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U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2007 Annual Report

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2007 Annual Report

February 2009

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

Preface

The U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2007 Annual Report is the 31st 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, 2007, as well as production volumes for the United States and producing States and State subdivisions for the year 2007. 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 crude oil, natural gas, and lease condensate reserves in nonproducing reservoirs. A discussion of notable oil and gas exploration and development activities during 2007 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 natural gas proved reserves group for 2007; 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 Stephen Harvey, Director, Office of Oil and Gas and John H. Wood, Director, Reserves and Production Division (214.720.6160).

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COVER PHOTO:

Chesapeake Energy, 2007 Annual Report. Photo by Gary Wilson.

A drilling rig near downtown Fort Worth, Texas. Its target: natural gas from the Barnett Shale.

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Executive Summary

In 2007, the U.S. recorded record-high additions to dry natural gas proved reserves totaling 46.1 trillion cubic feet (Tcf), more than double the 19.5 Tcf of dry natural gas actually produced in the United States during the year. The resulting 2007 year-end total proved reserves of dry natural gas in the United States rose 13 percent above 2006 levels to 237.7 Tcf, the highest level in the 31 years EIA has published annual reserves data. The record additions mostly reflect the rapid development of unconventional gas resources made up of coalbed methane and those resources that use advanced technologies like horizontal drilling with hydraulic fracturing including shales and tight, low permeability formations.

The United States also recorded more 2007 proved reserves additions of crude oil than it produced, 2.0 billion barrels, or 0.3 billion barrels above production of 1.7 billion barrels. Year-end proved reserves in 2007 stood at 21.3 billion barrels, nearly 2 percent higher than at the end of 2006.

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. Since 1977, EIA has published comprehensive U.S. proved reserves data. *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves 2007 Annual Report* marks the thirty-first edition of this EIA publication.

Changes to Proved Reserves, 2007:

Crude Oil (billion barrels)		
Proved Reserves, 2006	21.0	
Plus Proved Reserves Additions	+2.0	
Less 2007 Production	-1.7	
Proved Reserves, 2007	21.3	(+2%)
Dry Natural Gas (trillion cubic feet)		
Proved Reserves, 2006	211.1	
Plus Proved Reserves Additions	+46.1	
Less 2007 Production	-19.5	
Proved Reserves, 2007	237.7	(+13%)
Natural Gas Liquids (billion barrels)		
Proved Reserves, 2006	8.47	
Plus Proved Reserves Additions	+1.50	
Less 2007 Production	-0.83	
Proved Reserves, 2007	9.14	(+8%)

Natural Gas

In any given year, EIA's aggregate U.S. estimate of proved reserves represents a snapshot of what can be produced with reasonable certainty. Each year estimates change as new discoveries and improving technologies increase and changing prices alter estimates of proved reserves. The result is aggregated as proved reserves additions. If proved reserves additions are greater than production, reserves increase; if not, they decline.

Developments in 2007. Proved reserves of natural gas increased by 26.6 Tcf in 2007, with 46.1 Tcf total proved reserves additions and 19.5 Tcf of natural gas production. It was the ninth consecutive year that U.S. natural gas proved reserves rose, but the increase was more than twice as great an increase as in any other year since EIA began estimating this data in 1977.

In 2007, natural gas proved reserves additions came mostly from two broad categories, *total discoveries* and *net revisions*.

Total Discoveries. Discoveries arise from drilling exploratory wells. *Total discoveries* include extensions to known fields, discovery of new fields, and the discovery of new reservoirs in old fields.

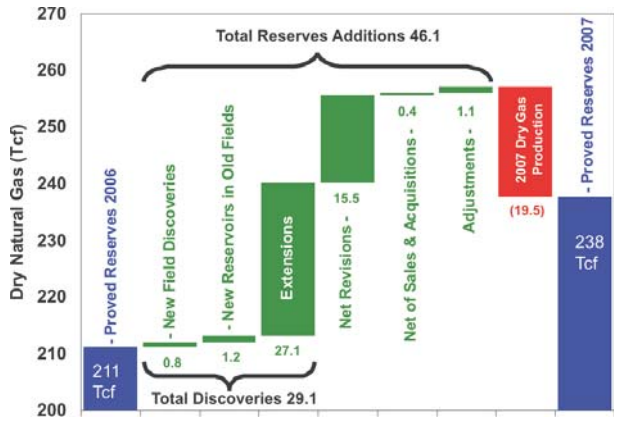
In 2007, *total discoveries* accounted for 63 percent of total natural gas proved reserves additions. Exploratory gas well completions in 2007 rose by 32 percent from 2006. These exploration efforts led to 29 Tcf of *total discoveries* in 2007; 25 percent more than in 2006 and 58 percent more than the prior 10-year average (18.4 Tcf).

The different types of discoveries largely reflect different stages of exploration. When an operator discovers a new field or a new reservoir in an old field, the proved reserves are often fairly low compared to the eventual *proved ultimate recovery*. The operator knows relatively little about the new field or reservoir and can therefore be "reasonably certain" of being able to produce only a small part of the reserves that may be found and proved up at a later stage of exploration. In 2007, new field and reservoir discoveries accounted for about 7 percent of *total discoveries*. *New field discoveries* were 0.8 Tcf, 95 percent more than in 2006, but 51 percent less than the prior 10-year average (1.6 Tcf). *New reservoir discoveries in old fields* were 1.2 Tcf, 3 percent more

than in 2006, and 37 percent less than the prior 10-year average (1.9 Tcf).

After the initial discovery of a field or reservoir, proved reserves (and production) often grow rapidly as further exploration extends the original boundary. The resulting proved reserves additions are recorded as *extensions* of an existing field. Every year, most natural gas *total discoveries* are *extensions*. In 2007, 27.1 Tcf, or the vast majority of *total discoveries* - and almost 59 percent of all additions - were *extensions* to existing gas fields. *Extensions* of dry gas proved reserves in 2007 were 24 percent larger than in 2006 and 82 percent larger than the prior 10-year average of 14.9 Tcf.

Natural Gas Proved Reserves Changes, 2007



Net Revisions. Revisions occur primarily during the development of already discovered reservoirs or fields. Each year U.S. exploration and production companies make positive and negative revisions. In most years, *net revisions* are positive and sometimes they are large, as in 2007. Most proved reserves additions at this stage come from the ability to produce a greater proportion of the original in-place resources in the reservoir. Revisions can result from greater experience with and understanding of the geology and production characteristics of the field, drilling on tighter spacing, installation of enhanced recovery projects, improving technology, and operator corrections to prior year reports. Changing prices and price expectations lead to revisions, both positive and negative, as well.

In 2007, *net revisions* accounted for 34 percent of total natural gas reserves additions (15.5 Tcf). Over the last 10 years, about 15 percent of proved reserves additions have come from *net revisions*.

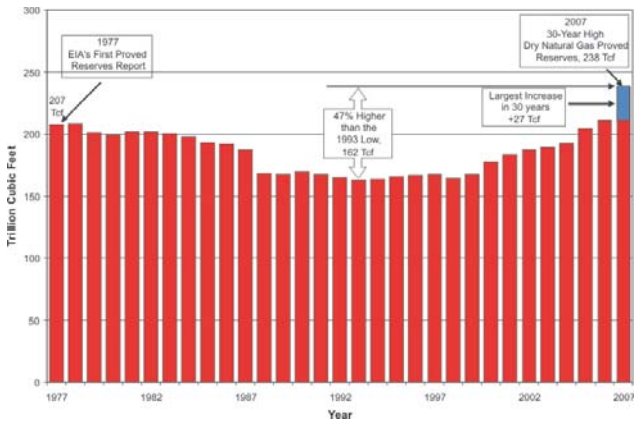
Sales and Acquisitions, and Adjustments. Three percent of natural gas proved reserves additions came from a small difference in the estimates of buyers and sellers of reserves during the year and because of various EIA adjustments made for statistical purposes.

Production. Natural gas production grew to 19.5 Tcf in 2007, a 5-percent increase over 2006. With 46.1 Tcf of gross proved reserves additions, net proved reserves additions totaled 26.6 Tcf.

Prices. Natural gas prices at the wellhead in 2007 changed little from 2006, declining by only 3 cents to an average of $6.39 per thousand cubic feet. Natural gas prices had increased considerably between 2002 and 2005. Drilling for natural gas also increased in 2003 and has continued to increase each year through 2007.

Long-term perspective. Dry natural gas proved reserves declined between 1977 and 1993, but have generally risen since then. Looking at the whole 31-year period from 1977 through 2007, gross proved reserves additions totaled 601.4 Tcf, almost three times the total proved reserves estimated in 1977 and more than enough to replace the 571 Tcf of production during that period.

Changes in Natural Gas Proved Reserves, 1977-2007



Regional Natural Gas Proved Reserves Additions. Regionally, Texas had the Nation's largest increase in dry natural gas proved reserves in 2007, amounting to a 17-percent gain (10.3 Tcf). Major net reserves additions in the Rocky Mountain States included a

26-percent (6.2 Tcf) increase in Wyoming, a 27-percent (4.7 Tcf) increase in Colorado, and a 24-percent (1.2 Tcf) increase in Utah. Proved reserves declined in two major gas-producing regions including a 6-percent decline in the Gulf of Mexico Federal Offshore (0.9 Tcf) and a 4-percent decline in New Mexico (0.7 Tcf).

The additions in Texas were primarily due to development of unconventional gas resources in north and east Texas from shale in the Barnett Shale and from tight sands in the Cotton Valley Formation, supported by relatively high natural gas prices and advancing technologies. The Newark East field in the Texas Barnett Shale formation may soon become the largest natural gas field in the country.

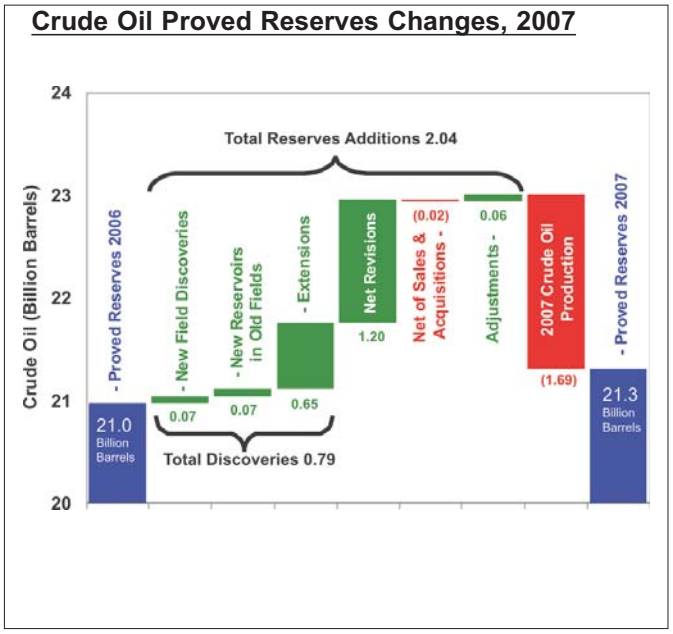
Unconventional Natural Gas Proved Reserves Additions. Unconventional resources are playing an increasingly important role in U.S. dry natural gas reserves and production. For example, improved technology now allows high economic returns for development of reserves in *shale* reservoirs at the prices seen in 2006 and 2007. As a result, proved reserves of shale gas have been increasing rapidly. EIA has collected data on proved natural gas reserves from shale reservoirs for 2 years. The shale gas proved reserves increased 50 percent in 2007 and are now at about 9 percent of the U.S. total.

Proved reserves and production from *coal reservoirs* increased rapidly from 1989 through 2002 before stabilizing and even dropping slightly in 2006. However, coalbed natural gas reserves saw an 11.5-percent increase in 2007. Coalbed proved reserves now account for about 9 percent of U.S. dry natural gas reserves. Coalbed natural gas production decreased in 2007 but still accounted for about 9 percent of U.S. dry natural gas production.

Crude Oil

In 2007, U.S. crude oil proved reserves increased nearly 2 percent as proved reserves additions replaced 120 percent of production. Alaska saw the largest increase in year-end crude oil proved reserves, growing 7 percent over 2006 (284 million barrels), followed closely by Texas with an increase in year-end proved reserves of 5 percent (251 million barrels). Alaska's increase included 45 million barrels of new field discoveries. Due to rapid development of unconventional oil resources associated with the Bakken Formation, North Dakota had the third largest increase in crude oil proved reserves, up 17 percent from 2006 (70 million barrels).

Developments in 2007. *Total discoveries* of crude oil were 790 million barrels in 2007, 28 percent lower than the prior 10-year average (1,100 million barrels) and 37 percent greater than in 2006 (577 million barrels). The majority of crude oil *total discoveries* in 2007 came from *extensions* to existing fields in Texas, the Gulf of Mexico Federal Offshore, North Dakota, New Mexico, and Alaska.



Total Discoveries. Operators discovered 29 percent more *extensions* in 2007 than in 2006 (651 million barrels) and 18 percent more than the prior 10-year average (554 million barrels).

New field discoveries of crude oil reserves doubled in 2007 over 2006 (66 million barrels), though they were only 16 percent of the prior 10-year average (407 million barrels). More than two-thirds of these discoveries (45 of 66 million barrels) were in Alaska.

New reservoir discoveries in old fields were 70 percent greater than 2006 (73 million barrels) but 48 percent lower than the prior 10-year average (140 million barrels).

Net Revisions. Crude oil *net revisions* totaled 1,200 million barrels in 2007.

Production. U.S. crude oil production increased for the first time in 4 years, up 2 percent from estimated 2006 production. Alaska and the lower 48 States each contributed about half of the U.S. total increase.

Other 2007 crude oil events of note:

- The annual average domestic first purchase price for crude oil increased 11 percent from $59.69 per barrel in 2006 to $66.52 per barrel.
- Exploratory oil well completions increased 17 percent from 2006.

Long-term Perspective. Starting in 1977, EIA estimated 32 billion barrels of crude oil proved reserves. As with natural gas, this estimate proved not to be a limit to future production, but an estimate that was revised upward many times in the years since. The United States produced 75 billion barrels from 1977 through 2007, more than twice the proved reserves estimated in 1977. Total proved reserves of crude oil have declined by a third since 1977 as the rate of production has outstripped proved reserves additions (a total of 62 billion barrels over the period). However, the rate of decline in total U.S. crude oil reserves began to slow in 1994. Proved reserves additions from revisions due to intensive field development and enhanced oil recovery projects have helped to sustain crude oil proved reserves by providing more than half of all proved reserves additions.

Natural Gas Liquids

Natural gas liquids reserves are associated with natural gas production and include lease condensate extracted at the well on the producing lease and natural gas plant liquids reserves extracted at plants. Large increases in natural gas proved reserves lead to large increases in natural gas liquids proved reserves, but the percent increases are not the same because natural gas from different fields varies in how much liquid is extractable. Overall, natural gas liquids proved reserves increased 8 percent in 2007. Operators replaced 181 percent of U.S. natural gas liquids production with reserves additions.

Natural gas liquids represented 30 percent of total liquid hydrocarbon proved reserves in 2007. Total proved reserves of liquid hydrocarbons (crude oil plus natural gas liquids) were 30.5 billion barrels in 2007, a 3-percent increase from the 2006 level.

Data

These estimates are based upon analysis of data from Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves", filed by 1,438 operators of oil and gas wells, and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production", filed by operators of 496 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.

EIA collects data on eight categories of proved reserves changes in a survey at the field level. This reported data represents a sample of the roughly 55,000 oil and gas fields that EIA has identified. Companies report about 96 percent of the proved reserve total. *Adjustments* cannot be attributed directly to one of the other specific eight categories because of the survey and statistical survey methods employed.

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 natural 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 how reserves fit in the description of overall oil and natural gas resources should see Appendix G.

This report provides proved reserves estimates for calendar year 2007. 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 natural 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 natural 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-23L 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 are 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 are instead estimated using statistical calculations that preserve 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 on Form EIA-23S. Details on the selection of these operators and the determination of the reserves volumes are 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 estimates from 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-23L Element: Type Code

The importance of unconventional resources of natural gas and crude oil to domestic energy supply continues to increase. EIA seeks to separately track the development of these resources.

For the 2007 survey, respondents to the long form version of Form EIA-23 were requested to assign a *Type Code* to their field-level data. *Type Code* categorizes proved reserves and production from a field as either *Conventional* (C) or one of four types of *Unconventional* reservoirs: *Coal Bed* (CB); *Chalk* (CH); *Shale* (SH); or *other Low Permeability* (LP) reservoirs (permeability of 0.1 millidarcy or less). Sufficient responses were received in the category of natural gas from *Shale* that a separate table for *Shale* (**Table 13**) is included in this report.

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 13,774 probable active operators and the Form EIA-64A plant frame contained 496 probable active natural gas processing plants in the United States for 2007.

For more details on the survey process, see Appendix E, Summary of Data Collection Operations.

The 2007 survey sample consisted of 1,438 operators. EIA sampled 960 operators with certainty; 158 Category I operators, 510 Category II operators, and 292 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 478 Noncertainty operators in a systematic random sample of the remaining operators. There were 17 Successor operators in 2007. Seventy-five (75) respondents ceased operating oil and/or gas properties (became non-operator) during the survey year. For more details on the survey response statistics, see Table E2 in Appendix E.

EIA mailed EIA-64A forms to all known natural gas processing plant operators as of February 1, 2007. The 100 percent response rate is detailed in Table E5 in Appendix E.

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 2007, the Form EIA-23 National production estimates were 1 percent higher than the comparable *Petroleum Supply Annual (PSA) 2007* volumes for crude oil and lease condensate combined and were 1 percent higher than the comparable *Natural Gas Monthly, October 2008* volume for 2007 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, 2007:

- **Crude Oil — 21,317 million barrels**
- **Dry Natural Gas — 237,726 billion cubic feet**
- **Natural Gas Liquids — 9,143 million barrels.**

This Overview summarizes the 2007 proved reserves balances of crude oil, dry natural gas, and natural gas liquids on a national level and provides historical comparisons between 2007 and prior years. **Table 1** lists the estimated annual reserve balances since 1997 for crude oil, dry natural gas, and natural gas liquids.

Crude Oil

U.S. crude oil proved reserves increased 2 percent (345 million barrels) in 2007. **Figure 1** shows the crude oil proved reserves levels by major region and **Figure 2** shows the components of reserves changes from 1997 through 2007.

As indicated in **Figure 1**, U.S. crude oil proved reserves increased onshore in the lower 48 States and in Alaska, but declined slightly in the Gulf of Mexico 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 790 million barrels in 2007, 28 percent less than the prior 10-year average (1,100 million barrels) and 37 percent more than 2006's discoveries of 577 million barrels.

The majority of crude oil total discoveries in 2007 came from extensions to fields in Texas, the Gulf of Mexico, North Dakota, New Mexico and Alaska. Operators discovered 651 million barrels in extensions in 2007, 29 percent more than in 2006 and 18 percent more than the prior 10-year average (554 million barrels).

New field discoveries accounted for 66 million barrels of crude oil total discoveries. This was more than twice the new field discoveries of 2006 (30 million barrels), and only 16 percent of the prior 10-year average (407 million barrels). More than two-thirds of these discoveries (45 of 66 million barrels) were in Alaska.

New reservoir discoveries in old fields were 73 million barrels, 70 percent more than 2006 (43 million barrels) but 48 percent lower than the prior 10-year average (140 million barrels).

Crude oil net revisions totaled 1,200 million barrels in 2007. The net of sales and acquisitions of crude oil proved reserves was a decline of 19 million barrels.

U.S. 2007 crude oil production was 1,691 million barrels, up 2 percent from 2006's estimated production (1,652 million barrels) and the first increase in 4 years. Alaska and the lower 48 States each contributed about half of the U.S. total increase. Reserves additions of crude oil replaced 120 percent of 2007 crude oil production.

Dry Natural Gas

Natural gas proved reserves increased by 26,641 billion cubic feet in 2007. **Figure 3** shows the dry natural gas proved reserves levels by major region. It indicates that additions of natural gas reserves in the Lower 48 onshore are raising the national total despite declining Federal offshore natural gas reserves. **Figure 4** shows the components of reserves changes from 1997 through 2007.

Total discoveries of dry natural gas reserves, which is the sum of field extensions, new field discoveries, and new reservoir discoveries in old fields, were 29,091 billion cubic feet in 2007. This was 59 percent more than the prior 10-year average (18,357 billion cubic feet) and 25 percent more than in 2006 (23,342 billion cubic feet).

The majority of natural gas total discoveries in 2007 were from extensions to existing fields. Field extensions were 27,107 billion cubic feet, 25 percent more than in 2006 (21,778 billion cubic feet) and 82

Table 1. Total U.S. Proved Reserves of Crude Oil, Dry Natural Gas, and Natural Gas Liquids, 1997-2007

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)										
1997	520	914	1,434	NA	477	637	119	1,233	2,138	22,546	+529
1998	-638	518	-120	NA	327	152	120	599	1,991	21,034	-1,512
1999	139	1,819	1958	NA	259	321	145	725	1,952	21,765	+731
2000	143	746	889	-20	766	276	249	1,291	1,880	22,045	+280
2001	-4	-158	-162	-87	866	1,407	292	2,565	1,915	22,446	+401
2002	416	720	1,136	24	492	300	154	946	1,875	22,677	+231
2003	163	94	257	-398	426	705	101	1,232	1,877	21,891	-786
2004	74	420	494	23	617	33	132	782	1,819	21,371	-520
2005	221	569	790	278	805	205	41	1,051	1,733	21,757	+386
2006	94	2	96	194	504	30	43	577	1,652	20,972	-785
2007	65	1,200	1,265	-19	651	66	73	790	1,691	21,317	+345
	Dry Natural Gas (billion cubic feet, 14.73 psia, 60° Fahrenheit)										
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
2004	-114	744	630	1,844	18,198	759	1,206	20,163	19,168	192,513	+3,469
2005	1,887	2,699	4,586	2,544	21,050	942	1,208	23,200	18,458	204,385	+11,872
2006	743	-1,836	-1,093	2,996	21,778	409	1,155	23,342	18,545	211,085	+6,700
2007	1,147	15,461	16,608	408	27,107	796	1,188	29,091	19,466	237,726	+26,641
	Natural Gas Liquids (million barrels of 42 U.S. gallons)										
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
2004	273	97	370	112	734	26	54	814	827	7,928	+469
2005	-89	21	-68	156	863	32	42	937	788	8,165	+237
2006	173	-165	8	117	924	16	53	993	811	8,472	+307
2007	-139	422	283	101	1,030	30	58	1,118	831	9,143	+671

[a]Revisions and adjustments = Col. 1 + Col. 2.
[b]Net of sales and acquisitions = acquisitions - sales.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
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 2007 contained in the *Petroleum Supply Annual 2007*, DOE/EIA-0340(07) and the *Natural Gas Annual 2007,* DOE/EIA-0131(07).

Sources: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1996 through 2006 annual reports, DOE/EIA-0216.

Figure 1. U.S. Crude Oil Proved Reserves, 1997-2007

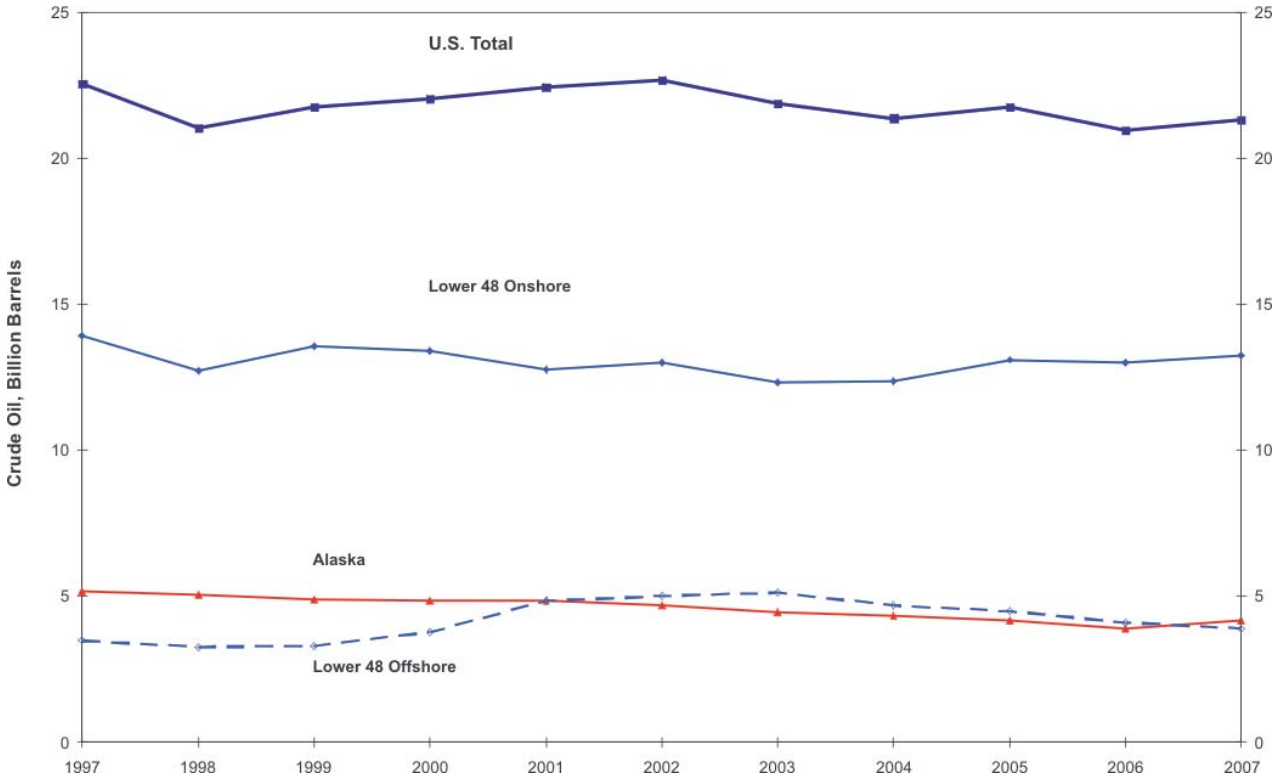
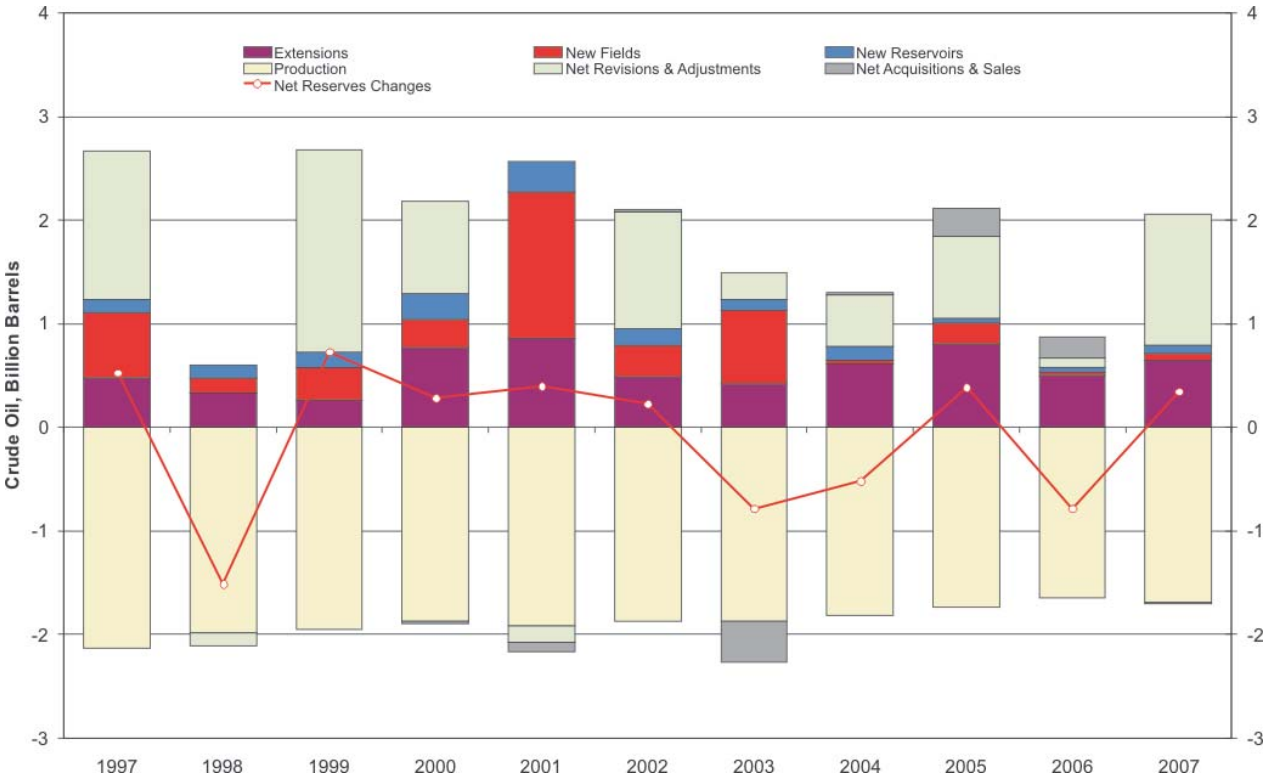


Figure 2. Components of Reserves Changes for Crude Oil, 1997-2007



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1997-2006 annual reports, DOE/EIA-0216.{21-30}

Figure 3. U.S. Dry Natural Gas Proved Reserves, 1997-2007

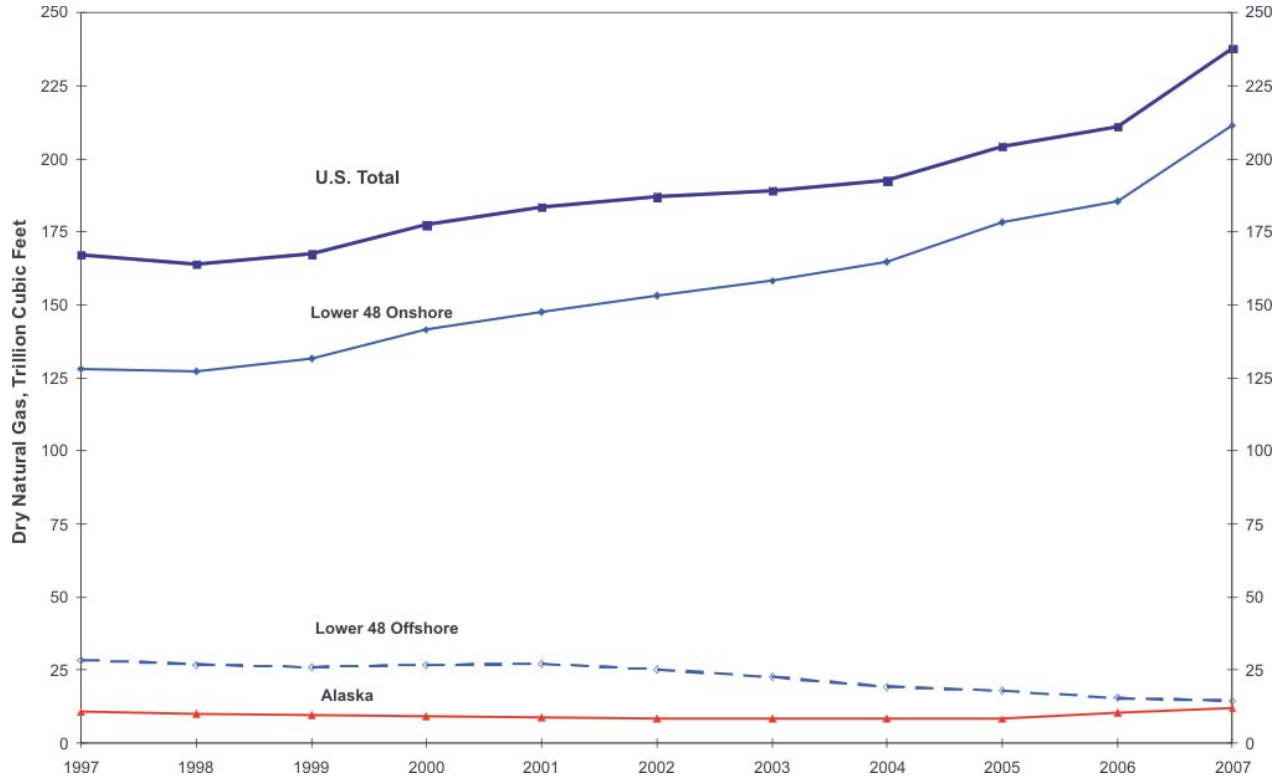
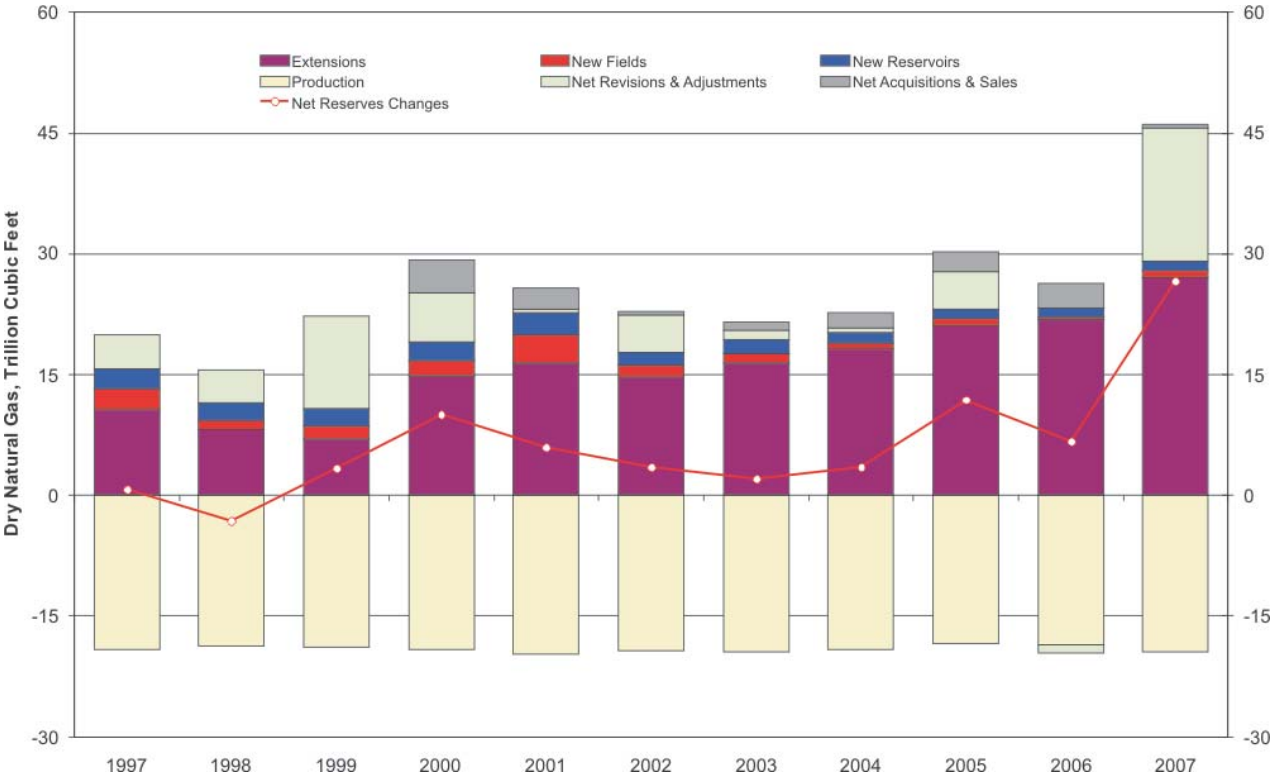


Figure 4. Components of Reserves Changes for Dry Natural Gas, 1997-2007



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1997-2006 annual reports, DOE/EIA-0216.{21-30}

percent more than the prior 10-year average (14,924 billion cubic feet).

New field discoveries were 796 billion cubic feet, 95 percent more than the volume discovered in 2006 (409 billion cubic feet) and 51 percent of the prior 10-year average (1,555 billion cubic feet).

