1997 to 2002. The top 20 operators' wet natural gas production had a decrease of 2 percent in 2002 from 2001.

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 2002 had 71 percent of U.S. proved reserves of crude oil (Table A3), in contrast to wet natural gas where these same companies operated 58 percent of the total proved reserves.

U.S. proved reserves of crude oil increased 1 percent in 2002. The top 20 producing companies proved reserves of crude oil during 2002 decreased 2 percent. The top 20 class had an increase of 12 percent in their crude oil proved reserves from 1997 to 2002.

Production

Crude oil production reported for 1997 to 2002 has decreased from 2,138 million barrels to 1,875 million barrels (Table A4). The 20 largest oil and gas producing companies had 68 percent of U.S. production of crude oil in 2002. In 1997 they accounted for 61 percent of production. This is in contrast to wet natural gas where these same companies produced only 58 percent of the total. U.S. production of crude oil declined by 12 percent from 1997 to 2002. The top 20 operators had a decline of 3 percent in their oil production during the same period. U.S. production of crude oil decreased by 2 percent from 2001 to 2002, the top 20 operators production also decreased by 2 percent.

Fields

The number of fields in which Category I and Category II operators were active increased during the 1997–2002 period (Table A5). From 1997-2002, the number of fields in which the top 20 operators were active increased by 1,165 fields (24 percent) while in 2002 the number decreased by 18 fields from 2001.

Table A1. Natural Gas Proved Reserves, Wet After Lease Separation, by Operator Production Size Class, 1997–2002

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

Size Class	1997	1998	1999	2000	2001	2002	2001–2002 Volume and Percent Change	1997–2002 Volume and Percent Change	2002 Average Reserves per Operator
Class 1-10	68,876	64,336	64,320	81,437	88,936	88,100	-837	19,224	8,809.961
Percent of Total	39.2%	37.3%	36.5%	43.7%	46.4%	45.0%	-0.9%	27.9%	
Class 11-20	27,705	28,338	24,925	22,590	24,588	25,938	1,350	-1,767	2,593.823
Percent of Total	15.8%	16.4%	14.1%	12.1%	12.8%	13.3%	5.5%	-6.4%	
Class 21-100	45,593	47,009	52,160	48,832	50,055	50,633	577	5,040	632.908
Percent of Total	25.9%	27.3%	29.6%	26.2%	26.1%	25.9%	1.2%	11.1%	
Class 101-500	23,338	24,471	25,967	22,620	19,046	19,723	677	-3,615	49.308
Percent of Total	13.3%	14.2%	14.7%	12.1%	9.9%	10.1%	3.6%	-15.5%	
Class Other (22,019)	10,209	8,289	8,289	11,030	9,118	11,167	2,049	958	0.500
Percent of Total	5.8%	4.8%	5.0%	5.9%	4.8%	5.7%	22.5%	9.4%	
Category I (179)	147,491	146,458	146,458	162,144	169,056	173,325	4,270	25,834	984.803
Percent of Total	83.9%	84.9%	82.8%	86.9%	88.2%	88.6%	2.5%	17.5%	
Category II (430)	17,764	18,033	18,033	13,123	13,346	11,051	-2,294	-6,713	23.024
Percent of Total	10.1%	10.5%	12.5%	7.0%	7.0%	5.7%	-17.2%	-37.8%	
Category III (22,519)	10,467	7,952	7,952	R11,243	9,342	11,184	1,843	717	0.505
Percent of Total	6.0%	4.6%	4.7%	R6.0%	4.9%	5.7%	19.7%	6.9%	
Total Published	**175,721**	**172,443**	**176,159**	**186,510**	**191,743**	**195,561**	**3,818**	**19,840**	**8.569**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**2.0%**	**11.3%**	

R = Revised

Note: There were 22,167 active Category III operators in the 2002 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 861 Category III operators (Table E2). The "other" size class represents 22,323 operators in the 2002 frame (22,823 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, 1997–2002

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

Size Class	1997	1998	1999	2000	2001	2002	2001–2002 Volume and Percent Change	1997–2002 Volume and Percent Change	2002 Average Production per Operator
Class 1-10	7,178	6,954	6,881	8,495	9,019	8,996	-24	1,818	899.569
Percent of Total	35.7%	35.4%	34.7%	42.1%	43.7%	44.4%	-0.3%	25.3%	
Class 11-20	3,286	3,317	3,560	2,886	3,064	2,854	-210	-432	285.386
Percent of Total	15.8%	16.4%	14.1%	14.3%	14.8%	14.1%	-6.9%	-13.2%	
Class 21-100	5,729	5,595	5,523	4,965	4,949	4,763	-186	-966	59.537
Percent of Total	25.9%	27.3%	29.6%	24.6%	24.0%	23.5%	-3.8%	-16.9%	
Class 101-500	2,665	2,721	2,793	2,780	2,609	2,475	-134	-190	6.187
Percent of Total	13.3%	14.2%	14.7%	13.8%	12.6%	12.2%	-5.1%	-7.1%	
Class Other (22,019)	1,276	1,035	1,099	1,038	1,000	1,161	161	-115	0.052
Percent of Total	5.8%	4.8%	5.0%	5.1%	4.8%	5.7%	16.1%	-9.0%	
Category I (179)	16,897	16,619	16,248	17,096	17,672	17,335	-337	438	98.493
Percent of Total	83.9%	84.9%	82.8%	84.8%	85.6%	85.6%	-1.9%	2.6%	
Category II (430)	1,979	2,019	2,556	1,921	1,932	1,738	-194	-241	3.620
Percent of Total	10.1%	10.5%	12.5%	9.5%	9.4%	8.6%	-10.1%	-12.2%	
Category III (22,519)	1,258	984	1,052	R1,147	1,038	1,176	137	-82	0.053
Percent of Total	6.0%	4.6%	4.7%	R5.7%	5.0%	5.8%	13.2%	-6.6%	
Total Published	**20,134**	**19,622**	**19,856**	**20,164**	**20,642**	**20,248**	**-394**	**114**	**0.887**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**-1.9%**	**0.6%**	

R = Revised

Note: There were 22,167 active Category III operators in the 2002 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 861 Category III operators (Table E2). The "other" size class represents 22,323 operators in the 2002 frame (22,823 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, 1997–2002
(Million Barrels of 42 U.S. Gallons)

Size Class	1997	1998	1999	2000	2001	2002	2001–2002 Volume and Percent Change	1997–2002 Volume and Percent Change	2002 Average Reserves per Operator
Class 1-10	11,434	11,501	11,121	12,367	13,590	13,346	-245	1,912	1,334.553
Percent of Total	50.7%	54.7%	51.1%	56.1%	60.5%	58.9%	-1.8%	16.7%	
Class 11-20	2,977	2,894	2,585	3,172	2,901	2,817	-85	-160	281.676
Percent of Total	13.2%	13.8%	11.9%	14.4%	12.9%	12.4%	-2.9%	-5.4%	
Class 21-100	4,384	3,677	4,338	2,505	2,856	3,230	375	-1,154	40.381
Percent of Total	19.4%	17.5%	19.9%	11.4%	12.7%	14.2%	13.1%	-26.3%	
Class 101-500	2,111	1,754	2,379	2,286	1,794	1,817	23	-294	4.541
Percent of Total	9.4%	8.3%	10.9%	10.4%	8.0%	8.0%	1.3%	-13.9%	
Class Other (22,019)	1,640	1,208	1,342	1,716	1,305	1,468	163	-172	0.066
Percent of Total	7.3%	5.7%	6.2%	7.8%	5.8%	6.5%	12.5%	-10.5%	
Category I (179)	19,461	18,819	18,952	19,421	20,325	20,213	-113	752	114.845
Percent of Total	86.3%	89.5%	87.1%	88.1%	90.6%	89.1%	-0.6%	3.9%	
Category II (430)	1,400	1,018	1,521	873	794	992	198	-408	2.068
Percent of Total	6.2%	4.8%	7.0%	4.0%	3.5%	4.4%	24.9%	-29.1%	
Category III (22,519)	1,685	1,197	1,293	R1,751	1,326	1,472	146	-213	0.066
Percent of Total	7.5%	5.7%	5.9%	R7.9%	5.9%	6.5%	11.0%	-12.7%	
Total Published	**22,546**	**21,034**	**21,765**	**22,045**	**22,446**	**22,677**	**231**	**131**	**0.994**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**1.0%**	**0.6%**	

R = Revised

Note: There were 22,167 active Category III operators in the 2002 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 861 Category III operators (Table E2). The "other" size class represents 22,323 operators in the 2002 frame (22,823 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, 1997–2002
(Million Barrels of 42 U.S. Gallons)

Size Class	1997	1998	1999	2000	2001	2002	2001–2002 Volume and Percent Change	1997–2002 Volume and Percent Change	2002 Average Production per Operator
Class 1-10	1,047	1,025	974	961	1,061	1,037	-24	-10	103.677
Percent of Total	49.0%	51.5%	49.9%	51.1%	55.4%	55.3%	-2.2%	-1.0%	
Class 11-20	262	255	241	304	240	233	-7	-29	23.329
Percent of Total	12.3%	12.8%	12.3%	16.2%	12.5%	12.4%	-2.9%	-11.0%	
Class 21-100	373	342	350	214	233	240	7	-133	3.001
Percent of Total	17.4%	17.2%	17.9%	11.4%	12.2%	12.8%	3.1%	-35.6%	
Class 101-500	237	206	208	211	195	181	-14	-56	0.453
Percent of Total	11.1%	10.3%	10.7%	11.2%	10.2%	9.7%	-7.3%	-23.6%	
Class Other (22,019)	219	163	179	190	186	184	-2	-35	0.008
Percent of Total	10.2%	8.2%	9.2%	10.1%	9.7%	9.8%	-1.2%	-16.1%	
Category I (179)	1,760	1,714	1,617	1,572	1,612	1,573	-39	-187	8.938
Percent of Total	82.3%	86.1%	82.8%	83.6%	84.2%	83.9%	-2.4%	-10.6%	
Category II (430)	157	118	160	111	112	115	3	-42	0.240
Percent of Total	7.3%	5.9%	8.2%	5.9%	5.8%	6.1%	3.1%	-26.6%	
Category III (22,519)	221	159	175	R197	191	187	-4	-34	0.008
Percent of Total	10.3%	8.0%	9.0%	R10.5%	10.0%	10.0%	-2.2%	-15.5%	
Total Published	**2,138**	**1,991**	**1,952**	**1,880**	**1,915**	**1,875**	**-40**	**-263**	**0.082**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**-2.1%**	**-12.3%**	

R = Revised

Note: There were 22,167 active Category III operators in the 2002 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 861 Category III operators (Table E2). The "other" size class represents 22,323 operators in the 2002 frame (22,823 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, 1997–2002

Size Class	1997	1998	1999	2000	2001	2002	2001–2002 Number and Percent Change	1997–2002 Number and Percent Change	2002 Average Number of Fields per Operator
Class 1-10	2,566	2,475	2,559	3,444	3,794	3,596	-198	1,030	359.600
Percent of Total	10.4%	9.5%	10.0%	13.0%	14.0%	12.9%	-5.2%	40.1%	
Class 11-20	2,257	1,822	1,514	1,923	2,212	2,392	180	135	239.200
Percent of Total	9.1%	7.0%	5.9%	7.2%	8.2%	8.6%	8.1%	6.0%	
Class 21-100	7,159	7,526	8,180	7,084	7,195	7,947	752	788	99.338
Percent of Total	28.9%	29.0%	32.0%	26.7%	26.5%	28.4%	10.5%	11.0%	
Class 101-500	12,878	12,817	12,344	12,580	12,435	12,661	226	-217	31.653
Percent of Total	52.0%	49.4%	48.2%	47.4%	45.9%	45.3%	1.8%	-1.7%	
Rest	1,332	1,524	1,287	1,529	1,480	1,349	-131	17	8.647
Percent of Total	5.4%	5.9%	5.0%	5.8%	5.5%	4.8%	-8.9%	1.3%	
Category I	15,232	15,666	15,120	16,174	16,196	17,049	853	1,817	96.869
Percent of Total	61.5%	60.4%	59.1%	60.9%	59.7%	61.0%	5.3%	11.9%	
Category II	R9,530	10,271	10,467	10,146	10,764	10,473	-291	943	21.819
Percent of Total	38.5%	39.6%	40.9%	38.2%	39.7%	37.5%	-2.7%	9.9%	
Total	**R24,762**	**25,937**	**25,587**	**26,560**	**27,116**	**27,945**	**829**	**3,183**	**42.599**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.00%**	**3.1%**	**12.9%**	

R = Revised
Note: Includes only data from Category I and Category II operators. In 2002, there were 176 Category I operators and 480 Category II operators. The “rest” size class had 156 operators in 2002.
Source: Energy Information Administration, Office of Oil and Gas.

Appendix B

Top 100 Oil and Gas Fields for 2002

Top 100 Oil and Gas Fields for 2002

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 2002

The top 100 oil fields in the United States as of December 31, 2002, had 15,452 million barrels of **proved reserves** accounting for 64 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 2002 there are six fields, Mississippi Canyon Block 778 (Thunder Horse), Mississippi Canyon Block 807 (Mars), Green Canyon Block 644 (Holstein), Mississippi Canyon Block 810 (Ursa), Green Canyon 826 (Mad Dog), and Mississippi Canyon 84 (King Horn Mountain) 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, 2002, had 1,041 million barrels of **production**, or 50 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 Main Pass Blk 61 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 2002

The top 100 gas fields in the United States as of December 31, 2002, had 98,376 billion cubic feet of wet natural gas **proved reserves**, or 50 percent of the total (**Table 9**).

The top 100 gas fields in the United States as of December 31, 2002, had 7,426 billion cubic feet of **production**, or 37 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 and 55 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, Colorado, and Wyoming.

Table B3. Top U.S. Operators Ranked by Reported 2002 Operated Production Data

Table B3 lists the top U.S. oil and gas operators ranked by reported 2002 operated production data.

