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U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2003 Annual Report



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2003 Annual Report

November 2004

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

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Preface

The *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2003 Annual Report* is the 27th 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, 2003, as well as production volumes for the United States and selected States and State subdivisions for the year 2003. 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 2003 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 2003; Table 1 converted to metric units; historical State data; a summary of survey operations; a discussion of statistical considerations; methods used to develop

the estimates provided in this report; maps of selected State subdivisions; and examples of the survey forms. A glossary of the terms used in this report and in survey Forms EIA-23 and EIA-64A is provided to assist readers in more fully understanding the data.

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

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COVER PHOTO:

Gas drilling operations in the Newark East Field in the Barnett Shale, courtesy of Devon Energy Corporation. Devon Energy Corporation, headquartered in Oklahoma City, is the largest producer in the Newark East Field in the Barnett Shale. The Barnett has become the 6th largest gas field in the United States, located in the Fort Worth area.

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Executive Summary: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2003 Annual Report

Proved reserves of natural gas increased for the fifth year in a row as U.S. natural gas reserves increased by 1 percent in 2003. The majority of natural gas total discoveries were from extensions of existing conventional and unconventional gas fields. Reserves additions replaced 111 percent of 2003 gas production. Natural gas proved reserves have increased in nine of the past ten years. U.S. gas production remained almost level in 2003 as declines in the Gulf of Mexico and New Mexico were offset by production increases in the Rocky Mountain States and Texas.

and coalbeds. Significant reserves were added in the Powder River basin (coalbed methane) and Green River basin (deep and tight sand) in Wyoming, and in the Wattenberg Field (tight sand) and San Juan basin (coalbed methane) in Colorado and New Mexico. Significant reserves were also added in Texas' Newark East Field (Barnett Shale) which is the Nation's sixth largest natural gas field.

Coalbed methane reserves increased 1 percent from 2002 and accounted for 10 percent of U.S. dry gas proved reserves. Coalbed methane production declined very slightly in 2003 (less than 1 percent) and accounted for 8 percent of U.S. dry gas production.

As of December 31, 2003 proved reserves were:

Crude Oil (million barrels)	
2002	22,677
2003	21,891
Decrease	-3.5%
Dry Natural Gas (billion cubic feet)	
2002	186,946
2003	189,044
Increase	+1.1%
Natural Gas Liquids (million barrels)	
2002	7,994
2003	7,459
Decrease	-6.7%

Crude oil proved reserves declined 3 percent in 2003, the first decline in five years. Operators only replaced 58 percent of oil production with reserves additions. Total discoveries, that included significant new field discoveries in the Gulf of Mexico Federal Offshore, were larger than average. However, proved reserves in several fields were lowered substantially because of poor well performance accompanied by engineering reassessments. The net of revisions, adjustments, sales, and acquisitions was a negative 141 million barrels in 2003 compared to a more typical positive 1,160 million barrels in 2002.

The Rocky Mountain States and Texas saw large gas reserves additions in 2003. These were driven by continuing development of unconventional gas fields, i.e., fields developed in tight sands, shales,

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 2003 U.S. proved reserves of crude oil, natural gas, and natural gas liquids is the 27th 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 1,232 million barrels in 2003, 16 percent more than the prior 10-year average and 30 percent more than 2002's discoveries of 946 million barrels.

The majority of crude oil total discoveries in 2003 were new field discoveries in 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 2003.

New field discoveries accounted for 705 million barrels of crude oil reserves additions. Almost all were in the Gulf of Mexico Federal Offshore (702 of 705 million). This was more than double the new

field discoveries of 2002 and 84 percent more than the prior 10-year average.

Operators discovered 426 million barrels in extensions in 2003, 13 percent less than in 2002 and 14 percent less than the prior 10-year average.

New reservoir discoveries in old fields were 101 million barrels, 34 percent less than in 2002 and 43 percent less than the prior 10-year average.

Reserves additions are the sum of total discoveries, revisions, adjustments, sales, and acquisitions. In 2003, reserve additions were 1,091 million barrels which is 48 percent less than the volume of reserves additions in 2002.

Crude oil net revisions and adjustments were 257 million barrels, which is 77 percent less than the net revisions and adjustments of 2002. The net of sales and acquisitions of crude oil proved reserves was -398 million barrels.

Other 2003 crude oil events of note:

- The annual average domestic first purchase price for crude oil increased 22 percent from the 2002 level to \$27.56 per barrel.
- Exploratory and developmental oil completions were up 4 percent from 2002.

Natural Gas

Total discoveries of dry gas reserves were 19,286 billion cubic feet in 2003. This was 36 percent more than the prior 10-year average and 8 percent more than in 2002. The majority of natural gas total discoveries in 2003 were from extensions of existing conventional and unconventional gas fields.

Field extensions were 16,454 billion cubic feet, 11 percent more than extensions in 2002 and 66 percent more than the prior 10-year average of 9,941 billion cubic feet.

New field discoveries were 1,222 billion cubic feet, 8 percent less than the volume discovered in 2002 and 33 percent less than the prior 10-year average.

New reservoir discoveries in old fields were 1,610 billion cubic feet, down 5 percent from 2002 and 34 percent less than the prior 10-year average.

Natural gas net revisions and adjustments were 1,203 billion cubic feet, which is 74 percent less than the net revisions and adjustments of 2002. The net of sales and acquisitions of dry natural gas proved reserves was 1,034 billion cubic feet.

Coalbed methane proved reserves grew in 2003, while production declined slightly. Coalbed methane proved reserves were 18,743 billion cubic feet, an increase of 1 percent from 2002 and accounted for 10 percent of U.S. dry gas proved reserves. Coalbed methane production was 1,600 billion cubic feet, a decrease of less than 1 percent from 2002 and accounted for 8 percent of U.S. dry gas production.

Other 2003 natural gas events of note:

- Natural gas prices were up 69 percent in 2003 to an average of \$4.98 per thousand cubic feet at the wellhead, as compared to \$2.95 per thousand cubic feet in 2002.
- Exploratory and developmental gas completions were up 22 percent from 2002.
- U.S. gas production increased slightly (less than 1 percent) in 2003.

Natural Gas Liquids

U.S. natural gas liquids proved reserves declined 7 percent in 2003 to 7,459 million barrels. This resulted from changes in the relative economics of natural gas and natural gas liquids, and in the liquids content of the gas production. 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 29,350 million barrels in 2003, a 4 percent decrease from the 2002 level. Natural gas liquids represented 25 percent of total liquid hydrocarbon proved reserves in 2003.

Data

These estimates are based upon analysis of data from Form EIA-23, Annual Survey of Domestic Oil and Gas Reserves, filed by 1,554 operators of oil and gas wells, and Form EIA-64A, Annual Report of the Origin of Natural Gas Liquids Production, filed by operators of 507 active natural gas processing plants. The U.S. proved reserves estimates for crude oil and natural gas are associated with sampling errors of less than 1 percent.

1. Introduction

Background

The 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 2003. 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 20,923 probable active operators and the Form EIA-64A plant frame contained 504 probable active natural gas processing plants in the United States when the 2003 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 2003. For more details on the survey process, see Appendix E, Summary of Data Collection Operations.

The 2003 survey sample consisted of 1,554 operators. EIA sampled 1,075 operators with certainty; 164 Category I operators, 512 Category II operators, and 399 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 479 Noncertainty operators as a systematic random sample of the remaining operators. There were 15 Successor operators in 2003. Fifty-five (55) of the 1,554 ceased operating oil and/or gas properties (became non-operator) during the survey year. Fifty-seven (57) operators changed size significantly in 2003; 43 reduced in size from Category I or II to Category III, and 14 operators increased in size from Category III to Category II.

EIA mailed EIA-64A forms to all known natural gas processing plant operators as of February 1, 2004. 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 504 unique active natural gas processing plants in 2003.

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 2003, the Form EIA-23 National production estimates were less than 1 percent lower than the comparable *Petroleum Supply Annual (PSA) 2003* volumes for crude oil and lease condensate combined, and were less than 2 percent higher than the comparable *Natural Gas Monthly, October 2004* volume for 2003 dry natural gas.

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, 2003:

- **Crude Oil — 21,891 million barrels**
- **Dry Natural Gas — 189,044 billion cubic feet**
- **Natural Gas Liquids — 7,459 million barrels.**

This Overview summarizes the 2003 proved reserves balances of crude oil, dry natural gas, and natural gas liquids on a National level and provides historical comparisons between 2003 and prior years. **Table 1** lists the estimated annual reserve balances since 1993 for crude oil, dry natural gas, and natural gas liquids.

Crude Oil

Proved reserves of crude oil decreased by 786 million barrels in 2003. **Figure 1** shows the crude oil proved reserves levels by major region and **Figure 2** shows the components of reserves changes from 1993 through 2003.

As indicated in **Figure 1**, U.S. crude oil proved reserves decreased in 2003 in the lower 48 States onshore and Alaska, but increased in the Federal Offshore.

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

Total discoveries are those reserves attributable to field extensions, new field discoveries, and new reservoir discoveries in old fields. They result from the drilling of exploratory wells. Total discoveries of crude oil were 1,232 million barrels in 2003, 16 percent more than the prior 10-year average and 30 percent more than 2002's discoveries of 946 million barrels.

The majority of crude oil total discoveries in 2003 were new field discoveries in 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 2003.

New field discoveries accounted for 705 million barrels of crude oil reserves additions, 702 million of which were in the Gulf of Mexico Federal Offshore. This was more than double the new field discoveries of 2002 and 84 percent more than the prior 10-year average.

Operators discovered 426 million barrels in extensions in 2003, 13 percent less than in 2002 and 14 percent less than the prior 10-year average.

New reservoir discoveries in old fields were 101 million barrels, 34 percent less than in 2002 and 43 percent less than the prior 10-year average.

Reserves additions are the sum of total discoveries, revisions and adjustments, and sales and acquisitions. In 2003 there were 1,091 million barrels of reserves additions, 48 percent less than the volume of reserves additions in 2002.

The smaller than average volume of net revisions and adjustments and a negative net of sales and acquisitions of crude oil proved reserves significantly reduced reserves additions in 2003. Crude oil net revisions and adjustments were 257 million barrels, 77 percent less than the net revisions and adjustments of 2002. The net of sales and acquisitions of crude oil proved reserves was -398 million barrels.

Production of crude oil was an estimated 1,877 million barrels in 2003 (lease condensate not included, see Natural Gas Liquids section below for condensate volumes). This was up less than 1 percent from 2002's level (1,875 million barrels) and down 9 percent from the prior 10-year average (2,074 million barrels). Operators replaced only 58 percent of crude oil production with reserves additions in 2003.

Natural Gas

Dry natural gas proved reserves increased by 2,098 billion cubic feet in 2003. **Figure 3** shows the dry natural gas proved reserves levels by major region. It indicates that additions of gas reserves in the Lower 48 onshore are raising the National total despite declining offshore gas reserves. **Figure 4** shows the components of reserves changes from 1993 through 2003.

Table 1. Total U.S. Proved Reserves of Crude Oil, Dry Natural Gas, and Natural Gas Liquids, 1993-2003

Year	Adjustments (1)	Net Revisions (2)	Revisions ^a and Adjustments (3)	Net of Sales ^b 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)
Crude Oil (million barrels of 42 U.S. gallons)											
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
2003	163	94	257	-398	426	705	101	1,232	1,877	21,891	-786
Dry Natural Gas (billion cubic feet, 14.73 psia, 60° Fahrenheit)											
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
2003	2,841	-1,638	1,203	1,034	16,454	1,222	1,610	19,286	19,425	189,044	+2,098
Natural Gas Liquids (million barrels of 42 U.S. gallons)											
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
2003	-338	-161	-499	30	629	35	72	736	802	7,459	-535

^aRevisions and adjustments = Col. 1 + Col. 2.^bNet of sales and acquisitions = acquisitions - sales.^cTotal discoveries = Col. 5 + Col. 6 + Col. 7.^dProved 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 2003 contained in the *Petroleum Supply Annual 2003*, DOE/EIA-0340(03) and the *Natural Gas Annual 2003*, DOE/EIA-0131(03).

Sources: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1993 through 2002 annual reports, DOE/EIA-0216.

Figure 1. U.S. Crude Oil Proved Reserves, 1993-2003

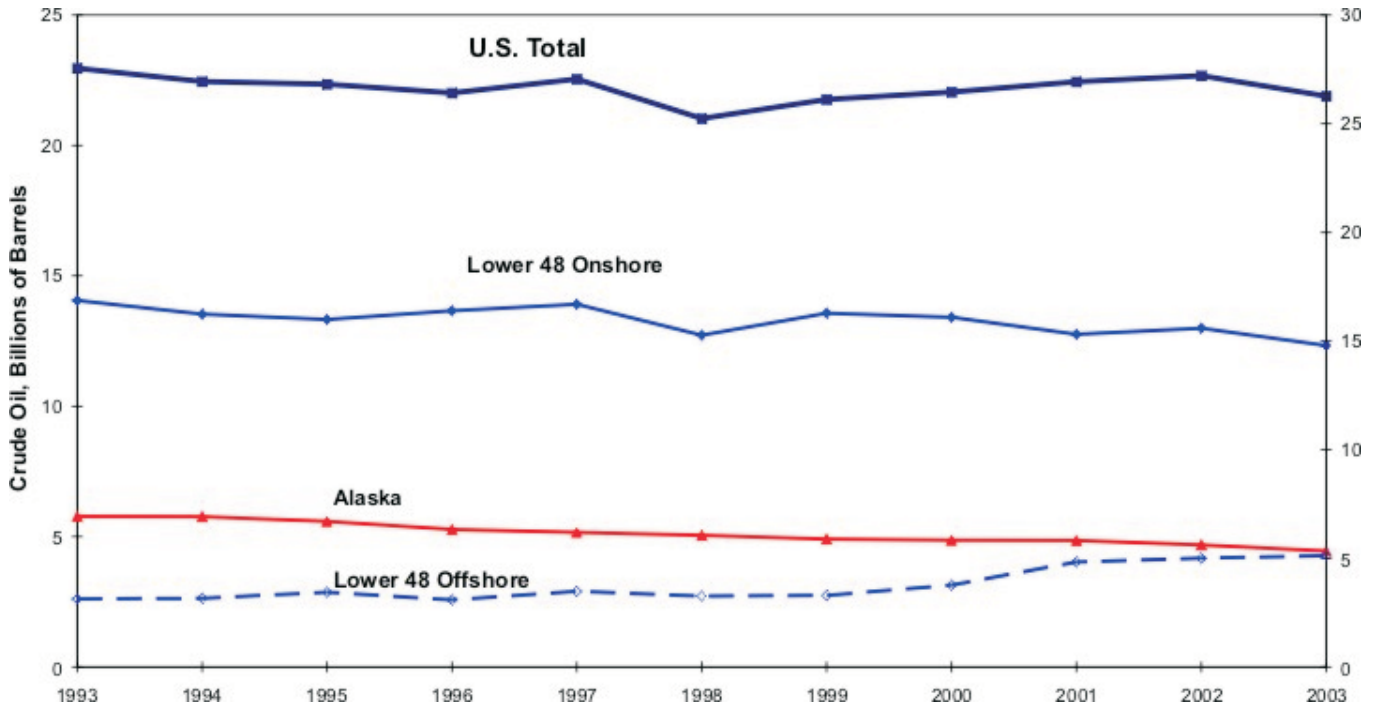
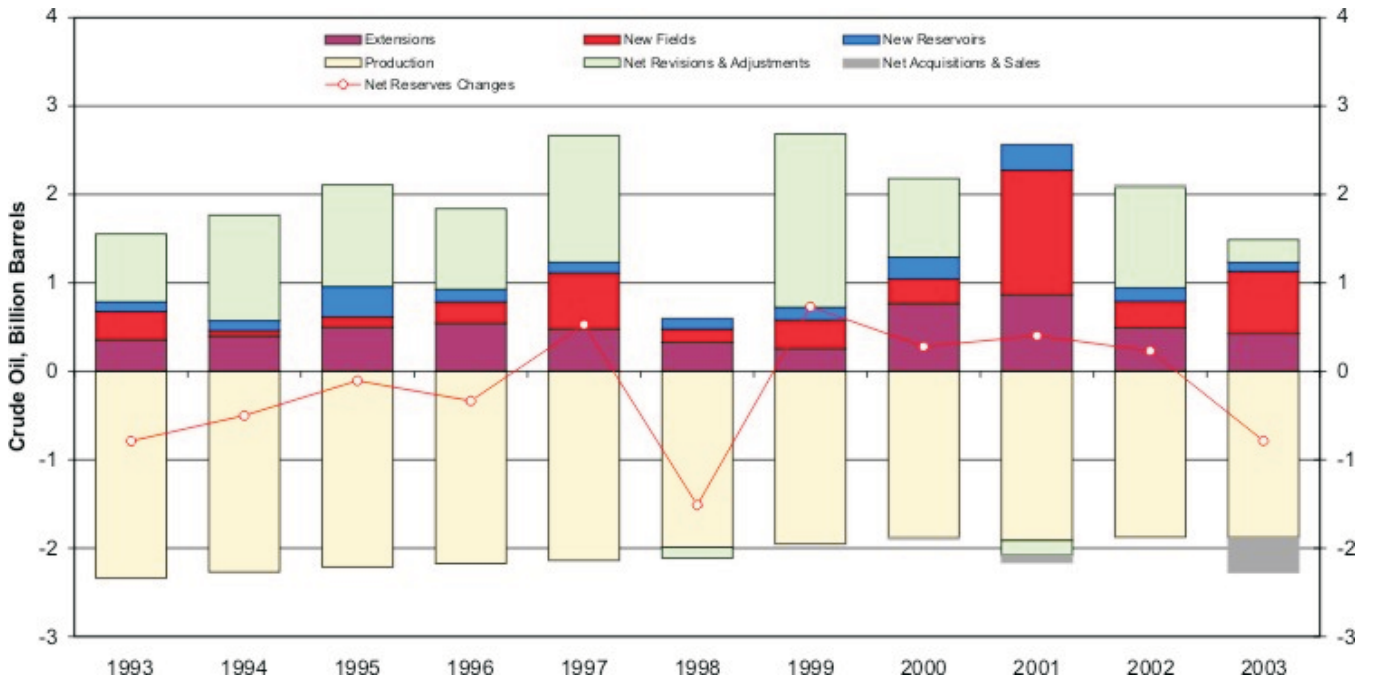


Figure 2. Components of Reserves Changes for Crude Oil, 1993-2003



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1993-2002 annual reports, DOE/EIA-0216.{17-26}

Figure 3. U.S. Dry Natural Gas Proved Reserves, 1993-2003

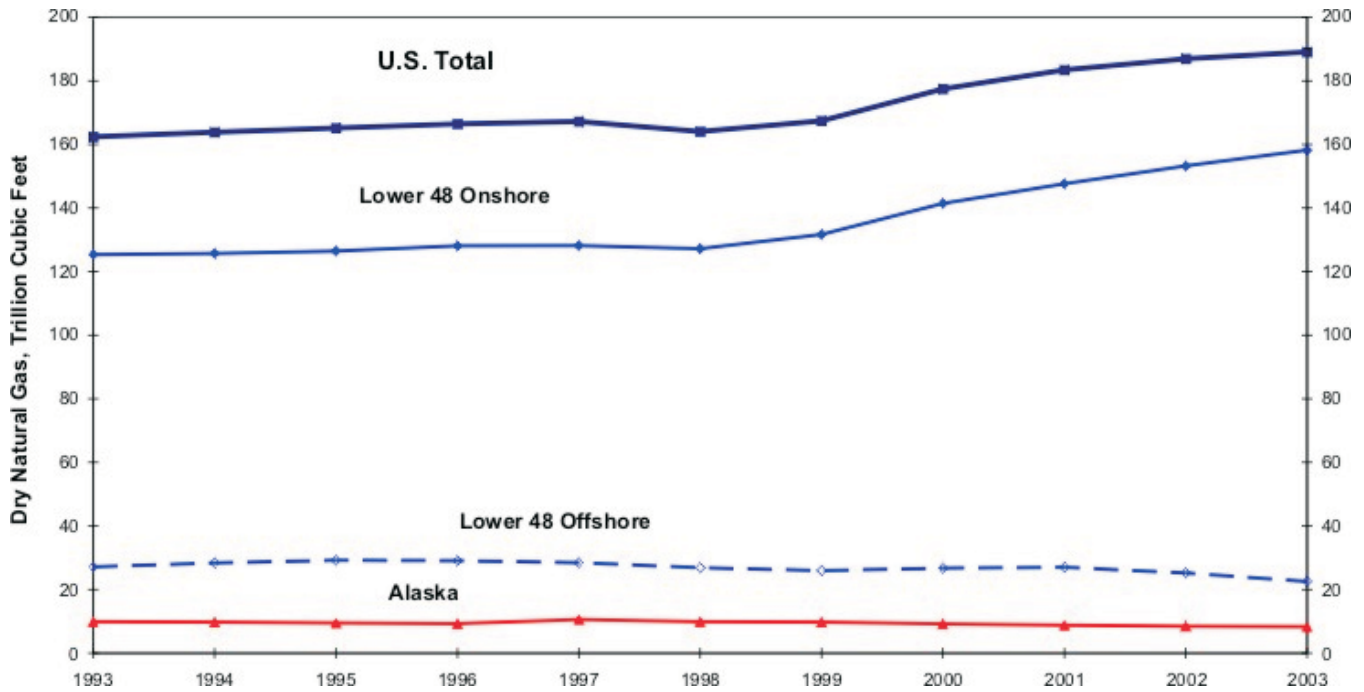
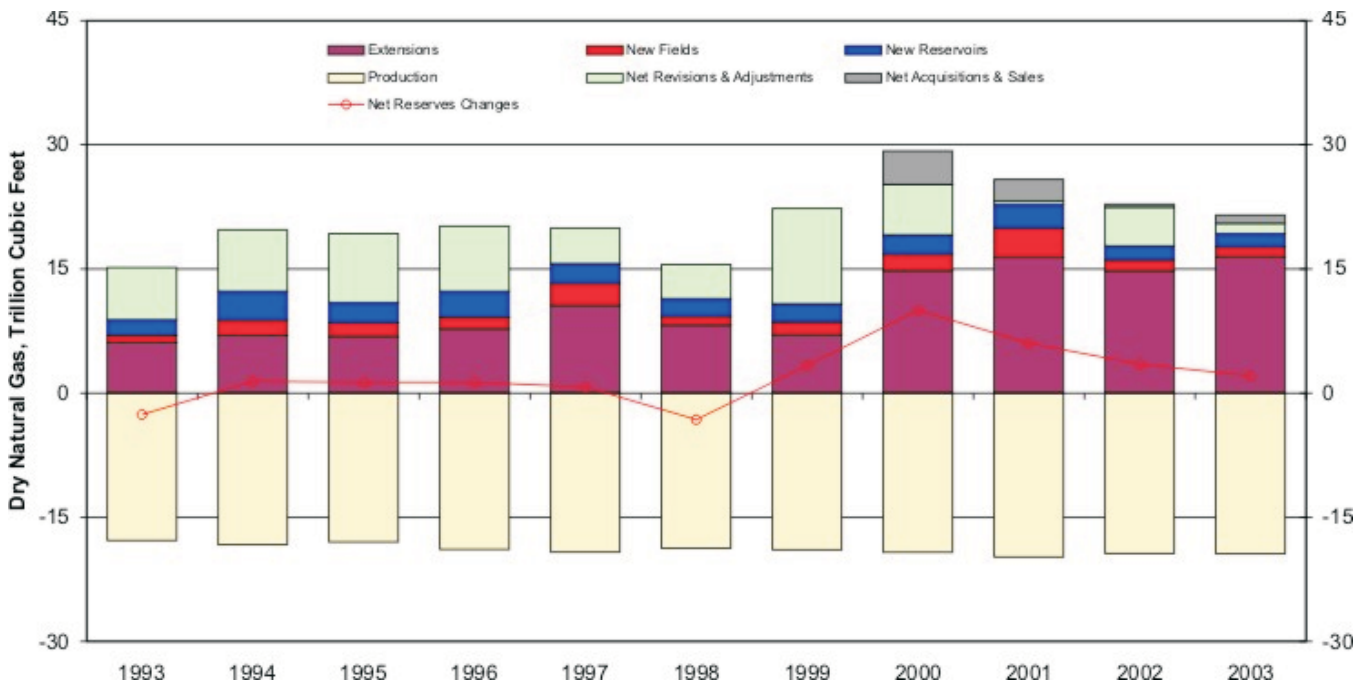


Figure 4. Components of Reserves Changes for Dry Natural Gas, 1993-2003



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1993-2002 annual reports, DOE/EIA-0216.{17-26}

Total discoveries of dry gas reserves were 19,286 billion cubic feet in 2003. This was 36 percent more than the prior 10-year average and 8 percent less than in 2002. The majority of natural gas total discoveries in 2003 were from extensions of existing conventional and unconventional gas fields.

Field extensions were 16,454 billion cubic feet, 11 percent more than extensions in 2002 and 66 percent more than the prior 10-year average of 9,941 billion cubic feet.

New field discoveries were 1,222 billion cubic feet, 8 percent less than the volume discovered in 2002 and 33 percent less than the prior 10-year average.

New reservoir discoveries in old fields were 1,610 billion cubic feet, down 5 percent from 2002 and 34 percent less than the prior 10-year average.

Natural gas net revisions and adjustments were 1,203 billion cubic feet, 74 percent less than the net revisions and adjustments of 2002. The net of sales and acquisitions of dry natural gas proved reserves was 1,034 billion cubic feet.

Production removed an estimated 19,425 billion cubic feet of proved reserves from the National total. Dry gas production increased by less than 1 percent compared to 2002. Operators replaced 111 percent of dry natural gas production with reserves additions.

Coalbed methane reserves grew in 2003, while production declined slightly. Coalbed methane proved reserves were 18,743 billion cubic feet, an increase of 1 percent from 2002 and accounted for 10 percent of U.S. dry gas reserves. Coalbed methane production was 1,600 billion cubic feet, a decrease of less than 1 percent from 2002 and accounted for 8 percent of U.S. dry gas production.

Natural Gas Liquids

Proved reserves of natural gas liquids declined 7 percent in 2003 to 7,459 million barrels. This resulted from changes in the relative economics of natural gas and natural gas liquids, and in the liquid content of gas production. **Figure 5** shows the natural gas liquids proved reserves levels by major region. It indicates that declining reserves in both the Lower 48 onshore and offshore combine to cause the decrease in the National total in 2003. **Figure 6** shows the components of natural gas liquids reserves changes from 1993 through 2003.

Operators replaced 33 percent of their 2003 natural gas liquids production with reserve additions. Total discoveries added 736 million barrels (primarily from extensions), net revisions and adjustments were -498 million barrels, and net sales and acquisitions added 30 million barrels in 2003.

Total proved reserves of liquid hydrocarbons (crude oil plus natural gas liquids) were 29,350 million barrels in 2003—a 4 percent decrease from the 2002 level. Natural gas liquids represented 25 percent of total liquid hydrocarbon proved reserves in 2003.

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 2003. The table has two sections, one for the lower 48 States and another for the U.S. total (which includes Alaska's contribution). Annual averages for each component of reserves changes are also listed, along with the percentage of that particular component's impact on total U.S. proved reserves. In this section, we compare these averages to the 2003 proved reserves estimates as a means of gauging the past year against history.

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

- discovered an average of 905 million barrels per year of new reserves
- had proved reserves additions of an average 2,093 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 430 million barrels (the difference between post-1976 average annual production and post-1976 average annual reserve additions) because production has outpaced reserve additions.

Since 1977, crude oil reserves have been primarily sustained by proved ultimate recovery appreciation in existing fields rather than the discovery of new oil fields. Only 12 percent of reserves additions since 1976 were booked as new field discoveries. Proved ultimate recovery appreciation is the sum of net revisions, adjustments, net sales and acquisitions, extensions, and new reservoir discoveries in old fields (see the Proved Ultimate Recovery section later in this chapter.) Since 1977, the 24,427 million barrels of total discoveries accounted for 43 percent of reserves additions.

Figure 5. U.S. Natural Gas Liquids Proved Reserves, 1993-2003

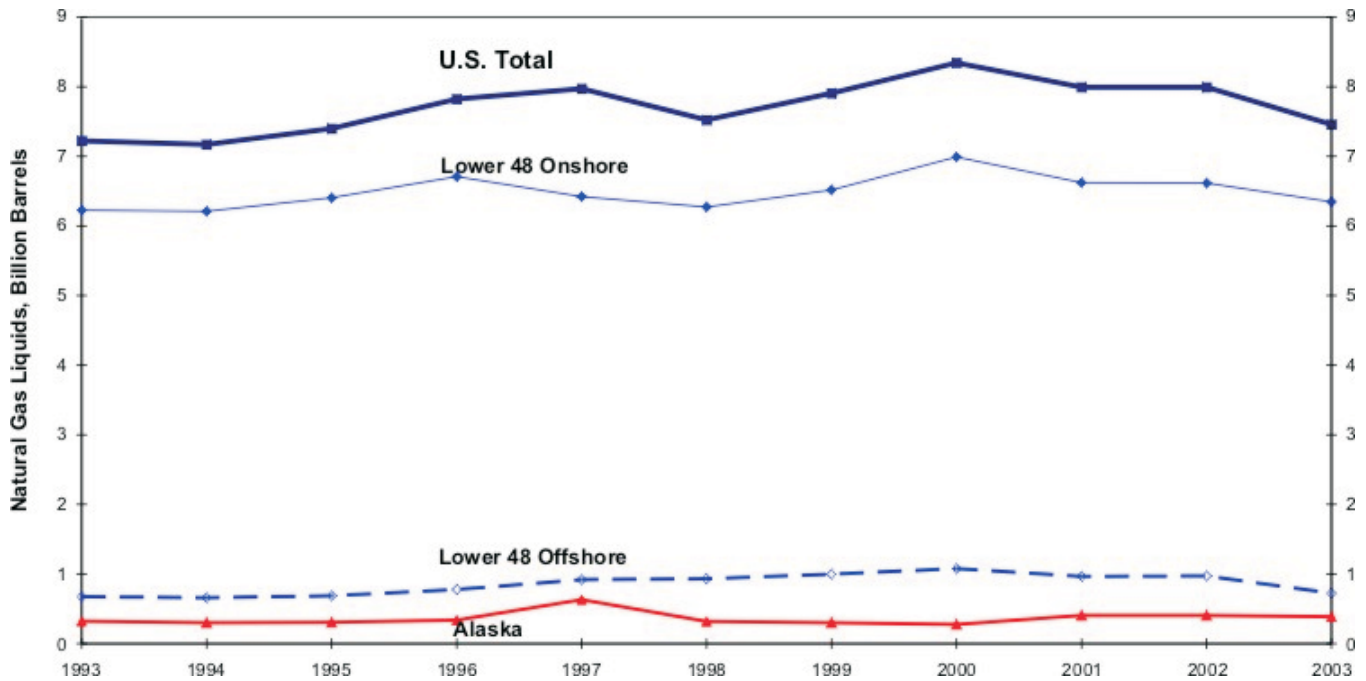
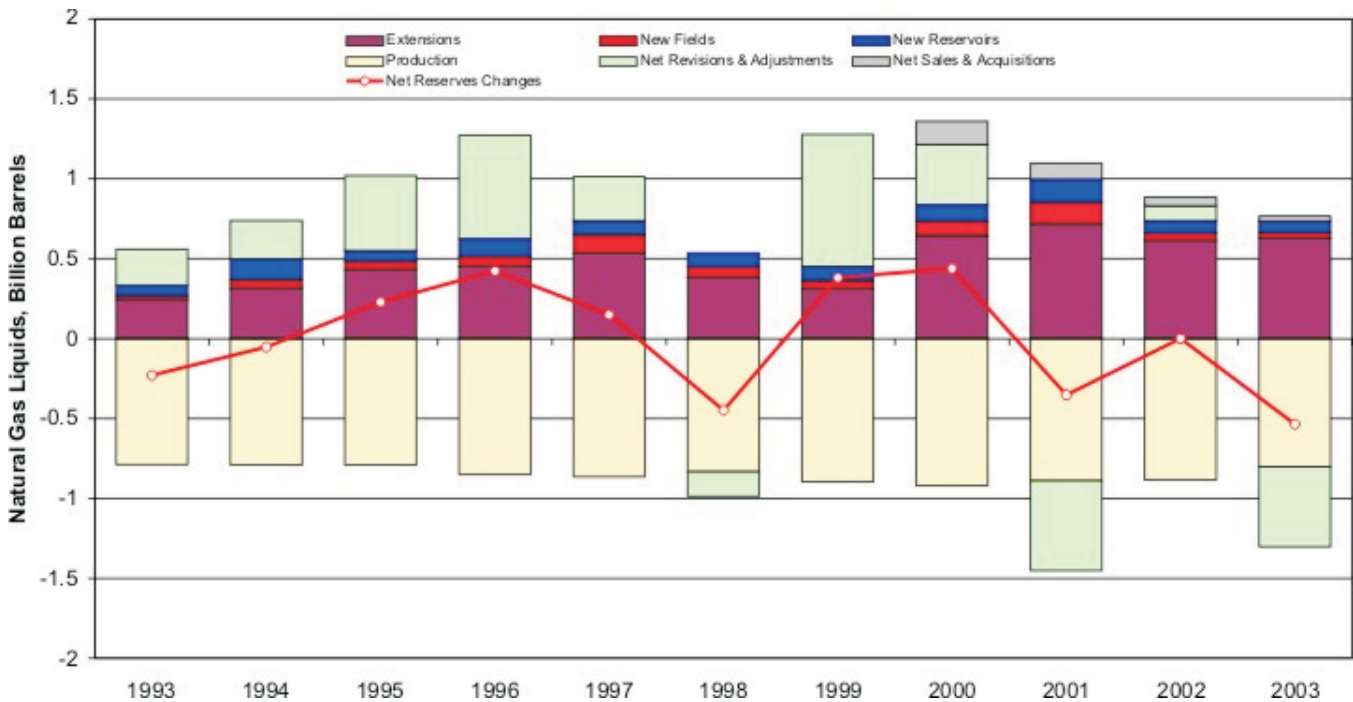


Figure 6. Components of Reserves Changes for Natural Gas Liquids, 1993-2003



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1993-2003 annual reports, DOE/EIA-0216.(17-26)

Table 2. Reserves Changes, 1977-2003

Components of Change	Lower 48 States			U.S. Total		
	Volume	Average per Year	Percent of Reserves Additions	Volume	Average per Year	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	5,692	211	12.3	6,643	246	11.8
New Reservoir Discoveries in Old Fields	3,840	142	8.3	3,970	147	7.0
Extensions	12,223	453	26.5	13,824	512	24.4
Total Discoveries	21,755	806	47.1	24,427	905	43.2
Revisions, Adjustments, Sales & Acquisitions ^a	24,416	904	52.9	32,097	1,189	56.8
Total Reserves Additions	46,171	1,710	100.0	56,524	2,093	100.0
Production	53,590	1,985	116.1	68,135	2,524	120.5
Net Reserves Change	-7,419	-275	-16.1	-11,611	-430	-20.5
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	52,170	1,932	11.0	52,412	1,941	11.4
New Reservoir Discoveries in Old Fields	66,919	2,478	14.1	67,333	2,494	14.6
Extensions	231,535	8,575	48.7	234,605	8,689	50.8
Total Discoveries	350,624	12,986	73.7	354,350	13,124	76.8
Revisions, Adjustments, Sales & Acquisitions ^a	125,060	4,632	26.3	107,037	3,964	23.2
Total Reserves Additions	475,684	17,618	100.0	461,387	17,088	100.0
Production	475,763	17,621	100.0	485,621	17,986	105.3
Net Reserves Change	-79	-3	0.0	-24,234	-898	-5.3

^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 1977-2003 annual reports, DOE/EIA-0216.(1-26)

Compared to the averages of reserves changes since 1977, 2003 was an up year for crude oil discoveries. Total discoveries of crude oil (1,232 million barrels) in 2003 were 36 percent greater than the post-1976 U.S. average (905 million barrels per year).

Looking at the components of total discoveries in 2003:

- 2003's new field discoveries (705 million barrels) were almost three times larger than the post-1976 average for crude oil,
- New reservoir discoveries in old fields (101 million barrels) were 31 percent less than the post-1976 average, and
- Extensions in 2003 (426 million barrels) were 17 percent less than the post-1976 average for crude oil.

In 2003, the Revisions, Adjustments, Sales & Acquisitions were -141 million barrels, a net loss. This loss was significantly smaller than the post-1976 average of 1,189 million barrels per year. Certain downward revisions and large reported sales of

reserves have negatively impacted the National total for 2003.

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

- discovered an average of 13,124 billion cubic feet per year of new reserves,
- had proved reserves additions of an average 17,088 billion cubic feet per year from total discoveries, net revisions and adjustments, and net sales and acquisitions, and
- had an average net reduction in U.S. reserves of 898 billion cubic feet per year.

Like crude oil reserves, natural gas reserves have been sustained primarily by proved ultimate recovery appreciation since 1977. Usually extensions rather than net revisions and adjustments are the largest component. Extensions accounted for 51 percent of all reserves additions since 1977 while net revisions and adjustments accounted for only 23 percent.

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, 1977-2003

Year	Crude Oil		Natural Gas		Number of Rigs	
	Current	2003 Constant	Current	2003 Constant		
	(dollars per barrel)		(dollars per thousand cubic feet)			
1977	8.57	21.41	0.79	1.97	2,001	
1978	9.00	20.89	0.91	2.12	2,259	
1979	12.64	27.21	1.18	2.54	2,177	
1980	21.59	42.55	1.59	3.13	2,909	
1981	31.77	57.28	1.98	3.57	3,970	
1982	28.52	48.40	2.46	4.17	3,105	
1983	26.19	42.76	2.59	4.23	2,232	
1984	25.88	40.74	2.66	4.19	2,428	
1985	24.09	36.76	2.51	3.83	1,980	
1986	12.51	18.68	1.94	2.90	964	
1987	15.40	22.32	1.67	2.42	936	
1988	12.58	17.63	1.69	2.37	936	
1989	15.86	21.42	1.69	2.28	869	
1990	20.03	26.03	1.71	2.22	1,010	
1991	16.54	20.74	1.64	2.06	860	
1992	15.99	19.58	1.74	2.13	721	
1993	14.25	17.04	2.04	2.44	754	
1994	13.19	15.45	1.85	2.17	775	
1995	14.62	16.76	1.55	1.78	723	
1996	18.46	20.76	2.17	2.44	779	
1997	17.23	19.00	2.32	2.56	943	
1998	10.87	11.84	1.96	2.14	827	
1999	15.56	16.71	2.19	2.35	625	
2000	26.72	28.11	3.68	3.87	918	
2001	21.84	22.44	4.00	4.11	1,156	
2002	January	15.89	16.24	2.50	2.56	867
	February	16.93	17.29	2.19	2.24	825
	March	20.28	20.68	2.40	2.45	763
	April	22.52	22.94	2.94	2.99	750
	May	23.51	23.92	2.94	2.99	826
	June	22.59	22.95	2.96	3.01	842
	July	23.51	23.86	2.92	2.96	851
	August	24.76	25.10	2.76	2.80	848
	September	26.08	26.40	2.97	3.01	860
	October	25.29	25.57	3.24	3.28	851
	November	23.38	23.60	3.59	3.62	834
	December	25.29	25.48	3.96	3.99	901
2002		22.51	22.87	2.95	3.00	830
2003	January	28.35	28.49	4.47	4.49	854
	February	31.85	31.96	5.45	5.47	907
	March	30.09	30.16	6.69	6.71	941
	April	25.46	25.51	4.71	4.72	983
	May	24.96	24.98	4.97	4.97	1,034
	June	26.83	26.82	5.35	5.35	1,067
	July	27.53	27.48	4.91	4.90	1,081
	August	27.94	27.85	4.72	4.71	1,090
	September	25.23	25.12	4.58	4.56	1,093
	October	26.52	26.37	4.43	4.40	1,102
	November	27.21	27.02	4.34	4.31	1,111
	December	28.54	28.31	5.08	5.04	1,114
2003		27.56	27.56	4.98	4.98	1,032

=Revised data.

Sources: Current dollars and number of rigs: *Monthly Energy Review September 2004*, DOE/EIA-0035(2004/9). 2003 constant dollars: U.S. Department of Commerce, Bureau of Economic Analysis, Gross Domestic Product Implicit Price Deflators, October 2004.

Compared to the averages of reserves changes since 1977, 2003 was an up year for dry natural gas total discoveries. Operators reported 19,286 billion cubic feet of total discoveries of dry natural gas proved reserves, 47 percent more than the post-1976 average (13,124 billion cubic feet).

The net of revisions, adjustments, sales, and acquisitions was 2,237 billion cubic feet in 2003, 44 percent lower than the post-1976 U.S. average (3,964 billion cubic feet per year).

Economics and Drilling

Economics: Table 3 lists the average annual domestic wellhead prices of crude oil and natural gas from 1977 to 2003.

The U.S. crude oil first purchase price started at an average of \$28.35 per barrel in January 2003, then fluctuated between a high of \$31.85 (February) and a low of \$24.96 (May). The average U.S. crude oil first purchase price increased from \$22.51 in 2002 to \$27.56 per barrel in 2003.