New reservoir discoveries in old fields were 1,188 billion cubic feet, 3 percent more than in 2006 (1,155 billion cubic feet) and 63 percent of the prior 10-year average (1,878 billion cubic feet).

In 2007, net revisions (15,461 billion cubic feet) accounted for 34 percent of total natural gas reserves additions (46,107 billion cubic feet). Over the last 10 years, about 15 percent of proved reserves additions have come from net revisions. The net of sales and acquisitions of dry natural gas proved reserves was 408 billion cubic feet.

U.S. dry natural gas production grew to 19,466 billion cubic feet in 2007, a 5-percent increase over 2006's dry natural gas production (18,545 billion cubic feet).

Unconventional resources are playing an increasingly important role in U.S. dry natural gas reserves and production. For example, improved technology now allows high economic returns for development of reserves in shale reservoirs at the prices seen in 2006 and 2007. As a result, proved reserves of shale gas have been increasing rapidly. EIA has collected data on proved natural gas reserves from shale reservoirs for two years. The shale gas proved reserves increased 50 percent in 2007 and are now at about 9 percent of the U.S. total.

Proved reserves and production from coal reservoirs increased rapidly from 1989 through 2002 before stabilizing and even dropping slightly in 2006. However, coalbed natural gas reserves saw an 11.5-percent increase in 2007. Coalbed proved reserves now account for about 9 percent of U.S. dry natural gas reserves. Coalbed natural gas production decreased in 2007 but still accounted for about 9 percent of U.S. dry natural gas production.

Natural Gas Liquids

Natural gas liquids reserves are associated with natural gas production and include lease condensate extracted at the well on the producing lease and natural gas plant liquids reserves extracted at plants. Large increases in natural gas proved reserves lead to large increases in natural gas liquids proved reserves, but the percent increases are not the same because natural gas from different fields varies in how much liquid is extractable. Overall, natural gas liquids proved reserves increased 8 percent in 2007. Operators replaced 181 percent of U.S. natural gas liquids production with reserves additions.

Natural gas liquids represented 30 percent of total liquid hydrocarbon proved reserves in 2007. Total proved reserves of liquid hydrocarbons (crude oil plus natural gas liquids) were 30.5 billion barrels in 2007, a 3-percent increase from the 2006 level.

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 2007. 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 2007 proved reserves estimates as a means of gauging the past year against history.

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

- had average annual total discoveries of reserves of 891 million barrels,
- had average annual proved reserves additions of 2,027 million barrels from total discoveries, net revisions and adjustments, and net sales and acquisitions, and
- had an average annual proved reserves decline of 393 million barrels nationwide, because production exceeded proved reserves additions.

Since 1977, crude oil reserves have primarily been sustained by proved ultimate recovery appreciation in existing fields rather than by the discovery of new oil fields. Only 11 percent of reserves additions since 1977 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 27,627 million barrels of total discoveries accounted for 44 percent of reserves additions.

Figure 5. U.S. Natural Gas Liquids Proved Reserves, 1997-2007

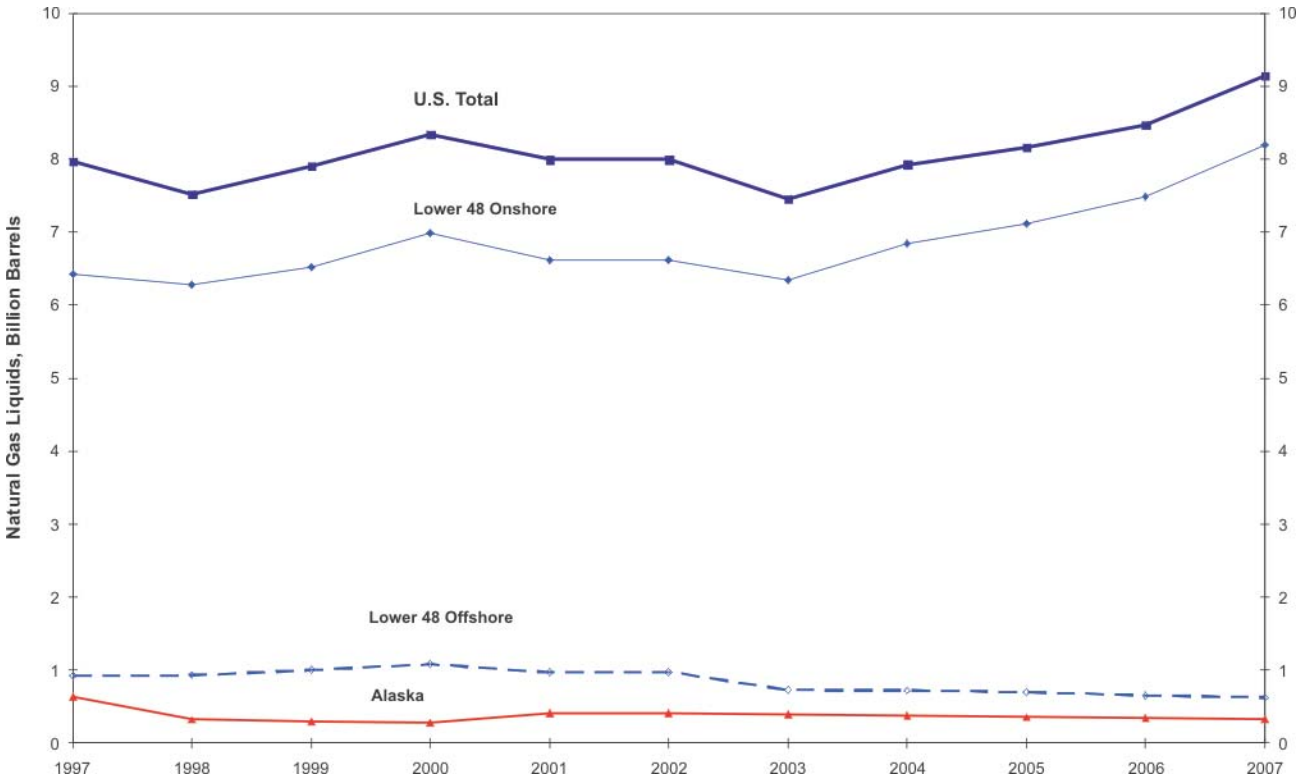
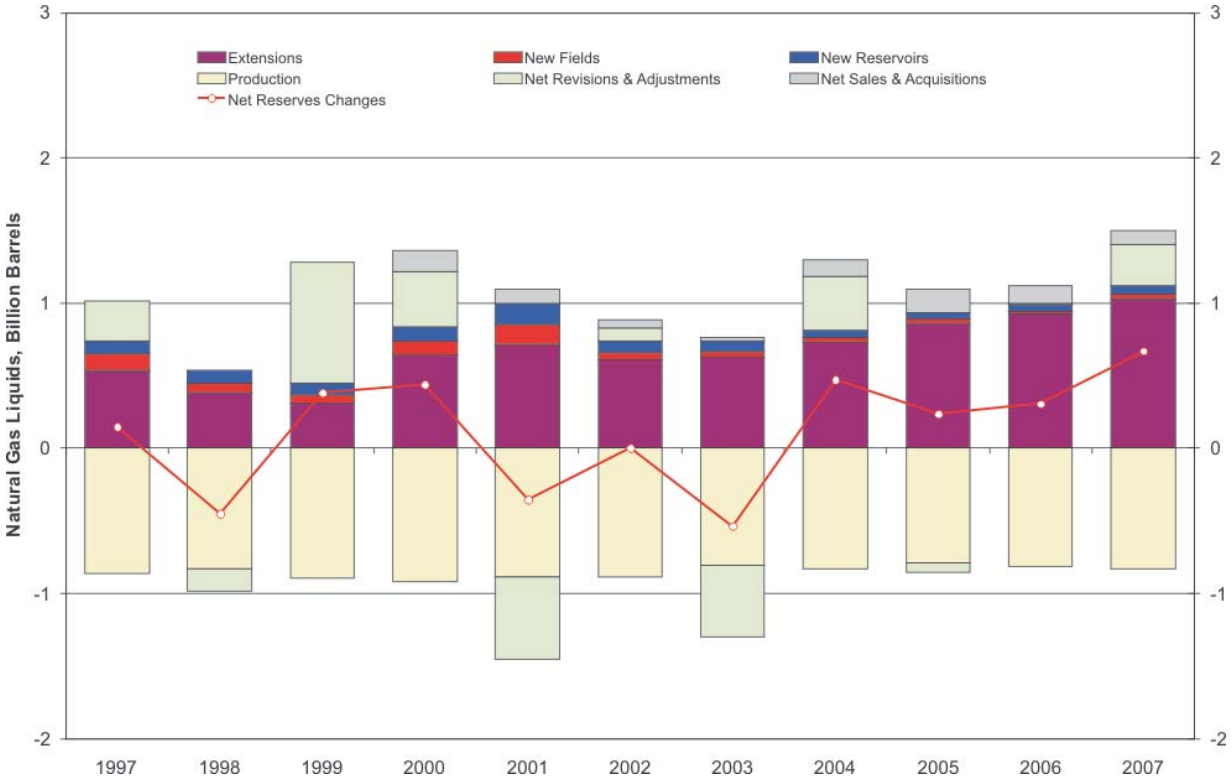


Figure 6. Components of Reserves Changes for Natural Gas Liquids, 1997-2007



Source: U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves, 1997-2006 annual reports, DOE/EIA-0216.{21-30}

Table 2. Reserves Changes, 1977-2007

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	5,981	193	11.6	6,977	225	11.1
New Reservoir Discoveries in Old Fields	4,071	131	7.9	4,259	137	6.8
Extensions	14,493	468	28.1	16,391	529	26.1
Total Discoveries	**24,545**	**792**	**47.5**	**27,627**	**891**	**44.0**
Revisions, Adjustments, Sales & Acquisitions[a]	27,081	874	52.5	35,218	1,136	56.0
Total Reserves Additions	**51,626**	**1,665**	**100.0**	**62,845**	**2,027**	**100.0**
Production	**59,336**	**1,914**	**114.9**	**75,030**	**2,420**	**119.4**
Net Reserves Change (since 1976)	**-7,710**	**-249**	**-14.9**	**-12,185**	**-393**	**-19.4**
	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	55,054	1,776	9.3	55,318	1,784	9.4
New Reservoir Discoveries in Old Fields	71,629	2,311	12.0	72,090	2,325	12.3
Extensions	319,388	10,303	53.7	322,738	10,411	55.1
Total Discoveries	**446,071**	**14,389**	**75.0**	**450,146**	**14,521**	**76.9**
Revisions, Adjustments, Sales & Acquisitions[a]	148,557	4,792	25.0	135,570	4,373	23.1
Total Reserves Additions	**594,628**	**19,182**	**100.0**	**585,716**	**18,894**	**100.0**
Production	**549,657**	**17,731**	**92.4**	**541,792**	**17,477**	**92.5**
Net Reserves Change (since 1976)	**44,971**	**1,451**	**7.6**	**43,924**	**1,417**	**7.5**

[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* 1977-2007 annual reports, DOE/EIA-0216.{1-30}

Compared to the averages of reserves changes since 1977, 2007 was a down year for crude oil discoveries, but an up year for net revisions, adjustments, and net sales & acquisitions. Total discoveries of crude oil (790 million barrels) in 2007 were 11 percent less than the post-1976 U.S. average (891 million barrels per year).

Looking at the components of total discoveries in 2007:

- Extensions in 2007 (651 million barrels) were 23 percent more than the post-1976 average (529 million barrels),
- 2007's new field discoveries (66 million barrels) were 71 percent less than the post-1976 average for crude oil (225 million barrels), and
- New reservoir discoveries in old fields (73 million barrels) in 2007 were 47 percent less than the post-1976 average (137 million barrels).

Revisions, Adjustments, Sales & Acquisitions were 1,246 million barrels in 2007. This was 10 percent more than the post-1976 average of 1,136 million barrels per year.

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

- had average annual new reserves discoveries of 14,521 billion cubic feet,
- had average annual proved reserves additions of 18,894 billion cubic feet from total discoveries, net revisions and adjustments, and net sales and acquisitions, and
- had an average annual production of 17,477 billion cubic feet, increasing U.S. dry natural gas reserves by an average 1,417 billion cubic feet per year. In 2006 and prior years, this average was negative.

Like crude oil reserves, natural gas reserves have primarily been sustained by proved ultimate recovery appreciation since 1977. For gas, extensions rather than net revisions and adjustments are usually the largest component. Extensions accounted for 55 percent of all reserves additions since 1977 while net revisions, adjustments, sales, and acquisitions 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, 1977-2007

Year		Crude Oil		Natural Gas		
		Current	2007 Constant	Current	2007 Constant	
		(dollars per barrel)		(dollars per thousand cubic feet)		Number of Rigs
1977		8.57	24.02	0.79	2.21	2,001
1978		9.00	23.56	0.91	2.38	2,259
1979		12.64	30.56	1.18	2.85	2,177
1980		21.59	47.85	1.59	3.52	2,909
1981		31.77	64.38	1.98	4.01	3,970
1982		28.52	54.47	2.46	4.70	3,105
1983		26.19	48.12	2.59	4.76	2,232
1984		25.88	45.83	2.66	4.71	2,428
1985		24.09	41.40	2.51	4.31	1,980
1986		12.51	21.03	1.94	3.26	964
1987		15.40	25.21	1.67	2.73	936
1988		12.58	19.91	1.69	2.67	936
1989		15.86	24.19	1.69	2.58	869
1990		20.03	29.41	1.71	2.51	1,010
1991		16.54	23.47	1.64	2.33	860
1992		15.99	22.17	1.74	2.41	721
1993		14.25	19.32	2.04	2.77	754
1994		13.19	17.51	1.85	2.46	775
1995		14.62	19.02	1.55	2.02	723
1996		18.46	23.57	2.17	2.77	779
1997		17.23	21.64	2.32	2.91	943
1998		10.87	13.50	1.96	2.43	827
1999		15.56	19.05	2.19	2.68	625
2000		26.72	32.02	3.68	4.41	918
2001		21.84	25.55	4.00	4.68	1,156
2002		22.51	25.89	2.95	3.39	830
2003		27.56	31.03	4.88	5.49	1,032
2004		36.77	40.25	5.46	5.98	1,192
2005		50.28	53.30	7.33	7.77	1,381
2006	January	57.85	60.15	8.66	9.00	1,473
	February	55.69	57.75	7.28	7.55	1,533
	March	55.64	57.56	6.52	6.74	1,551
	April	62.52	64.55	6.59	6.80	1,597
	May	64.40	66.34	6.19	6.38	1,635
	June	64.65	66.45	5.80	5.96	1,665
	July	67.71	69.42	5.82	5.97	1,681
	August	67.21	68.76	6.51	6.66	1,738
	September	59.37	60.62	5.51	5.63	1,739
	October	53.26	54.34	5.03	5.13	1,734
	November	52.42	53.35	6.43	6.54	1,706
	December	55.03	55.85	6.65	6.75	1,718
2006	**Average**	**59.69**	**61.30**	**6.42**	**6.59**	**1,649**
2007	January	49.32	49.82	5.92	5.98	1,714
	February	52.94	53.32	6.66	6.71	1,736
	March	54.95	55.23	6.56	6.59	1,749
	April	58.2	58.43	6.84	6.87	1,750
	May	58.9	59.04	6.98	7.00	1,748
	June	62.35	62.41	6.86	6.87	1,771
	July	69.23	69.26	6.19	6.19	1,777
	August	67.77	67.68	5.90	5.89	1,804
	September	73.27	73.03	5.61	5.59	1,783
	October	79.32	78.84	6.25	6.21	1,762
	November	87.16	86.43	6.37	6.32	1,798
	December	85.28	84.38	6.53	6.46	1,811
2007	**Average**	**66.52**	**66.52**	**6.39**	**6.39**	**1,768**

Sources: Crude oil first purchase prices, natural gas wellhead prices, and number of rigs: Tables 9.1, 9.11, and 5.1, *Monthly Energy Review October 2008*, DOE/EIA-0035(2008/10). 2007 constant dollars: U.S. Department of Commerce, Bureau of Economic Analysis, Gross Domestic Product Implicit Price Deflators, August 2008.

Compared to the averages of reserves changes since 1977, 2007 was an up year for dry natural gas total discoveries. Operators reported 29,091 billion cubic feet of total discoveries of dry natural gas proved reserves, twice as much as the post-1976 average (14,521 billion cubic feet).

The net of revisions, adjustments, sales, and acquisitions was 17,016 billion cubic feet in 2007, almost quadruple the post-1976 U.S. average (4,373 billion cubic feet per year).

For the ninth year in a row (and 13 out of the last 14 years), the annual change to the national total of gas reserves has been an increase. Consequently, the average since 1977 is now a positive volume.

Economics and Drilling

Economics: Table 3 lists the average annual domestic wellhead prices of crude oil and natural gas from 1977 to 2007.

In 2007, the U.S. crude oil first purchase price started at a monthly average of $49.32 per barrel in January, rose to a high of $87.16 in November, and ended the year at $85.28 per barrel in December. The average annual U.S. crude oil first purchase price increased from $59.69 in 2006 to $66.52 per barrel in 2007.

Oil prices vary by region. The average annual 2007 crude oil first purchase price ranged from a low of $58.34 per barrel in Wyoming to a high of $71.63 per barrel in Louisiana. {31}

The average annual wellhead natural gas price decreased from $6.42 per thousand cubic feet in 2006 to $6.39 in 2007. Monthly average natural gas prices started at $5.92 per thousand cubic feet in January 2007, rose to $6.98 in May, and ended the year at $6.53 per thousand cubic feet in December 2007. {32}

Drilling: Also listed in **Table 3** is the average number of active rotary drilling rigs from 1977 to 2007. From 2006 to 2007, the annual average active rig count rose from 1,649 to 1,768, a 7-percent increase.

Looking first at exploratory wells, there were 5,509 exploratory wells drilled in 2007 (**Table 4**). Of these, 14 percent were completed as oil wells, 60 percent were completed as gas wells, and 26 percent were dry holes. Exploratory oil and gas completions (excluding dry holes) in 2007 were 29 percent more (**Figure 7**) than the revised 2006 total.

The number of successful development wells decreased for oil and natural gas in 2007 **(Figure 8**). Including dry holes, there were an estimated 48,501 exploratory and development wells drilled in 2007. This is 1 percent less than in 2006 and 49 percent more than the average number of wells drilled annually in the prior 10 years (32,495).

Figures 9 and 10 show the average volume of discoveries per exploratory well for dry natural gas and oil, respectively, since 1977. The 2007 average volume of oil discoveries per exploratory well increased 17 percent compared to 2006. The 2007 average volume of gas discoveries per exploratory well decreased 5 percent compared to 2006.

For the fourteenth 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 2007 and are expected to have an impact on the energy industry in the future:

On June 4, 2007, Dominion announced it would sell most of its onshore natural gas and oil exploration and production operations in two separate transactions for a total of approximately $6.5 billion. This included 3.51 trillion cubic feet equivalent of natural gas and oil reserves. Loews Corporation acquired Dominion's operations in the Permian Basin, Michigan, and Alabama. XTO Energy Inc. acquired operations in the Rocky Mountains, Gulf Coast, San Juan Basin, and south Louisiana. {33}

On July 18, 2007, Plains Exploration & Production Company agreed to acquire Pogo Producing Company for $3.42 billion in cash and stock. {34}

Reserve-to-Production Ratio and Ultimate Recovery

R/P Ratios

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

Table 4. U.S. Exploratory and Development Well Completions[a], 1973-2007

	Exploratory				Total Exploratory and Development			
Year	Oil	Gas	Dry	Total	Oil	Gas	Dry	Total
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	1,777	2,099	9,081	12,957	32,959	17,461	20,785	71,205
1981	2,651	2,522	12,400	17,573	43,887	20,250	27,953	92,090
1982	2,437	2,133	11,307	15,877	39,459	19,076	26,379	84,914
1983	2,030	1,605	10,206	13,841	37,366	14,684	24,355	76,405
1984	2,209	1,528	11,321	15,058	42,906	17,338	25,884	86,128
1985	1,680	1,200	8,954	11,834	35,261	14,324	21,211	70,796
1986	1,084	797	5,567	7,448	19,213	8,599	12,799	40,611
1987	926	756	5,052	6,734	16,210	8,096	11,167	35,473
1988	855	747	4,711	6,313	13,646	8,578	10,119	32,343
1989	607	706	3,934	5,247	10,230	9,522	8,236	27,988
1990	664	693	3,793	5,150	12,445	11,126	8,496	32,067
1991	601	544	3,390	4,535	12,035	9,611	7,882	29,528
1992	498	427	2,550	3,475	9,019	8,305	6,284	23,608
1993	509	541	2,509	3,559	8,764	10,174	6,513	25,451
1994	579	740	2,465	3,784	7,001	9,739	5,515	22,255
1995	549	583	2,279	3,411	7,827	8,454	5,319	21,600
1996	496	591	2,246	3,333	8,760	9,539	5,587	23,886
1997 R	491	561	2,108	3,160	11,044	11,435	5,848	28,327
1998 R	327	566	1,585	2,478	7,556	11,510	4,745	23,811
1999 R	196	565	1,157	1,918	4,734	11,899	3,517	20,150
2000 R	288	657	1,333	2,278	7,986	16,935	4,117	29,038
2001 R	353	1,046	1,714	3,113	8,805	21,959	4,539	35,303
2002 R	255	843	1,271	2,369	6,724	17,225	3,706	27,655
2003 R	349	991	1,285	2,625	8,026	20,587	3,898	32,511
2004 R	386	1,652	1,331	3,370	8,676	23,728	3,975	36,379
2005 R	515	2,087	1,431	4,033	10,381	27,780	4,512	42,673
2006 R	637	2,498	1,400	4,535	12,693	31,597	4,812	49,101
2007	747	3,307	1,455	5,509	12,543	31,303	4,655	48,501

[a]Excludes service wells and stratigraphic and core testing.

R = Revised Data.

Notes: Estimates include only the original drilling of a hole intended to discover of further develop already discovered oil or natural 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.

Source: Table 5.2, EIA *Monthly Energy Review October 2008*, DOE/EIA-0035(2008/10). These estimates are subject to continuous revision as new data, some of which pertain to earlier months and years, become available.

Figure 7. U.S. Exploratory Well Completions, 1997-2007

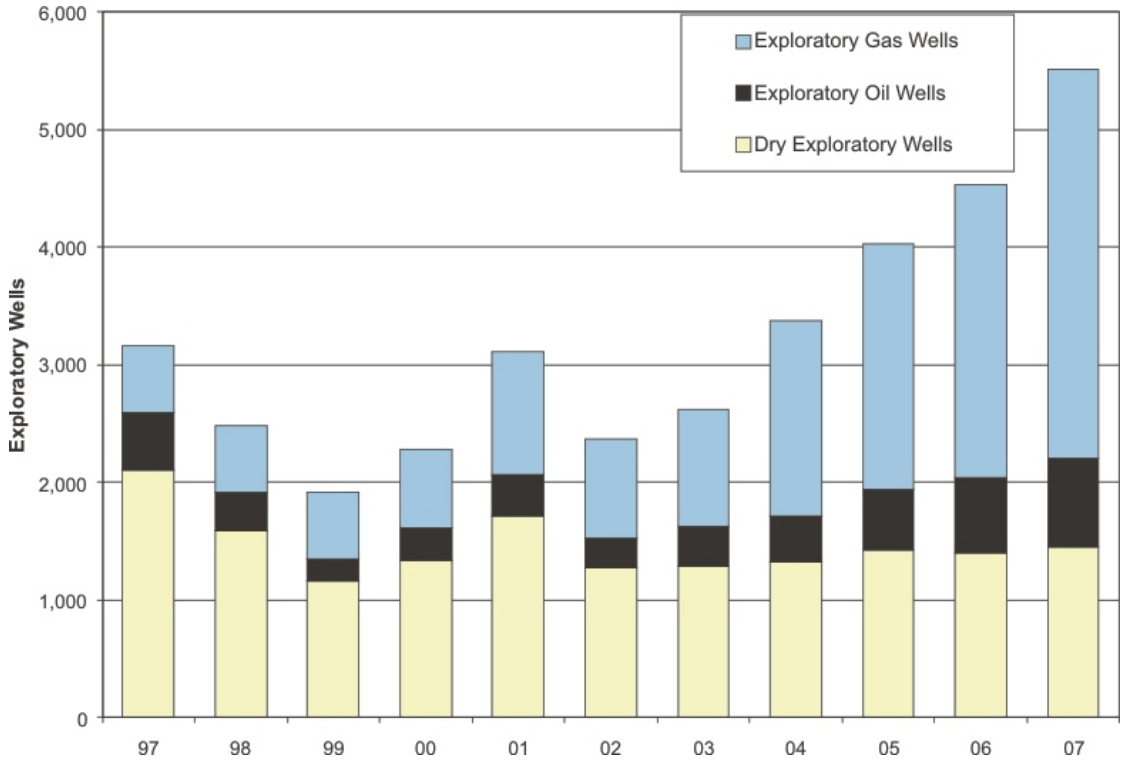
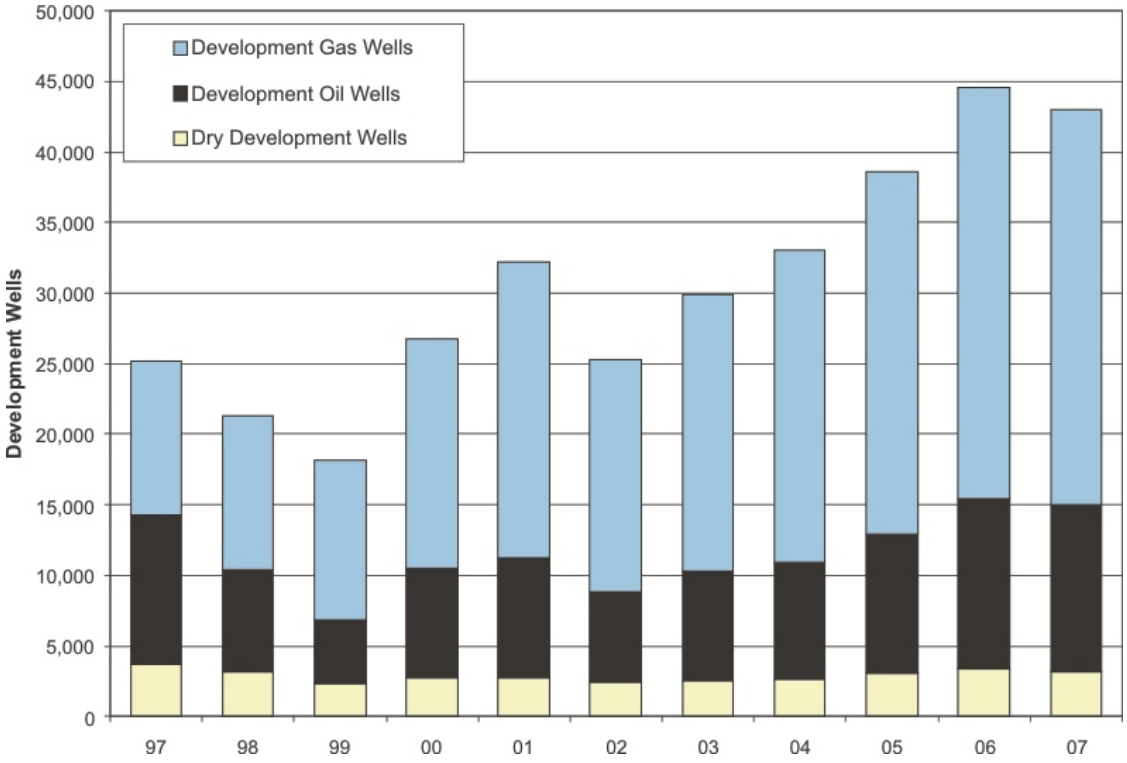


Figure 8. U.S. Development Well Completions, 1997-2007



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

Figure 9. U.S. Total Discoveries of Dry Natural Gas per Exploratory Gas Well Completion, 1977-2007

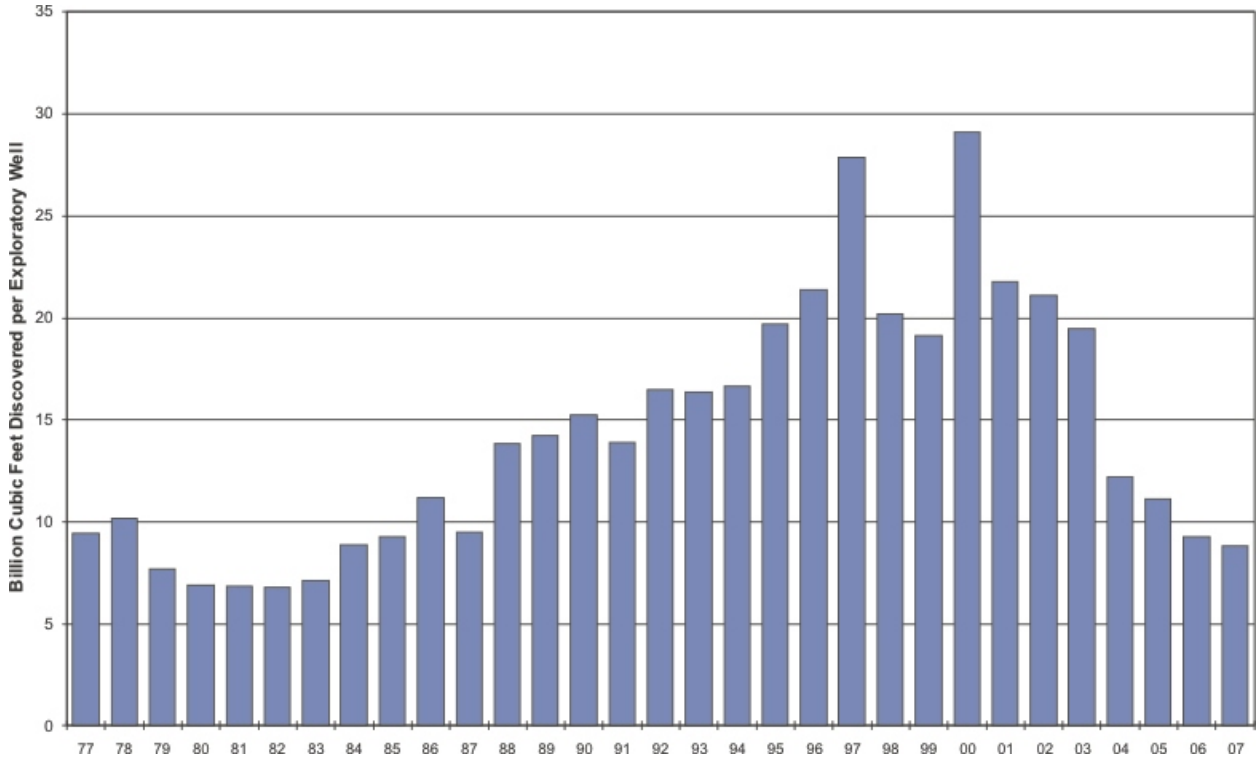
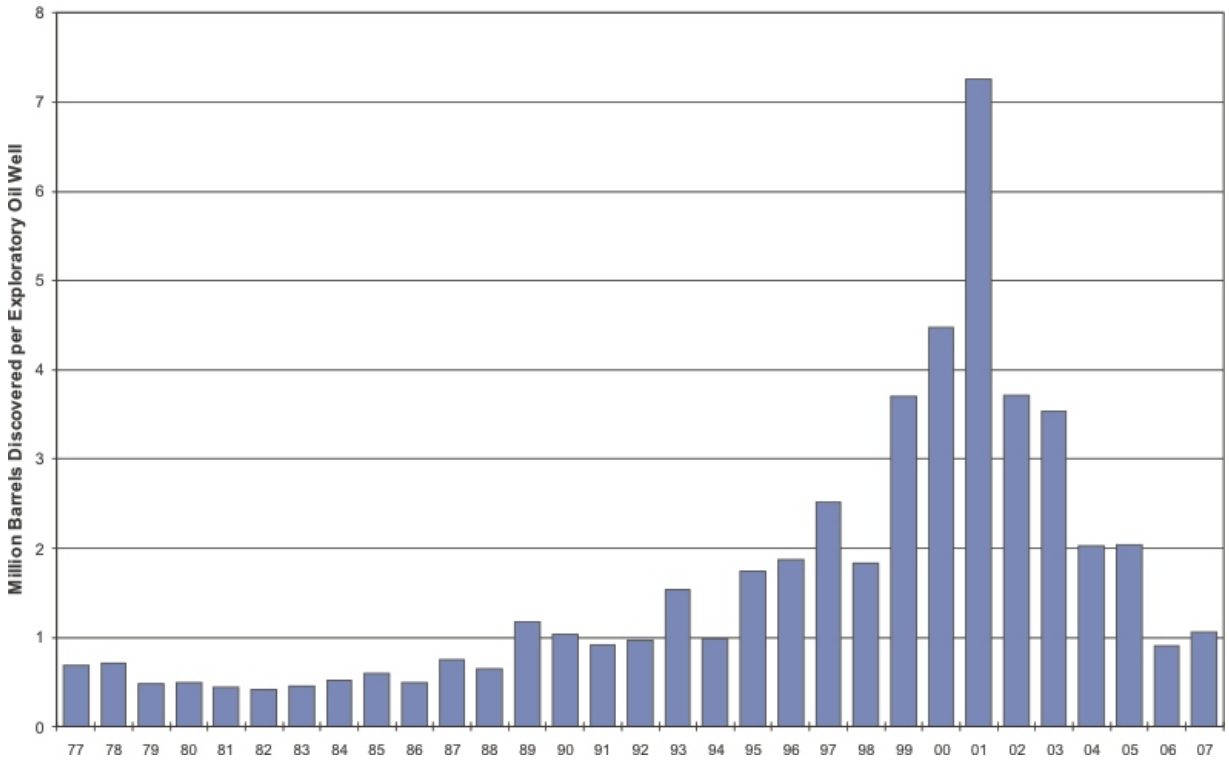


Figure 10. U.S. Total Discoveries of Crude Oil per Exploratory Oil Well Completion, 1977-2007



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

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

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

R/P ratios are a general 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 in 1970, the U.S. R/P ratio for crude oil increased because significant production from these reserves did not begin until 7 years later due to the need to build the Trans Alaska pipeline first. 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 reserves development and oil production reached high levels.

In 2007 the national average R/P ratio decreased from 12.7 to 12.6, although both crude oil proved reserves and production increased. **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 areas with relatively high R/P ratios in 2007 were the Permian Basin of Texas and New Mexico, and California, where enhanced oil recovery techniques such as carbon dioxide (CO_2) injection and steamflooding have improved the 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 are helping add new 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 yet well developed. The market for natural gas grew rapidly after World War II, lowering the R/P ratio. From 2006 to 2007, the U.S. average R/P ratio for natural gas increased from 11.4 to 12.2, since proved reserves increased more than production increased.

Different marketing, transportation, and production characteristics for gas are seen when looking at regional average R/P ratios as compared to the 2007 U.S. average R/P ratio of about 12.2-to-1. Areas with a higher range of R/P ratios than the national average were the Pacific offshore and the Rockies. 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

Proved Ultimate Recovery is the sum of proved reserves and cumulative production at a specified point in time. It measures the maximum recoverable volume *known* at that time and is a dynamic quantity that is expected to change over time for any field, group of fields, State, or country. In most instances, therefore, an estimate of Proved Ultimate Recovery does not represent the all-time maximum recoverable volume of resources for a given field or area. In fact, the proved ultimate recovery of a field, a group of fields, a State, a region, or a country grows (appreciates) over time in most instances.