Table B1. Top 100 U.S. Fields Ranked by Liquids Proved Reserves from Estimated 2002 Field Level Data[a]
(Million Barrels of 42 U.S. Gallons)

	Field Name	Location	Discovery Year	Proved Reserves Rank Group	2002 Reported Production Volume
1	PRUDHOE BAY	AK	1967	(1-10)	151.6
2	MISSISSIPPI CANYON BLK 778	FG	1999	(1-10)	0.0
3	KUPARUK RIVER	AK	1969	(1-10)	58.6
4	BELRIDGE SOUTH	CA	1911	(1-10)	39.9
5	MIDWAY-SUNSET	CA	1901	(1-10)	50.4
6	WASSON	TX	1937	(1-10)	25.5
7	YATES	TX	1926	(1-10)	6.9
8	KERN RIVER	CA	1899	(1-10)	38.6
9	ELK HILLS	CA	1920	(1-10)	19.7
10	MISSISSIPPI CANYON BLK 807	FG	1989	(1-10)	52.1
Top 10 Volume Subtotal				**7,407.4**	**443.4**
Top 10 Percentage of U.S. Total				**30.8%**	**21.3%**
11	SPRABERRY TREND AREA	TX	1951	(11-20)	24.0
12	ALPINE	AK	1994	(11-20)	35.0
13	MILNE POINT	AK	1982	(11-20)	18.6
14	SLAUGHTER	TX	1937	(11-20)	15.3
15	HONDO	FP	1990	(11-20)	9.0
16	GREEN CANYON BLK 644	FG	1999	(11-20)	0.0
17	GREEN CANYON BLK 826	FG	1999	(11-20)	0.0
18	MISSISSIPPI CANYON BLK 810	FG	1996	(11-20)	31.8
19	CYMRIC	CA	1916	(11-20)	20.1
20	MISSISSIPPI CANYON 84	FG	1993	(11-20)	5.3
Top 20 Volume Subtotal				**9,966.3**	**602.6**
Top 20 Percentage of U.S. Total				**41.5%**	**28.9%**
21	LEVELLAND	TX	1945	(21-50)	9.6
22	LOST HILLS NW	CA	1910	(21-50)	11.3
23	WILMINGTON	CA	1932	(21-50)	15.1
24	PESCADO	FP	1970	(21-50)	5.8
25	SHO-VEL-TUM	OK	1905	(21-50)	9.5
26	NORTHSTAR	AK	1984	(21-50)	17.6
27	HOBBS	NM	1928	(21-50)	2.7
28	COWDEN NORTH	TX	1930	(21-50)	7.3
29	ENDICOTT	AK	1978	(21-50)	8.7
30	POINT MCINTYRE	AK	1988	(21-50)	15.2
31	SAN ARDO	CA	1947	(21-50)	4.7
32	WATTENBERG	CO	1970	(21-50)	7.5
33	INGLEWOOD	CA	1924	(21-50)	2.8
34	CEDAR HILLS	ND & MT & SD	1954	(21-50)	2.0
35	VENTURA	CA	1916	(21-50)	4.7
36	KELLY-SNYDER	TX	1948	(21-50)	4.8
37	VACUUM	NM	1929	(21-50)	8.1
38	SACATE	FP	1970	(21-50)	2.3
39	GREEN CANYON BLK 339	FG	2001	(21-50)	0.0
40	MCELROY	TX	1926	(21-50)	5.2
41	BOREALIS	AK	2001	(21-50)	9.2
42	GREATER ANETH	UT	1956	(21-50)	3.7
43	ROBERTSON NORTH	TX	1956	(21-50)	3.9
44	HAWKINS	TX	1975	(21-50)	3.3
45	MONUMENT BUTTE	UT	1964	(21-50)	1.7
46	MISSISSIPPI CANYON BLK 383	FG	1987	(21-50)	0.0
47	VIOSCA KNOLL BLK 786	FG	1996	(21-50)	17.7
48	FULLERTON	TX	1942	(21-50)	5.1
49	COALINGA	CA	1887	(21-50)	6.9
50	GOLDSMITH	TX	1935	(21-50)	4.1
Top 50 Volume Subtotal				**13,148.5**	**803.3**
Top 50 Percentage of U.S. Total				**54.7%**	**38.6%**

Table B1. Top 100 U.S. Fields Ranked by Liquids Proved Reserves from Estimated 2002 Field Level Data[a] (Continued)
(Million Barrels of 42 U.S. Gallons)

	Field Name	Location	Discovery Year	Proved Reserves Rank Group	2002 Reported Production Volume
51	RANGELY	CO	1902	(51-100)	5.5
52	VIOSCA KNOLL BLK 990	FG	1981	(51-100)	12.2
53	REDOUBT SHOAL	AK	1968	(51-100)	0.0
54	MISSISSIPPI CANYON BLK 773	FG	2000	(51-100)	0.0
55	POLARIS	AK	2000	(51-100)	0.9
56	ARROYO GRANDE	CA	1906	(51-100)	0.7
57	SALT CREEK	TX	1942	(51-100)	5.2
58	JAY	MT & WY	1915	(51-100)	2.9
59	PENNEL	AL & FL	1970	(51-100)	2.2
60	WEST SAK	MT	1955	(51-100)	2.4
61	GREEN CANYON BLK 158	AK	1969	(51-100)	18.0
62	GIDDINGS	FG	1992	(51-100)	11.5
63	SEMINOLE	TX	1960	(51-100)	9.0
64	GREEN CANYON BLK 608	TX	1936	(51-100)	0.0
65	MEANS	FG	2000	(51-100)	3.7
66	EWING BANK BLK 873	TX	1934	(51-100)	9.0
67	GREEN CANYON BLK 205	FG	1991	(51-100)	17.2
68	JO-MILL	FG	1988	(51-100)	2.4
69	CEDAR LAKE	TX	1953	(51-100)	2.5
70	ANTON-IRISH	TX	1939	(51-100)	5.8
71	KERN FRONT	TX	1944	(51-100)	1.4
72	LAKE WASHINGTON	CA	1925	(51-100)	1.9
73	ELK BASIN	LA	1931	(51-100)	2.6
74	MISSISSIPPI CANYON BLK 582	FG	2000	(51-100)	0.0
75	ALAMINOS CANYON BLK 25	FG	1997	(51-100)	16.1
76	BEVERLY HILLS	CA	1900	(51-100)	1.4
77	TARN	AK	1991	(51-100)	11.8
78	WEST DELTA BLK 30	FG	1949	(51-100)	5.2
79	MISSISSIPPI CANYON BLK 899	FG	1998	(51-100)	13.3
80	ALTAMONT-BLUEBELL	UT	1949	(51-100)	2.6
81	GOLDEN TREND	OK	1945	(51-100)	2.2
82	WASSON 72	TX	1940	(51-100)	1.6
83	MONUMENT	NM	1935	(51-100)	2.6
84	VIOSCA KNOLL BLK 915	FG	1993	(51-100)	4.9
85	BELRIDGE NORTH	CA	1912	(51-100)	2.8
86	MISSISSIPPI CANYON BLK 935	FG	1994	(51-100)	6.0
87	EAST BREAKS BLK 602	FG	1999	(51-100)	6.2
88	BREA-OLINDA	CA	1897	(51-100)	1.8
89	GARDEN BANKS BLK 668	FG	2000	(51-100)	0.0
90	GREEN CANYON BLK 244	FG	1994	(51-100)	21.6
91	AURORA	AK	1999	(51-100)	2.2
92	LOOKOUT BUTTE EAST	MT	1986	(51-100)	1.7
93	FOSTER	TX	1985	(51-100)	2.6
94	MAIN PASS BLK 61	FG	2001	(51-100)	0.4
95	DOLLARHIDE	NM & TX	1945	(51-100)	3.0
96	SOUTH PASS EA BLK 62	FG	1974	(51-100)	2.1
97	EUNICE MONUMENT	NM	1929	(51-100)	1.1
98	BIG STICK	ND	1979	(51-100)	0.8
99	MONTEBELLO	CA	1917	(51-100)	1.0
100	GARDEN BANKS BLK 559	FG	1999	(51-100)	5.8
Top 100 Volume Subtotal				**15,451.6**	**1,041.3**
Top 100 Percentage of U.S. Total				**64.3%**	**50.0%**

[a]Includes lease condensate.

Notes: The U.S. total production estimate of 2,085 million barrels and the U.S. total reserves estimate of 24,023 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 as Ranked by Gas Proved Reserves from Estimated 2002 Field Level Data[a]
(Billion Cubic Feet)

	Field Name	Location	Discovery Year	Proved Reserves Rank Group	2002 Reported Production Volume
1	BLANCO / IGNACIO-BLANCO	CO & NM	1927	(1-10)	841.7
2	BASIN	NM	1969	(1-10)	592.1
3	PRUDHOE BAY	AK	1967	(1-10)	196.5
4	HUGOTON GAS AREA	KS & OK & TX	1922	(1-10)	393.0
5	PINEDALE	WY	1955	(1-10)	31.2
6	MADDEN	WY	1968	(1-10)	99.2
7	JONAH	WY	1977	(1-10)	224.7
8	WATTENBERG	CO	1970	(1-10)	175.4
9	ANTRIM	MI	1965	(1-10)	224.7
10	RATON BASIN GAS AREA	CO & NM	1999	(1-10)	71.3
Top 10 Volume Subtotal				**44,246.6**	**2,849.8**
Top 10 Percentage of U.S. Total				**22.6%**	**14.1%**
11	NEWARK EAST	TX	1981	(11-20)	203.2
12	PRB COALBED	WY	1999	(11-20)	311.1
13	CARTHAGE	TX	1944	(11-20)	195.7
14	FOGARTY CREEK	WY	1975	(11-20)	32.0
15	NATURAL BUTTES	UT	1952	(11-20)	94.3
16	MOBILE BAY FIELDS	AL	1979	(11-20)	135.2
17	BIG SANDY	KY & WV	1881	(11-20)	49.0
18	DRUNKARDS WASH	UT	1989	(11-20)	86.3
19	SPRABERRY TREND AREA	TX	1952	(11-20)	95.8
20	SAWYER	TX	1975	(11-20)	66.5
Top 20 Volume Subtotal				**60,650.5**	**4,119.1**
Top 20 Percentage of U.S. Total				**31.0%**	**20.3%**
21	PANHANDLE WEST	TX	1918	(21-50)	99.6
22	OAKWOOD	VA	1990	(21-50)	47.3
23	MAMM CREEK	CO	1959	(21-50)	28.1
24	VERNON	LA	1967	(21-50)	31.3
25	RED OAK-NORRIS	OK	1910	(21-50)	53.7
26	MISSISSIPPI CANYON BLK 778	FG	1999	(21-50)	0.0
27	STRONG CITY DISTRICT	OK	1966	(21-50)	70.1
28	ELK HILLS	CA	1919	(21-50)	129.4
29	OAK HILL	TX	1980	(21-50)	71.1
30	LAKE RIDGE	WY	1981	(21-50)	16.1
31	MISSISSIPPI CANYON BLK 810	FG	1996	(21-50)	49.9
32	MESA UNIT	WY	1981	(21-50)	25.4
33	GOMEZ	TX	1977	(21-50)	54.2
34	GRAND VALLEY	CO	1985	(21-50)	31.4
35	GIDDINGS	TX	1973	(21-50)	142.9
36	BELUGA RIVER	AK	1962	(21-50)	43.8
37	COOK INLET NORTH	AK	1962	(21-50)	54.3
38	MOCANE-LAVERNE GAS AREA	KS & OK & TX	1947	(21-50)	89.6
39	RULISON	CO	1958	(21-50)	32.2
40	DEW	TX	1982	(21-50)	60.1
41	PANOMA GAS AREA	KS	1956	(21-50)	60.7
42	BALD PRAIRIE	TX	1976	(21-50)	30.0
43	WATONGA-CHICKASHA TREND	OK	1962	(21-50)	63.4
44	KINTA	OK	1926	(21-50)	45.8
45	FREESTONE	TX	1949	(21-50)	49.9
46	GOLDEN TREND	OK	1947	(21-50)	48.4
47	ELM GROVE	LA	1958	(21-50)	52.3
48	VIOSCA KNOLL BLK 956	FG	1985	(21-50)	78.9
49	EAST BREAKS BLK 602	FG	1999	(21-50)	26.5
50	EAST BREAKS BLK 945	FG	1994	(21-50)	43.5
Top 50 Volume Subtotal				**82,254.5**	**5,749.0**
Top 50 Percentage of U.S. Total				**42.1%**	**28.4%**

Table B2. Top 100 U.S. Fields as Ranked by Gas Proved Reserves from Estimated 2002 Field Level Data[a] (Continued)
(Billion Cubic Feet)

	Field Name	Location	Discovery Year	Proved Reserves Rank Group	2002 Reported Production Volume
51	LOWER MOBILE BAY-MARY ANN	AL	1979	(51-100)	26.9
52	WAMSUTTER	WY	1958	(51-100)	33.6
53	WASSON	TX	1973	(51-100)	23.1
54	MISSISSIPPI CANYON BLK 807	FG	1989	(51-100)	66.6
55	PARACHUTE	CO	1985	(51-100)	15.6
56	WHITNEY CANYON-CARTER CRK	WY	1978	(51-100)	77.6
57	DOWDY RANCH	TX	1999	(51-100)	28.4
58	MAYFIELD NE	OK	1951	(51-100)	47.1
59	BRUFF	WY	1969	(51-100)	39.9
60	FARRAR	TX	1963	(51-100)	11.2
61	MISSISSIPPI CANYON BLK 731	FG	1987	(51-100)	76.2
62	WILBURTON	OK	1960	(51-100)	64.4
63	BLUE CREEK COAL DEGAS	AL	1988	(51-100)	25.9
64	MONTE CHRISTO NORTH	TX	1982	(51-100)	59.7
65	NORA	VA	1949	(51-100)	16.1
66	ELK CITY	OK	1947	(51-100)	49.4
67	BOB WEST	TX	1990	(51-100)	30.4
68	OZONA	TX	1971	(51-100)	32.1
69	WILD ROSE	WY	1975	(51-100)	24.2
70	STRATTON	TX	1981	(51-100)	16.3
71	ECHO SPRINGS	WY	1977	(51-100)	33.3
72	BELRIDGE SOUTH	CA	1911	(51-100)	17.9
73	CEMENT	OK	1917	(51-100)	45.5
74	VERDEN	OK	1948	(51-100)	31.3
75	STANDARD DRAW	WY	1979	(51-100)	28.6
76	MIMMS CREEK	TX	1978	(51-100)	27.7
77	KUPARUK RIVER	AK	1969	(51-100)	25.6
78	GARDEN BANKS BLK 668	FG	2000	(51-100)	0.0
79	GARDEN BANKS BLK 877	FG	2001	(51-100)	0.0
80	LABARGE	WY	1924	(51-100)	26.9
81	MOBILE BLK 823	FG	1983	(51-100)	48.5
82	WILLOW SPRINGS	TX	1954	(51-100)	30.2
83	LA PERLA	TX	1958	(51-100)	64.3
84	BLANCO SOUTH	NM	1952	(51-100)	18.3
85	MATAGORDA ISLAND BLK 623	FG	1980	(51-100)	51.0
86	CEDAR COVE COAL DEGAS	AL	1983	(51-100)	18.0
87	BOONSVILLE	TX	1945	(51-100)	35.1
88	DOUBLE A WELLS	TX	1980	(51-100)	24.4
89	BROWN-BASSETT	TX	1953	(51-100)	28.3
90	DESOTO CANYON BLK 133	FG	1993	(51-100)	5.8
91	GRAND ISLE SA BLK 116	FG	1999	(51-100)	41.7
92	BLOCK 16	TX	1969	(51-100)	31.3
93	INDIAN BASIN	NM	1971	(51-100)	130.3
94	ELK BASIN	MT & WY	1915	(51-100)	7.1
95	SHO-VEL-TUM	OK	1905	(51-100)	20.2
96	CEDARDALE NE	OK	1957	(51-100)	21.7
97	AWP	TX	1981	(51-100)	13.9
98	RIO VISTA	CA	1936	(51-100)	22.6
99	CARPENTER	OK	1980	(51-100)	20.2
100	KNOX	OK	1916	(51-100)	42.3
Top 100 Volume Subtotal				**98,375.5**	**7,425.9**
Top 100 Percentage of U.S. Total				**50.3%**	**36.7%**

[a]Total wet gas after lease separation.