Oil prices vary by region. In Texas the average 2003 crude oil first purchase price was \$29.13 per barrel, \$26.43 per barrel in California, \$30.71 per barrel in Colorado, \$28.18 per barrel in Ohio, and \$24.25 per barrel in the California Federal Offshore. The lowest average crude oil first purchase price in 2003 was \$23.78 per barrel for the Alaska North Slope oil. {27}

The average annual wellhead natural gas price increased from \$3.00 in 2002 to \$4.98 per thousand cubic feet in 2003. Natural gas prices started at \$4.49 per thousand cubic feet in January 2003, rose to an annual average high on \$6.71 per thousand cubic feet in March, then fluctuated between \$4.31 and \$5.35 until the end of the year, ending with a price of \$5.04 per thousand cubic feet in December 2003. {28}

Drilling: Also listed in Table 3 are the average number of active rotary drilling rigs from 1977 to 2003. From 2002 to 2003, the annual average active rig count increased from 830 to 1,032, a 24 percent increase in active rigs.

Looking first at exploratory wells, there were 2,341 exploratory wells drilled in 2003 (Table 4). Of these, 11 percent were completed as oil wells, 33 percent were completed as gas wells, and 56 percent were dry holes. Exploratory oil and gas completions (excluding dry

holes) in 2003 were 17 percent more (Figures 7 and 8) than the revised 2002 total.

Figures 9 and 10 show the average volume of discoveries per exploratory well for dry natural gas and oil, respectively, since 1977. The 2003 average volume of oil discoveries per exploratory well increased 18 percent compared to 2002. The 2003 average volume of gas discoveries per exploratory well decreased 7 percent compared to 2002.

The number of successful development wells increased 4 percent for oil and 22 percent for gas from their 2002 levels. Including dry holes, there were an estimated 29,984 exploratory and development wells drilled in 2003. This is 16 percent more than in 2002 and 21 percent more than the average number of wells drilled annually in the prior 10 years (24,706).

For the eleventh 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 2003, and are expected to have a major impact on the energy industry in the future:

On February 14, 2003, the Federal Trade Commission voted unanimously 5- to-0 to approve Conoco Inc.'s merger with Phillips Petroleum Co., Dow Jones reported. The commission issued its final consent order following a public comment period. In November 2001, Oklahoma-based Phillips agreed to merge with Houston-based Conoco in a \$15.2 billion deal. The transaction forms ConocoPhillips, the world's sixth-largest oil and gas company in terms of proved reserves. The new company, which already is operating as ConocoPhillips, will be headquartered in Houston. {29}

In June 2003, Marathon signed a Dissolution and Distribution Agreement with Kinder Morgan Energy Partners, L.P. To dissolve MKM Partners L.P. Formed in January 2001, the MKM partnership had oil and gas production operations in the Permian Basin of Texas. Prior to the dissolution of the partnership, an agreement was signed exploring the sale of Marathon's interest in the Yates Field to Kinder Morgan. {30}

In October 2003, Shareholders of Carbon Energy Corporation of Denver, CO approved the proposed

Table 4. U.S. Exploratory and Development Well Completions,^a 1970-2003

Year	Exploratory				Total Exploratory and Development			
	Oil	Gas	Dry	Total	Oil	Gas	Dry	Total
1970	763	478	6,193	7,434	13,043	4,031	11,099	28,173
1971	664	472	5,995	7,131	11,903	3,983	10,382	26,268
1972	690	659	6,202	7,551	11,437	5,484	11,013	27,934
1973	642	1,067	5,952	7,661	10,167	6,933	10,320	27,420
1974	859	1,190	6,833	8,882	13,647	7,138	12,116	32,901
1975	982	1,248	7,129	9,359	16,948	8,127	13,646	38,721
1976	1,086	1,346	6,772	9,204	17,688	9,409	13,758	40,855
1977	1,164	1,548	7,283	9,995	18,745	12,122	14,985	45,852
1978	1,171	1,771	7,965	10,907	19,181	14,413	16,551	50,145
1979	1,321	1,907	7,437	10,665	20,851	15,254	16,099	52,204
1980	1,764	2,081	9,039	12,884	32,639	17,333	20,638	70,610
1981	2,636	2,514	12,349	17,499	43,598	20,166	27,789	91,553
1982	2,431	2,125	11,247	15,803	39,199	18,979	26,219	84,397
1983	2,023	1,593	10,148	13,764	37,120	14,564	24,153	75,837
1984	2,198	1,521	11,278	14,997	42,605	17,127	25,681	85,413
1985	1,679	1,190	8,924	11,793	35,118	14,168	21,056	70,342
1986	1,084	793	5,549	7,426	19,097	8,516	12,678	40,291
1987	925	754	5,049	6,728	16,164	8,055	11,112	35,331
1988	855	732	4,693	6,280	13,636	8,555	10,041	32,232
1989	607	705	3,924	5,236	10,204	9,539	8,188	27,931
1990	654	689	3,715	5,058	12,198	11,044	8,313	31,555
1991	592	534	3,314	4,440	11,770	9,526	7,596	28,892
1992	493	423	2,513	3,429	8,757	8,209	6,118	23,084
1993	502	548	2,469	3,519	8,407	10,017	6,328	24,752
1994	570	726	2,405	3,701	6,721	9,538	5,307	21,566
1995	542	570	2,198	3,310	7,627	8,354	5,075	21,056
1996	483	570	2,136	3,189	8,314	9,302	5,282	22,898
1997	428	536	2,110	3,074	10,436	11,327	5,702	27,465
1998	291	504	1,647	2,442	R 7,064	R 11,144	4,840	R 23,048
1999	R 157	539	1,195	R 1,891	4,176	10,877	R 3,412	R 18,465
2000	264	R 602	1,288	R 2,154	7,358	16,455	4,025	27,838
2001	R 322	988	R 1,669	R 2,979	8,060	22,083	R 4,084	R 34,227
2002	R 231	R 659	R 1,240	R 2,130	R 6,058	R 16,155	R 3,531	R 25,744
2003	254	766	1,321	2,341	6,284	19,722	3,978	29,984

^aExcludes service wells and stratigraphic and core testing.
R = Revised Data.

Notes: Estimates include only the original drilling of a hole intended to discover or further develop already discovered oil or gas resources. Other drilling activities, such as drilling an old well deeper, drilling of laterals from the original well, drilling of service and injection wells, and drilling for resources other than oil and gas are excluded.

Sources: Years 1970-1972: Energy Information Administration, Office of Oil and Gas. Years 1973-2003: EIA *Monthly Energy Review* September 2004, DOE/EIA-0035(2004/09). Web Page <http://www.eia.doe.gov/emeu/mer/resource.html>.

Figure 7. U.S. Exploratory Gas Well Completions, 1977-2003

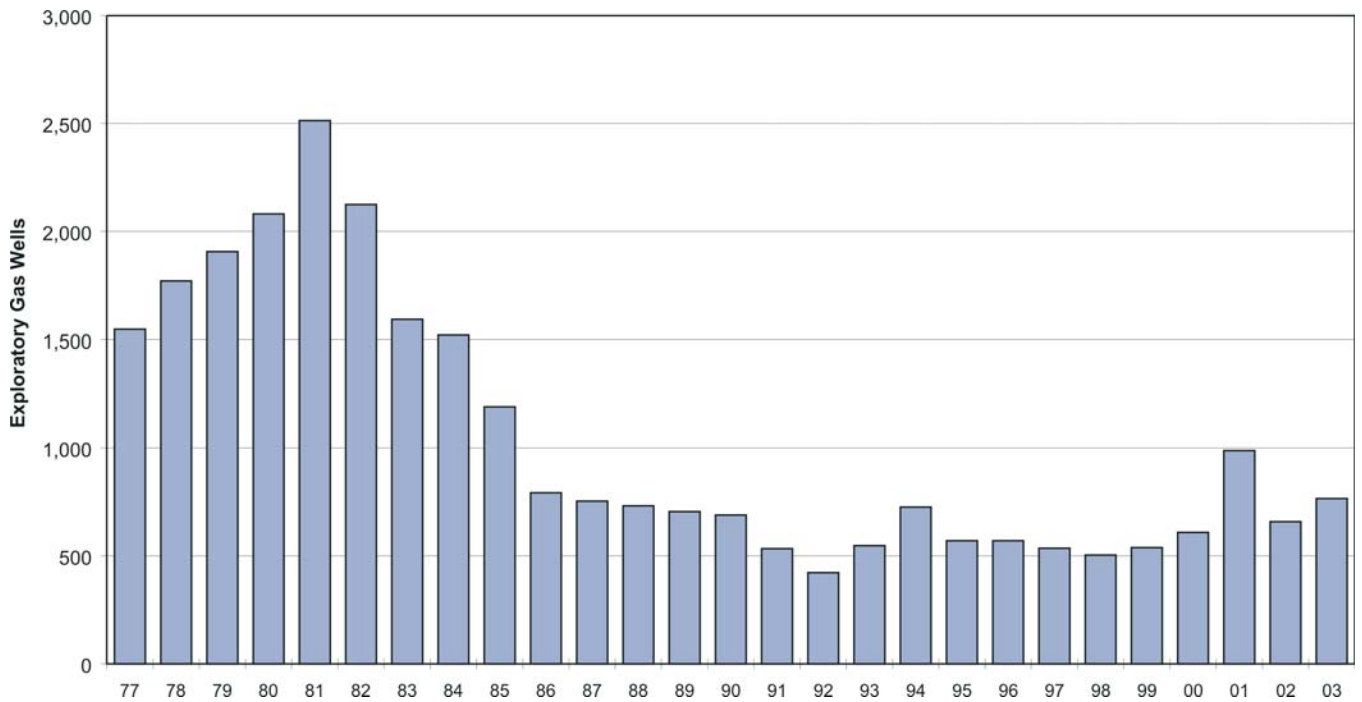
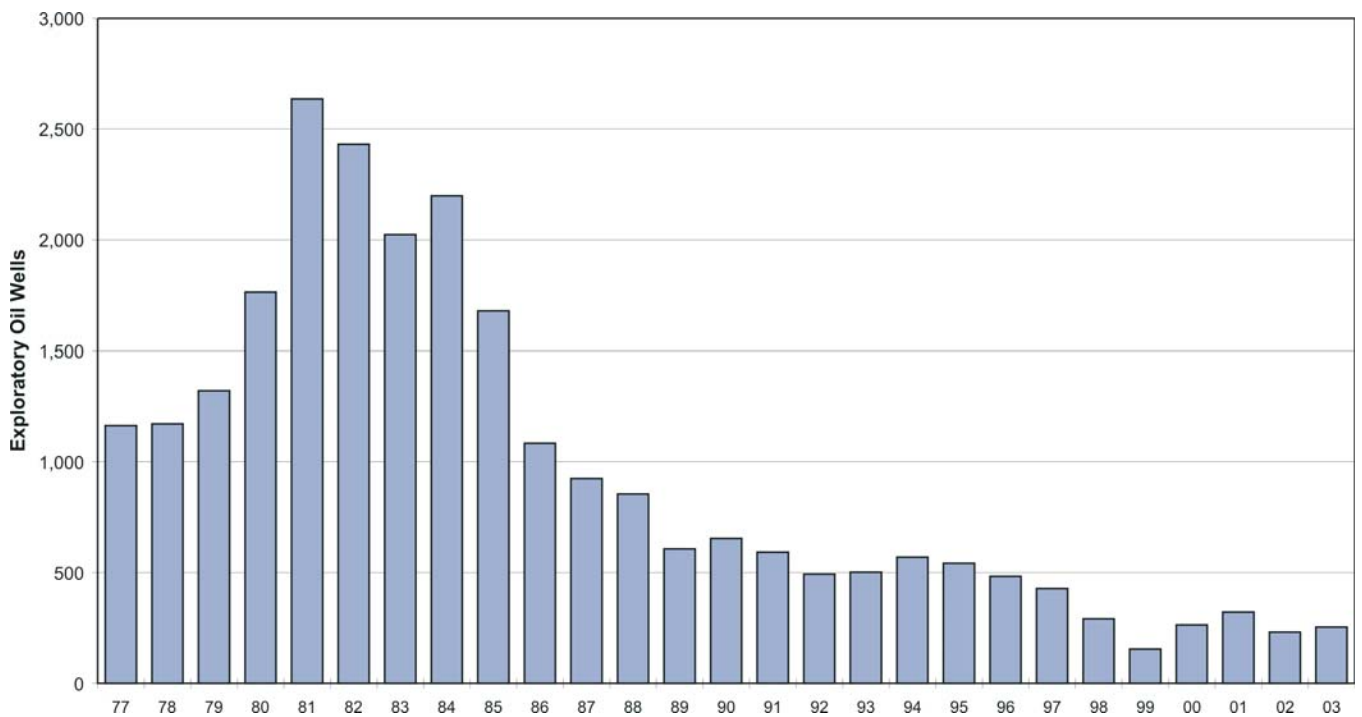


Figure 8. U.S. Exploratory Oil Well Completions, 1977-2003



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

Figure 9. U.S. Total Discoveries of Dry Natural Gas per Exploratory Gas Well Completion, 1977-2003

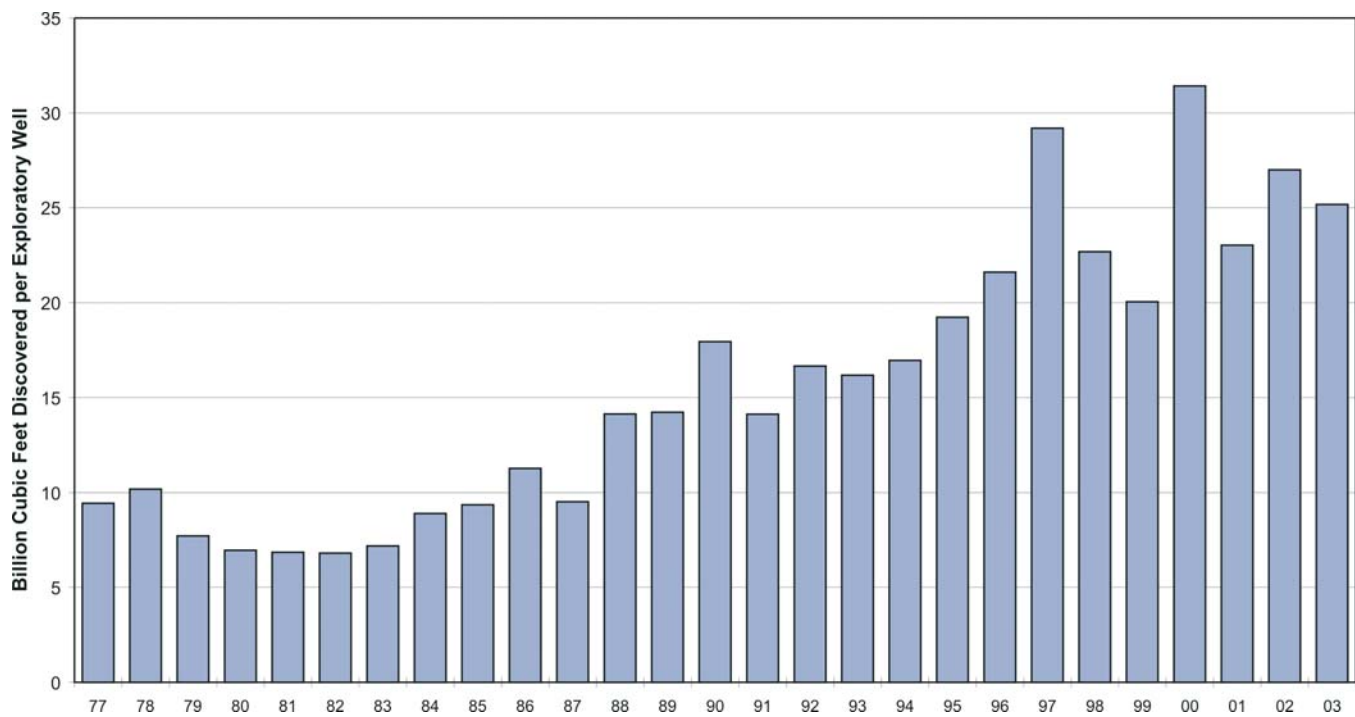
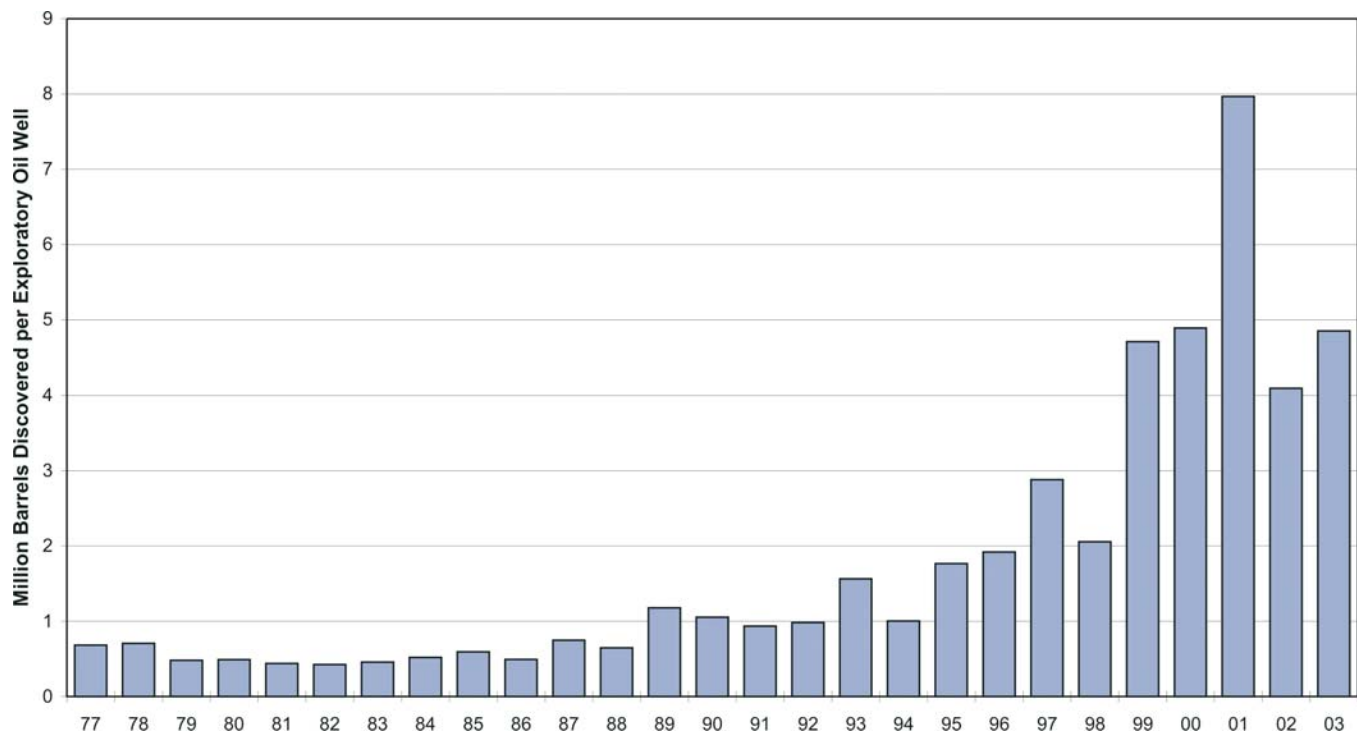


Figure 10. U.S. Total Discoveries of Crude Oil per Exploratory Oil Well Completion, 1977-2003



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

merger of Carbon with a subsidiary of Evergreen Resources, Inc. also based in Denver, in a deal worth about \$90 million. Carbon has oil and gas operations in the Piceance Basin of Colorado and in the Uintah Basin in Utah, as well as in central Alberta and southeast Saskatchewan in Canada. The acquired Carbon properties have about \$88 billion cubic feet equivalent of reserves, mostly in natural gas. {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 and economics
- number and size of new discoveries
- amount of drilling that has occurred.

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

In 2003, U.S. crude oil proved reserves decreased and oil production increased, decreasing the National average R/P ratio from 12.1 to 11.7.

Figure 11 shows the U.S. R/P ratio trend for crude oil since 1945. After World War II, increased drilling and discoveries led to a greater R/P ratio. Later, when drilling found fewer reserves than were produced, the ratio became smaller. R/P ratios also vary geographically, because of differences in development history and reservoir conditions. The 2003 National average R/P ratio for crude oil was 11.7-to-1. Areas with relatively high R/P ratios are the Permian Basin of

Texas and New Mexico, and California, where enhanced oil recovery techniques such as carbon dioxide (CO₂) 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 to 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 2002 to 2003 the U.S. average R/P ratio for natural gas increased from 9.66 to 9.74 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 2003 U.S. average R/P ratio of about 9.7-to-1. Areas with a higher range of R/P ratios than the National average were the Pacific offshore and the Rockies, as well as 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 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

Figure 11. Reserves-to-Production Ratios for Crude Oil, 1945-2003

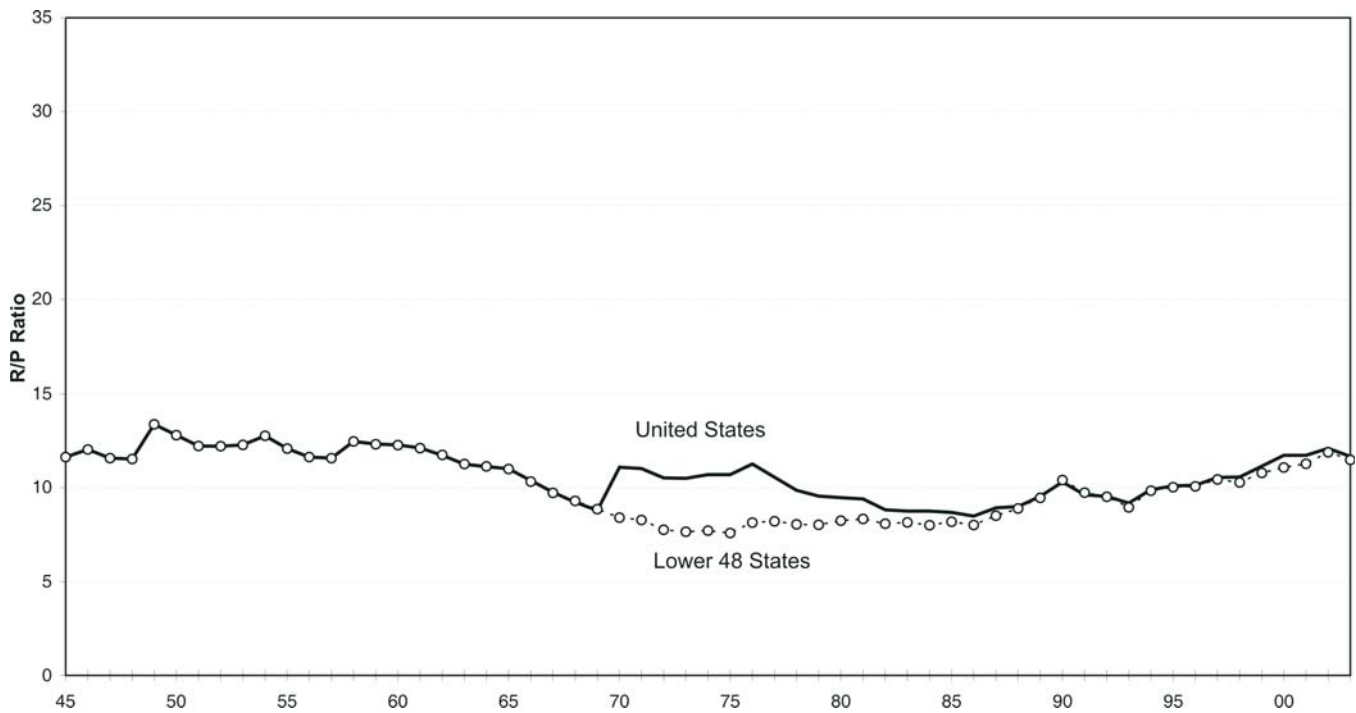
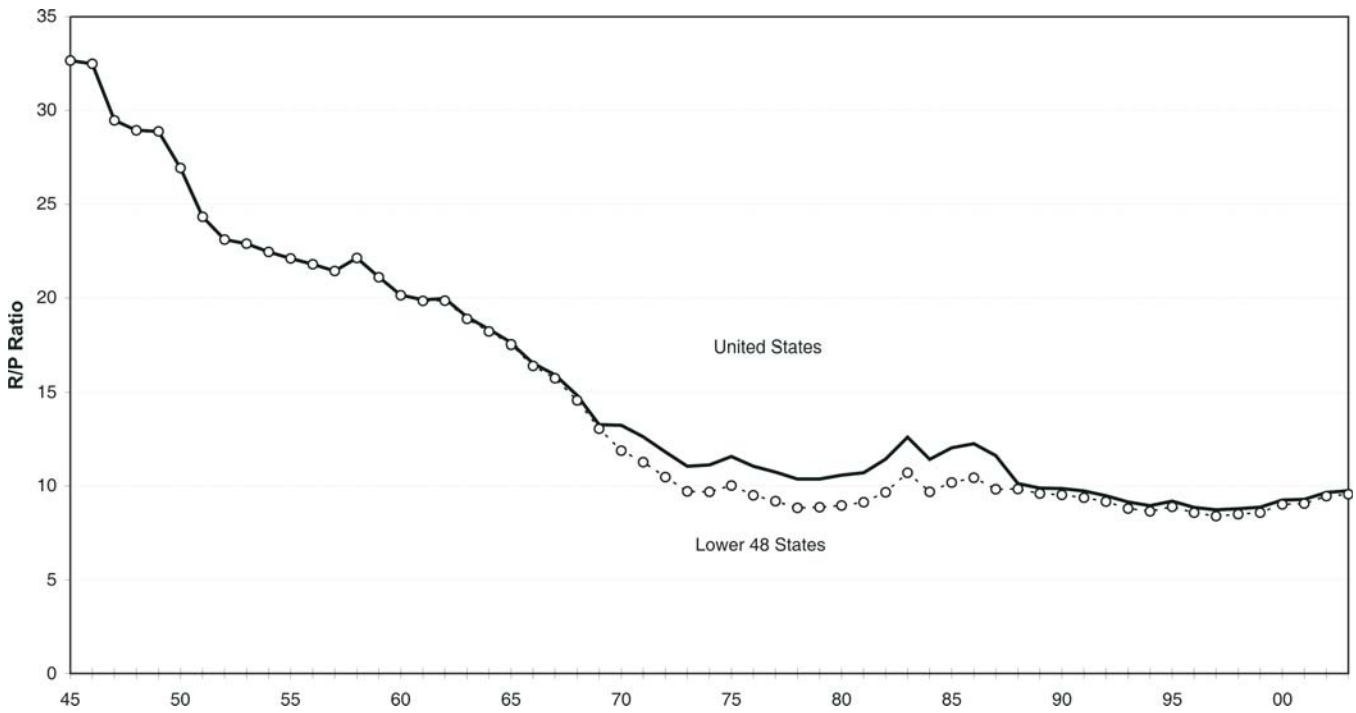


Figure 12. Reserves-to-Production Ratios for Wet Natural Gas, 1945-2003



Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {32} and Energy Information Administration, Office of Oil and Gas (1977–2002){1-26}. 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, 1977-2003

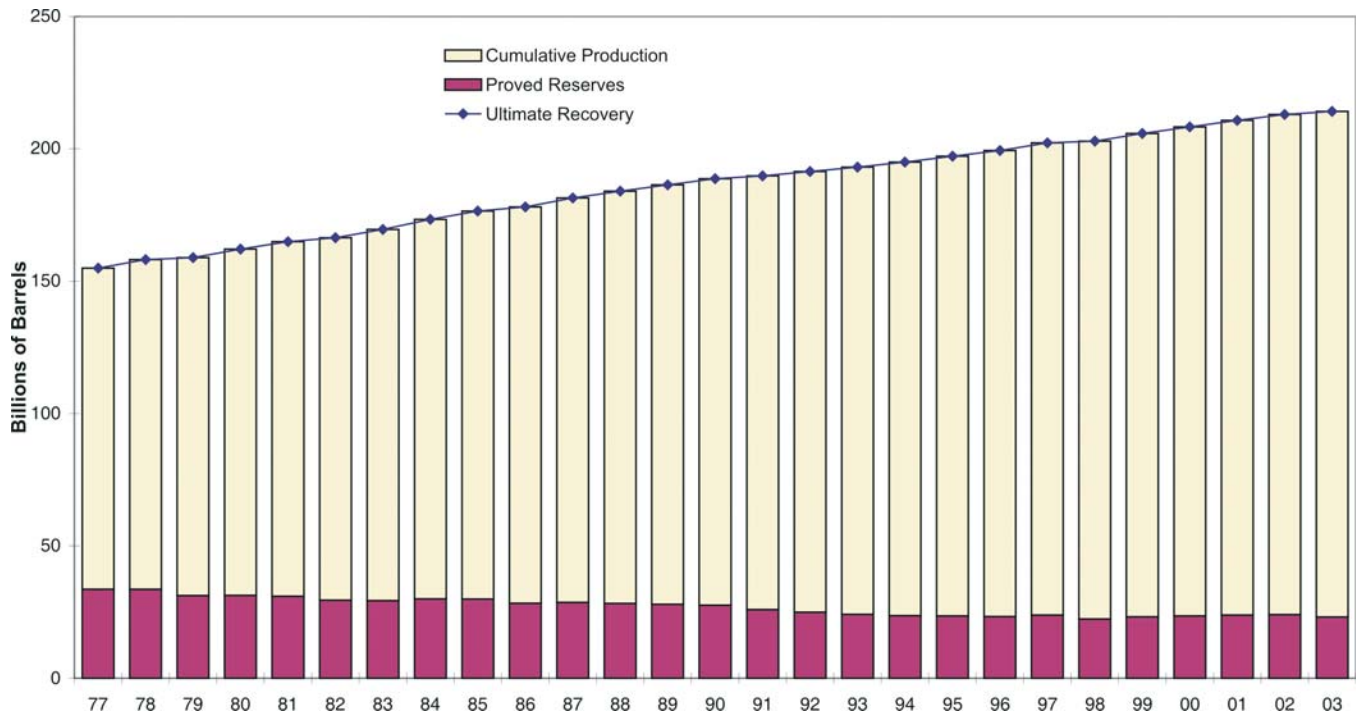
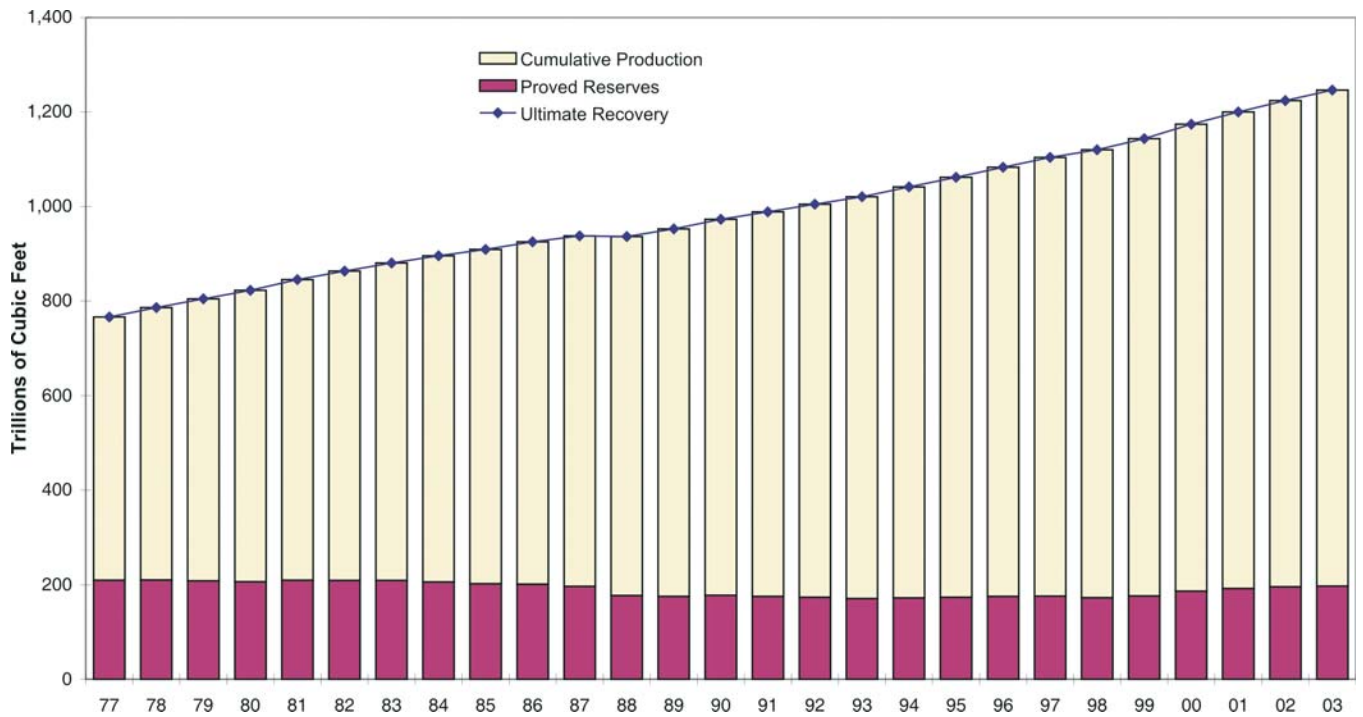


Figure 14. Components of Proved Ultimate Recovery for Wet Natural Gas, 1977-2003



Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {32} and Energy Information Administration, Office of Oil and Gas (1977–2002){1-26}. 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, 2003

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 261,900	^d 259,400	1	Russia	1,680,000	2,340,500
2	Iran ^c	125,800	105,000	2	Iran ^c	940,000	955,000
3	Iraq ^c	115,000	115,000	3	Qatar ^c	910,000	915,992
4	Kuwait ^c	^d 99,000	^d 99,375	4	Saudia Arabia ^c	^d 231,000	^d 238,500
5	Canada ^e	178,893	4,957	5	United Arab Emirates ^c	212,100	204,050
6	United Arab Emirates ^c	97,800	66,230	6	United States	186,946	186,946
7	Venezuela ^c	77,800	52,450	7	Nigeria ^c	159,000	178,500
8	Russia	60,000	65,393	8	Algeria ^c	160,000	171,500
9	Libya ^c	36,000	30,500	9	Venezuela ^c	148,000	149,210
10	Nigeria ^c	25,000	33,000	10	Iraq ^c	110,000	112,600
Top 10 Total		1,077,193	831,305	Top 10 Total		4,737,046	5,452,348
11	United States	22,677	22,677	11	Australia	90,000	142,900
12	Qatar ^c	15,207	27,352	12	Indonesia ^c	90,300	67,650
13	China	18,250	15,509	13	Norway	74,800	74,733
14	Mexico	15,674	14,597	14	Turkmenistan	71,000	-
15	Algeria ^c	11,314	14,000	15	Malaysia	75,000	57,608
16	Norway	10,447	9,395	16	Uzbekistan	66,200	-
17	Brazil	8,500	10,602	17	Kazakhstan	65,000	-
18	Kazakhstan	9,000	-	18	Egypt	58,500	71,250
19	Angola	5,412	8,800	19	Canada	59,069	59,069
20	Azerbaijan	7,000	-	20	Netherlands	62,000	55,100
21	Oman	5,506	5,700	21	Kuwait ^c	^d 55,500	^d 56,600
22	Indonesia ^c	4,700	5,500	22	China	53,325	47,911
23	Ecuador	4,630	4,950	23	Libya ^c	46,400	46,000
24	India	5,371	4,002	24	Ukraine	39,600	-
25	United Kingdom	4,665	4,300	25	Oman	29,280	31,000
Top 25 Total		1,225,546	978,689	Top 25 Total		5,673,020	6,162,169
OPEC Total		869,521	807,807	OPEC Total		3,062,400	3,095,602
World Total		1,265,812	1,051,477	World Total		6,076,494	6,803,282

^aRank is based on an average of oil reserves reported by *Oil & Gas Journal* and *World Oil*.

^bRank is based on an average of natural gas reserves reported by *Oil & Gas Journal* and *World Oil*.

^cMember of the Organization of Petroleum Exporting Countries (OPEC).

^dIncludes one-half of the reserves in the Neutral Zone.

^e*Oil and Gas Journal* Canadian oil reserves include heavy (low gravity) oil.

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, 2003, pp. 46-47. Gulf Publishing Company, *World Oil*, September, 2004, p 63.

of crude oil or natural gas are the estimated quantities of petroleum which geological and engineering data demonstrate with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions. When deterministic proved reserves estimation methods are used, the term reasonable certainty is intended to express a high degree of confidence that the estimated quantities will be recovered. When probabilistic methods are used there should be at least a 90 percent probability that the actual quantities recovered will exceed the estimate.

Figures 13 and 14 show successive estimates of proved ultimate recovery and its components (proved reserves and cumulative production) for both *crude oil plus lease condensate* and *wet natural gas*, over the period 1977 through 2003. They 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* for 1977 through 2003 was 69,732 million barrels. This substantially exceeds the 1977 proved reserves, but at the end of 2003 there were still 23,106 million barrels of *crude oil plus lease condensate* proved reserves. Therefore, the Nation's estimated proved ultimate recovery of crude oil was fundamentally increased during this period owing to the *proved ultimate recovery appreciation* process (continued development of old fields). In fact, only 12 percent of proved reserves additions of crude oil were booked as *new field discoveries* from 1976 through 2003. The rest came from the proved reserves categories related to the proved ultimate recovery appreciation process.

Similarly, the 1977 *wet natural gas* proved reserves were 209,490 billion cubic feet, but more than twice this amount of gas was produced from 1977 through 2003 and there were still 197,145 billion cubic feet of *wet natural gas* proved reserves in 2003. Only 11 percent of proved reserve additions of natural gas were booked as *new field discoveries* from 1976 through 2003.

International Perspective

International Reserves

The EIA estimates domestic oil and gas reserves but does not systematically estimate worldwide reserves.

As shown in **Table 5**, international reserves estimates are presented in two widely circulated trade publications. The world's total reserves are estimated to be roughly 1.16 trillion barrels of oil and 6.5 quadrillion cubic feet of gas.

The United States ranked 11th in the world for proved reserves of crude oil and 6th for natural gas in 2003. 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 2003. There are sometimes substantial differences between the estimates from these sources. The *Oil & Gas Journal* reported oil reserves for Canada at about 179 billion barrels. This is much higher than the *World Oil* estimate of 5 billion. The *Oil and Gas Journal* estimate includes heavy oil from Canadian tar sands, the *World Oil* estimate does not. Another reason (among many) for these differences is that condensate is often included in foreign oil reserve estimates.

The *Oil & Gas Journal* {34} estimate for world oil reserves increased 4 percent in 2003 owing to its addition of former Soviet Union states. This addition was not shared by *World Oil* {35} where the estimate increased only 2 percent. For world gas reserves, the *Oil & Gas Journal* reported a 10 percent increase, while *World Oil* reported a 11 percent increase. *World Oil* estimated a 38 percent increase in Russian gas reserves in 2003, while *Oil and Gas Journal* attributed the reserves increases to Turkmenistan, Uzbekistan, and Kazakhstan.

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

Petroleum Consumption

The United States is the world's largest energy consumer. The EIA estimates energy consumption and publishes it in its *Annual Energy Review*.{36} In 2003:

- The U.S. consumed 98,160,000,000,000 Btu of energy (98.2 quadrillion Btu). This was an increase of 0.13 quadrillion Btu from the 2002 level of consumption.
- 64 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 (25 percent).

- U.S. petroleum consumption was about 20 million barrels of oil and natural gas liquids and 60 billion cubic feet of dry gas per day.

Dependence on Imports

The United States remains dependent on imported oil and gas. In 2003, crude oil imports made up 63 percent of the U.S. crude oil supply.

Net gas imports decreased slightly from the revised 2002 total of 4.02 trillion cubic feet to 3.93 trillion cubic feet in 2003. The last decline in imports was in 1986. Imports satisfied approximately 17 percent of consumption. Almost all of this gas was pipelined from Canada. Some came from Mexico, though Mexico remains a net importer of natural gas from the U.S., and liquefied natural gas was imported from Trinidad and Tobago, Nigeria, and Algeria.

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

List Of Appendices

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

Appendix B: Top 100 Oil and Gas Fields - What fields have the most reserves and production in the United States? The top 100 fields for oil and natural gas out of the inventory of more than 45,000 oil and gas fields are listed in Appendix B. These fields hold two-thirds of U.S. crude oil proved reserves. Two new tables have been added to this appendix for 2003, ranking the top 100 oil and natural gas fields by their 2003 production rather than their proved reserves. Table B5 in Appendix B lists the top U.S. operators by reported 2003 production.

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 1993-2003, due to expressed interest from the industry regarding this area. Table D9 contains the production and proved reserves for 1993-2003 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 21,891 million barrels of crude oil proved reserves as of December 31, 2003. This is 3 percent (-786 million barrels) less than in 2002. The major factors contributing to the decline in 2003 were lower than average net revisions and adjustments and a negative net of sales and acquisitions.

The majority of crude oil total discoveries in 2003 were new field discoveries in the Gulf of Mexico Federal Offshore. The north slope of Alaska (normally a key area) had no significant impact on the National total in 2002. Operators replaced only 58 percent of 2003 oil production with proved reserves additions (Figure 15).