Figures 13 and 14 show successive estimates of proved ultimate recovery for the United States. The figures show proved reserves and cumulative production over the period 1977 through 2007 for *crude oil plus lease condensate* and *wet natural gas.* 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 2007 was 77,346 million barrels. This substantially exceeds the 1977 proved reserves, but at the end of 2007 there were still 22,812 million barrels of *crude oil plus lease condensate* proved reserves. Therefore, the Nation's estimated proved ultimate recovery of crude oil primarily increased during this period owing to the *proved ultimate recovery appreciation* phenomenon that typically accompanies the continued development of old fields. In fact, only 11 percent of proved reserves additions of crude oil were booked as *new field discoveries* from 1976 through 2007. The other 89 percent 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 571 trillion cubic feet of gas was produced from 1977 through 2007; there are

Figure 11. Reserves-to-Production Ratios for Crude Oil, 1945-2007

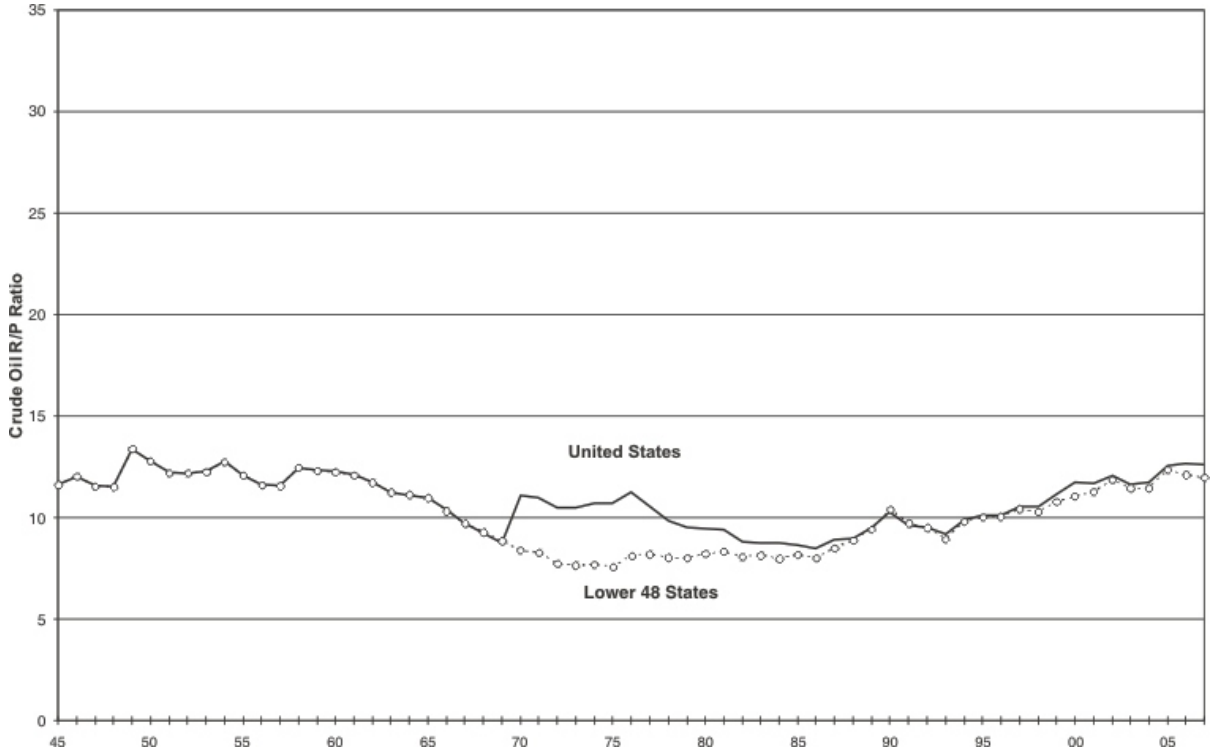
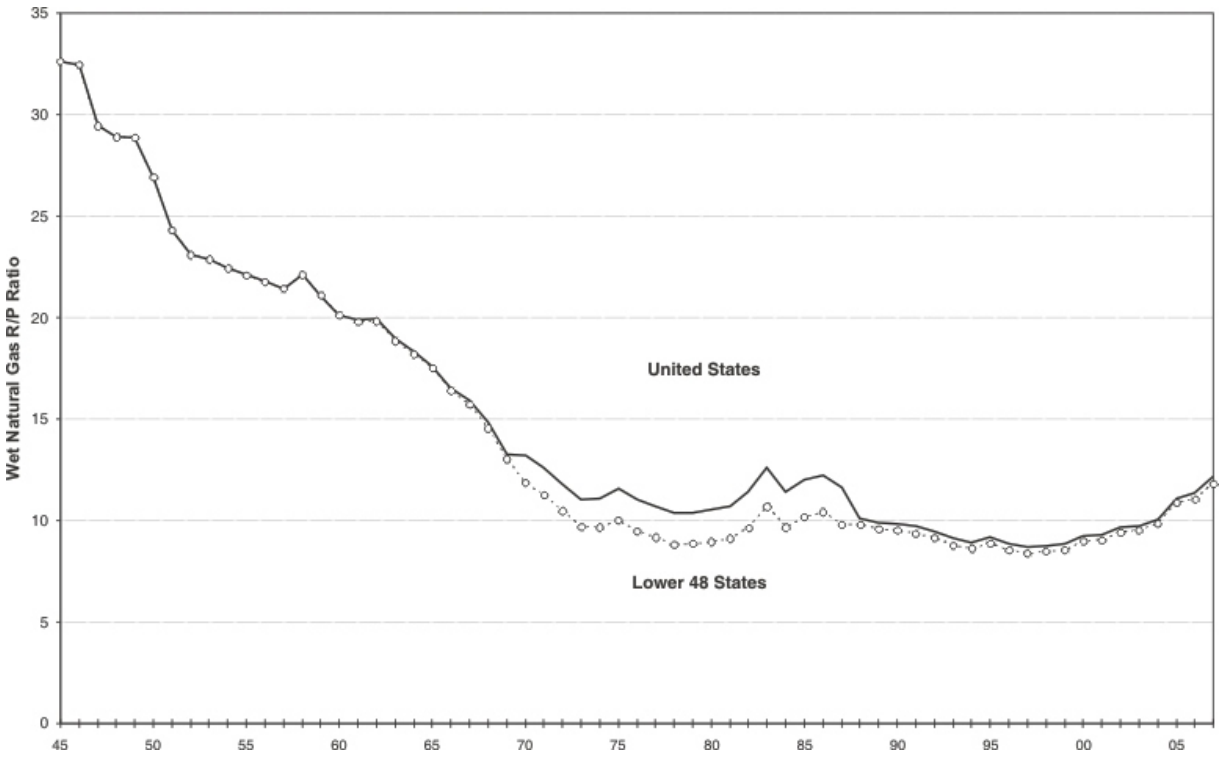


Figure 12. Reserves-to-Production Ratios for Wet Natural Gas, 1945-2007



Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {35} and Energy Information Administration, Office of Oil and Gas (1977–2006){1-30}. Cumulative production: *U.S. Oil and Gas Reserves by Year of Field Discovery* (1977-1988).{36}

Figure 13. Components of Proved Ultimate Recovery for Crude Oil and Lease Condensate, 1977-2007

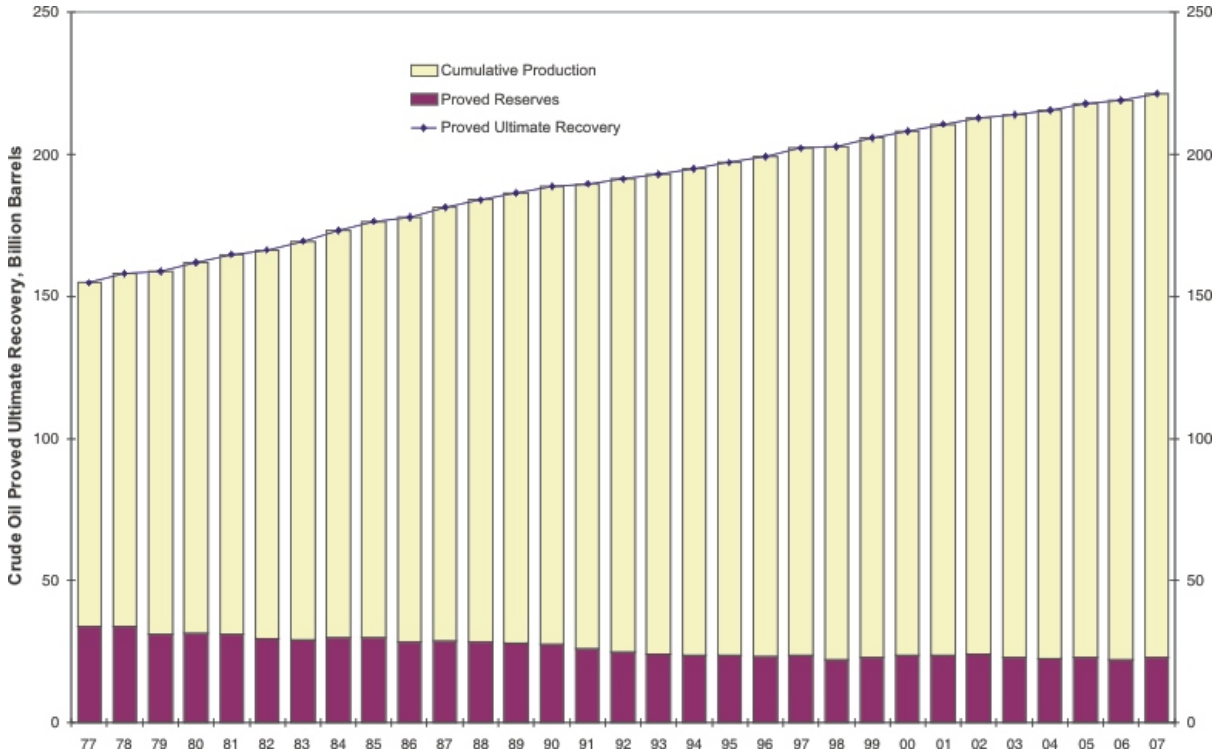
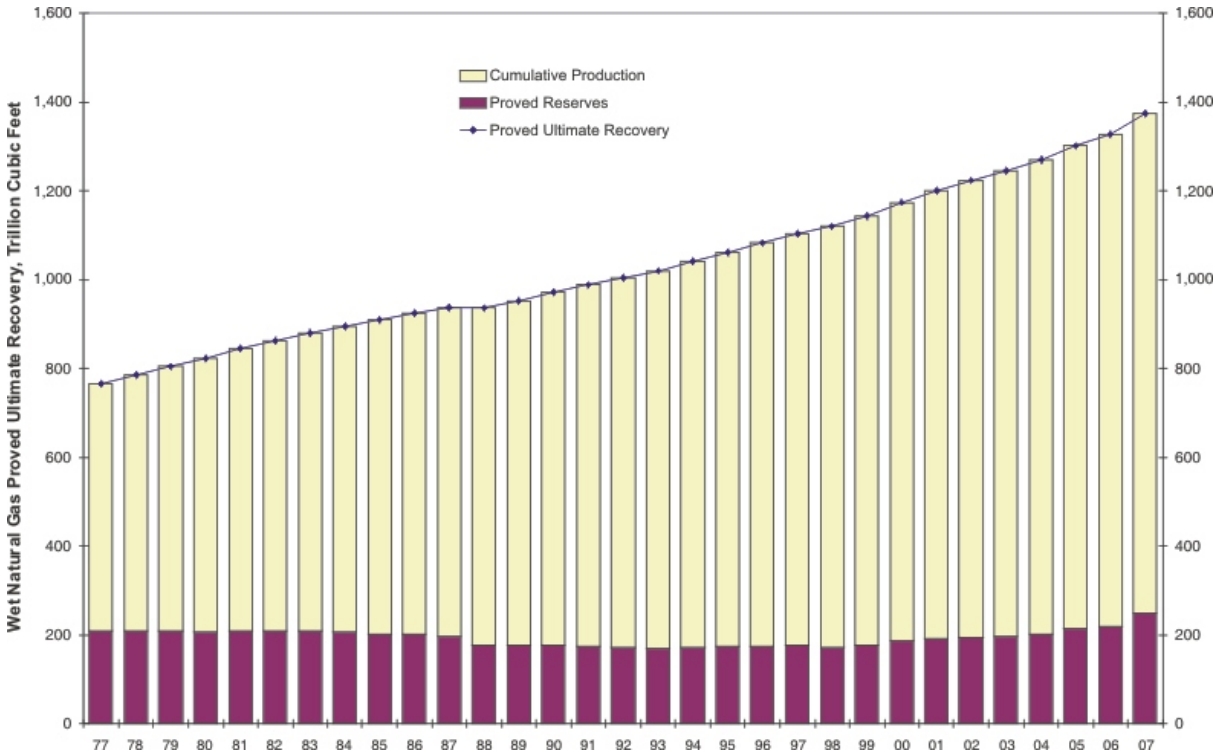


Figure 14. Components of Proved Ultimate Recovery for Wet Natural Gas, 1977-2007



Sources: Annual reserves and production - American Petroleum Institute and American Gas Association (1945–1976) {35} and Energy Information Administration, Office of Oil and Gas (1977–2006){1-30}. Cumulative production: *U.S. Oil and Gas Reserves by Year of Field Discovery* (1977-1988).{36}

Table 5. International Oil and Natural Gas Reserves as of December 31, 2007

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]266,751	[d]264,825	1	Russia	1,680,000	1,654,000
2	Iran[c]	138,400	137,000	2	Iran[c]	948,200	985,000
3	Iraq[c]	115,000	126,000	3	Qatar[c]	905,300	905,450
4	Canada[e]	178,592	25,157	4	Saudia Arabia[c]	[d]253,107	[d]254,000
5	Kuwait[c]	[d]104,000	[d]99,425	5	United States	211,085	217,500
6	Venezuela[c]	87,035	81,000	6	United Arab Emirates[c]	213,200	196,300
7	United Arab Emirates[c]	97,800	68,105	7	Nigeria[c]	183,990	184,500
8	Russia	60,000	76,000	8	Algeria[c]	159,000	160,000
9	Libya[c]	41,464	36,500	9	Venezuela[c]	166,260	152,000
10	Nigeria[c]	36,220	37,200	10	Iraq[c]	111,940	91,000
Top 10 Total		**1,125,262**	**951,212**	**Top 10 Total**		**4,832,082**	**4,799,750**
11	Kazakhstan	30,000	-	11	Kazakhstan	100,000	-
12	United States	20,972	21,000	12	Turkmenistan	100,000	-
13	Qatar[c]	15,207	20,000	13	Indonesia[c]	93,900	92,000
14	China	16,000	18,052	14	Australia	30,370	151,900
15	Brazil	12,182	12,539	15	Norway	79,130	81,683
16	Algeria[c]	12,200	11,900	16	China	80,000	61,800
17	Mexico	11,650	11,061	17	Malaysia	83,000	88,010
18	Angola[c]	9,035	9,500	18	Uzbekistan	65,000	-
19	Azerbaijan	7,000	-	19	Egypt	58,500	68,450
20	Norway	6,865	6,693	20	Kuwait[c]	[d]56,015	[d]66,300
21	Sudan	5,000	6,700	21	Canada	58,200	58,256
22	Oman	5,500	5,700	22	Libya[c]	50,100	52,800
23	India	5,625	4,042	23	Netherlands	50,000	48,800
24	Malaysia	4,000	5,458	24	Ukraine	39,000	-
25	Ecuador[c]	4,517	4,780	25	India	37,960	31,755
Top 25 Total		**1,291,015**	**1,088,637**	**Top 25 Total**		**5,819,531**	**5,601,504**
OPEC Total		**927,482**	**900,744**	**OPEC Total**		**3,151,742**	**3,145,380**
World Total		**1,331,698**	**1,183,891**	**World Total**		**6,185,693**	**6,255,963**

[a]Rank is based on an average of oil reserves reported by *Oil & Gas Journal* and *World Oil*.
[b]Rank is based on an average of natural gas reserves reported by *Oil & Gas Journal* and *World Oil*.
[c]Member of the Organization of Petroleum Exporting Countries (OPEC).
[d]Includes one-half of the reserves in the Neutral Zone.
[e]*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*, Vol. 105, No.48 (December 24, 2007). Gulf Publishing Company, *World Oil*, Vol.229, No. 9 (September, 2008).

still 247,789 billion cubic feet of *wet natural gas* proved reserves in 2007. Only 9 percent of proved reserves additions of natural gas were booked as *new field discoveries* from 1976 through 2007. The other 91 percent came from proved ultimate recovery appreciation.

International Perspective

International Reserves

The EIA estimates domestic oil and gas reserves but does not comprehensively 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 1.3 trillion barrels of oil and 6.2 quadrillion cubic feet of gas.

The United States ranked 12th in the world for proved reserves of crude oil and 5th for natural gas in 2007. 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 2007. 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 25 billion. The *Oil and Gas Journal* estimate includes a larger contribution of heavy oil from Canadian tar sands. Another reason (among many) for these differences is that condensate is often included in foreign oil reserve estimates.

The *Oil & Gas Journal* {37} estimate for world oil reserves increased 1 percent in 2007 owing to an increase in Saudi Arabian and Iranian reserves. The *World Oil* {38} estimate increased 3 percent in 2007 for the same reasons. For world gas reserves in 2007, the *Oil & Gas Journal* reported a slight (less than 0.5 percent) increase, while *World Oil* reported a 1-percent decrease.

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 more than five times the U.S. reserves.

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*.{39} In 2007:

- The U.S. consumed 101.6 quadrillion Btu of energy. This was an increase of 1.74 quadrillion Btu from the 2006 level of consumption. One quadrillion Btu is equivalent to the amount of energy in 45 million tons of coal, 170 million barrels of crude oil, or one trillion cubic feet of natural gas.
- 62 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 (23 percent).
- U.S. petroleum consumption was about 21 million barrels of oil and natural gas liquids and 63 billion cubic feet of gas per day.

Dependence on Imports

The United States remains dependent on imported oil and gas. In 2007, crude oil imports made up 66 percent of the U.S. crude oil supply. Canada, Mexico, Saudi Arabia, Venezuela, Nigeria, and Iraq were the primary foreign suppliers of petroleum to the United States.{40}

Net natural gas imports increased slightly from the 2006 total of 3.5 trillion cubic feet to 3.8 trillion cubic feet in 2007 (4.6 trillion imported; 0.8 trillion exported). Imports satisfied approximately 20 percent of consumption. Almost all of this gas was pipelined from Canada. Some liquefied natural gas was imported from Trinidad and Tobago, Egypt, Nigeria, and Algeria.

List of Appendices

Appendix A: Operator Level Data - How much of the national total of proved reserves are 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. Table A6 lists the top U.S. operators by reported 2007 production.

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 national inventory of more than 45,000 oil and gas fields are listed in Appendix B. These fields hold 66 percent of U.S. crude oil proved reserves and 60 percent of U.S. natural gas proved reserves.

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 national level. Readers interested in a historical look at one specific State or region can review these tables in an electronic data archive on the EIA website. Table D9 contains the production and proved reserves for 1997-2007 for the Gulf of Mexico Federal Offshore region by water depths greater than 200 meters, and less than 200 meters. Table D10 contains Nonproducing Reserves.

Appendix E: Summary of Data Collection Operations - This report is based on two annual EIA surveys. Proved reserves data is collected 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 the 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. Because a census 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 directly measurable. They 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 by EIA personnel who perform quality assurance checks for selected fields. 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 for Domestic Oil and Gas Reserves - Samples of Form EIA-23 and Form EIA-64A are presented in Appendix I.

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

3. Crude Oil Statistics

Proved Reserves

The United States had 21,317 million barrels of crude oil proved reserves as of December 31, 2007. This is 2 percent (345 million barrels) more than in 2006. The principal factors contributing to the increase were large positive net revisions and larger-than-average extensions to existing oil fields.

Alaska had the largest increase in year-end crude oil proved reserves, growing 7 percent over 2006 (284 million barrels), followed closely by Texas with an increase in year-end proved reserves of 5 percent (251 million barrels). Alaska's increase included 45 million barrels of new field discoveries. Due to rapid development of unconventional oil resources associated with the Bakken Formation, North Dakota had the third largest volumetric increase in crude oil proved reserves, up 17 percent from 2006 (70 million barrels).

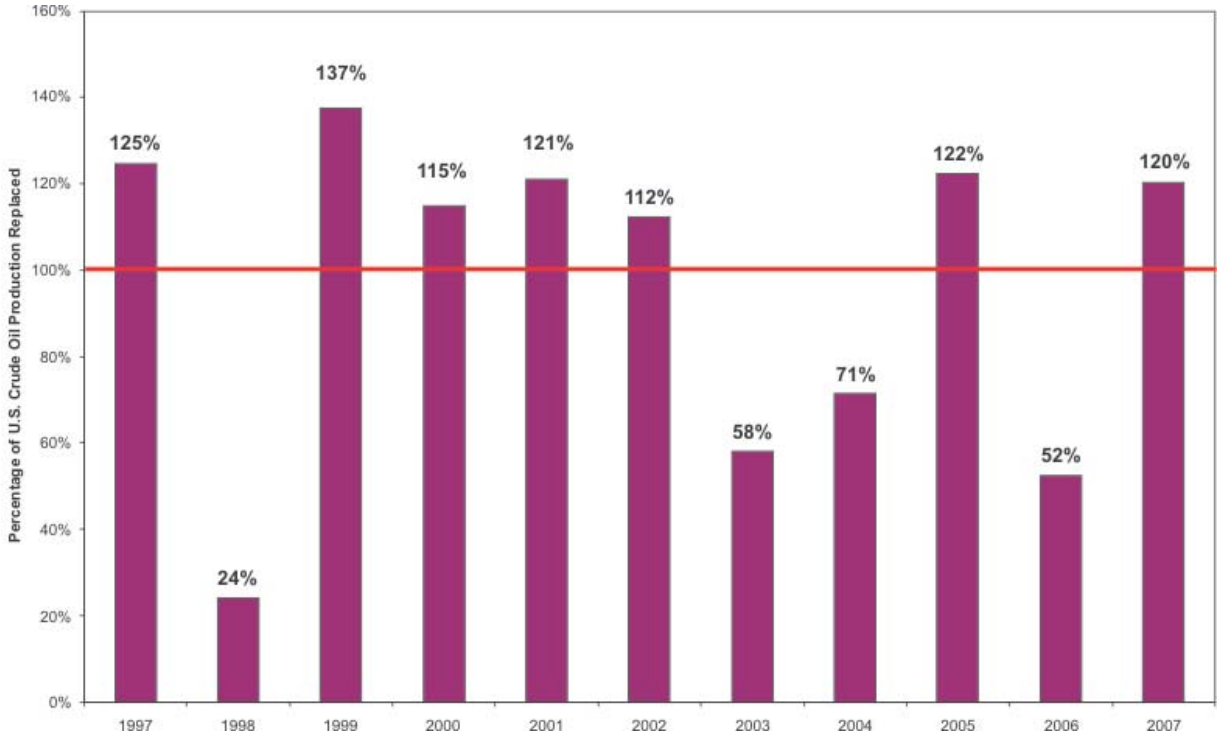
Reserves additions of crude oil in the U.S. replaced 120 percent of 2007 crude oil production (**Figure 15**).

Table 6 presents the U.S. proved reserves of crude oil as of December 31, 2007, by selected States and State subdivisions. **Figure 16** maps 2007 crude oil proved reserves by area.

The following four areas account for 76 percent of U.S. crude oil proved reserves:

Area	Percent of 2007 U.S. Oil Reserves
Texas	24
Alaska	20
Gulf of Mexico Federal Offshore	16
California	16
Area Subtotal	**76**

Figure 15. Replacement of U.S. Crude Oil Production by Reserves Additions, 1997-2007.



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

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Table 6. Crude Oil Proved Reserves, Reserves Changes, and Production, 2007

(million barrels of 42 U.S. gallons)

State and Subdivision	Published Proved Reserves 12/31/06	Changes in Reserves During 2007									Proved Reserves 12/31/07
		Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	
Alaska	3,879	0	487	34	9	16	40	45	0	261	4,163
Lower 48 States	**17,093**	**65**	**1,791**	**1,044**	**802**	**776**	**611**	**21**	**73**	**1,430**	**17,154**
Alabama	45	1	4	1	3	1	0	0	0	5	42
Arkansas	37	-2	4	2	0	0	0	0	0	6	31
California	3,389	-6	248	144	10	38	27	0	0	220	3,322
Coastal Region Onshore	375	3	44	19	5	9	1	0	0	15	393
Los Angeles Basin Onshore	364	-8	24	16	0	21	1	0	0	17	369
San Joaquin Basin Onshore	2,448	-2	160	104	2	8	16	0	0	173	2,351
State Offshore	202	1	20	5	3	0	9	0	0	15	209
Colorado	274	1	38	14	1	1	24	0	0	19	304
Florida	38	-1	21	0	37	14	0	0	0	3	32
Illinois	89	-4	10	0	2	0	16	0	0	8	101
Indiana	12	5	3	1	0	0	0	0	0	2	17
Kansas	263	-32	30	27	0	0	4	0	4	36	206
Kentucky	25	0	1	0	0	0	0	0	0	2	24
Louisiana	428	47	59	48	29	41	13	0	1	54	458
North	68	21	6	5	11	6	0	0	0	9	76
South Onshore	312	23	31	34	18	35	13	0	1	37	326
State Offshore	48	3	22	9	0	0	0	0	0	8	56
Michigan	63	2	2	6	5	3	1	0	0	5	55
Mississippi	186	9	24	9	1	6	6	0	1	22	200
Montana	419	5	37	35	43	38	24	0	0	35	410
Nebraska	14	-2	3	0	1	0	0	0	0	2	12
New Mexico	705	24	76	62	38	43	41	0	0	54	735
East	696	23	74	61	38	43	41	0	0	53	725
West	9	1	2	1	0	0	0	0	0	1	10
North Dakota	412	2	55	28	50	52	80	1	3	45	482
Ohio	49	2	10	11	0	0	2	0	0	4	48
Oklahoma	569	-52	142	50	80	28	25	0	1	53	530
Pennsylvania	20	-5	2	4	0	0	1	0	0	2	12
Texas	4,871	65	575	241	212	222	183	2	7	350	5,122
RRC District 1	76	3	15	2	1	1	2	0	0	10	84
RRC District 2 Onshore	65	1	5	2	2	2	0	0	0	7	62
RRC District 3 Onshore	180	8	25	27	15	46	8	0	1	26	200
RRC District 4 Onshore	30	4	6	4	6	2	1	0	1	4	30
RRC District 5	24	3	2	1	0	0	0	0	0	3	25
RRC District 6	157	0	33	7	15	3	2	0	1	14	160
RRC District 7B	89	3	15	1	6	2	0	0	0	9	93
RRC District 7C	288	16	21	16	25	33	29	0	1	21	326
RRC District 8	1,717	14	194	84	101	95	71	0	3	113	1,796
RRC District 8A	2,093	9	226	89	31	28	65	2	0	124	2,179
RRC District 9	96	13	20	1	0	0	0	0	0	13	115
RRC District 10	53	-8	12	6	10	10	5	0	0	6	50
State Offshore	3	-1	1	1	0	0	0	0	0	0	2
Utah	334	-8	25	3	0	1	23	0	0	17	355
West Virginia	23	0	7	0	0	0	0	0	0	2	28
Wyoming	706	10	36	34	72	69	18	0	0	43	690
Federal Offshore	4,096	3	372	324	218	219	122	18	56	439	3,905
Pacific (California)	441	2	14	8	3	20	0	0	0	25	441
Gulf of Mexico (Louisiana)	3,500	1	335	298	212	195	111	4	56	372	3,320
Gulf of Mexico (Texas)	155	0	23	18	3	4	11	14	0	42	144
Miscellaneous[a]	26	1	7	0	0	0	1	0	0	2	33
U.S. Total	**20,972**	**65**	**2,278**	**1,078**	**811**	**792**	**651**	**66**	**73**	**1,691**	**21,317**

[a]Includes Arizona, Missouri, Nevada, New York, South Dakota, Tennessee, and Virginia.

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for crude oil for 2007 contained in the *Petroleum Supply Annual 2007*, DOE/EIA-0340(07).

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

Figure 16. Crude Oil Proved Reserves by Area, 2007

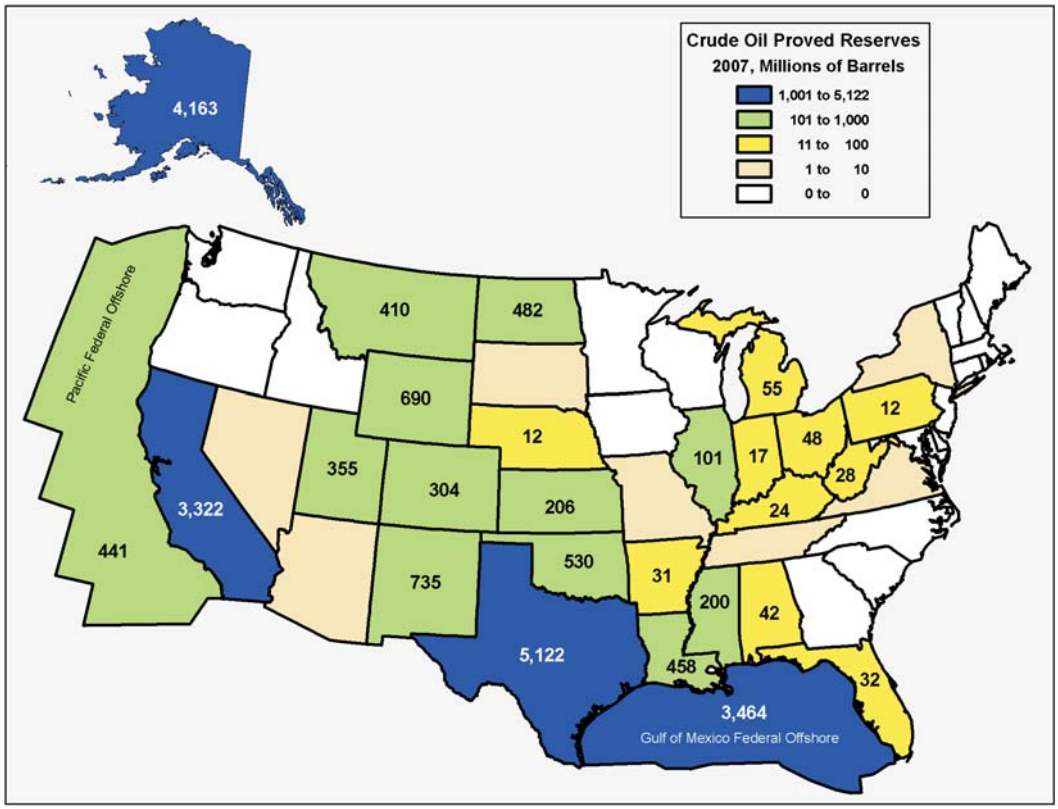
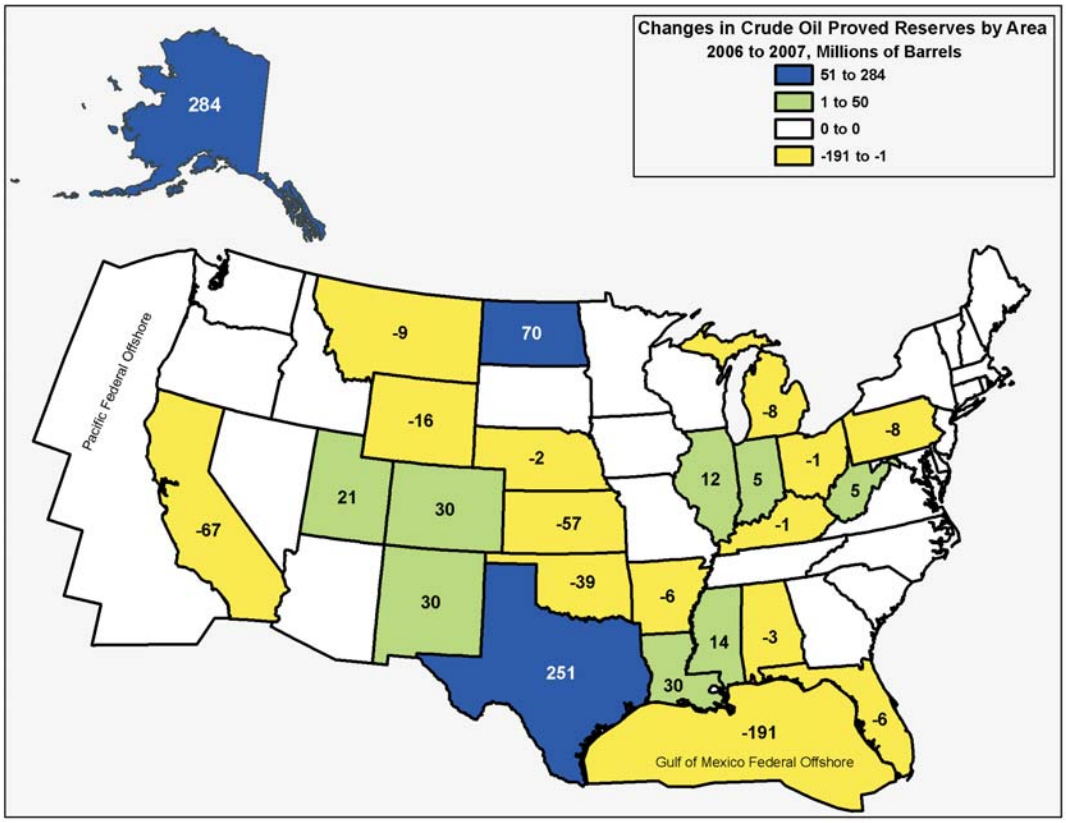


Figure 17. Changes in Crude Oil Proved Reserves by Area, 2006 to 2007



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

Discussion of Reserves Changes

The following graphic portrays the beginning- and end-of-year crude oil proved reserves, and the components of crude oil proved reserves change during 2007, at the same volumetric scale. Note that the scale starts at 20 billion barrels rather than at zero.

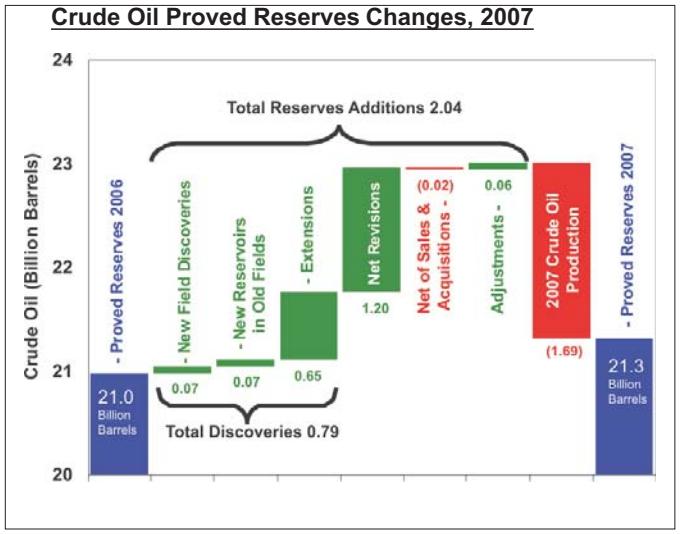


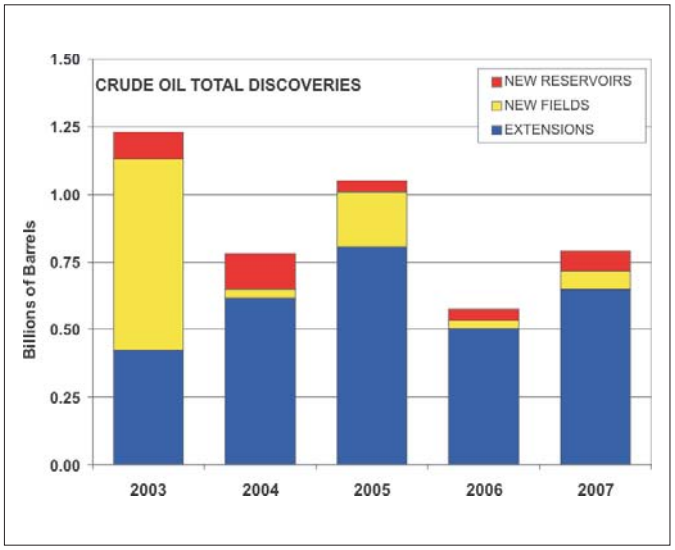
Figure 17 maps the change in crude oil proved reserves from 2006 to 2007 by area. The table below shows how the top four areas fared compared to the total United States:

Area	Change in 2007 U.S. Oil Reserves (million barrels)
Alaska	+284
Texas	+251
Gulf of Mexico Federal Offshore	-191
California	-67
Area Subtotal	**+277**
U.S. Total	**+345**

Figure 2 in Chapter 2 shows the components of the changes in crude oil proved reserves for 2007 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 (see graph below). They result from the drilling of exploratory wells.