Note: The U.S. total production estimate of 20,248 billion cubic feet and the U.S. total reserves estimate of 195,561 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 2002 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 PLC	868	1	BP PLC	5,512
2	CHEVRONTEXACO INC	620	2	EXXONMOBIL CORP	3,130
3	SHELL OIL CO	462	3	CHEVRONTEXACO INC	2,846
4	CONOCOPHILLIPS CO	350	4	CONOCOPHILLIPS CO.	2,445
5	EXXONMOBIL CORP	297	5	SHELL OIL CO.	2,377
6	OCCIDENTAL PETROLEUM CORP	261	6	DEVON ENERGY CORP	2,020
7	AERA ENERGY LLC	232	7	EL PASO ENERGY	1,894
8	AMERADA HESS CORP	106	8	BURLINGTON RESOURCES OIL & GAS CO.	1,875
9	ANADARKO PETROLEUM CORP	103	9	ANADARKO PETROLEUM CORP	1,776
10	MARATHON OIL CO.	97	10	UNOCAL CORP	1,261
Top 10 Volume Subtotal		***3,396***	***Top 10 Volume Subtotal***		***25,136***
Top 10 Percentage of U.S. Total		***60%***	***Top 10 Percentage of U.S. Total***		***45%***
11	UNOCAL CORP	80	11	DOMINION RESOURCES INC.	885
12	KERR-MCGEE CORP	79	12	E O G RESOURCES INC	884
13	DEVON ENERGY CORP	69	13	KERR-MCGEE CORP	876
14	APACHE CORP	65	14	MARATHON OIL CO.	865
15	EL PASO ENERGY	46	15	APACHE CORP	863
16	NUEVO ENERGY CO.	45	16	XTO ENERGY INC	810
17	WESTPORT RESOURCES CORP.	44	17	OCCIDENTAL PETROLEUM CORP	771
18	MERIT ENERGY CO	38	18	WILLIAMS ENERGY INC	720
19	CITY OF LONG BEACH	33	19	NEWFIELD EXPLORATION CO.	669
20	CITATION OIL & GAS CORP	28	20	ENCANA OIL & GAS INC	633
Top 20 Volume Subtotal		***3,923***	***Top 20 Volume Subtotal***		***33,112***
Top 20 Percentage of U.S. Total		***69%***	***Top 20 Percentage of U.S. Total***		***60%***
21	PIONEER NATURAL RESOURCES USA	28	21	AMERADA HESS CORP	621
22	BURLINGTON RESOURCES OIL & GAS CO	27	22	CHESAPEAKE ENERGY CORP	604
23	DENBURY RESOURCES INC	24	23	SAMSON INVESTMENT CO	426
24	NEWFIELD EXPLORATION CO.	23	24	OCEAN ENERGY INC	422
25	OCEAN ENERGY INC	23	25	PIONEER NATURAL RESOURCES USA	357
26	E O G RESOURCES INC	21	26	HOUSTON EXPLORATION	349
27	VINTAGE PETROLEUM INC	20	27	QUESTAR CORP	339
28	HUNT OIL CO	19	28	WESTPORT RESOURCES CORP.	302
29	PLAINS RESOURCES INC	19	29	EQUITABLE RESOURCES INC	292
30	ENCORE OPERATING LP	19	30	NOBLE AFFILIATES INC	285
31	DOMINION RESOURCES INC.	18	31	HUNT OIL CO	260
32	AGIP PETROLEUM CO INC.	18	32	TOTALFINAELF SA	249
33	NOBLE AFFILIATES INC	17	33	WALTER OIL & GAS CORP	242
34	HILCORP ENERGY CO	17	34	YATES PETROLEUM CORP	240
35	POGO PRODUCING CO	16	35	CABOT OIL & GAS CORP	229
36	STONE ENERGY CORP	16	36	STONE ENERGY CORP	221
37	XTO ENERGY INC	16	37	ENERGEN RESOURCES CORP	221
38	ARGUELLO INC	16	38	POGO PRODUCING CO	218
39	NATIONAL FUEL GAS	15	39	CIMAREX ENERGY CO	217
40	BERRY PETROLEUM CO	15	40	TOM BROWN INC	207
41	GRUY PETROLEUM MANAGEMENT CO	14	41	KAISER - FRANCIS OIL CO.	206
42	ENERGEN RESOURCES CORP	13	42	SPINNAKER EXPLORATION CO LLC	206
43	KINDER MORGAN CO2 CO LP	13	43	AGIP PETROLEUM CO INC	200
44	BASS ENTERPRISES PRODUCTION CO	12	44	HILCORP ENERGY CO	195
45	UNITED OIL & MINERALS LP	12	45	HUBER J M CORP	193
46	CHESAPEAKE ENERGY CORP	12	46	HUNT PETROLEUM CORP	188
47	FOREST OIL CORP	11	47	MERIT ENERGY CO	186
48	YATES PETROLEUM CORP	11	48	DENBURY RESOURCES INC	186
49	CONTINENTAL RESOURCES INC	11	49	FOREST OIL CORP	184
50	NEXEN ENERGY INC	10	50	PATINA OIL & GAS CORP	164
Top 50 Volume Subtotal		***4,429***	***Top 50 Volume Subtotal***		***41,321***
Top 50 Percentage of U.S. Total		***78%***	***Top 50 Percentage of U.S. Total***		***74%***

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

Appendix C

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."{44}

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, 1992 – 2002

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)										
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
2002	66.1	114.5	180.6	3.8	78.2	47.7	24.5	150.4	298.1	3,605.4	36.8
	Dry Natural Gas (billion cubic meters)										
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
2002	105.54	26.53	132.07	10.76	418.21	37.72	47.97	503.90	548.02	5,293.72	98.71
	Natural Gas Liquids (million cubic meters)										
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
2002	9.9	4.9	14.8	8.6	97.3	7.6	12.4	117.3	140.5	1,270.9	0.1

[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*, 1992–2002 annual reports, DOE/EIA–0216.{16–25}

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.{1-25}

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
2002	51	NA	[c]3,884	57

[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 Bcf in 2000; 2,454 Bcf in 2001; 2,290 Bcf in 2002.

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
2002	4,678	NA	8,468	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
2002	49	NA	1,650	4

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
2002	[d]3,633	NA	[d]2,591	[d]95

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

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
2002	404	NA	190	17

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
2002	330	NA	207	10

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
2002	2,702	NA	2,102	68

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
2002	762	NA	607	8

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
2002	197	NA	92	0

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
2002	565	NA	515	8

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
2002	214	NA	13,888	396
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
2002	73	NA	91	14

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
2002	107	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
2002	15	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
2002	237	NA	4,983	263

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
2002	27	NA	1,907	66

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
2002	[f]501	NA	[f]8,960	[f]323

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

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
2002	75	NA	4,245	49

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
2002	335	NA	4,224	226

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
2002	[f]91	NA	[f]491	[f]48

[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
2002	61	NA	3,254	47

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
2002	179	NA	744	8

Montana

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
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
2002	288	NA	906	6

Nebraska

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
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
2002	18	NA	NA	NA

New Mexico - Total

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
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
2002	710	NA	17,320	838

New Mexico - East

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
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
2002	699	NA	3,632	290

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
New Mexico - West				
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
2002	11	NA	13,688	548
New York				
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
2002	NA	NA	315	NA

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
North Dakota				
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
2002	342	NA	471	47
Ohio				
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
2002	67	NA	1,117	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
2002	598	NA	14,886	695

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
2002	12	NA	2,216	NA

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
2002	[g]5,015	NA	[g]44,297	[g]2,711

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

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
2002	50	NA	1,045	39

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
2002	54	NA	1,782	71
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
2002	218	NA	3,584	241

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
2002	28	NA	9,469	370
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
2002	24	NA	4,602	50

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
2002	198	NA	6,256	277
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
2002	82	NA	260	25

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
2002	177	NA	3,702	351
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
2002	1,913	NA	5,361	510

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
2002	2,093	NA	1,084	181

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
2002	113	NA	2,877	238

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
2002	59	NA	3,838	353

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
2002	362	NA	6,626	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
2002	6	NA	437	5

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)
2002	241	NA	4,135	(h)

[h]Included with Wyoming.

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
2002	NA	NA	1,673	NA

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
2002	13	NA	3,360	99

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
2002	524	NA	20,527	[i]938

[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
2002	565	NA	515	8

Note: Data not tabulated for years 1977-1984.

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
2002	5,009	NA	25,204	973

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

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
2002	4,088	NA	[k]18,500	[k]783

[f]Includes State and Federal offshore Alabama.
[k]Includes Federal 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 (Texas)				
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
2002	356	NA	6,189	182

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
Miscellaneous				
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
2002	15	NA	99	9

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

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Lower 48 States				
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
2002	17,999	NA	178,478	7,589

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
U.S. Total				
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
2002	22,677	NA	186,946	7,994

Table D1. U.S. Proved Reserves of Crude Oil, 1976–2002
(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
2002	416	720	1,136	24	492	300	154	946	1,875	22,677	231

[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 2002 annual reports, DOE/EIA-0216.{1-25}

Table D2. U.S. Lower 48 Proved Reserves of Crude Oil, 1976–2002
(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
2002	414	567	981	24	467	300	146	913	1,514	17,999	404

[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 2002 annual reports, DOE/EIA-0216.{1-25}

Table D3. U.S. Proved Reserves of Dry Natural Gas, 1976–2002
(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
2002	3,727	937	4,664	380	14,769	1,332	1,694	17,795	19,353	186,946	3,486

[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 2002 annual reports, DOE/EIA-0216.{1-25}

Table D4. U.S. Lower 48 Proved Reserves of Dry Natural Gas, 1976–2002
(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
2002	3,692	914	4,606	380	14,707	1,332	1,686	17,725	18,893	178,478	3,818

[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 2002 annual reports, DOE/EIA-0216.{1-25}

Table D5. U.S. Proved Reserves of Wet Natural Gas, After Lease Separation, 1978–2002
(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
2002	4,004	1,038	5,042	428	15,468	1,374	1,752	18,594	20,248	195,561	3,816

[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 2002 annual reports, DOE/EIA-0216.{3-25}

Table D6. U.S. Lower 48 Proved Reserves of Wet Natural Gas, After Lease Separation, 1978–2002
(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
2002	4,004	1,038	5,042	428	15,468	1,374	1,752	18,594	20,248	19,5561	3,816

[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 2002 annual reports, DOE/EIA-0216.{3-25}

Table D7. U.S. Proved Reserves of Natural Gas Liquids, 1978–2002
(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
2002	62	31	93	54	612	48	78	738	884	7,994	1

[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 2002 annual reports, DOE/EIA-0216.{3-25}

Table D8. U.S. Lower 48 Proved Reserves of Natural Gas Liquids, 1978–2002
(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
2002	42	31	73	54	612	48	78	738	864	7,589	1

[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 2002 annual reports, DOE/EIA-0216.{3-25}

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2002

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
2002	451	395	57	288	163	63.9
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
2002	4,444	4,088	356	3,372	1,072	75.9
	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
2002	4,544	3,541	1,003	1,365	3,180	30.0
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
2002	25,347	19,113	6,234	10,540	14,807	41.6

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2002 (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
2002	184	149	35	66	118	36.0
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
2002	965	783	182	407	558	42.2
	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
2002	4,423	3,427	996	1,328	3,095	30.0
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
2002	24,689	18,500	6,189	10,266	14,423	41.6

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2002 (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
2002	90	60	30	38	52	42.2
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
2002	454	300	154	195	259	43.0

[a]Includes Federal Offshore Alabama.
Source: Based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves.”

Table D10. 2002 Reported Proved Nonproducing Reserves of 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	546	0	570	29	599
Lower 48 States	4,725	489	42,831	6,544	49,375
Alabama	1	4	189	2	191
Arkansas	5	0	254	10	264
California	336	0	237	177	414
Coastal Region Onshore	61	0	0	49	49
Los Angeles Basin Onshore	122	0	0	94	94
San Joaquin Basin Onshore	111	0	237	13	250
State Offshore	42	0	0	21	21
Colorado	56	24	3,295	486	3,781
Florida	7	0	0	0	0
Kansas	23	0	109	3	112
Kentucky	4	0	117	0	117
Louisiana	185	47	3,352	309	3,661
North	16	2	1,541	71	1,612
South Onshore	139	40	1,651	212	1,863
State Offshore	30	5	160	26	186
Michigan	4	2	512	15	527
Mississippi	42	0	98	13	111
Montana	65	0	92	25	117
New Mexico	146	9	3,472	132	3,604
East	146	2	645	132	777
West	0	7	2,827	0	2,827
New York	0	0	29	0	29
North Dakota	62	3	42	21	63
Ohio	8	0	107	15	122
Oklahoma	105	26	3,085	121	3,206
Pennsylvania	1	0	400	66	466
Texas	753	83	11,441	1,237	12,678
RRC District 1	11	2	332	8	340
RRC District 2 Onshore	14	1	684	15	699
RRC District 3 Onshore	41	20	895	126	1,021
RRC District 4 Onshore	5	28	3,398	50	3,448
RRC District 5	4	1	1,792	28	1,820
RRC District 6	14	13	1,127	5	1,132
RRC District 7B	2	0	1	0	1
RRC District 7C	36	1	598	136	734
RRC District 8	258	5	532	471	1,003
RRC District 8A	345	0	31	336	367
RRC District 9	16	4	1,464	18	1,482
RRC District 10	7	8	538	41	579
State Offshore	0	0	49	3	52
Utah	91	2	1,002	200	1,202
Virginia	0	0	748	0	748
West Virginia	0	0	353	0	353
Wyoming	69	32	5,185	31	5,216
Federal Offshore[b]	2,746	257	8,698	3,680	12,378
Pacific (California)	62	8	49	117	166
Gulf of Mexico (Louisiana)[b]	2,530	157	5,935	3,181	9,116
Gulf of Mexico (Texas)	154	92	2,714	382	3,096
Miscellaneous[c]	16	0	14	1	15
U.S. Total	5,271	489	43,401	6,573	49,974

[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," 2002.