Proved Reserves

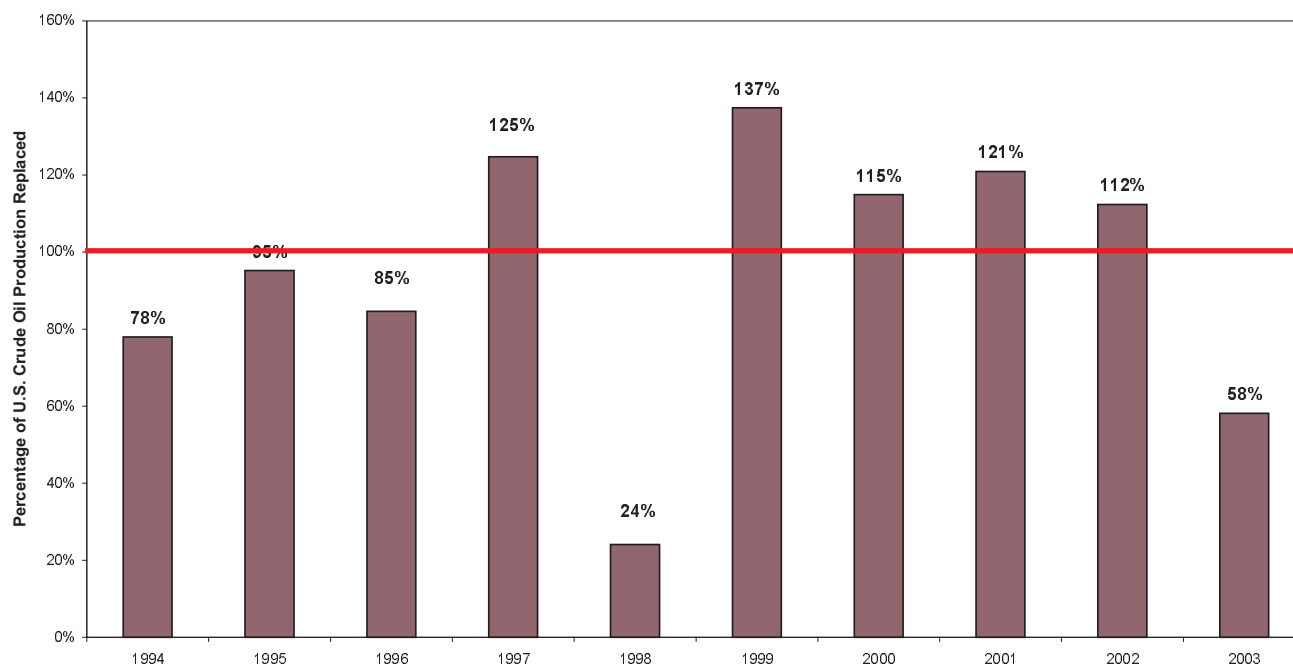
Table 6 presents the U.S. proved reserves of crude oil as of December 31, 2003, by selected States and State subdivisions.

Figure 16 maps 2003 crude oil proved reserves by area. The following four areas account for 78 percent of U.S. crude oil proved reserves:

Area	Percent of U.S. Oil Reserves
Texas	21
Gulf of Mexico Federal Offshore	21
Alaska	20
California	16
Area Total	78

Of these four areas, only the Gulf of Mexico Federal Offshore had an increase in crude oil proved reserves in 2003.

Figure 15. Reserve Additions Replace Only 58% of 2003 U.S. Crude Oil Production.



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

Table 6. Crude Oil Proved Reserves, Reserves Changes, and Production, 2003
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Published Proved Reserves 12/31/02	Changes in Reserves During 2003							New Reservoir Discoveries in Old Fields (+)	Estimated Production (-)	Proved Reserves 12/31/03
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Sales (-)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)			
Alaska	4,678	1	168	79	0	0	35	0	0	357	4,446
Lower 48 States	17,999	162	1,318	1,313	1,107	709	391	705	101	1,520	17,445
Alabama	51	1	4	0	0	0	2	0	0	6	52
Arkansas	49	9	2	1	4	2	0	0	0	7	50
California	3,633	-18	190	107	58	49	9	0	0	246	3,452
Coastal Region Onshore	404	-4	11	5	8	12	2	0	0	17	395
Los Angeles Basin Onshore	330	0	31	24	31	26	3	0	0	16	319
San Joaquin Basin Onshore	2,702	-13	139	62	19	11	4	0	0	197	2,565
State Offshore	197	-1	9	16	0	0	0	0	0	16	173
Colorado	214	-4	19	4	1	2	7	0	0	16	217
Florida	73	-1	0	1	0	0	0	0	0	3	68
Illinois	107	22	11	5	0	0	0	0	0	10	125
Indiana	15	5	1	0	0	0	0	0	0	2	19
Kansas	237	19	31	13	4	2	5	0	0	34	243
Kentucky	^a 27	2	2	4	0	0	0	0	0	2	25
Louisiana	501	3	57	75	46	38	31	0	6	63	452
North	75	5	4	9	1	0	2	0	0	10	66
South Onshore	335	1	46	48	26	19	23	0	3	39	314
State Offshore	91	-3	7	18	19	19	6	0	3	14	72
Michigan	61	12	14	16	10	21	0	0	0	7	75
Mississippi	179	9	20	9	15	1	0	0	0	16	169
Montana	288	-6	15	8	2	5	42	0	0	19	315
Nebraska	18	0	1	0	0	0	0	0	0	3	16
New Mexico	710	-5	65	69	18	15	38	0	0	59	677
East	699	-6	64	67	17	15	38	0	0	58	668
West	11	1	1	2	1	0	0	0	0	1	9
North Dakota	342	8	20	24	1	7	31	0	0	30	353
Ohio	67	9	4	8	1	0	0	0	0	5	66
Oklahoma	598	3	80	49	36	21	26	0	0	55	588
Pennsylvania	^a 12	-3	6	1	0	0	1	0	0	2	13
Texas	5,015	63	362	178	639	242	77	3	2	364	4,583
RRC District 1	50	10	4	4	1	0	7	1	0	8	59
RRC District 2 Onshore	54	4	4	5	2	3	0	0	0	7	51
RRC District 3 Onshore	218	1	15	14	32	15	14	0	0	27	190
RRC District 4 Onshore	28	1	6	3	2	2	1	0	1	4	30
RRC District 5	24	1	1	2	8	8	0	0	0	4	20
RRC District 6	198	6	11	8	9	6	2	0	0	17	189
RRC District 7B	82	-2	15	3	18	5	0	0	0	11	68
RRC District 7C	177	9	28	5	3	3	12	0	0	16	205
RRC District 8	1,913	-5	118	57	513	144	23	1	0	111	1,513
RRC District 8A	2,093	20	142	47	48	53	13	0	0	137	2,089
RRC District 9	113	10	11	10	1	2	4	0	0	15	114
RRC District 10	59	9	6	20	2	1	1	0	0	6	48
State Offshore	6	-1	1	0	0	0	0	1	1	1	7
Utah	241	1	7	18	24	25	1	0	0	12	221
West Virginia	^a 13	0	2	1	0	0	0	0	0	1	13
Wyoming	524	24	29	36	23	36	5	0	0	42	517
Federal Offshore	5,009	8	376	686	225	243	115	702	93	515	5,120
Pacific (California)	565	1	10	2	0	0	22	0	0	30	566
Gulf of Mexico (Louisiana)	4,088	5	289	616	201	230	93	698	91	426	4,251
Gulf of Mexico (Texas)	356	2	77	68	24	13	0	4	2	59	303
Miscellaneous ^b	15	1	0	0	0	0	1	0	0	1	16
U.S. Total	22,677	163	1,486	1,392	1,107	709	426	705	101	1,877	21,891

^aIndicates the estimate is associated with a sampling error (95 percent confidence interval) that exceeds 20 percent of the estimated value.

^bIncludes 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 2003 contained in the *Petroleum Supply Annual 2003*, DOE/EIA-0340(03).

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

Figure 16. Crude Oil Proved Reserves by Area, 2003

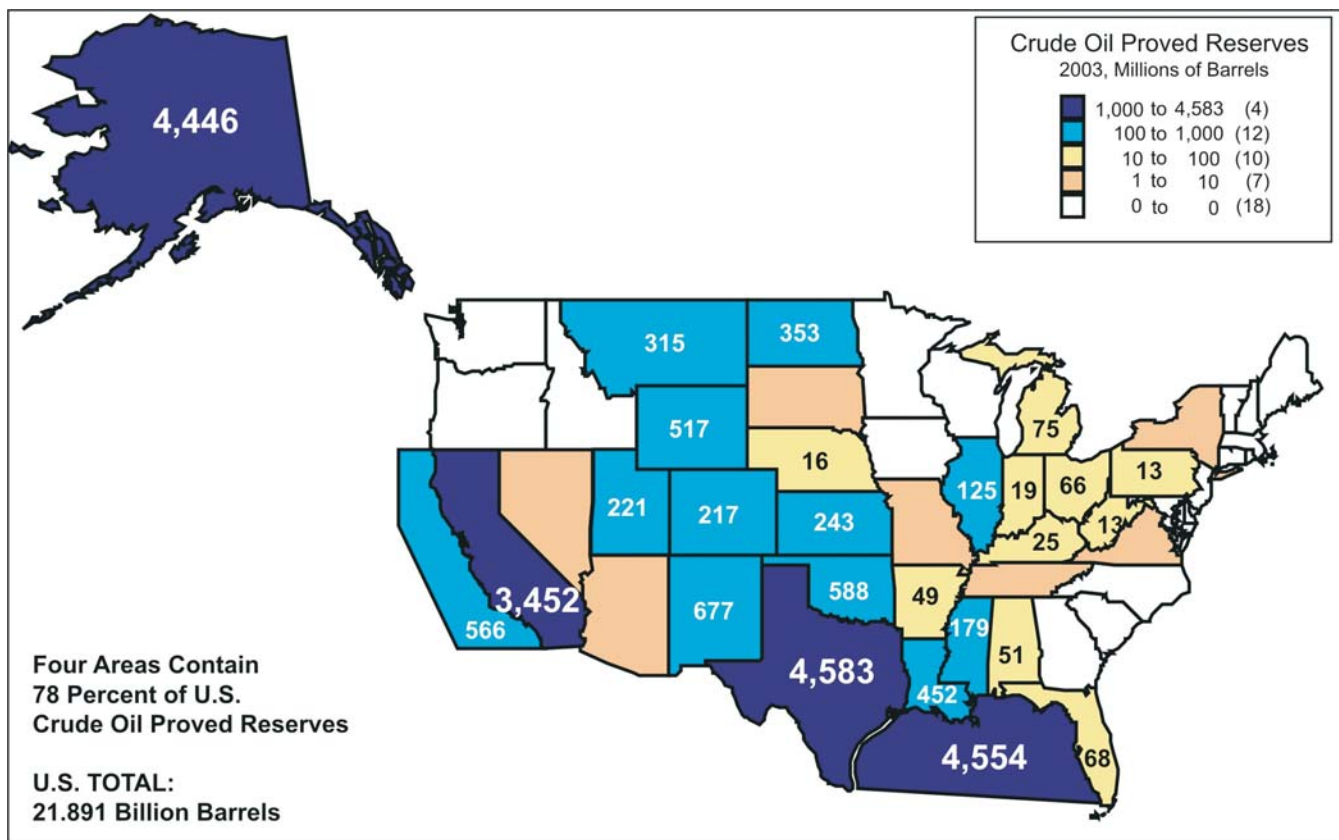
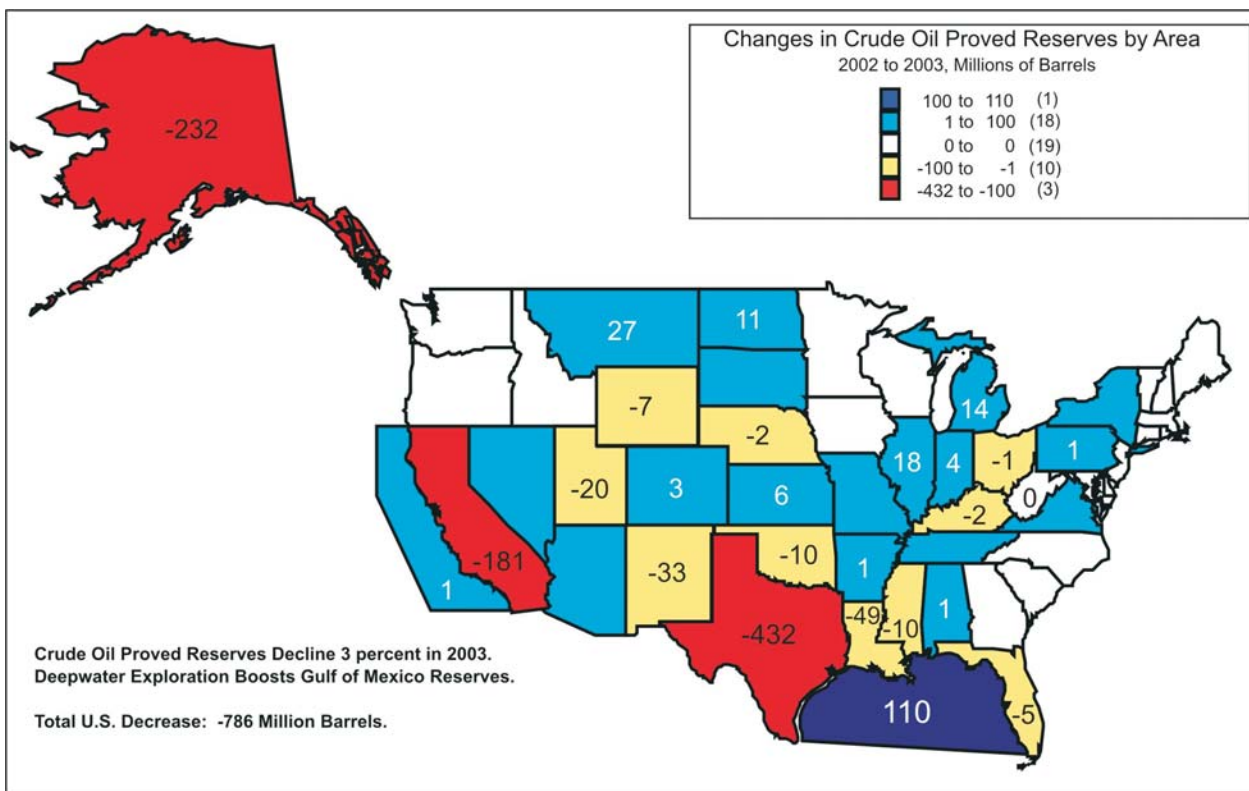


Figure 17. Changes in Crude Oil Proved Reserves by Area, 2002 to 2003



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

Discussion of Reserves Changes

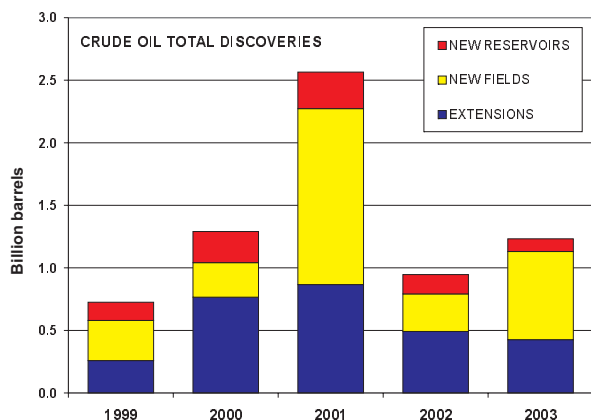
Figure 17 maps the change in crude oil proved reserves from 2002 to 2003 by area. Here's how the top four areas fared compared to the total United States:

Area	Change in U.S. Oil Reserves (million barrels)
Texas	-432
Gulf of Mexico Federal Offshore	+110
Alaska	-232
California	-181
Area Total	-735
U.S. Total	-786

Figure 2 in Chapter 2 shows the components of the changes in crude oil proved reserves for 2003 and the preceding 10 years.

Total Discoveries

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



Total discoveries of crude oil were 1,232 million barrels in 2003, 30 percent more than those of 2002. Only three areas had total discoveries exceeding 40 million barrels:

- The Gulf of Mexico Federal Offshore had 888 million barrels of total discoveries, 72 percent of the National total.
- Texas had 82 million barrels of total discoveries, 7 percent of the National total.

- Montana had 42 million barrels of total discoveries, 3 percent of the National total.

The United States discovered an average of 1,060 million barrels of new crude oil proved reserves per year in the prior 10 years (1993 through 2002). Total discoveries in 2003 (1,232 million barrels) were 16 percent higher than that average.

Extensions

Operators reported 426 million barrels of extensions in 2003. The highest volume of extensions was reported in the Gulf of Mexico Federal Offshore (93 million barrels). Texas reported 77 million barrels of extensions. Montana was third with 42 million barrels of extensions.

In the prior 10 years, U.S. operators reported an average of 498 million barrels of extensions per year. The 2003 extensions were 15 percent less than that average.

New Field Discoveries

There were 705 million barrels of new field discoveries of crude oil reported in 2003. Only two areas in the United States reported any new field discoveries, and only the Gulf of Mexico Federal Offshore contributed a significant volume (702 million barrels, or 99.6 percent).

In the prior 10 years, U.S. operators reported an average of 383 million barrels of reserves from new field discoveries per year. Reserves from new field discoveries in 2003 were 84 percent more than that average volume.

New Reservoir Discoveries in Old Fields

Operators in the United States reported 101 million barrels of crude oil reserves from new reservoir discoveries in old fields in 2003. As with new field discoveries, the most significant portion of the new reservoir discoveries in old fields came from the Gulf of Mexico Federal Offshore—93 million barrels or 92 percent of the total. Louisiana had 6 million barrels (6 percent). Texas was third with 2 million barrels (2 percent).

In the prior 10 years, U.S. operators reported an average of 178 million barrels of reserves from new reservoir discoveries in old fields per year. Reserves

from new reservoir discoveries in old fields in 2003 were 43 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 1,486 million barrels of revision increases, 1,392 million barrels of revision decreases, and 163 million barrels of adjustments in 2003. Combined, there were 257 million barrels of net revisions and adjustments for crude oil in 2003.

In the prior 10 years, net revisions and adjustments added an average of 916 million barrels per year. The 2003 net revisions and adjustments were substantially less than this volume and a major factor in the net loss of proved reserves of crude oil in 2003.

Sales and Acquisitions

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

There are several reasons why sales and acquisitions volumes are not equal. Since operators have different engineering staffs and resources, or different development plans or schedules, the estimate of proved reserves for a field can change with a change in ownership. Timing of the transfer of operations can also impact these values.

In 2003, there were 1,107 million barrels of sales transactions between operators, and 709 million barrels of acquisitions -- yielding a net difference of -398 million barrels in 2003. This large net difference, like the reduced net revisions and adjustments, contributed to the net loss of proved reserves of crude oil in 2003.

Production

U.S. production of crude oil in 2003 was an estimated 1,877 million barrels. This volume does not include lease condensate. This was less than 1 percent higher than 2002's production of 1,875 million barrels. The Gulf of Mexico Federal Offshore remained the largest producing area in the United States with 485 million barrels of production (26 percent of the National total). Texas and Alaska were second and third, each with 19 percent of the total. California was fourth with 13 percent.

The 2003 Form EIA-23 National production estimates (2,068 million barrels of crude oil and lease condensate) were slightly less than the comparable Petroleum Supply Annual (PSA) 2003 volumes for crude oil and lease condensate production combined (2,073 million barrels).

Areas of Note: Large Discoveries and Reserves Additions

The following State and area discussions summarize notable activities during 2003 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 2003.

Gulf of Mexico Federal Offshore

The Gulf of Mexico Federal Offshore led the Nation in total discoveries of crude oil proved reserves in 2003, 888 million barrels of total discoveries which is 72 percent of the National total.

- **Atlantis Field:** On February 10, 2003, BHP Billiton announced the results of appraisal well drilling and approved full funding for the development of the Atlantis Field. BHP Billiton has 44 percent interest in the Atlantis Field, BP is the operator with 56 percent interest. The estimate of recovery is 635 million barrels of oil equivalent. The Atlantis Field is located in the Atwater Foldbelt, approximately 125 miles south of New Orleans in the vicinity of Green Canyon Block 743. Comprising seven blocks in the area at water depths ranging from 4,400 to 7,100 feet. The field will be developed using a moored

semi-submersible production facility with a gross design capacity of 150,000 barrels of oil and 180 million cubic feet of natural gas per day. Atlantis is believed to be the third largest oil and gas field yet discovered in the Gulf of Mexico. {38}

- **Tahiti Field:** On April 22, 2003 ChevronTexaco announced positive results from two Tahiti appraisal wells, confirming one of the most significant net pay accumulations in the history of the deepwater Gulf of Mexico. The two-well appraisal program confirmed that the reservoirs in Tahiti are well developed and correlate over a three-mile distance. These results validated the hydrocarbon reservoirs found in the Tahiti discovery well, with one appraisal well encountering more than 1,000 feet of net pay in high-quality sandstones.

The Tahiti appraisal wells, located in Green Canyon blocks 596 and 640, approximately 190 miles southwest of New Orleans, were drilled in slightly more than 4,000 feet of water. The wells were drilled simultaneously using two rigs, the *Glomar Explorer* and the Transocean Inc. *Discoverer Deep Seas*, each drilling a vertical well with a sidetrack.

The Tahiti appraisal program has provided verification of the company's initial estimates of 400 million to 500 million barrels of ultimate recoverable oil reserves. The estimates were announced in June 2002, soon after the discovery. {39}

- **New Water-Depth Drilling Record:** On November 17, 2003 Transocean Inc. and ChevronTexaco announced that the Transocean drillship *Discoverer Deep Seas* had set a new world water-depth drilling record by spudding a well in 10,011 feet of water in the U.S. Gulf of Mexico. The record — set while constructing ChevronTexaco's Toledo well in Alaminos Canyon block 951 — marks the first time in the offshore drilling industry's history that a drilling rig has explored for oil and natural gas in more than 10,000 feet of water.

The previous world water-depth drilling record was 9,727 feet of water in the U.S. Gulf of Mexico by another Transocean drillship, the *Discoverer Spirit*, in October 2001 working for Unocal. {40}

Other Gain Areas

Montana: Montana reported a net increase of 27 million barrels of proved oil reserves in 2003 and had the third largest volume of extensions nationwide in 2003 (42 million barrels).

Illinois: Proved oil reserves in Illinois were revised upwards by 17 percent (18 million barrels) in 2003 as compared to 2002.

Areas of Note: Large Reserves Declines

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

Texas

Texas' crude oil proved reserves declined 9 percent (-432 million barrels) in 2003. Operators also reported a production decrease of 1 percent (-4 million barrels) from the 2002 level.

Alaska

Alaskan crude oil proved reserves declined 5 percent (-232 million barrels) in 2003. Alaskan operators reported revision increases and extensions in 2003, but this did not offset Alaska's oil production—an estimated 357 million barrels in 2003. Alaska production decreased 1 percent (-4 million barrels) from its 2002 level.

California

There was a net decline of 5 percent (-181 million barrels) in California's crude oil proved reserves in 2003. California's crude oil production declined 4 percent (-11 million barrels) from its 2002 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.

Louisiana: Proved oil reserves decreased by 10 percent (-49 million barrels).

New Mexico: Proved oil reserves decreased by 5 percent (-33 million barrels).

Reserves in Nonproducing Status

Not all proved reserves of crude oil reported in 2003 were producing. Operators reported 5,580 million barrels of proved reserves in nonproducing status, 6 percent more than reported in 2002 (5,271 million barrels). Nonproducing crude oil reserves (not including lease condensate) are listed in **Table 7**.

Nonproducing reserves are those awaiting well workovers, the drilling of extensions or additional development wells, installation of production or pipeline facilities, and 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, 2003^a
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Nonproducing Crude Oil Reserves	State and Subdivision	Nonproducing Crude Oil Reserves
Alaska	734	North Dakota	47
Lower 48 States	4,846	Ohio	8
Alabama	2	Oklahoma	92
Arkansas	2	Pennsylvania	1
California	313	Texas	613
Coastal Region Onshore	61	RRC District 1	14
Los Angeles Basin Onshore	117	RRC District 2 Onshore	12
San Joaquin Basin Onshore	110	RRC District 3 Onshore	37
State Offshore	25	RRC District 4 Onshore	7
Colorado	61	RRC District 5	2
Florida	6	RRC District 6	16
Illinois	0	RRC District 7B	5
Indiana	0	RRC District 7C	12
Kansas	18	RRC District 8	165
Kentucky	4	RRC District 8A	319
Louisiana	190	RRC District 9	16
North	14	RRC District 10	6
South Onshore	150	State Offshore	2
State Offshore	26	Utah	76
Michigan	14	Virginia	0
Mississippi	68	West Virginia	0
Montana	79	Wyoming	61
Nebraska	0	Federal Offshore	3,041
New Mexico	133	Pacific (California)	93
East	133	Gulf of Mexico (Louisiana)	2,801
West	0	Gulf of Mexico (Texas)	147
New York	0	Miscellaneous ^b	17
		U.S. Total	5,580

^aIncludes 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).

^bIncludes Arizona, Missouri, Nevada, South Dakota, and Tennessee.

Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2003.

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Energy Information Administration

4. Natural Gas Statistics

Dry Natural Gas

Proved Reserves

The United States had 189,044 billion cubic feet of dry natural gas reserves as of December 31, 2003, a 1 percent increase over the 2002 level (**Table 8**). All natural gas proved reserves data shown in this report exclude natural gas held in underground storage.

Reserves additions were 111 percent of production (**Figure 18**), and gas production increased 0.4 percent in 2003. Production declines in the Gulf of Mexico, New Mexico, and Louisiana were offset by production increases in Colorado, Texas, Oklahoma, and Wyoming.

In 2003, Colorado, Texas, Wyoming, and Oklahoma dominated dry gas reserves additions. This activity continues the trend of developing “unconventional” gas fields, i.e., tight sands, shales, and coalbeds. Considering the growing contribution of this gas to the

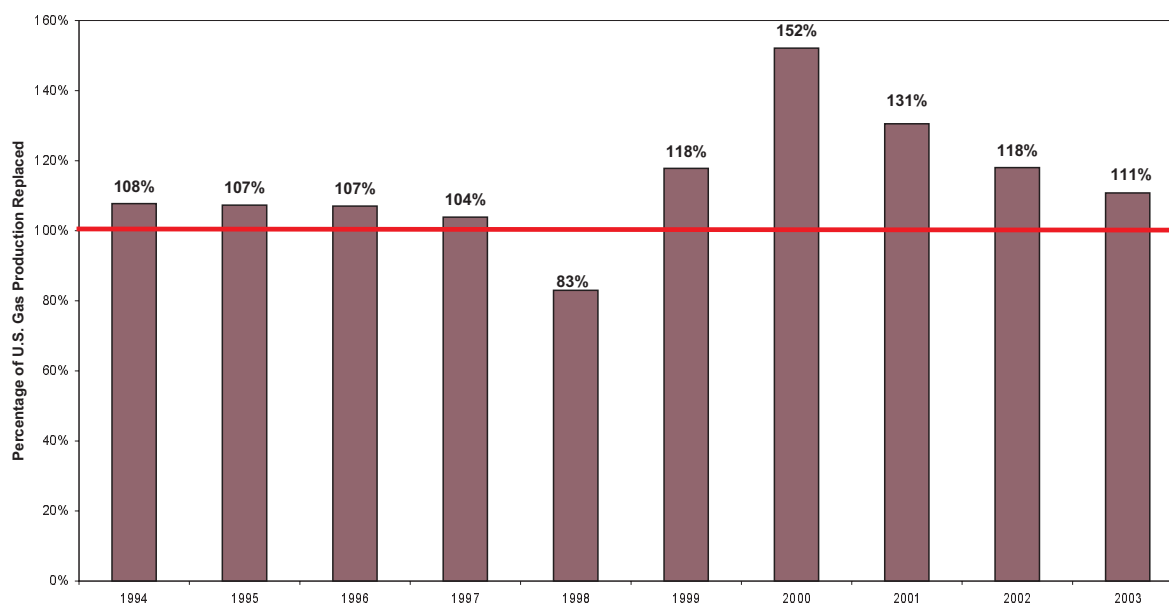
National total, the term “unconventional” is becoming a misnomer.

Additions to dry gas reserves in 2003 were 21,523 billion cubic feet, 6 percent less than in 2002. However, U.S. total discoveries of dry natural gas reserves were 19,286 billion cubic feet in 2003, up 8 percent from 2002 (17,795 billion cubic feet).

Proved reserves by State are shown on the map in **Figure 19**. Six areas account for 73 percent of the Nation’s dry natural gas proved reserves:

Area	Percent of U.S. Gas Reserves
Texas	24
Wyoming	12
Gulf of Mexico Federal Offshore	12
New Mexico	9
Colorado	8
Oklahoma	8
Area Total	73

Figure 18. Reserve Additions Replace 111% of 2003 U.S. Dry Natural Gas Production



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

Table 8. Dry Natural Gas Proved Reserves, Reserves Changes, and Production, 2003
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/02	Changes in Reserves During 2003									Proved Reserves 12/31/03
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Sales (-)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (-)	
Alaska	8,468	1	427	235	0	0	81	20	1	478	8,285
Lower 48 States	178,478	2,840	19,485	21,315	10,174	11,208	16,373	1,202	1,609	18,947	180,759
Alabama	3,884	-36	588	122	246	264	315	0	4	350	4,301
Arkansas	1,650	21	148	134	63	82	125	0	0	166	1,663
California	2,591	-52	301	172	60	47	55	5	0	265	2,450
Coastal Region Onshore	190	5	13	30	2	2	0	0	0	11	167
Los Angeles Basin Onshore	207	3	19	34	25	26	1	0	0	10	187
San Joaquin Basin Onshore	2,102	-60	263	99	33	19	54	5	0	238	2,013
State Offshore	92	0	6	9	0	0	0	0	0	6	83
Colorado	13,888	-3	2,114	812	429	604	1,215	1	0	1,142	15,436
Florida	91	-9	0	0	0	0	0	0	0	3	79
Kansas	4,983	149	206	180	230	239	78	0	0	426	4,819
Kentucky	1,907	49	128	167	0	0	49	0	1	78	1,889
Louisiana	8,960	281	792	1,159	622	513	1,584	12	244	1,280	9,325
North	4,245	95	255	319	287	242	1,233	5	6	401	5,074
South Onshore	4,224	154	452	755	237	166	323	7	164	753	3,745
State Offshore	491	32	85	85	98	105	28	0	74	126	506
Michigan	3,254	65	303	235	201	386	74	0	2	220	3,428
Mississippi	744	-26	67	41	42	29	81	0	28	94	746
Montana	906	-28	46	26	225	326	146	0	0	86	1,059
New Mexico	17,320	-104	1,547	1,941	652	852	1,394	3	16	1,415	17,020
East	3,632	-14	622	950	218	242	475	3	16	507	3,301
West	13,688	-90	925	991	434	610	919	0	0	908	13,719
New York	^a 315	41	37	29	118	111	24	19	0	35	^a 365
North Dakota	471	25	36	44	1	6	5	0	0	50	448
Ohio	^a 1,117	97	121	127	7	0	7	0	0	^a 82	1,126
Oklahoma	14,886	226	2,892	2,843	1,598	1,864	1,509	6	13	1,554	15,401
Pennsylvania	2,216	314	241	263	30	1	149	21	3	165	2,487
Texas	44,297	1,289	4,462	5,100	2,552	2,878	5,044	195	383	5,166	45,730
RRC District 1	1,045	36	59	87	15	6	109	0	9	100	1,062
RRC District 2 Onshore	1,782	200	205	333	146	29	279	11	25	282	1,770
RRC District 3 Onshore	3,584	45	383	531	191	83	458	50	44	576	3,349
RRC District 4 Onshore	9,469	325	943	1,936	441	465	1,084	38	197	1,381	8,763
RRC District 5	4,602	130	706	278	336	350	638	5	47	457	5,407
RRC District 6	6,256	184	383	496	667	787	829	1	50	642	6,685
RRC District 7B	260	165	57	104	5	5	19	0	0	57	340
RRC District 7C	3,702	149	425	173	36	91	507	1	11	350	4,327
RRC District 8	5,361	-97	546	532	202	207	322	21	0	484	5,142
RRC District 8A	1,084	10	112	54	11	12	3	0	0	100	1,056
RRC District 9	2,877	0	116	154	211	563	450	0	0	332	3,309
RRC District 10	3,838	87	490	333	268	261	326	1	0	338	4,064
State Offshore	437	55	37	89	23	19	20	67	0	67	456
Utah	4,135	40	188	767	729	690	230	0	7	278	3,516
Virginia	1,673	1	45	37	0	0	117	0	0	82	1,717
West Virginia	3,360	54	182	306	1	36	167	0	3	189	3,306
Wyoming	20,527	132	2,072	2,704	333	406	3,068	32	0	1,456	21,744
Federal Offshore ^b	25,204	311	2,963	4,106	2,035	1,873	902	908	903	4,353	22,570
Pacific (California)	515	-1	41	2	0	0	5	0	0	47	511
Gulf of Mexico (Louisiana) ^b	18,500	261	1,866	2,922	1,557	1,563	713	824	724	3,244	16,728
Gulf of Mexico (Texas)	6,189	51	1,056	1,182	478	310	184	84	179	1,062	5,331
Miscellaneous ^c	99	3	6	0	0	1	35	0	2	12	134
U.S. Total	186,946	2,841	19,912	21,550	10,174	11,208	16,454	1,222	1,610	19,425	189,044

^aIndicates the estimate is associated with a sampling error (95 percent confidence interval) that exceeds 20 percent of the estimated value.

^bIncludes Federal offshore Alabama.

^cIncludes 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 2003 contained in the *Natural Gas Annual 2003*, DOE/EIA-0131(03).

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

Figure 19. Dry Natural Gas Proved Reserves by Area, 2003

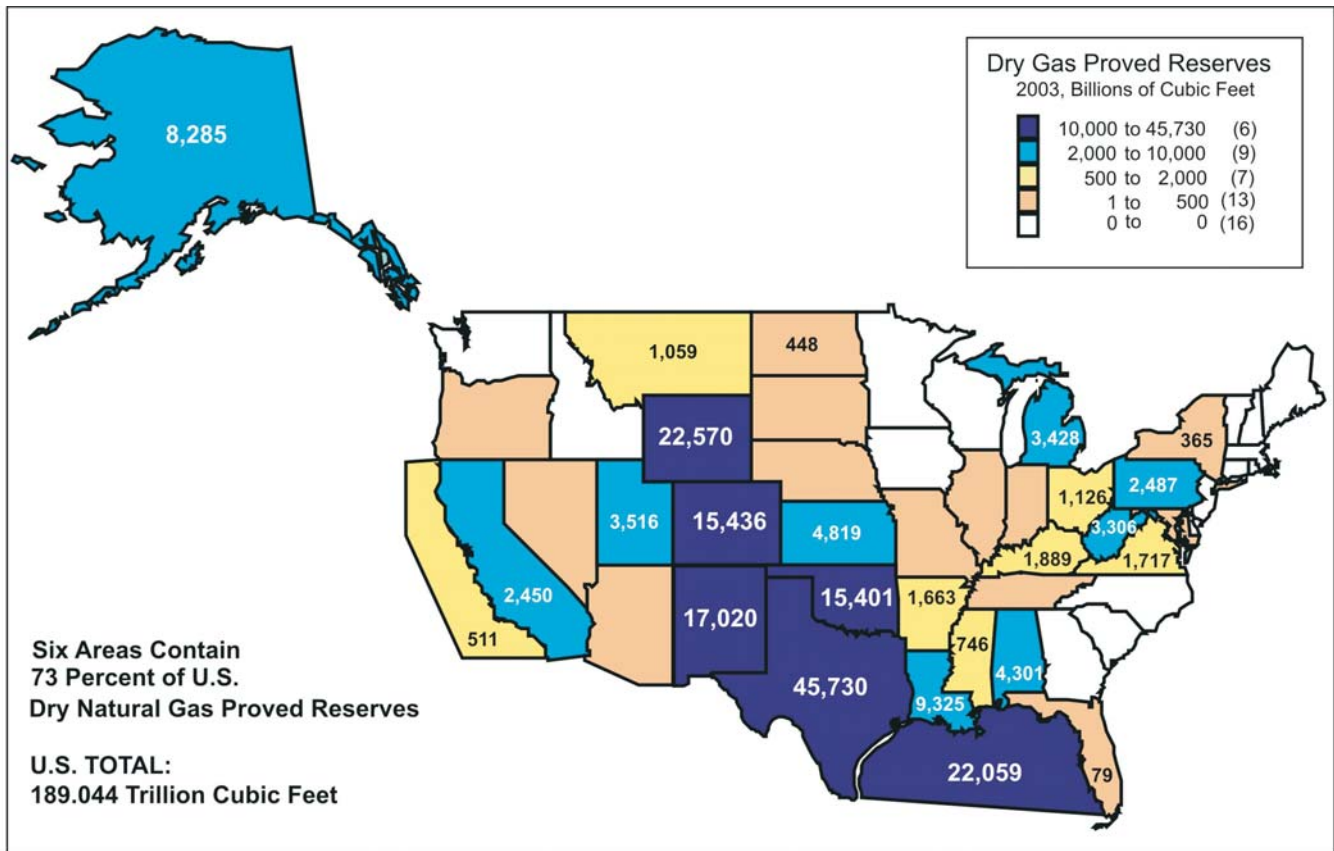
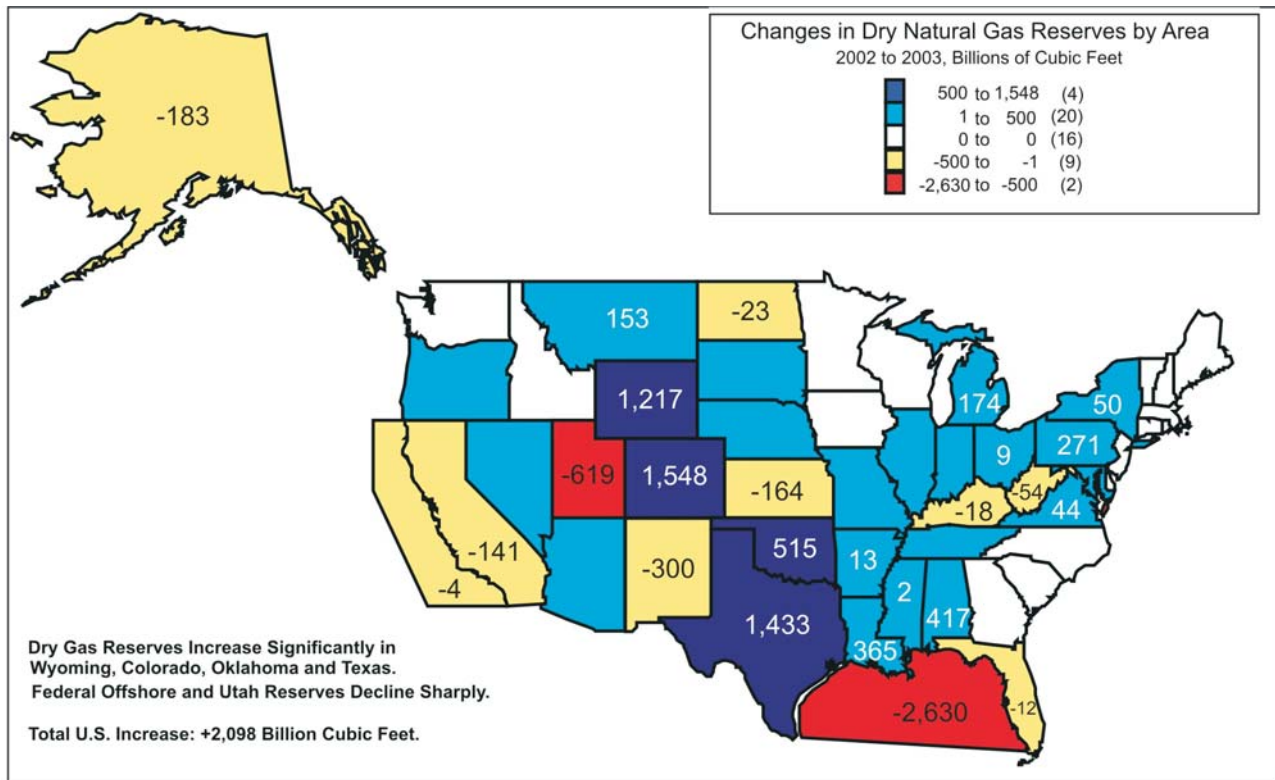


Figure 20. Changes in Dry Natural Gas Proved Reserves by Area, 2002 to 2003



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

Discussion of Reserves Changes

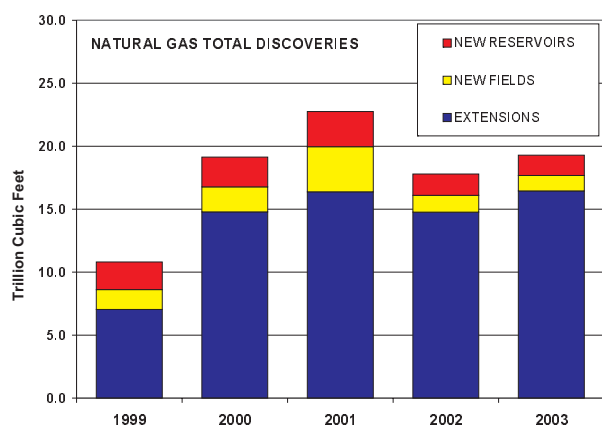
Figure 20 maps the change in dry gas proved reserves from 2002 to 2003 by area. Here's how the top six areas fared, compared to the total United States:

Area	Change in U.S. Gas Reserves (billion cubic feet)
Texas	+1,433
Wyoming	+1,217
Gulf of Mexico Federal Offshore	-2,630
New Mexico	-300
Colorado	+1,548
Oklahoma	+515
Area Total	+1,783
U.S. Total	+2,098

Figure 4 in Chapter 2 shows the components of change in dry natural gas proved reserves for 2003 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 19,286 billion cubic feet in 2003, an 8 percent increase from the level reported in 2002. About 29 percent of the total discoveries were in Texas, 16 percent were in Wyoming, 14 percent were in the Gulf of Mexico Federal Offshore, 10 percent were in Louisiana, 8 percent were in Oklahoma, and 7 percent were in New Mexico.