Total discoveries of crude oil were 790 million barrels in 2007, 37 percent more than those of 2006 (577 million barrels), but 28 percent less than the prior 10-year average (1,100 million barrels).

Only five areas had total discoveries of 35 million barrels or more in 2007:

Area	Percent of 2007 U.S. Oil Total Discoveries
Federal Offshore Gulf of Mexico	25
Texas	24
Alaska	11
North Dakota	11
New Mexico	5
Area Subtotal	**76**

Extensions

Operators reported 651 million barrels of extensions in 2007, 29 percent more than in 2006. The highest volume of extensions was reported in Texas (183 million barrels). The second highest volume of 2007 extensions was 122 million barrels in the Gulf of Mexico Federal Offshore, followed by 80 million barrels in North Dakota.

In the prior 10 years, U.S. operators reported an average of 554 million barrels of extensions per year. The 2007 extensions were 18 percent above that average.

New Field Discoveries

New field discoveries accounted for 66 million barrels of crude oil reserves additions. This was more than twice the new field discoveries of 2006 (30 million

barrels). Sixty-eight percent of 2007 new field discoveries (45 of 66 million barrels) were in Alaska.

In the prior 10 years, U.S. operators reported an annual average of 407 million barrels of reserves additions from new field discoveries. Reserves from new field discoveries in 2007 were 16 percent of that average.

New Reservoir Discoveries in Old Fields

Operators reported 73 million barrels of crude oil reserves additions from new reservoir discoveries in old fields in 2007. This is 70 percent more than in 2006. The majority of the new reservoir discoveries in old fields (56 of 73 million barrels) came from the Gulf of Mexico Federal Offshore.

In the prior 10 years, U.S. operators reported an annual average of 140 million barrels of reserves from new reservoir discoveries in old fields. Reserves from new reservoir discoveries in old fields in 2007 were 52 percent of that average.

Revisions and Adjustments

Operators report thousands of positive and negative revisions to proved reserves each year as development 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. They result instead from the survey and statistical estimation methods employed.

There were 2,278 million barrels of revision increases, 1,078 million barrels of revision decreases, and 65 million barrels of adjustments in 2007. Combined, there were 1,265 million barrels of net revisions and adjustments for crude oil in 2007.

In the prior 10 years, net revisions and adjustments added an annual average of 677 million barrels. The 2007 net revisions and adjustments were almost twice that average.

Sales and Acquisitions

In the context of this report, *Sales* represents the volume of crude oil proved reserves deducted from an operator's total reserves by sale or transfer of operations of existing oil fields or properties to another operator, instead of a volume of production "sold" at the wellhead. Similarly, *Acquisitions* is that volume of proved reserves added to an operator's total reserves through purchase or operations transfer of an existing oil field or properties.

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

In 2007, there were 811 million barrels of sales transactions between operators and 792 million barrels of acquisitions transactions yielding a net difference of -19 million barrels.

Production

U.S. production of crude oil in 2007 was an estimated 1,691 million barrels. This volume, which does not include lease condensate, was 2 percent higher than 2006's production of 1,652 million barrels.

The Gulf of Mexico Federal Offshore remained the largest oil producing area in the United States in 2007 with 24 percent of the national total (414 million barrels of production). Texas and Alaska were second and third, with 21 and 15 percent of the national production total, respectively. California was fourth with 13 percent.

Alaskan oil production increased the most in 2007, owing in part to repair work done in 2006 to the Prudhoe Bay Field's oil pipeline gathering system. Its production rose 19 million barrels, an 8-percent increase. The Gulf of Mexico Federal Offshore had the second largest production increase in 2007 (8 million barrels, a 2-percent increase).

North Dakota had the third largest annual oil production increase of any State (7 million barrels, an 18-percent increase) owing to continued development of the unconventional Bakken Formation.

The 2007 Form EIA-23 national production estimates (1,691 million barrels of crude oil and 181 million barrels of lease condensate) are 1 percent higher than the comparable *Petroleum Supply Annual* (*PSA*) *2007* volumes for crude oil and lease condensate production combined (1,848 million barrels).

Areas of Note: Large Discoveries and Reserves Additions

The following State and area discussions summarize notable activities during 2007 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 2007.

Alaska

Alaska reported the largest increase (284 million barrels) of proved oil reserves in 2007. The majority of these reserves additions were reported as revision increases. Alaska also had the largest volume of new field discoveries in the Nation in 2007.

- **Nikaitchuq Field**: One example of new development in Alaska is the Nikaitchuq Field. The operator, Eni Energy, reported that it planned to drill approximately 80 wells, 32 from onshore locations and the remaining 48 from an artificial offshore island. The wells will then be tied back to a production facility located at Oliktok Point and may produce as much as 40,000 barrels per day. {41} (ENI Press Release, April 11, 2007)

Texas

Texas reported a net increase of 251 million barrels of crude oil proved reserves in 2007. As in Alaska, the majority of the proved reserves additions in Texas came from revisions. But 30 percent of total Texas reserves additions (183 million barrels out of 601 million barrels) were extensions. This was the largest volume of extensions in the Nation and primarily occurred in west Texas.

- **Seminole Field**: In May, Amerada Hess, operator of the Seminole San Andres Unit (SSAU), announced plans for an approximate $300 million investment to expand its CO_2 enhanced oil recovery project in this large, mature field. A difficult-to-produce resource, termed a Residual Oil Zone (ROZ), lies directly underneath the field's main pay zone and contains nearly one billion barrels of estimated technically recoverable resources. However, the chemistry of the oil within the ROZ prevents it from moving without additional treatment. Amerada Hess planned to deepen 47 production wells into the ROZ, and then convert 29 wells from production to carbon dioxide injection; the injected carbon dioxide would then mobilize the otherwise trapped oil and increase recovery. Amerada Hess has successfully operated one pilot program in the ROZ since 1994 and a second pilot program since 2004, resulting in this expansion. (Excerpted from Seminole Sentinel, May 20, 2007)

North Dakota

North Dakota reported the Nation's third largest net increase in proved crude oil reserves in 2007 -- 70 million barrels (17 percent over its 2006 total). These increases come largely from the unconventional Bakken Formation, a deep, predominantly shale formation which produces light, sweet crude oil when fractured. North Dakota's production increased from 38 million barrels in 2006 to 45 million barrels in 2007.

- **Bakken Formation (Parshall Field):** EOG Resources, Inc. reported successful drilling in the unconventional Bakken Formation in North Dakota where it had accumulated approximately 320,000 net acres. During 2007, EOG increased its estimated reserves in the Bakken from 60 to approximately 80 million barrels of oil, net. {42} (EOG Letter to Stockholders, Annual Report 2007)

Other Gain Areas

Colorado, Louisiana, and New Mexico: Colorado, Louisiana, and New Mexico all reported a net increase of 30 million barrels of crude oil proved reserves in 2007.

Areas of Note: Large Declines in Reserves

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

Gulf of Mexico Federal Offshore

The Gulf of Mexico Federal Offshore crude oil proved reserves declined 5 percent (191 million barrels) in 2007. However, crude oil production increased 2

percent from 405 million barrels in 2006 to 414 million barrels in 2007.

California

California crude oil proved reserves declined 2 percent (67 million barrels) in 2007. Production exceeded reserves additions despite 27 million barrels of extensions, positive net revisions, and net acquisitions of crude oil proved reserves. California's estimated 2007 production of 220 million barrels decreased 1 percent from the 2006 level (222 million barrels).

Kansas

There was a 22 percent decline (57 million barrels) in Kansas' crude oil proved reserves in 2007. However, Kansas crude oil production increased 3 percent from its 2006 level.

Other Decline Areas

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

Oklahoma: Proved oil reserves decreased by 7 percent (39 million barrels).

Wyoming: Proved oil reserves decreased by 2 percent (16 million barrels).

Reserves in Nonproducing Status

Not all proved reserves of crude oil reported in 2007 were producing. Operators reported 5,455 million barrels of proved reserves in nonproducing status in 2007, 5 percent more than in 2006 (5,174 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, 2007[a]

(million barrels of 42 U.S. gallons)

State and Subdivision	Nonproducing Crude Oil Reserves
Alaska	400
Lower 48 States	**5,055**
Alabama	0
Arkansas	0
California	335
Coastal Region Onshore	42
Los Angeles Basin Onshore	98
San Joaquin Basin Onshore	168
State Offshore	27
Colorado	122
Florida	12
Kansas	9
Kentucky	0
Louisiana	193
North	11
South Onshore	164
State Offshore	18
Michigan	2
Mississippi	35
Montana	90
New Mexico	147
East	147
West	0
New York	0
North Dakota	107
Ohio	8
Oklahoma	118
Pennsylvania	0
Texas	1,186
RRC District 1	27
RRC District 2 Onshore	16
RRC District 3 Onshore	22
RRC District 4 Onshore	2
RRC District 5	1
RRC District 6	18
RRC District 7B	1
RRC District 7C	137
RRC District 8	454
RRC District 8A	484
RRC District 9	12
RRC District 10	12
State Offshore	0
Utah	174
Virginia	0
West Virginia	0
Wyoming	208
Federal Offshore	2,304
Pacific (California)	20
Gulf of Mexico (Louisiana)[c]	2,231
Gulf of Mexico (Texas)	53
Miscellaneous[b]	5
U.S. Total	**5,455**

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

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

[c] Includes Federal Offshore Alabama.

Source: Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves,” 2007.

4. Natural Gas Statistics

Dry Natural Gas

Proved Reserves

The U.S. had record-high additions to dry natural gas proved reserves in 2007, totaling 46.1 trillion cubic feet (Tcf). This was more than twice the 19.5 Tcf of dry natural gas produced in the United States during the year. Year-end 2007 total proved reserves of dry natural gas in the United States rose 13 percent above the 2006 level to 237.7 Tcf, the highest year-end volume in the 31 years EIA has published annual reserves estimates.

The reserves additions record mostly reflects rapid development of unconventional gas resources such as coalbed methane and those resources that require advanced technologies like horizontal drilling with hydraulic fracturing, including shales and low permeability (tight) formations. Total U.S. dry natural gas reserves additions replaced 237 percent of 2007 dry gas production **(Figure 18)**.

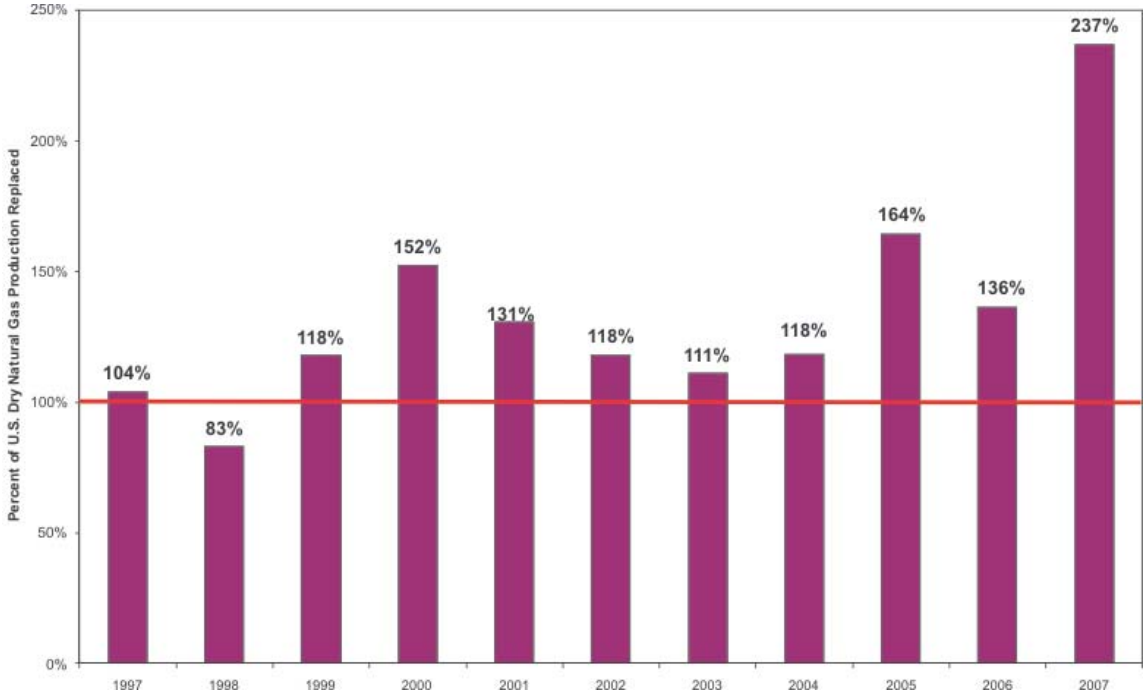
The proved reserves of dry natural gas by State are listed in **Table 8** and shown on the map in **Figure 19**.

Eight areas accounted for 81 percent of the Nation's dry natural gas proved reserves:

Area	Percent of 2007 U.S. Dry Gas Reserves
Texas	30
Wyoming	12
Colorado	9
Oklahoma	8
New Mexico	7
Gulf of Mexico Federal Offshore	6
Alaska	5
Louisiana	4
Area Subtotal	**81**

Total U.S. natural gas production increased in 2007 mostly due to production increases in Texas (particularly from the Barnett Shale), Colorado, Wyoming, and Oklahoma.

Figure 18. Replacement of U.S. Dry Natural Gas Production by Reserves Additions, 1997-2007



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

Table 8. Dry Natural Gas Proved Reserves, Reserves Changes, and Production, 2007

(billion cubic feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/06	Changes in Reserves During 2007									Proved Reserves 12/31/07
		Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	
Alaska	10,245	1	2,147	112	10	6	28	0	0	388	11,917
Lower 48 States	**200,840**	**1,146**	**30,027**	**16,601**	**14,730**	**15,142**	**27,079**	**796**	**1,188**	**19,078**	**225,809**
Alabama	3,911	12	163	35	302	379	123	0	17	274	3,994
Arkansas	2,269	-27	321	146	298	280	1,148	0	27	269	3,305
California	2,794	33	355	273	164	231	16	0	1	253	2,740
Coastal Region Onshore	206	3	32	26	4	6	0	0	0	12	205
Los Angeles Basin Onshore	153	0	15	16	0	0	0	0	0	8	144
San Joaquin Basin Onshore	2,345	31	296	217	158	225	13	0	1	227	2,309
State Offshore	90	-1	12	14	2	0	3	0	0	6	82
Colorado	17,149	136	3,924	582	750	450	2,812	15	23	1,326	21,851
Florida	45	4	110	0	47	0	0	0	0	4	108
Kansas	3,931	79	407	221	65	63	149	0	0	361	3,982
Kentucky	2,227	37	62	152	4	6	373	0	0	80	2,469
Louisiana	10,474	192	1,011	1,104	2,303	1,651	1,247	0	134	1,257	10,045
North	6,715	70	433	424	2,065	1,242	925	0	1	553	6,344
South Onshore	3,335	110	492	587	175	358	304	0	104	618	3,323
State Offshore	424	12	86	93	63	51	18	0	29	86	378
Michigan	3,065	-45	780	210	1,043	1,238	29	0	0	184	3,630
Mississippi	813	37	53	50	24	78	146	0	1	100	954
Montana	1,057	9	92	74	41	39	81	0	1	112	1,052
New Mexico	17,934	136	2,534	2,431	570	376	585	20	10	1,349	17,245
East	3,914	82	488	413	289	218	426	20	10	462	3,994
West	14,020	54	2,046	2,018	281	158	159	0	0	887	13,251
New York	363	33	46	45	3	0	19	7	0	44	376
North Dakota	479	12	69	62	39	43	59	0	3	53	511
Ohio	975	138	144	198	0	0	39	0	0	71	1,027
Oklahoma	17,464	13	2,115	1,366	1,545	1,567	2,380	6	56	1,659	19,031
Pennsylvania	3,050	181	326	418	4	41	358	7	3	183	3,361
Texas	61,836	227	9,325	4,818	5,790	6,244	10,717	78	535	6,263	72,091
RRC District 1	1,063	-18	71	110	180	238	68	0	0	92	1,040
RRC District 2 Onshore	2,060	-167	282	218	267	309	541	1	15	301	2,255
RRC District 3 Onshore	3,050	56	470	518	606	577	277	42	68	512	2,904
RRC District 4 Onshore	8,116	53	973	840	1,813	1,386	1,020	31	209	1,172	7,963
RRC District 5	12,593	97	3,223	952	23	151	3,243	0	3	1,130	17,205
RRC District 6	9,087	107	1,780	827	221	387	1,740	0	100	896	11,257
RRC District 7B	1,471	-38	154	74	41	78	706	0	0	139	2,117
RRC District 7C	5,126	-65	351	185	1,783	1,891	349	0	3	346	5,341
RRC District 8	6,070	111	690	558	320	321	664	0	120	538	6,560
RRC District 8A	1,290	15	249	80	5	6	58	1	0	103	1,431
RRC District 9	6,218	162	536	118	45	6	1,219	0	17	519	7,476
RRC District 10	5,387	-61	532	315	486	894	809	3	0	482	6,281
State Offshore	305	-25	14	23	0	0	23	0	0	33	261
Utah	5,146	17	1,113	325	484	541	744	4	0	365	6,391
Virginia	2,302	-25	108	36	0	27	262	0	0	109	2,529
West Virginia	4,509	14	310	359	2	25	412	11	1	192	4,729
Wyoming	23,549	-6	4,832	1,818	337	647	4,666	2	0	1,825	29,710
Federal Offshore[a]	15,360	-62	1,815	1,864	897	1,185	657	608	368	2,731	14,439
Pacific (California)	811	-7	49	10	1	3	0	0	0	40	805
Gulf of Mexico (Louisiana)[a]	11,824	-16	1,430	1,429	803	991	525	304	330	2,066	11,090
Gulf of Mexico (Texas)	2,725	-39	336	425	93	191	132	304	38	625	2,544
Miscellaneous[b]	138	1	12	14	18	31	57	38	8	14	239
U.S. Total	**211,085**	**1,147**	**32,174**	**16,713**	**14,740**	**15,148**	**27,107**	**796**	**1,188**	**19,466**	**237,726**

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

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." They may differ from the official Energy Information Administration production data for natural gas for 2007 contained in the *Natural Gas Annual 2007*, DOE/EIA-0131(07).

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

Figure 19. Dry Natural Gas Proved Reserves by Area, 2007

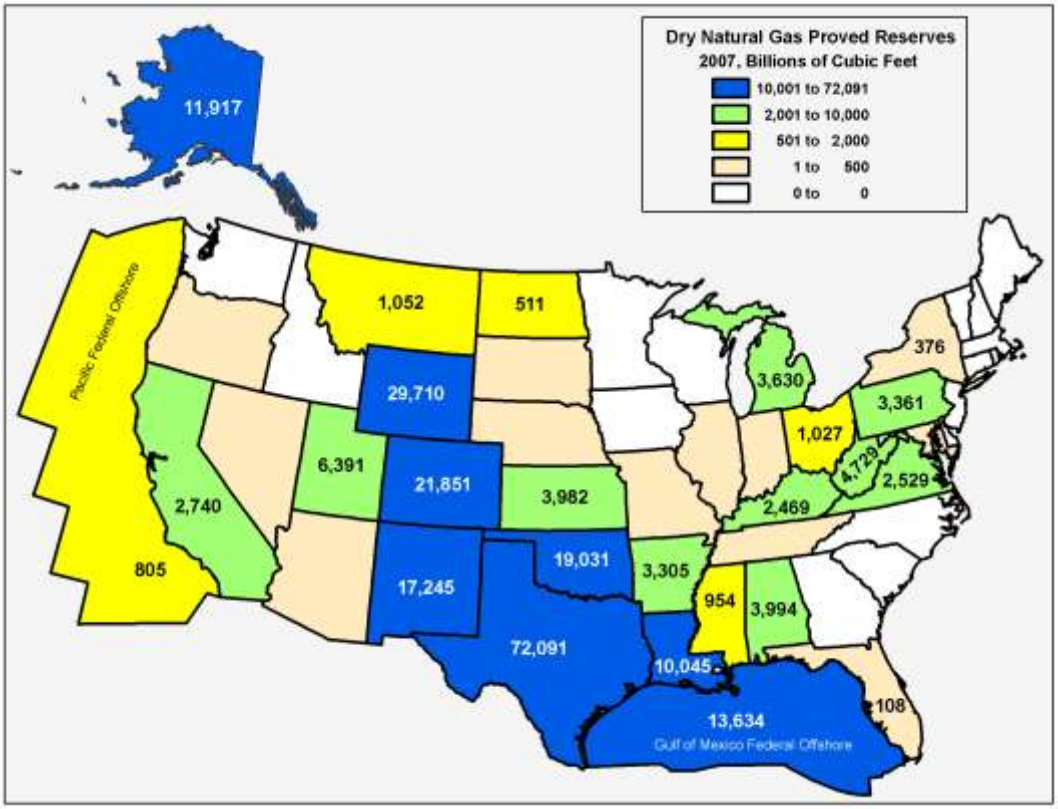
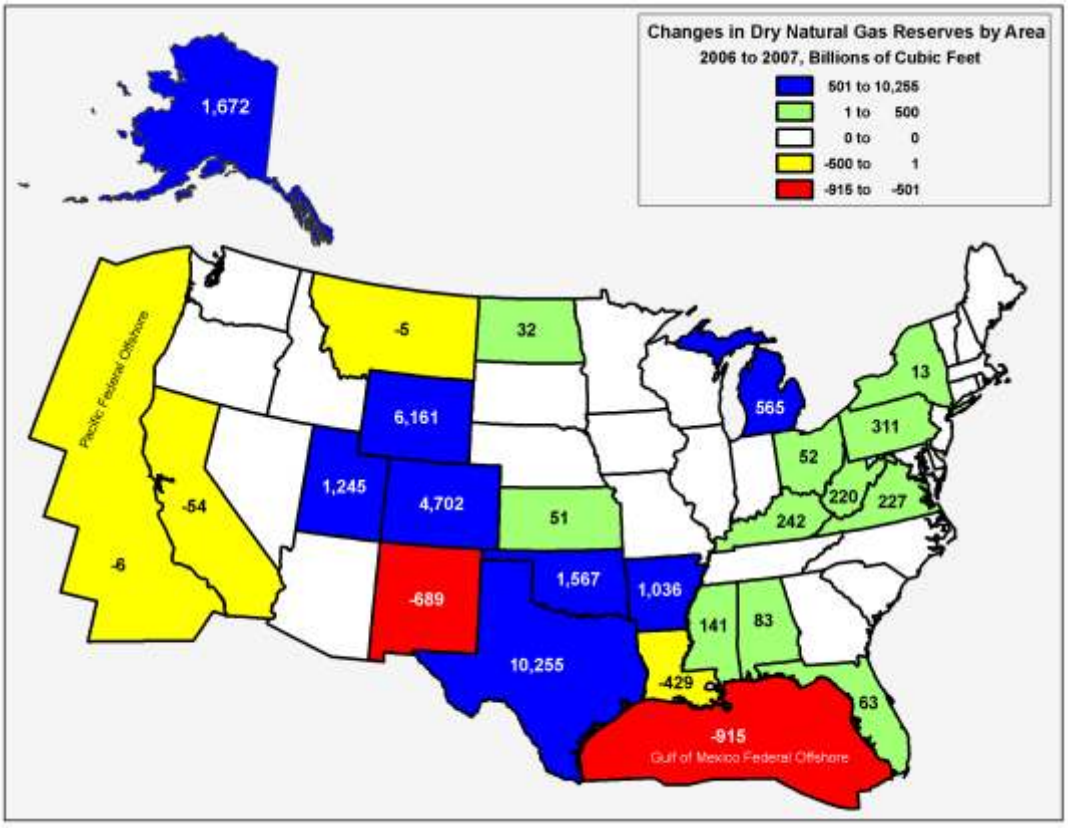


Figure 20. Changes in Dry Natural Gas Proved Reserves by Area, 2006 to 2007



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

Texas had the largest increase in production in 2007 (12 percent, 655 billion cubic feet), while New Mexico declined the most (5 percent, 77 billion cubic feet).

Discussion of Reserves Changes

The following graphic portrays the beginning- and end-of-year dry natural gas proved reserves, and the components of natural gas proved reserves change during 2007, at the same volumetric scale. Note that the scale starts at 200 billion cubic feet rather than at zero.

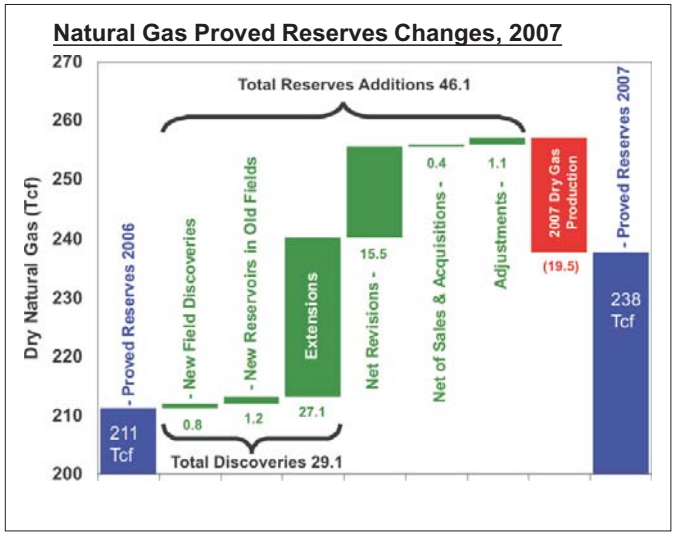


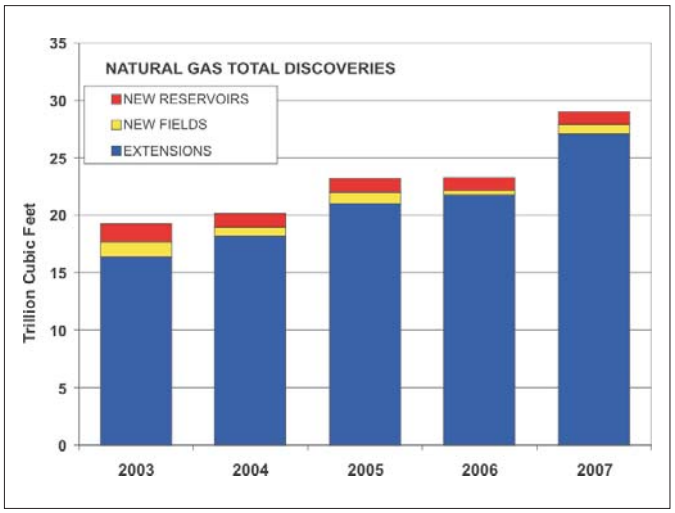
Figure 20 maps the change in dry gas proved reserves from 2006 to 2007 by area. The table below shows how the top eight areas fared, compared to the total United States:

Area	Change in U.S. Gas Reserves (billion cubic feet)
Texas	+10,255
Wyoming	+6,161
Colorado	+4,702
Alaska	+1,672
Oklahoma	+1,567
Gulf of Mexico Federal Offshore	-915
New Mexico	-689
Louisiana	-429
Area Subtotal	**+22,324**
U.S. Total	**+26,641**

Figure 4 in Chapter 2 shows the components of change in dry natural gas proved reserves for 2007 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. The following graphic shows total discoveries by component for 2003-2007.



Total discoveries of dry natural gas reserves were 29,091 billion cubic feet in 2007, a 25 percent increase from the level reported in 2006. Seven areas reported total discoveries of dry natural gas exceeding 1 trillion cubic feet in 2007:

Area	2007 Total Discoveries (Billion cubic feet)
Texas	11,330
Wyoming	4,668
Colorado	2,850
Oklahoma	2,442
Gulf of Mexico Federal Offshore	1,633
Louisiana	1,381
Arkansas	1,175
Area Subtotal	**25,479**
U.S. Total	**29,091**

Extensions

The largest component of total discoveries in 2007 was extensions of existing gas fields. Extensions were 27,107 billion cubic feet, 24 percent more than 2006 and 82 percent more than the prior 10-year average (14,924 billion cubic feet).

Areas with the largest extensions and their percentage of total extensions were:

Area	Percent of 2007 Extensions
Texas	40
Wyoming	17
Colorado	10
Oklahoma	9
Louisiana	5
Arkansas	4
Area Subotal	**85**

New Field Discoveries

New field discoveries were 796 billion cubic feet in 2007, 95 percent more than in 2006 (409 billion cubic feet). The areas with the largest new field discoveries were the Gulf of Mexico Federal Offshore (608 billion cubic feet, 76 percent of the total), and Texas (78 billion cubic feet, 10 percent of the total).

In the prior 10 years, U.S. operators had reported an annual average of 1,555 billion cubic feet of reserves from new field discoveries. Reserves from new field discoveries in 2007 were 51 percent of that average.

New Reservoir Discoveries in Old Fields

New reservoir discoveries in old fields were 1,188 billion cubic feet, 3 percent more than 2006 (1,155 billion cubic feet). The areas with the largest new reservoir discoveries in old fields and their percentage of the total were: Texas (535 billion cubic feet, 45 percent), Gulf of Mexico Federal Offshore (368 billion cubic feet, 31 percent), Louisiana (134 billion cubic feet, 11 percent), and Oklahoma (56 billion cubic feet, 5 percent).

In the prior 10 years, U.S. operators had reported an annual average of 1,878 billion cubic feet of reserves from new reservoirs discovered in old fields. Reserves from new reservoirs discovered in old fields in 2007 were 63 percent of that average.

Revisions and Adjustments

There were 32,174 billion cubic feet of revision increases, 16,713 billion cubic feet of revision decreases, and 1,147 billion cubic feet of adjustments in 2007. Net revisions and adjustments were therefore a net increase of 16,608 billion cubic feet in 2007. In the prior 10 years, U.S. operators reported an average of net revisions and adjustments of 3,639 billion cubic feet.

Sales and Acquisitions

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

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 upon a change in operatorship. Timing of the transfer of operations can also impact these volumes.

There were 14,740 billion cubic feet of sales transactions between operators in 2007, and 15,148 billion cubic feet of acquisitions transactions. The net difference of 408 billion cubic feet was added to the national total of dry natural gas proved reserves.

Production

The estimated 2007 U.S. dry natural gas production was 19,466 billion cubic feet (**Table 8**), a 5-percent increase from 2006 (18,545 billion cubic feet). Areas with the largest production and their percentage of total production were:

Area	Percent of 2007 U.S. Dry Gas Production
Texas	32
Gulf of Mexico Federal Offshore	14
Wyoming	9
Oklahoma	9
New Mexico	7
Colorado	7
Louisiana	6
Area Subtotal	**84**

Wet Natural Gas

U. S. proved reserves of wet natural gas as of December 31, 2007, were 247,789 billion cubic feet, a 12-percent increase over the 2006 volume (**Table 9**). At year-end 2007, proved wet natural gas reserves for the lower 48 States had increased by 12 percent compared to 2006, and those of Alaska had increased by 16 percent.

Table 9. Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2007 (billion cubic feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/06	Changes in Reserves During 2007: Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	Proved Reserves 12/31/07
Alaska	10,333	2	2,168	113	11	6	28	0	0	391	12,022
Lower 48 States	**210,083**	**988**	**31,236**	**17,355**	**15,507**	**15,964**	**28,227**	**814**	**1,244**	**19,927**	**235,767**
Alabama	3,963	1	165	36	308	386	125	0	17	277	4,036
Arkansas	2,271	-29	321	146	298	280	1,149	0	27	269	3,306
California	2,935	35	372	288	173	243	18	0	1	264	2,879
Coastal Region Onshore	214	2	33	27	4	6	0	0	0	12	212
Los Angeles Basin Onshore	161	2	16	17	0	0	0	0	0	8	154
San Joaquin Basin Onshore	2,470	31	311	229	167	237	14	0	1	238	2,430
State Offshore	90	0	12	15	2	0	4	0	0	6	83
Colorado	17,682	100	4,037	598	772	463	2,893	15	24	1,364	22,480
Florida	50	-1	113	0	48	0	0	0	0	4	110
Kansas	4,197	82	434	236	69	68	158	0	0	386	4,248
Kentucky	2,369	5	65	160	4	6	391	0	0	84	2,588
Louisiana	10,710	216	1,042	1,138	2,343	1,685	1,275	0	139	1,294	10,292
North	6,795	88	439	430	2,095	1,260	939	0	1	560	6,437
South Onshore	3,473	117	513	612	182	373	317	0	108	644	3,463
State Offshore	442	11	90	96	66	52	19	0	30	90	392
Michigan	3,117	-47	793	213	1,061	1,259	30	0	0	187	3,691
Mississippi	816	35	54	50	24	79	147	0	1	100	958
Montana	1,069	11	94	75	41	39	82	0	1	113	1,067
New Mexico	19,104	167	2,699	2,588	615	406	636	22	11	1,445	18,397
East	4,295	95	536	454	318	240	468	22	11	508	4,387
West	14,809	72	2,163	2,134	297	166	168	0	0	937	14,010
New York	363	33	46	45	3	0	19	7	0	45	375
North Dakota	539	10	77	70	44	49	66	1	4	60	572
Ohio	975	138	144	198	0	0	39	0	0	71	1,027
Oklahoma	18,535	2	2,243	1,449	1,639	1,662	2,525	6	59	1,760	20,184
Pennsylvania	3,064	182	327	420	4	41	360	7	3	183	3,377
Texas	65,805	74	9,760	5,094	6,276	6,777	11,290	83	569	6,631	76,357
RRC District 1	1,109	-1	74	117	191	252	72	0	0	97	1,101
RRC District 2 Onshore	2,166	-163	299	231	283	327	573	1	16	319	2,386
RRC District 3 Onshore	3,278	40	503	554	648	616	296	45	73	547	3,102
RRC District 4 Onshore	8,474	68	1,018	878	1,896	1,449	1,066	33	219	1,226	8,327
RRC District 5	12,648	95	3,235	957	23	151	3,256	0	3	1,134	17,274
RRC District 6	9,481	87	1,852	860	230	403	1,811	0	104	933	11,715
RRC District 7B	1,663	-30	176	85	47	89	804	0	0	158	2,412
RRC District 7C	5,727	-15	396	209	2,012	2,134	394	0	3	390	6,028
RRC District 8	6,855	26	768	620	356	357	739	0	133	599	7,303
RRC District 8A	1,384	14	266	86	6	6	62	1	0	110	1,531
RRC District 9	6,765	50	572	126	48	6	1,302	0	18	554	7,985
RRC District 10	5,950	-71	587	348	536	987	892	3	0	532	6,932
State Offshore	305	-26	14	23	0	0	23	0	0	32	261
Utah	5,211	12	1,125	329	490	547	752	4	0	369	6,463
Virginia	2,302	-25	108	36	0	27	262	0	0	109	2,529
West Virginia	4,654	16	319	370	2	25	425	11	1	198	4,881
Wyoming	24,463	20	5,024	1,890	351	673	4,852	2	0	1,897	30,896
Federal Offshore[a]	15,750	-50	1,862	1,912	924	1,218	675	618	379	2,803	14,813
Pacific (California)	811	-5	48	10	1	3	0	0	0	41	805
Gulf of Mexico (Louisiana)[a]	12,201	1	1,477	1,476	830	1,023	543	313	341	2,135	11,458
Gulf of Mexico (Texas)	2,738	-46	337	426	93	192	132	305	38	627	2,550
Miscellaneous[b]	139	1	12	14	18	31	58	38	8	14	241
U.S. Total	**220,416**	**990**	**33,404**	**17,468**	**15,518**	**15,970**	**28,255**	**814**	**1,244**	**20,318**	**247,789**

[a]Includes Federal offshore Alabama.