Appendix E

Summary of Data Collection Operations

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 2002 by crude oil or natural gas well operators who were active as of December 31, 2002. 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 1995 and 2002, and depicts the number of active operators, with 1995 showing the largest in the series. The 2002 sampling frame consisted of 176 Category I, 480 Category II, 388 Category III Certainty, and 21,779 Category III Noncertainty operators, for a total of 22,823 active operators. The survey sample consisted of 1,044 operators selected with certainty that included all of the Category I and II Certainty operators, the 388 smaller operators that were selected with certainty because of their size in relation to the area or areas in which they operated, and 533 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 2002 survey is summarized in **Table E2**. EIA makes a considerable effort to gain responses from all operators. About 3.8 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 60 nonoperators, 0 had successor operators that had taken over the production of the nonoperator. These successor operators were subsequently sampled. The overall response rate for the 2002 survey was 99.8 percent. For the 3 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, 1995-2002

Operator Category	Number of Operators							
	1995	1996	1997	1998	1999	2000	2001	2002
Certainty								
Category I	161	176	180	178	177	175	179	176
Category II	476	486	461	420	399	436	485	480
Category III	1,596	3	1,194	862	648	854	559	388
Sampled	2,233	665	1,835	1,460	1,224	1,465	1,223	1,044
Percent Sampled	100	100	100	100	100	100	100	100
Noncertainty								
Sampled	1,632	0	1,645	1,459	1,305	1,311	644	533
Percent Sampled	8	0	8	7	6	6	3	3
Total								
Active Operators	22,766	23,410	22,678	23,620	22,089	22,102	22,519	22,823
Not Sampled	18,901	22,745	19,198	20,701	19,560	19,326	20,652	21,246
Sampled	3,865	665	3,480	2,919	R2,529	2,776	1,867	1,577
Percent Sampled	17	3	15	12	R11	13	8	7

R=Revised data.
Source: Energy Information Administration, Office of Oil and Gas.

Table E2. Form EIA-23 Survey Response Statistics, 2002

Operator Category	Original Sample Selected	Successor[a] Operators	Net[b] Category Changes	Non-[c] operators	Adjusted[d] Sample	Responding Operators Number	Responding Operators Percent	Nonresponding Operators Number	Nonresponding Operators Percent
Certainty									
Category I	176	0	+1	-13	164	164	100.0	0	0.0
Category II	480	0	-35	-19	426	426	100.0	0	0.0
Category III	388	0	+34	-13	409	408	99.8	[e]1	0.2
Subtotal	1,044	0	0	-45	999	998	99.9	[e]1	0.1
Noncertainty	533	0	0	-15	518	516	99.6	[e]2	0.4
Total	1,577	0	0	-60	1,517	1,514	99.8	[e]3	0.2

[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 3 operators (1 Category III operators and 2 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" 2002.

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 2002*, in January of 2003, was the 21st annual report and reflected data collected through November 2002. 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 2002, Form EIA-23 National estimates of production were 2,082 million barrels for crude oil and lease condensate or 15 million barrels (less than 1 percent) lower than that reported in the *Petroleum Supply Annual 2002* for crude oil and lease condensate (2,097 million barrels). Form EIA-23 National estimates of production for dry natural gas were 19,353 billion cubic feet, 306 billion cubic feet (less than 2 percent) higher than the *Natural Gas Monthly, November 2003* for 2002 dry natural gas production (19,047 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 2002 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, 2002. Of these, 22,823 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

Table E3. Summary of the 2002 Operator Frame Activity, Form EIA-23

Total 2001 Operator Frame	68,616
Operators	22,519
Nonoperators	46,097
Changes to 2001 Operator Status	616
From Nonoperator to Operator[a]	497
From Operator to Nonoperator	119
No Changes to 2001 Operator Status	68,000
Operators	22,326
Nonoperators	45,674
Additions to 2001 Operator Frame	0
Operator	0
Nonoperator	0
Total 2002 Operator Frame	**68,616**
Operators	22,823
Nonoperators	45,793

[a]Includes operator frame activity through December 14, 2002.

[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.

operators (including both definite and probable 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.

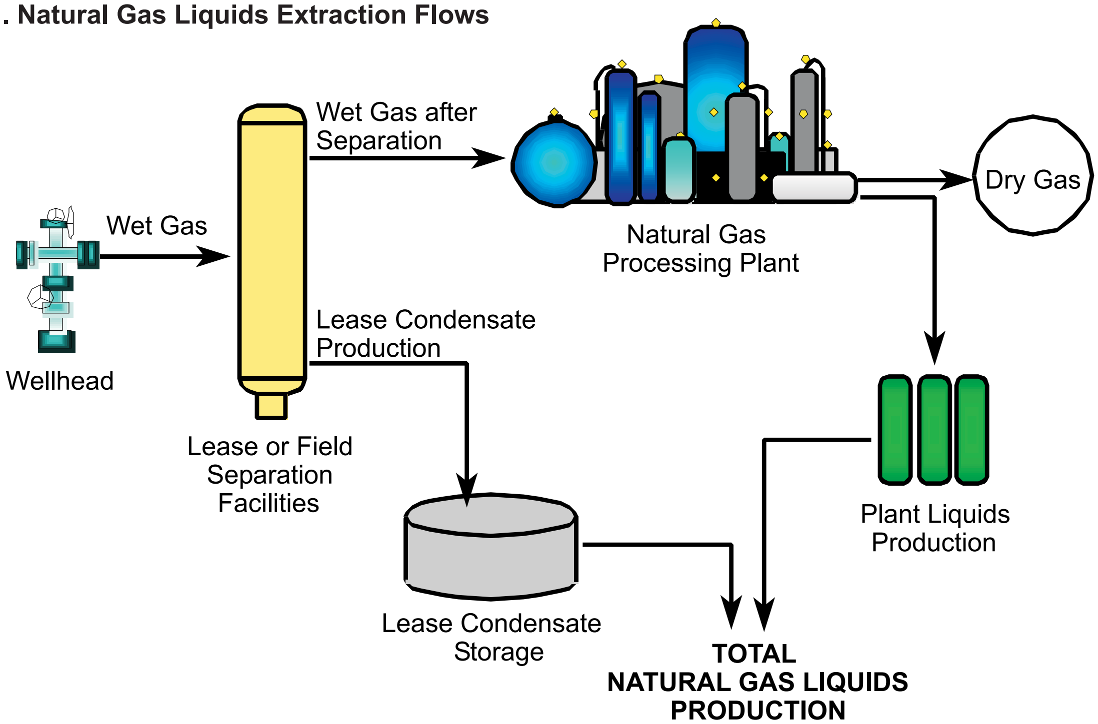
The EIA recognized that its estimates of proved reserves of natural gas liquids (NGL) had to reflect not only those volumes extractable in the future under current economic and operating conditions at the lease or field (lease condensate), but also volumes (plant liquids) extractable downstream at existing 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, 2003. In addition, plant operators whose plants were shut down or dismantled during 2002 were required to complete forms for the portion of 2002 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 207 operators of 514 plants were sent forms. This number included 6 new plants, 6 reactivated plants, and 4 successor plants identified after the initial 2002 survey mailing. A total of 17 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 15th 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, 2002

Plant Location	Volume of Natural Gas Delivered to Processing Plants				
	State Production	Federal Production	Out of State Production	Natural Gas Processed	Total Liquids Extracted
	(million cubic feet)				(thousand barrels)
Alaska	2,997,824		0	2,997,824	29,102
Alabama	44,507	244,274	1,383	290,164	10,431
Arkansas	12,635		0	12,635	287
California	248,274	1,397		249,671	9,933
Colorado	534,295		0	534,295	22,856
Florida	3,365		2,698	6,063	833
Kansas	442,681		129,363	572,044	27,439
Kentucky	41,078		0	41,078	1,290
Louisiana	1,187,766	2,583,235		3,771,001	108,359
Michigan	47,292		0	47,292	3,103
Mississippi	2,525	260,931		263,456	12,615
Montana	6,030		0	6,030	433
North Dakota	59,894		0	59,894	4,610
New Mexico	994,953		0	994,953	75,862
Oklahoma	852,691		1,529	854,220	57,163
Texas	3,815,008	23,925	22,181	3,861,114	254,960
Utah	133,245		3,598	136,843	2,519
West Virginia	95,942		31,102	127,044	7,114
Wyoming	1,045,183		38,677	1,083,860	52,220
Miscellanous[a]	11,281		149	11,430	517
Total	**12,576,469**	**3,113,762**	**230,680**	**15,920,911**	**681,646**

[a]Includes Illinois, Ohio, and Pennsylvania.
Source: Form EIA-64A, “Annual Report of the Origin of Natural Gas Liquids Production,” 2002

when found, were reconciled in both sources. For 2002, the Form EIA-64A National estimates were less than 1 percent (15 million barrels) lower than the *Petroleum Supply Annual 2002* volume for natural gas plant liquids production.

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

Frame as of 2000 survey mailing	525
Additions	121
Deletions	–131
Frame as of 2001 survey mailing	515

Note: Includes operator frame activity through January 31, 2003.
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 2002 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, 2003.

Appendix F

Statistical Considerations

Appendix F

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 2002 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 2001 (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 2001 (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 2001 for crude oil and for natural gas.

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 2001.
- **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 2001.
- **Category III -** *Small Operators:* Operators who produced less than the Category II operators in 2001, 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.
    - All other operators with production or reserves in a State/subdivision that

Table F1. 2002 EIA–23 Initial Number of Operators in Survey Sample

State and Subdivision	Number of Certainty Operators	Noncertainty Sample: Number of Single State Operators	Noncertainty Sample: Number of Multi–State Operators
Alabama Onshore	47	2	6
Alaska	7	0	0
Arkansas	90	7	6
California-Coastal Region Onshore	18	0	1
California-Los Angeles Basin Onshore	25	3	0
California-San Joaquin Basin Onshore	49	4	1
Colorado	124	20	10
Florida-Onshore	2	0	0
Illinois	32	11	14
Indiana	31	7	9
Kansas	168	70	24
Kentucky	25	9	13
Louisiana-North	165	9	7
Louisiana-South Onshore	190	4	7
Michigan	42	5	3
Mississippi-Onshore	91	1	2
Montana	63	1	4
Nebraska	33	2	11
New Mexico-East	161	1	6
New Mexico-West	58	1	0
New York	19	4	6
North Dakota	64	1	1
Ohio	31	50	4
Oklahoma	302	124	34
Pennsylvania	54	27	3
Texas-RRC District 1	138	8	12
Texas-RRC District 2 Onshore	154	2	7
Texas-RRC District 3 Onshore	236	7	11
Texas-RRC District 4 Onshore	179	5	8
Texas-RRC District 5	87	3	6
Texas-RRC District 6	170	4	9
Texas-RRC District 7B	225	23	15
Texas-RRC District 7C	169	2	10
Texas-RRC District 8	211	3	11
Texas-RRC District 8A	191	2	12
Texas-RRC District 9	170	8	11
Texas-RRC District 10	156	9	3
Utah	53	2	0
Virginia	12	0	0
West Virginia	60	25	7
Wyoming	137	1	4
Offshore Areas	273	0	0
Other States[a]	18	3	1
Total	**[b]1,045**	**470**	**[b]162**

[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 7 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.

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.
  - Only the operators in the following 10 states were included in the noncertainty sample: Illinois, Indiana, Kentucky, Maryland, New York, Pennsylvania, Tennessee, Virginia, and West Virginia.

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.

Sampling rates are shown in **Table F1**.

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 2002 survey was 0.1 percent and for the Noncertainty operators 0.4 percent. An imputation was made for the production and reserves for these 3 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.

There were 514 operators sampled proportional to size (Table E1) that responded as Category III Noncertainty operators. Only 193 of these, located in 10 states, had their data weighted and used to estimate the production and reserves of the operators that were not sampled in those states. The remaining 321 Noncertainty sampled operators were treated as certainty sampled operators with a weight of 1 and were used in states where the bulk of the operator production data was obtained from Auxillary State Data.