The largest component of total discoveries in 2003 were extensions of existing gas fields. Extensions were 16,454 billion cubic feet, 11 percent more than 2002 and 66 percent more than the prior 10-year average (9,941

billion cubic feet). Areas with the largest extensions and their percentage of total extensions were:

- Texas had 5,044 billion cubic feet of extensions (31 percent of the total)
- Wyoming had 3,068 billion cubic feet (19 percent)
- Louisiana had 1,584 billion cubic feet (10 percent)
- Oklahoma had 1,509 billion cubic feet (9 percent)
- New Mexico had 1,394 billion cubic feet (8 percent)
- Colorado had 1,215 billion cubic feet (7 percent).

New field discoveries were 1,222 billion cubic feet in 2003—8 percent less than in 2002. The areas with the largest new field discoveries were the Gulf of Mexico Federal Offshore (with 908 billion cubic feet of new field discoveries, 74 percent of the total), Texas (195 billion cubic feet, 16 percent), and Wyoming (32 billion cubic feet, 3 percent). In the prior 10 years, U.S. operators reported an average of 1,813 billion cubic feet of reserves from new field discoveries per year. Reserves from new field discoveries in 2003 were 33 percent less than that average.

New reservoir discoveries in old fields were 1,610 billion cubic feet, 5 percent less than 2002. The areas with the largest new reservoir discoveries in old fields and their percentage of the total were:

- Gulf of Mexico Federal Offshore (903 billion cubic feet, 56 percent)
- Texas (383 billion cubic feet, 24 percent)
- Louisiana (244 billion cubic feet, 15 percent).

In the prior 10 years, U.S. operators reported an average of 2,451 billion cubic feet of reserves from new reservoirs discovered in old fields per year. Reserves from new reservoirs discovered in old fields in 2003 were 66 percent of that average.

Revisions and Adjustments

There were 19,912 billion cubic feet of revision increases, 21,550 billion cubic feet of revision decreases, and 2,841 billion cubic feet of adjustments in 2003. Combined, there were 1,203 billion cubic feet of net revisions and adjustments in 2003, excluding reserves additions from net sales and acquisitions. This is 80 percent less than the average volume of net revisions and adjustments of the prior 10 years (6,100 billion cubic feet).

Table 9. Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2003 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/02	Changes in Reserves During 2003							New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (-)	Proved Reserves 12/31/03
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Sales (-)	Acquisitions (+)	Extensions (+)					
Alaska	8,533	-1	428	234	0	0	81	20	1	480	8,348	
Lower 48 States	187,028	2,324	20,352	22,261	10,593	11,700	17,114	1,232	1,652	19,751	188,797	
Alabama	3,922	-42	598	125	251	270	321	0	4	352	4,345	
Arkansas	1,654	19	149	134	63	82	125	0	0	166	1,666	
California	2,696	-36	317	180	63	50	57	5	0	277	2,569	
Coastal Region Onshore	197	5	14	31	2	2	0	0	0	11	174	
Los Angeles Basin Onshore	218	1	20	36	26	28	1	0	0	10	196	
San Joaquin Basin Onshore	2,190	-43	277	104	35	20	56	5	0	250	2,116	
State Offshore	91	1	6	9	0	0	0	0	0	6	83	
Colorado	14,348	-51	2,176	836	442	622	1,250	1	0	1,175	15,893	
Florida	102	-7	0	0	0	0	0	0	0	3	92	
Kansas	5,329	148	219	192	245	256	83	0	0	455	5,143	
Kentucky	1,999	41	134	174	0	0	51	0	1	81	1,971	
Louisiana	9,190	278	815	1,193	638	525	1,612	12	254	1,317	9,538	
North	4,283	111	258	323	291	245	1,249	5	6	406	5,137	
South Onshore	4,395	135	468	781	245	171	334	7	170	780	3,874	
State Offshore	512	32	89	89	102	109	29	0	78	131	527	
Michigan	3,311	69	308	240	205	392	75	0	2	224	3,488	
Mississippi	746	-27	67	41	42	29	81	0	28	93	748	
Montana	914	-29	46	26	227	329	147	0	0	86	1,068	
New Mexico	18,453	-3	1,672	2,106	703	915	1,503	3	18	1,526	18,226	
East	4,011	2	690	1,054	242	268	527	3	18	562	3,661	
West	14,442	-5	982	1,052	461	647	976	0	0	964	14,565	
New York	^a 315	41	37	29	118	111	24	19	0	35	^a 365	
North Dakota	524	25	41	49	1	7	6	0	0	56	497	
Ohio	^a 1,118	97	121	127	7	0	7	0	0	^a 82	1,127	
Oklahoma	15,753	175	3,048	2,996	1,684	1,964	1,590	6	13	1,638	16,231	
Pennsylvania	2,225	313	242	264	30	1	150	22	3	165	2,497	
Texas	47,491	1,053	4,750	5,396	2,699	3,060	5,346	200	395	5,483	48,717	
RRC District 1	1,094	20	61	89	15	6	113	0	9	104	1,095	
RRC District 2 Onshore	1,867	205	214	348	153	30	292	11	26	295	1,849	
RRC District 3 Onshore	3,826	18	406	562	202	88	485	53	46	610	3,548	
RRC District 4 Onshore	9,861	258	974	2,000	455	481	1,121	39	203	1,427	9,055	
RRC District 5	4,653	125	713	281	339	354	644	5	47	461	5,460	
RRC District 6	6,561	144	399	516	695	819	862	1	52	668	6,959	
RRC District 7B	294	186	64	118	6	6	22	0	0	65	383	
RRC District 7C	4,167	99	471	192	40	100	561	0	12	387	4,791	
RRC District 8	6,056	-80	619	604	230	235	365	24	0	550	5,835	
RRC District 8A	1,167	12	121	59	12	13	3	0	0	108	1,137	
RRC District 9	3,210	-50	128	169	231	620	496	0	0	365	3,639	
RRC District 10	4,299	59	543	369	298	289	362	1	0	376	4,510	
State Offshore	436	57	37	89	23	19	20	66	0	67	456	
Utah	4,274	20	194	789	750	710	237	0	7	286	3,617	
Virginia	1,673	1	45	37	0	0	117	0	0	82	1,717	
West Virginia	3,498	13	187	315	1	37	171	0	3	194	3,399	
Wyoming	21,531	52	2,164	2,825	347	424	3,205	33	0	1,521	22,716	
Federal Offshore ^b	25,862	174	3,016	4,187	2,077	1,915	921	931	922	4,444	23,033	
Pacific (California)	515	0	40	2	0	0	5	0	0	47	511	
Gulf of Mexico (Louisiana) ^b	19,113	141	1,916	2,998	1,597	1,604	731	846	742	3,330	17,168	
Gulf of Mexico (Texas)	6,234	33	1,060	1,187	480	311	185	85	180	1,067	5,354	
Miscellaneous ^c	100	0	6	0	0	1	35	0	2	10	134	
U.S. Total	195,561	2,323	20,780	22,495	10,593	11,700	17,195	1,252	1,653	20,231	197,145	

^aIndicates the estimate is associated with a sampling error (95 percent confidence interval) that exceeds 20 percent of the estimated value.

^bIncludes Federal offshore Alabama.

^cIncludes 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 2003 contained in the *Natural Gas Annual 2003*, DOE/EIA-0131(03).

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

Table 10. Nonassociated Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2003 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/02	Changes in Reserves During 2003									Proved Reserves 12/31/03
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Sales (-)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (-)	
Alaska	2,157	0	241	215	0	0	81	20	1	204	2,081
Lower 48 States	163,863	2,121	17,495	19,490	9,553	10,638	16,297	785	1,528	17,172	166,512
Alabama	3,891	-45	595	125	251	270	321	0	4	347	4,313
Arkansas	1,616	17	146	132	63	81	125	0	0	161	1,629
California	796	-22	70	28	15	4	36	5	0	87	759
Coastal Region Onshore	0	-1	2	0	0	0	0	0	0	0	1
Los Angeles Basin Onshore	0	0	0	0	0	0	0	0	0	0	0
San Joaquin Basin Onshore	790	-21	65	27	15	4	36	5	0	86	751
State Offshore	6	0	3	1	0	0	0	0	0	1	7
Colorado	13,251	-64	2,068	826	438	615	1,185	1	0	1,085	14,707
Florida	0	0	0	0	0	0	0	0	0	0	0
Kansas	5,263	144	195	187	245	255	79	0	0	446	5,058
Kentucky	1,974	40	134	174	0	0	51	0	1	80	1,946
Louisiana	8,520	270	704	1,051	559	464	1,573	12	246	1,227	8,952
North	4,124	113	241	309	283	241	1,246	5	6	386	4,998
South Onshore	3,968	126	397	671	202	142	302	7	165	728	3,506
State Offshore	428	31	66	71	74	81	25	0	75	113	448
Michigan	3,097	50	225	197	82	244	75	0	2	195	3,219
Mississippi	713	-26	59	37	40	28	81	0	28	85	721
Montana	820	-21	39	23	227	325	122	0	0	79	956
New Mexico	16,971	31	1,320	1,936	650	831	1,379	3	16	1,284	16,681
East	2,632	37	345	895	192	184	403	3	16	328	2,205
West	14,339	-6	975	1,041	458	647	976	0	0	956	14,476
New York	315	41	37	29	118	111	24	19	0	35	365
North Dakota	209	11	4	30	0	2	2	0	0	17	181
Ohio	772	107	112	106	7	0	7	0	0	62	823
Oklahoma	14,576	184	2,908	2,838	1,603	1,923	1,511	6	10	1,501	15,176
Pennsylvania	2,088	279	229	249	30	1	146	22	3	156	2,333
Texas	41,104	935	3,843	4,885	2,452	2,846	5,111	199	394	4,815	42,280
RRC District 1	1,047	20	57	87	14	6	108	0	9	99	1,047
RRC District 2 Onshore	1,797	205	189	342	150	29	276	11	26	273	1,768
RRC District 3 Onshore	3,219	8	332	433	164	78	429	53	46	524	3,044
RRC District 4 Onshore	9,711	248	955	1,971	449	476	1,116	39	202	1,408	8,919
RRC District 5	4,588	126	702	277	327	344	644	5	47	454	5,398
RRC District 6	6,161	125	340	491	692	809	862	1	52	595	6,572
RRC District 7B	237	198	26	113	4	3	19	0	0	52	314
RRC District 7C	3,430	45	319	163	26	85	474	0	12	312	3,864
RRC District 8	3,284	-87	257	443	102	94	327	23	0	321	3,032
RRC District 8A	101	0	17	4	0	2	0	0	0	16	100
RRC District 9	3,070	-57	110	140	229	620	488	0	0	348	3,514
RRC District 10	4,028	49	502	332	272	281	348	1	0	347	4,258
State Offshore	431	55	37	89	23	19	20	66	0	66	450
Utah	3,915	23	174	721	713	667	232	0	7	266	3,318
Virginia	1,673	1	45	37	0	0	117	0	0	82	1,717
West Virginia	3,477	14	182	314	1	37	171	0	3	193	3,376
Wyoming	20,970	-24	2,128	2,667	336	418	3,202	33	0	1,458	22,266
Federal Offshore ^a	17,772	171	2,272	2,898	1,723	1,515	712	485	812	3,502	15,616
Pacific (California)	56	0	1	0	0	0	0	0	0	2	55
Gulf of Mexico (Louisiana) ^a	12,749	137	1,415	1,843	1,321	1,220	527	404	638	2,600	11,326
Gulf of Mexico (Texas)	4,967	34	856	1,055	402	295	185	81	174	900	4,235
Miscellaneous ^b	80	5	6	0	0	1	35	0	2	9	120
U.S. Total	166,020	2,121	17,736	19,705	9,553	10,638	16,378	805	1,529	17,376	168,593

^aIncludes Federal offshore Alabama.

^bIncludes 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 2003 contained in the *Natural Gas Annual 2003*, DOE/EIA-0131(03).

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, 2003 (Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/02	Changes in Reserves During 2003									Proved Reserves 12/31/03
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Sales (-)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (-)	
Alaska	6,376	-1	187	19	0	0	0	0	0	276	6,267
Lower 48 States	23,165	203	2,857	2,771	1,040	1,062	817	447	124	2,579	22,285
Alabama	31	3	3	0	0	0	0	0	0	5	32
Arkansas	38	2	3	2	0	1	0	0	0	5	37
California	1,900	-14	247	152	48	46	21	0	0	190	1,810
Coastal Region Onshore	197	6	12	31	2	2	0	0	0	11	173
Los Angeles Basin Onshore	218	1	20	36	26	28	1	0	0	10	196
San Joaquin Basin Onshore	1,400	-22	212	77	20	16	20	0	0	164	1,365
State Offshore	85	1	3	8	0	0	0	0	0	5	76
Colorado	1,097	13	108	10	4	7	65	0	0	90	1,186
Florida	102	-7	0	0	0	0	0	0	0	3	92
Kansas	66	4	24	5	0	1	4	0	0	9	85
Kentucky	25	1	0	0	0	0	0	0	0	1	25
Louisiana	670	8	111	142	79	61	39	0	8	90	586
North	159	-2	17	14	8	4	3	0	0	20	139
South Onshore	427	9	71	110	43	29	32	0	5	52	368
State Offshore	84	1	23	18	28	28	4	0	3	18	79
Michigan	214	19	83	43	123	148	0	0	0	29	269
Mississippi	33	-1	8	4	2	1	0	0	0	8	27
Montana	94	-8	7	3	0	4	25	0	0	7	112
New Mexico	1,482	-34	352	170	53	84	124	0	2	242	1,545
East	1,379	-35	345	159	50	84	124	0	2	234	1,456
West	103	1	7	11	3	0	0	0	0	8	89
New York	0	0	0	0	0	0	0	0	0	0	0
North Dakota	315	14	37	19	1	5	4	0	0	39	316
Ohio	346	-10	9	21	0	0	0	0	0	20	304
Oklahoma	1,177	-9	140	158	81	41	79	0	3	137	1,055
Pennsylvania	137	34	13	15	0	0	4	0	0	9	164
Texas	6,387	118	907	511	247	214	235	1	1	668	6,437
RRC District 1	47	0	4	2	1	0	5	0	0	5	48
RRC District 2 Onshore	70	0	25	6	3	1	16	0	0	22	81
RRC District 3 Onshore	607	10	74	129	38	10	56	0	0	86	504
RRC District 4 Onshore	150	10	19	29	6	5	5	0	1	19	136
RRC District 5	65	-1	11	4	12	10	0	0	0	7	62
RRC District 6	400	19	59	25	3	10	0	0	0	73	387
RRC District 7B	57	-12	38	5	2	3	3	0	0	13	69
RRC District 7C	737	54	152	29	14	15	87	0	0	75	927
RRC District 8	2,772	7	362	161	128	141	38	1	0	229	2,803
RRC District 8A	1,066	12	104	55	12	11	3	0	0	92	1,037
RRC District 9	140	7	18	29	2	0	8	0	0	17	125
RRC District 10	271	10	41	37	26	8	14	0	0	29	252
State Offshore	5	2	0	0	0	0	0	0	0	1	6
Utah	359	-3	20	68	37	43	5	0	0	20	299
Virginia	0	0	0	0	0	0	0	0	0	0	0
West Virginia	21	-1	5	1	0	0	0	0	0	1	23
Wyoming	561	76	36	158	11	6	3	0	0	63	450
Federal Offshore ^a	8,090	3	744	1,289	354	400	209	446	110	942	7,417
Pacific (California)	459	0	39	2	0	0	5	0	0	45	456
Gulf of Mexico (Louisiana) ^a	6,364	4	501	1,155	276	384	204	442	104	730	5,842
Gulf of Mexico (Texas)	1,267	-1	204	132	78	16	0	4	6	167	1,119
Miscellaneous ^b	20	-5	0	0	0	0	0	0	0	1	14
U.S. Total	29,541	202	3,044	2,790	1,040	1,062	817	447	124	2,855	28,552

^aIncludes Federal offshore Alabama.

^bIncludes 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 2003 contained in the *Natural Gas Annual 2003*, DOE/EIA-0131(03).

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

Sales and Acquisitions

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

In 2003, there were 10,174 billion cubic feet of sales transactions between operators, and 11,208 billion cubic feet of acquisitions. The net difference of 1,034 billion cubic feet was added to the National total of dry natural gas reserves in 2003.

Production

The estimated 2003 U.S. dry natural gas production was 19,425 billion cubic feet, an increase of less than 1 percent from 2002 (**Table 8**). Areas with the largest production and their percentage of total production were:

- Texas produced 5,166 billion cubic feet (BCF) of dry natural gas (27 percent of the total)
- Gulf of Mexico Federal Offshore produced 4,306 BCF (22 percent)
- Oklahoma produced 1,554 BCF (8 percent)
- Wyoming produced 1,456 BCF (7 percent)
- New Mexico produced 1,415 BCF (7 percent)
- Louisiana produced 1,280 BCF (7 percent)
- Colorado produced 1,142 BCF (6 percent of the National total).

In 2003, Colorado's reported annual dry natural gas production exceeded 1 TCF for the first time.

Wet Natural Gas

U. S. proved reserves of wet natural gas as of December 31, 2003 were 197,145 billion cubic feet, a 1 percent increase from the volume reported in 2002 (**Table 9**). At year-end 2003, proved wet natural gas reserves for the lower 48 States had increased by 1 percent compared to 2002, while those of Alaska had decreased by 2 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 2 percent (+2,573 billion cubic feet) in 2003 to 168,593 billion cubic feet (**Table 10**). The lower 48 States' NA wet natural gas proved reserves increased 2 percent to a level of 166,512 billion cubic feet, while Alaska had a 4 percent decline to a level of 2,081 billion cubic feet. Those States with the largest increases in NA wet natural gas reserves were Colorado, Wyoming, and Texas.

Total Discoveries

NA wet natural gas *total discoveries* of 18,712 billion cubic feet in 2003 increased 9 percent compared to 2002's total of 17,182 billion cubic feet. Areas with the most *total discoveries* in 2003 were Texas (5,704 billion cubic feet), Wyoming (3,235 billion cubic feet), the Gulf of Mexico Federal Offshore (2,009 billion cubic feet), Louisiana (1,831 billion cubic feet), Oklahoma (1,527 billion cubic feet), and New Mexico (1,398 billion cubic feet).

Production

U.S. production of NA wet natural gas increased less than 1 percent from an estimated 17,260 billion cubic feet in 2002 to 17,376 billion cubic feet in 2003. The five leading producing areas were: Texas (28 percent), the Gulf of Mexico Federal Offshore (20 percent), Oklahoma (9 percent), Wyoming (8 percent), and New Mexico (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 3 percent to 28,552 billion cubic feet in 2003 (**Table 11**). Proved reserves of AD wet natural gas in the lower 48 States decreased by 4 percent (-880 billion cubic feet) to 22,285 billion cubic feet, and in Alaska

declined 2 percent (-109 billion cubic feet) to 6,267 billion cubic feet in 2003. 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 (24 percent)
- Texas (23 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 4 percent from an estimated 2,988 billion cubic feet in 2002 to 2,855 billion cubic feet in 2003 (**Table 11**). Production of AD wet natural gas in the lower 48 States decreased from 2,726 billion cubic feet to 2,579 billion cubic feet in 2003, a decline of 5 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 (31 percent)
- Texas (23 percent)
- Alaska (10 percent)
- New Mexico (8 percent)
- California (7 percent).

Table 12. Coalbed Methane Proved Reserves and Production, 1989–2003
(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
2003	1,665	6,473	4,396	1,224	2,759	1,528	698	--	18,743
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
2003	98	488	451	97	344	71	51	--	1,600

^aIncludes Indiana, Ohio, Pennsylvania, Virginia, and West Virginia.

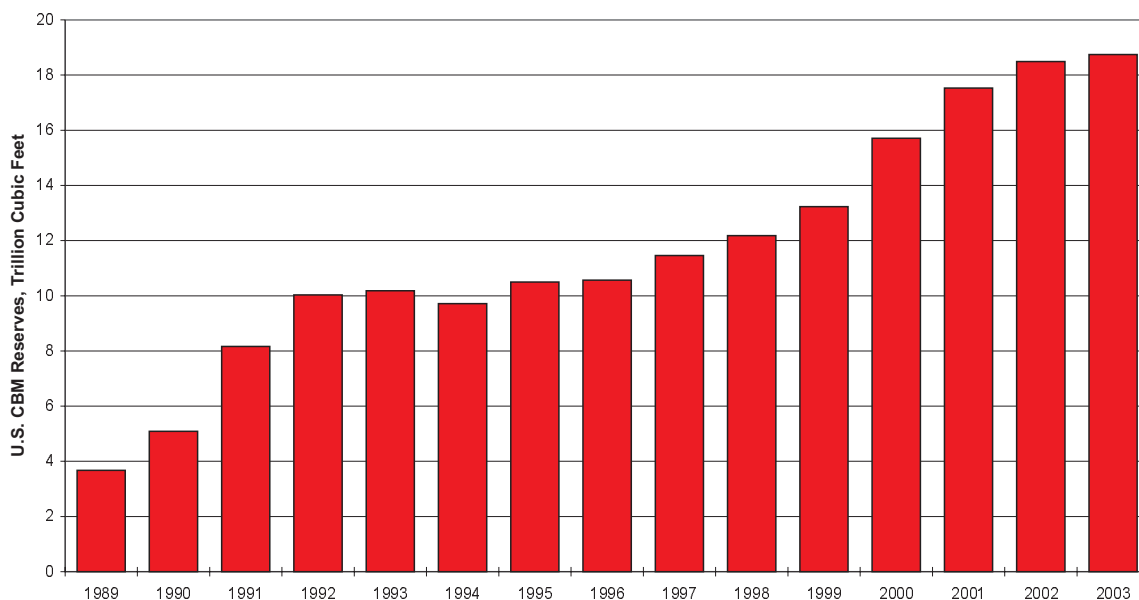
^bIncludes Arkansas, Kansas, Montana, and Oklahoma.

^cIncludes Oklahoma, Pennsylvania, Utah, Virginia, West Virginia, and Wyoming; these states are individually listed or grouped in Eastern States and Western States for 2000-2003.

NA = Not applicable.

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

Figure 21. Coalbed Methane Proved Reserves, 1989-2003



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

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

Coalbed Methane

Proved Reserves

Proved reserves of coalbed methane increased to 18,743 billion cubic feet in 2003, a 1 percent increase over the 2002 level (18,491 billion cubic feet). Coalbed methane accounted for 10 percent of all 2003 dry natural gas reserves (**Table 12**). For the ninth year in a row, gas reserves of fields identified as having coalbed methane have increased (**Figure 21**). Five States (Colorado, New Mexico, Wyoming, Utah, and Alabama) currently have the majority (88 percent) of U.S. coalbed methane proved reserves. Colorado and Utah reported declines in their proved coalbed methane reserves in 2003.

Production

U.S. coalbed methane production declined less than 1 percent in 2003 to 1,600 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.

Colorado

Colorado had a net increase of 1,548 billion cubic feet of dry natural gas proved reserves in 2003, the largest of any State. This was primarily due to development of the Wattenberg Field, the Mamm Creek Field, and coalbed methane reserves in the Raton Basin.

- **Wattenberg Field:** Onshore in the lower 48 States, Kerr-McGee Corporation's exploration and field exploitation programs target natural gas to help meet strong domestic demand. Use of 3-D seismic surveys, new well-stimulation techniques and creative collaboration with service companies enable the company to extract

additional production from mature fields. About a third of Kerr-McGee's worldwide 2003 natural gas production flowed from tight sands in Colorado and South Texas. These unconventional reservoirs consist of harder, less permeable rock formations than conventional fields but are long-lived and generate predictable cash flow at low unit cost. In Colorado's Wattenberg field, Kerr-McGee operates more than 3,100 wells and a 1,600-mile gathering system. Production techniques include infill drilling, fracture stimulation, well deepenings and recompletions. {40}

- **Mamm Creek Field:** Oil and Gas Investor Magazine recently named EnCana Corporation's Mamm Creek Field as the Best Field Rejuvenation in 2003, recognizing the tremendous growth achieved over the past couple of years from this high-quality Colorado property. This is a success story of continuous innovation. Mamm Creek's gas-bearing zone is typically 2,500 feet thick. These tight sandstone reservoirs contain large volumes of natural gas that are trapped by the dense structure of the rock. Freeing the gas requires high-pressure rock fracturing.

In 2000, the accepted technique called for splitting the gas-bearing zone into several zones through fracture stimulation, yielding typical initial gas production rates of about 500,000 cubic feet per day. Through experiment and pilot testing, EnCana has made great strides with more frequent fracs across narrower intervals. Instead of two big frac jobs, EnCana now executes up to eight fracs across the same 2,500-foot zone. When improved fracturing techniques are applied, the gains are monumental, tripling production to more than 1.4 million cubic feet per day from the same formations. {41}

Texas

Texas had a 3 percent increase in dry natural gas proved reserves in 2003 (+1,433 billion cubic feet). Production also increased 3 percent (+128 billion cubic feet). This resulted from exploration in South Texas and extensions of existing gas fields in the Permian Basin and the Newark East Field in north central Texas.

- **Newark East Field:** Devon Energy Corporation has drilled about 800 wells into the Barnett Shale

since 2001. Use of fracturing technology has helped Devon increase its Barnett production from 345 million cubic feet of natural gas equivalent per day to nearly 600 million today. In all, Devon is operating more than 1,700 wells in what is known as the Barnett's core area, where dense layers of limestone separate the shale's gas deposits from the watery Ellenberger formation which lies below.

Today, Devon is continuing to confront the most challenging questions in the Barnett. It ventured outside the core with horizontal drilling projects where geological complexities have impeded development in the past. Those projects have shown promise, and Devon geoscientists continue to explore the Barnett's non-core area, where it is a major lease holder with 390,000 net acres of land. Through Devon's pioneering effort, the Barnett Shale formation has emerged as the largest natural gas field in Texas and one of the most important gas fields in the nation. With recent inroads into the vast non-core area, the Barnett has potential to remain one of the country's most vital energy resources for years to come. Devon's accomplishments in the Barnett are an example of how technology and innovation are helping to meet growing energy demands by finding new ways to tap North America's remaining reserves. {42}

Wyoming

Wyoming's dry natural gas reserves increased by 1,217 billion cubic feet in 2003. This was the result of development in the Pinedale and Jonah fields, and in coalbed methane fields located in the Powder River Basin.

- **Jonah Field:** Spanning just 30 square miles in southwest Wyoming, the Jonah natural gas field contains an estimated 10 trillion cubic feet of original gas-in-place and EnCana Corporation owns about 75 percent of it. Jonah's gas treasures lay deep underground, in a zone between 8,000 and 11,500 feet. Since Jonah's discovery in 1986, wells have been drilled on 40 acre spacing. Through pilot projects, we have determined there's plenty of untapped natural gas between existing wells. Initial tests of these infill wells have discovered several geological horizons at original pressures and exhibited production rates similar to existing wider-spaced wells. Knowing there's far more

gas to recover, we are seeking regulatory approval to increase drilling density. This approval process includes completion of an environmental impact assessment by the U.S. Bureau of Land Management, which is expected later in 2004. Upon approval, EnCana plans to increase drilling and significantly grow production. This infill potential adds a five-year inventory of up to 1,200 wells. Add to that the application of recompletion techniques of bypassed zones in wells drilled before 2000 and the future of Jonah looks bright. In the second quarter of 2004, EnCana's gas production averaged 387 million cubic feet per day from the Jonah field. {43}

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 11 percent (-2,630 billion cubic feet) in 2003. Production decreased 3 percent from 4,423 billion cubic feet in 2002 to 4,306 billion cubic feet in 2003.

Utah

Utah's proved dry natural gas reserves decreased by 15 percent (-619 billion cubic feet) in 2003. Production in Utah decreased 3 percent (-8 billion cubic feet) in 2003.

New Mexico

New Mexico's proved dry natural gas reserves decreased by 2 percent (-300 billion cubic feet) in 2003. Production in New Mexico decreased 7 percent (-109 billion cubic feet) in 2003.

Reserves in Nonproducing Status

Nonproducing proved natural gas reserves (wet after lease separation) of 49,068 billion cubic feet were reported in 2003, 2 percent less than the 49,974 billion cubic feet reported in 2002 (**Appendix D, Table D10**). About 24 percent of the reserves in nonproducing status are located in Texas. Another 22 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 awaiting well workovers, the drilling of extensions or additional development wells, installation of production or pipeline facilities, and depletion of other zones or reservoirs before recompletion in reservoirs not currently open to production (called "behind pipe" reserves).

5. Natural Gas Liquids Statistics

Natural Gas Liquids

Proved Reserves

U.S. natural gas liquids proved reserves decreased 7 percent to 7,459 million barrels in 2003 (Table 13). The significant decline is a result of changes in the relative economics of natural gas and natural gas liquids, in the liquids content of the gas production, and a reduction in the number of U.S. gas plants active in 2003. Reserve additions replaced only 33 percent of 2003 natural gas liquids production.

The reserves of seven areas account for 87 percent of the Nation's natural gas liquids proved reserves.

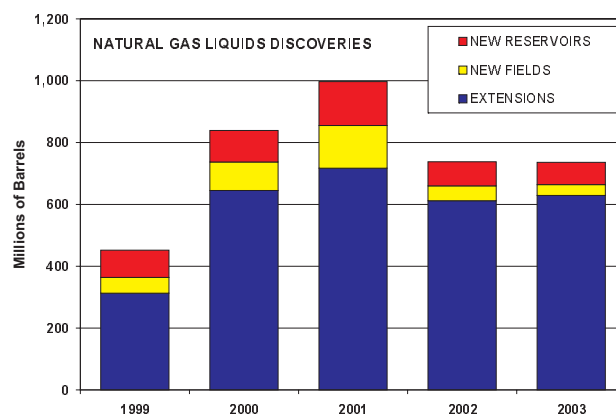
Area	Percent of U.S. NGL Reserves
Texas	34
Utah - Wyoming	12
New Mexico	12
Gulf of Mexico Federal Offshore	10
Oklahoma	9
Colorado	5
Alaska	5
Area Total	87

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.

Total Discoveries

Total discoveries of natural gas liquids reserves were 736 million barrels in 2003, a decrease of less than 1 percent from 2002 (738 million barrels). Areas with the largest total discoveries were:

- Texas (37 percent of the National total)
- Utah & Wyoming (17 percent)
- Gulf of Mexico Federal Offshore (13 percent)
- New Mexico (11 percent)
- Oklahoma (9 percent)
- Louisiana (7 percent).



New field discoveries in 2003 (35 million barrels) were 27 percent lower than in 2002 (48 million barrels). Areas with the largest new field discoveries were the Gulf of Mexico Federal Offshore (71 percent of the National total), Texas (26 percent), and Utah and Wyoming (3 percent).

New reservoir discoveries in old fields (72 million barrels) were 8 percent lower than they were in 2002 (78 million barrels). Areas with the largest new reservoir discoveries in old fields were the Gulf of Mexico Federal Offshore (51 percent of the National total), Texas (25 percent), and Louisiana (22 percent).

Extensions were 629 million barrels in 2003, 3 percent more than the 2002 volume of 612 million barrels. Areas with the largest extensions were Texas (39 percent of the National total), Utah & Wyoming (19 percent), New Mexico (12 percent), and Oklahoma (10 percent).

Revisions and Adjustments

In 2003, there were 882 million barrels of revision increases, 1,043 million barrels of revision decreases and -338 million barrels of adjustments. The net of revisions and adjustments was -499 million barrels.

Sales and Acquisitions

There were 433 million barrels of acquisitions, and 403 million barrels of sales in 2003. The net of these transactions added 30 million barrels of natural gas liquids proved reserves.

Table 13. Natural Gas Liquids Proved Reserves, Reserves Changes, and Production, 2003
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	Published Proved Reserves 12/31/02	Changes in Reserves During 2003									Proved Reserves 12/31/03
		Adjustments (+,-)	Revision Increases (+)	Revision Decreases (-)	Sales (-)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (-)	
Alaska	405	0	0	0	0	0	0	0	0	18	387
Lower 48 States	7,589	-338	882	1,043	403	433	629	35	72	784	7,072
Alabama	57	-2	8	3	4	4	5	0	0	5	60
Arkansas	4	-1	0	0	0	0	0	0	0	0	3
California	95	11	12	9	2	2	2	0	0	10	101
Coastal Region Onshore	17	1	1	3	0	0	0	0	0	1	15
Los Angeles Basin Onshore	10	-1	1	2	1	1	0	0	0	0	8
San Joaquin Basin Onshore	68	11	10	4	1	1	2	0	0	9	78
State Offshore	0	0	0	0	0	0	0	0	0	0	0
Colorado	396	-38	51	21	10	13	33	0	0	29	395
Florida	14	4	0	0	0	0	0	0	0	1	17
Kansas	263	3	11	10	12	12	4	0	0	23	248
Kentucky	66	3	4	6	0	0	2	0	0	3	66
Louisiana	323	15	52	79	23	19	34	0	16	62	295
North	49	12	6	7	4	3	15	0	0	7	67
South Onshore	226	3	39	63	12	8	16	0	8	43	182
State Offshore	48	0	7	9	7	8	3	0	8	12	46
Michigan	47	1	5	6	3	6	1	0	0	3	48
Mississippi	8	0	1	1	0	0	0	0	0	1	7
Montana	6	1	0	0	1	2	1	0	0	1	8
New Mexico	838	66	103	137	39	47	78	0	1	82	875
East	290	10	53	81	19	20	40	0	1	42	272
West	548	56	50	56	20	27	38	0	0	40	603
North Dakota	47	3	4	6	0	1	0	0	0	4	45
Oklahoma	695	-23	124	123	69	86	66	0	0	70	686
Texas	2,711	-180	267	302	123	147	246	9	18	276	2,517
RRC District 1	39	-9	1	2	0	0	2	0	0	2	29
RRC District 2 Onshore	71	6	9	13	7	1	12	0	1	11	69
RRC District 3 Onshore	241	-26	29	30	9	4	27	4	4	37	207
RRC District 4 Onshore	370	-53	38	70	14	16	38	2	7	47	287
RRC District 5	50	-3	6	4	3	3	6	0	0	4	51
RRC District 6	277	-21	19	42	26	31	29	0	5	24	248
RRC District 7B	25	15	5	10	0	0	2	0	0	5	32
RRC District 7C	351	-40	35	16	4	8	39	0	1	29	345
RRC District 8	510	9	54	60	21	21	31	2	0	48	498
RRC District 8A	181	-11	17	9	2	2	0	0	0	15	163
RRC District 9	238	-30	9	12	15	39	32	0	0	25	236
RRC District 10	353	-18	45	33	22	22	28	0	0	28	347
State Offshore	5	1	0	1	0	0	0	1	0	1	5
Utah and Wyoming	938	-70	115	144	33	32	121	1	0	62	898
West Virginia	99	-29	4	6	0	1	3	0	0	4	68
Federal Offshore ^a	973	-101	118	189	84	61	33	25	37	148	725
Pacific (California)	8	0	0	0	0	0	0	0	0	0	8
Gulf of Mexico (Louisiana) ^a	783	-93	89	129	77	58	30	25	32	120	598
Gulf of Mexico (Texas)	182	-8	29	60	7	3	3	0	5	28	119
Miscellaneous ^b	9	-1	3	1	0	0	0	0	0	0	10
U.S. Total	7,994	-338	882	1,043	403	433	629	35	72	802	7,459

^aIncludes Federal offshore Alabama.

^bIncludes 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 2003 contained in the publications *Petroleum Supply Annual 2003*, DOE/EIA-0340(03) and *Natural Gas Annual 2003* DOE/EIA-0131(03).

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

Table 14. Natural Gas Plant Liquids Proved Reserves and Production, 2003
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2003 Reserves	2003 Production	State and Subdivision	2003 Reserves	2003 Production
Alaska	387	18	North Dakota	40	4
Lower 48 States	5,857	593	Oklahoma	582	59
Alabama	33	2	Texas	2,192	229
Arkansas	2	0	RRC District 1	24	2
California	101	10	RRC District 2 Onshore	56	9
Coastal Region Onshore	15	1	RRC District 3 Onshore	135	23
Los Angeles Basin Onshore	8	0	RRC District 4 Onshore	202	32
San Joaquin Basin Onshore	78	9	RRC District 5	40	3
State Offshore	0	0	RRC District 6	195	19
Colorado	325	24	RRC District 7B	31	5
Florida	17	1	RRC District 7C	319	26
Kansas	245	22	RRC District 8	484	46
Kentucky	65	3	RRC District 8A	163	15
Louisiana	183	33	RRC District 9	228	23
North	48	4	RRC District 10	315	26
South Onshore	100	20	State Offshore	0	0
State Offshore	35	9	Utah and Wyoming	756	52
Michigan	44	3	West Virginia	67	4
Mississippi	2	0	Federal Offshore ^a	364	70
Montana	7	1	Pacific (California)	0	0
New Mexico	824	76	Gulf of Mexico (Louisiana) ^a	347	67
East	251	38	Gulf of Mexico (Texas)	17	3
West	573	38	Miscellaneous ^b	8	0
			U.S. Total	6,244	611

^aIncludes Federal Offshore Alabama.

^bIncludes 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 2003 contained in the publications *Petroleum Supply Annual 2003*, DOE/EIA-0340(2003) and *Natural Gas Annual 2003*, DOE/EIA-0131(2003).

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

Table 15. Lease Condensate Proved Reserves and Production, 2003
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2003 Reserves	2003 Production	State and Subdivision	2003 Reserves	2003 Production
Alaska	0	0	North Dakota	5	0
Lower 48 States	1,215	191	Oklahoma	104	11
Alabama	27	3	Texas	325	47
Arkansas	1	0	RRC District 1	5	0
California	0	0	RRC District 2 Onshore	13	2
Coastal Region Onshore	0	0	RRC District 3 Onshore	72	14
Los Angeles Basin Onshore	0	0	RRC District 4 Onshore	85	15
San Joaquin Basin Onshore	0	0	RRC District 5	11	1
State Offshore	0	0	RRC District 6	53	5
Colorado	70	5	RRC District 7B	1	0
Florida	0	0	RRC District 7C	26	3
Kansas	3	1	RRC District 8	14	2
Kentucky	1	0	RRC District 8A	0	0
Louisiana	112	29	RRC District 9	8	2
North	19	3	RRC District 10	32	2
South Onshore	82	23	State Offshore	5	1
State Offshore	11	3	Utah and Wyoming	142	10
Michigan	4	0	West Virginia	1	0
Mississippi	5	1	Federal Offshore ^a	361	78
Montana	1	0	Pacific (California)	8	0
New Mexico	51	6	Gulf of Mexico (Louisiana) ^a	251	53
East	21	4	Gulf of Mexico (Texas)	102	25
West	30	2	Miscellaneous ^b	2	0
			U.S. Total	1,215	191

^aIncludes Federal Offshore Alabama.

^bIncludes 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" 2003.

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

Production

Natural gas liquids production was an estimated 802 million barrels in 2003, a decrease of 9 percent from 2002. Alaska production dropped from 20 to 18 million barrels in 2003.

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

- Texas (34 percent of the National total)
- Gulf of Mexico Federal Offshore (18 percent)
- New Mexico (10 percent)
- Oklahoma (9 percent)
- Louisiana (8 percent)
- Utah-Wyoming (8 percent).

Natural Gas Plant Liquids

Proved Reserves

Natural gas plant liquids proved reserves decreased in 2003 to 6,244 million barrels, a 6 percent decrease from the 2002 level (6,648 million barrels) (Table 14). Six areas accounted for about 81 percent of the Nation's natural gas plant liquids proved reserves:

Area	Percent of U.S. Gas Plant Liquids
Texas	35
New Mexico	13
Utah-Wyoming	12
Oklahoma	9
Alaska	6
Gulf of Mexico Federal Offshore	6
Area Total	81

In a year where the U.S. dry natural gas reserves increased, the volume of natural gas liquids reserves decreased. This would seem to defy logic, but this resulted from changes in the relative economics of natural gas and natural gas liquids, and in the liquids content of the gas production. Coalbed methane, in particular, has almost no associated natural gas liquids and is a significant portion of the U.S. dry natural gas supply.

Production

Natural gas plant liquids production decreased 10 percent in 2003—from 677 million barrels in 2002 to 611 million barrels of production (Table 14).

In a year where the U.S. dry natural gas production increased, the volume of liquids produced from gas plants decreased significantly. The reasons for this are primarily economic.

The higher average gas prices of 2003 reduced the historical gap between gas and liquids prices. Given certain gas market conditions, it became more economic to offer higher BTU gas directly to the market than to strip the liquids from the produced gas stream.

Also, the number of active gas plants dropped in 2003. According to survey results from Form EIA-64A, the number of unique active U.S. natural gas processing plants dropped from 514 in 2002 to 497 in 2003.

The top six areas for proved reserves of natural gas plant liquids accounted for about 82 percent of the Nation's natural gas plant liquids production:

- Texas (37 percent)
- New Mexico (12 percent)
- Gulf of Mexico Federal Offshore (11 percent)
- Oklahoma (10 percent)
- Utah and Wyoming (9 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 1,215 million barrels in 2003 (Table 15). This was 10 percent less than the volume reported in 2002 (1,346 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	29
Texas	27
Utah-Wyoming	12
Louisiana	9
Oklahoma	9
Area Total	86

Production

Production of lease condensate was 191 million barrels in 2003, a decrease of 8 percent from 2002's production (207 million barrels). The production of five areas account for about 92 percent of the Nation's lease condensate production.