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

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for natural gas for 2007 contained in the *Natural Gas Annual 2007,* DOE/EIA-0131(07).

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

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. See Appendix F for a discussion of the methodology used to generate the wet and dry natural gas reserves estimates tabulated in this report.

Nonassociated Natural Gas

Proved Reserves

Proved reserves of nonassociated (NA) natural gas, wet after lease separation, in the United States increased by 13 percent (24,345 billion cubic feet) in 2007 to 215,121 billion cubic feet (**Table 10**). The lower 48 States' NA wet natural gas proved reserves increased 13 percent to a level of 213,851 billion cubic feet, while Alaska had a 12 percent decline to a level of 1,270 billion cubic feet.

Seven areas accounted for 82 percent of U.S. NA wet natural gas proved reserves in 2007:

Area	Percent of 2007 U.S. NA Gas Reserves
Texas	32
Wyoming	14
Colorado	10
Oklahoma	9
New Mexico	8
Gulf of Mexico Federal Offshore	5
Louisiana	4
Area Subtotal	**82**

Total Discoveries

NA wet natural gas *total discoveries* of 29,096 billion cubic feet in 2007 were 24 percent more than the 2006 total of 23,541 billion cubic feet. Areas with the most *total discoveries* of NA wet natural gas in 2007 were Texas (11,555 billion cubic feet), Wyoming (4,853 billion cubic feet), Colorado (2,752 billion cubic feet), and Oklahoma (2,487 billion cubic feet).

Production

U.S. production of NA wet natural gas increased 5 percent from an estimated 17,092 billion cubic feet in 2006 to 18,022 billion cubic feet in 2007. The leading producing areas were Texas (33 percent of the national total), the Gulf of Mexico Federal Offshore (12 percent), Wyoming (10 percent), Oklahoma (9 percent), New Mexico (7 percent), Colorado (7 percent), and Louisiana (7 percent).

Associated-Dissolved Natural Gas

Proved Reserves

Proved reserves of associated-dissolved (AD) natural gas, wet after lease separation, in the United States increased 10 percent to 32,668 billion cubic feet in 2007 (**Table 11**). Proved reserves of AD wet natural gas in Alaska increased 21 percent to 10,752 billion cubic feet, and increased in the lower 48 States by 6 percent to 21,916 billion cubic feet.

The areas of the country with the largest AD wet natural gas reserves and their percentage of the total were:

Area	Percent of 2007 U.S. AD Gas Reserves
Alaska	33
Texas	23
Gulf of Mexico Federal Offshore	12
California	7
New Mexico	6
Area Subtotal	**81**

These areas logically correspond to the areas of the country with the largest volumes of crude oil reserves. Alaska's AD wet gas proved reserves surpassed those of Texas for the second year in a row.

Production

U.S. production of AD wet natural gas increased 1 percent from an estimated 2,281 billion cubic feet in 2006 to 2,296 billion cubic feet in 2007. Production of AD wet natural gas in the lower 48 States was essentially unchanged (2,063 billion cubic feet in 2006 and 2,069 billion cubic feet in 2007). Alaska's AD wet gas production increased 4 percent from 218 billion cubic feet in 2006 to 227 billion cubic feet in 2007.

Table 10. Nonassociated Natural Gas Proved Reserves, Reserves Changes, and Production, Wet After Lease Separation, 2007 (billion cubic feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/06	Changes in Reserves During 2007									Proved Reserves 12/31/07
		Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	
Alaska	1,447	1	70	103	8	5	22	0	0	164	1,270
Lower 48 States	**189,329**	**713**	**27,934**	**15,561**	**14,395**	**14,615**	**27,135**	**768**	**1,171**	**17,858**	**213,851**
Alabama	3,945	2	153	35	303	385	125	0	17	273	4,016
Arkansas	2,227	-22	310	139	298	280	1,149	0	27	265	3,269
California	780	29	80	186	165	234	14	0	1	101	686
Coastal Region Onshore	6	0	0	5	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	769	28	80	180	165	234	13	0	1	99	681
State Offshore	5	1	0	1	0	0	1	0	0	2	4
Colorado	16,141	91	3,823	584	769	448	2,713	15	24	1,260	20,642
Florida	0	0	0	0	0	0	0	0	0	0	0
Kansas	4,115	74	423	221	69	68	152	0	0	377	4,165
Kentucky	2,333	5	65	158	4	6	391	0	0	84	2,554
Louisiana	10,149	201	907	1,044	2,307	1,589	1,255	0	131	1,230	9,651
North	6,705	80	432	407	2,091	1,259	937	0	1	552	6,364
South Onshore	3,058	112	412	553	150	278	299	0	101	597	2,960
State Offshore	386	9	63	84	66	52	19	0	29	81	327
Michigan	2,925	-48	791	210	1,041	1,235	30	0	0	170	3,512
Mississippi	795	33	48	49	22	70	147	0	1	95	928
Montana	874	10	34	43	13	13	64	0	1	92	848
New Mexico	17,332	129	2,445	2,425	502	284	524	22	11	1,264	16,556
East	2,605	56	307	308	205	123	356	22	11	334	2,633
West	14,727	73	2,138	2,117	297	161	168	0	0	930	13,923
New York	361	24	46	45	3	0	19	7	0	44	365
North Dakota	182	5	13	33	0	1	4	0	0	17	155
Ohio	801	92	122	65	0	0	39	0	0	63	926
Oklahoma	17,735	17	1,965	1,363	1,514	1,554	2,422	6	59	1,656	19,225
Pennsylvania	2,913	77	318	271	4	40	337	7	3	173	3,247
Texas	58,736	-11	8,776	4,523	5,819	6,142	10,912	81	562	6,029	68,827
RRC District 1	1,048	-6	51	109	187	250	71	0	0	89	1,029
RRC District 2 Onshore	2,048	-162	250	220	271	318	573	1	16	304	2,249
RRC District 3 Onshore	2,789	16	445	444	565	483	269	44	72	481	2,628
RRC District 4 Onshore	8,364	62	980	854	1,895	1,446	1,065	33	219	1,210	8,210
RRC District 5	12,591	92	3,233	951	23	151	3,256	0	3	1,128	17,224
RRC District 6	9,205	79	1,807	826	222	402	1,806	0	104	887	11,468
RRC District 7B	1,589	-35	161	77	33	86	804	0	0	145	2,350
RRC District 7C	4,531	-15	271	167	1,880	1,972	316	0	0	314	4,714
RRC District 8	3,891	14	501	423	198	188	559	0	130	395	4,267
RRC District 8A	82	14	5	11	1	2	9	0	0	12	88
RRC District 9	6,660	4	554	116	48	6	1,302	0	18	534	7,846
RRC District 10	5,634	-49	507	302	496	838	859	3	0	498	6,496
State Offshore	304	-25	11	23	0	0	23	0	0	32	258
Utah	4,894	12	1,085	326	490	543	713	4	0	340	6,095
Virginia	2,302	-25	108	36	0	27	262	0	0	109	2,529
West Virginia	4,638	16	318	370	2	25	425	11	1	197	4,865
Wyoming	24,116	34	4,852	1,860	289	653	4,851	2	0	1,828	30,531
Federal Offshore[a]	10,915	-46	1,240	1,561	763	987	539	575	325	2,178	10,033
Pacific (California)	55	0	0	0	0	0	0	0	0	2	53
Gulf of Mexico (Louisiana)[a]	8,500	1	963	1,172	674	804	410	309	294	1,628	7,807
Gulf of Mexico (Texas)	2,360	-47	277	389	89	183	129	266	31	548	2,173
Miscellaneous[b]	120	14	12	14	18	31	48	38	8	13	226
U.S. Total	**190,776**	**714**	**28,004**	**15,664**	**14,403**	**14,620**	**27,157**	**768**	**1,171**	**18,022**	**215,121**

[a]Includes Federal offshore Alabama.

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

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for natural gas for 2007 contained in the *Natural Gas Annual 2007,* DOE/EIA-0131(07).

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, 2007 (billion cubic feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Published Proved Reserves 12/31/06	Changes in Reserves During 2007									Proved Reserves 12/31/07
		Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	
Alaska	8,886	1	2,098	10	3	1	6	0	0	227	10,752
Lower 48 States	**20,754**	**275**	**3,302**	**1,794**	**1,112**	**1,349**	**1,092**	**46**	**73**	**2,069**	**21,916**
Alabama	18	-1	12	1	5	1	0	0	0	4	20
Arkansas	44	-7	11	7	0	0	0	0	0	4	37
California	2,155	6	292	102	8	9	4	0	0	163	2,193
Coastal Region Onshore	208	2	33	22	4	6	0	0	0	12	211
Los Angeles Basin Onshore	161	2	16	17	0	0	0	0	0	8	154
San Joaquin Basin Onshore	1,701	3	231	49	2	3	1	0	0	139	1,749
State Offshore	85	-1	12	14	2	0	3	0	0	4	79
Colorado	1,541	9	214	14	3	15	180	0	0	104	1,838
Florida	50	-1	113	0	48	0	0	0	0	4	110
Kansas	82	8	11	15	0	0	6	0	0	9	83
Kentucky	36	0	0	2	0	0	0	0	0	0	34
Louisiana	561	15	135	94	36	96	20	0	8	64	641
North	90	8	7	23	4	1	2	0	0	8	73
South Onshore	415	5	101	59	32	95	18	0	7	47	503
State Offshore	56	2	27	12	0	0	0	0	1	9	65
Michigan	192	1	2	3	20	24	0	0	0	17	179
Mississippi	21	2	6	1	2	9	0	0	0	5	30
Montana	195	1	60	32	28	26	18	0	0	21	219
New Mexico	1,772	38	254	163	113	122	112	0	0	181	1,841
East	1,690	39	229	146	113	117	112	0	0	174	1,754
West	82	-1	25	17	0	5	0	0	0	7	87
New York	2	9	0	0	0	0	0	0	0	1	10
North Dakota	357	5	64	37	44	48	62	1	4	43	417
Ohio	174	46	22	133	0	0	0	0	0	8	101
Oklahoma	800	-15	278	86	125	108	103	0	0	104	959
Pennsylvania	151	105	9	149	0	1	23	0	0	10	130
Texas	7,069	85	984	571	457	635	378	2	7	602	7,530
RRC District 1	61	5	23	8	4	2	1	0	0	8	72
RRC District 2 Onshore	118	-1	49	11	12	9	0	0	0	15	137
RRC District 3 Onshore	489	24	58	110	83	133	27	1	1	66	474
RRC District 4 Onshore	110	6	38	24	1	3	1	0	0	16	117
RRC District 5	57	3	2	6	0	0	0	0	0	6	50
RRC District 6	276	8	45	34	8	1	5	0	0	46	247
RRC District 7B	74	5	15	8	14	3	0	0	0	13	62
RRC District 7C	1,196	0	125	42	132	162	78	0	3	76	1,314
RRC District 8	2,964	12	267	197	158	169	180	0	3	204	3,036
RRC District 8A	1,302	0	261	75	5	4	53	1	0	98	1,443
RRC District 9	105	46	18	10	0	0	0	0	0	20	139
RRC District 10	316	-22	80	46	40	149	33	0	0	34	436
State Offshore	1	-1	3	0	0	0	0	0	0	0	3
Utah	317	0	40	3	0	4	39	0	0	29	368
Virginia	0	0	0	0	0	0	0	0	0	0	0
West Virginia	16	0	1	0	0	0	0	0	0	1	16
Wyoming	347	-14	172	30	62	20	1	0	0	69	365
Federal Offshore[a]	4,835	-4	622	351	161	231	136	43	54	625	4,780
Pacific (California)	756	-5	48	10	1	3	0	0	0	39	752
Gulf of Mexico (Louisiana)[a]	3,701	0	514	304	156	219	133	4	47	507	3,651
Gulf of Mexico (Texas)	378	1	60	37	4	9	3	39	7	79	377
Miscellaneous[b]	19	-13	0	0	0	0	10	0	0	1	15
U.S. Total	**29,640**	**276**	**5,400**	**1,804**	**1,115**	**1,350**	**1,098**	**46**	**73**	**2,296**	**32,668**

[a]Includes Federal offshore Alabama.

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

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves." They may differ from the official Energy Information Administration production data for natural gas for 2007 contained in the *Natural Gas Annual 2007*, DOE/EIA-0131(07).

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

The areas of the country with the largest AD wet natural gas production and their percentage of the total were:

Area	Percent of 2007 U.S. AD Gas Production
Gulf of Mexico Federal Offshore	26
Texas	26
Alaska	10
New Mexico	8
California	7
Area Subtotal	**77**

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

Coalbed and Shale Natural Gas

Proved Reserves

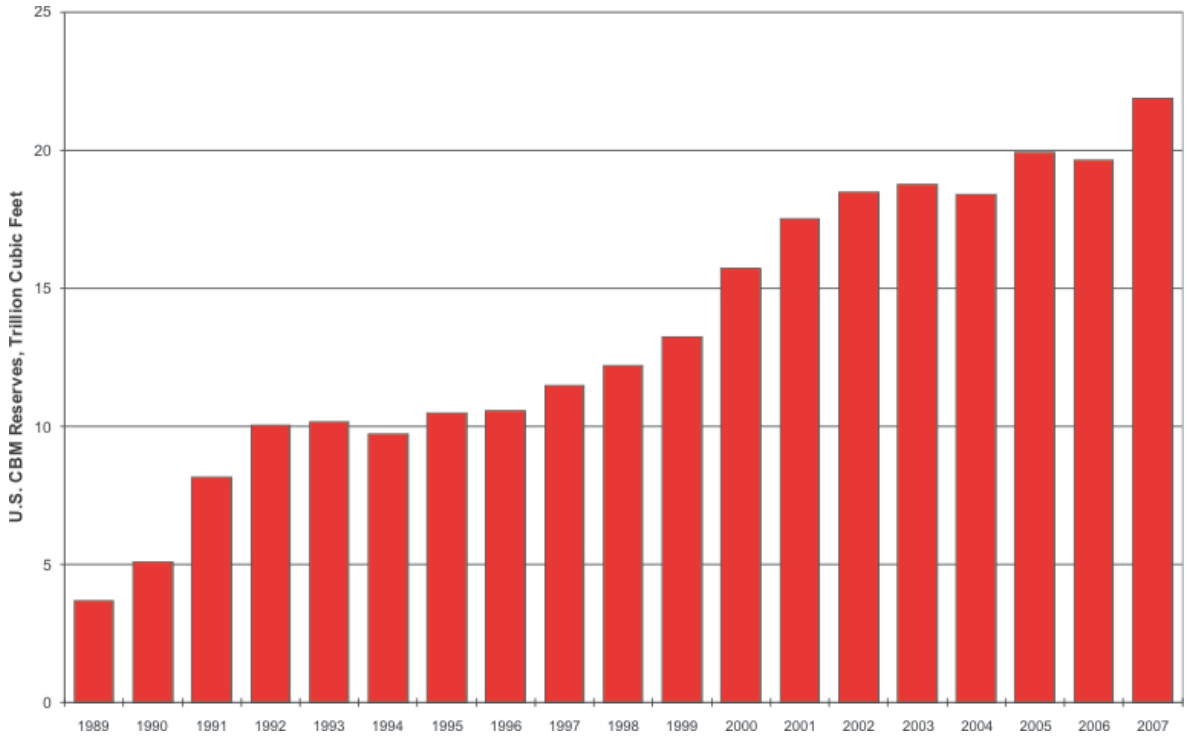
Unconventional resources are playing an increasingly important role in U.S. dry natural gas reserves and production.

Proved reserves and production from coal reservoirs increased rapidly from 1989 through 2002 before stabilizing and even dropping slightly in 2006 (**Figure 21**). However, coalbed natural gas reserves increased 11.5 percent in 2007. Coalbed proved reserves now account for about 9 percent of U.S. dry natural gas reserves. While coalbed natural gas production decreased in 2007, it still accounted for about 9 percent of U.S. dry natural gas production (**Figure 22**).

Improved technology now allows high economic returns for development of reserves in shale reservoirs at the gas prices prevalent in 2006 and 2007. As a result, proved reserves of shale gas have been rapidly increasing. EIA has collected data on proved natural gas reserves from shale reservoirs for two years. Shale gas proved reserves increased 50 percent in 2007 and are now at about 9 percent of the U.S. total (**Figure 23**).

Table 12 lists the proved reserves and production of natural gas from two unconventional sources, coalbed and shale, as reported to EIA in 2007. The historical table of coalbed methane proved reserves and production from 1989-2007 can be found in Appendix D, Table D11.

Figure 21. Coalbed Natural Gas Proved Reserves, 1989-2007



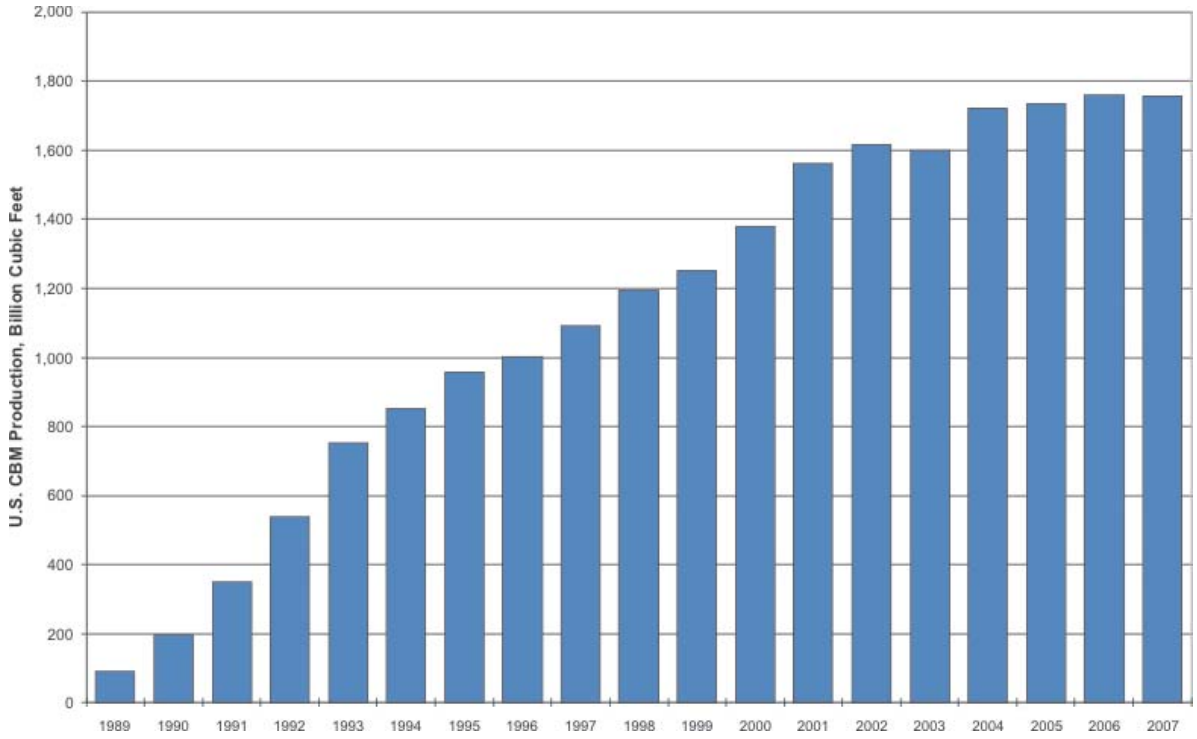
Source: Energy Information Administration, Office of Oil and Gas.

Table 12. Reported Unconventional Natural Gas Proved Reserves and Production
(billion cubic feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	Coalbed Reported Production	Coalbed Reported Reserves	Shale Reported Production	Shale Reported Reserves
Alaska	0	0	0	0
Lower 48 States	1,742	21,868	1,187	21,496
Alabama	114	2,126	0	0
Arkansas	WS	WS	78	1,095
California	0	0	0	0
Colorado	521	7,870	0	0
Florida	0	0	0	0
Kansas	WS	WS	0	0
Kentucky	0	0	ES	ES
Louisiana	WS	WS	0	0
Michigan	0	0	123	2,830
Mississippi	0	0	0	0
Montana	WS	WS	WS	WS
New Mexico	391	4,171	0	0
East	23	390	0	0
West	368	3,781	0	0
New York	0	0	0	0
North Dakota	0	0	1	18
Ohio	ES	ES	0	0
Oklahoma	75	1,264	3	133
Pennsylvania	ES	ES	ES	ES
Texas	0	0	967	17,115
RRC District 1	0	0	0	0
RRC District 2 Onshore	0	0	0	0
RRC District 3 Onshore	0	0	0	0
RRC District 4 Onshore	0	0	0	0
RRC District 5	0	0	429	8,055
RRC District 6	0	0	0	0
RRC District 7B	0	0	90	2,014
RRC District 7C	0	0	0	0
RRC District 8	0	0	1	4
RRC District 8A	0	0	0	0
RRC District 9	0	0	447	7,042
RRC District 10	0	0	0	0
State Offshore	0	0	0	0
Utah	75	922	0	0
Virginia	84	1,948	0	0
West Virginia	ES	ES	0	0
Wyoming	399	2,734	0	0
Federal Offshore	0	0	0	0
Eastern States[a]	31	392	3	166
Western States[b]	52	441	12	139
US Total	**1,742**	**21,868**	**1,187**	**21,496**

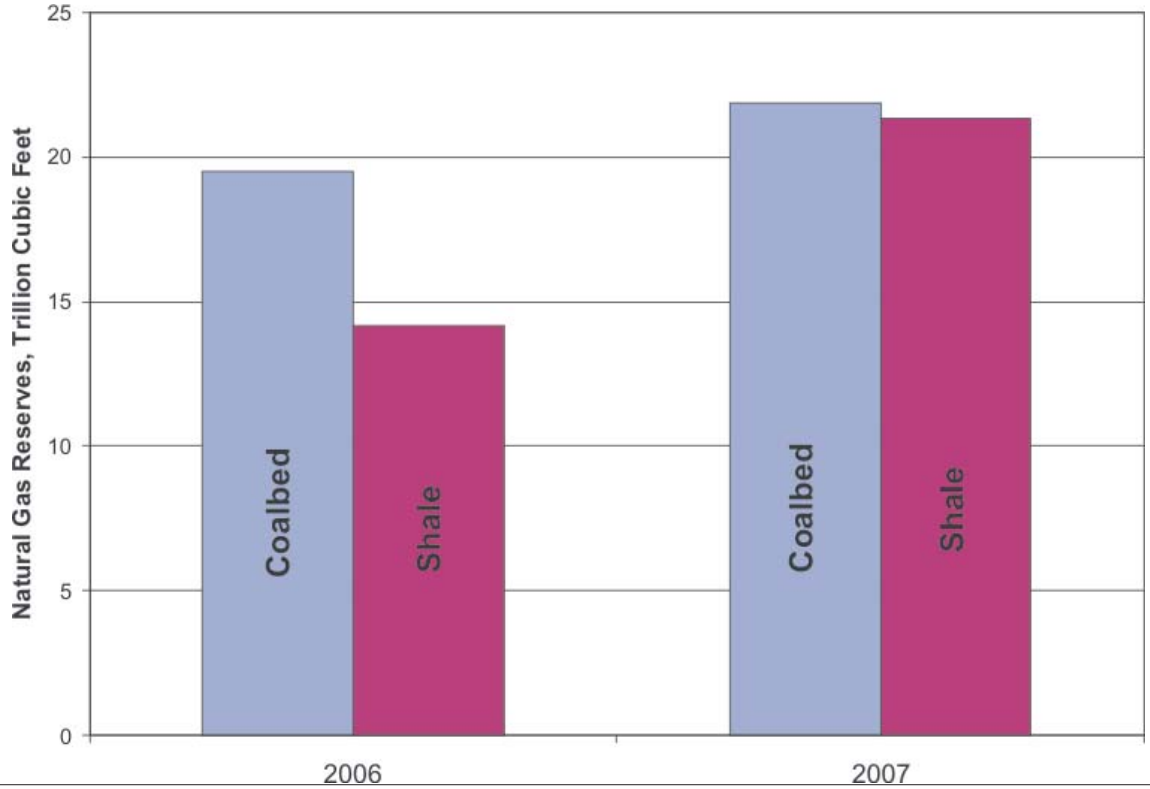
ES=State data withheld, included in Eastern States.
WS=State data withheld, included in Western States.
[a]Eastern States include Illinois, Indiana, Kentucky, Ohio, Pennsylvania, Tennessee, and West Virginia.
[b]Western States include Arkansas, Kansas, Louisiana, Montana, North Dakota, and South Dakota.
Source: Energy Information Administration, Office of Oil and Gas.

Figure 22. Coalbed Natural Gas Production, 1989-2007



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

Figure 23. Coalbed and Shale Natural Gas Proved Reserves, 2006-2007



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

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 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.

Texas

Texas had the largest volumetric increase in dry natural gas proved reserves in 2007 (10,255 billion cubic feet), a 17-percent increase. Production also increased 12 percent. This resulted primarily from extensions in the Newark East Field of north central Texas and natural gas fields located in the Permian Basin of west Texas.

- **Barnett Shale (Newark East Field)**: In 2007, natural gas production from the Barnett Shale rose from 705 billion cubic feet in 2006 to 949 billion cubic feet. The Texas Railroad Commission maintains a website that provides updated Barnett Shale statistics {43}: http://www.rrc.state.tx.us/barnettshale

Wyoming

Wyoming's dry natural gas reserves increased by 26 percent (6,161 billion cubic feet) in 2007. This resulted primarily from extensions to existing fields and nonassociated natural gas revision increases.

- **Pinedale Field**: On October 30, 2007, Ultra Petroleum announced results of its ongoing delineation drilling program in and around the Pinedale Field. Six of the 21 delineation wells planned for 2007 had sufficient production history to enable estimation of reserves. All six had reserves better than the pre-drill estimates, on average 167 percent more. The current plan is to continue this delineation effort for at least the next 5 years. (Ultra Petroleum Press Release, October 30, 2007) {44}.

Colorado

Colorado's dry natural gas reserves increased by 27 percent (4,702 billion cubic feet) in 2007. Large coalbed methane revision increases for the San Juan Basin Gas Area were a major portion of this increase.

Areas of Note: Large Declines in Reserves

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 6 percent (915 billion cubic feet) in 2007. Production also decreased by 2 percent from 2,738 billion cubic feet in 2006 to 2,691 billion cubic feet in 2007.

New Mexico

New Mexico's proved dry natural gas reserves decreased by 4 percent (689 billion cubic feet) in 2007. Production in New Mexico decreased 5 percent (77 billion cubic feet) in 2007.

Louisiana

Louisiana's proved dry natural gas reserves decreased by 4 percent (429 billion cubic feet) in 2007. Production in Louisiana decreased 4 percent (52 billion cubic feet) in 2007.

Reserves in Nonproducing Status

Nonproducing proved natural gas reserves (wet after lease separation) of 78,094 billion cubic feet were reported in 2007, 17 percent more than the 66,714 billion cubic feet reported in 2006 (**Appendix D, Table D10**). About 34 percent of the reserves in nonproducing status were located in Texas. Wyoming had 15 percent, Colorado had 12 percent, and 9 percent were in the Gulf of Mexico Federal Offshore. 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 increased 8 percent to 9,143 million barrels in 2007 (**Table 13**). Reserves additions replaced 181 percent of 2007 natural gas liquids production.

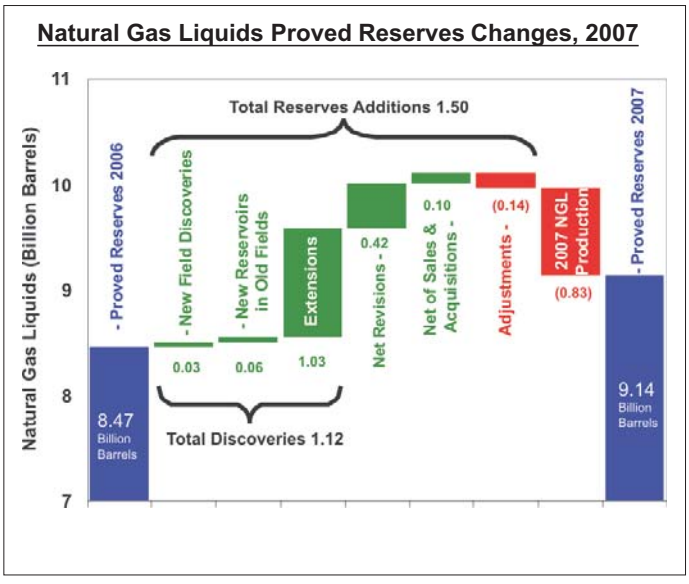
The reserves of seven areas accounted for 88 percent of the Nation's natural gas liquids proved reserves.

Area	Percent of U.S. NGL Reserves
Texas	40
Utah and Wyoming	12
Oklahoma	10
New Mexico	9
Gulf of Mexico Federal Offshore	7
Colorado	6
Alaska	4
Area Subtotal	**88**

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.**

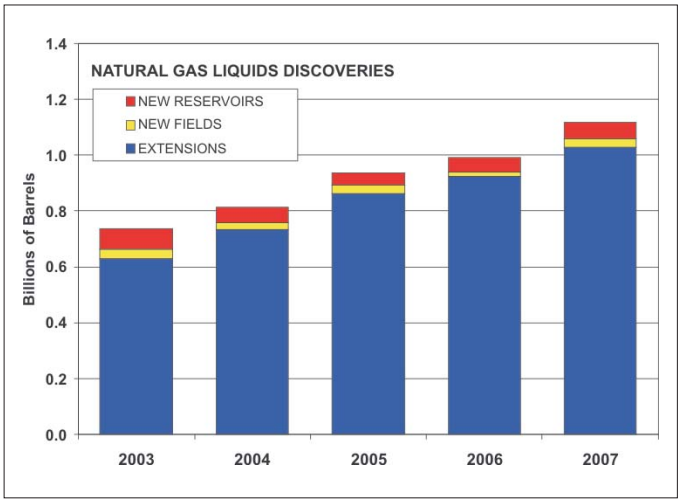
Discussion of Reserves Changes

The following graphic portrays the beginning- and end-of-year natural gas liquids proved reserves, and the components of natural gas liquids proved reserves change during 2007, at the same volumetric scale. Note that the scale starts at 7 billion barrels rather than at zero.



Total Discoveries

Total discoveries of natural gas liquids reserves were 1,118 million barrels in 2007, an increase of 13 percent from 2006 (993 million barrels) (see graph below).



Areas with the largest total discoveries were:

Area	Percent of 2007 U.S. NGL Total Discoveries
Texas	46
Utah and Wyoming	18
Oklahoma	11
Gulf of Mexico Federal Offshore	7
Colorado	6
Louisiana	4
New Mexico	4
Area Subtotal	**96**

Extensions

Extensions were 1,030 million barrels in 2007, 62 percent more than the 2006 volume of 924 million barrels. Areas with the largest extensions were Texas (47 percent of the National total), Utah and Wyoming (20 percent), Oklahoma (12 percent), and Colorado (7 percent).

Table 13. Natural Gas Liquids Proved Reserves, Reserves Changes, and Production, 2007[a]

(million barrels of 42 U.S. gallons)

State and Subdivision	Published Proved Reserves 12/31/06	Changes in Reserves During 2007									Proved Reserves 12/31/07
		Adjustments (+,–)	Revision Increases (+)	Revision Decreases (–)	Sales (–)	Acquisitions (+)	Extensions (+)	New Field Discoveries (+)	New Reservoir Discoveries in Old Fields (+)	Estimated Production (–)	
Alaska	338	0	0	0	0	0	0	0	0	13	325
Lower 48 States	**8,134**	**-139**	**1,187**	**765**	**670**	**771**	**1,030**	**30**	**58**	**818**	**8,818**
Alabama	56	-13	2	2	4	16	2	0	0	4	53
Arkansas	4	-2	0	0	0	0	1	0	0	0	3
California	132	0	16	15	7	10	1	0	0	11	126
Coastal Region Onshore	22	-7	2	2	0	0	0	0	0	1	14
Los Angeles Basin Onshore	10	1	1	3	0	0	0	0	0	0	9
San Joaquin Basin Onshore	100	6	13	10	7	10	1	0	0	10	103
State Offshore	0	0	0	0	0	0	0	0	0	0	0
Colorado	478	-23	105	23	22	10	67	0	0	33	559
Florida	3	-2	2	0	1	0	0	0	0	0	2
Kansas	209	-9	22	12	3	3	7	0	0	19	198
Kentucky	105	-23	2	5	0	0	13	0	0	3	89
Louisiana	280	33	49	48	42	35	36	0	10	50	303
North	89	14	11	8	27	15	16	0	0	10	100
South Onshore	159	11	30	32	10	16	19	0	7	32	168
State Offshore	32	8	8	8	5	4	1	0	3	8	35
Michigan	42	7	11	4	15	17	0	0	0	3	55
Mississippi	8	0	1	1	0	1	1	0	0	1	9
Montana	10	1	1	1	0	0	1	0	0	1	11
New Mexico	861	17	126	117	33	25	39	1	1	76	844
East	295	11	39	35	21	19	33	1	1	37	306
West	566	6	87	82	12	6	6	0	0	39	538
North Dakota	55	1	8	7	4	5	6	0	0	6	58
Oklahoma	892	-4	110	73	93	80	119	0	2	84	949
Texas	3,335	-113	428	291	389	495	484	5	29	325	3,658
RRC District 1	42	12	3	6	12	12	3	0	0	5	49
RRC District 2 Onshore	90	4	14	12	12	15	27	0	1	16	111
RRC District 3 Onshore	234	-3	35	42	43	99	23	3	6	41	271
RRC District 4 Onshore	333	-2	47	42	71	56	46	2	8	50	327
RRC District 5	53	-8	10	5	0	0	10	0	0	4	56
RRC District 6	357	-24	79	35	8	14	73	0	3	33	426
RRC District 7B	133	4	16	7	4	7	68	0	0	14	203
RRC District 7C	439	35	34	21	170	173	33	0	0	32	491
RRC District 8	566	-52	61	53	26	39	58	0	10	45	558
RRC District 8A	233	8	45	17	1	2	11	0	0	19	262
RRC District 9	385	-78	34	6	2	0	59	0	1	26	367
RRC District 10	466	-9	50	44	40	78	73	0	0	40	534
State Offshore	4	0	0	1	0	0	0	0	0	0	3
Utah and Wyoming	887	-5	173	64	16	28	205	0	0	68	1,140
West Virginia	110	0	8	9	0	1	10	0	0	5	115
Federal Offshore[b]	653	-7	116	91	41	45	36	24	16	127	624
Pacific (California)	4	0	0	0	0	0	0	0	0	0	4
Gulf of Mexico (Louisiana)[b]	575	-3	90	84	40	44	25	13	16	108	528
Gulf of Mexico (Texas)	74	-4	26	7	1	1	11	11	0	19	92
Miscellaneous[c]	14	3	7	2	0	0	2	0	0	2	22
U.S. Total	**8,472**	**-139**	**1,187**	**765**	**670**	**771**	**1,030**	**30**	**58**	**831**	**9,143**

[a]This table is natural gas plant liquids plus lease condensate.

[b]Includes Federal offshore Alabama.

[c]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, New York, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, and Virginia.

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." They may differ from the official Energy Information Administration production data for natural gas and natural gas liquids for 2007 contained in the publications *Petroleum Supply Annual* 2007, DOE/EIA-0340(07) and *Natural Gas Annual 2007* DOE/EIA-0131(07).