The data reported by operator category on Form EIA-23 and data imputed and estimated for report year 2002 are summarized in **Tables F2, F3, F4, and F5**. The reported data in **Table F2** shows that those responding operators accounted for 99.7 percent of the published production for wet natural gas and 95.5 percent of the reserves shown in **Table 9**. Data shown in **Table F3** indicate that those responding operators accounted for 99.7 percent of the nonassociated natural gas production and 95.6 percent of the reserves published in **Table 10**. The reported data shown in **Table F4** indicate that those responding operators accounted for 99.6 percent of published crude oil production and 94.9

Table F2. Summary of Form EIA-23 Reported, Imputed, and Estimated Natural Gas Data for 2002, Wet after Lease Separation (Million Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

Level of Reporting	Operator Category I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
Reported						
Number of Operators	164	426	731[a]	193[a]	11,539	13,053
Proved Reserves as of 12/31/01	172,712,687	11,960,730	219,620	-	-	184,893,037
(+) Revision Increases	18,306,878	1,443,815	53,532	-	-	19,804,225
(-) Revision Decreases	17,336,477	1,397,777	42,956	-	-	18,777,210
(-) Sales	9,002,529	1,030,453	72,771	-	-	10,105,753
(+) Acquisitions	9,521,240	1,040,754	6,156	-	-	10,568,150
(+) Extensions	13,302,479	1,715,041	7,359	-	-	15,024,879
(+) New Field Discoveries	1,289,495	70,945	0	-	-	1,360,440
(+) New Reservoirs in Old Fields	1,290,049	395,853	105	-	-	1,686,007
(-) Production With Proved Reserves Reported	17,272,536	1,417,427	112,537	6,318	-	18,808,818
(-) Production Without Proved Reserves Reported	14,580	523,407	190,429	16,278	643,447	1,388,141
Proved Reserves as of 12/31/02	172,819,334	12,810,212	1,080,294	91,659	-	186,801,499
Imputed and Estimated						
Number of Operators	0	0	0	9,770	0	9,770
Proved Reserves as of 12/31/01	0	0	-	-	-	0
(+) Revision Increases	10,121	523,583	349,103	81,204	471,886	1,435,898
(-) Revision Decreases	14,090	514,649	326,066	62,118	508,101	1,425,024
(-) Sales	6,104	171,757	121,178	5,101	254,987	559,128
(+) Acquisitions	7,247	203,950	106,835	5,475	201,020	524,527
(+) Extensions	6,068	199,713	94,141	20,889	122,722	443,533
(+) New Field Discoveries	287	6,065	3,070	1,205	3,044	13,671
(+) New Reservoirs in Old Fields	1,479	24,260	12,179	1,503	26,693	66,114
(-) Production With Proved Reserves Reported	0	0	0	16,323	-	16,323
(-) Production Without Proved Reserves Reported	0	0	0	31,899	0	31,899
Proved Reserves as of 12/31/02	83,824	3,756,375	1,377,404	563,041	2,978,940	8,759,584
Total						
Number of Operators	164	426	731	9,963	11,539	22,823
Proved Reserves as of 12/31/01	172,712,687	11,960,730	219,620	-	-	184,893,037
(+) Revision Increases	18,316,999	1,967,398	402,635	81,204	471,886	21,240,123
(-) Revision Decreases	17,350,567	1,912,426	369,022	62,118	508,101	20,202,234
(-) Sales	9,008,633	1,202,210	193,949	5,101	254,987	10,664,881
(+) Acquisitions	9,528,487	1,244,704	112,991	5,475	201,020	11,092,677
(+) Extensions	13,308,547	1,914,754	101,500	20,889	122,722	15,468,412
(+) New Field Discoveries	1,289,782	77,010	3,070	1,205	3,044	1,374,111
(+) New Reservoirs in Old Fields	1,291,528	420,113	12,284	1,503	26,693	1,752,121
(-) Production With Proved Reserves Reported	17,272,536	1,417,427	112,537	22,641	-	18,825,141
(-) Production Without Proved Reserves Reported	14,580	523,407	190,429	48,177	643,447	1,420,040
Proved Reserves as of 12/31/02	172,903,158	16,566,587	2,457,698	654,700	2,978,940	195,561,083
Summary						
Total Number of Operators	**164**	**426**	**731**	**9,963**	**11,539**	**22,823**
Percent of Total	**0.7%**	**1.9%**	**3.2%**	**43.7%**	**50.6%**	**100.0%**
Total Production in 2002	**17,287,116**	**1,940,834**	**302,966**	**70,818**	**643,447**	**20,245,181**
Percent of Total	**85.4%**	**9.6%**	**1.5%**	**0.3%**	**3.2%**	**100.0%**
Total Proved Reserves 12/31/02	**172,903,158**	**16,566,587**	**2,457,298**	**654,700**	**2,978,940**	**195,561,083**
Percent of Total	**88.4%**	**8.5%**	**1.2%**	**0.3%**	**1.5%**	**100.0%**

[a]There were 514 noncertainty responses, 193 were used with their sample weights and 324 were used like Certainty III operators.

– = 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," 2002.

Table F3. Summary of Form EIA-23 Reported, Imputed, and Estimated Nonassociated Natural Gas Data for 2002, Wet after Lease Separation (Million Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

	Operator Category					
Level of Reporting	I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
Reported						
Number of Operators	164	426	731[a]	193[a]	11,539	13,053
Proved Reserves as of 12/31/01	145,792,834	10,430,368	161,786	-	-	156,384,988
(+) Revision Increases	15,200,773	1,206,879	50,413	-	-	16,458,065
(-) Revision Decreases	15,236,917	1,139,366	256	-	-	16,376,539
(-) Sales	8,221,213	952,127	71,259	-	-	9,244,599
(+) Acquisitions	8,839,777	931,425	5,747	-	-	9,776,949
(+) Extensions	12,666,431	1,566,313	6,696	-	-	14,239,440
(+) New Field Discoveries	1,067,701	64,536	0	-	-	1,132,237
(+) New Reservoirs in Old Fields	978,536	380,937	0	-	-	1,359,473
(-) Production With Proved Reserves Reported	14,723,152	1,251,908	95,645	6,042	-	16,076,747
(-) Production Without Proved Reserves Reported	14,455	454,347	162,273	16,023	491,983	1,139,081
Proved Reserves as of 12/31/02	146,372,818	11,262,703	937,942	88,485	-	158,661,948
Imputed and Estimated						
Number of Operators	0	0	0	9,770	0	9,770
Proved Reserves as of 12/31/01	0	0	-	-	-	0
(+) Revision Increases	10,081	457,306	299,439	73,165	355,243	1,195,235
(-) Revision Decreases	13,983	452,362	277,434	54,697	390,236	1,188,712
(-) Sales	4,565	113,946	80,650	3,562	153,977	356,701
(+) Acquisitions	6,751	165,267	85,381	4,203	146,444	408,046
(+) Extensions	6,012	176,024	80,434	18,908	94,938	376,315
(+) New Field Discoveries	298	5,818	2,950	1,211	2,708	12,985
(+) New Reservoirs in Old Fields	1,555	23,458	11,459	1,557	23,609	61,639
(-) Production With Proved Reserves Reported	0	0	0	14,030	-	14,030
(-) Production Without Proved Reserves Reported	0	0	0	29,465	0	29,465
Proved Reserves as of 12/31/02	83,535	3,295,307	1,188,599	514,273	2,277,575	7,359,289
Total						
Number of Operators	164	426	731	9,963	11,539	22,823
Proved Reserves as of 12/31/01	145,792,834	10,430,368	161,786	-	-	156,384,988
(+) Revision Increases	15,210,854	1,664,185	349,852	73,165	355,243	17,653,300
(-) Revision Decreases	15,250,900	1,591,728	277,690	54,697	390,236	17,565,251
(-) Sales	8,225,778	1,066,073	151,909	3,562	153,977	9,601,300
(+) Acquisitions	8,846,528	1,096,692	91,128	4,203	146,444	10,184,995
(+) Extensions	12,672,443	1,742,337	87,130	18,908	94,938	14,615,755
(+) New Field Discoveries	1,067,999	70,354	2,950	1,211	2,708	1,145,222
(+) New Reservoirs in Old Fields	980,091	404,395	11,459	1,557	23,609	1,421,112
(-) Production With Proved Reserves Reported	14,723,152	1,251,908	95,645	20,072	-	16,090,777
(-) Production Without Proved Reserves Reported	14,455	454,347	162,273	45,488	491,983	1,168,5464
Proved Reserves as of 12/31/02	146,456,353	14,558,010	2,126,641	602,758	2,277,575	166,021,237
Summary						
Total Number of Operators	**164**	**426**	**731**	**9,963**	**11,539**	**22,823**
Percent of Total	**0.7%**	**1.9%**	**3.2%**	**43.7%**	**50.6%**	**100.0%**
Total Production in 2002	**14,737,607**	**1,706,255**	**257,918**	**65,560**	**491,983**	**17,259,323**
Percent of Total	**85.4%**	**9.9%**	**1.5%**	**0.4%**	**2.9%**	**100.0%**
Total Proved Reserves 12/31/02	**146,456,353**	**14,558,010**	**2,126,541**	**602,758**	**2,277,575**	**166,021,237**
Percent of Total	**88.2%**	**8.8%**	**1.3%**	**0.4%**	**1.4%**	**100.0%**

[a]There were 514 noncertainty responses, 193 were used with their sample weights and 324 were used like Certainty III operators.
– = 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," 2002.

Table F4. Summary of Form EIA-23 Reported, Imputed, and Estimated Crude Oil Data for 2002,
(Thousand Barrels of 42 U.S. Gallons)

Level of Reporting	Operator Category I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
Reported						
Number of Operators	164	426	731[a]	193[a]	11,539	13,053
Proved Reserves as of 12/31/01	20,330,757	979,763	20,841	-		21,331,361
(+) Revision Increases	1,561,926	161,251	4,237	-		1,727,414
(-) Revision Decreases	903,968	100,503	1,602	-		1,006,073
(-) Sales	632,808	40,957	3,059	-		676,824
(+) Acquisitions	563,872	151,072	159	-		715,103
(+) Extensions	407,816	48,049	1,466	-		457,331
(+) New Field Discoveries	294,678	5,004	0	-		299,682
(+) New Reservoirs in Old Fields	140,296	9,976	240	-		150,512
(-) Production With Proved Reserves Reported	1,571,623	97,555	20,927	856	-	1,690,961
(-) Production Without Proved Reserves Reported	78	30,546	43,837	2,552	98,898	175,911
Proved Reserves as of 12/31/02	20,190,946	1,117,537	197,280	8,047	-	21,513,810
Imputed and Estimated						
Number of Operators	0	0	0	9,770	0	9,770
Proved Reserves as of 12/31/01	0	0	-	-	-	0
(+) Revision Increases	32	31,107	73,855	6,421	86,472	197,886
(-) Revision Decreases	35	25,990	65,258	1,659	106,430	199,371
(-) Sales	7	13,415	41,067	824	72,184	127,497
(+) Acquisitions	11	17,762	46,003	1,631	47,517	112,925
(+) Extensions	9	6,848	12,776	349	14,686	34,668
(+) New Field Discoveries	0	92	145	4	78	319
(+) New Reservoirs in Old Fields	3	814	1,076	45	1,772	3,710
(-) Production With Proved Reserves Reported	0	0	0	855	-	855
(-) Production Without Proved Reserves Reported	0	0	0	3,648	0	3,648
Proved Reserves as of 12/31/02	241	255,225	326,907	35,755	546,635	1,164,763
Total						
Number of Operators	164	426	731	9,963	11,539	22,823
Proved Reserves as of 12/31/01	20,330,757	979,763	20,841	-	-	21,331,361
(+) Revision Increases	1,561,958	192,358	78,092	6,421	86,472	1,925,300
(-) Revision Decreases	904,003	126,493	66,860	1,659	106,430	1,205,444
(-) Sales	632,815	54,372	44,126	824	72,184	804,321
(+) Acquisitions	563,883	168,834	46,162	1,631	47,517	828,028
(+) Extensions	407,825	54,897	14,242	349	14,686	491,999
(+) New Field Discoveries	294,678	5,096	145	4	78	300,001
(+) New Reservoirs in Old Fields	140,299	10,790	1,316	45	1,772	154,222
(-) Production With Proved Reserves Reported	1,571,623	97,555	20,927	1,711	-	1,691,816
(-) Production Without Proved Reserves Reported	78	30,546	43,837	6,200	98,898	179,559
Proved Reserves as of 12/31/02	20,191,187	1,372,762	524,187	43,802	546,635	22,678,573
Summary						
Total Number of Operators	**164**	**426**	**731**	**9,963**	**11,539**	**22,823**
Percent of Total	**0.7%**	**1.9%**	**3.2%**	**43.7%**	**50.6%**	**100.0%**
Total Production in 2002	**1,571,701**	**128,101**	**64,764**	**7,911**	**98,898**	**1,871,375**
Percent of Total	**84.0%**	**6.8%**	**3.5%**	**0.4%**	**5.3%**	**100.0%**
Total Proved Reserves 12/31/02	**20,191,187**	**1,372,762**	**524,187**	**43,802**	**546,635**	**22,678,573**
Percent of Total	**89.0%**	**6.1%**	**2.3%**	**0.2%**	**2.4%**	**100.0%**

[a]There were 514 noncertainty responses, 193 were used with their sample weights and 324 were used like Certainty III operators.
– = 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," 2002.

Table F5. Summary of Form EIA-23 Reported, Imputed, and Estimated Lease Condensate Data for 2002,
(Thousand Barrels of 42 U.S. Gallons)

Level of Reporting	I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
			Reported			
Number of Operators	164	426	731[a]	193[a]	11,539	13,053
Proved Reserves as of 12/31/01	1,260,452	91,957	369	-	-	1,352,778
(+) Revision Increases	232,807	15,422	1,240	-	-	249,469
(-) Revision Decreases	269,431	19,164	25	-	-	288,620
(-) Sales	77,854	14,339	911	-	-	93,104
(+) Acquisitions	108,381	8,223	2	-	-	116,606
(+) Extensions	96,181	9,660	0	-	-	105,841
(+) New Field Discoveries	17,578	282	0	-	-	17,860
(+) New Reservoirs in Old Fields	27,261	4,932	0	-	-	32,193
(-) Production With Proved Reserves Reported	181,389	14,968	355	6	-	196,718
(-) Production Without Proved Reserves Reported	354	4,594	863	9	4,692	10,512
Proved Reserves as of 12/31/02	1,213,977	82,079	2,107	56	-	1,298,219
			Imputed and Estimated			
Number of Operators	0	0	0	9,770	0	9,770
Proved Reserves as of 12/31/01	0	0	-	-	-	0
(+) Revision Increases	323	5,424	1,386	33	5,067	12,232
(-) Revision Decreases	400	6,216	1,604	13	5,448	13,682
(-) Sales	117	1,688	538	9	2,499	4,852
(+) Acquisitions	112	2,636	695	11	2,384	5,838
(+) Extensions	103	1,592	352	6	1,206	3,259
(+) New Field Discoveries	10	88	8	0	33	139
(+) New Reservoirs in Old Fields	45	521	110	3	451	1,129
(-) Production With Proved Reserves Reported	0	0	0	2	-	2
(-) Production Without Proved Reserves Reported	0	0	0	7	0	7
Proved Reserves as of 12/31/02	1,547	22,049	3,810	48	18,292	45,746
			Total			
Number of Operators	164	426	731	9,963	11,539	22,823
Proved Reserves as of 12/31/01	1,260,452	91,957	369	-	-	1,352,778
(+) Revision Increases	233,130	20,846	2,626	33	5,067	261,701
(-) Revision Decreases	269,831	25,380	1,629	13	5,448	302,302
(-) Sales	77,971	16,027	1,449	9	2,499	97,956
(+) Acquisitions	108,493	10,859	697	11	2,384	122,444
(+) Extensions	96,284	11,252	352	6	1,206	109,100
(+) New Field Discoveries	17,588	370	8	0	33	17,999
(+) New Reservoirs in Old Fields	27,306	5,453	110	3	451	33,322
(-) Production With Proved Reserves Reported	181,389	14,968	355	8	-	196,720
(-) Production Without Proved Reserves Reported	354	4,594	863	16	4,692	10,519
Proved Reserves as of 12/31/02	1,215,524	104,128	5,917	104	18,292	1,343,965
			Summary			
Total Number of Operators	**164**	**426**	**731**	**9,963**	**11,539**	**22,823**
Percent of Total	**0.7%**	**1.9%**	**3.2%**	**43.7%**	**50.6%**	**100.0%**
Total Production in 2002	**181,743**	**19,562**	**24**	**1,218**	**4,692**	**207,239**
Percent of Total	**87.7%**	**9.4%**	**0.0%**	**0.6%**	**2.3%**	**100.0%**
Total Proved Reserves 12/31/02	**1,215,524**	**104,128**	**104**	**5,917**	**18,292**	**1,343,965**
Percent of Total	**90.4%**	**7.7%**	**0.0%**	**0.4%**	**1.4%**	**100.0%**

[a]There were 514 noncertainty responses, 193 were used with their sample weights and 324 were used like Certainty III operators.
– = 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,” 2002.

percent of the reserves shown in **Table 6**. Additionally, **Table F5** indicates that those responding operators accounted for 100 percent of the published production and 96.4 percent of the published proved reserves for lease condensate shown in **Table 15**.