- Gulf of Mexico Federal Offshore (41 percent)
- Texas (25 percent)
- Louisiana (15 percent)
- Oklahoma (6 percent)
- Utah and Wyoming (5 percent).

Reserves in Nonproducing Status

Like crude oil and natural gas, not all lease condensate proved reserves were producing during 2003. Proved reserves of 399 million barrels of lease condensate, a decrease of 18 percent from 2002's level (489 million barrels), were reported in nonproducing status in 2003 (**Appendix D, Table D10**). About 41 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 1998 through 2003 for oil and gas well operators. The tables show the volumetric change and percent change from the previous year and from 1998. In addition they show the 2003 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 20,423 small operators. We estimated production and reserves for small operators for 2003 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 1998 through 2003 have changed from 172,443 billion cubic feet to 197,145 billion cubic feet (Table A1). These proved reserves are highly concentrated in the larger companies. In 2003, the top 20 operators (Class 1-10 and Class 11-20) producing companies had 57 percent of the proved reserves of natural gas. The next two size classes contain 80 and 400 companies and account for 27 and 10 percent of the U.S. natural gas proved reserves, respectively. The top 20 operators had an increase of 21 percent in their natural gas proved reserves from 1998 to 2003. 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 2003, the top 20 operators' natural gas reserves had a decrease of 2 percent from 2002.

Production

Wet natural gas production has decreased from 20,248 billion cubic feet in 2002 to 20,231 billion cubic feet in 2003 (Table A2). In 2003, the top 20 producing companies had 56 percent of the production of wet natural gas. The next two size classes have 26 and 12 percent of the wet natural gas production, respectively. The top 20 operators had an increase of 11 percent in wet natural gas production from 1998 to 2003. The rest of the operators had a decrease of 5 percent from 1998 to 2003. The top 20 operators' wet natural gas production had a decrease of 4 percent in 2003 from 2002.

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 2003 had 70 percent of U.S. proved reserves of crude oil (Table A3), in contrast to wet natural gas where these same companies operated 57 percent of the total proved reserves.

U.S. proved reserves of crude oil decreased 4 percent in 2003. The top 20 producing companies proved reserves of crude oil during 2003 decreased 6 percent. The top 20 class had an increase of 16 percent in their crude oil proved reserves from 1998 to 2003.

Production

Crude oil production reported for 1998 to 2003 has decreased from 1,991 million barrels to 1,877 million barrels (Table A4). The 20 largest oil and gas producing companies had 67 percent of U.S. production of crude oil in 2003. In 1998 they accounted for 64 percent of production.

This is in contrast to wet natural gas where these same companies produced only 56 percent of the total. U.S. production of crude oil declined by 6 percent from 1998 to 2002. The top 20 operators had a decline of 2 percent in their oil production during the same period. U.S. production of crude oil remained level from 2002 to 2003, the top 20 operators production also decreased by 1 percent.

Fields

The number of fields in which Category I and Category II operators were active increased during the 1998-2002 period (Table A5). From 1998-2002, the number of fields in which the top 20 operators were active increased by 1,884 fields (44 percent) while in 2003 the number increased by 193 fields from 2002.

Table A1. Natural Gas Proved Reserves, Wet After Lease Separation, by Operator Production Size Class, 1998–2003
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Size Class	1998	1999	2000	2001	2002	2003	2002–2003 Volume and Percent Change	1998–2003 Volume and Percent Change	2003 Average Reserves per Operator
Class 1-10	64,336	64,320	81,437	88,936	88,100	82,222	-5,878	17,886	8,222.176
Percent of Total	37.3%	36.5%	43.7%	46.4%	45.0%	41.7%	-6.7%	27.8%	
Class 11-20	28,338	24,925	22,590	24,588	25,938	29,890	3,952	1,552	2,989.003
Percent of Total	16.4%	14.1%	12.1%	12.8%	13.3%	15.2%	15.2%	5.5%	
Class 21-100	47,009	52,160	48,832	50,055	50,633	53,098	2,465	6,089	663.725
Percent of Total	27.3%	29.6%	26.2%	26.1%	25.9%	26.9%	4.9%	13.0%	
Class 101-500	24,471	25,967	22,620	19,046	19,723	20,030	307	-4,441	50.076
Percent of Total	14.2%	14.7%	12.1%	9.9%	10.1%	10.2%	1.6%	-18.1%	
Class Other (22,019)	8,289	8,289	11,030	9,118	11,167	11,905	737	3,616	0.583
Percent of Total	4.8%	5.0%	5.9%	4.8%	5.7%	6.0%	6.6%	43.6%	
Category I (179)	146,458	146,458	162,144	169,056	173,325	173,225	-100	26,767	1,056.252
Percent of Total	84.9%	82.8%	86.9%	88.2%	88.6%	87.9%	-0.1%	18.3%	
Category II (430)	18,033	18,033	13,123	13,346	11,051	11,983	932	-6,050	23.404
Percent of Total	10.5%	12.5%	7.0%	7.0%	5.7%	6.1%	8.4%	-33.5%	
Category III (22,519)	7,952	7,952	R11,243	9,342	11,184	11,937	752	3,985	0.590
Percent of Total	4.6%	4.7%	R6.0%	4.9%	5.7%	6.1%	6.7%	50.1%	
Total Published	172,443	176,159	186,510	191,743	195,561	197,145	1,584	24,702	9.422
Percent of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.8%	14.3%	

R = Revised

Note: There were 20,247 active Category III operators in the 2003 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 838 Category III operators (Table E2). The "other" size class represents 20,423 operators in the 2003 frame (20,923 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, 1998–2003
(Billion Cubic Feet at 14.73 psia and 60° Fahrenheit)

Size Class	1998	1999	2000	2001	2002	2003	2002–2003 Volume and Percent Change	1998–2003 Volume and Percent Change	2003 Average Production per Operator
Class 1-10	6,954	6,881	8,495	9,019	8,996	8,220	-776	1,266	821.954
Percent of Total	35.4%	34.7%	42.1%	43.7%	44.4%	40.6%	-8.6%	18.2%	
Class 11-20	3,317	3,560	2,886	3,064	2,854	3,136	282	-181	313.572
Percent of Total	16.4%	14.1%	14.3%	14.8%	14.1%	15.5%	9.9%	-5.5%	
Class 21-100	5,595	5,523	4,965	4,949	4,763	5,275	512	-320	65.942
Percent of Total	27.3%	29.6%	24.6%	24.0%	23.5%	26.1%	10.8%	-5.7%	
Class 101-500	2,721	2,793	2,780	2,609	2,475	2,386	-89	-335	5.965
Percent of Total	14.2%	14.7%	13.8%	12.6%	12.2%	11.8%	-3.6%	-12.3%	
Class Other (22,019)	1,035	1,099	1,038	1,000	1,161	1,215	54	180	0.059
Percent of Total	4.8%	5.0%	5.1%	4.8%	5.7%	6.0%	4.6%	17.3%	
Category I (179)	16,619	16,248	17,096	17,672	17,335	17,347	12	728	105.772
Percent of Total	84.9%	82.8%	84.8%	85.6%	85.6%	85.7%	0.1%	4.4%	
Category II (430)	2,019	2,556	1,921	1,932	1,738	1,648	-90	-371	3.219
Percent of Total	10.5%	12.5%	9.5%	9.4%	8.6%	8.1%	-5.2%	-18.4%	
Category III (22,519)	984	1,052	R1,147	1,038	1,176	1,236	61	252	0.061
Percent of Total	4.6%	4.7%	R5.7%	5.0%	5.8%	6.1%	5.2%	25.6%	
Total Published	19,622	19,856	20,164	20,642	20,248	20,231	-17	609	0.967
Percent of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	-0.1%	3.1%	

R = Revised

Note: There were 20,247 active Category III operators in the 2003 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 838 Category III operators (Table E2). The "other" size class represents 20,423 operators in the 2003 frame (20,923 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, 1998–2003
(Million Barrels of 42 U.S. Gallons)

Size Class	1998	1999	2000	2001	2002	2003	2002–2003 Volume and Percent Change	1998–2003 Volume and Percent Change	2003 Average Reserves per Operator
Class 1-10	11,501	11,121	12,367	13,590	13,346	13,355	10	1,854	1,335.527
Percent of Total	54.7%	51.1%	56.1%	60.5%	58.9%	61.0%	0.1%	16.1%	
Class 11-20	2,894	2,585	3,172	2,901	2,817	1,907	-910	-987	190.721
Percent of Total	13.8%	11.9%	14.4%	12.9%	12.4%	8.7%	-32.3%	-34.1%	
Class 21-100	3,677	4,338	2,505	2,856	3,230	3,483	253	-194	43.539
Percent of Total	17.5%	19.9%	11.4%	12.7%	14.2%	15.9%	7.8%	-5.3%	
Class 101-500	1,754	2,379	2,286	1,794	1,817	1,705	-111	-49	4.264
Percent of Total	8.3%	10.9%	10.4%	8.0%	8.0%	7.8%	-6.1%	-2.8%	
Class Other (22,019)	1,208	1,342	1,716	1,305	1,468	1,440	-28	232	0.071
Percent of Total	5.7%	6.2%	7.8%	5.8%	6.5%	6.6%	-1.9%	19.2%	
Category I (179)	18,819	18,952	19,421	20,325	20,213	19,499	-714	680	118.895
Percent of Total	89.5%	87.1%	88.1%	90.6%	89.1%	89.1%	-3.5%	3.6%	
Category II (430)	1,018	1,521	873	794	992	937	-56	-81	1.830
Percent of Total	4.8%	7.0%	4.0%	3.5%	4.4%	4.3%	-5.6%	-8.0%	
Category III (22,519)	1,197	1,293	R1,751	1,326	1,472	1,456	-16	259	0.072
Percent of Total	5.7%	5.9%	R7.9%	5.9%	6.5%	6.6%	-1.1%	21.6%	
Total Published	21,034	21,765	22,045	22,446	22,677	21,891	-786	857	1.046
Percent of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	-3.5%	4.1%	

R = Revised

Note: There were 20,247 active Category III operators in the 2003 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 838 Category III operators (Table E2). The "other" size class represents 20,423 operators in the 2003 frame (20,923 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, 1998–2003
(Million Barrels of 42 U.S. Gallons)

Size Class	1998	1999	2000	2001	2002	2003	2002–2003 Volume and Percent Change	1998–2003 Volume and Percent Change	2003 Average Production per Operator
Class 1-10	1,025	974	961	1,061	1,037	1,047	10	22	104.708
Percent of Total	51.5%	49.9%	51.1%	55.4%	55.3%	55.8%	1.0%	2.2%	
Class 11-20	255	241	304	240	233	205	-28	-50	20.491
Percent of Total	12.8%	12.3%	16.2%	12.5%	12.4%	10.9%	-12.2%	-19.6%	
Class 21-100	342	350	214	233	240	272	32	-70	3.399
Percent of Total	17.2%	17.9%	11.4%	12.2%	12.8%	14.5%	13.2%	-20.5%	
Class 101-500	206	208	211	195	181	178	-3	-28	0.446
Percent of Total	10.3%	10.7%	11.2%	10.2%	9.7%	9.5%	-1.5%	-13.4%	
Class Other (22,019)	163	179	190	186	184	175	-9	12	0.009
Percent of Total	8.2%	9.2%	10.1%	9.7%	9.8%	9.3%	-4.9%	7.2%	
Category I (179)	1,714	1,617	1,572	1,612	1,573	1,574	1	-140	9.599
Percent of Total	86.1%	82.8%	83.6%	84.2%	83.9%	83.9%	0.1%	-8.2%	
Category II (430)	118	160	111	112	115	124	9	6	0.243
Percent of Total	5.9%	8.2%	5.9%	5.8%	6.1%	6.6%	7.8%	5.3%	
Category III (22,519)	159	175	R197	191	187	179	-8	20	0.009
Percent of Total	8.0%	9.0%	R10.5%	10.0%	10.0%	9.5%	-4.3%	12.3%	
Total Published	1,991	1,952	1,880	1,915	1,875	1,877	2	-114	0.090
Percent of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	0.1%	-5.7%	

R = Revised

Note: There were 20,247 active Category III operators in the 2003 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 838 Category III operators (Table E2). The "other" size class represents 20,423 operators in the 2003 frame (20,923 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, 1998–2003

Size Class	1998	1999	2000	2001	2002	2003	2002–2003 Number and Percent Change	1999–2003 Number and Percent Change	2003 Average Number of Fields per Operator
Class 1-10	2,475	2,559	3,444	3,794	3,596	3,689	93	1,214	368.900
Percent of Total	9.5%	10.0%	13.0%	14.0%	12.9%	13.2%	2.6%	49.1%	
Class 11-20	1,822	1,514	1,923	2,212	2,392	2,492	100	670	249.200
Percent of Total	7.0%	5.9%	7.2%	8.2%	8.6%	8.9%	4.2%	36.8%	
Class 21-100	7,526	8,180	7,084	7,195	7,947	8,168	221	642	102.100
Percent of Total	29.0%	32.0%	26.7%	26.5%	28.4%	29.3%	2.8%	8.5%	
Class 101-500	12,817	12,344	12,580	12,435	12,661	11,859	-802	-958	29.648
Percent of Total	49.4%	48.2%	47.4%	45.9%	45.3%	42.5%	-6.3%	-7.5%	
Rest	1,524	1,287	1,529	1,480	1,349	1,709	360	185	9.710
Percent of Total	5.9%	5.0%	5.8%	5.5%	4.8%	6.1%	26.7%	12.1%	
Category I	15,666	15,120	16,174	16,196	17,049	16,760	-289	1,094	102.195
Percent of Total	60.4%	59.1%	60.9%	59.7%	61.0%	60.0%	-1.7%	7.0%	
Category II	10,271	10,467	10,146	10,764	10,473	10,688	215	417	20.875
Percent of Total	39.6%	40.9%	38.2%	39.7%	37.5%	38.3%	2.1%	4.1%	
Total	25,937	25,587	26,560	27,116	27,945	27,917	-28	1,980	41.297
Percent of Total	100.0%	100.0%	100.0%	100.0%	100.0%	100.00%	-0.1%	7.6%	

Note: Includes only data from Category I and Category II operators. In 2003, there were 164 Category I operators and 512 Category II operators. The "rest" size class had 176 operators in 2003.

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

Appendix B

Top 100 Oil and Gas Fields for 2003

Appendix B

Top 100 Oil and Gas Fields for 2003

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, labeled as liquids. The total gas production and reserve data is wet after lease separation. 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. Two new tables have been added to this Appendix. They rank the top 100 fields by production (B3 and B4) rather than by reserves (B1 and B2).

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. Many of the same fields are in each of the tables B1, B2, B3, and B4. The oil fields with the more recent discovery dates are typically located in the Gulf of Mexico Offshore and Alaska. The gas fields with the more recent discovery dates are located in the Gulf of Mexico Offshore, New Mexico, Colorado, and Wyoming. Blanco/Ignacio-Blanco and Basin have been combined into San Juan Basin Gas Area for the 2003 tables.

Summary for the Top 100 Fields for 2003 Liquids and Gas

Rank Group	12/31/2003 Proved Reserves	Percent	12/31/2003 Nonproducing Reserves	Percent	Estimated 2003 Production	Percent
Table B1. Top 100 U.S. Fields as Ranked by Liquids Proved Reserves (Million Barrels)						
Top 10	6,725.4	29.1%	1,420.6	23.8%	390.2	18.9%
Top 20	9,231.8	40.0%	2,201.7	36.8%	590.8	28.6%
Top 50	12,536.3	54.3%	3,240.2	54.2%	816.3	39.5%
Top 100	14,894.8	64.5%	4,003.2	67.0%	1,010.5	48.9%
Others	8,211.2	35.5%	1,975.8	33.0%	1,057.5	51.1%
Total	23,106.0	100.0%	5,979.0	100.0%	2,068.0	100.0%
Table B2. Top 100 U.S. Fields as Ranked by Gas Proved Reserves (Billion Cubic Feet)						
Top 10	48,552.4	24.6%	8,123.4	16.6%	3,217.3	15.9%
Top 20	64,681.6	32.8%	12,181.1	24.8%	4,303.2	21.3%
Top 50	85,803.4	43.5%	18,219.5	37.1%	6,024.4	29.8%
Top 100	102,144.6	51.8%	22,752.2	46.4%	7,441.3	36.8%
Others	95,000.4	48.2%	26,315.8	53.6%	12,789.7	63.2%
Total	197,145.0	100.0%	49,068.0	100.0%	20,231.0	100.0%
Table B3. Top 100 U.S. Fields as Ranked by Liquids Production (Million Barrels)						
Top 10	6,042.4	26.2%	657.5	11.0%	516.6	25.0%
Top 20	8,094.1	35.0%	875.5	14.6%	697.7	33.7%
Top 50	10,175.2	44.0%	1,258.2	21.0%	963.1	46.6%
Top 100	12,192.4	52.8%	1,566.7	26.2%	1,173.6	56.8%
Others	10,913.6	47.2%	4,412.3	73.8%	894.4	43.2%
Total	23,106.0	100.0%	5,979.0	100.0%	2,068.0	100.0%
Table B4. Top 100 U.S. Fields as Ranked by Gas Production (Billion Cubic Feet)						
Top 10	46,356.9	23.5%	8,251.4	16.8%	3,582.0	17.7%
Top 20	60,393.5	30.6%	11,042.4	22.5%	4,603.4	22.8%
Top 50	79,072.1	40.1%	15,801.0	32.2%	6,438.9	31.8%
Top 100	93,145.0	47.2%	18,654.6	38.0%	8,347.5	41.3%
Others	104,000.0	52.8%	30,413.4	62.0%	11,883.5	58.7%
Total	197,145.0	100.0%	49,068.0	100.0%	20,231.0	100.0%

Table B1. Top 100 Oil Fields Ranked by Reserves

The top 100 oil fields by reserves had 14,895 million barrels of **proved reserves** accounting for 65 percent of the total United States as of December 31, 2003, (**Table 6 and Table 14**) and 67 percent of the reported nonproducing reserves. In the top 20 oil fields for 2003 there are six fields, which are in the deep water of the Gulf of Mexico Federal Offshore and four are currently nonproducing.

The top 100 oil fields by reserves had 1,011 million barrels of **production**, or 49 percent of the 2003 U.S. total (**Table 6 and Table 14**). From year to year these top 100 fields change rank. The most notable change from last year is the 7th largest field, Yates, moving to 43rd in 2003, as a new operator had a different view of the reserves for the field and a different method of enhanced oil recovery.

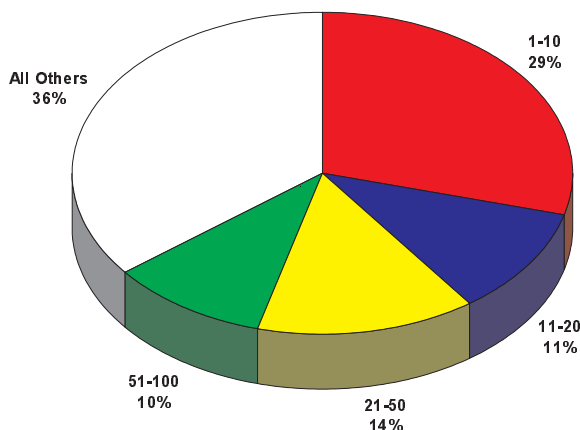


Table B2. Top 100 Gas Fields Ranked by Reserves

The top 100 gas fields by reserves had 102,145 billion cubic feet of wet natural gas **proved reserves** or 52 percent of the total, as of December 31, 2003 (**Table 9**) and 46 percent of the reported nonproducing reserves. The top 100 gas fields by reserves had 7,441 billion cubic feet of **production**, or 37 percent of the 2003 U.S. total (**Table 9**).

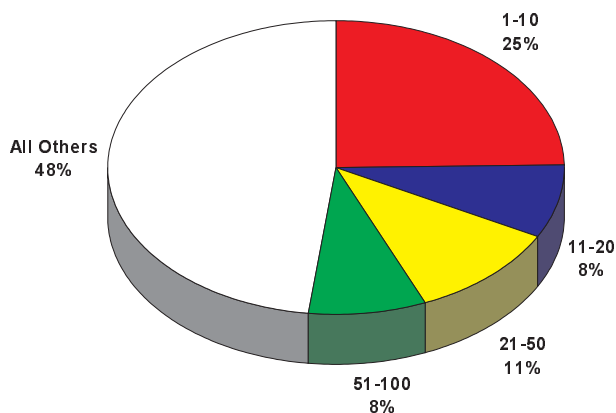


Table B3. Top 100 Oil Fields Ranked by Production

The top 100 oil fields by production had 12,192 million barrels of **proved reserves** accounting for 53 percent of the total United States as of December 31, 2003 (**Table 6 and Table 14**) and 26 percent of the reported nonproducing reserves. The top 100 oil fields by production had 1,174 million barrels of **production**, or 57 percent of the 2003 U.S. total (**Table 6 and Table 14**).

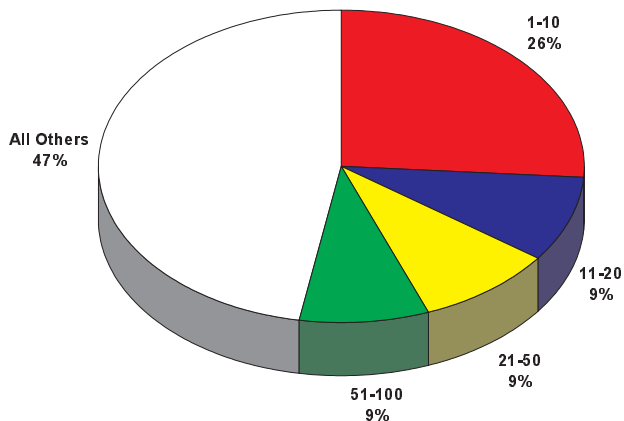


Table B4. Top 100 Gas Fields Ranked by Production

The top 100 gas fields by production had 93,145 billion cubic feet of wet natural gas **proved reserves**, as of December 31, 2003, or 47 percent of the total (**Table 9**). The top 100 gas fields had 8,348 billion cubic feet of **production**, or 41 percent of the 2003 U.S. total (**Table 9**).

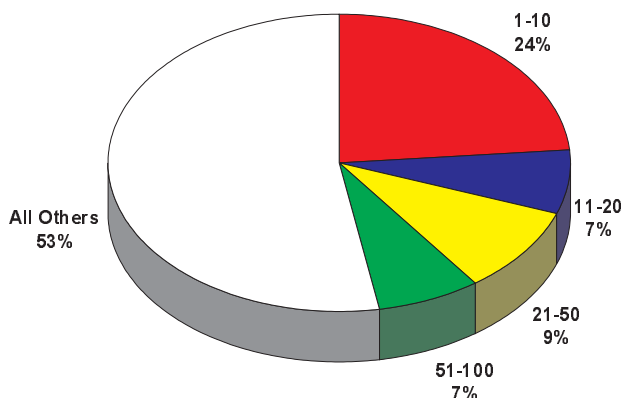


Table B5. Top U.S. Operators Ranked by 2003 Production Data

Table B5 lists the top U.S. oil and gas operators ranked by reported 2003 operated production data.

Table B1. Top 100 U.S. Fields Ranked by Liquids Proved Reserves from Estimated 2003 Field Level Data^a
(Million Barrels of 42 U.S. Gallons)

Field Name	Location	Discovery Year	Proved Reserves Rank Group	Nonproducing Reserves	2003 Estimated Production Volume
1 PRUDHOE BAY	AK	1967	(1-10)		141.3
2 KUPARUK RIVER	AK	1969	(1-10)		58.8
3 WASSON	TX	1937	(1-10)		26.1
4 BELRIDGE SOUTH	CA	1911	(1-10)		41.1
5 MISSISSIPPI CANYON BLK 778	FG	1999	(1-10)		0.0
6 MIDWAY-SUNSET	CA	1901	(1-10)		47.8
7 KERN RIVER	CA	1899	(1-10)		36.7
8 SPRABERRY TREND AREA	TX	1950	(1-10)		19.8
9 ELK HILLS	CA	1920	(1-10)		18.7
10 GREEN CANYON BLK 699	FG	1998	(1-10)		0.0
Top 10 Volume Subtotal				6,725.4	390.2
Top 10 Percentage of U.S. Total				29.1%	18.9%
11 MISSISSIPPI CANYON BLK 807	FG	1989	(11-20)		58.1
12 ALPINE	AK	1994	(11-20)		36.1
13 MILNE POINT	AK	1982	(11-20)		18.8
14 SLAUGHTER	TX	1937	(11-20)		14.3
15 GREEN CANYON BLK 644	FG	1999	(11-20)		0.0
16 HONDO	FP	1969	(11-20)		6.8
17 GREEN CANYON BLK 826	FG	1999	(11-20)		0.0
18 LOST HILLS	CA	1910	(11-20)		11.0
19 CYMRIC	CA	1916	(11-20)		18.7
20 MISSISSIPPI CANYON BLK 810	FG	1996	(11-20)		36.9
Top 20 Volume Subtotal				9,231.8	590.8
Top 20 Percentage of U.S. Total				40.0%	28.6%
21 LEVELLAND	TX	1945	(21-50)		9.6
22 WILMINGTON	CA	1932	(21-50)		14.9
23 MISSISSIPPI CANYON BLK 84	FG	1993	(21-50)		33.9
24 GREEN CANYON BLK 640	FG	2002	(21-50)		0.0
25 PESCADO	FP	1970	(21-50)		6.3
26 WATTENBERG	CO	1970	(21-50)		8.6
27 ENDICOTT	AK	1978	(21-50)		9.2
28 POINT MCINTYRE	AK	1988	(21-50)		13.8
29 COWDEN NORTH	TX	1930	(21-50)		7.0
30 SAN ARDO	CA	1947	(21-50)		4.5
31 SHO-VEL-TUM	OK	1905	(21-50)		8.4
32 NORTHSTAR	AK	1984	(21-50)		22.9
33 CEDAR HILLS	ND & MT & SD	1954	(21-50)		3.9
34 HOBBS	NM	1928	(21-50)		3.7
35 MISSISSIPPI CANYON BLK 383	FG	1987	(21-50)		0.3
36 INGLEWOOD	CA	1924	(21-50)		2.4
37 SACATE	FP	1970	(21-50)		2.8
38 GREEN CANYON BLK 339	FG	2001	(21-50)		0.0
39 WEST SAK	AK	1969	(21-50)		2.9
40 VENTURA	CA	1916	(21-50)		4.6
41 GREEN CANYON BLK 562	FG	1999	(21-50)		0.0
42 KELLY-SNYDER	TX	1948	(21-50)		7.4
43 YATES	TX	1926	(21-50)		6.9
44 BOREALIS	AK	2001	(21-50)		11.8
45 MCELROY	TX	1926	(21-50)		4.7
46 VACUUM	NM	1929	(21-50)		7.4
47 ROBERTSON NORTH	TX	1956	(21-50)		4.0
48 MISSISSIPPI CANYON BLK 773	FG	2000	(21-50)		0.0
49 VIOSCA KNOLL BLK 786	FG	1996	(21-50)		19.3
50 GREATER ANETH	UT	1956	(21-50)		4.3
Top 50 Volume Subtotal				12,536.3	816.3
Top 50 Percentage of U.S. Total				54.3%	39.5%

Table B1. Top 100 U.S. Fields Ranked by Liquids Proved Reserves from Estimated 2003 Field Level Data^a
(Continued)
(Million Barrels of 42 U.S. Gallons)

Field Name	Location	Discovery Year	Proved Reserves Rank Group	Nonproducing Reserves	2003 Estimated Production Volume
51 MONUMENT BUTTE	UT	1964	(51-100)		1.9
52 HAWKINS	TX	1940	(51-100)		3.2
53 GOLDSMITH NORTH	TX	1946	(51-100)		4.7
54 FULLERTON	TX	1942	(51-100)		4.8
55 RANGELY	CO	1902	(51-100)		4.7
56 MISSISSIPPI CANYON BLK 20	FG	1995	(51-100)		0.5
57 POLARIS	AK	2000	(51-100)		0.9
58 ARROYO GRANDE	CA	1906	(51-100)		0.7
59 GREEN CANYON BLK 680	FG	2003	(51-100)		0.0
60 LAKE WASHINGTON	LA	1931	(51-100)		3.5
61 COALINGA	CA	1887	(51-100)		6.4
62 GIDDINGS	TX	1960	(51-100)		10.3
63 JAY	AL & FL	1970	(51-100)		2.6
64 PENNEL	MT	1955	(51-100)		2.4
65 SEMINOLE	TX	1936	(51-100)		8.6
66 SALT CREEK	TX	1942	(51-100)		4.9
67 TARN	AK	1991	(51-100)		12.6
68 GREEN CANYON BLK 608	FG	2002	(51-100)		0.0
69 MISSISSIPPI CANYON BLK 582	FG	2000	(51-100)		1.1
70 MEANS	TX	1934	(51-100)		3.8
71 ELM COULEE	MT	2000	(51-100)		2.3
72 HARTZOG DRAW	WY	1976	(51-100)		3.1
73 CEDAR LAKE	TX	1939	(51-100)		2.4
74 GOLDEN TREND	OK	1945	(51-100)		3.3
75 BELRIDGE NORTH	CA	1912	(51-100)		2.8
76 AURORA	AK	1969	(51-100)		3.8
77 GREEN CANYON BLK 243	FG	2001	(51-100)		8.2
78 KERN FRONT	CA	1925	(51-100)		1.5
79 EWING BANK BLK 873	FG	1991	(51-100)		7.9
80 EAST BREAKS BLK 690	FG	2001	(51-100)		10.6
81 JO-MILL	TX	1953	(51-100)		2.5
82 ANTON-IRISH	TX	1944	(51-100)		5.5
83 ORION	AK	2002	(51-100)		0.4
84 VIOSCA KNOLL BLK 990	FG	1981	(51-100)		8.1
85 WEST DELTA BLK 30	FG	1949	(51-100)		4.3
86 HOWARD-GLASSCOCK	TX	1925	(51-100)		3.1
87 GARDEN BANKS BLK 668	FG	2000	(51-100)		0.0
88 GREEN CANYON BLK 205	FG	1988	(51-100)		11.5
89 ALAMINOS CANYON BLK 25	FG	1997	(51-100)		7.9
90 LOOKOUT BUTTE EAST	MT	1986	(51-100)		1.8
91 VIOSCA KNOLL BLK 915	FG	1993	(51-100)		2.9
92 WASSON 72	TX	1940	(51-100)		1.7
93 NIAKUK	AK	1984	(51-100)		4.6
94 MELTWATER	AK	2001	(51-100)		2.1
95 PATRICK DRAW	WY	1959	(51-100)		0.1
96 WELCH	TX	1942	(51-100)		2.0
97 ELK BASIN	MT & WY	1915	(51-100)		3.0
98 SOUTH PASS EA BLK 62	FG	1967	(51-100)		1.7
99 MISSISSIPPI CANYON BLK 935	FG	1994	(51-100)		4.9
100 FOSTER	TX	1932	(51-100)		2.6
Top 100 Volume Subtotal			14,894.8	4,003.2	1,010.5
Top 100 Percentage of U.S. Total			64.5%	67.0%	48.9%

^aIncludes lease condensate.

Notes: The U.S. total production estimate of 2,068 million barrels and the U.S. total reserves estimate of 23,106 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.

FP = Federal Offshore Pacific

FG = Federal Offshore Gulf of Mexico

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

Table B2. Top 100 U.S. Fields Ranked by Gas Proved Reserves from Estimated 2003 Field Level Data^a
(Billion Cubic Feet)

Field Name	Location	Discovery Year	Proved Reserves Rank Group	Nonproducing Reserves	2003 Reported Production Volume
1 SAN JUAN BASIN GAS AREA	CO & NM	1927	(1-10)		1479.6
2 PRUDHOE BAY	AK	1967	(1-10)		209.6
3 HUGOTON GAS AREA	KS & OK & TX	1922	(1-10)		348.1
4 PINEDALE	WY	1955	(1-10)		87.3
5 JONAH	WY	1977	(1-10)		244.5
6 NEWARK EAST	TX	1981	(1-10)		306.4
7 MADDEN	WY	1968	(1-10)		108.1
8 WATTENBERG	CO	1970	(1-10)		194.2
9 RATON BASIN GAS AREA	CO & NM	1998	(1-10)		94.7
10 ANTRIM	MI	1965	(1-10)		144.7
Top 10 Volume Subtotal				48,552.4	3,217.3
Top 10 Percentage of U.S. Total				24.6%	15.9%
11 PRB COALBED	WY	1992	(11-20)		296.3
12 LOWER MOBILE BAY AREA	AL & FG	1979	(11-20)		187.9
13 CARTHAGE	TX	1944	(11-20)		170.7
14 NATURAL BUTTES	UT	1952	(11-20)		84.0
15 SPRABERRY TREND AREA	TX	1950	(11-20)		72.1
16 FOGARTY CREEK	WY	1975	(11-20)		34.7
17 SAWYER	TX	1975	(11-20)		74.3
18 MAMM CREEK	CO	1959	(11-20)		57.5
19 BIG SANDY	KY & WV	1881	(11-20)		48.6
20 VERNON	LA	1967	(11-20)		59.7
Top 20 Volume Subtotal				64,681.6	4,303.2
Top 20 Percentage of U.S. Total				32.8%	21.3%
21 OAKWOOD	VA	1990	(21-50)		51.2
22 PANHANDLE WEST	TX	1918	(21-50)		91.6
23 RULISON	CO	1958	(21-50)		30.1
24 DRUNKARDS WASH	UT	1989	(21-50)		78.4
25 ELK HILLS	CA	1920	(21-50)		113.2
26 RED OAK-NORRIS	OK	1910	(21-50)		77.2
27 GRAND VALLEY	CO	1985	(21-50)		31.2
28 OAK HILL	TX	1958	(21-50)		62.4
29 GIDDINGS	TX	1960	(21-50)		125.1
30 MISSISSIPPI CANYON BLK 810	FG	1996	(21-50)		60.9
31 LAKE RIDGE	WY	1981	(21-50)		14.3
32 ELM GROVE	LA	1958	(21-50)		57.9
33 STRONG CITY DISTRICT	OK	1966	(21-50)		66.8
34 BELUGA RIVER	AK	1962	(21-50)		56.6
35 PANOMA GAS AREA	KS	1956	(21-50)		66.8
36 GOMEZ	TX	1977	(21-50)		50.6
37 BALD PRAIRIE	TX	1976	(21-50)		41.3
38 MAYFIELD NE	OK	1951	(21-50)		100.2
39 GOLDEN TREND	OK	1945	(21-50)		47.1
40 MOCANE-LAVERNE GAS AREA	KS & OK & TX	1947	(21-50)		82.1
41 MISSISSIPPI CANYON BLK 383	FG	1987	(21-50)		5.7
42 DEW	TX	1982	(21-50)		48.1
43 WATONGA-CHICKASHA TREND	OK	1962	(21-50)		51.7
44 PARACHUTE	CO	1985	(21-50)		24.0
45 COOK INLET NORTH	AK	1962	(21-50)		48.1
46 FREESTONE	TX	1949	(21-50)		55.1
47 EAST BREAKS BLK 690	FG	2001	(21-50)		66.6
48 FARRAR	TX	1963	(21-50)		27.4
49 WEBBER CREEK	MI	1994	(21-50)		20.7
50 MISSISSIPPI CANYON BLK 807	FG	1989	(21-50)		68.8
Top 50 Volume Subtotal				85,803.4	6,024.4
Top 50 Percentage of U.S. Total				43.5%	29.8%

Table B2. Top 100 U.S. Fields Ranked by Gas Proved Reserves from Estimated 2003 Field Level Data^a
(Continued)
(Billion Cubic Feet)

Field Name	Location	Discovery Year	Proved Reserves Rank Group	Nonproducing Reserves	2003 Reported Production Volume
51 WAMSUTTER	WY	1958	(51-100)		36.2
52 EAST BREAKS BLK 945	FG	1994	(51-100)		50.0
53 SLIGO	LA	1922	(51-100)		14.0
54 KINTA	OK	1914	(51-100)		42.9
55 VIOSCA KNOLL BLK 956	FG	1985	(51-100)		76.8
56 MISSISSIPPI CANYON BLK 778	FG	1999	(51-100)		0.0
57 DOWDY RANCH	TX	1999	(51-100)		42.2
58 WASSON	TX	1937	(51-100)		21.9
59 WILD ROSE	WY	1975	(51-100)		22.0
60 GREEN RIVER BEND	WY	1958	(51-100)		29.8
61 KUPARUK RIVER	AK	1969	(51-100)		23.8
62 BRUFF	WY	1969	(51-100)		33.3
63 OAKS	TX	1975	(51-100)		19.2
64 ECHO SPRINGS	WY	1977	(51-100)		30.8
65 WILBURTON	OK	1941	(51-100)		47.9
66 STANDARD DRAW	WY	1979	(51-100)		23.0
67 MOBILE BLK 823	FG	1983	(51-100)		31.9
68 OZONA	TX	1962	(51-100)		28.6
69 NORA	VA	1949	(51-100)		17.1
70 VERDEN WEST	OK	1981	(51-100)		30.4
71 HOLLY	LA	1928	(51-100)		19.4
72 BROWN-BASSETT	TX	1953	(51-100)		35.3
73 BOONSVILLE	TX	1950	(51-100)		27.7
74 MESA	WY	1977	(51-100)		25.0
75 ELK CITY	OK	1947	(51-100)		42.6
76 STRATTON	TX	1937	(51-100)		14.0
77 CEMENT	OK	1917	(51-100)		41.0
78 BUFFALO WALLOW	TX	1978	(51-100)		19.1
79 GARDEN BANKS BLK 668	FG	2000	(51-100)		0.0
80 GARDEN BANKS BLK 877	FG	2003	(51-100)		0.0
81 BETHANY	TX	1936	(51-100)		23.3
82 MESA UNIT	WY	1981	(51-100)		23.0
83 KNOX	OK	1916	(51-100)		35.1
84 MIMMS CREEK	TX	1978	(51-100)		28.1
85 INDIAN BASIN	NM	1971	(51-100)		124.3
86 OVERTON	TX	1973	(51-100)		21.7
87 CEDARDALE NE	OK	1958	(51-100)		21.7
88 LABARGE	WY	1924	(51-100)		25.0
89 BROOKWOOD COAL DEGASIFICAT	AL	1981	(51-100)		20.0
90 TEAGUE	TX	1945	(51-100)		11.3
91 WILLOW SPRINGS	TX	1954	(51-100)		28.0
92 GREEN CANYON BLK 699	FG	1998	(51-100)		0.0
93 CEDAR COVE COAL DEGAS	AL	1983	(51-100)		17.9
94 MISSISSIPPI CANYON BLK 731	FG	1987	(51-100)		92.7
95 OAK GROVE COAL DEGAS	AL	1980	(51-100)		14.1
96 BELRIDGE SOUTH	CA	1911	(51-100)		16.3
97 BLANCO SOUTH	NM	1951	(51-100)		18.0
98 BLUE CREEK COAL DEGAS	AL	1988	(51-100)		19.5
99 BEAR GRASS	TX	1977	(51-100)		11.8
100 DOUBLE A WELLS	TX	1980	(51-100)		18.9
Top 100 Volume Subtotal			102,144.6	22,752.2	7,441.3
Top 100 Percentage of U.S. Total			51.8%	46.4%	36.8%

^aTotal wet gas after lease separation.

Note: The U.S. total production estimate of 20,231 billion cubic feet and the U.S. total reserves estimate of 197,145 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.