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

Table 14. Natural Gas Plant Liquids Proved Reserves and Production, 2007

(million barrels of 42 U.S. gallons)

State and Subdivision	2007 Reserves	2007 Production
Alaska	325	13
Lower 48 States	**7,323**	**637**
Alabama	32	2
Arkansas	2	0
California	126	11
Coastal Region Onshore	14	1
Los Angeles Basin Onshore	9	0
San Joaquin Basin Onshore	103	10
State Offshore	0	0
Colorado	452	27
Florida	2	0
Kansas	194	18
Kentucky	88	3
Louisiana	191	30
North	69	6
South Onshore	97	18
State Offshore	25	6
Michigan	50	3
Mississippi	3	0
Montana	11	1
New Mexico	788	66
East	274	32
West	514	34
North Dakota	54	6
Oklahoma	797	69
Texas	3,158	272
RRC District 1	43	4
RRC District 2 Onshore	94	13
RRC District 3 Onshore	143	25
RRC District 4 Onshore	250	37
RRC District 5	50	3
RRC District 6	324	26
RRC District 7B	200	13
RRC District 7C	464	30
RRC District 8	525	43
RRC District 8A	260	19
RRC District 9	347	24
RRC District 10	458	35
State Offshore	0	0
Utah and Wyoming	878	54
West Virginia	114	5
Federal Offshore[a]	369	69
Pacific (California)	0	0
Gulf of Mexico (Louisiana)[a]	365	68
Gulf of Mexico (Texas)	4	1
Miscellaneous[b]	14	1
U.S. Total	**7,648**	**650**

[a]Includes Federal Offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, New York, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, and Virginia.

Note: The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," and Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production." They may differ from the official Energy Information Administration production data for natural gas plant liquids for 2007 contained in the publications *Petroleum Supply Annual 2007, DOE/EIA-0340(2007) and Natural Gas Annual 2007*, DOE/EIA-0131(2007).

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

Table 15. Lease Condensate Proved Reserves and Production, 2007

(million barrels of 42 U.S. gallons)

State and Subdivision	2007 Reserves	2007 Production
Alaska	0	0
Lower 48 States	**1,495**	**181**
Alabama	21	2
Arkansas	1	0
California	0	0
Coastal Region Onshore	0	0
Los Angeles Basin Onshore	0	0
San Joaquin Basin Onshore	0	0
State Offshore	0	0
Colorado	107	6
Florida	0	0
Kansas	4	1
Kentucky	1	0
Louisiana	112	20
North	31	4
South Onshore	71	14
State Offshore	10	2
Michigan	5	0
Mississippi	6	1
Montana	0	0
New Mexico	56	10
East	32	5
West	24	5
North Dakota	4	0
Oklahoma	152	15
Texas	500	53
RRC District 1	6	1
RRC District 2 Onshore	17	3
RRC District 3 Onshore	128	16
RRC District 4 Onshore	77	13
RRC District 5	6	1
RRC District 6	102	7
RRC District 7B	3	1
RRC District 7C	27	2
RRC District 8	33	2
RRC District 8A	2	0
RRC District 9	20	2
RRC District 10	76	5
State Offshore	3	0
Utah and Wyoming	262	14
West Virginia	1	0
Federal Offshore a	255	58
Pacific (California)	4	0
Gulf of Mexico (Louisiana)a	163	40
Gulf of Mexico (Texas)	88	18
Miscellaneous b	8	1
U.S. Total	**1,495**	**181**

[a]Includes Federal Offshore Alabama.

[b]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, New York, Ohio, Oregon, Pennsylvania, South Dakota, Tennessee, and Virginia.

Note: The estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves” 2007.

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

New Field Discoveries

New field discoveries in 2007 (30 million barrels) were 88 percent higher than in 2006 (16 million barrels). Areas with the largest new field discoveries were the Gulf of Mexico Federal Offshore (80 percent) and Texas (17 percent).

New Reservoir Discoveries in Old Fields

New reservoir discoveries in old fields in 2007 (58 million barrels) were 9 percent higher than they were in 2006 (53 million barrels). Areas with the largest new reservoir discoveries in old fields were Texas (50 percent of the National total), the Gulf of Mexico Federal Offshore (28 percent), and Louisiana (17 percent).

Revisions and Adjustments

In 2007, there were 1,187 million barrels of revision increases, 765 million barrels of revision decreases, and -139 million barrels of adjustments. The net of revisions and adjustments was 283 million barrels.

Sales and Acquisitions

There were 771 million barrels of acquisitions and 670 million barrels of sales in 2007. The net of these transactions added 101 million barrels of natural gas liquids proved reserves.

Production

Natural gas liquids production was an estimated 831 million barrels in 2007, an increase of 2 percent from 2006's production (811 million barrels).

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

Area	Percent of 2007 U.S. NGL Production
Texas	39
Gulf of Mexico Federal Offshore	15
Oklahoma	10
New Mexico	9
Utah and Wyoming	8
Louisiana	6
Area Subtotal	**87**

Natural Gas Plant Liquids

Proved Reserves

Natural gas plant liquids proved reserves increased in 2007 to 7,648 million barrels, a 7-percent increase from the 2006 level (7,133 million barrels) (**Table 14**).

Six areas accounted for about 83 percent of the Nation's natural gas plant liquids proved reserves:

Area	Percent of 2007 U.S. Gas Plant Liqids
Texas	41
Utah and Wyoming	11
Oklahoma	10
New Mexico	10
Colorado	6
Gulf of Mexico Federal Offshore	5
Area Subtotal	**83**

Production

Natural gas plant liquids production increased 3 percent in 2007—from 629 million barrels in 2006 to 650 million barrels of production (**Table 14**).

The top six areas for proved reserves of natural gas plant liquids accounted for about 87 percent of the Nation's natural gas plant liquids production:

Area	Percent of 2007 U.S. Gas Plant Liquids Producion
Texas	42
Oklahoma	11
Gulf of Mexico Federal Offshore	11
New Mexico	10
Utah and Wyoming	8
Louisiana	5
Area Subtotal	**87**

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 1,495 million barrels in 2007 (**Table 15**). This was 12 percent higher than the volume reported in 2006 (1,339 million barrels).

The reserves of five areas accounted for about 85 percent of the Nation's lease condensate proved reserves.

Area	Percent of 2007 U.S. Condensate Reserves
Texas	33
Utah and Wyoming	18
Gulf of Mexico Federal Offshore	17
Oklahoma	10
Louisiana	7
Area Subtotal	**85**

Production

Production of lease condensate was 181 million barrels in 2007, a slight decrease from 2006's production (182 million barrels). The production of 5 areas accounted for about 88 percent of the Nation's lease condensate production.

Area	Percent of 2007 U.S. Condensate Production
Gulf of Mexico Federal Offshore	32
Texas	29
Louisiana	11
Oklahoma	8
Utah and Wyoming	8
Area Subtotal	**88**

Reserves in Nonproducing Status

Like crude oil and natural gas, not all lease condensate proved reserves were producing during 2007. Proved reserves of 559 million barrels of lease condensate, an increase of 11 percent from 2006's level (504 million barrels), were reported in nonproducing status in 2007 (**Appendix D, Table D10**). About 25 percent of the nonproducing lease condensate reserves were located in Texas, 24 percent in Utah and Wyoming, and 21 percent were in the Gulf of Mexico Federal Offshore.

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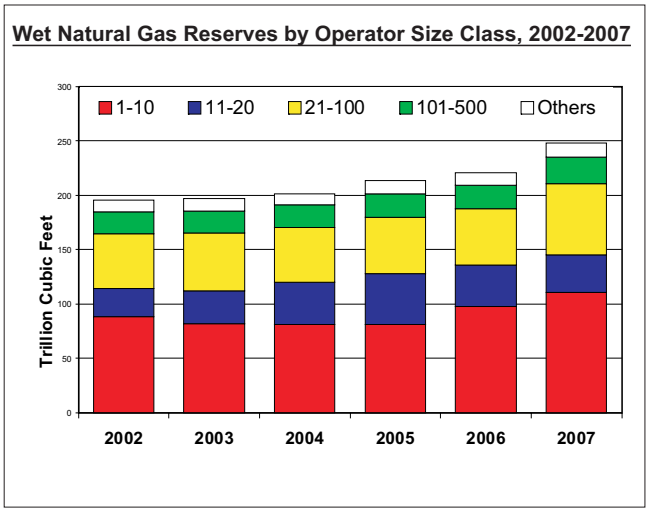
Operator Level Data

This appendix provides a series of tables of the proved reserves and production by production size class for the years 2002 through 2007 for crude oil and natural gas well operators. These tables show the volumetric change and percent change by production size class from the previous year and from 2002. In addition they show the 2007 average per operator in each class. All companies that reported to EIA on Form EIA-23 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 of operator contains 13,274 small operators. We estimated production and reserves for small operators for 2007 from a sample of approximately 4 percent. Class 1-10 contains the 10 highest producing companies during each year on a barrel oil equivalent (BOE) basis. These companies may not necessarily be the same 10 companies each year. The total natural gas production and proved reserves are reported in Table 9 of this report. The total crude oil production and proved reserves are reported in Table 6 of this report.

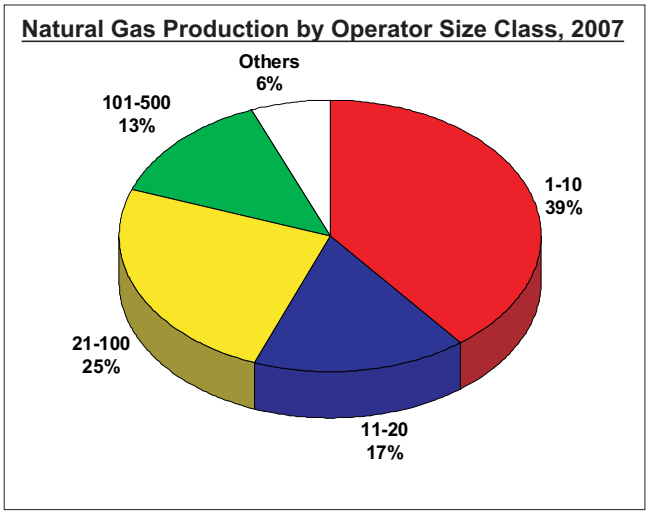
Natural Gas Proved Reserves

The wet natural gas proved reserves reported for 2002 through 2007 have changed from 195,561 billion cubic feet to 247,789 billion cubic feet or 27 percent (**Table A1**). These proved reserves continue to be concentrated in the larger companies. In 2007, the top 20 operators (Class 1-10 and Class 11-20) producing companies had 58 percent of the proved reserves of natural gas in the United States. The next two size classes contain 80 and 400 companies and accounted for 27 and 10 percent of the U.S. natural gas proved reserves, respectively. The top 20 operators had an increase of 27 percent in their natural gas proved reserves from 2002 to 2007. The rest of the operators in (Class 21-100, Class 101-500, and Class Other) had an increase of 28 percent in their reserves in the same time period. In 2007, the top 20 operators' natural gas reserves had an increase of 7 percent from 2006.



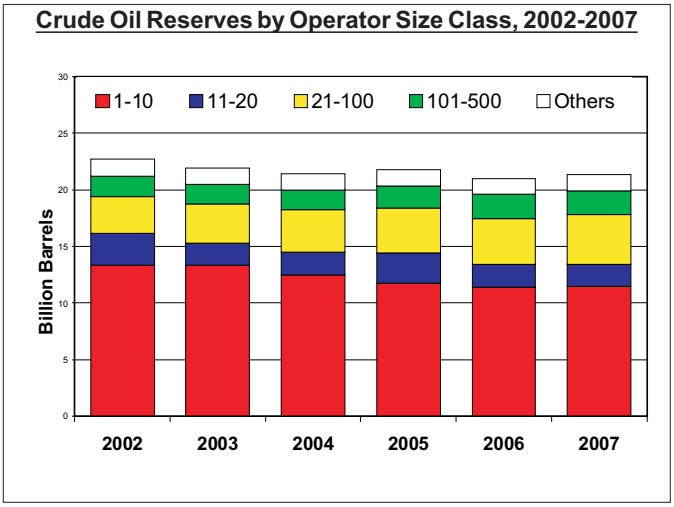
Natural Gas Production

Wet natural gas production has increased from 19,373 billion cubic feet in 2006 to 20,318 billion cubic feet in 2007 or 5 percent (**Table A2**). In 2007, the top 20 producing companies had 56 percent of the production of wet natural gas in the United States. The next two size classes have 25 percent and 13 percent of the wet natural gas production, respectively. The top 20 operators had a decrease of 4 percent in wet natural gas production from 2002 to 2007. The rest of the operators had an increase of 7 percent from 2002 to 2007.



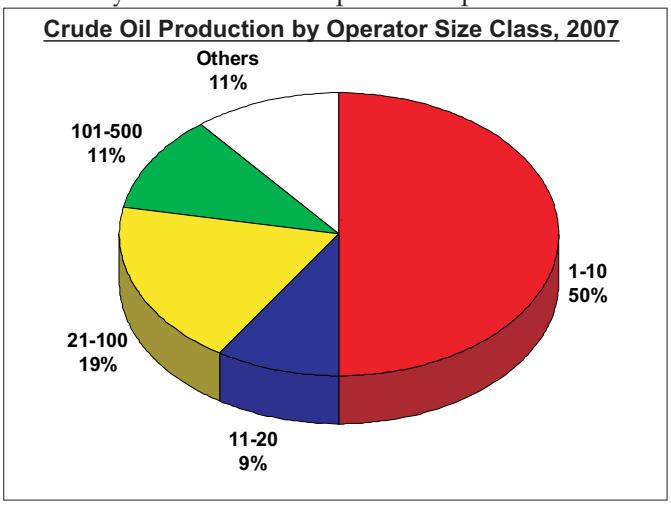
Crude Oil Proved Reserves

The crude oil proved reserves reported by Operator Production Size Class 1-10 for 2002 through 2007 have changed from 13,346 million barrels to 11,437 million barrels or a decrease of 14 percent (**Table A3**). The 10 largest producing companies in 2007 had 54 percent of U.S. proved reserves of crude oil. The 20 largest oil and gas producing companies in 2007 had 63 percent of proved reserves of crude oil. Proved reserves of crude oil in the United States increased 1 percent in 2007 from 2006.



Crude Oil Production

Crude oil production reported for 2006 to 2007 has increased from 1,652 million barrels to 1,691 million barrels or 2 percent (**Table A4**). The 20 largest oil and gas producing companies had 59 percent of U.S. production of crude oil in the United States in 2007. In 2002 they accounted for 68 percent of production.



Crude Oil and Natural Gas Fields

The number of fields in the United States in which Category I and Category II operators were active increased during the 2002-2007 period (**Table A5**). From 2002-2007, the number of fields in which the top 20 operators were active increased by 1,230 fields (21 percent) while in 2007 the number increased by 38 fields from 2006. 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.

Ranked Crude Oil and Natural Gas Production

Table A6 lists the top U.S. oil and gas operators ranked by reported 2007 operated production data. About 75 percent of the production of crude oil or natural gas is reported by the top 50 operators.

Table A1. Natural Gas Proved Reserves, Wet After Lease Separation, by Operator Production Size Class, 2002–2007

(billion cubic feet at 14.73 pia and 60° Fahrenheit)

Size Class	2002	2003	2004	2005	2006	2007	2006–2007 Volume and Percent Change	2002–2007 Volume and Percent Change	2007 Average Reserves per Operator
Class 1-10	88,100	82,222	81,325	80,785	97,372	110,559	13,187	22,460	11,055.924
Percent of Total	45.0%	41.7%	40.4%	37.9%	44.2%	44.6%	13.5%	25.5%	
Class 11-20	25,938	29,890	38,643	47,078	38,134	34,331	-3,803	8,393	3,433.131
Percent of Total	13.3%	15.2%	19.2%	22.1%	17.3%	13.9%	-10.0%	32.4%	
Class 21-100	50,633	53,098	50,149	52,061	52,064	65,795	13,731	15,162	822.435
Percent of Total	25.9%	26.9%	24.9%	24.4%	23.6%	26.6%	26.4%	29.9%	
Class 101-500	19,723	20,030	20,912	21,737	21,877	24,591	2,714	4,868	61.478
Percent of Total	10.1%	10.2%	10.4%	10.2%	9.9%	9.9%	12.4%	24.7%	
Class Other (13,274)	11,167	11,905	10,170	11,647	10,968	12,512	1,544	1,345	0.943
Percent of Total	5.7%	6.0%	5.1%	5.5%	5.0%	5.0%	14.1%	12.0%	
Category I (158)	173,325	173,225	178,269	189,644	182,133	206,699	24,566	33,374	1,324.994
Percent of Total	88.6%	87.9%	88.6%	88.9%	82.6%	83.4%	13.5%	19.3%	
Category II (510)	11,051	11,983	12,494	11,838	27,294	28,365	1,071	17,314	57.073
Percent of Total	5.7%	6.1%	6.2%	5.5%	12.4%	11.4%	3.9%	156.7%	
Category III (13,121)	11,184	11,937	10,437	11,826	10,989	12,725	1,736	1,540	0.970
Percent of Total	5.7%	6.1%	5.2%	5.5%	5.0%	5.1%	15.8%	13.8%	
Total Published	**195,561**	**197,145**	**201,200**	**213,308**	**220,416**	**247,789**	**27,373**	**52,228**	**17.990**

Note: There were 13,121 active Category III operators in the 2007 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 727 Category III operators (Table E2). The "other" size class represents 13,274 operators in the 2007 frame (13,774 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, 2002–2007

(billion cubic feet at 14.73 pia and 60° Fahrenheit)

Size Class	2002	2003	2004	2005	2006	2007	2006–2007 Volume and Percent Change	2002–2007 Volume and Percent Change	2007 Average Production per Operator
Class 1-10	8,996	8,220	7,617	7,068	7,956	7,997	41	-999	799.714
Percent of Total	44.4%	40.6%	38.1%	36.7%	41.1%	39.4%	0.5%	-11.1%	
Class 11-20	2,854	3,136	3,647	3,534	3,078	3,362	284	508	336.218
Percent of Total	14.1%	15.5%	18.2%	18.4%	15.9%	16.5%	9.2%	17.8%	
Class 21-100	4,763	5,275	4,982	4,832	4,492	5,020	528	257	62.749
Percent of Total	23.5%	26.1%	24.9%	25.1%	23.2%	24.7%	11.7%	5.4%	
Class 101-500	2,475	2,386	2,559	2,506	2,605	2,692	87	217	6.730
Percent of Total	12.2%	11.8%	12.8%	13.0%	13.4%	13.2%	3.3%	8.8%	
Class Other (13,274)	1,161	1,215	1,213	1,318	1,241	1,247	6	86	0.094
Percent of Total	5.7%	6.0%	6.1%	6.8%	6.4%	6.1%	0.5%	7.4%	
Category I (158)	17,335	17,347	17,036	16,311	15,092	15,923	831	-1,412	102.071
Percent of Total	85.6%	85.7%	85.1%	84.7%	77.9%	78.4%	5.5%	-8.1%	
Category II (510)	1,738	1,648	1,718	1,605	3,026	3,129	103	1,391	6.295
Percent of Total	8.6%	8.1%	8.6%	8.3%	15.6%	15.4%	3.4%	80.0%	
Category III (13,121)	1,176	1,236	1,263	1,342	1,255	1,266	11	91	0.096
Percent of Total	5.8%	6.1%	6.3%	7.0%	6.5%	6.2%	0.9%	7.7%	
Total Published	**20,248**	**20,231**	**20,017**	**19,259**	**19,373**	**20,318**	**945**	**70**	**1.475**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**4.9%**	**0.3%**	

Note: There were 13,121 active Category III operators in the 2007 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 727 Category III operators (Table E2). The "other" size class represents 13,274 operators in the 2007 frame (13,774 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, 2002–2007
(million barrels of 42 U.S. gallons)

Size Class	2002	2003	2004	2005	2006	2007	2006–2007 Volume and Percent Change	2002–2007 Volume and Percent Change	2007 Average Reserves per Operator
Class 1-10	13,346	13,355	12,454	11,775	11,352	11,437	85	-1,908	1,143.711
Percent of Total	58.9%	61.0%	58.3%	54.1%	54.1%	53.7%	0.8%	-14.3%	
Class 11-20	2,817	1,907	2,053	2,659	2,048	1,933	-115	-884	193.274
Percent of Total	12.4%	8.7%	9.6%	12.2%	9.8%	9.1%	-5.6%	-31.4%	
Class 21-100	3,230	3,483	3,711	3,915	4,066	4,412	346	1,182	55.155
Percent of Total	14.2%	15.9%	17.4%	18.0%	19.4%	20.7%	8.5%	36.6%	
Class 101-500	1,817	1,705	1,761	1,969	2,111	2,136	25	320	5.340
Percent of Total	8.0%	7.8%	8.2%	9.1%	10.1%	10.0%	1.2%	17.6%	
Class Other (13,274)	1,468	1,440	1,393	1,439	1,395	1,399	3	-69	0.105
Percent of Total	6.5%	6.6%	6.5%	6.6%	6.7%	6.6%	0.2%	-4.7%	
Category I (158)	20,213	19,499	19,055	19,348	17,927	18,244	317	-1,969	116.948
Percent of Total	89.1%	89.1%	89.2%	88.9%	85.5%	85.6%	1.8%	-9.7%	
Category II (510)	992	937	906	954	1,642	1,658	16	666	3.337
Percent of Total	4.4%	4.3%	4.2%	4.4%	7.8%	7.8%	1.0%	67.1%	
Category III (13,121)	1,472	1,456	1,410	1,456	1,403	1,415	12	-57	0.108
Percent of Total	6.5%	6.6%	6.6%	6.7%	6.7%	6.6%	0.9%	-3.9%	
Total Published	**22,677**	**21,891**	**21,371**	**21,757**	**20,972**	**21,317**	**345**	**-1,360**	**1.548**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**1.6%**	**-6.0%**	

Note: There were 13,121 active Category III operators in the 2007 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 727 Category III operators (Table E2). The "other" size class represents 13,274 operators in the 2007 frame (13,774 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, 2002–2007
(million barrels of 42 U.S. gallons)

Size Class	2002	2003	2004	2005	2006	2007	2006–2007 Volume and Percent Change	2002–2007 Volume and Percent Change	2007 Average Production per Operator
Class 1-10	1,037	1,047	986	912	820	846	25	-191	84.589
Percent of Total	55.3%	55.8%	54.2%	52.6%	49.7%	50.0%	3.1%	-18.4%	
Class 11-20	233	205	180	178	170	157	-13	-76	15.691
Percent of Total	12.4%	10.9%	9.9%	10.3%	10.3%	9.3%	-7.8%	-32.7%	
Class 21-100	240	272	303	293	309	318	9	78	3.979
Percent of Total	12.8%	14.5%	16.6%	16.9%	18.7%	18.8%	2.9%	32.6%	
Class 101-500	181	178	172	178	173	187	14	6	0.467
Percent of Total	9.7%	9.5%	9.5%	10.3%	10.5%	11.1%	8.0%	3.2%	
Class Other (13,274)	184	175	178	173	179	183	4	-1	0.014
Percent of Total	9.8%	9.3%	9.8%	10.0%	10.8%	10.8%	2.2%	-0.4%	
Category I (158)	1,573	1,574	1,534	1,451	1,314	1,346	33	-227	8.631
Percent of Total	83.9%	83.9%	84.3%	83.7%	79.5%	79.6%	2.5%	-14.4%	
Category II (510)	115	124	105	105	157	159	2	44	0.320
Percent of Total	6.1%	6.6%	5.8%	6.1%	9.5%	9.4%	1.2%	37.9%	
Category III (13,121)	187	179	180	176	181	186	4	-1	0.014
Percent of Total	10.0%	9.5%	9.9%	10.2%	11.0%	11.0%	2.4%	-0.6%	
Total Published	**1,875**	**1,877**	**1,819**	**1,733**	**1,652**	**1,691**	**39**	**-184**	**0.123**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**2.4%**	**-9.8%**	

Note: There were 13,121 active Category III operators in the 2007 sample frame. The reserves and production of Category III operators were estimated from an adjusted sample of 727 Category III operators (Table E2). The "other" size class represents 13,274 operators in the 2007 frame (13,774 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, 2002–2007

Size Class	2002	2003	2004	2005	2006	2007	2006–2007 Number and Percent Change	2002–2007 Number and Percent Change	2007 Average Number of Fields per Operator
Class 1-10	3,596	3,689	3,409	3,738	4,667	4,535	-132	939	453.500
Percent of Total	12.9%	13.2%	12.4%	13.2%	16.4%	15.5%	-2.8%	26.1%	
Class 11-20	2,392	2,492	3,352	2,488	2,513	2,683	170	291	268.300
Percent of Total	8.6%	8.9%	12.2%	8.8%	8.8%	9.2%	6.8%	12.2%	
Class 21-100	7,947	8,168	8,071	9,196	8,433	8,890	457	943	111.125
Percent of Total	28.4%	29.3%	29.4%	32.6%	29.6%	30.4%	5.4%	11.9%	
Class 101-500	12,661	11,859	10,698	10,845	11,219	11,495	276	-1,166	28.738
Percent of Total	45.3%	42.5%	39.0%	38.4%	39.4%	39.3%	2.5%	-9.2%	
Rest	1,349	1,709	1,929	1,952	1,662	1,610	-52	261	10.523
Percent of Total	4.8%	6.1%	7.0%	6.9%	5.8%	5.5%	-3.1%	19.3%	
Category I	17,049	16,760	17,368	17,858	16,953	16,921	-32	-128	108.468
Percent of Total	61.0%	60.0%	63.3%	63.3%	59.5%	57.9%	-0.2%	-0.8%	
Category II	10,473	10,688	9,486	9,738	11,161	12,123	962	1,650	24.392
Percent of Total	37.5%	38.3%	34.5%	34.5%	39.2%	41.5%	8.6%	15.8%	
Total	**27,945**	**27,917**	**27,459**	**28,219**	**28,494**	**29,213**	**719**	**1,268**	**44.737**
Percent of Total	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**100.0%**	**2.5%**	**4.5%**	

Note: Includes only data from Category I and Category II operators. In 2007 there were 156 Category I operators and 497 Category II operators. The "rest" size class had 153 operators in 2007.

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

Table A6. Top 50 U.S. Operators Ranked by Reported 2007 Operated Production Data

Rank	Company Name	Crude Oil Production (thousand barrels/day)	Rank	Company Name	Total Natural Gas Production (milion cubic feet/day)
1	BP PLC	654	1	CONOCOPHILLIPS CO	3,549
2	CHEVRON CORP	427	2	BP PLC	3,028
3	CONOCOPHILLIPS CO	373	3	ANADARKO PETROLEUM CORP	2,463
4	SHELL OIL CO	339	4	CHESAPEAKE ENERGY CORP	2,433
5	OCCIDENTAL PETROLEUM CORP	283	5	DEVON ENERGY CORP	2,351
6	AERA ENERGY LLC	178	6	CHEVRON CORP	1,998
7	ANADARKO PETROLEUM CORP	158	7	XTO ENERGY INC	1,890
8	EXXONMOBIL CORP	115	8	ENCANA OIL & GAS INC	1,793
9	APACHE CORP	107	9	EXXONMOBIL CORP	1,746
10	PLAINS EXPLORATION & PRODUCTION CO	62	10	SHELL OIL CO	1,663
Top 10 Volume Subtotal		2,696	Top 10 Volume Subtotal		22,914
Top 10 Percentage of U.S. Total		53%	Top 10 Percentage of U.S. Total		41%
11	KINDER MORGAN ENERGY PARTNERS	55	11	E O G RESOURCES INC	1,348
12	AMERADA HESS CORP	54	12	WILLIAMS ENERGY INC	1,192
13	NOBLE ENERGY INC	52	13	APACHE CORP	1,151
14	DEVON ENERGY CORP	52	14	EL PASO ENERGY	981
15	MARATHON OIL CORP	44	15	SAMSON RESOURCES CO	851
16	MERIT ENERGY CO	43	16	OCCIDENTAL PETROLEUM CORP	789
17	XTO ENERGY INC	42	17	DOMINION RESOURCES INC	726
18	DENBURY RESOURCES INC	39	18	NEWFIELD EXPLORATION CO	680
19	ENCORE OPERATING LP	38	19	QUESTAR CORP	659
20	CHESAPEAKE ENERGY CORP	36	20	MARATHON OIL CORP	625
Top 20 Volume Subtotal		3,151	Top 20 Volume Subtotal		31,916
Top 20 Percentage of U.S. Total		61%	Top 20 Percentage of U.S. Total		57%
21	E O G RESOURCES INC	34	21	PIONEER NATURAL RESOURCES USA INC	574
22	ENI PETROLEUM CO INC	32	22	NOBLE ENERGY INC	487
23	CONTINENTAL RESOURCES INC	31	23	FOREST OIL CORP	411
24	PIONEER NATURAL RESOURCES USA INC	31	24	MERIT ENERGY CO	404
25	CITY OF LONG BEACH	29	25	CIMAREX ENERGY CO	403
26	DOMINION RESOURCES INC	29	26	ULTRA PETROLEUM INC	386
27	CITATION OIL & GAS CORP	27	27	SANDRIDGE ENERGY	362
28	ST MARY LAND & EXPLORATION CO	25	28	EQUITABLE RESOURCES INC	324
29	ALLIANT ENERGY CORP	25	29	ENERGEN RESOURCES CORP	305
30	MURPHY OIL CORP	24	30	KCS ENERGY INC	269
31	HILCORP ENERGY CO	24	31	SEECO INC	269
32	ENERGEN RESOURCES CORP	24	32	CABOT OIL & GAS CORP	246
33	CIMAREX ENERGY CO	24	33	YATES PETROLEUM CORP	241
34	EL PASO ENERGY	23	34	BILL BARRETT CORP	237
35	NEWFIELD EXPLORATION CO	23	35	PLAINS EXPLORATION & PRODUCTION CO	236
36	BERRY PETROLEUM CO	22	36	W & T OFFSHORE INC	229
37	W & T OFFSHORE INC	20	37	HUNT OIL CO	223
38	STONE ENERGY CORP	19	38	HILCORP ENERGY CO	223
39	SWIFT ENERGY CO	19	39	EXCO RESOURCES INC	216
40	SAMSON RESOURCES CO	17	40	MCMORAN OIL & GAS LLC	214
41	SANDRIDGE ENERGY	17	41	MARINER ENERGY INC	207
42	A T P OIL & GAS CORP	17	42	J - W OPERATING CO	203
43	ENERGY XXI GOM LLC	15	43	RANGE RESOURCES CORP	199
44	ENCANA OIL & GAS INC	14	44	ST MARY LAND & EXPLORATION CO	195
45	NEXEN PETROLEUM USA INC	14	45	HUNT PETROLEUM CORP	188
46	ENERPLUS RESOURCES (USA) CORP	14	46	AMERADA HESS CORP	187
47	FOREST OIL CORP	14	47	ENI PETROLEUM CO INC	187
48	MARINER ENERGY INC	13	48	C N X GAS CO LLC	183
49	HENRY PETROLEUM LP	13	49	UNIT CORP	177
50	WALTER OIL & GAS CORP	12	50	FIDELITY EXPLORATION & PROD CO	171
Top 50 Volume Subtotal		3,796	Top 50 Volume Subtotal		40,072
Top 50 Percentage of U.S. Total		74%	Top 50 Percentage of U.S. Total		72%

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

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

Appendix B

Top 100 Oil and Gas Fields

This appendix presents estimates of the proved reserves and production of the largest or top 100 liquids or gas fields as ranked by reserves or by production. The total liquids production and reserve data include both crude oil and lease condensate, and are 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 may be estimated for the proved reserves and production of these fields. The tables rank the top 100 fields by production (Table B3 and Table B4) rather than by their reserves (Table B1 and Table B2).

Some of the fields in the top 100 are operated by only one or two operators, therefore, the totals for proved reserves are combined in four groups top 10, top 20, top 50, and top 100 to avoid revealing company proprietary data. Many of these same fields are in each of the tables B1, B2, B3, and B4. The top liquids fields with the more recent discovery dates are typically located in the deep waters of the Gulf of Mexico Offshore or Alaska. The gas fields with the more recent discovery dates are normally located in the deep Gulf of Mexico Offshore, New Mexico, Colorado, and Wyoming.

Summary for the Top 100 Fields for 2007 Liquids and Gas

Rank Group	12/31/2007 Proved Reserves	Percent	12/31/2007 Nonproducing Reserves	Percent	Estimated 2007 Production	Percent
Table B1. Top 100 U.S. Fields as Ranked by Liquids Proved Reserves (million barrels)						
Top 10	6,896.1	30.2%	1,872.6	31.1%	359.2	19.2%
Top 20	9,389.8	41.2%	2,560.3	42.6%	526.5	28.1%
Top 50	12,724.3	55.8%	3,370.1	56.0%	757.5	40.5%
Top 100	14,935.7	65.5%	4,097.8	68.1%	927.0	49.5%
Others	7,876.3	34.5%	1,916.2	31.9%	945.0	50.5%
Total	22,812.0	100.0%	6,014.0	100.0%	1,872.0	100.0%
Table B2. Top 100 U.S. Fields as Ranked by Gas Proved Reserves (billion cubic feet)						
Top 10	74,307.4	30.0%	22,553.0	28.9%	4,554.7	22.4%
Top 20	95,713.3	38.6%	26,694.4	34.2%	5,654.8	27.8%
Top 50	126,605.5	51.1%	40,051.1	51.3%	7,748.2	38.1%
Top 100	148,486.7	59.9%	48,297.9	61.8%	9,296.5	45.8%
Others	99,302.3	40.1%	29,796.1	38.2%	11,021.5	54.2%
Total	247,789.0	100.0%	78,094.0	100.0%	20,318.0	100.0%
Table B3. Top 100 U.S. Fields as Ranked by Liquids Production (million barrels)						
Top 10	n/a	n/a	n/a	n/a	433.4	23.2%
Top 20	n/a	n/a	n/a	n/a	596.8	31.9%
Top 50	n/a	n/a	n/a	n/a	832.3	44.5%
Top 100	n/a	n/a	n/a	n/a	1,003.2	53.6%
Others	n/a	n/a	n/a	n/a	868.8	46.4%
Total	n/a	n/a	n/a	n/a	1,872.0	100.0%
Table B4. Top 100 U.S. Fields as Ranked by Gas Production (billion cubic feet)						
Top 10	n/a	n/a	n/a	n/a	4,650.4	22.9%
Top 20	n/a	n/a	n/a	n/a	5,956.8	29.3%
Top 50	n/a	n/a	n/a	n/a	8,179.9	40.3%
Top 100	n/a	n/a	n/a	n/a	9,895.5	48.7%
Others	n/a	n/a	n/a	n/a	10,422.5	51.3%
Total	n/a	n/a	n/a	n/a	20,318.0	100.0%

Table B1. Top 100 Liquids Fields Ranked by Reserves

The top 100 liquids fields by reserves had 14,936 million barrels of proved reserves accounting for 66 percent of the total United States as of December 31, 2007, (Table 6 and Table 15) and 68 percent of the reported nonproducing reserves. In the top 20 liquids fields for 2007 there are eight fields, which are in the deep water of the Gulf of Mexico Federal Offshore or Alaska. The top 100 liquids fields by reserves had 927 million barrels of production, or 50 percent of the 2007 U.S. total (Table 6 and Table 15).