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 2002 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 2002, 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

Table F6. Statistical Parameters of Reserves Estimation Equation by Region for 2002

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	8	10	0	-0.1331	0.3956	-0.1170	0.3465	-0.0816	0.3921
2	Pacific Coast States	55	63	3	-0.1331	0.3426	-0.1170	0.4123	-0.0816	0.6527
2A	Federal Offshore Pacific	6	6	0	-0.1331	0.2644	-0.1170	0.2979	-0.0816	0.3921
3	Western Rocky Mountains	93	142	61	-0.1331	0.3169	-0.1170	0.2873	-0.0816	0.2201
4	Northern Rocky Mountains	165	151	46	-0.1331	0.3169	-0.1170	0.2873	-0.0816	0.2201
5	West Texas and East New Mexico	534	548	181	-0.1331	0.3127	-0.1170	0.3456	-0.0816	0.3853
6	Western Gulf Basin	546	855	570	-0.1331	0.4273	-0.1170	0.4223	-0.0816	0.3541
6A	Gulf of Mexico	71	131	106	-0.1331	0.6948	-0.1170	0.6550	-0.0816	0.5103
7	Mid-Continent	340	422	157	-0.1331	0.3333	-0.1170	0.3201	-0.0816	0.2234
8 + 9	Michigan Basin and Eastern Interior	94	65	14	-0.1331	0.2933	-0.1170	0.1863	-0.0816	0.2595
10 + 11	Appalachians	29	79	8	-0.1331	0.2933	-0.1170	0.1863	-0.0816	0.2595
	United States	1941	2472	1146	-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, 2002".

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.

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:

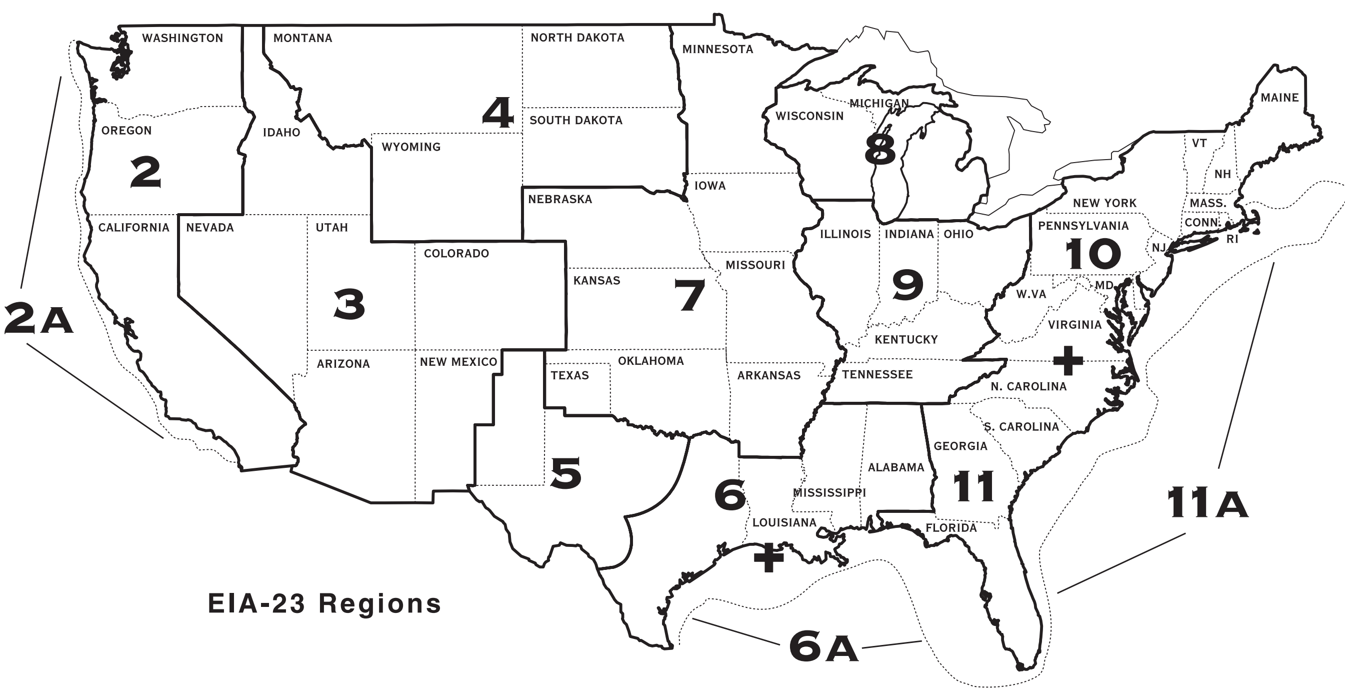
- applying an algebraic allocation scheme which preserved the relative relationships between these items within each State / subdivision, as reported by Category I and Category II operators, or
- applying a modified version of the R / P function to each separate component of change, calculated with its 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 2002 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 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.

Figure F1. Form EIA-23 Regional Boundaries



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

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 2002 than in 2001.
- One or more operators may have reported data incorrectly on Schedule A in 2002 or 2001, but not both, and the error was not detected by edit processing.
- Operation of properties was transferred during 2002 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, which 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 186,946 $\pm$ 935 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:

$$S^2_j = \frac{\sum_i^{n_j} V'^2_{ji} - \left(\sum_i^{n_j} V'_{ji}\right)^2 / n_j}{n_j - 1}$$

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, 2002
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2002 Reserves	2002 Production
United States	17	2
Alabama[b]	0	0
Alaska[a]	0	0
Arkansas[b]	0	0
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[b]	0	0
Kentucky	7	0
Louisiana[b]	0	0
North[b]	0	0
South Onshore[b]	0	0
State Offshore[a]	0	0
Michigan[b]	0	0
Mississippi[b]	0	0
Montana[b]	0	0
New Mexico[b]	0	0
East[b]	0	0
West[b]	0	0
New York	0	0
North Dakota[b]	0	0
Ohio	3	0
Oklahoma[b]	0	0
Pennsylvania	4	1
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	5	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[c]	5	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 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," 2002.

Table F8. Factors for Confidence Intervals (2S.E.) for Natural Gas Proved Reserves and Production, Wet After Lease Separation, 2002 (Billion Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

State and Subdivision	2002 Reserves	2002 Production
United States	453	39
Alabama[b]	0	0
Alaska[a]	0	0
Arkansas[b]	0	0
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[b]	0	0
Kentucky	68	7
Louisiana[b]	0	0
North[b]	0	0
South Onshore[b]	0	0
State Offshore[a]	0	0
Michigan[b]	0	0
Mississippi[b]	0	0
Montana[b]	0	0
New Mexico[b]	0	0
East[b]	0	0
West[b]	0	0
New York	107	6
North Dakota[b]	0	0
Ohio	286	28
Oklahoma[b]	0	0
Pennsylvania	196	15
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	108	8
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]	0	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," 2002

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, 5 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 2002 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 2002 Form EIA-64A survey, the national weighted average gas equivalents ratio was computed to be 1,404 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

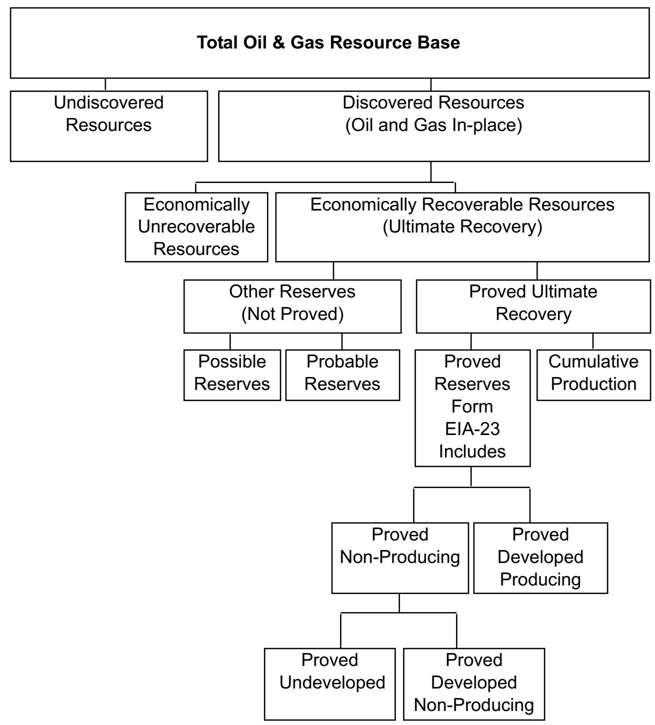
Oil and Gas Resource Base

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 2002 U.S. proved reserves of 187 trillion cubic feet yields a technically recoverable resource target of 1,618 trillion cubic feet. This is about 84 times the 2002 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 2002 oil production (**Table G1**) was about 93 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.{45} They are similarly defined by the MMS, although its system also subdivides them by degree of development and producing status.{46} 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.