FP = Federal Offshore Pacific

FG = Federal Offshore Gulf of Mexico

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

Table B3. Top 100 U.S. Fields Ranked by Liquids Production from Estimated 2003 Field Level Data^a
(Million Barrels of 42 U.S. Gallons)

Field Name	Location	Discovery Year	Proved Reserves Rank Group	Nonproducing Reserves	2003 Estimated Production Volume
1 PRUDHOE BAY	AK	1967	(1-10)		141.3
2 KUPARUK RIVER	AK	1969	(1-10)		58.8
3 MISSISSIPPI CANYON BLK 807	FG	1989	(1-10)		58.1
4 MIDWAY-SUNSET	CA	1901	(1-10)		47.8
5 BELRIDGE SOUTH	CA	1911	(1-10)		41.1
6 MISSISSIPPI CANYON BLK 810	FG	1996	(1-10)		36.9
7 KERN RIVER	CA	1899	(1-10)		36.7
8 ALPINE	AK	1994	(1-10)		36.1
9 MISSISSIPPI CANYON BLK 84	FG	1993	(1-10)		33.9
10 WASSON	TX	1937	(1-10)		26.1
Top 10 Volume Subtotal			6,042.4	657.5	516.6
Top 10 Percentage of U.S. Total			26.2%	11.0%	25.0%
11 NORTHSTAR	AK	1984	(11-20)		22.9
12 GREEN CANYON BLK 158	FG	1992	(11-20)		19.8
13 SPRABERRY TREND AREA	TX	1950	(11-20)		19.8
14 VIOSCA KNOLL BLK 786	FG	1996	(11-20)		19.3
15 MILNE POINT	AK	1982	(11-20)		18.8
16 ELK HILLS	CA	1920	(11-20)		18.7
17 CYMRIC	CA	1916	(11-20)		18.7
18 WILMINGTON	CA	1932	(11-20)		14.9
19 SLAUGHTER	TX	1937	(11-20)		14.3
20 POINT MCINTYRE	AK	1988	(11-20)		13.8
Top 20 Volume Subtotal			8,094.1	875.5	697.7
Top 20 Percentage of U.S. Total			35.0%	14.6%	33.7%
21 GREEN CANYON BLK 244	FG	1994	(21-50)		12.8
22 TARN	AK	1991	(21-50)		12.6
23 BOREALIS	AK	2001	(21-50)		11.8
24 GREEN CANYON BLK 205	FG	1988	(21-50)		11.5
25 EAST BREAKS BLK 643	FG	1999	(21-50)		11.3
26 LOST HILLS	CA	1910	(21-50)		11.0
27 EAST BREAKS BLK 690	FG	2001	(21-50)		10.6
28 GIDDINGS	TX	1960	(21-50)		10.3
29 MISSISSIPPI CANYON BLK 899	FG	1998	(21-50)		10.2
30 LEVELLAND	TX	1945	(21-50)		9.6
31 MAIN PASS BLK 61	FG	2001	(21-50)		9.6
32 ENDICOTT	AK	1978	(21-50)		9.2
33 GARDEN BANKS BLK 215	FG	1995	(21-50)		8.7
34 SEMINOLE	TX	1936	(21-50)		8.6
35 WATTENBERG	CO	1970	(21-50)		8.6
36 SHO-VEL-TUM	OK	1905	(21-50)		8.4
37 GREEN CANYON BLK 243	FG	2001	(21-50)		8.2
38 VIOSCA KNOLL BLK 990	FG	1981	(21-50)		8.1
39 EWING BANK BLK 873	FG	1991	(21-50)		7.9
40 ALAMINOS CANYON BLK 25	FG	1997	(21-50)		7.9
41 VACUUM	NM	1929	(21-50)		7.4
42 KELLY-SNYDER	TX	1948	(21-50)		7.4
43 EUGENE ISLAND SA BLK 330	FG	1971	(21-50)		7.1
44 COWDEN NORTH	TX	1930	(21-50)		7.0
45 YATES	TX	1926	(21-50)		6.9
46 HONDO	FP	1969	(21-50)		6.8
47 VIOSCA KNOLL BLK 956	FG	1985	(21-50)		6.6
48 COALINGA	CA	1887	(21-50)		6.4
49 GARDEN BANKS BLK 426	FG	1992	(21-50)		6.4
50 INDIAN BASIN	NM	1971	(21-50)		6.4
Top 50 Volume Subtotal			10,175.2	1,258.2	963.1
Top 50 Percentage of U.S. Total			44.0%	21.0%	46.6%

Table B3. Top 100 U.S. Fields Ranked by Liquids Production from Estimated 2003 Field Level Data^a
(Continued)
(Million Barrels of 42 U.S. Gallons)

Field Name	Location	Discovery Year	Proved Reserves Rank Group	Nonproducing Reserves	2003 Estimated Production Volume
51 GARDEN BANKS BLK 260	FG	1995	(51-100)		6.4
52 PESCADO	FP	1970	(51-100)		6.3
53 SOUTH TIMBALIER BLK 37	FG	1974	(51-100)		6.3
54 GREEN CANYON BLK 236	FG	1999	(51-100)		6.1
55 KENT BAYOU	LA	1950	(51-100)		5.5
56 ANTON-IRISH	TX	1944	(51-100)		5.5
57 GARDEN BANKS BLK 559	FG	1999	(51-100)		5.4
58 GREEN CANYON BLK 254	FG	1994	(51-100)		5.2
59 VIOSCA KNOLL BLK 825	FG	1988	(51-100)		5.0
60 SALT CREEK	TX	1942	(51-100)		4.9
61 MISSISSIPPI CANYON BLK 935	FG	1994	(51-100)		4.9
62 FULLERTON	TX	1942	(51-100)		4.8
63 MCELROY	TX	1926	(51-100)		4.7
64 POINT ARGUELLO	FP	1981	(51-100)		4.7
65 RANGELY	CO	1902	(51-100)		4.7
66 GOLDSMITH NORTH	TX	1946	(51-100)		4.7
67 NIAKUK	AK	1984	(51-100)		4.6
68 VENTURA	CA	1916	(51-100)		4.6
69 GRAND ISLE BLK 43	FG	1956	(51-100)		4.6
70 SAN ARDO	CA	1947	(51-100)		4.5
71 WEST DELTA BLK 30	FG	1949	(51-100)		4.3
72 GREATER ANETH	UT	1956	(51-100)		4.3
73 GREEN CANYON BLK 282	FG	2002	(51-100)		4.3
74 MCARTHUR RIVER	AK	1965	(51-100)		4.1
75 MAIN PASS SA BLK 299	FG	1967	(51-100)		4.1
76 GREEN CANYON BLK 65	FG	1984	(51-100)		4.0
77 BAY MARCHAND BLK 2	LA	1949	(51-100)		4.0
78 ELAND	ND	1995	(51-100)		4.0
79 ROBERTSON NORTH	TX	1956	(51-100)		4.0
80 CEDAR HILLS	ND & MT & SD	1954	(51-100)		3.9
81 AURORA	AK	1969	(51-100)		3.8
82 MEANS	TX	1934	(51-100)		3.8
83 MISSISSIPPI CANYON BLK 109	FG	1984	(51-100)		3.7
84 EAST TEXAS	TX	1930	(51-100)		3.7
85 HOBBS	NM	1928	(51-100)		3.7
86 GREEN CANYON BLK 112	FG	1998	(51-100)		3.7
87 LAKE WASHINGTON	LA	1931	(51-100)		3.5
88 LISBURNE	AK	1967	(51-100)		3.4
89 HIGH ISLAND SA BLK A563	FG	1975	(51-100)		3.3
90 GOLDEN TREND	OK	1945	(51-100)		3.3
91 HAWKINS	TX	1940	(51-100)		3.2
92 EUGENE ISLAND BLK 238	FG	1964	(51-100)		3.1
93 HOWARD-GLASSCOCK	TX	1925	(51-100)		3.1
94 HARTZOG DRAW	WY	1976	(51-100)		3.1
95 SHIP SHOAL BLK 169	FG	1961	(51-100)		3.1
96 ELK BASIN	MT & WY	1915	(51-100)		3.0
97 MAIN PASS BLK 41	FG	1957	(51-100)		3.0
98 HUNTINGTON BEACH	CA	1920	(51-100)		3.0
99 DOLLARHIDE	NM & TX	1945	(51-100)		2.9
100 SOUTH MARSH IS SA BLK 128	FG	1975	(51-100)		2.9
Top 100 Volume Subtotal			12,192.4	1,566.7	1,173.6
Top 100 Percentage of U.S. Total			52.8%	26.2%	56.8%

^aIncludes lease condensate.

Notes: The U.S. total production estimate of 2,068 million barrels and the U.S. total reserves estimate of 23,106 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.

FP = Federal Offshore Pacific

FG = Federal Offshore Gulf of Mexico

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

Table B4. Top 100 U.S. Fields Ranked by Gas Production from Estimated 2003 Field Level Data^a
(Billion Cubic Feet)

Field Name	Location	Discovery Year	Proved Reserves Rank Group	Nonproducing Reserves	2003 Reported Production Volume
1 SAN JUAN BASIN GAS AREA	CO & NM	1927	(1-10)		1479.6
2 HUGOTON GAS AREA	KS & OK & TX	1922	(1-10)		348.1
3 NEWARK EAST	TX	1981	(1-10)		306.4
4 PRB COALBED	WY	1992	(1-10)		296.3
5 JONAH	WY	1977	(1-10)		244.5
6 PRUDHOE BAY	AK	1967	(1-10)		209.6
7 WATTENBERG	CO	1970	(1-10)		194.2
8 LOWER MOBILE BAY AREA	AL & FG	1979	(1-10)		187.9
9 CARTHAGE	TX	1944	(1-10)		170.7
10 ANTRIM	MI	1965	(1-10)		144.7
Top 10 Volume Subtotal			46,356.9	8,251.4	3,582.0
Top 10 Percentage of U.S. Total			23.5%	16.8%	17.7%
11 GIDDINGS	TX	1960	(11-20)		125.1
12 INDIAN BASIN	NM	1971	(11-20)		124.3
13 ELK HILLS	CA	1920	(11-20)		113.2
14 MADDEN	WY	1968	(11-20)		108.1
15 MAYFIELD NE	OK	1951	(11-20)		100.2
16 RATON BASIN GAS AREA	CO & NM	1998	(11-20)		94.7
17 MISSISSIPPI CANYON BLK 731	FG	1987	(11-20)		92.7
18 PANHANDLE WEST	TX	1918	(11-20)		91.6
19 PINEDALE	WY	1955	(11-20)		87.3
20 NATURAL BUTTES	UT	1952	(11-20)		84.0
Top 20 Volume Subtotal			60,393.5	11,042.4	4,603.4
Top 20 Percentage of U.S. Total			30.6%	22.5%	22.8%
21 MOCANE-LAVERNE GAS AREA	KS & OK & TX	1947	(21-50)		82.1
22 DRUNKARDS WASH	UT	1989	(21-50)		78.4
23 RED OAK-NORRIS	OK	1910	(21-50)		77.2
24 VIOSCA KNOLL BLK 956	FG	1985	(21-50)		76.8
25 SAWYER	TX	1975	(21-50)		74.3
26 SPRABERRY TREND AREA	TX	1950	(21-50)		72.1
27 MISSISSIPPI CANYON BLK 305	FG	2002	(21-50)		71.5
28 MISSISSIPPI CANYON BLK 807	FG	1989	(21-50)		68.8
29 STRONG CITY DISTRICT	OK	1966	(21-50)		66.8
30 PANOMA GAS AREA	KS	1956	(21-50)		66.8
31 EAST BREAKS BLK 690	FG	2001	(21-50)		66.6
32 OAK HILL	TX	1958	(21-50)		62.4
33 MISSISSIPPI CANYON BLK 810	FG	1996	(21-50)		60.9
34 VERNON	LA	1967	(21-50)		59.7
35 ELM GROVE	LA	1958	(21-50)		57.9
36 MAMM CREEK	CO	1959	(21-50)		57.5
37 BELUGA RIVER	AK	1962	(21-50)		56.6
38 FREESTONE	TX	1949	(21-50)		55.1
39 LA PERLA	TX	1958	(21-50)		53.9
40 JUDGE DIGBY	LA	1977	(21-50)		53.4
41 MCALLEN RANCH	TX	1986	(21-50)		53.3
42 VIOSCA KNOLL BLK 915	FG	1993	(21-50)		52.6
43 VAQUILLAS RANCH	TX	1978	(21-50)		52.4
44 WHITNEY CANYON-CARTER CRK	WY	1978	(21-50)		52.4
45 EAST BREAKS BLK 579	FG	2003	(21-50)		52.3
46 WATONGA-CHICKASHA TREND	OK	1962	(21-50)		51.7
47 OAKWOOD	VA	1990	(21-50)		51.2
48 GOMEZ	TX	1977	(21-50)		50.6
49 EAST BREAKS BLK 945	FG	1994	(21-50)		50.0
50 MISSISSIPPI CANYON BLK 211	FG	1994	(21-50)		50.0
Top 50 Volume Subtotal			79,072.1	15,801.0	6,438.9
Top 50 Percentage of U.S. Total			40.1%	32.2%	31.8%

Table B4. Top 100 U.S. Fields Ranked by Gas Production from Estimated 2003 Field Level Data^a
(Continued)
(Billion Cubic Feet)

Field Name	Location	Discovery Year	Proved Reserves Rank Group	Nonproducing Reserves	2003 Reported Production Volume
51 BIG SANDY	KY & WV	1881	(51-100)		48.6
52 COOK INLET NORTH	AK	1962	(51-100)		48.1
53 SOUTH TIMBALIER BLK 176	FG	1963	(51-100)		48.1
54 DEW	TX	1982	(51-100)		48.1
55 WILBURTON	OK	1941	(51-100)		47.9
56 WEST CAMERON BLK 46	FG	2002	(51-100)		47.4
57 GOLDEN TREND	OK	1945	(51-100)		47.1
58 TOM EAST	TX	2001	(51-100)		46.5
59 SOUTH TIMBALIER BLK 190	FG	1965	(51-100)		46.3
60 B. M. T.	TX	1994	(51-100)		44.8
61 KINTA	OK	1914	(51-100)		42.9
62 GREEN CANYON BLK 116	FG	1985	(51-100)		42.8
63 ELK CITY	OK	1947	(51-100)		42.6
64 WEST CAMERON BLK 192	FG	1954	(51-100)		42.3
65 DOWDY RANCH	TX	1999	(51-100)		42.2
66 BALD PRAIRIE	TX	1976	(51-100)		41.3
67 CEMENT	OK	1917	(51-100)		41.0
68 MATAGORDA ISLAND BLK 623	FG	1980	(51-100)		41.0
69 JAVELINA	TX	1947	(51-100)		40.9
70 BRAZOS BLK A20	FG	1979	(51-100)		40.6
71 MCARTHUR RIVER	AK	1965	(51-100)		39.0
72 DESOTO CANYON BLK 133	FG	1993	(51-100)		38.1
73 HAWKINS	TX	1940	(51-100)		38.0
74 GARDEN BANKS BLK 215	FG	1995	(51-100)		37.5
75 MISSISSIPPI CANYON BLK 348	FG	2000	(51-100)		36.9
76 WAMSUTTER	WY	1958	(51-100)		36.2
77 MISSISSIPPI CANYON BLK 311	FG	1975	(51-100)		36.0
78 SAMANO	TX	1985	(51-100)		35.9
79 GREEN CANYON BLK 472	FG	1989	(51-100)		35.8
80 BROWN-BASSETT	TX	1953	(51-100)		35.3
81 KNOX	OK	1916	(51-100)		35.1
82 FOGARTY CREEK	WY	1975	(51-100)		34.7
83 EAST BREAKS BLK 688	FG	1992	(51-100)		34.2
84 ANSCHUTZ RANCH EAST	UT & WY	1980	(51-100)		34.1
85 BRAZOS SA BLK A133	FG	1975	(51-100)		33.9
86 BRUFF	WY	1969	(51-100)		33.3
87 HAYNES	TX	1954	(51-100)		33.3
88 EUGENE ISLAND BLK 238	FG	1964	(51-100)		33.1
89 FRESH WATER BAYOU	LA	1965	(51-100)		33.0
90 RIO VISTA	CA	1936	(51-100)		32.6
91 VIOSCA KNOLL BLK 783	FG	1985	(51-100)		32.3
92 MOBILE BLK 823	FG	1983	(51-100)		31.9
93 MISSISSIPPI CANYON BLK 194	FG	1975	(51-100)		31.5
94 CHARCO	TX	1948	(51-100)		31.3
95 SOONER TREND	OK	1938	(51-100)		31.2
96 GRAND VALLEY	CO	1985	(51-100)		31.2
97 MISSISSIPPI CANYON BLK 84	FG	1993	(51-100)		30.9
98 ECHO SPRINGS	WY	1977	(51-100)		30.8
99 MONTE CHRISTO NORTH	TX	1988	(51-100)		30.4
100 KENAI	AK	1959	(51-100)		30.4
Top 100 Volume Subtotal			93,145.0	18,654.6	8,347.5
Top 100 Percentage of U.S. Total			47.2%	38.0%	41.3%

^aTotal wet gas after lease separation.

Note: The U.S. total production estimate of 20,231 billion cubic feet and the U.S. total reserves estimate of 197,145 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.

FP = Federal Offshore Pacific

FG = Federal Offshore Gulf of Mexico

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

Table B5. Top U.S. Operators Ranked by Reported 2003 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	874	1	BP PLC	4,797
2	CHEVRONTEXACO INC	567	2	EXXONMOBIL CORP	2,992
3	SHELL OIL CO	466	3	CHEVRONTEXACO INC	2,554
4	CONOCOPHILLIPS CO	351	4	DEVON ENERGY CORP	2,313
5	OCCIDENTAL PETROLEUM CORP	265	5	SHELL OIL CO	2,279
6	EXXONMOBIL CORP	248	6	CONOCOPHILLIPS CO	2,266
7	AERA ENERGY LLC	228	7	ANADARKO PETROLEUM CORP	1,777
8	ANADARKO PETROLEUM CORP	104	8	BURLINGTON RESOURCES OIL & GAS CO	1,677
9	KERR-MCGEE CORP	97	9	EL PASO ENERGY	1,410
10	AMERADA HESS CORP	93	10	APACHE CORP	1,164
Top 10 Volume Subtotal		3,293	Top 10 Volume Subtotal		23,229
Top 10 Percentage of U.S. Total		58%	Top 10 Percentage of U.S. Total		42%
11	MARATHON OIL CO	84	11	UNOCAL CORP	1,025
12	DEVON ENERGY CORP	83	12	DOMINION RESOURCES INC	998
13	APACHE CORP	82	13	XTO ENERGY INC	985
14	UNOCAL CORP	65	14	CHESAPEAKE ENERGY CORP	929
15	NUEVO ENERGY CO	44	15	KERR-MCGEE CORP	912
16	POGO PRODUCING CO	43	16	MARATHON OIL CO	909
17	WESTPORT RESOURCES CORP	43	17	E O G RESOURCES INC	879
18	MERIT ENERGY CO	40	18	ENCANA OIL & GAS INC	835
19	CITY OF LONG BEACH	32	19	OCCIDENTAL PETROLEUM CORP	701
20	PLAINS EXPLOR & PROD CO	32	20	WILLIAMS ENERGY INC	662
Top 20 Volume Subtotal		3,841	Top 20 Volume Subtotal		32,064
Top 20 Percentage of U.S. Total		68%	Top 20 Percentage of U.S. Total		58%
21	PIONEER NATURAL RESOURCES USA	29	21	NEWFIELD EXPLORATION CO	579
22	CITATION OIL & GAS CORP	26	22	PIONEER NATURAL RESOURCES USA	495
23	BURLINGTON RESOURCES OIL & GAS CO	26	23	WESTPORT RESOURCES CORP	476
24	EL PASO ENERGY	26	24	AMERADA HESS CORP	466
25	NEXEN PETROLEUM USA INC	25	25	QUESTAR CORP	466
26	ENI PETROLEUM CO INC	23	26	SAMSON RESOURCES CO	465
27	NEWFIELD EXPLORATION CO	23	27	TOTALFINAELF SA	407
28	DENBURY RESOURCES INC	23	28	HOUSTON EXPLORATION	378
29	KINDER MORGAN PROD CO INC	23	29	TOM BROWN INC	306
30	HILCORP ENERGY CO	22	30	NOBLE ENERGY INC	302
31	E O G RESOURCES INC	21	31	MERIT ENERGY CO	299
32	NOBLE ENERGY INC	19	32	EQUITABLE RESOURCES INC	292
33	VINTAGE PETROLEUM INC	19	33	WALTER OIL & GAS CORP	277
34	PATINA OIL & GAS CORP	19	34	YATES PETROLEUM CORP	264
35	BERRY PETROLEUM CO	18	35	PATINA OIL & GAS CORP	249
36	ENCORE OPERATING LP	18	36	POGO PRODUCING CO	245
37	DOMINION RESOURCES INC	17	37	HUNT OIL CO	239
38	STONE ENERGY CORP	17	38	ENERGEN RESOURCES CORP	232
39	FOREST OIL CORP	16	39	CABOT OIL & GAS CORP	230
40	XTO ENERGY INC	16	40	FOREST OIL CORP	224
41	CHESAPEAKE ENERGY CORP	15	41	HILCORP ENERGY CO	217
42	NATIONAL FUEL GAS	14	42	STONE ENERGY CORP	214
43	WALTER OIL & GAS CORP	14	43	CIMAREX ENERGY CO	200
44	ST MARY LAND & EXPLOR CO	14	44	KAISER - FRANCIS OIL CO	192
45	GRUY PETROLEUM MANAGEMENT CO	13	45	DENBURY RESOURCES INC	181
46	BASS ENTERPRISES PRODUCTION CO	12	46	W & T OFFSHORE INC	181
47	BHP BILLITON	12	47	SPINNAKER EXPLORATION CO LLC	180
48	YATES PETROLEUM CORP	11	48	CALPINE NATURAL GAS CO	177
49	HUNT OIL CO	11	49	EVERGREEN OPERATING CORP	174
50	MARBOB ENERGY CORP	10	50	RED WILLOW LLC	173
Top 50 Volume Subtotal		4,393	Top 50 Volume Subtotal		40,844
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. Total natural gas production is wet after lease separation.

Conversion to the Metric System

Conversion to the Metric System

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

(1) to designate the metric system of measurement as the preferred system of weights and measures for United States trade and commerce. . . .

(2) to require that each Federal agency, by the end of Fiscal Year 1992, use the metric system of measurement in its procurements, grants, and other business-related activities."{42}

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, 1993 – 2003

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)											
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
2003	25.9	14.9	40.9	-63.3	67.7	112.1	16.1	195.9	298.4	3,480.4	-125.0
Dry Natural Gas (billion cubic meters)											
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
2003	80.45	-46.38	34.07	29.28	465.93	34.60	45.59	546.12	550.05	5,353.10	59.38
Natural Gas Liquids (million cubic meters)											
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
2003	-53.7	-25.6	-79.3	4.8	100.0	5.6	11.4	117.0	127.5	1,185.9	-85.0

^aRevisions and adjustments = Col. 1 + Col. 2.

^bTotal discoveries = Col. 5 + Col. 6 + Col. 7.

^cProved 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, 1993-2003 annual reports, DOE/EIA-0216.{17-26}

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 2002 of the EIA publication *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, DOE EIA-0216.{1-26}

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.

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves	Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Alabama					Alaska				
1977	85	0	530	NA	1977	8,413	846	32,243	NA
1978	*74	0	514	NA	1978	9,384	398	32,045	NA
1979	45	NA	652	213	1979	8,875	398	32,259	23
1980	54	NA	636	226	1980	8,751	0	33,382	11
1981	55	NA	648	192	1981	8,283	0	33,037	10
1982	54	NA	^a 648	193	1982	7,406	60	34,990	9
1983	51	NA	^a 785	216	1983	7,307	576	34,283	8
1984	*68	NA	^a 961	200	1984	7,563	369	34,476	19
1985	69	NA	^a 821	182	1985	7,056	379	33,847	383
1986	55	20	^b 951	177	1986	6,875	902	32,664	381
1987	55	20	^b 842	166	1987	7,378	566	33,225	418
1988	54	20	^b 809	166	1988	6,959	431	9,078	401
1989	43	20	^b 819	168	1989	6,674	750	8,939	380
1990	44	<1	^c 4,125	170	1990	6,524	969	9,300	340
1991	43	<1	^c 5,414	145	1991	6,083	1,456	9,553	360
1992	41	0	^c 5,802	171	1992	6,022	1,331	9,638	347
1993	41	0	^c 5,140	158	1993	5,775	1,161	9,907	321
1994	44	0	^c 4,830	142	1994	5,767	1,022	9,733	301
1995	43	0	^c 4,868	120	1995	5,580	582	9,497	306
1996	45	0	^c 5,033	119	1996	5,274	952	9,294	337
1997	47	0	^c 4,968	93	1997	5,161	832	10,562	631
1998	39	0	^c 4,604	81	1998	5,052	832	9,927	320
1999	49	0	^c 4,287	107	1999	4,900	464	9,734	299
2000	34	NA	^c 4,149	150	2000	4,861	NA	9,237	277
2001	42	NA	^c 3,915	64	2001	4,851	NA	8,800	405
2002	51	NA	^c 3,884	57	2002	4,678	NA	8,468	405
2003	52	NA	^c 4,301	60	2003	4,446	NA	8,285	387

^aOnshore only; offshore included in Louisiana.

^bOnshore only; offshore included in Federal Offshore - Gulf of Mexico (Louisiana).

^cIncludes 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; 2,132 Bcf in 2003.

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

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Arkansas				
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
2003	50	NA	1,663	3

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
California - Coastal Region Onshore				
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
2003	395	NA	167	15

California - Total				
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	d4,810	d590	d4,325	d146
1986	d4,734	d616	d3,928	d134
1987	d4,709	d1,493	d3,740	d130
1988	d4,879	d1,440	d3,519	d123
1989	d4,816	d1,608	d3,374	d113
1990	d4,658	d1,425	d3,185	d105
1991	d4,217	d1,471	d3,004	d92
1992	d3,893	d1,299	d2,778	d99
1993	d3,764	d965	d2,682	d104
1994	d3,573	d835	d2,402	d92
1995	d3,462	d823	d2,243	d92
1996	d3,437	d905	d2,082	d92
1997	d3,750	d1,264	d2,273	d95
1998	d3,843	d1,297	d2,244	d72
1999	d3,934	d1,400	d2,387	d98
2000	d3,813	NA	d2,849	d101
2001	d3,627	NA	d2,681	d76
2002	d3,633	NA	d2,591	d95
2003	d3,452	NA	d2,450	d101

California - Los Angeles Basin Onshore				
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
2003	319	NA	187	8

^dExcludes Federal offshore; now included in Federal Offshore-Pacific (California).

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
California - San Joaquin Basin Onshore				
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
2003	2,565	NA	2,013	78

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
California - State Offshore				
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
2003	173	NA	83	0

California-State and Federal Offshore				
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
2003	739	NA	594	0

California - Federal Offshore				
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
2003	566	NA	511	8

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
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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
2003	217	NA	15,436	395

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
2003	68	NA	79	17

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
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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
2003	125	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
2003	19	NA	NA	NA

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Kansas				
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
2003	243	NA	4,819	248

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Louisiana - Total				
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
2003	^f 452	NA	^f 9,325	^f 295

^eIncludes State and Federal offshore Alabama.

^fExcludes Federal offshore; now included in Federal Offshore-Gulf of Mexico (Louisiana).

Kentucky				
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
2003	25	NA	1,889	66

Louisiana - North				
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
2003	66	NA	5,074	67

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Louisiana - South Onshore				
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
2003	314	NA	3,745	182

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Louisiana - State Offshore				
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
2003	^f 72	NA	^f 506	^f 46

^eIncludes State and Federal offshore Alabama.

^fExcludes Federal offshore; now included in Federal Offshore-Gulf of Mexico (Louisiana).

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Michigan				
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
2003	75	NA	3,428	48

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Mississippi				
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
2003	169	NA	746	7

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Montana				
1977	175	27	*887	NA
1978	158	27	926	NA
1979	152	38	825	10
1980	179	13	*1,287	16
1981	186	11	*1,321	11
1982	216	6	847	18
1983	234	8	896	19
1984	224	4	802	18
1985	232	3	857	21
1986	248	27	803	16
1987	246	<1	780	16
1988	241	0	819	11
1989	225	<1	867	16
1990	221	0	899	15
1991	201	0	831	14
1992	193	0	859	12
1993	171	0	673	8
1994	175	0	717	8
1995	178	0	782	8
1996	168	0	796	7
1997	159	1	762	5
1998	167	0	782	5
1999	207	0	841	8
2000	235	NA	885	4
2001	260	NA	898	5
2002	288	NA	906	6
2003	315	NA	1,059	8

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
New Mexico - Total				
1977	605	97	12,000	NA
1978	579	90	12,688	NA
1979	563	77	13,724	530
1980	547	58	13,287	541
1981	555	93	13,870	560
1982	563	76	12,418	531
1983	576	75	11,676	551
1984	660	87	11,364	511
1985	688	99	10,900	445
1986	644	225	11,808	577
1987	654	235	11,620	771
1988	661	241	17,166	1,023
1989	665	256	15,434	933
1990	687	256	17,260	990
1991	721	275	18,539	908
1992	757	293	18,998	1,066
1993	707	211	18,619	996
1994	718	215	17,228	1,011
1995	732	185	17,491	943
1996	744	148	16,485	1,059
1997	735	146	15,514	869
1998	620	168	14,987	929
1999	718	165	15,449	954
2000	719	NA	17,322	896
2001	715	NA	17,414	873
2002	710	NA	17,320	838
2003	677	NA	17,020	875

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Nebraska				
1977	22	0	NA	NA
1978	30	1	NA	NA
1979	25	0	NA	NA
1980	*46	0	NA	NA
1981	41	0	NA	NA
1982	*32	0	NA	NA
1983	44	0	NA	NA
1984	*46	0	NA	NA
1985	42	0	NA	NA
1986	*45	7	NA	NA
1987	33	0	NA	NA
1988	42	0	NA	NA
1989	32	0	NA	NA
1990	26	0	NA	NA
1991	26	0	NA	NA
1992	26	0	NA	NA
1993	20	0	NA	NA
1994	22	0	NA	NA
1995	25	0	NA	NA
1996	28	0	NA	NA
1997	*21	0	NA	NA
1998	18	0	NA	NA
1999	17	0	NA	NA
2000	18	NA	NA	NA
2001	15	NA	NA	NA
2002	18	NA	NA	NA
2003	16	NA	NA	NA

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
New Mexico - East				
1977	576	95	3,848	NA
1978	554	88	3,889	NA
1979	542	77	4,031	209
1980	518	58	3,530	209
1981	522	93	3,598	214
1982	537	76	3,432	209
1983	542	75	3,230	232
1984	625	87	3,197	221
1985	643	98	3,034	209
1986	593	225	2,694	217
1987	608	230	2,881	192
1988	621	235	2,945	208
1989	619	252	3,075	196
1990	633	253	3,256	222
1991	694	275	3,206	205
1992	731	293	3,130	223
1993	688	211	3,034	233
1994	702	215	3,021	234
1995	713	185	2,867	247
1996	731	148	2,790	299
1997	719	146	2,642	273
1998	610	168	2,693	262
1999	705	165	3,037	255
2000	705	NA	3,537	333
2001	703	NA	3,518	279
2002	699	NA	3,632	290
2003	668	NA	3,301	272

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
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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
2003	9	NA	13,719	603

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
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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
2003	353	NA	448	45

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
2003	NA	NA	365	NA

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
2003	66	NA	1,126	NA

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Oklahoma				
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
2003	588	NA	15,401	686

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Texas - Total				
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	97,782	609	941,775	92,981
1986	97,152	1,270	940,574	92,964
1987	97,112	1,028	938,711	92,822
1988	97,043	1,099	938,167	92,617
1989	96,966	805	938,381	92,563
1990	97,106	618	938,192	92,575
1991	96,797	756	936,174	92,493
1992	96,441	9612	935,093	92,402
1993	96,171	9581	934,718	92,469
1994	95,847	9491	935,974	92,414
1995	95,743	9395	936,542	92,524
1996	95,736	9358	938,270	92,606
1997	95,687	9479	937,761	92,687
1998	94,927	9400	937,584	92,544
1999	95,339	9426	940,157	92,584
2000	95,273	NA	940,082	92,819
2001	94,944	NA	943,527	92,653
2002	95,015	NA	944,297	92,711
2003	94,583	NA	945,730	92,517

⁹Excludes Federal offshore; now included in Federal Offshore-Gulf of Mexico (Texas).

Pennsylvania				
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
2003	13	NA	2,487	NA

Texas - RRC District 1				
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
2003	59	NA	1,062	29

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
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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
2003	51	NA	1,770	69

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
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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
2003	30	NA	8,763	287

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
2003	190	NA	3,349	207

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
2003	20	NA	5,407	51

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
2003	189	NA	6,685	248

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
2003	205	NA	4,327	345

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
2003	68	NA	340	32

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
2003	1,513	NA	5,142	498

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Texas - RRC District 8A				
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
2003	2,089	NA	1,056	163

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Texas - RRC District 10				
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
2003	48	NA	4,064	347

Texas - RRC District 9				
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
2003	114	NA	3,309	236

Texas - State and Federal Offshore				
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
2003	310	NA	5,787	124

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Texas - State Offshore				
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
2003	7	NA	456	5

Year	Crude Oil Proved Reserves	Crude Oil Indicated Additional Reserves	Dry Natural Gas Proved Reserves	Natural Gas Liquids Proved Reserves
Virginia				
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
2003	NA	NA	1,717	NA

Utah				
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)
2003	221	NA	3,516	(h)

West Virginia				
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
2003	13	NA	3,306	68

^hIncluded with Wyoming.

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	681
1983	957	61	10,227	789
1984	954	71	10,482	860
1985	951	18	10,617	949
1986	849	126	9,756	950
1987	854	27	10,023	924
1988	815	35	10,308	1,154
1989	825	46	10,744	896
1990	794	42	9,944	812
1991	757	24	9,941	748
1992	689	18	10,826	660
1993	624	12	10,933	600
1994	565	13	10,879	564
1995	605	12	12,166	593
1996	603	14	12,320	727
1997	627	11	13,562	761
1998	547	10	13,650	675
1999	590	5	14,226	615
2000	561	NA	16,158	947
2001	489	NA	18,398	897
2002	524	NA	20,527	938
2003	517	NA	21,744	898

ⁱUtah 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
2003	566	NA	511	8

Note: Data not tabulated for years 1977-1984.

Federal Offshore - Total				
1985	2,862	11	34,492	702
1986	2,715	16	34,223	681
1987	2,639	21	31,931	638
1988	2,629	21	32,264	622
1989	2,747	32	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
2003	5,120	NA	22,570	725

^jIncludes State offshore Alabama.
Note: Data not tabulated for years 1977-1984.

Federal Offshore - Gulf of Mexico (Louisiana)				
1985	1,759	11	26,113	610
1986	1,640	14	25,454	566
1987	1,514	19	23,260	532
1988	1,527	21	23,471	512
1989	1,691	32	24,187	575
1990	1,772	49	22,679	519
1991	1,775	18	21,611	545
1992	1,643	31	19,653	472
1993	1,880	18	19,383	490
1994	1,922	43	20,835	500
1995	2,269	46	21,392	496
1996	2,357	40	21,856	621
1997	2,587	36	21,934	785
1998	2,483	7	20,774	776
1999	2,442	5	19,598	833
2000	2,751	NA	19,788	921
2001	3,877	NA	19,721	785
2002	4,088	NA	18,500	783
2003	4,251	NA	16,728	598

^fIncludes State and Federal offshore Alabama.
^kIncludes 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
2003	303	NA	5,331	119

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
2003	16	NA	134	10

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

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
2003	17,445	NA	180,759	7,072

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
2003	21,891	NA	189,044	7,459

Table D1. U.S. Proved Reserves of Crude Oil, 1976–2003
(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
2003	163	94	257	-398	426	705	101	1,232	1,877	21,891	-786

^aIncludes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.

^bRevisions and adjustments = Col. 1 + Col. 2.

^cTotal discoveries = Col. 5 + Col. 6 + Col. 7.

^dProved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

^eBased on following year data only.

^fConsists 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 2003 annual reports, DOE/EIA-0216.{1-26}

Table D2. U.S. Lower 48 Proved Reserves of Crude Oil, 1976–2003
(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
2003	162	5	167	-398	391	705	101	1,197	1,520	17,445	-554

^aIncludes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.

^bRevisions and adjustments = Col. 1 + Col. 2.

^cTotal discoveries = Col. 5 + Col. 6 + Col. 7.

^dProved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

^eBased on following year data only.

^fConsists 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 2003 annual reports, DOE/EIA-0216.(1-26)

Table D3. U.S. Proved Reserves of Dry Natural Gas, 1976–2003
(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
2003	2,841	-1,638	1,203	-10,092	16,454	1,222	1,610	19,286	19,425	189,044	2,098

^aIncludes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.

^bRevisions and adjustments = Col. 1 + Col. 2.

^cTotal discoveries = Col. 5 + Col. 6 + Col. 7.

^dProved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

^eBased on following year data only.

^fConsists only of operator reported corrections and no other adjustments.

^gAn 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 2003 annual reports, DOE/EIA-0216.{1-26}

Table D4. U.S. Lower 48 Proved Reserves of Dry Natural Gas, 1976–2003
(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
2003	2,840	-1,830	1,010	1,034	16,373	1,202	1,609	19,184	18,947	180,759	2,281

^aIncludes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.

^bRevisions and adjustments = Col. 1 + Col. 2.

^cTotal discoveries = Col. 5 + Col. 6 + Col. 7.

^dProved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

^eBased on following year data only.

^fConsists 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 2003 annual reports, DOE/EIA-0216.(1-26)

Table D5. U.S. Proved Reserves of Wet Natural Gas, After Lease Separation, 1978–2003
(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
2003	2,323	-1,715	608	1,107	17,195	1,252	1,653	20,100	20,231	197,145	1,584

^aIncludes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.

^bRevisions and adjustments = Col. 1 + Col. 2.

^cTotal discoveries = Col. 5 + Col. 6 + Col. 7.

^dProved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

^eBased on following year data only.

^fAn 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 2003 annual reports, DOE/EIA-0216.{3-26}

Table D6. U.S. Lower 48 Proved Reserves of Wet Natural Gas, After Lease Separation, 1978–2003
(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
2003	2,324	-1,909	415	1,107	17,114	1,232	1,652	19,998	19,751	188,797	1,769

^aIncludes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.

^bRevisions and adjustments = Col. 1 + Col. 2.

^cTotal discoveries = Col. 5 + Col. 6 + Col. 7.

^dProved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

^eBased 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 2003 annual reports, DOE/EIA-0216.{3-26}

Table D7. U.S. Proved Reserves of Natural Gas Liquids, 1978–2003
(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
2003	-338	-161	-499	30	629	35	72	736	802	7,459	-535

^aIncludes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.

^bRevisions and adjustments = Col. 1 + Col. 2.

^cTotal discoveries = Col. 5 + Col. 6 + Col. 7.

^dProved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

^eBased on following year data only.

^fConsists 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 2003 annual reports, DOE/EIA-0216.(3-26)

Table D8. U.S. Lower 48 Proved Reserves of Natural Gas Liquids, 1978–2003
(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
2003	-338	-161	-499	30	629	35	72	736	784	7,072	-517

^aIncludes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.

^bRevisions and adjustments = Col. 1 + Col. 2.

^cTotal discoveries = Col. 5 + Col. 6 + Col. 7.

^dProved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

^eBased on following year data only.

^fConsists 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 2003 annual reports, DOE/EIA-0216.{3-26}

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2003

Year	Gulf of Mexico			Depth		Deepwater Percentage
	Total	Louisiana ^a	Texas	Greater than 200 meters	Less than 200 meters	
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
2003	485	426	59	336	149	69.3
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
2003	4,554	4,251	303	3,627	927	79.6
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
2003	4,397	3,330	1,067	1,545	2,852	35.1
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
2003	22,522	17,168	5,354	10,041	12,481	44.6

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2003 (continued)

Year	Gulf of Mexico			Depth		Deepwater Percentage
	Total	Louisiana ^a	Texas	Greater than 200 meters	Less than 200 meters	
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
2003	148	120	28	55	93	37.2
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
2003	717	598	119	262	455	36.5

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
2003	4,306	3,244	1,062	1,513	2,793	35.1
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
2003	22,059	16,728	5,331	9,835	12,224	44.6

**Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2003
(continued)**

Year	Gulf of Mexico			Depth		Deepwater Percentage
	Total	Louisiana ^a	Texas	Greater than 200 meters	Less than 200 meters	
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
2003	78	53	25	30	48	38.5
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
2003	353	251	102	135	218	38.2

^aIncludes Federal Offshore Alabama.

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

Table D10. 2003 Reported Proved Nonproducing Reserves of Crude Oil, Lease Condensate, and Natural Gas^a

State and Subdivision	Crude Oil (mmbbls)	Lease Condensate (mmbbls)	Nonassociated Gas (bcf)	Associated Dissolved Gas (bcf)	Total Gas (bcf)
Alaska	734	0	691	25	716
Lower 48 States	4,846	399	42,474	5,878	48,352
Alabama	2	3	284	2	286
Arkansas	2	0	243	10	253
California	313	0	246	130	376
Coastal Region Onshore	61	0	0	29	29
Los Angeles Basin Onshore	117	0	0	67	67
San Joaquin Basin Onshore	110	0	246	18	264
State Offshore	25	0	0	16	16
Colorado	61	29	3,411	534	3,945
Florida	6	0	0	0	0
Kansas	18	0	139	6	145
Kentucky	4	0	111	0	111
Louisiana	190	31	3,649	278	3,927
North	14	5	2,072	64	2,136
South Onshore	150	23	1,384	184	1,568
State Offshore	26	3	193	30	223
Michigan	14	0	633	30	663
Mississippi	68	0	92	11	103
Montana	79	0	175	31	206
New Mexico	133	8	3,745	140	3,885
East	133	3	563	140	703
West	0	5	3,182	0	3,182
New York	0	0	50	0	50
North Dakota	47	1	16	18	34
Ohio	8	0	98	14	112
Oklahoma	92	28	3,537	121	3,658
Pennsylvania	1	0	274	59	333
Texas	613	89	10,869	734	11,603
RRC District 1	14	2	284	9	293
RRC District 2 Onshore	12	1	496	17	513
RRC District 3 Onshore	37	18	791	90	881
RRC District 4 Onshore	7	27	2,869	44	2,913
RRC District 5	2	2	1,939	21	1,960
RRC District 6	16	9	1,411	15	1,426
RRC District 7B	5	0	29	3	32
RRC District 7C	12	5	697	69	766
RRC District 8	165	1	599	153	752
RRC District 8A	319	0	19	265	284
RRC District 9	16	3	1,050	15	1,065
RRC District 10	6	21	550	32	582
State Offshore	2	0	135	1	136
Utah	76	2	840	143	983
Virginia	0	0	743	0	743
West Virginia	0	0	295	0	295
Wyoming	61	37	5,361	20	5,381
Federal Offshore ^b	3,041	171	7,624	3,596	11,220
Pacific (California)	93	8	51	130	181
Gulf of Mexico (Louisiana) ^b	2,801	118	5,329	3,091	8,420
Gulf of Mexico (Texas)	147	45	2,244	375	2,619
Miscellaneous ^c	17	0	39	1	40
U.S. Total	5,580	399	43,165	5,903	49,068

^aIncludes 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).