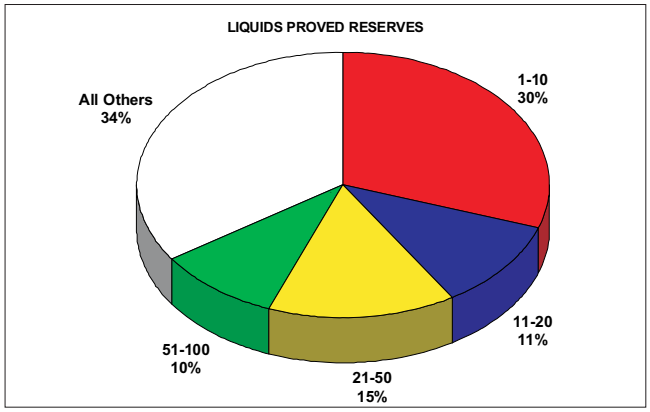


Table B2. Top 100 Gas Fields Ranked by Reserves

The top 100 gas fields by reserves had 148,487 billion cubic feet of wet natural gas proved reserves or 60 percent of the total, as of December 31, 2007 (Table 9) and 62 percent of the reported nonproducing reserves. The top 100 gas fields by reserves had 9,297 billion cubic feet of production, or 46 percent of the 2007 U.S. total (Table 9).

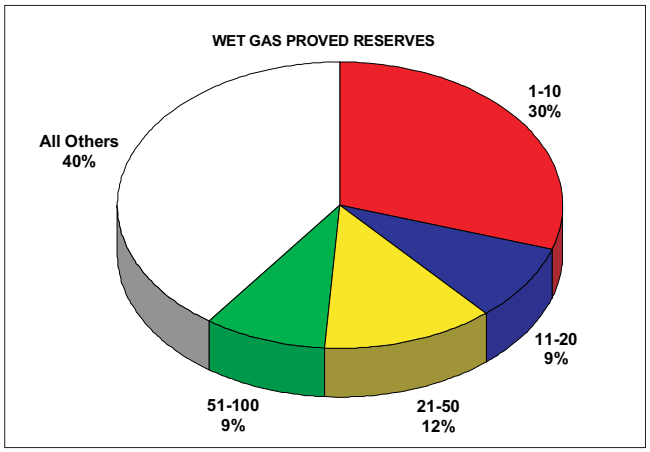


Table B3. Top 100 Liquids Fields Ranked by Production

The top 100 liquids fields by production had 1,003 million barrels of production, or accounted for 54 percent of the 2007 U.S. total (Table 6 and Table 15).

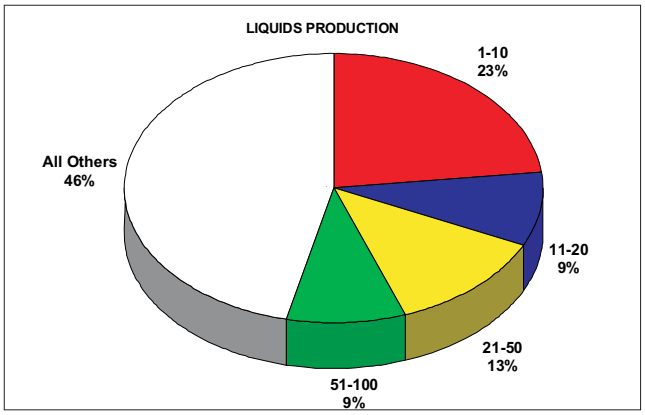


Table B4. Top 100 Gas Fields Ranked by Production

The top 100 gas fields had 9,896 billion cubic feet of production, or 48 accounted for percent of the 2007 U.S. total (Table 9).

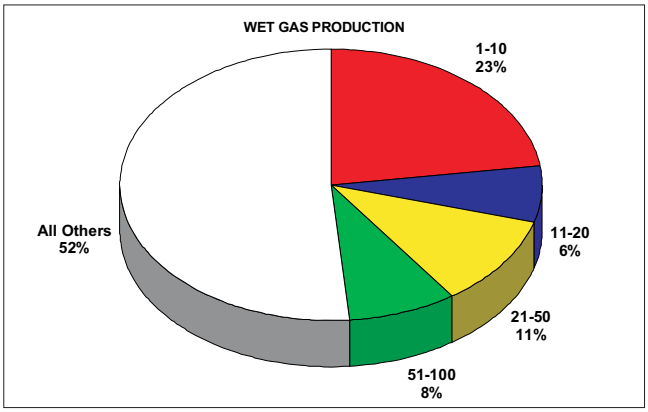


Table B1. Top 100 U.S. Fields Ranked by Liquids Proved Reserves from Estimated 2007 Field Level Data[a]

(million barrels of 42 U.S. gallons)

Num	Field Name	Location	2007 Estimated Production Volume	Rank Group: Proved Reserves	Rank Group: Nonproducing Reserves	Discovery Year
1	PRUDHOE BAY	AK	96.3			1967
2	WASSON	TX	23.6			1937
3	SPRABERRY TREND AREA	TX	28.1			1949
4	BELRIDGE SOUTH	CA	37.0			1911
5	MISSISSIPPI CANYON BLK 807 (MARS-URSA)	FG	75.2	(1-10)		1989
6	KUPARUK RIVER	AK	43.0			1969
7	MISSISSIPPI CANYON BLK 778 (THUNDER HORSE)	FG	0.0			1999
8	MIDWAY-SUNSET	CA	38.0			1901
9	ELK HILLS	CA	16.4			1919
10	GREEN CANYON BLK 743 (ATLANTIS)	FG	1.6			1998
Top 10 Volume Subtotal			**359.2**	**6,896.1**	**1,872.6**	
Top 10 Percentage of U.S. Total			**19.2%**	**30.2%**	**31.1%**	
11	CEDAR HILLS	MT & ND & SD	26.6			1951
12	KERN RIVER	CA	30.1			1899
13	SLAUGHTER	TX	11.3			1937
14	WILMINGTON	CA	14.9			1932
15	WATTENBERG	CO	11.0	(11-20)		1970
16	ALPINE	AK	33.7			1994
17	MILNE POINT	AK	12.2			1982
18	SALT CREEK	WY	3.0			1889
19	GREEN CANYON BLK 826 (MAD DOG)	FG	16.5			1998
20	LEVELLAND	TX	8.0			1945
Top 20 Volume Subtotal			**526.5**	**9,389.8**	**2,560.3**	
Top 20 Percentage of U.S. Total			**28.1%**	**41.2%**	**42.6%**	
21	CYMRIC	CA	18.4			1916
22	LOST HILLS	CA	12.2			1910
23	SEMINOLE	TX	7.5			1936
24	GREEN CANYON BLK 640 (TAHITI)	FG	0.0			2002
25	ELM COULEE	MT	18.4			2000
26	GREATER ANETH	UT	3.7			1956
27	GOLDSMITH	TX	5.8			1935
28	HONDO	FP	5.6			1969
29	ORION	AK	3.7			2002
30	PESCADO	FP	4.4			1970
31	YATES	TX	9.9			1926
32	MISSISSIPPI CANYON BLK 383 (KEPLER)	FG	25.3			1987
33	SHO-VEL-TUM	OK	7.8			1905
34	COWDEN NORTH	TX	5.0			1930
35	HOBBS	NM & TX	4.5	(21-50)		1945
36	VENTURA	CA	4.2			1916
37	NORTHSTAR	AK	13.9			1984
38	ENDICOTT	AK	4.6			1978
39	GIDDINGS	TX	6.5			1960
40	INGLEWOOD	CA	3.1			1924
41	MONUMENT BUTTE	UT	4.3			1964
42	SAN ARDO	CA	3.4			1947
43	WEST SAK	AK	6.4			969
44	GREEN CANYON BLK 644 (HOLSTEIN)	FG	12.3			1999
45	SACATE	FP	3.9			1970
46	POINT MCINTYRE	AK	8.8			1988
47	GREEN CANYON BLK 562 (K 2)	FG	10.9			1999
48	KELLY-SNYDER	TX	10.1			1948
49	BOREALIS	AK	4.6			2001
50	WARD-ESTES NORTH	TX	1.8			1927
Top 50 Volume Subtotal			**757.5**	**12,724.3**	**3,370.1**	
Top 50 Percentage of U.S. Total			**40.5%**	**55.8%**	**56.0%**	

Table B1. Top 100 U.S. Fields Ranked by Liquids Proved Reserves from Estimated 2007 Field Level Data[a] (Continued)
(million barrels of 42 U.S. gallons)

Num	Field Name	Location	2007 Estimated Production Volume	Rank Group: Proved Reserves	Rank Group: Nonproducing Reserves	Discovery Year
51	MISSISSIPPI CANYON BLK 127 (HORN MT.)	FG	8.4			2000
52	FUHRMAN-MASCHO	TX	3.3			1930
53	VACUUM	NM	5.5			1929
54	ROBERTSON NORTH	TX	4.1			1956
55	FULLERTON	TX	4.1			1942
56	MCELROY	TX	4.7			1926
57	SALT CREEK	TX	4.5			1942
58	COALINGA	CA	5.6			1887
59	MISSISSIPPI CANYON BLK 696 (BLIND FAITH)	FG	0.0			2005
60	ARROYO GRANDE	CA	0.5			1906
61	RANGELY	CO	5.2			1902
62	PINEDALE	WY	2.4			1955
63	ATWATER VALLEY BLK 575 (NEPTUNE (AT))	FG	0.0			1995
64	LAKE WASHINGTON	LA	8.3			1931
65	ANTON-IRISH	TX	3.4			1944
66	WESTBROOK	TX	2.0			1920
67	GREEN CANYON BLK 654 (SHENZI)	FG	0.1			2003
68	GARDEN BANKS BLK 171 (SALSA)	FG	4.5			1988
69	EAST TEXAS	TX	4.2			1930
70	BREA-OLINDA	CA	1.2			1897
71	POSTLE	OK	1.9			1958
72	CEDAR LAKE	TX	2.0			1939
73	AURORA	AK	3.5			1969
74	HAWKINS	TX	2.4			1940
75	LISBURNE	AK	3.7	(51-100)		1967
76	NATURAL BUTTES	UT	1.9			1940
77	POLARIS	AK	0.9			2000
78	VIOSCA KNOLL BLK 786 (PETRONIUS)	FG	11.2			1995
79	BURBANK	OK	0.8			1920
80	EUNICE MONUMENT	NM	1.9			1929
81	KERN FRONT	CA	1.7			1925
82	MEANS	TX	3.1			1934
83	TARN	AK	5.8			1991
84	PARSHALL	ND	1.9			2006
85	POSO CREEK	CA	1.3			1929
86	GRAND ISLE BLK 43	FG	3.0			1956
87	MISSISSIPPI CANYON BLK 773 (DEVILS TOWER)	FG	11.6			1999
88	MISSISSIPPI CANYON BLK 84 (KING)	FG	16.8			1993
89	FULLER	TX	0.5			1951
90	NIKAITCHUQ	AK	0.0			2005
91	GOLDEN TREND	OK	2.0			1945
92	HUGOTON GAS AREA	KS & OK & TX	1.5			1922
93	JONAH	WY	3.7			1977
94	WELCH	TX	1.5			1942
95	HOWARD-GLASSCOCK	TX	2.6			1925
96	GREEN CANYON BLK 339 (FRONT RUNNER)	FG	3.6			2001
97	MISSISSIPPI CANYON BLK 20	FG	1.3			1982
98	ALTAMONT-BLUEBELL	UT	2.0			1949
99	FITTS	OK	1.7			1933
100	IATAN EAST HOWARD	TX	1.3			1926
Top 100 Volume Subtotal			**927.0**	**14,935.7**	**4,097.8**	
Top 100 Percentage of U.S. Total			**49.5%**	**65.5%**	**68.1%**	

[a]Includes lease condensate.

Notes: The U.S. total production estimate of 1,872 million barrels and the U.S. total reserves estimate of 22,812 million barrels, used to calculate the percentages in this table, are from the combined totals of Table 6 (crude oil) and Table 15 (lease condensate) 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 2007 Field Level Data[a]
(billion cubic feet)

Num	Field Name	Location	2007 Estimated Production Volume	Rank Group: Proved Reserves	Rank Group: Nonproducing Reserves	Discovery Year
1	SAN JUAN BASIN GAS AREA	CO & NM	1320.7			1927
2	NEWARK EAST	TX	1110.3			1981
3	PRUDHOE BAY	AK	168.7			1967
4	PINEDALE	WY	313.4			1955
5	HUGOTON GAS AREA	KS & OK & TX	357.8	(1-10)		1922
6	NATURAL BUTTES	UT	170.4			1940
7	JONAH	WY	366.3			1977
8	WATTENBERG	CO	169.0			1970
9	ANTRIM	MI	136.1			1965
10	PRB COALBED	MT & WY	442.0			1992
Top 10 Volume Subtotal			**4,554.7**	**74,307.4**	**22,553.0**	
Top 10 Percentage of U.S. Total			**22.4%**	**30.0%**	**28.9%**	
11	FOGARTY CREEK	WY	161.7			1975
12	CARTHAGE	TX	231.7			1936
13	NORTHSTAR	AK	0.0			1984
14	RATON BASIN GAS AREA	CO & NM	123.7			1998
15	LOWER MOBILE BAY AREA	AL & FG	163.0	(11-20)		1979
16	GRAND VALLEY	CO	132.6			1985
17	SPRABERRY TREND AREA	TX	87.9			1949
18	LAKE RIDGE	WY	71.1			1981
19	SAWYER	TX	82.3			1960
20	BIG SANDY	KY	45.9			1926
Top 20 Volume Subtotal			**5,654.8**	**95,713.3**	**26,694.4**	
Top 20 Percentage of U.S. Total			**27.8%**	**38.6%**	**34.2%**	
21	FREESTONE	TX	97.3			1949
22	MADDEN	WY	132.6			1968
23	ELM GROVE	LA	119.9			1916
24	PARACHUTE	CO	99.4			1985
25	OAKWOOD	VA	63.6			1990
26	B-43 (FAYETTEVILLE)	AR	91.8			2004
27	MAMM CREEK	CO	93.1			1959
28	PINON	TX	65.6			1982
29	RULISON	CO	82.3			1958
30	OAK HILL	TX	99.0			1958
31	BALD PRAIRIE	TX	59.8			1976
32	STILES RANCH	OK & TX	72.6			1978
33	ELK HILLS	CA	130.2			1919
34	STRONG CITY DISTRICT	OK	84.2			1966
35	FARRAR	TX	64.2	(21-50)		1963
36	WILD ROSE	WY	31.5			1975
37	MISSISSIPPI CANYON BLK 807 (MARS-URSA)	FG	98.1			1989
38	WAMSUTTER	WY	35.6			1958
39	ECHO SPRINGS	WY	29.3			1976
40	CARTHAGE NORTH	TX	26.0			1966
41	MINDEN	TX	39.0			1954
42	STANDARD DRAW	WY	24.4			1979
43	TEAGUE	TX	74.6			1945
44	BUFFALO WALLOW	TX	62.2			1969
45	HALEY	TX	107.2			1983
46	PICEANCE CREEK	CO	17.9			1930
47	VERNON	LA	78.4			1967
48	NORA	VA	31.7			1949
49	RED OAK-NORRIS	OK	55.8			1910
50	MESA UNIT	WY	25.9			1981
Top 50 Volume Subtotal			**7,748.2**	**126,605.5**	**40,051.1**	
Top 50 Percentage of U.S. Total			**38.1%**	**51.1%**	**51.3%**	

Table B2. Top 100 U.S. Fields Ranked by Gas Proved Reserves from Estimated 2007 Field Level Data[a] (Continued)
(billion cubic feet)

Num	Field Name	Location	2007 Estimated Production Volume	Rank Group: Proved Reserves	Rank Group: Nonproducing Reserves	Discovery Year
51	PINE HOLLOW SOUTH	OK	33.4			1959
52	MOCANE-LAVERNE GAS AREA	KS & OK & TX	53.0			1946
53	DRUNKARDS WASH	UT	53.7			1989
54	GOLDEN TREND	OK	33.8			1945
55	BEAR GRASS	TX	35.1			1977
56	JOHN AMORUSO	TX	59.2			2005
57	GIDDINGS	TX	86.5			1960
58	MAYFIELD NE	OK	80.2			1951
59	OVERTON	TX	47.8			1973
60	BELUGA RIVER	AK	48.0			1962
61	CEDARDALE NE	OK	34.5			1957
62	CASPIANA	LA	34.7			1925
63	HONDO	FP	17.8			1969
64	WATONGA-CHICKASHA TREND	OK	39.3			1948
65	WASSON	TX	40.5			1937
66	SHO-VEL-TUM	OK	31.9			1905
67	GURNEE COAL DEGAS	AL	3.8			1990
68	TIP TOP	WY	17.1			1928
69	RILEY RIDGE	WY	0.1			1980
70	VERDEN	OK	26.2			1948
71	SLIGO	LA	41.5			1922
72	ELK CITY	OK	44.8			1947
73	BRUFF	WY	29.9			1969
74	ENDICOTT	AK	10.1			1978
75	GOMEZ	TX	35.3	(51-100)		1963
76	KINTA	OK	56.3			1914
77	DOWDY RANCH	TX	32.1			1999
78	MISSISSIPPI CANYON BLK 778 (THUNDER HORSE)	FG	0.0			1999
79	SULPHUR CREEK	CO	6.6			1955
80	DEW	TX	30.1			1982
81	CEMENT	OK	44.1			1916
82	BETHANY-LONGSTREET	LA & TX	34.2			1921
83	TRAIL RIDGE	CO	5.8			1990
84	COALGATE NE	OK	12.5			1978
85	WAYNOKA NE	OK	21.5			1956
86	TIERNEY	WY	5.5			1973
87	NACONICHE CREEK	TX	18.6			1978
88	LOGANSPORT-JOAQUIN	LA & TX	32.6			1931
89	FRENCHIE DRAW	WY	14.0			1961
90	BLOCKER	TX	23.4			1954
91	HEMPHILL	TX	26.4			1961
92	BOONSVILLE	TX	28.1			1945
93	WILBURTON	OK	28.4			1941
94	EAST BREAKS BLK 602 (NANSEN)	FG	32.2			1999
95	CLEBURNE WEST	TX	20.9			1992
96	KUPARUK RIVER	AK	19.9			1969
97	OZONA NE	TX	21.7			1966
98	CHEROKEE BASIN COAL GAS AR	KS	35.7			1891
99	MISSISSIPPI CANYON BLK 383 (KEPLER)	FG	44.1			1987
100	BECKVILLE	TX	15.2			1974
Top 100 Volume Subtotal			**9,296.5**	**148,486.7**	**48,297.9**	
Top 100 Percentage of U.S. Total			**45.8%**	**59.9%**	**61.8%**	

[a]Total wet gas after lease separation.

Note: The U.S. total production estimate of 20,318 billion cubic feet and the U.S. total reserves estimate of 247,789 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 2007 Field Level Data[a]
(million barrels of 42 U.S. gallons)

Num	Field Name	Location	2007 Estimated Production Volume	Discovery Year
1	PRUDHOE BAY	AK	96.3	1967
2	MISSISSIPPI CANYON BLK 807 (MARS-URSA)	FG	75.2	1989
3	KUPARUK RIVER	AK	43.0	1969
4	MIDWAY-SUNSET	CA	38.0	1901
5	BELRIDGE SOUTH	CA	37.0	1911
6	ALPINE	AK	33.7	1994
7	KERN RIVER	CA	30.1	1899
8	SPRABERRY TREND AREA	TX	28.1	1949
9	CEDAR HILLS	MT & ND & SD	26.6	1951
10	MISSISSIPPI CANYON BLK 383 (KEPLER)	FG	25.3	1987
Top 10 Volume Subtotal			**433.4**	
Top 10 Percentage of U.S. Total			**23.2%**	
11	WASSON	TX	23.6	1937
12	CYMRIC	CA	18.4	1916
13	ELM COULEE	MT	18.4	2000
14	MISSISSIPPI CANYON BLK 84 (KING)	FG	16.8	1993
15	GREEN CANYON BLK 826 (MAD DOG)	FG	16.5	1998
16	ELK HILLS	CA	16.4	1919
17	WILMINGTON	CA	14.9	1932
18	NORTHSTAR	AK	13.9	1984
19	GREEN CANYON BLK 644 (HOLSTEIN)	FG	12.3	1999
20	MILNE POINT	AK	12.2	1982
Top 20 Volume Subtotal			**596.8**	
Top 20 Percentage of U.S. Total			**31.9%**	
21	LOST HILLS	CA	12.2	1910
22	MISSISSIPPI CANYON BLK 773 (DEVILS TOWER)	FG	11.6	1999
23	SLAUGHTER	TX	11.3	1937
24	VIOSCA KNOLL BLK 786 (PETRONIUS)	FG	11.2	1995
25	WATTENBERG	CO	11.0	1970
26	GREEN CANYON BLK 158 (BRUTUS)	FG	11.0	1989
27	GREEN CANYON BLK 562 (K 2)	FG	10.9	1999
28	KELLY-SNYDER	TX	10.1	1948
29	YATES	TX	9.9	1926
30	POINT MCINTYRE	AK	8.8	1988
31	MISSISSIPPI CANYON BLK 127 (HORN MT.)	FG	8.4	2000
32	LAKE WASHINGTON	LA	8.3	1931
33	LEVELLAND	TX	8.0	1945
34	SHO-VEL-TUM	OK	7.8	1905
35	SEMINOLE	TX	7.5	1936
36	GREEN CANYON BLK 680 (CONSTITUTION)	FG	6.6	2001
37	GIDDINGS	TX	6.5	1960
38	WEST SAK	AK	6.4	1969
39	NANUQ	AK	6.2	2000
40	MISSISSIPPI CANYON BLK 429 (ARIEL)	FG	6.2	1995
41	GOLDSMITH	TX	5.8	1935
42	TARN	AK	5.8	1991
43	MISSISSIPPI CANYON BLK 582 (MEDUSA)	FG	5.7	1998
44	HONDO	FP	5.6	1969
45	COALINGA	CA	5.6	1887
46	FIORD	AK	5.6	1992
47	VACUUM	NM	5.5	1929
48	EWING BANK BLK 873 (LOON)	FG	5.3	1985
49	EAST BREAKS BLK 602 (NANSEN)	FG	5.3	1999
50	RANGELY	CO	5.2	1902
Top 50 Volume Subtotal			**832.3**	
Top 50 Percentage of U.S. Total			**44.5%**	

Table B3. Top 100 U.S. Fields Ranked by Liquids Production from Estimated 2007 Field Level Data[a] (Continued)
(million barrels of 42 U.S. gallons)

Num	Field Name	Location	2007 Estimated Production Volume	Discovery Year
51	COWDEN NORTH	TX	5.0	1930
52	MCELROY	TX	4.7	1926
53	BOREALIS	AK	4.6	2001
54	ENDICOTT	AK	4.6	1978
55	HOBBS	NM & TX	4.5	1945
56	GARDEN BANKS BLK 171 (SALSA)	FG	4.5	1988
57	SALT CREEK	TX	4.5	1942
58	PESCADO	FP	4.4	1970
59	SAN JUAN BASIN GAS AREA	CO & NM	4.4	1927
60	MONUMENT BUTTE	UT	4.3	1964
61	VENTURA	CA	4.2	1916
62	EAST TEXAS	TX	4.2	1930
63	ROBERTSON NORTH	TX	4.1	1956
64	FULLERTON	TX	4.1	1942
65	MISSISSIPPI CANYON BLK 755 (GOMEZ)	FG	4.0	1986
66	SACATE	FP	3.9	1970
67	BURR FERRY NORTH	LA & TX	3.8	1946
68	LISBURNE	AK	3.7	1967
69	ORION	AK	3.7	2002
70	JONAH	WY	3.7	1977
71	GREATER ANETH	UT	3.7	1956
72	GREEN CANYON BLK 339 (FRONT RUNNER)	FG	3.6	2001
73	GARDEN BANKS BLK 260 (BALDPATE)	FG	3.6	1991
74	EUGENE ISLAND SA BLK 330	FG	3.5	1971
75	AURORA	AK	3.5	1969
76	SAN ARDO	CA	3.4	1947
77	ANTON-IRISH	TX	3.4	1944
78	FUHRMAN-MASCHO	TX	3.3	1930
79	INGLEWOOD	CA	3.1	1924
80	MEANS	TX	3.1	1934
81	GRAND ISLE BLK 43	FG	3.0	1956
82	MISSISSIPPI CANYON BLK 109 (AMBERJACK)	FG	3.0	1983
83	SALT CREEK	WY	3.0	1889
84	LOST SOLDIER	WY	2.9	1916
85	NEWARK EAST	TX	2.8	1981
86	POINT PEDERNALES	FP	2.8	1983
87	MAIN PASS SA BLK 299	FG	2.8	1967
88	GREEN CANYON BLK 768 (TICONDEROGA)	FG	2.7	2004
89	JAY	AL & FL	2.6	1951
90	HOWARD-GLASSCOCK	TX	2.6	1925
91	DOLLARHIDE	NM & TX	2.6	1945
92	OREGON BASIN	WY	2.5	1912
93	COGDELL	TX	2.4	1949
94	HAWKINS	TX	2.4	1940
95	PINEDALE	WY	2.4	1955
96	ELK BASIN	MT & WY	2.4	1915
97	GRAYBURG JACKSON	NM	2.3	1929
98	PANHANDLE	TX	2.3	1910
99	JO-MILL	TX	2.3	1953
100	MCARTHUR RIVER	AK	2.2	1965
Top 100 Volume Subtotal			**1,003.2**	
Top 100 Percentage of U.S. Total			**53.6%**	

[a]Includes lease condensate.

Notes: The U.S. total production estimate of 1,834 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 2007 Field Level Data[a]
(billion cubic feet)

Num	Field Name	Location	2007 Estimated Production Volume	Discovery Year
1	SAN JUAN BASIN GAS AREA	CO & NM	1320.7	1927
2	NEWARK EAST	TX	1110.3	1981
3	PRB COALBED	MT & WY	442.0	1992
4	JONAH	WY	366.3	1977
5	HUGOTON GAS AREA	KS & OK & TX	357.8	1922
6	PINEDALE	WY	313.4	1955
7	CARTHAGE	TX	231.7	1936
8	NATURAL BUTTES	UT	170.4	1940
9	WATTENBERG	CO	169.0	1970
10	PRUDHOE BAY	AK	168.7	1967
Top 10 Volume Subtotal			**4,650.4**	
Top 10 Percentage of U.S. Total			**22.9%**	
11	LOWER MOBILE BAY AREA	AL & FG	163.0	1979
12	FOGARTY CREEK	WY	161.7	1975
13	ANTRIM	MI	136.1	1965
14	GRAND VALLEY	CO	132.6	1985
15	MADDEN	WY	132.6	1968
16	ELK HILLS	CA	130.2	1919
17	RATON BASIN GAS AREA	CO & NM	123.7	1998
18	ELM GROVE	LA	119.9	1916
19	HALEY	TX	107.2	1983
20	PARACHUTE	CO	99.4	1985
Top 20 Volume Subtotal			**5,956.8**	
Top 20 Percentage of U.S. Total			**29.3%**	
21	OAK HILL	TX	99.0	1958
22	MISSISSIPPI CANYON BLK 807 (MARS-URSA)	FG	98.1	1989
23	FREESTONE	TX	97.3	1949
24	MAMM CREEK	CO	93.1	1959
25	B-43 (FAYETTEVILLE)	AR	91.8	2004
26	SPRABERRY TREND AREA	TX	87.9	1949
27	GIDDINGS	TX	86.5	1960
28	MCALLEN RANCH	TX	84.4	1960
29	STRONG CITY DISTRICT	OK	84.2	1966
30	RULISON	CO	82.3	1958
31	SAWYER	TX	82.3	1960
32	MAYFIELD NE	OK	80.2	1951
33	VERNON	LA	78.4	1967
34	SAVELL	TX	77.0	1997
35	YATES	TX	74.9	1926
36	TEAGUE	TX	74.6	1945
37	STILES RANCH	OK & TX	72.6	1978
38	LAKE RIDGE	WY	71.1	1981
39	PINON	TX	65.6	1982
40	FARRAR	TX	64.2	1963
41	OAKWOOD	VA	63.6	1990
42	MISSISSIPPI CANYON BLK 731 (MENSA)	FG	63.4	1986
43	BUFFALO WALLOW	TX	62.2	1969
44	BALD PRAIRIE	TX	59.8	1976
45	JOHN AMORUSO	TX	59.2	2005
46	KINTA	OK	56.3	1914
47	RED OAK-NORRIS	OK	55.8	1910
48	DRUNKARDS WASH	UT	53.7	1989
49	MOCANE-LAVERNE GAS AREA	KS & OK & TX	53.0	1946
50	CEDAR HILLS	MT & ND & SD	50.4	1951
Top 50 Volume Subtotal			**8,179.9**	
Top 50 Percentage of U.S. Total			**40.3%**	

Table B4. Top 100 U.S. Fields Ranked by Gas Production from Estimated 2007 Field Level Data[a] (Continued)

(billion cubic feet)

Num	Field Name	Location	2007 Estimated Production Volume	Discovery Year
51	BELUGA RIVER	AK	48.0	1962
52	OVERTON	TX	47.8	1973
53	BIG SANDY	KY	45.9	1926
54	ELK CITY	OK	44.8	1947
55	CEMENT	OK	44.1	1916
56	MISSISSIPPI CANYON BLK 383 (KEPLER)	FG	44.1	1987
57	HAYNES	TX	43.0	1954
58	SLIGO	LA	41.5	1922
59	BURR FERRY NORTH	LA & TX	41.3	1946
60	WASSON	TX	40.5	1937
61	EXSUN	TX	39.7	1974
62	WATONGA-CHICKASHA TREND	OK	39.3	1948
63	MINDEN	TX	39.0	1954
64	B M T	TX	36.6	1994
65	LA PERLA	TX	35.9	1958
66	CHEROKEE BASIN COAL GAS AR	KS	35.7	1891
67	WAMSUTTER	WY	35.6	1958
68	GOMEZ	TX	35.3	1963
69	BEAR GRASS	TX	35.1	1977
70	CASPIANA	LA	34.7	1925
71	CEDARDALE NE	OK	34.5	1957
72	BETHANY-LONGSTREET	LA & TX	34.2	1921
73	GOLDEN TREND	OK	33.8	1945
74	PINE HOLLOW SOUTH	OK	33.4	1959
75	VAQUILLAS RANCH	TX	33.0	1978
76	LOGANSPORT-JOAQUIN	LA & TX	32.6	1931
77	PANOLA	OK	32.5	1964
78	EAST BREAKS BLK 602 (NANSEN)	FG	32.2	1999
79	DOWDY RANCH	TX	32.1	1999
80	SHO-VEL-TUM	OK	31.9	1905
81	NORA	VA	31.7	1949
82	WILD ROSE	WY	31.5	1975
83	CHEYENNE WEST	OK	31.2	1971
84	MENDOTA NW	TX	30.9	1962
85	DEW	TX	30.1	1982
86	BRUFF	WY	29.9	1969
87	BLOCK 31	TX	29.6	1945
88	ROLETA	TX	29.5	1955
89	ECHO SPRINGS	WY	29.3	1976
90	COOK INLET NORTH	AK	28.8	1962
91	JAVELINA	TX	28.4	1947
92	MILLS RANCH	OK & TX	28.4	1945
93	WILBURTON	OK	28.4	1941
94	BOONSVILLE	TX	28.1	1945
95	DOUGLASS WEST	TX	28.0	1967
96	TRAWICK	TX	27.2	1949
97	BROWN-BASSETT	TX	26.9	1953
98	GREENWOOD-WASKOM	LA & TX	26.7	1924
99	HEMPHILL	TX	26.4	1961
100	VERDEN	OK	26.2	1948
Top 100 Volume Subtotal			**9,895.5**	
Top 100 Percentage of U.S. Total			**48.7%**	

[a]Total wet gas after lease separation.

Note: The U.S. total production estimate of 19,259 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.

Appendix C

Conversion to the Metric System

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

> (1) to designate the metric system of measurement as the preferred system of weights and measures for United States trade and commerce. . . .
>
> (2) to require that each Federal agency, by the end of Fiscal Year 1992, use the metric system of measurement in its procurements, grants, and other business–related activities."{45}

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, 1997 – 2007

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)										
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
2004	11.8	66.8	78.5	3.7	98.1	5.2	21.0	124.3	289.2	3,397.7	-82.7
2005	35.1	90.5	125.6	44.2	128.0	32.6	6.5	167.1	275.5	3,459.1	61.4
2006	14.9	0.3	15.3	30.8	80.1	4.8	6.8	91.7	262.6	3,334.3	-124.8
2007	10.3	190.8	201.1	-3.0	103.5	10.5	11.6	125.6	268.8	3,389.1	54.9
	Dry Natural Gas (billion cubic meters)										
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
2004	-3.23	21.07	17.84	52.22	515.31	21.49	34.15	570.95	542.78	5,451.36	98.23
2005	53.43	76.43	129.86	72.04	596.07	26.67	34.21	656.95	522.67	5,787.54	336.18
2006	21.04	-51.99	-30.95	84.84	616.68	11.58	32.71	660.97	525.14	5,977.26	189.72
2007	32.48	437.81	470.29	767.58	22.54	22.54	33.64	823.77	551.22	6,731.65	754.39
	Natural Gas Liquids (million cubic meters)										
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
2004	43.4	15.4	58.8	17.8	116.7	4.1	8.6	129.4	131.5	1,260.5	74.6
2005	-14.1	3.3	-10.8	24.8	137.2	5.1	6.7	149.0	125.3	1,298.1	37.7
2006	27.5	-26.2	1.3	18.6	146.9	2.5	8.4	157.9	128.9	1,346.9	48.8
2007	-22.1	67.1	45.0	16.1	163.8	4.8	9.2	177.7	132.1	1,453.6	106.7

[a]Revisions and adjustments = Col. 1 + Col. 2.

[b]Total discoveries = Col. 5 + Col. 6 + Col. 7.

[c]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

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

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1997–2007 annual reports, DOE/EIA–0216.{20–30}

Appendix D

Historical Reserves Statistics

EIA maintains a data archive of all published proved reserves volumes at the State and National level. Appendix D provides a series of tables of the proved reserves and production of crude oil, natural gas, and natural gas liquids for the U.S. and the lower 48 States for the years 1977 through 2007.

All historical statistics included have previously been published in the annual reports of 1977 through 2006 of the EIA publication U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves Annual Report, DOE EIA-0216.{1-30}

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.

Data Archive Link

http://www.eia.doe.gov/oil_gas/natural_gas/data_publications/crude_oil_natural_gas_reserves/cr.html

The Data Archive is listed in the "Special Files" section of the destination site.

Table D1. U.S. Proved Reserves of Crude Oil, 1976–2007

(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
2004	74	420	494	23	617	33	132	782	1,819	21,371	-520
2005	221	569	790	278	805	205	41	1,051	1,733	21,757	386
2006	94	2	96	194	504	30	43	577	1,652	20,972	-785
2007	65	1,200	1,265	-19	651	66	73	790	1,691	21,317	345

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

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves". They may differ from the official Energy Information Administration production data for crude oil contained in the *Petroleum Supply Annual*, DOE/EIA-0340.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1977 through 2007 annual reports, DOE/EIA-0216.{1-30}

Table D2. U.S. Lower 48 Proved Reserves of Crude Oil, 1976–2007

(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
2004	75	373	448	23	506	33	74	613	1,485	17,044	-401
2005	223	467	690	278	749	205	41	995	1,421	17,586	542
2006	93	153	246	194	404	30	43	477	1,410	17,093	-493
2007	65	747	812	-26	611	21	73	705	1,430	17,154	61

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

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, “Annual Survey of Domestic Oil and Gas Reserves”. They may differ from the official Energy Information Administration production data for crude oil contained in the *Petroleum Supply Annual*, DOE/EIA-0340.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1977 through 2007 annual reports, DOE/EIA-0216.{1-30}

Table D3. U.S. Proved Reserves of Dry Natural Gas, 1976–2007

(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
2004	-114	744	630	1,844	18,198	759	1,206	20,163	19,168	192,513	3,469
2005	1,887	2,699	4,856	2,544	21,050	942	1,208	23,200	18,458	204,385	11,872
2006	743	-1,836	-1,093	2,996	21,778	409	1,155	23,342	18,545	211,085	6,700
2007	1147	15,461	16,608	408	27,107	796	1,188	23,342	19,466	237,726	26,641

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.
[b]Revisions and adjustments = Col. 1 + Col. 2.
[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.
[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.
[e]Based on following year data only.
[f]Consists only of operator reported corrections and no other adjustments.
[g]An unusually large revision decrease to North Slope dry natural gas reserves was made in 1988. It recognizes some 24.6 trillion cubic feet of downward revisions reported during the last few years by operators because of economic and market conditions. EIA in previous years carried these reserves in the proved category.