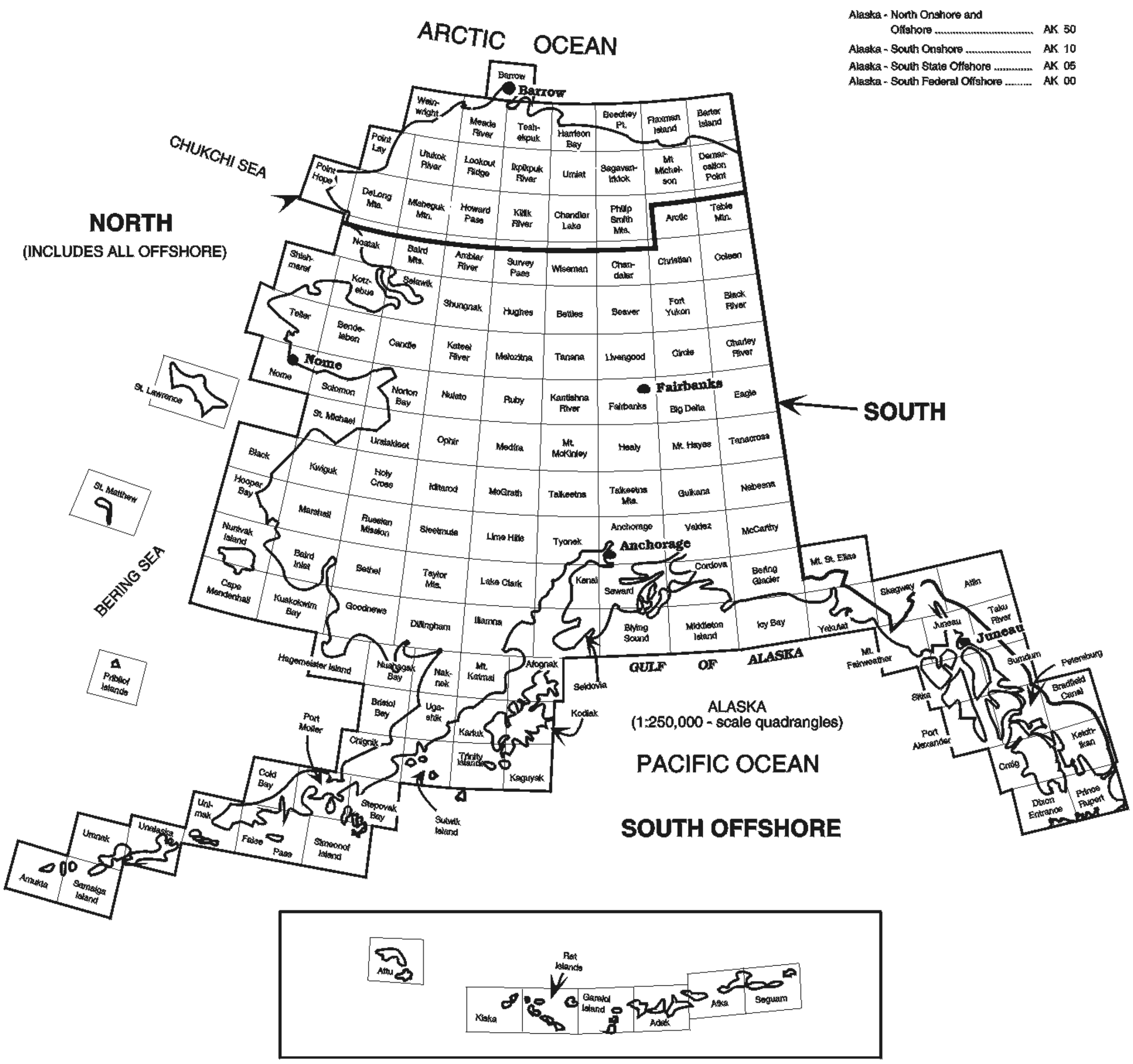
Appendix H

Maps of Selected State Subdivisions

Appendix H

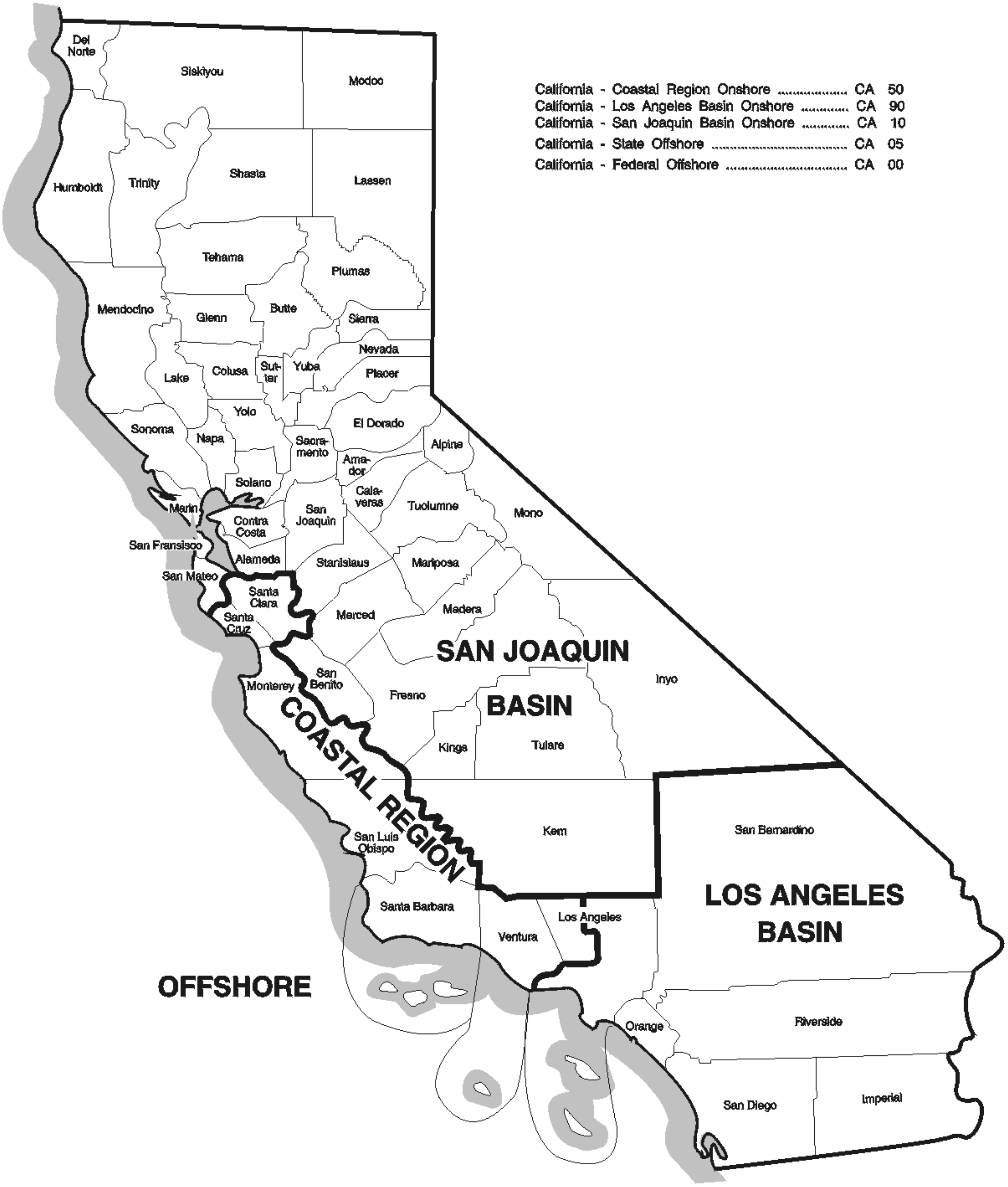
Maps of Selected State Subdivisions

Figure H1. Subdivisions of Alaska



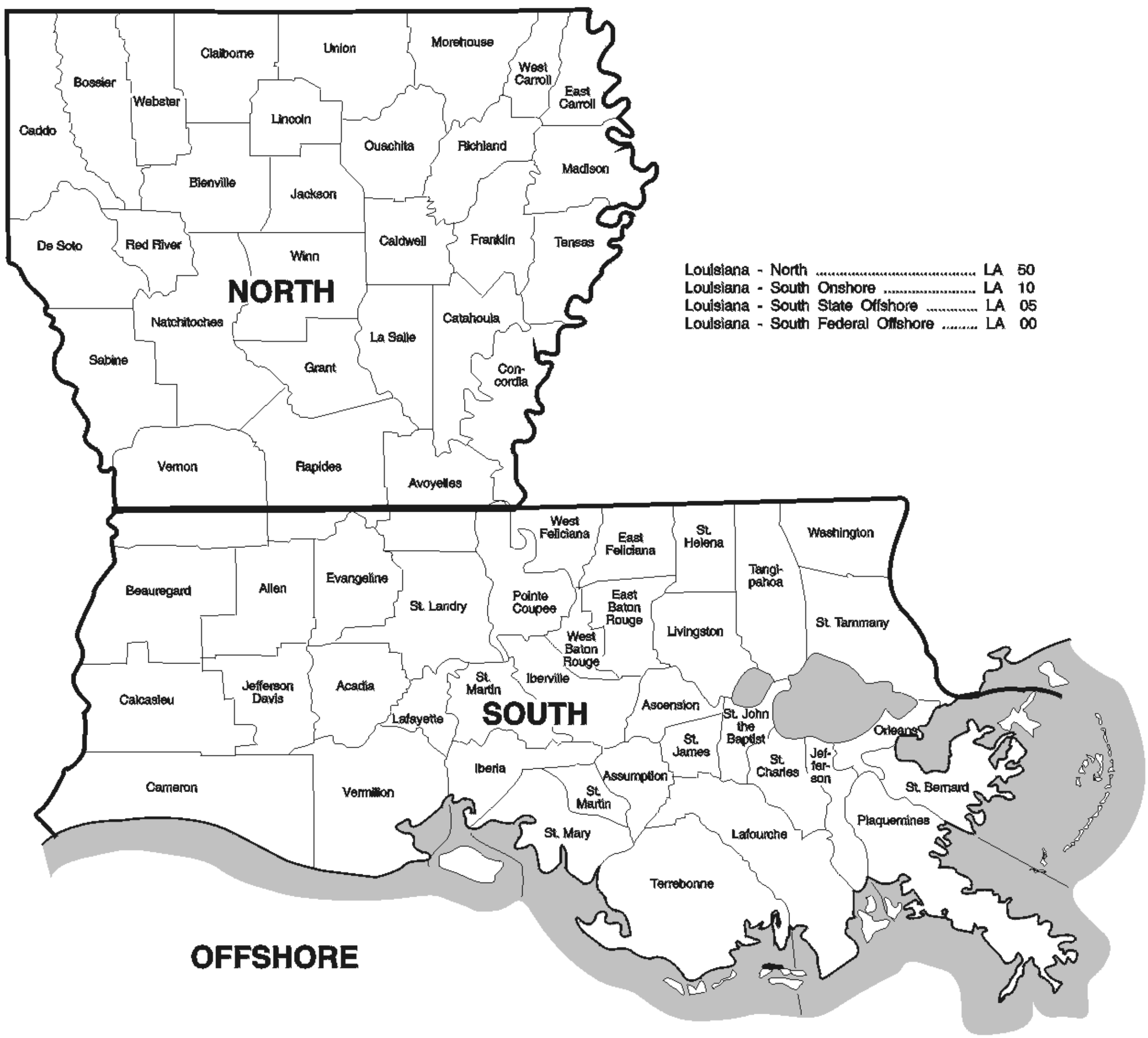
Source: After U.S. Geological Survey.

Figure H2. Subdivisions of California



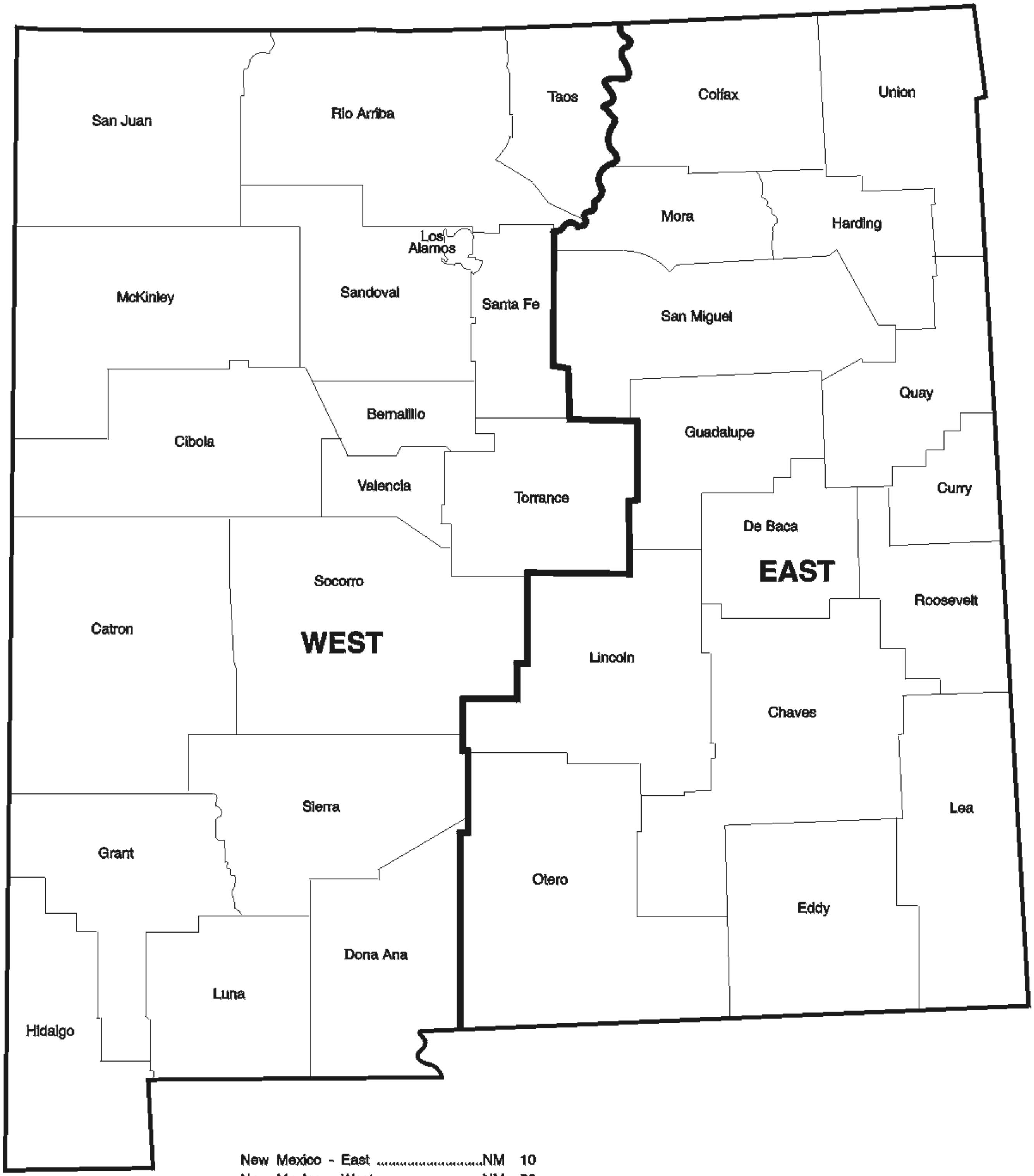
Source: Energy Information Administration, Office of Oil and Gas.