^bIncludes Federal offshore Alabama.

^cIncludes Arizona, Maryland, Missouri, Nevada, Oregon, South Dakota and Tennessee.

Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2002.

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 2003 by crude oil or natural gas well operators who were active as of December 31, 2003. 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 1996 and 2003, and depicts the number of active operators, with 1997 showing the largest in the series. The 2003 sampling frame consisted of 164 Category I, 512 Category II, 399 Category III Certainty, and 19,848 Category III Noncertainty operators, for a total of 20,923 active operators. The survey sample consisted of 1,075 operators selected with certainty that included all of the Category I and II Certainty operators, the 399 smaller operators that were selected with certainty because of their size in relation to the area or areas in which they operated, and 479 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 2003 survey is summarized in **Table E2**. EIA makes a considerable effort to gain responses from all operators. About 3.5 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 55 nonoperators, 15 had successor operators that had taken over the production of the nonoperator. These successor operators were subsequently sampled. The overall response rate for the 2003 survey was 96 percent. For the 61 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, 1996-2003

Operator Category	Number of Operators							
	1996	1997	1998	1999	2000	2001	2002`	2003
Certainty								
Category I	176	180	178	177	175	179	176	164
Category II	486	461	420	399	436	485	480	512
Category III	3	1,194	862	648	854	559	388	399
Sampled	665	1,835	1,460	1,224	1,465	1,223	1,044	1,075
Percent Sampled	100	100	100	100	100	100	100	100
Noncertainty								
Sampled	0	1,645	1,459	1,305	1,311	644	533	479
Percent Sampled	0	8	7	6	6	3	3	2
Total								
Active Operators	23,410	22,678	23,620	22,089	22,102	22,519	22,823	20,923
Not Sampled	22,745	19,198	20,701	19,560	19,326	20,652	21,246	19,369
Sampled	665	3,480	2,919	R2,529	2,776	1,867	1,577	1,554
Percent Sampled	3	15	12	R11	13	8	7	7

R=Revised data.

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

Table E2. Form EIA-23 Survey Response Statistics, 2003

Operator Category	Original Sample Selected	Successor ^a Operators	Net ^b Category Changes	Non- ^c operators	Adjusted ^d Sample	Responding Operators		Nonresponding Operators	
						Number	Percent	Number	Percent
Certainty									
Category I	164	0	10	-7	167	167	100.0	0	0.0
Category II	512	15	-39	-23	465	459	98.7	6	1.3
Category III	399	0	38	-12	425	401	94.4	^e 24	5.6
Subtotal	1,075	15	9	-42	1,057	1,027	97.2	^e 30	2.8
Noncertainty									
Noncertainty	479	0	-9	-13	457	426	93.2	^e 31	6.8
Total	1,554	15	0	-55	1,514	1,453	96.0	^e 61	4.0

^aSuccessor operators are those, not initially sampled, that have taken over the production of a sampled operator.

^bNet of recategorized operators in the sample (excluding nonoperators).

^cIncludes former operators reporting that they were not operators during the report year and operators that could not be located who are treated as nonoperators.

^dAdjusted sample equals original sample plus successor operators plus net category changes minus nonoperators.

^eFor the 61 operators (24 Category III operators and 6 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" 2003.

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 2003*, in January of 2004, was the 22nd annual report and reflected data collected through November 2003. 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 2003, Form EIA-23 National estimates of production were 2,067 million barrels for crude oil and lease condensate or 7 million barrels (less than 1 percent) lower than that reported in the *Petroleum Supply Annual 2003* for crude oil and lease condensate (2,074 million barrels). Form EIA-23 National estimates of production for dry natural gas were 19,425 billion cubic feet, 357 billion cubic feet (less than 2 percent) higher than the *Natural Gas Monthly, September 2004* for 2003 dry natural gas production (19,068 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 2003 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, 2003. Of these, 20,923 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 2003 Operator Frame Activity, Form EIA-23

Total 2002 Operator Frame	68,616
Operators	22,823
Nonoperators	45,793
Changes to 2002 Operator Status	2,824
From Nonoperator to Operator ^a	503
From Operator to Nonoperator	2,321
No Changes to 2002 Operator Status	65,792
Operators	20,502
Nonoperators	45,290
Additions to 2002 Operator Frame	0
Operator	0
Nonoperator	0
Total 2003 Operator Frame	68,616
Operators	20,923
Nonoperators	47,693

^aIncludes operator frame activity through December 14, 2003.

^bRelatively 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.

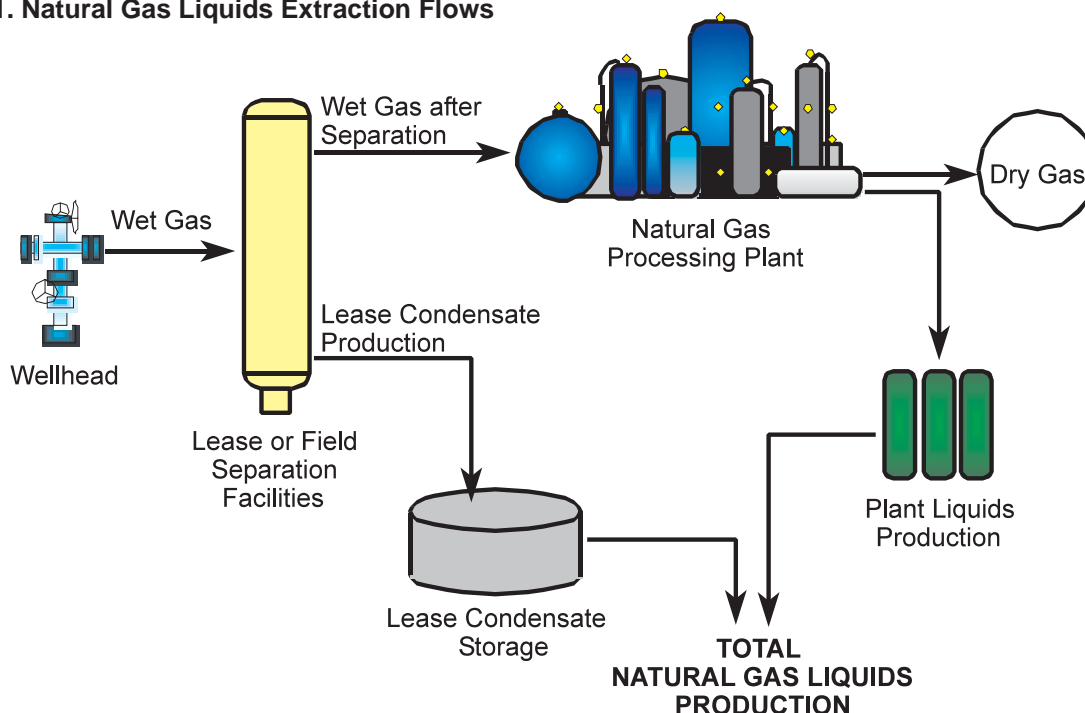
The EIA recognized that its estimates of proved reserves of natural gas liquids (NGL) had to reflect not only those volumes extractable in the future under current economic and operating conditions at the lease or field (lease condensate), but also volumes (plant liquids) extractable downstream at existing 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 209 operators of 504 plants were sent forms. This number included 2 new plants, 1 reactivated plants, and 7 successor plants identified after the initial 2003 survey mailing. A total of 26 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 16th 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

Table E4. Natural Gas Processed and Liquids Extracted at Natural Gas Processing Plants, 2003

Plant Location	Volume of Natural Gas Delivered to Processing Plants				Total Liquids Extracted (thousand barrels)
	State Production	Federal Production	Out of State Production	Natural Gas Processed	
	(million cubic feet)				
Alaska	2,447,017			2,447,017	28,025
Alabama	38,437	197,484	1,456	237,377	7,994
Arkansas	13,725			13,725	236
California	237,778	965		238,743	10,598
Colorado	555,544			555,544	23,982
Florida	3,504		2,267	5,771	796
Kansas	405,697		125,241	530,938	24,311
Kentucky	42,758			42,758	1,304
Louisiana	1,269,356	2,122,514		3,391,870	88,732
Michigan	41,619			41,619	2,818
Mississippi	2,150	281,525		283,675	8,431
Montana	6,263			6,263	491
North Dakota	58,479			58,479	4,448
New Mexico	987,762			987,762	76,393
Oklahoma	802,437		1,592	804,029	53,116
Texas	3,607,239		51,690	3,658,929	233,252
Utah	157,082		4,193	161,275	2,532
West Virginia	86,012		30,749	116,761	5,220
Wyoming	1,071,066		30,359	1,101,425	49,034
Miscellaneous ^a	13,356			13,356	578
Total	11,847,281	2,602,488	247,547	14,697,316	622,291

^aIncludes Illinois, Ohio, and Pennsylvania.

Source: Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production," 2003

revisions to EIA's monthly estimates. Differences, when found, were reconciled in both sources. For 2003, the Form EIA-64A National estimates were less than 1 percent (5 million barrels) lower than the *Petroleum Supply Annual 2003* volume for natural gas plant liquids production.

Table E5. Form EIA-64A 2003 Plant Frame Activity

Frame as of 2002 survey mailing	515
Additions	70
Deletions	-81
Frame as of 2003 survey mailing	504

Note: Includes operator frame activity through February 15, 2004.
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 2003 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, 2004.

Statistical Considerations

Statistical Considerations

Sampling Plan

The goal was a sample that would provide estimates of reserves and production of crude oil, natural gas, and lease condensate for the United States. A stratified sample using a single stage and systematic selection with probability proportional to size was designed. The measure of size was the volume of production for crude oil, natural gas, and lease condensate by State by company in 2002. There were two strata: companies selected with certainty and companies selected under the systematic probability proportional to size design.

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. EIA conducts extensive frame maintenance activities each year to identify all current operators of crude oil and natural gas wells in the country. 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.

Sample Design

To meet survey objectives, while minimizing respondent burden, a sampling strategy has been used since 1977. EIA publishes data on reserves and production for crude oil, natural gas, and lease condensate by State for most States, and by subdivision for the States of California, Louisiana, New Mexico, and Texas. 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.

Each operator is asked to report production and reserves 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.

EIA selected the following target sampling error for the 2003 survey for each product class.

- 1.0 percent for National estimates and for each of the States having subdivisions: Alaska, California, Louisiana, New Mexico, and Texas.
- 2.5 percent for each State having 1 percent or more of estimated lower 48 States reserves or production in 2002 for any product class.
- 4 percent for each State/subdivision having less than 1 percent of estimated U.S. reserves or production in 2002 (lower 48 States) for all 3 product class.
- 8 percent for States not published separately.

Certainty Stratum

There are three components to the certainty stratum Category I, Category II, and certain Category III Small Operators.

- **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 2002.
- **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 2002, and additionally, all coalbed methane and Federal Offshore operators.
- **Category III - Small Operators:** Operators who produced less than the Category II operators in 2002.

Small operators were further subdivided into certainty and noncertainty strata. Small operators who satisfied any of the following criteria based upon their production shown in the operator frame are certainty operators:

- All other operators with production or reserves in a State/subdivision that exceed selected cutoff levels.

Table F1. 2003 EIA-23 Initial Number of Operators in Survey Sample

State and Subdivision	Number of Certainty Operators	Number of Multi-State Operators	Number of Noncertainty Operators	Target Error	
				Oil	Gas
Alabama Onshore	49	1	2	0.040	0.025
Alaska	8	0	0	0.000	0.000
Arkansas	77	7	8	0.040	0.025
California - Coastal Region Onshore	15	0	0	0.080	0.080
California - Los Angeles Basin Onshore	17	0	0	0.010	0.010
California - San Joaquin Basin Onshore	44	0	0	0.025	0.040
Colorado	117	14	1	0.025	0.010
Florida - Onshore	6	0	0	0.025	0.025
Illinois	33	37	25	0.040	0.040
Indiana	22	30	2	0.040	0.080
Kansas	181	54	57	0.040	0.080
Kentucky	29	21	19	0.025	0.010
Louisiana-North	132	6	0	0.040	0.040
Louisiana-South Onshore	202	1	0	0.010	0.010
Michigan	45	4	15	0.010	0.010
Mississippi - Onshore	90	2	2	0.040	0.040
Montana	69	8	2	0.040	0.040
Nebraska	26	14	2	0.040	0.040
New Mexico - East	169	2	0	0.040	0.080
New Mexico - West	61	0	0	0.025	0.025
New York	22	9	9	0.025	0.010
North Dakota	73	7	0	0.080	0.040
Ohio	52	9	52	0.040	0.040
Oklahoma	265	54	43	0.040	0.040
Pennsylvania	62	20	29	0.025	0.025
Texas - RRC District 1	162	0	0	0.040	0.040
Texas - RRC District 2 Onshore	192	1	0	0.025	0.025
Texas - RRC District 3 Onshore	265	1	0	0.040	0.025
Texas - RRC District 4 Onshore	213	0	0	0.025	0.025
Texas - RRC District 5	109	2	0	0.040	0.010
Texas - RRC District 6	178	4	0	0.040	0.010
Texas - RRC District 7B	163	3	0	0.025	0.010
Texas - RRC District 7C	170	4	0	0.025	0.025
Texas - RRC District 8	218	4	0	0.040	0.025
Texas - RRC District 8A	197	6	0	0.010	0.010
Texas - RRC District 9	167	4	0	0.010	0.040
Texas - RRC District 10	154	13	0	0.025	0.025
Utah	59	1	2	0.040	0.010
Virginia	19	0	0	0.040	0.025
West Virginia	56	11	54	0.080	0.040
Wyoming	163	10	3	0.040	0.025
Offshore Areas	313	0	0	0.025	0.025
Other States ^a	52	2	2	0.080	0.080
Total	b_{1,069}	151^b	329	0.010	0.010

^aIncludes Arizona, Idaho, Iowa, Maryland, Missouri, Nevada, Oregon, South Dakota, Tennessee, and Washington.

^bNonduplicative 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.

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

- 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.

Noncertainty Stratum

Small operators not in the certainty stratum were classified in the noncertainty stratum. They were systematically sampled with probability proportional to size. Only the operators in the following 10 states were included in the noncertainty sample: Illinois, Indiana, Kentucky, Maryland, New York, Ohio, Pennsylvania, Tennessee, Virginia, and West Virginia. All other States were treated as certainty stratum.

In each State/subdivision the balance between the number of 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. 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.

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 and for the U.S. Total. **Table F1** shows sampling rates.

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. The total volume of certainty operators in the State/subdivision is simply the sum of individual operator's volumes. The estimated total volume of noncertainty operators in the State/subdivision is the weighted sum of the reports of the noncertainty sample operators.

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 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.

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

There were 457 operators sampled proportional to size (Table E1) that responded as Category III noncertainty operators. Only 241 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 216 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 auxiliary 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 99.9 percent of the published production for wet natural gas and 95.2 percent of the reserves shown in **Table 9**. Data shown in **Table F3** indicate that those responding operators accounted for 99.9 percent of the nonassociated natural gas production and 95.3 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 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 95.8 percent of the published proved reserves for lease condensate shown in **Table 15**.

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).
- Imputation was required for the natural gas data of the small operators to estimate their volumes of associated-dissolved and nonassociated natural gas.
- Adjustments to maintain reserves balance.

Methods used are discussed in the following sections.

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.

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:

$$\text{Calculated } P/[P+R] = \text{Beta} * \text{EXP}(\text{Alpha} * \ln(1 + \text{MOS}))$$

- *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 2003 production.

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 2003, rather than rely on a weighted sample, 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. These States were chosen for this new procedure because of the many years of historical production and reserves data within EIA and availability of reliable State government and commercial production data for these States. This technique improved the correlation of EIA data with State and commercial production data, and

Table F2. Summary of Form EIA-23 Reported, Imputed, and Estimated Natural Gas Data for 2003, Wet after Lease Separation (Million Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

Level of Reporting	Operator Category					Total
	I	II	Certainty III	Noncertainty III	Auxillary State Data	
Reported						
Number of Operators	167	459	619	^a 241	11,863	13,349
Proved Reserves as of 12/31/02	174,296,369	12,083,346	482,534	-	-	186,862,249
(+) Revision Increases	18,369,471	1,279,727	44,746	-	-	19,693,944
(-) Revision Decreases	19,893,218	1,180,431	181,383	-	-	21,255,032
(-) Sales	8,675,864	1,803,025	114,677	-	-	10,593,566
(+) Acquisitions	9,901,446	1,783,322	15,660	-	-	11,700,428
(+) Extensions	14,245,260	2,068,650	59,150	-	-	16,373,060
(+) New Field Discoveries	996,642	232,106	0	-	-	1,228,748
(+) New Reservoirs in Old Fields	1,347,733	256,998	0	-	-	1,604,731
(-) Production With						
Proved Reserves Reported	17,348,450	1,291,857	94,789	5,559	-	18,740,655
(-) Production Without						
Proved Reserves Reported	259	559,120	195,854	27,468	692,047	1,474,748
Proved Reserves as of 12/31/03	173,239,389	13,461,704	970,053	98,177	0	187,769,323
Imputed and Estimated						
Number of Operators	-	-	-	7,574	-	7,574
Proved Reserves as of 12/31/02	-	-	-	-	-	-
(+) Revision Increases	0	442,073	183,596	37,299	423,488	1,086,456
(-) Revision Decreases	0	554,079	188,736	31,733	465,231	1,239,779
(-) Sales	0	0	0	0	0	0
(+) Acquisitions	0	0	0	0	0	0
(+) Extensions	0	300,625	125,874	20,296	374,922	821,717
(+) New Field Discoveries	0	10,109	4,815	1,336	7,096	23,357
(+) New Reservoirs in Old Fields	0	18,635	5,090	347	23,787	47,859
(-) Production With						
Proved Reserves Reported	0	0	0	1,785	-	1,785
(-) Production Without						
Proved Reserves Reported	0	0	0	14,252	-	14,252
Proved Reserves as of 12/31/03	0	3,988,665	1,643,570	453,026	3,290,750	9,376,010
Total						
Number of Operators	167	459	619	7,815	11,863	20,923
Proved Reserves as of 12/31/02	174,296,369	12,083,346	482,534	0	0	186,862,249
(+) Revision Increases	18,369,471	1,721,800	228,342	37,299	423,488	20,780,400
(-) Revision Decreases	19,893,218	1,734,510	370,119	31,733	465,231	22,494,811
(-) Sales	8,675,864	1,803,025	114,677	0	0	10,593,566
(+) Acquisitions	9,901,446	1,783,322	15,660	0	0	11,700,428
(+) Extensions	14,245,260	2,369,275	185,024	20,296	374,922	17,194,777
(+) New Field Discoveries	996,642	242,215	4,815	1,336	7,096	1,252,105
(+) New Reservoirs in Old Fields	1,347,733	275,633	5,090	347	23,787	1,652,590
(-) Production With						
Proved Reserves Reported	17,348,450	1,291,857	94,789	7,344	0	18,742,440
(-) Production Without						
Proved Reserves Reported	259	559,120	195,854	41,720	692,047	1,489,000
Proved Reserves as of 12/31/03	173,239,389	17,450,369	2,613,623	551,203	3,290,750	197,145,333
Summary						
Total Number of Operators	167	459	619	7,815	11,863	20,923
Percent of Total	0.8%	2.2%	2.8%	37.4%	56.9%	100.0%
Total Production in 2003	17,348,709	1,850,977	290,643	49,064	692,047	20,231,440
Percent of Total	85.8%	9.1%	1.4%	0.2%	3.4%	100.0%
Total Proved Reserves 12/31/03	173,239,389	17,450,369	2,613,623	551,203	3,290,750	197,145,333
Percent of Total	87.9%	8.9%	1.3%	0.3%	1.7%	100.0%

^aThere were 457 noncertainty responses, 241 were used with their sample weights and 216 were treated as 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," 2003.

Table F3. Summary of Form EIA-23 Reported, Imputed, and Estimated Nonassociated Natural Gas Data for 2003, Wet after Lease Separation (Million Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

Level of Reporting	Operator Category					Total
	I	II	Certainty III	Noncertainty III	Auxillary State Data	
Reported						
Number of Operators	167	459	619	^a 241	11,863	13,349
Proved Reserves as of 12/31/02	147,855,953	10,445,583	462,862	-	-	158,764,398
(+) Revision Increases	15,801,437	1,028,659	43,903	-	-	16,873,999
(-) Revision Decreases	17,564,243	923,524	174,979	-	-	18,662,746
(-) Sales	7,720,801	1,719,224	111,942	-	-	9,551,967
(+) Acquisitions	8,956,366	1,682,644	0	-	-	10,639,010
(+) Extensions	13,618,926	1,951,679	57,519	-	-	15,628,124
(+) New Field Discoveries	552,045	228,992	0	-	-	781,037
(+) New Reservoirs in Old Fields	1,230,548	250,867	0	-	-	1,481,415
(-) Production With						
Proved Reserves Reported	14,911,813	1,128,912	83,949	5,409	-	16,130,083
(-) Production Without						
Proved Reserves Reported	119	494,371	176,856	26,154	531,288	1,228,788
Proved Reserves as of 12/31/03	147,818,418	11,847,691	883,044	96,768	0	160,645,921
Imputed and Estimated						
Number of Operators	-	-	-	7,574	-	7,574
Proved Reserves as of 12/31/02	-	-	-	-	-	-
(+) Revision Increases	0	368,184	157,781	31,778	304,658	862,401
(-) Revision Decreases	0	487,943	168,553	27,268	358,614	1,042,379
(-) Sales	0	280	70	1	192	543
(+) Acquisitions	0	0	0	0	0	0
(+) Extensions	0	286,962	126,502	20,507	316,306	750,276
(+) New Field Discoveries	0	10,744	5,355	1,480	6,868	24,448
(+) New Reservoirs in Old Fields	0	26,832	7,380	504	31,868	66,585
(-) Production With						
Proved Reserves Reported	0	0	0	2,917	-	2,917
(-) Production Without						
Proved Reserves Reported	0	0	0	14,262	-	14,262
Proved Reserves as of 12/31/03	0	3,533,735	1,486,047	411,345	2,515,613	7,946,739
Total						
Number of Operators	167	459	619	7,815	11,863	20,923
Proved Reserves as of 12/31/02	147,855,953	10,445,583	462,862	0	0	158,764,398
(+) Revision Increases	15,801,437	1,396,843	201,684	31,778	304,658	17,736,400
(-) Revision Decreases	17,564,243	1,411,467	343,532	27,268	358,614	19,705,125
(-) Sales	7,720,801	1,719,504	112,012	1	192	9,552,510
(+) Acquisitions	8,956,366	1,682,644	0	0	0	10,639,010
(+) Extensions	13,618,926	2,238,641	184,021	20,507	316,306	16,378,400
(+) New Field Discoveries	552,045	239,736	5,355	1,480	6,868	805,485
(+) New Reservoirs in Old Fields	1,230,548	277,699	7,380	504	31,868	1,548,000
(-) Production With						
Proved Reserves Reported	14,911,813	1,128,912	83,949	8,326	0	16,133,000
(-) Production Without						
Proved Reserves Reported	119	494,371	176,856	40,416	531,288	1,243,050
Proved Reserves as of 12/31/03	147,818,418	15,381,426	2,369,091	508,113	2,515,613	168,592,660
Summary						
Total Number of Operators	167	459	619	7,815	11,863	20,923
Percent of Total	0.8%	2.2%	2.8%	37.4%	56.9%	100.0%
Total Production in 2003	14,911,932	1,623,283	260,805	48,742	531,288	17,376,050
Percent of Total	85.8%	9.3%	1.5%	0.3%	3.1%	100.0%
Total Proved Reserves 12/31/03	147,818,418	15,381,426	2,369,091	508,113	2,515,613	168,592,660
Percent of Total	87.7%	9.1%	1.4%	0.3%	1.5%	100.0%

^aThere were 457 noncertainty responses, 241 were used with their sample weights and 216 were treated as 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," 2003.

Table F4. Summary of Form EIA-23 Reported, Imputed, and Estimated Crude Oil Data for 2003,
(Thousand Barrels of 42 U.S. Gallons)

Level of Reporting	Operator Category					Total
	I	II	Certainty III	Noncertainty III	Auxillary State Data	
Reported						
Number of Operators	167	459	619	^a 241	11,863	13,349
Proved Reserves as of 12/31/02	20,310,374	1,027,391	21,913	-	-	21,359,678
(+) Revision Increases	1,230,638	129,215	1,254	-	-	1,361,107
(-) Revision Decreases	1,198,147	103,847	1,986	-	-	1,303,980
(-) Sales	1,014,470	90,032	3,369	-	-	1,107,871
(+) Acquisitions	620,449	86,066	3,007	-	-	709,522
(+) Extensions	338,355	53,396	2,776	-	-	394,527
(+) New Field Discoveries	704,055	1,534	0	-	-	705,589
(+) New Reservoirs in Old Fields	92,235	9,897	0	-	-	102,132
(-) Production With						
Proved Reserves Reported	1,575,292	95,209	18,854	492	-	1,689,847
(-) Production Without						
Proved Reserves Reported	53	38,402	40,237	3,052	102,700	184,444
Proved Reserves as of 12/31/03	19,508,197	1,019,615	186,814	5,289	0	20,719,915
Imputed and Estimated						
Number of Operators	-	-	-	7,574	-	7,574
Proved Reserves as of 12/31/02	-	-	-	-	-	-
(+) Revision Increases	3	32,995	31,905	2,513	57,708	125,124
(-) Revision Decreases	3	23,813	27,032	4,345	33,271	88,463
(-) Sales	0	0	0	0	0	0
(+) Acquisitions	0	0	0	0	0	0
(+) Extensions	1	7,558	7,067	226	16,733	31,584
(+) New Field Discoveries	0	8	1	0	2	11
(+) New Reservoirs in Old Fields	0	22	26	0	53	101
(-) Production With						
Proved Reserves Reported	0	0	0	152	-	152
(-) Production Without						
Proved Reserves Reported	0	0	0	2,400	-	2,400
Proved Reserves as of 12/31/03	30	300,085	299,303	32,766	539,345	1,171,529
Total						
Number of Operators	167	459	619	7,815	11,863	20,923
Proved Reserves as of 12/31/02	20,310,374	1,027,391	21,913	0	0	21,359,678
(+) Revision Increases	1,230,641	162,210	33,159	2,513	57,708	1,486,231
(-) Revision Decreases	1,198,150	127,660	29,018	4,345	33,271	1,392,443
(-) Sales	1,014,470	90,032	3,369	0	0	1,107,871
(+) Acquisitions	620,449	86,066	3,007	0	0	709,522
(+) Extensions	338,356	60,954	9,843	226	16,733	426,111
(+) New Field Discoveries	704,055	1,542	1	0	2	705,600
(+) New Reservoirs in Old Fields	92,235	9,919	26	0	53	102,233
(-) Production With						
Proved Reserves Reported	1,575,292	95,209	18,854	644	0	1,689,999
(-) Production Without						
Proved Reserves Reported	53	38,402	40,237	5,452	102,700	186,844
Proved Reserves as of 12/31/03	19,508,227	1,319,700	486,117	38,055	539,345	21,891,444
Summary						
Total Number of Operators	167	459	619	7,815	11,863	20,923
Percent of Total	0.8%	2.2%	2.8%	37.4%	56.9%	100.0%
Total Production in 2003	1,575,345	133,611	59,091	6,096	102,700	1,876,843
Percent of Total	83.9%	7.1%	3.1%	0.3%	5.5%	100.0%
Total Proved Reserves 12/31/03	19,508,227	1,319,700	486,117	38,055	539,345	21,891,444
Percent of Total	89.1%	6.0%	2.2%	0.2%	2.5%	100.0%

^aThere were 457 noncertainty responses, 241 were used with their sample weights and 216 were treated as 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," 2003.

Table F5. Summary of Form EIA-23 Reported, Imputed, and Estimated Lease Condensate Data for 2003,
(Thousand Barrels of 42 U.S. Gallons)

Level of Reporting	Operator Category					Total
	I	II	Certainty III	Noncertainty III	Auxillary State Data	
Reported						
Number of Operators	167	459	619	^a 241	11,863	13,349
Proved Reserves as of 12/31/02	1,225,384	80,418	2,583	-	-	1,308,385
(+) Revision Increases	218,570	26,253	792	-	-	245,615
(-) Revision Decreases	332,405	13,632	237	-	-	346,274
(-) Sales	83,307	12,440	494	-	-	96,241
(+) Acquisitions	69,614	12,459	0	-	-	82,073
(+) Extensions	86,780	12,629	10	-	-	99,419
(+) New Field Discoveries	7,765	4,479	0	-	-	12,244
(+) New Reservoirs in Old Fields	28,984	7,113	0	-	-	36,097
(-) Production With						
Proved Reserves Reported	164,671	13,649	438	5	-	178,763
(-) Production Without						
Proved Reserves Reported	5	5,022	856	9	6,010	11,902
Proved Reserves as of 12/31/03	1,056,714	103,630	3,697	56	0	1,164,097
Imputed and Estimated						
Number of Operators	-	-	-	7,574	-	7,574
Proved Reserves as of 12/31/02	-	-	-	-	-	-
(+) Revision Increases	4	4,576	724	2	4,299	9,606
(-) Revision Decreases	4	5,523	814	0	4,984	11,326
(-) Sales	0	0	0	0	0	0
(+) Acquisitions	0	0	0	0	0	0
(+) Extensions	3	2,234	356	0	2,429	5,021
(+) New Field Discoveries	0	40	5	0	52	96
(+) New Reservoirs in Old Fields	0	103	14	0	128	245
(-) Production With						
Proved Reserves Reported	0	0	0	1	-	1
(-) Production Without						
Proved Reserves Reported	0	0	0	4	-	4
Proved Reserves as of 12/31/03	31	24,145	3,757	27	23,045	51,005
Total						
Number of Operators	167	459	619	7,815	11,863	20,923
Proved Reserves as of 12/31/02	1,225,384	80,418	2,583	0	0	1,308,385
(+) Revision Increases	218,574	30,829	1,516	2	4,299	255,221
(-) Revision Decreases	332,409	19,155	1,051	0	4,984	357,600
(-) Sales	83,307	12,440	494	0	0	96,241
(+) Acquisitions	69,614	12,459	0	0	0	82,073
(+) Extensions	86,783	14,863	366	0	2,429	104,440
(+) New Field Discoveries	7,765	4,519	5	0	52	12,340
(+) New Reservoirs in Old Fields	28,984	7,216	14	0	128	36,342
(-) Production With						
Proved Reserves Reported	164,671	13,649	438	6	0	178,764
(-) Production Without						
Proved Reserves Reported	5	5,022	856	13	6,010	11,906
Proved Reserves as of 12/31/03	1,056,745	127,775	7,454	83	23,045	1,215,102
Summary						
Total Number of Operators	167	459	619	7,815	11,863	20,923
Percent of Total	0.8%	2.2%	2.8%	37.4%	56.9%	100.0%
Total Production in 2003	164,676	18,671	19	1,294	6,010	190,670
Percent of Total	86.4%	9.8%	0.0%	0.7%	3.2%	100.0%
Total Proved Reserves 12/31/03	1,056,745	127,775	83	7,454	23,045	1,215,102
Percent of Total	87.0%	10.5%	0.0%	0.6%	1.9%	100.0%

^aThere were 457 noncertainty responses, 241 were used with their sample weights and 216 were treated as 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.

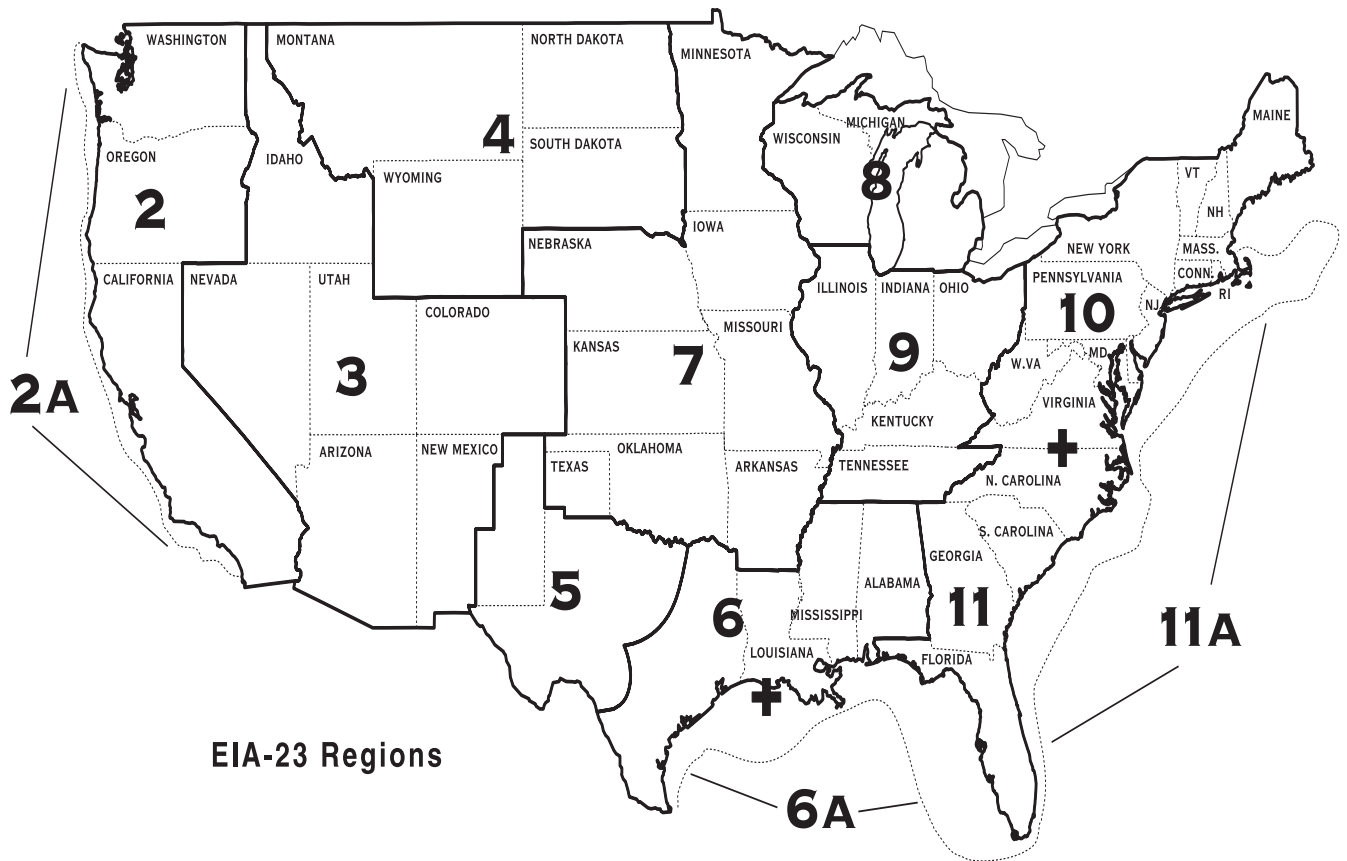
Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2003.

Table F6. Statistical Parameters of Reserves Estimation Equation by Region for 2003

Region Number	Region	Number of Nonzero			Equation Coefficients					
		Oil	R/P Pairs Gas	LC	Oil Alpha	Oil Beta	Gas Alpha	Gas Beta	LC Alpha	LC Beta
1	Alaska	8	13	0	-0.1264	0.3880	-0.1094	0.2183	0.0000	0.0000
2	Pacific Coast States	54	64	5	-0.1264	0.2853	-0.1094	0.3040	-0.0827	0.3606
2A	Federal Offshore Pacific	6	6	0	-0.1264	0.2029	-0.1094	0.2921	0.0000	0.0000
3	Western Rocky Mountains	79	142	55	-0.1264	0.2246	-0.1094	0.2378	-0.0827	0.1527
4	Northern Rocky Mountains	173	171	50	-0.1264	0.2422	-0.1094	0.2126	-0.0827	0.1590
5	West Texas and East New Mexico	516	527	165	-0.1264	0.2602	-0.1094	0.2964	-0.0827	0.3451
6	Western Gulf Basin	530	894	560	-0.1264	0.3438	-0.1094	0.3438	-0.0827	0.3816
6A	Gulf of Mexico	72	143	116	-0.1264	0.4774	-0.1094	0.5813	-0.0827	0.4783
7	Mid-Continent	291	388	151	-0.1264	0.2475	-0.1094	0.2654	-0.0827	0.1990
8 + 9	Michigan Basin and Eastern Interior	84	63	14	-0.1264	0.1620	-0.1094	0.1360	-0.0827	0.2196
10 + 11	Appalachians	31	90	9	-0.1264	0.2098	-0.1094	0.1401	-0.0827	0.1220
	United States	1,844	2,525	1,125	-0.1264	0.3406	-0.1094	0.3049	-0.0827	0.3500

Source: Based on data filed on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves, 2003".

Figure F1. Form EIA-23 Regional Boundaries



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

reduced the burden of reporting and analysis on both EIA and the noncertainty operators in these States.

Imputation of 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 2003 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.

Imputation of Natural Gas Volumes

Small operators in the 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 large and intermediate 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 2003 than in 2002.

- One or more operators may have reported data incorrectly on Schedule A in 2003 or 2002, but not both, and the error was not detected by edit processing.
- Operation of properties was transferred during 2003 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 189,044 ± 371 billion cubic feet. The sampling error of \hat{V}_s is equal to the sampling error of the noncertainty estimate \hat{V}_{nr} , 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.

Sources of Errors

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 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. Several sources of possible error, apart from sampling error, are associated with the Form EIA-23 survey:

- Operator nonresponse
- Respondent estimation errors
- Reporting errors and data processing errors
- Inadequate frame coverage
- Errors associated with statistical estimates.

Imputation for Operator Nonresponse

The nonresponse rate for certainty operators for the 2003 survey was 1.3 percent and for the noncertainty operators 6.8 percent. An imputation was made for the production and reserves for these 6 nonresponding operators.

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 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.

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 2003 survey is particularly likely to be deficient in States where a large portion of total reserves and production is accounted for by small operators. EIA is continuing to work to remedy the under coverage problem in those States where it occurred.

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, 5.4 percent of the crude oil proved reserve estimates, 4.8 percent of the wet natural gas proved reserve estimates, and 4.2 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.

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

Table F7. Factors for Confidence Intervals (2S.E.) for Crude Oil Proved Reserves and Production, 2003
(Million Barrels of 42 U.S. Gallons)

State and Subdivision	2003 Reserves	2003 Production	State and Subdivision	2003 Reserves	2003 Production
United States	14	1	Oklahoma ^b	0	0
Alabama ^b	0	0	Pennsylvania	0	1
Alaska ^a	0	0	Texas ^b	0	0
Arkansas ^b	0	0	RRC District 1 ^b	0	0
California ^b	0	0	RRC District 2 Onshore ^b	0	0
Coastal Region Onshore ^b	0	0	RRC District 3 Onshore ^b	0	0
Los Angeles Basin Onshore ^b	0	0	RRC District 4 Onshore ^b	0	0
San Joaquin Basin Onshore ^b	0	0	RRC District 5 ^b	0	0
State Offshore ^a	0	0	RRC District 6 ^b	0	0
Colorado ^b	0	0	RRC District 7B ^b	0	0
Florida ^a	0	0	RRC District 7C ^b	0	0
Kansas ^b	0	0	RRC District 8 ^b	0	0
Kentucky	5	0	RRC District 8A ^b	0	0
Louisiana ^b	0	0	RRC District 9 ^b	0	0
North ^b	0	0	RRC District 10 ^b	0	0
South Onshore ^b	0	0	State Offshore ^a	0	0
State Offshore ^a	0	0	Utah ^b	0	0
Michigan ^b	0	0	Virginia ^a	0	0
Mississippi ^b	0	0	West Virginia	1	0
Montana ^a	0	0	Wyoming ^b	0	0
Nebraska	0	0	Federal Offshore ^a	0	0
New Mexico ^b	0	0	Pacific (California) ^a	0	0
East ^b	0	0	Gulf of Mexico (Louisiana) ^a	0	0
West ^b	0	0	Gulf of Mexico (Texas) ^a	0	0
North Dakota ^b	0	0	Miscellaneous ^c	8	0
Ohio	2	0			

^aSampling rate was 100 percent in Alaska, Florida Onshore, Virginia, and Offshore areas.

^bSampling was not used. Estimates for each operator were made using an imputation function.

^cIncludes Arizona, Missouri, Nevada, New York, South Dakota, Tennessee, and Virginia.

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," 2003.

Table F8. Factors for Confidence Intervals (2S.E.) for Natural Gas Proved Reserves and Production, Wet After Lease Separation, 2003
(Billion Cubic Feet at 14.73 psia and 60 Degrees Fahrenheit)

State and Subdivision	2003 Reserves	2003 Production	State and Subdivision	2003 Reserves	2003 Production
United States	371	28	Oklahoma ^b	0	0
Alabama ^b	0	0	Pennsylvania	115	10
Alaska ^a	0	0	Texas ^b	0	0
Arkansas ^b	0	0	RRC District 1 ^b	0	0
California ^b	0	0	RRC District 2 Onshore ^b	0	0
Coastal Region Onshore ^b	0	0	RRC District 3 Onshore ^b	0	0
Los Angeles Basin Onshore ^b	0	0	RRC District 4 Onshore ^b	0	0
San Joaquin Basin Onshore ^b	0	0	RRC District 5 ^b	0	0
State Offshore ^a	0	0	RRC District 6 ^b	0	0
Colorado ^b	0	0	RRC District 7B ^b	0	0
Florida ^a	0	0	RRC District 7C ^b	0	0
Kansas ^b	0	0	RRC District 8 ^b	0	0
Kentucky	0	0	RRC District 8A ^b	0	0
Louisiana ^b	0	0	RRC District 9 ^b	0	0
North ^b	0	0	RRC District 10 ^b	0	0
South Onshore ^b	0	0	State Offshore ^a	0	0
State Offshore ^a	0	0	Utah ^b	0	0
Michigan ^b	0	0	Virginia ^a	0	0
Mississippi ^b	0	0	West Virginia	59	4
Montana ^a	0	0	Wyoming ^b	0	0
New Mexico ^b	0	0	Federal Offshore ^{a,c}	0	0
East ^b	0	0	Pacific (California) ^a	0	0
West ^b	0	0	Gulf of Mexico (Louisiana) ^{a,c}	0	0
New York	150	4	Gulf of Mexico (Texas) ^a	0	0
North Dakota ^b	0	0	Miscellaneous ^d	2	0
Ohio	205	18			

^aSampling rate was 100 percent in Alaska, Florida Onshore, Virginia, and Offshore areas.

^bSampling was not used. Estimates for each operator were made using an imputation function.

^cIncludes Federal offshore Alabama.

^dIncludes 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," 2003

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 MMCF per thousand barrels (where NGL consists primarily of ethane) and 0.940 MMCF per thousand barrels (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 2003 Form EIA-64A survey, the national weighted average gas equivalents ratio was computed to be 1,407 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. Coalbed methane fields contain 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.

Appendix G

Estimation of Reserves and Resources

Estimation of Reserves and Resources

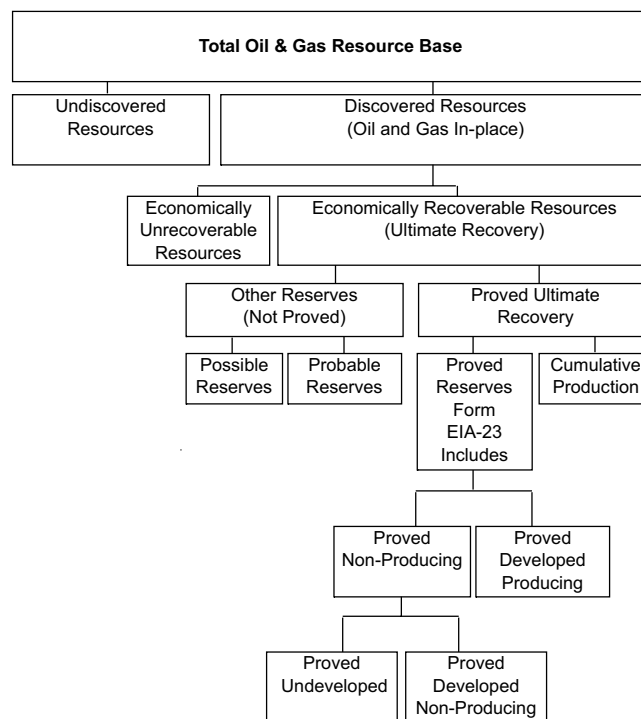
Oil and Gas Resource Base

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

Figure G1. Components of the Oil and Gas Resource Base



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

past) production, and reserves. Reserves are additionally subdivided into proved reserves and “other reserves”.

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 chinks, 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 2003 U.S. proved reserves of 189 trillion cubic feet yields a technically recoverable resource target of 1,620 trillion cubic feet. This is about 83 times the 2003 dry gas production level.

Other organizations have also estimated unproved 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 unproved technically recoverable oil resources to 2003 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.^{43} They are similarly defined by the MMS, although its system also subdivides them by degree of development and producing status.^{44} Measured reserves are demonstrated with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions, and are essentially equivalent to proved reserves as defined by the EIA. Effectively, estimates of proved reserves may be thought of as reasonable estimates (as opposed to exact measures) of "on-the-shelf inventory".

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

"probable reserves" by many analysts, for example, those of the PGC.

Proved Reserves

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

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

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

Reserve Estimation Methodologies

The adoption of a standard definition of proved reserves for each type of hydrocarbon surveyed by the Form EIA-23 program provided a far more consistent response from operators than if each operator had used their own definition. Such standards, however, do not guarantee that the resulting estimates themselves are

determinate. Regardless of the definition selected, proved reserves cannot be measured directly. They are estimated quantities that are inferred on the basis of the best geological, engineering, and economic data available to the estimator, who generally uses considerable judgment in the analysis and interpretation of the data. Consequently, the accuracy of a given estimate varies with and depends on the quality and quantity of raw data available, the estimation method used, and the training and experience of the estimator. The element of judgment commonly accounts for the differences among independent estimates for the same reservoir or field.

Data Used in Making Reserve Estimates

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

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

Reserve Estimation Techniques

Depending on the kinds and amounts of data available, and a judgment on the reliability of those data, the estimator will select one of several methods of making a proved reserves estimate. Methods based on

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.

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.

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.

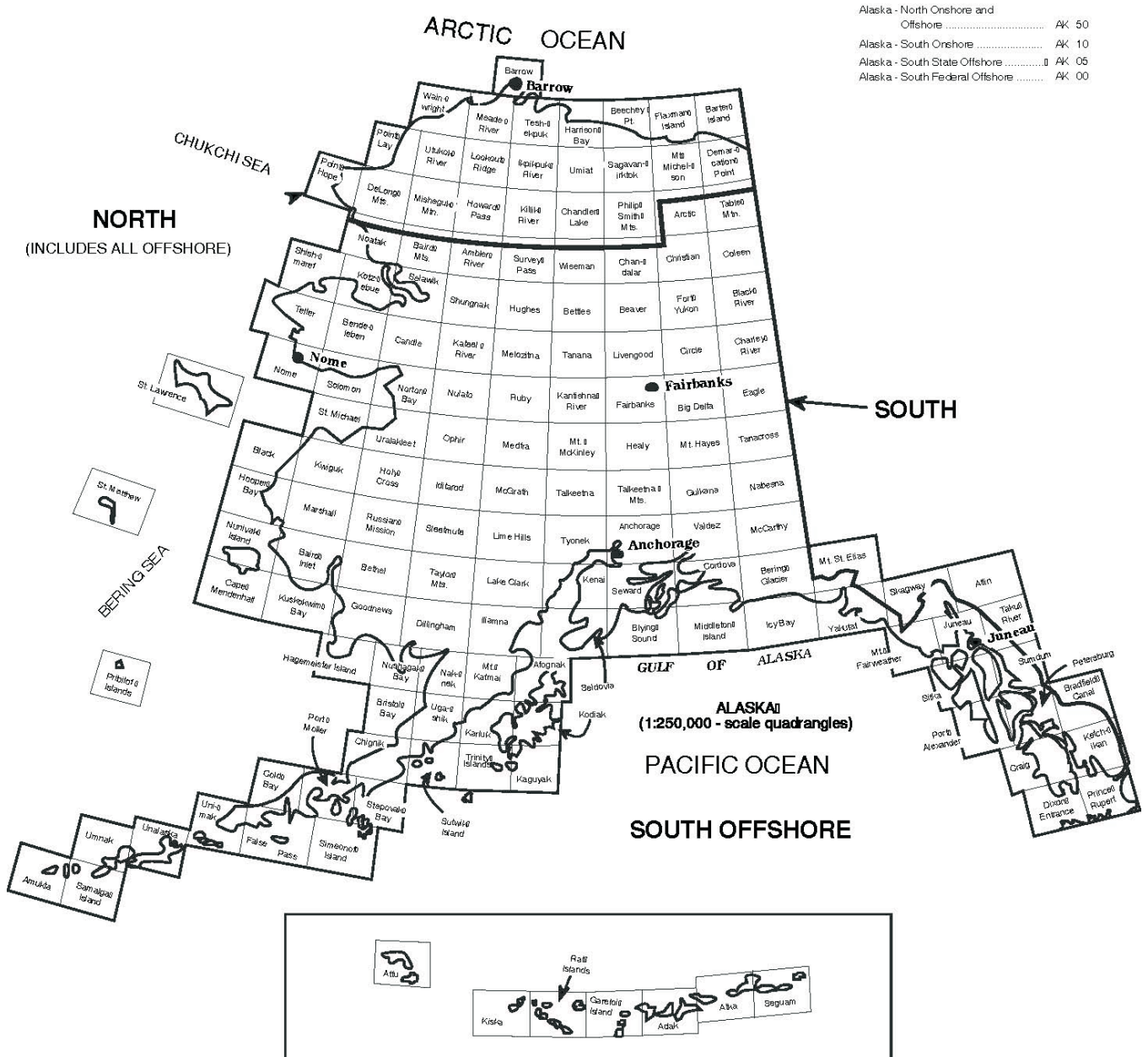
Reservoir limits: The initial proved reserves estimate made from the discovery well is subject to significant uncertainty because one well provides little information on the size of the reservoir. The area proved by a discovery well is frequently estimated on the basis of experience in a given producing 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.

Maps of Selected State Subdivisions

Maps of Selected State Subdivisions

Figure H1. Subdivisions of Alaska



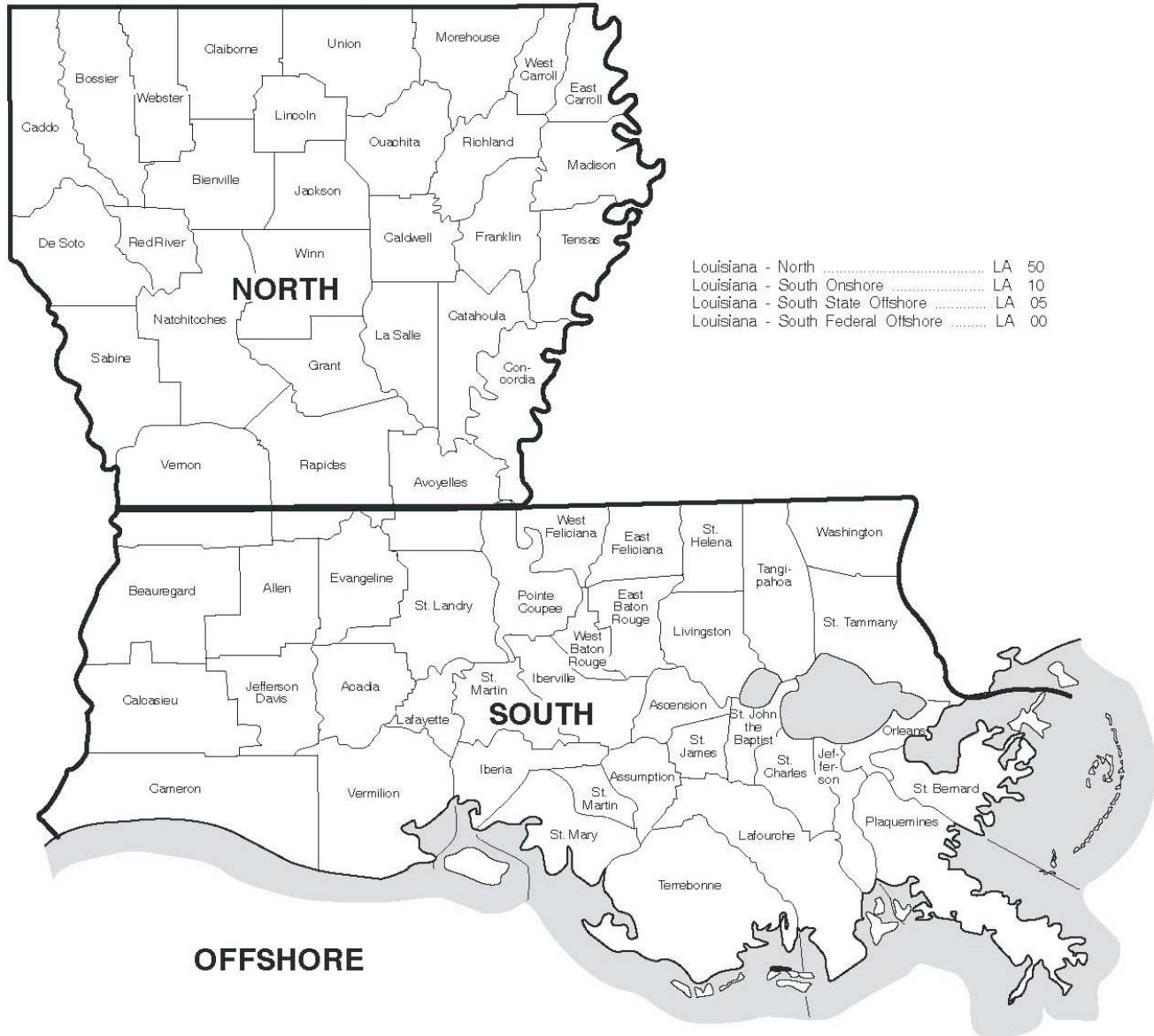
Source: After U.S. Geological Survey.

Figure H2. Subdivisions of California



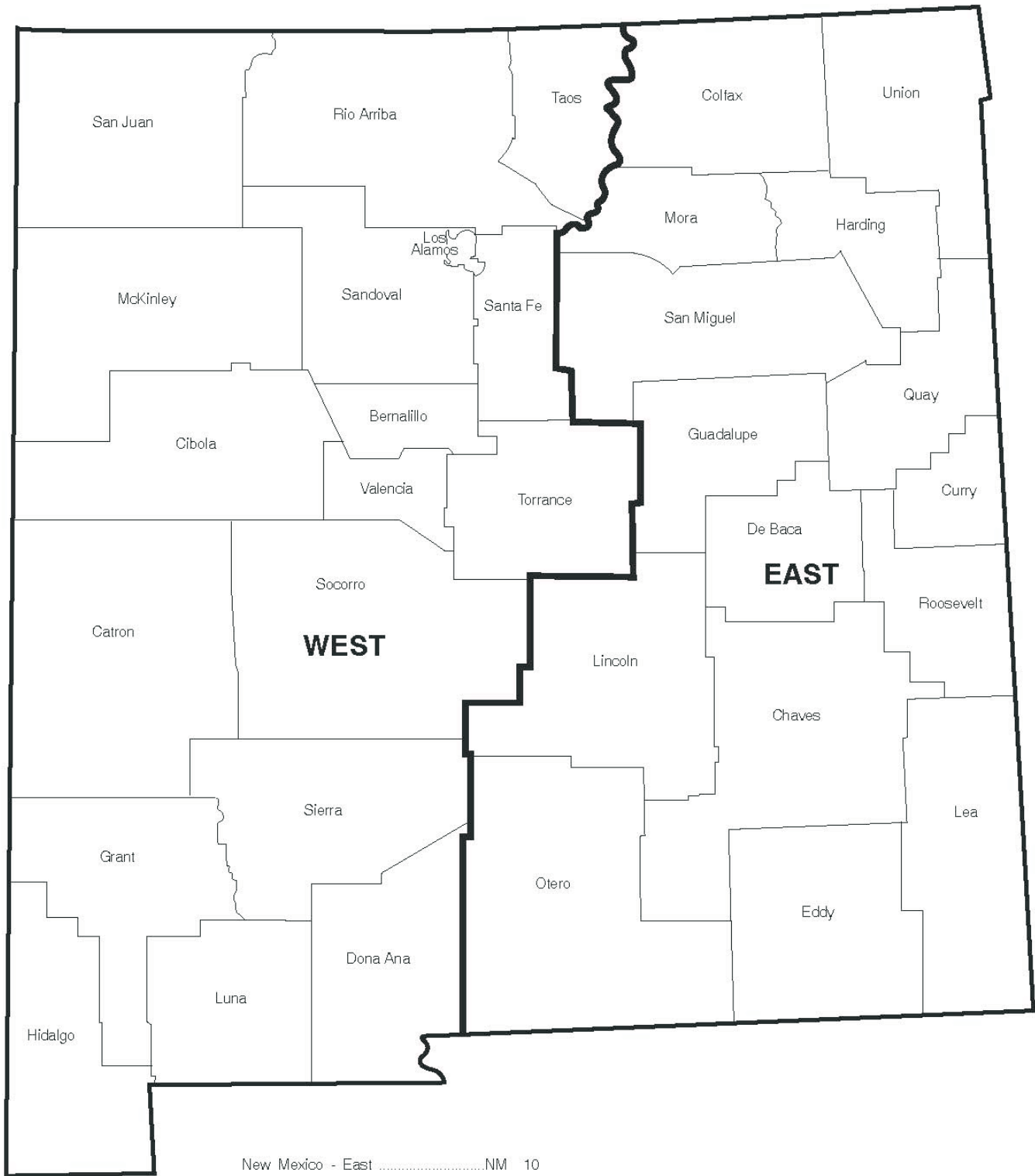
Source: Energy Information Administration, Office of Oil and Gas.

Figure H3. Subdivisions of Louisiana



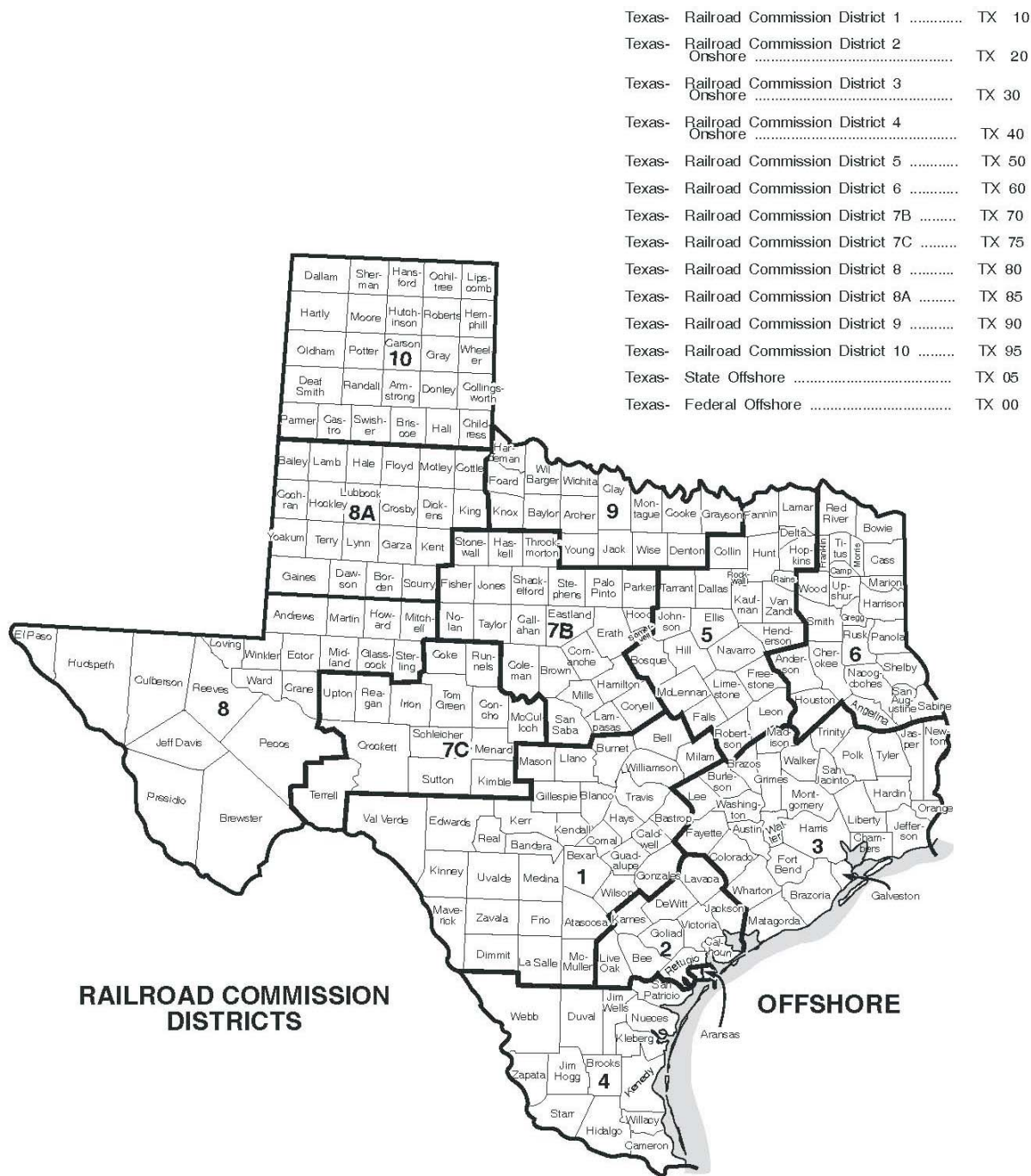
Source: Energy Information Administration, Office of Oil and Gas.

Figure H4. Subdivisions of New Mexico



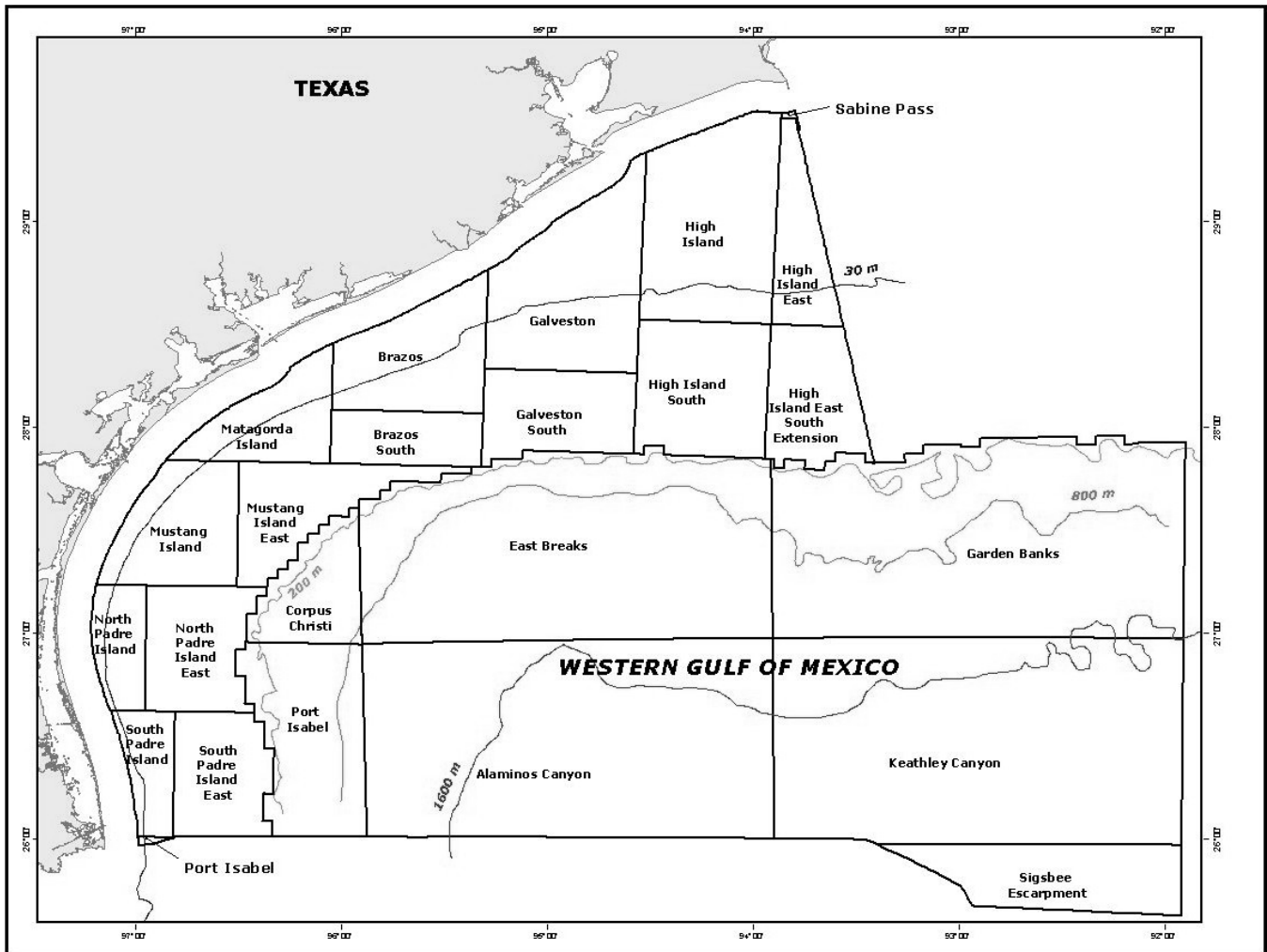
Source: Energy Information Administration, Office of Oil and Gas.

Figure H5. Subdivisions of Texas



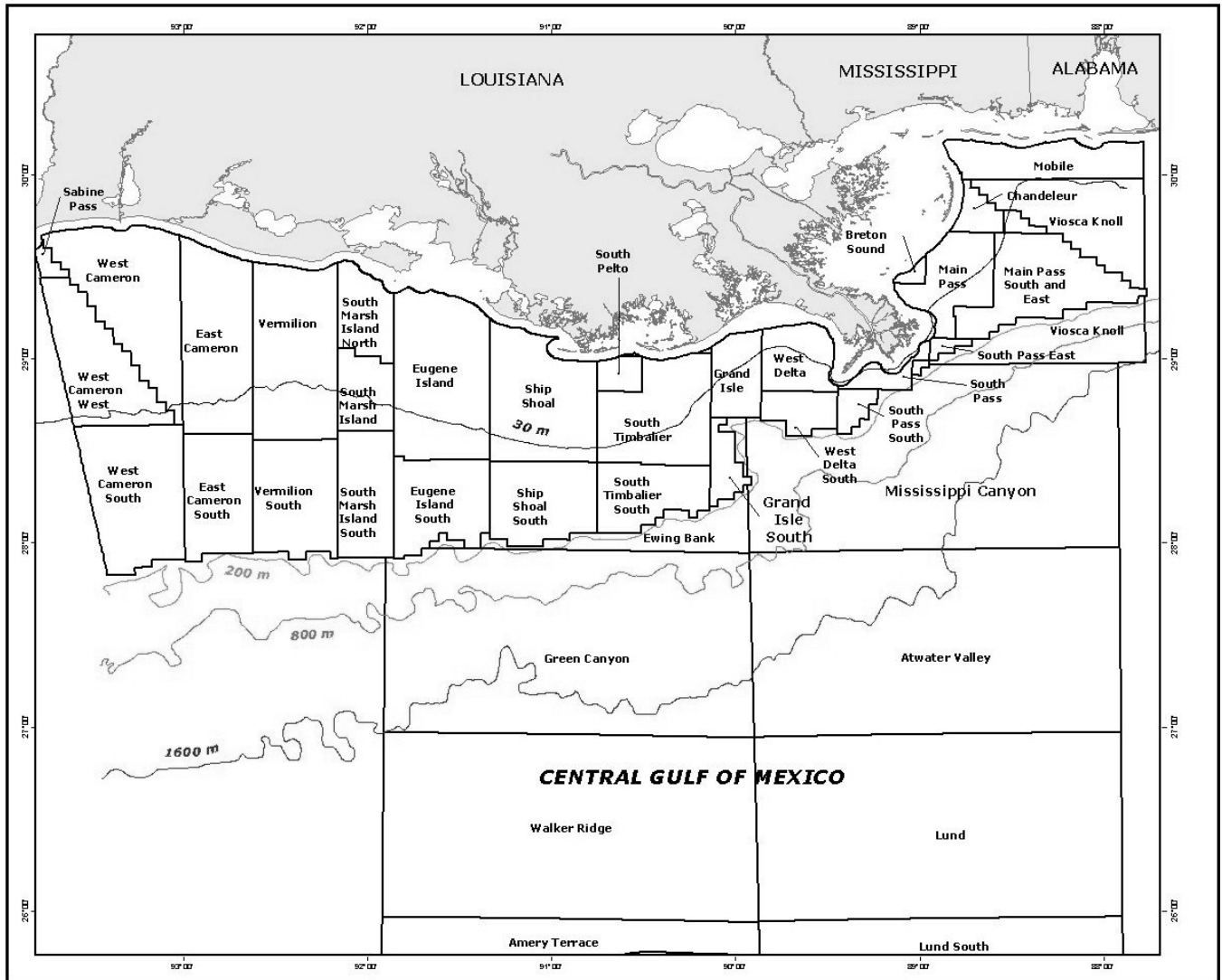
Source: Energy Information Administration, Office of Oil and Gas.

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



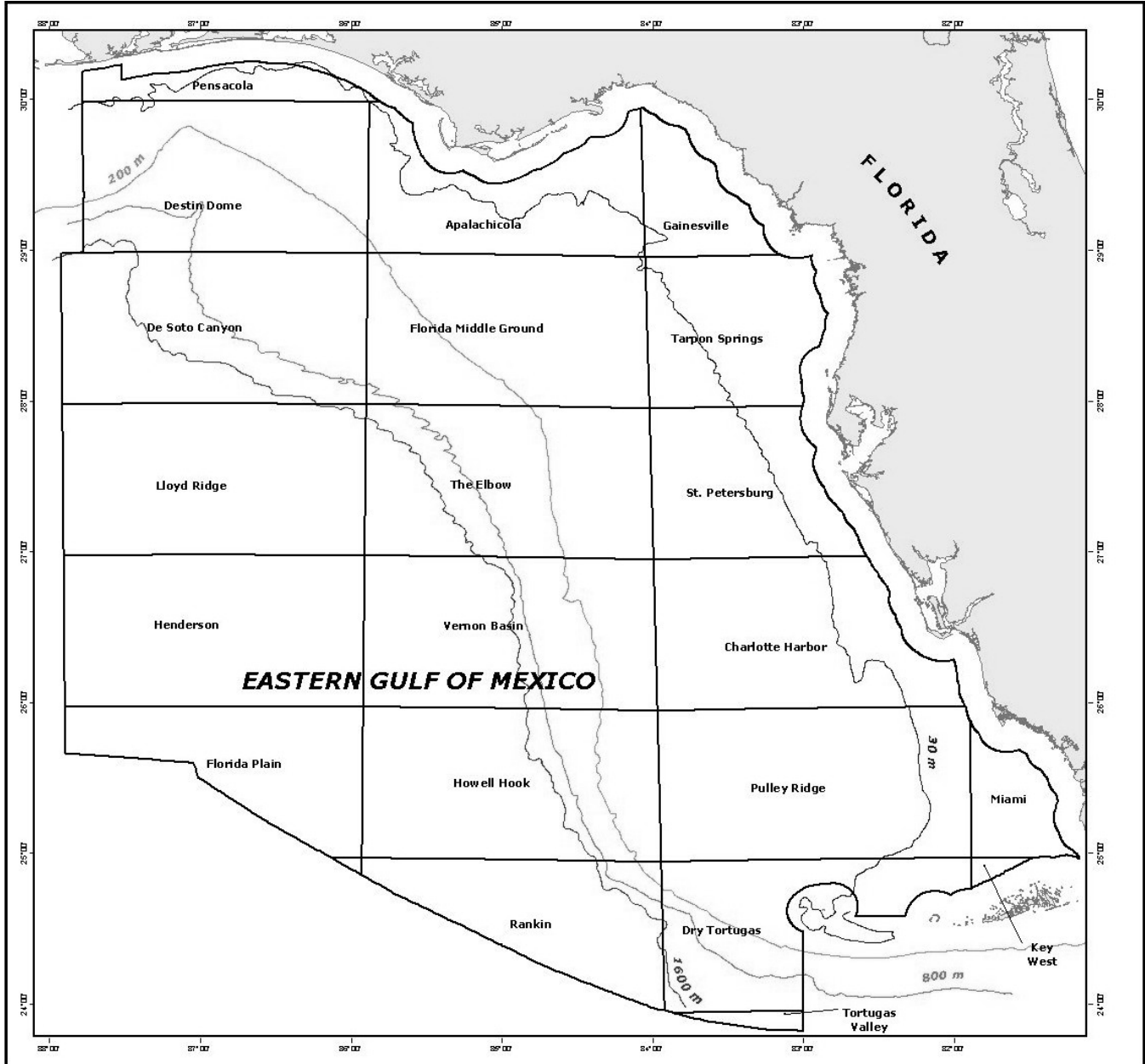
Source: Energy Information Administration, Office of Oil and Gas.

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

 <p>www.eia.doe.gov Energy Information Administration</p>	<p>U.S. DEPARTMENT OF ENERGY ENERGY INFORMATION ADMINISTRATION Washington, DC 20585</p>	<p>Form Approved OMB No. 1905-0057 Expiration Date: 12/31/06 (Revised 2003)</p>									
<p>FORM EIA-23 ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES REPORT YEAR 2003</p>											
<p>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.</p>		<p>Resubmission?</p>									
<p>PART I. IDENTIFICATION</p>											
<p>Complete and return by April 1, 2004 to:</p> <p>Energy Information Administration U.S. Department of Energy P O Box 8279 Silver Spring, MD 20907 Attn: Form EIA-23 OR Fax to: (202) 586-1076/ATTN: FORM EIA-23</p> <p>Questions? Call 1-800-879-1470</p>	<p style="text-align: center;">Affix mailing label or enter mailing address</p> <p>EIA Identification Number: <table border="1" style="display: inline-table; border-collapse: collapse;"><tr><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px;"></td><td style="width: 20px; height: 20px; text-align: center;">0</td><td style="width: 20px; height: 20px; text-align: center;">0</td><td style="width: 20px; height: 20px; text-align: center;">0</td><td style="width: 20px; height: 20px; text-align: center;">0</td></tr></table></p> <p>Company Name: _____</p> <p>Street or P.O. Box: _____</p> <p>City, State, Zip Code: _____</p> <p>EIN: _____</p>							0	0	0	0
						0	0	0	0		
<p>1. Contact Information (person most knowledgeable about the reported data) Contact Person (Please Print): _____</p> <p>Phone Number: () - Ext. _____</p> <p>Fax Number: () - _____</p> <p>E-mail Address: _____</p>	<p>2. Was your company an oil and gas field operator at any time during calendar year 2003? (See definition of an operator, page 1)</p> <p>(1) <input type="checkbox"/> No... Complete only items 3 through 15 below and return this page.</p> <p>(2) <input type="checkbox"/> Yes... Complete rest of form.</p>										
<p>3. Company Status, Name, and/or Address Change or Correction. (Check appropriate box.)</p> <p><input type="checkbox"/> Name and address on mailing label are correct.</p> <p><input type="checkbox"/> Change company name, contact person, and/or mailing address as indicated below.</p> <p><input type="checkbox"/> Company was sold to or merged with company entered below.</p> <p><input type="checkbox"/> Company went out of business. Operations transferred to company entered below.</p>											
<p>4. Change Company Name, Address, Employer Identification Number (EIN), and/or Contact Information to:</p> <p>Company Name: _____</p> <p>Street or P. O. Box: _____</p> <p>City, State, Zip Code: _____</p> <p>EIN: _____</p> <p>Contact Person (Please Print): _____</p> <p>Phone Number: () - Ext. _____ Fax Number: () - _____ E-Mail Address: _____</p> <p>Comments: _____</p>											
<p>PART II. PARENT COMPANY IDENTIFICATION</p>											
<p>5. Is there a parent company that exercises ultimate control over your company?</p> <p>(1) <input type="checkbox"/> No... Answer 12 through 15.</p> <p>(2) <input type="checkbox"/> Yes... Answer 6 through 15.</p>	<p>6. Company Name</p> <p>_____</p> <p>8. Address</p> <p>_____</p> <p>9. City</p> <p>_____</p>	<p>7. Parent Company EIN</p> <p>_____</p> <p>10. State</p> <p>_____</p> <p>11. Zip Code</p> <p>_____</p>									
<p>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.)</p>											
<p>12. Attestor (Please Print)</p> <p>_____</p> <p>14. Signature</p> <p>_____</p>	<p>13. Title</p> <p>_____</p> <p>15. Date</p> <p>_____</p>										

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, Office of Oil and Gas.

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

OFFICIAL USE ONLY		ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES						Form Approved OMB No. 1905-0057 Expiration Date: 12/31/06 (Revised 2003)		
2003		SUMMARY REPORT PAGE 1 OF 2								
1.0 OPERATOR AND REPORT IDENTIFICATION DATA		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								
1.1 OPERATOR I.D. CODE	1.2 OPERATOR NAME	REPORT DATE			1.3 ORIGINAL	1.4 RESUBMISSION				
		12	31	03						
2.0 PRODUCTION AND RESERVES DATA		CRUDE OIL			NATURAL GAS			LEASE CONDENSATE		
STATE OR GEOGRAPHIC SUBDIVISION	RESERVES	2003 PRODUCTION		RESERVES	2003 PRODUCTION		RESERVES	2003 PRODUCTION		
	Proved Reserves Dec. 31, 2003 (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, 2003 (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, 2003 (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									

SAMPLE

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

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

OFFICIAL USE ONLY		2003		ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES												
				SUMMARY REPORT												
				PAGE 2 OF 2												
				Report All Volumes of Crude Oil and Lease Condensate in Thousands of Barrels [MMbbls] 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 03						
2.0 PRODUCTION AND RESERVES DATA				CRUDE OIL			NATURAL GAS			LEASE CONDENSATE						
STATE OR GEOGRAPHIC SUBDIVISION		RESERVES	2003 PRODUCTION	RESERVES	2003 PRODUCTION	RESERVES	2003 PRODUCTION	RESERVES	2003 PRODUCTION							
		Proved Reserves Dec. 31, 2003 (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, 2003 (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, 2003 (MMbbls) (G)	(From properties for which reserves were Estimated) (MMbbls) (H)	(From properties for which reserves were Not Estimated) (MMbbls) (I)						
OKLAHOMA	OK															
PENNSYLVANIA	PA															
SOUTH DAKOTA	SD															
TENNESSEE	TN															
TEXAS-RRR DISTRICT 1	TX10															
TEXAS-RRR DISTRICT 2 ONSHORE	TX20															
TEXAS-RRR DISTRICT 3 ONSHORE	TX30															
TEXAS-RRR DISTRICT 4 ONSHORE	TX40															
TEXAS-RRR DISTRICT 5	TX50															
TEXAS-RRR DISTRICT 6	TX60															
TEXAS-RRR DISTRICT 7B	TX70															
TEXAS-RRR DISTRICT 7C	TX75															
TEXAS-RRR DISTRICT 8	TX80															
TEXAS-RRR DISTRICT 8A	TX85															
TEXAS-RRR DISTRICT 9	TX90															
TEXAS-RRR 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															

SAMPLE

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

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

OFFICIAL USE ONLY		2003		ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES										Form Approved OMB No. 1905-0057 Expiration Date: 12/31/06 (Revised 2003)	
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 03						_____ 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, 2003				8. FOOTNOTE	
										CRUDE OIL (a)	ASSOC-DISSOLVED GAS (b)	NONASSOCIATED GAS (c)	LEASE CON-DENSATE (d)		
		9. WATER DEPTH		10. FIELD DISCOVERY YEAR			11. INDICATED ADDITIONAL RESERVES OF CRUDE OIL (MBbls)								
		TYPE OF HYDROCARBON		TOTAL PROVED RESERVES DECEMBER 31, 2002 (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, 2003 (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, 2003				8. FOOTNOTE	
										CRUDE OIL (a)	ASSOC-DISSOLVED GAS (b)	NONASSOCIATED GAS (c)	LEASE CON-DENSATE (d)		
		9. WATER DEPTH		10. FIELD DISCOVERY YEAR			11. INDICATED ADDITIONAL RESERVES OF CRUDE OIL (MBbls)								
		TYPE OF HYDROCARBON		TOTAL PROVED RESERVES DECEMBER 31, 2002 (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, 2003 (J)	
		12. CRUDE OIL (MBbls)													
		13. ASSOCIATED-DISSOLVED GAS (MMCF)													
		14. NONASSOCIATED GAS (MMCF)													
		15. LEASE CONDENSATE (MBbls)													
2.3		1. STATE ABBR.	2. SUBDIV. CODE	3. COUNTY CODE	4. FIELD CODE	5. MMS CODE	6. FIELD NAME			7. PROVED NONPRODUCING RESERVES - DECEMBER 31, 2003				8. FOOTNOTE	
										CRUDE OIL (a)	ASSOC-DISSOLVED GAS (b)	NONASSOCIATED GAS (c)	LEASE CON-DENSATE (d)		
		9. WATER DEPTH		10. FIELD DISCOVERY YEAR			11. INDICATED ADDITIONAL RESERVES OF CRUDE OIL (MBbls)								
		TYPE OF HYDROCARBON		TOTAL PROVED RESERVES DECEMBER 31, 2002 (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, 2003 (J)	
		12. CRUDE OIL (MBbls)													
		13. ASSOCIATED-DISSOLVED GAS (MMCF)													
		14. NONASSOCIATED GAS (MMCF)													
		15. LEASE CONDENSATE (MBbls)													

SAMPLE

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


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

OFFICIAL USE ONLY		2003		ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES SCHEDULE B – FOOTNOTES				Form Approved OMB No. 1905-0057 Expiration Date: 12/31/06 (Revised 2003)	
1.1 OPERATOR I.D. CODE				REPORT DATE			1.3 ORIGINAL	1.4 AMENDED	1.5 PAGE
				12	31	03			
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

SAMPLE

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

Figure I6. Form EIA-64A



www.eia.doe.gov
Energy Information Administration

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

Form Approved
OMB No. 1905-0057
Expiration Date: 12/31/06

ANNUAL REPORT OF THE ORIGIN OF NATURAL GAS LIQUIDS PRODUCTION
FORM EIA-64A
CALENDAR YEAR 2003

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, 2004 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? es o (indicate number of months below)

Months covered by this report _____ through _____, 2003 (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: _____

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, Office 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 Ownership 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.