Figure H3. Subdivisions of Louisiana



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

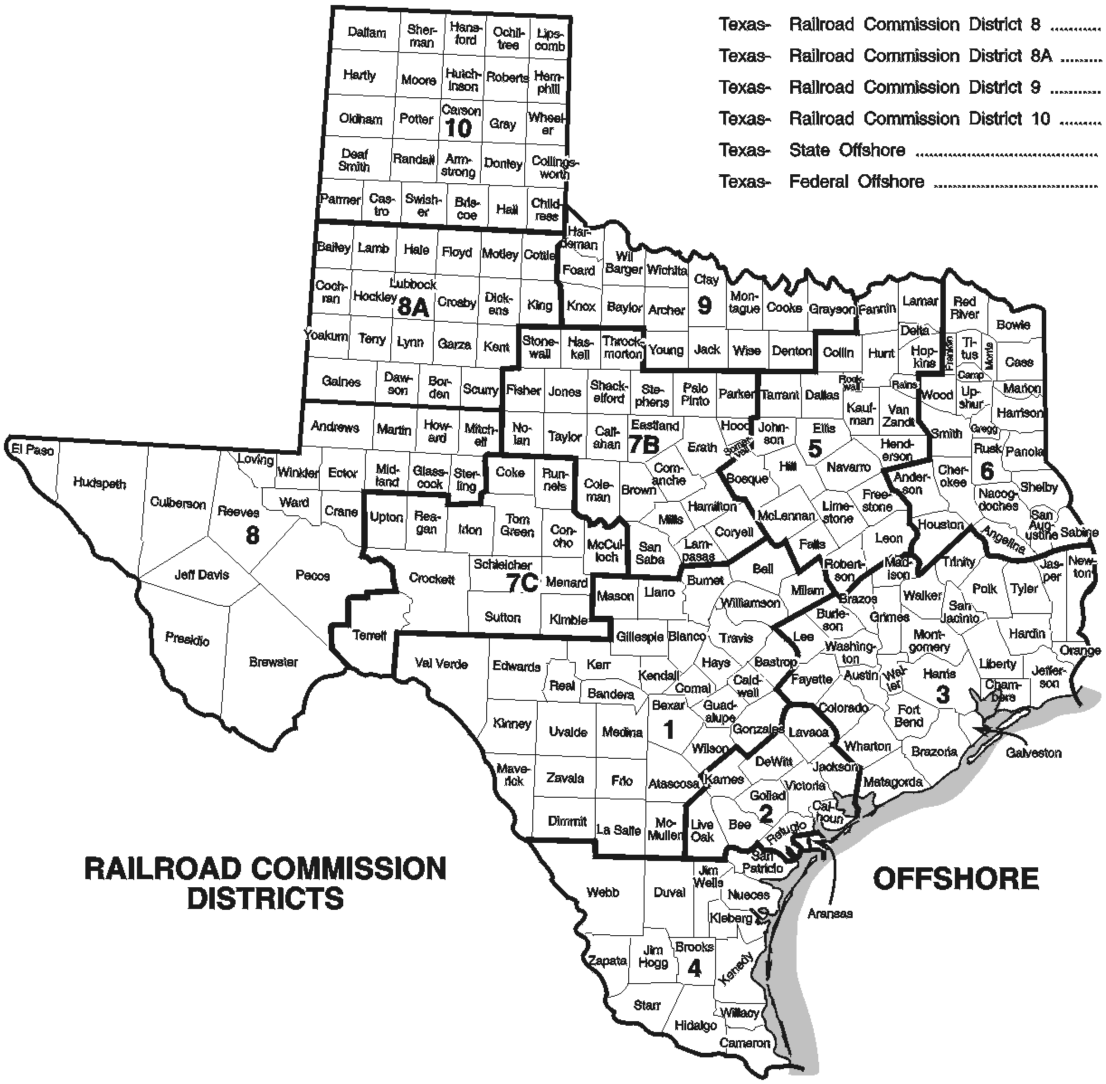
Figure H4. Subdivisions of New Mexico



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

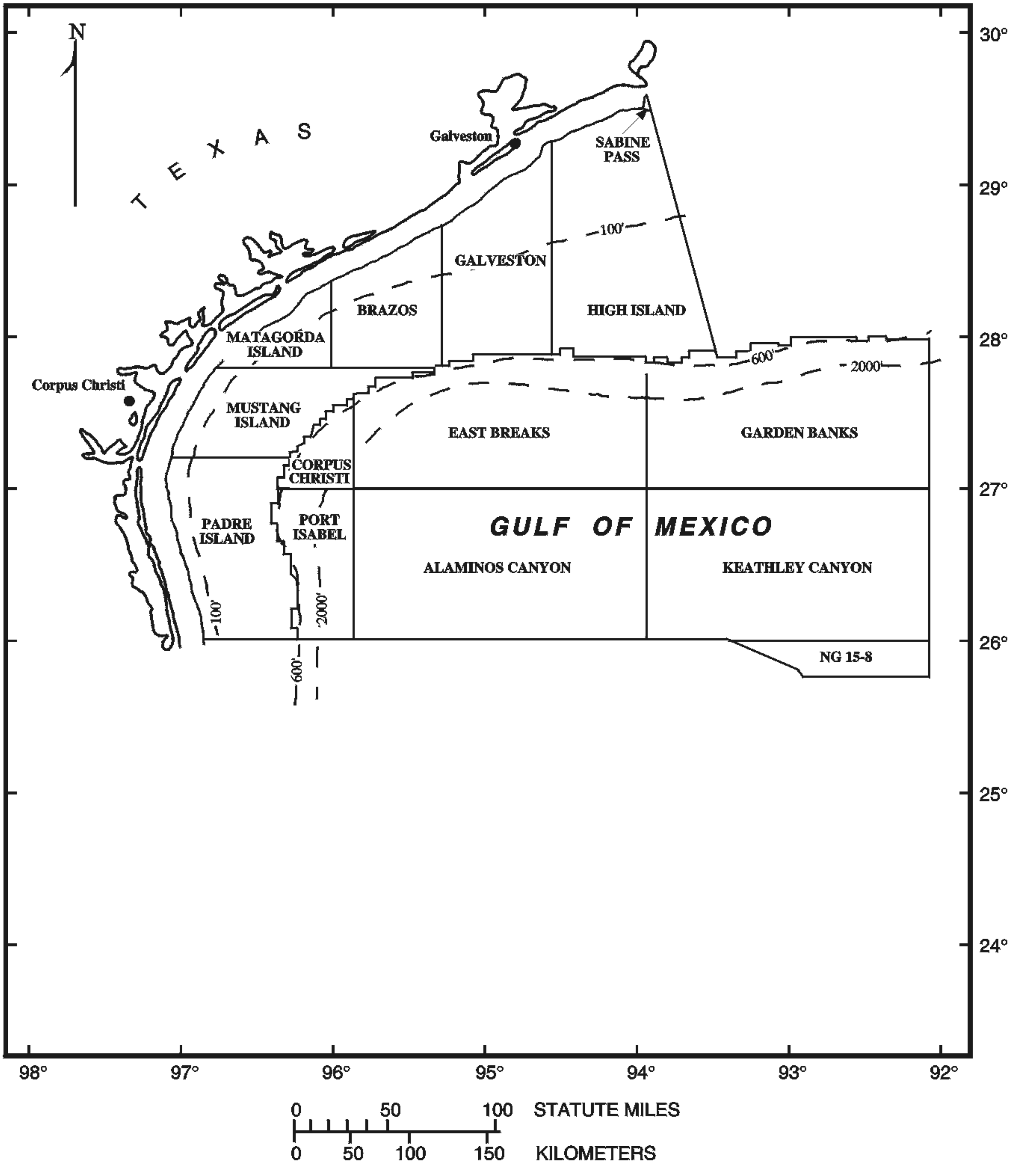
Figure H5. Subdivisions of Texas

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



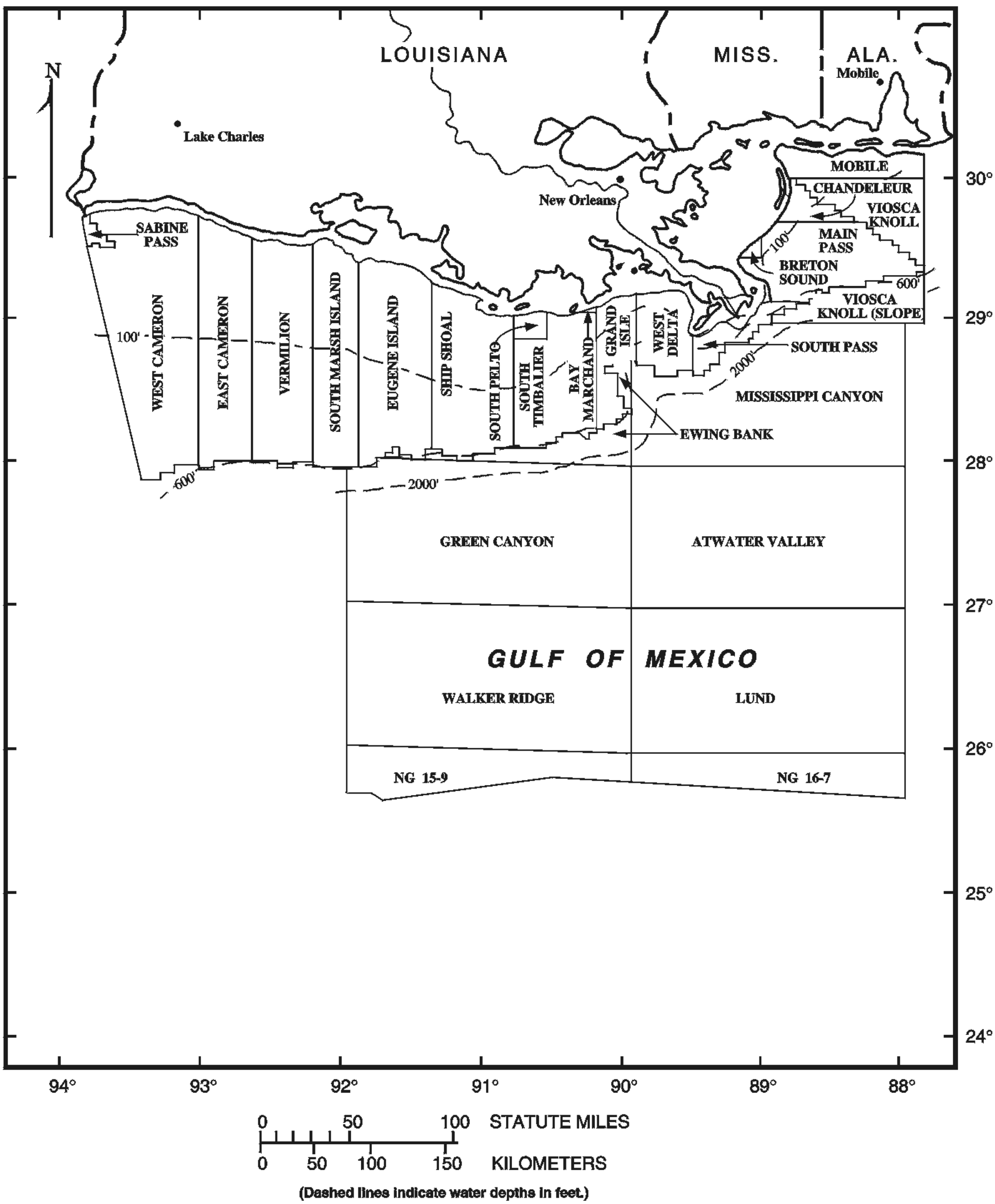
Source: Energy Information Administration, Office of Oil and Gas.

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



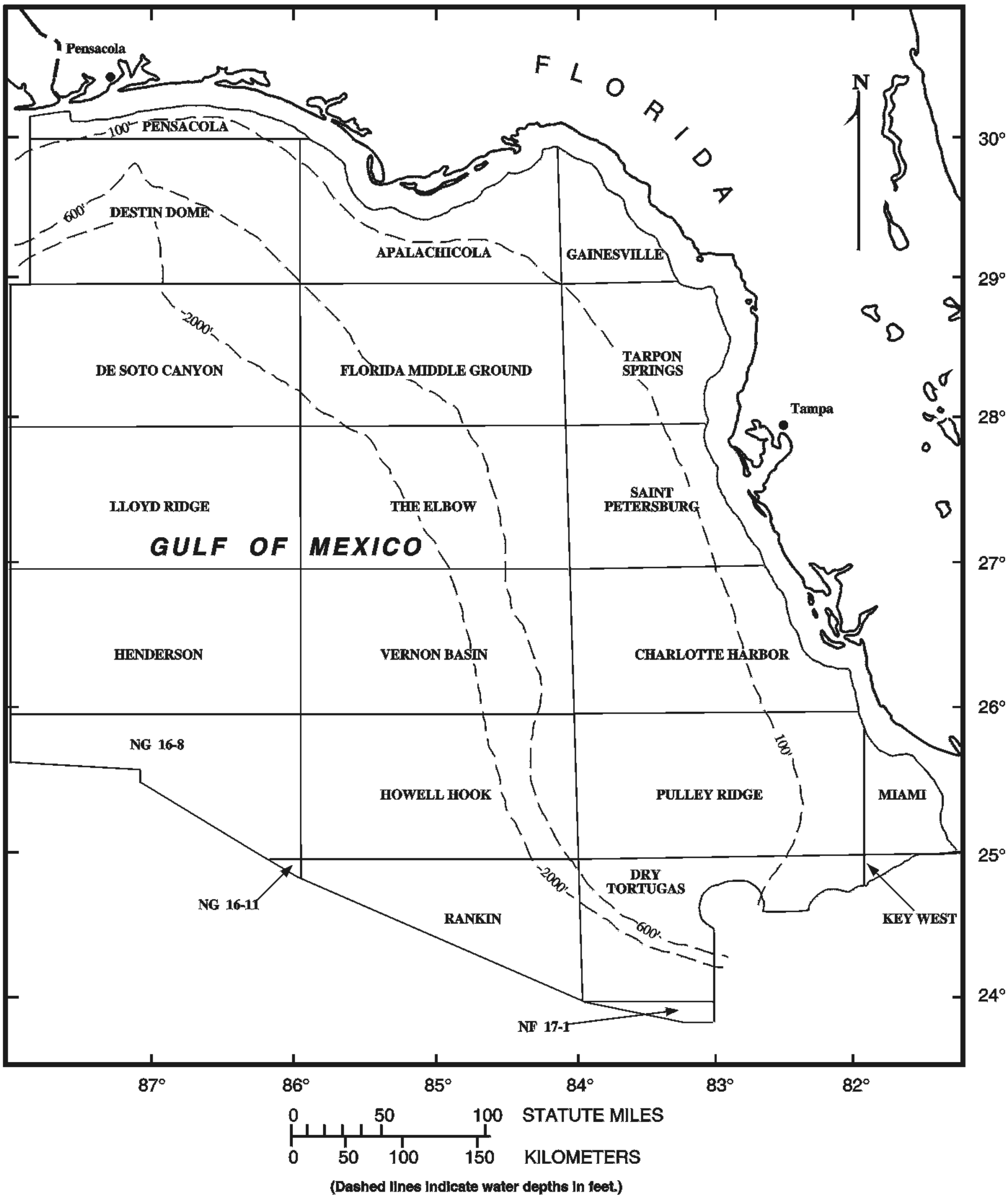
Source: Energy Information Administration, Office of Oil and Gas.

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



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 2

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, 2003 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 2002?** ***(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

OFFICIAL USE ONLY

2002

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	02		

2.0 PRODUCTION AND RESERVES DATA

STATE OR GEOGRAPHIC SUBDIVISION		CRUDE OIL RESERVES	CRUDE OIL 2002 PRODUCTION		NATURAL GAS RESERVES	NATURAL GAS 2002 PRODUCTION		LEASE CONDENSATE RESERVES	LEASE CONDENSATE 2002 PRODUCTION	
		Proved Reserves Dec. 31, 2002 (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, 2002 (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, 2002 (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-STATE OFFSHORE	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

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2002

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 02		

2.0 PRODUCTION AND RESERVES DATA

STATE OR GEOGRAPHIC SUBDIVISION		CRUDE OIL RESERVES	CRUDE OIL 2002 PRODUCTION		NATURAL GAS RESERVES	NATURAL GAS 2002 PRODUCTION		LEASE CONDENSATE RESERVES	LEASE CONDENSATE 2002 PRODUCTION	
		Proved Reserves Dec. 31, 2002 (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, 2002 (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, 2002 (MBbls) (G)	(From properties for which reserves were Estimated) (MBbls) (H)	(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

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2002

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	02			_____ 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 – DECEMBER 31, 2002: (a) CRUDE OIL (MBbls)	(b) ASSOC-DISSOLVED GAS (MMCF)	(c) NONASSOCIATED GAS (MMCF)	(d) LEASE CONDENSATE (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, 2001 (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, 2002 (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 – DECEMBER 31, 2002: (a) CRUDE OIL (MBbls)	(b) ASSOC-DISSOLVED GAS (MMCF)	(c) NONASSOCIATED GAS (MMCF)	(d) LEASE CONDENSATE (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, 2001 (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, 2002 (J)
12. CRUDE OIL (MBbls)										
13. ASSOCIATED-DISSOLVED GAS (MMCF)										
14. NONASSOCIATED GAS (MMCF)										
15. LEASE CONDENSATE (MBbls)										

SAMPLE

2.3	1. STATE ABBR.	2. SUBDIV. CODE	3. COUNTY CODE	4. FIELD CODE	5. MMS CODE	6. FIELD NAME	7. PROVED NONPRODUCING RESERVES – DECEMBER 31, 2002: (a) CRUDE OIL (MBbls)	(b) ASSOC-DISSOLVED GAS (MMCF)	(c) NONASSOCIATED GAS (MMCF)	(d) LEASE CONDENSATE (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, 2001** (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, 2002 (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

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2002

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	02							

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

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

www.eia.doe.gov
Energy Information Administration

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 2002

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, 2003 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 ____________ , 2002 (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 Operator's 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 Reserves: Quantities of proved liquid or gaseous hydrocarbon reserves that 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. This includes both proved undeveloped and proved developed non-producing reserves.

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.