– = Not applicable.

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

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1977 through 2007 annual reports, DOE/EIA-0216.{1-30}

Table D4. U.S. Lower 48 Proved Reserves of Dry Natural Gas, 1976–2007

(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
2004	-113	319	206	1,844	18,057	759	1,171	19,987	18,690	184,106	3,347
2005	1,889	2,560	4,449	2,542	20,988	920	1,198	23,106	17,989	196,214	12,108
2006	789	-4,313	-3,524	2,996	21,729	409	1,153	23,291	18,137	200,840	4,626
2007	1146	13,426	14,572	412	27,079	796	1,188	29,063	19,078	225,809	24,969

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

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

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1977 through 2006 annual reports, DOE/EIA-0216.{1-30}

Table D5. U.S. Proved Reserves of Wet Natural Gas, After Lease Separation, 1978–2007

(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
2004	170	825	995	1,975	19,068	790	1,244	21,102	20,017	201,200	4,055
2005	1,693	2,715	4,408	2,674	22,069	973	1,243	24,285	19,259	213,308	12,108
2006	946	-2,099	-1,153	3,178	22,834	425	1,197	24,456	19,373	220,416	7,108
2007	990	15,936	16,926	452	28,255	814	12,744	41,813	20,318	247,789	27,373

[a]Includes operator reported corrections for the years 1978 through 1981. After 1981 operators included corrections with revisions.

[b]Revisions and adjustments = Col. 1 + Col. 2.

[c]Total discoveries = Col. 5 + Col. 6 + Col. 7.

[d]Proved reserves = Col. 10 from prior year + Col. 3 + Col. 4 + Col. 8 - Col. 9.

[e]Based on following year data only.

[f]An unusually large revision decrease to North Slope wet natural gas reserves was made in 1988. It recognizes some 25 trillion cubic feet of downward revisions reported during the last few years by operators because of economic and market conditions. EIA in previous years carried these reserves in the proved category.

– = Not applicable.

Notes: Old means discovered in a prior year. New means discovered during the report year. The production estimates in this table are based on data reported on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves". They may differ from the official Energy Information Administration production data for natural gas contained in the *Natural Gas Annual,* DOE/EIA-013.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1979 through 2007 annual reports, DOE/EIA-0216.{3-30}

Table D6. U.S. Lower 48 Proved Reserves of Wet Natural Gas, After Lease Separation, 1978–2007

(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
2004	170	395	565	1,975	18,927	790	1,209	20,926	19,536	192,727	3,930
2005	1,694	2,575	4,269	2,672	22,007	951	1,233	24,191	18,788	205,071	12,344
2006	996	-4,603	-3,607	3,178	22,784	425	1,195	24,404	18,963	210,083	5,012
2007	988	13,881	14,869	457	28,227	814	1,244	30,285	19,927	235,767	25,684

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

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

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1979 through 2007 annual reports, DOE/EIA-0216.{3-30}

Table D7. U.S. Proved Reserves of Natural Gas Liquids, 1978–2007

(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
2004	273	97	370	112	734	26	54	814	827	7,928	469
2005	-89	21	-68	156	863	32	42	937	788	8,165	237
2006	173	-165	8	117	924	16	53	993	811	8,472	307
2007	-139	422	283	101	1,030	30	58	1,118	831	9,143	671

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

Notes: Natural Gas Liquids volumes in this table are a sum of lease condensate and natural gas plant liquids for the year referenced. 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 publications *Petroleum Supply Annual,* DOE/EIA-0340 and *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves,* 1979 through 2007 annual reports, DOE/EIA-0216.{3-30}

Table D8. U.S. Lower 48 Proved Reserves of Natural Gas Liquids, 1978–2007

(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
2004	273	97	370	112	734	26	54	814	809	7,559	487
2005	-89	21	-68	156	863	32	42	937	771	7,813	254
2006	173	-165	8	117	924	16	53	993	797	8,134	321
2007	-139	422	283	101	1,030	30	58	1,118	818	8,818	684

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

Notes: Natural Gas Liquids volumes in this table are a sum of lease condensate and natural gas plant liquids for the year referenced. 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 publications *Petroleum Supply Annual,* DOE/EIA-0340 and *Natural Gas Annual,* DOE/EIA-0131.

Source: *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, 1979 through 2007 annual reports, DOE/EIA-0216.{3-30}

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2007

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
2004	467	404	63	310	157	66.4
2005	409	342	67	305	104	75.0
2006	406	348	58	318	87	78.5
2007	414	372	42	313	101	75.6
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
2004	4,144	3,919	225	3,280	864	79.2
2005	4,042	3,851	191	3,272	770	81.0
2006	3,655	3,500	155	2,983	672	81.6
2007	3,464	3,320	144	2,836	628	81.9

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2007 (continued)

Year	Gulf of Mexico			Depth		Deepwater Percentage
	Total	Louisiana[a]	Texas	Greater than 200 meters	Less than 200 meters	
	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
2004	3,967	2,890	1,077	1,251	2,716	31.5
2005	2,968	2,056	912	1,070	1,898	36.1
2006	2,805	2,036	769	1,112	1,692	39.6
2007	2,762	2,135	627	1,050	1,712	38.0
Reserves						
1992	27,050	20,006	7,044	3,273	23,777	12.1
1993	26,463	19,751	6,712	3,495	22,968	13.2
1994	27,626	21,208	6,418	4,772	22,854	17.3
1995	28,229	21,664	6,565	5,811	22,418	20.6
1996	28,153	22,119	6,034	6,389	21,764	22.7
1997	28,455	22,428	6,027	7,491	20,964	26.3
1998	26,937	21,261	5,676	7,575	19,362	28.1
1999	26,062	20,172	5,890	7,726	18,336	29.6
2000	26,891	20,466	6,425	8,731	18,160	32.5
2001	27,100	20,290	6,810	11,229	15,871	41.4
2002	25,347	19,113	6,234	10,540	14,807	41.6
2003	22,522	17,168	5,354	10,041	12,481	44.6
2004	19,288	15,144	4,144	8,591	10,698	44.5
2005	17,427	14,073	3,354	8,042	9,385	46.1
2006	14,938	12,201	2,737	6,690	8,248	44.8
2007	14,008	11,458	2,550	6,550	7,458	46.8

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2007 (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
2004	155	127	28	51	104	32.9
2005	123	98	25	44	79	35.8
2006	125	102	23	50	75	39.6
2007	127	108	19	48	79	37.8
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
2004	713	615	98	292	421	32.9
2005	688	603	85	248	440	36.0
2006	649	575	74	291	358	44.8
2007	620	528	92	290	330	46.8

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2007 (continued)

Year	Gulf of Mexico			Depth		Deepwater Percentage
	Total	Louisiana[a]	Texas	Greater than 200 meters	Less than 200 meters	
	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
2004	3,874	2,802	1,072	1,222	2,652	31.5
2005	2,906	1,997	909	1,069	1,837	36.8
2006	2,738	1,973	765	1,086	1,652	39.6
2007	2,691	2,066	625	1,024	1,667	38.1
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
2004	18,812	14,685	4,127	8,379	10,433	44.5
2005	17,007	13,665	3,342	8,043	8,964	47.3
2006	14,549	11,824	2,725	6,516	8,033	44.8
2007	13,634	11,090	2,544	6,382	7,252	46.8

Table D9. Deepwater Production and Proved Reserves of the Gulf of Mexico Federal Offshore, 1992-2007 (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
2004	74	49	25	27	47	36.2
2005	62	39	23	26	36	41.9
2006	58	37	21	23	35	40.1
2007	58	40	18	22	36	37.9
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
2004	290	205	85	103	187	35.6
2005	272	196	76	104	168	38.2
2006	249	185	64	90	159	36.2
2007	251	163	88	111	140	44.2

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

Table D10. 2007 Reported Proved Nonproducing Reserves of Crude Oil, Lease Condensate, and Wet Natural Gas, After Lease Separation[a]

State and Subdivision	Crude Oil (million bbls)	Lease Condensate (million bbls)	Nonassociated Gas (bcf)	Associated Dissolved Gas (bcf)	Total Gas (bcf)
Alaska	400	0	21	317	338
Lower 48 States	5,055	559	6,869	70,887	77,756
Alabama	0	1	0	225	225
Arkansas	0	0	2	1,045	1,047
California	335	0	466	175	641
Coastal Region Onshore	42	0	14	0	14
Los Angeles Basin Onshore	98	0	16	0	16
San Joaquin Basin Onshore	168	0	426	173	599
State Offshore	27	0	10	2	12
Colorado	122	53	969	8,177	9,146
Florida	12	0	98	0	98
Kansas	9	0	2	148	150
Kentucky	0	0	0	232	232
Louisiana	193	41	363	3,976	4,339
North	11	10	22	2,549	2,571
South Onshore	164	29	311	1,324	1,635
State Offshore	18	2	30	103	133
Michigan	2	1	12	674	686
Mississippi	35	1	6	200	206
Montana	90	0	23	128	151
New Mexico	147	11	294	3,682	3,976
East	147	10	287	612	899
West	0	1	7	3,070	3,077
New York	0	0	0	49	49
North Dakota	107	1	60	12	72
Ohio	8	0	3	125	128
Oklahoma	118	54	154	5,926	6,080
Pennsylvania	0	0	5	709	714
Texas	1,186	140	1,998	24,549	26,547
RRC District 1	27	2	19	361	380
RRC District 2 Onshore	16	4	57	770	827
RRC District 3 Onshore	22	14	92	717	809
RRC District 4 Onshore	2	30	38	2,751	2,789
RRC District 5	1	0	17	8,024	8,041
RRC District 6	18	44	6	4,139	4,145
RRC District 7B	1	1	0	807	807
RRC District 7C	137	7	515	1,250	1,765
RRC District 8	454	4	674	1,514	2,188
RRC District 8A	484	0	441	4	445
RRC District 9	12	9	13	2,289	2,302
RRC District 10	12	23	126	1,850	1,976
State Offshore	0	2	0	73	73
Utah	174	28	167	2,272	2,439
Virginia	0	0	0	894	894
West Virginia	0	0	0	1,010	1,010
Wyoming	208	105	67	11,533	11,600
Federal Offshore[b]	2,304	123	2,180	5,081	7,261
Pacific (California)	20	4	43	48	91
Gulf of Mexico (Louisiana)[b]	2,231	85	1,970	4,139	6,109
Gulf of Mexico (Texas)	53	34	167	894	1,061
Miscellaneous[c]	5	0	0	65	65
U.S. Total	5,455	559	6,890	71,204	78,094

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

[b]Includes Federal offshore Alabama.

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

Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2007.

Appendix E

Summary of Data Collection Operations

Form EIA-23 Survey Design

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

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

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

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

Data were filed for calendar year 2007 by crude oil or natural gas well operators who were active as of December 31, 2007. 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 2000 and 2007, and depicts the number of active operators, with 2002 showing the largest in the series. The 2007 sampling frame consisted of 158 Category I, 510 Category II, 292 Category III Certainty, and 12,814 Category III Noncertainty operators, for a total of 13,774 active operators. The survey sample consisted of 960 operators selected with certainty that included all of the Category I and II Certainty operators, the 292 smaller operators that were selected with certainty because of their size in relation to the area or areas in which they operated, and 478 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 2007 survey is summarized in **Table E2**. EIA makes a considerable effort to gain responses from all operators. About 4 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 75 nonoperators, 17 had successor operators that had taken over the production of the nonoperator. These successor operators were subsequently sampled. The overall response rate for the 2007 survey was 96 percent. For the 59 operators that did not respond, production data were 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, 2000-2007

Operator Category	Number of Operators							
	2000	2001	2002	2003	2004	2005	2006	2007
Certainty								
Category I	175	179	176	164	164	172	173	158
Category II	436	485	480	512	532	522	467	510
Category III	854	559	388	399	275	195	232	292
Sampled	1,465	1,223	1,044	1,075	971	889	872	960
Percent Sampled	100	100	100	100	100	100	100	100
Noncertainty								
Sampled	1,311	644	533	479	370	505	483	478
Percent Sampled	7	3	3	3	2	4	4	4
Total								
Active Operators	22,102	22,519	22,823	20,923	20,670	15,158	13,820	13,774
Not Sampled	19,326	20,652	21,246	19,369	19,329	13,764	12,465	12,336
Sampled	2,776	1,867	1,577	1,554	1,341	1,394	1,355	1,438
Percent Sampled	13	8	7	7	7	9	10	10

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

Table E2. Form EIA-23 Survey Response Statistics, 2007

Operator Category	Original Sample Selected	Successor[a] Operators	Net[b] Category Changes	Non-[c] operators	Adjusted[d] Sample	Responding Operators		Nonresponding[e] Operators	
						Number	Percent	Number	Percent
Certainty									
Category I	158	1	0	-3	156	156	100.0	0	0.0
Category II	510	14	-11	-16	497	497	100.0	0	0.0
Category III	292	2	15	-21	288	268	93.1	20	6.9
Subtotal	960	17	4	-40	941	921	97.9	20	2.1
Noncertainty	478	0	-4	-35	439	427	97.3	39	8.9
Total	1,438	17	0	-75	1,380	1,348	97.7	59	4.3

[a]Successor operators are those, not initially sampled, that have taken over the production of a sampled operator.
[b]Net of recategorized operators in the sample (excluding nonoperators).
[c]Includes former operators reporting that they were not operators during the report year and operators that could not be located who are treated as nonoperators.
[d]Adjusted sample equals original sample plus successor operators plus net category changes minus nonoperators.
[e]For the 59 operators (20 Category III operators and 39 Noncertainty operators) that did not respond, production data were obtained from State or other sources.
Source: Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves" 2007.

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, prospect name, reservoir type, 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 2007,* in January 2008, was the 26th annual report and reflected data collected through December 2007. 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 2007, Form EIA-23 National estimates of production were 1,872 million barrels for crude oil and lease condensate or 24 million barrels (1.3 percent) higher than that reported in the *Petroleum Supply Annual 2007* for crude oil and lease condensate (1,848 million barrels). Form EIA-23 National estimates of production for dry natural gas were 19,465 billion cubic feet, 187 billion cubic feet (almost 1 percent) higher than the *Natural Gas Monthly, October 2008* for 2007 dry natural gas production (19,278 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 HPDI, LLC., 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 2007 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 31, 2007. Of these, 14,043 were confirmed operators. These are operators who have filed in the past or for whom the EIA has recent production data from an outside source. The remaining operators (including both definite and probable nonoperators) exist as a pool of names and addresses that may be added to the active list if review indicates activity.

Table E3. Summary of the 2007 Operator Frame Activity, Form EIA-23

Total 2006 Operator Frame	68,616
Operators	13,774
Nonoperators	54,842
Changes to 2007 Operator Status	365
From Nonoperator to Operator[a]	294
From Operator to Nonoperator	71
Recycles Old Operator ID's	-336
New Operators	336
No Changes to 2007 Operator Status	68,251
Operators	13,749
Nonoperators	54,502
Total 2007 Operator Frame	**68,616**
Operators	13,997
Nonoperators	54,619

Note: Includes operator frame activity through December 31, 2007.
[a]No additions were made since EIA ID numbers are now being recycled when no useable data are 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.

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.

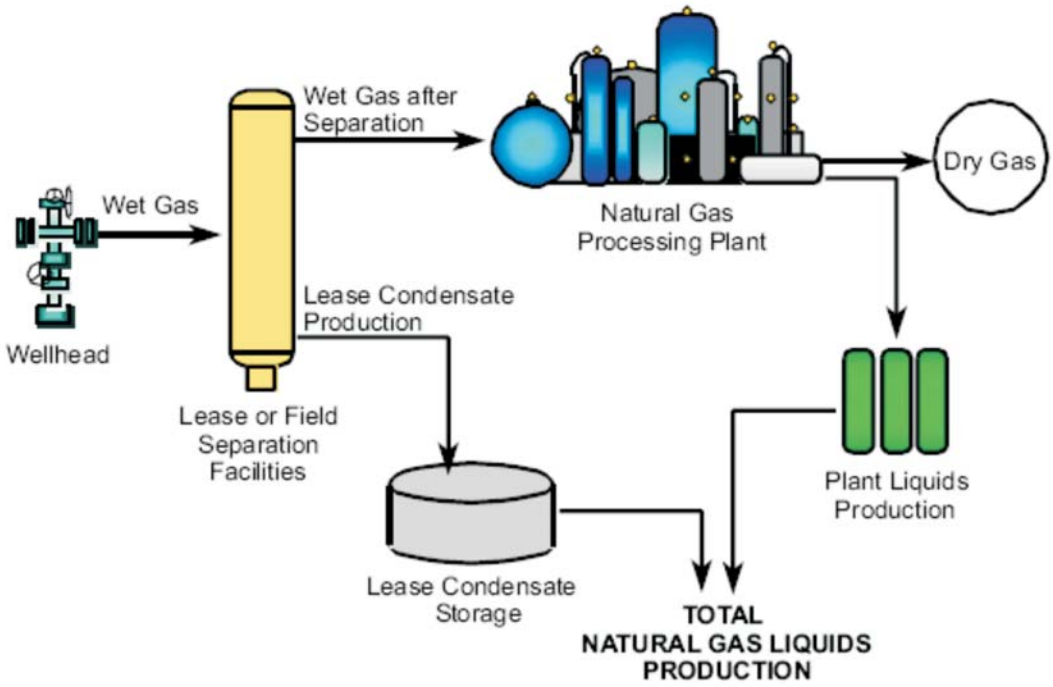
Form EIA-64A Response Statistics

EIA mailed EIA-64A forms to all known natural gas processing plant operators as of February 1, 2007. In addition, plant operators whose plants were shut down or dismantled during 2007 were required to complete forms for the portion of 2007 when the plants were in operation.

Natural gas processing plant operators were requested to file a Form EIA-64A for each of their plants. A total of 214 operators of 496 plants were sent forms. This number included 5 new plants, 3 reactivated plants, and 2 successor plants, all identified after the initial 2007 survey mailing. A total of 11 plants were reported as nonoperating according to the Form EIA-64A definition. For the 20th 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

Figure E1. Natural Gas Liquids Extraction Flows



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

of the volume and origin of natural gas delivered to the processing plants and the volume of the natural gas liquids extracted by the plants by State. The majority of the plant operators reported only one area of origin for the natural gas that was processed by a plant. The State or area of origin reported is generally also the plant's location.

Form EIA-64A Reporting Requirements

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

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

Form EIA-64A Comparison with Other Data Series

Form EIA-64A plant liquids production data were compared with data collected on Form EIA-816, "Monthly Natural Gas Liquids Report." Aggregated production from Form EIA-816 represents the net volume of natural gas processing plant liquid output less input for the report year. These data are published in EIA's *Petroleum Supply Annual* reports. The Form EIA-64A annual responses reflect all corrections and revisions to EIA's monthly estimates. Differences, when found, were reconciled in both sources. For 2007, the Form EIA-64A National estimates (**Table E4**) were 1.2 percent (7,497 thousand barrels) higher than the *Petroleum Supply Annual 2007* volume of 650,794 thousand barrels for natural gas plant liquids production.

Table E4. Natural Gas Processed and Liquids Extracted at Natural Gas Processing Plants, 2007

Plant Location	Volume of Natural Gas Delivered to Processing Plants				
	State Production	Federal Production	Out of State Production	Natural Gas Processed	Total Liquids Extracted
	(million cubic feet)				(thousand barrels)
Alaska	2,965,956	0	0	2,965,956	22,419
Alabama	36,238	221,205	0	257,443	13,381
Arkansas	11,532	0	0	11,532	126
California	206,125	114	0	206,239	11,388
Colorado	888,081	0	624	888,705	27,447
Florida	1,269	0	1,153	2,422	103
Kansas	318,567	0	72,455	391,022	19,600
Kentucky	38,158	0	0	38,158	1,455
Louisiana	1,045,012	1,812,431	0	2,857,443	77,905
Michigan	29,436	0	0	29,436	2,547
Mississippi	5,096	219,500	0	224,596	9,133
Montana	13,646	0	0	13,646	1,168
North Dakota	69,653	0	0	69,653	5,647
New Mexico	811,312	0	0	811,312	66,007
Oklahoma	953,871	0	10,838	964,709	66,458
Texas	4,146,194	0	41,164	4,187,358	273,082
Utah	193,027	0	2,674	195,701	2,241
West Virginia	102,625	0	30,797	133,422	6,009
Wyoming	1,381,987	0	17,583	1,399,570	51,488
Miscellanous[a]	15,058	0	0	15,058	687
Total	**13,232,843**	**2,253,250**	**177,288**	**15,663,381**	**658,291**

[a]Includes Illinois, Ohio, and Pennsylvania.

Source: Form EIA-64A, "Annual Report of the Origin of Natural Gas Liquids Production," 2007

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 2007 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 March 1, 2008.

Table E5. Form EIA-64A 2007 Plant Frame Activity

Frame as of 2006 survey mailing	491
Additions	99
Deletions	–94
Frame as of 2007 survey mailing	496

Note: Includes operator frame activity through March 1, 2008.
Source: Energy Information Administration, Office of Oil and Gas.

Appendix F

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 2006. 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 2007 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 2006 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 2006 for any product class.
- 4 percent for each State/subdivision having less than 1 percent of estimated U.S. reserves or production in 2006 (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 2006.
- **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 2006, and additionally, all coalbed methane and Federal Offshore operators.
- **Category III** - *Small Operators:* Operators who produced less than the Category II operators in 2006.

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.
- 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.

Table F1. 2007 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	36	1	10	0.040	0.025
Alaska	8	0	0		
Arkansas	62	9	15	0.040	0.025
California - Coastal Region Onshore	15	1	2	0.080	0.080
California - Los Angeles Basin Onshore	17	5	2	0.010	0.010
California - San Joaquin Basin Onshore	41	3	5	0.025	0.040
Colorado	116	3	24	0.025	0.010
Florida	4	0	0	0.025	0.025
Illinois	33	29	24	0.040	0.040
Indiana	35	18	22	0.040	0.080
Kansas	163	86	70	0.040	0.080
Kentucky	40	21	13	0.025	0.010
Louisiana-North	114	18	31	0.040	0.040
Louisiana-South Onshore	200	25	30	0.010	0.010
Michigan	34	5	6	0.010	0.010
Mississippi	77	2	15	0.040	0.040
Montana	65	1	9	0.040	0.040
Nebraska	16	1	12	0.040	0.040
New Mexico - East	150	5	36	0.040	0.080
New Mexico - West	53	8	6	0.025	0.025
New York	16	4	4	0.025	0.010
North Dakota	64	0	6	0.080	0.040
Ohio	27	37	8	0.040	0.040
Oklahoma	258	66	105	0.040	0.040
Pennsylvania	42	10	7	0.025	0.025
Texas - RRC District 1	128	5	37	0.040	0.040
Texas - RRC District 2 Onshore	192	3	39	0.025	0.025
Texas - RRC District 3 Onshore	248	4	49	0.040	0.025
Texas - RRC District 4 Onshore	202	7	33	0.025	0.025
Texas - RRC District 5	105	4	22	0.040	0.010
Texas - RRC District 6	173	7	43	0.040	0.010
Texas - RRC District 7B	148	30	91	0.025	0.010
Texas - RRC District 7C	161	5	54	0.025	0.025
Texas - RRC District 8	190	1	47	0.040	0.025
Texas - RRC District 8A	170	0	53	0.010	0.010
Texas - RRC District 9	149	25	84	0.010	0.040
Texas - RRC District 10	142	32	45	0.025	0.025
Utah	54	0	6	0.040	0.010
Virginia	20	0	0	0.040	0.025
West Virginia	32	15	5	0.080	0.040
Wyoming	148	10	16	0.040	0.025
Offshore Areas	334	0	2	0.025	0.025
Other States[a]	50	5	1	0.080	0.080
Total	**[b]964**	**511**	**[b]404**	**0.010**	**0.010**

[a]Includes Arizona, Idaho, Iowa, Maryland, Missouri, Nevada, Oregon, South Dakota, Tennessee, and Washington.

[b]Nonduplicative count of operators by States.

Note: Sampling rate was 10 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.

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 6 states were included in the noncertainty sample: Illinois, Indiana, Kentucky, Pennsylvania, Tennessee, 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.

Imputation and Estimation for Reserves Data

There were 439 operators sampled proportional to size (Table E2) that responded as Category III noncertainty operators. Only 50 of these, located in 6 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 389 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 (**Table F2-F5**).

The data reported by operator category on Form EIA-23 and data imputed and estimated for report year 2007 are summarized in **Tables F2, F3, F4, and F5**. The reported data in **Table F2** shows that those responding operators accounted for 93.7 percent of the published production for wet natural gas and 95.7 percent of the reserves shown in **Table 9**. Data shown in **Table F3**

indicate that those responding operators accounted for 94.5 percent of the nonassociated natural gas production and 95.6 percent of the reserves published in **Table 10**. The reported data shown in **Table F4** indicate that those responding operators accounted for 79.5 percent of published crude oil production and 93.8 percent of the reserves shown in **Table 6**. Additionally, **Table F5** indicates that those responding operators accounted for 92.3 percent of the published production and 84.8 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:

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

- *Alpha, Beta* = Regional Coefficients (calculated)
- *MOS* = *Measure of size* for a respondent, which is equal to the barrel oil equivalent volume of a respondent's 2006 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.

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. This technique improved the correlation of EIA data with State and commercial production data, and reduced the burden of reporting and analysis on both EIA and the noncertainty operators in these States.

Imputation of 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.

Table F2. Summary of Form EIA-23 Reported, Imputed, and Estimated Natural Gas Data for 2007, Wet after Lease Separation (million cubic feet at 14.73 psia and 60° Fahrenheit)

Level of Reporting	Operator Category I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
			Reported			
Number of Operators	156	497	288	439	9,324	10,704
Proved Reserves as of 12/31/06	192,939,286	17,390,372	275,120	0	0	210,604,778
(+) Revision Increases	27,892,861	4,242,700	22,252	0	0	32,157,813
(-) Revision Decreases	13,574,786	2,927,766	19,440	0	0	16,521,992
(-) Sales	13,084,210	2,226,057	201,468	0	0	15,511,735
(+) Acquisitions	9,867,217	6,059,406	16,780	0	0	15,943,403
(+) Extensions	22,660,941	4,352,000	60,283	0	0	27,073,224
(+) New Field Discoveries	589,968	211,047	0	0	0	801,015
(+) New Reservoirs in Old Fields	941,482	252,811	0	0	0	1,194,293
(-) Production With Proved Reserves Reported	16,671,585	2,047,865	4,062	0	0	18,723,512
(-) Production Without Proved Reserves Reported	0	249,676	3,797	0	0	253,473
Proved Reserves as of 12/31/07	211,561,394	25,320,441	149,465	0	0	237,031,300
			Imputed and Estimated			
Number of Operators	-	-	-	3,070	-	3,070
Proved Reserves as of 12/31/06	-	-	-	-	-	-
(+) Revision Increases	0	0	0	0	1,247,943	1,247,943
(-) Revision Decreases	0	0	0	0	945,370	945,370
(-) Sales	0	0	0	0	0	0
(+) Acquisitions	0	0	0	0	28,542	28,542
(+) Extensions	0	0	0	0	1,182,840	1,182,840
(+) New Field Discoveries	0	0	0	0	15,450	15,450
(+) New Reservoirs in Old Fields	0	0	0	0	51,906	51,906
(-) Production With Proved Reserves Reported	0	0	0	0	88,184	88,184
(-) Production Without Proved Reserves Reported	0	157,392	123,941	281,333	690,920	1,253,586
Proved Reserves as of 12/31/07	0	1,642,214	1,079,609	2,721,823	5,319,393	10,763,039
			Total			
Number of Operators	156	497	288	3,509	9,324	13,774
Proved Reserves as of 12/31/06	192,939,286	17,390,372	275,120	0	0	210,604,778
(+) Revision Increases	27,892,861	4,242,700	22,252	0	1,247,943	33,405,756
(-) Revision Decreases	13,574,786	2,927,766	19,440	0	945,370	17,467,362
(-) Sales	13,084,210	2,226,057	201,468	0	0	15,511,735
(+) Acquisitions	9,867,217	6,059,406	16,780	0	28,542	15,971,945
(+) Extensions	22,660,941	4,352,000	60,283	0	1,182,840	28,256,064
(+) New Field Discoveries	589,968	211,047	0	0	15,450	816,465
(+) New Reservoirs in Old Fields	941,482	252,811	0	0	51,906	1,246,199
(-) Production With Proved Reserves Reported	16,671,585	2,047,865	4,062	0	88,184	18,811,696
(-) Production Without Proved Reserves Reported	0	407,068	127,738	281,333	690,920	1,507,059
Proved Reserves as of 12/31/07	211,561,394	26,962,655	1,229,074	2,721,823	5,319,393	247,794,339
			Summary			
Total Number of Operators	**156**	**497**	**288**	**3,509**	**9,324**	**13,774**
Percent of Total	**1.1%**	**3.6%**	**2.1%**	**25.5%**	**67.7%**	**100.0%**
Total Production in 2007	**16,671,585**	**2,454,933**	**131,800**	**281,333**	**779,104**	**20,318,755**
Percent of Total	**82.1%**	**12.1%**	**0.6%**	**1.4%**	**3.8%**	**100.0%**
Total Proved Reserves 12/31/07	**211,561,394**	**26,962,655**	**1,229,074**	**2,721,823**	**5,319,393**	**247,794,339**
Percent of Total	**85.4%**	**10.9%**	**0.5%**	**1.1%**	**2.1%**	**100.0%**

[a]There were 439 noncertainty responses, 50 were used with their sample weights and 389 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," 2007.

Table F3. Summary of Form EIA-23 Reported, Imputed, and Estimated Nonassociated Natural Gas Data for 2007, Wet after Lease Separation (million cubic feet at 14.73 psia and 60° Fahrenheit)

Level of Reporting	Operator Category I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
Reported						
Number of Operators	156	497	288	439	9,324	10,704
Proved Reserves as of 12/31/06	166,185,699	15,722,876	228,829	0	0	182,137,404
(+) Revision Increases	23,291,549	3,669,234	15,646	0	0	26,976,429
(-) Revision Decreases	12,258,754	2,710,398	12,994	0	0	14,982,146
(-) Sales	12,064,119	2,132,407	201,468	0	0	14,397,994
(+) Acquisitions	9,037,696	5,541,141	12,706	0	0	14,591,543
(+) Extensions	21,809,567	4,184,924	59,418	0	0	26,053,909
(+) New Field Discoveries	548,812	205,006	0	0	0	753,818
(+) New Reservoirs in Old Fields	875,444	246,155	0	0	0	1,121,599
(-) Production With Proved Reserves Reported	14,800,167	1,837,184	3,293	0	0	16,640,644
(-) Production Without Proved Reserves Reported	17	385,015	7,643	0	0	392,675
Proved Reserves as of 12/31/07	182,625,749	22,902,263	98,844	0	0	205,626,856
Imputed and Estimated						
Number of Operators	-	-	-	3,070	-	3,070
Proved Reserves as of 12/31/06	-	-	-	-	-	-
(+) Revision Increases	0	0	0	0	1,028,107	1,028,107
(-) Revision Decreases	0	0	0	0	683,341	683,341
(-) Sales	0	0	0	0	0	0
(+) Acquisitions	0	0	0	0	28,542	28,542
(+) Extensions	0	0	0	0	1,105,078	1,105,078
(+) New Field Discoveries	0	0	0	0	15,075	15,075
(+) New Reservoirs in Old Fields	0	0	0	0	50,585	50,585
(-) Production With Proved Reserves Reported	0	0	0	0	81,611	81,611
(-) Production Without Proved Reserves Reported	0	151,681	114,007	265,688	375,469	906,845
Proved Reserves as of 12/31/07	0	1,586,236	990,703	2,576,939	4,342,044	9,495,922
Total						
Number of Operators	156	497	288	3,509	9,324	13,774
Proved Reserves as of 12/31/06	166,185,699	15,722,876	228,829	0	0	182,137,404
(+) Revision Increases	23,291,549	3,669,234	15,646	0	1,028,107	28,004,536
(-) Revision Decreases	12,258,754	2,710,398	12,994	0	683,341	15,665,487
(-) Sales	12,064,119	2,132,407	201,468	0	0	14,397,994
(+) Acquisitions	9,037,696	5,541,141	12,706	0	28,542	14,620,085
(+) Extensions	21,809,567	4,184,924	59,418	0	1,105,078	27,158,987
(+) New Field Discoveries	548,812	205,006	0	0	15,075	768,893
(+) New Reservoirs in Old Fields	875,444	246,155	0	0	50,585	1,172,184
(-) Production With Proved Reserves Reported	14,800,167	1,837,184	3,293	0	81,611	16,722,255
(-) Production Without Proved Reserves Reported	17	536,696	121,650	265,688	375,469	1,299,520
Proved Reserves as of 12/31/07	182,625,749	24,488,499	1,089,547	2,576,939	4,342,044	215,122,778
Summary						
Total Number of Operators	**156**	**497**	**288**	**3,509**	**9,324**	**13,774**
Percent of Total	**1.1%**	**3.6%**	**2.1%**	**25.5%**	**67.7%**	**100.0%**
Total Production in 2007	**14,800,184**	**2,373,880**	**124,943**	**265,688**	**457,080**	**18,021,775**
Percent of Total	**82.1%**	**13.2%**	**0.7%**	**1.5%**	**2.5%**	**100.0%**
Total Proved Reserves 12/31/07	**182,625,749**	**24,488,499**	**1,089,547**	**2,576,939**	**4,342,044**	**215,122,778**
Percent of Total	**84.9%**	**11.4%**	**0.5%**	**1.2%**	**2.0%**	**100.0%**

[a]There were 439 noncertainty responses, 50 were used with their sample weights and 389 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," 2007.

Table F4. Summary of Form EIA-23 Reported, Imputed, and Estimated Crude Oil Data for 2007, (thousand barrels of 42 U.S. gallons)

Level of Reporting	Operator Category I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
			Reported			
Number of Operators	156	497	288	439	9,324	10,704
Proved Reserves as of 12/31/06	18,191,093	1,436,722	9,468	0	0	19,637,283
(+) Revision Increases	1,902,879	218,892	2,831	0	0	2,124,602
(-) Revision Decreases	876,019	127,187	2,947	0	0	1,006,153
(-) Sales	725,908	83,677	0	0	0	809,585
(+) Acquisitions	469,951	318,256	6,370	0	0	794,577
(+) Extensions	558,787	52,974	366	0	0	612,127
(+) New Field Discoveries	65,440	1,594	0	0	0	67,034
(+) New Reservoirs in Old Fields	61,864	10,465	0	0	0	72,329
(-) Production With Proved Reserves Reported	1,360,438	126,833	753	0	0	1,488,024
(-) Production Without Proved Reserves Reported	7	14,592	444	0	0	15,043
Proved Reserves as of 12/31/07	18,287,661	1,701,490	15,335	0	0	20,004,486
			Imputed and Estimated			
Number of Operators	-	-	-	3,070	-	3,070
Proved Reserves as of 12/31/06	-	-	-	-	-	-
(+) Revision Increases	0	0	0	0	152,032	152,032
(-) Revision Decreases	0	0	0	0	72,065	72,065
(-) Sales	0	0	0	0	0	0
(+) Acquisitions	0	0	0	0	0	0
(+) Extensions	0	0	0	0	43,635	43,635
(+) New Field Discoveries	0	0	0	0	718	718
(+) New Reservoirs in Old Fields	0	0	0	0	3,305	3,305
(-) Production With Proved Reserves Reported	0	0	0	0	20,428	20,428
(-) Production Without Proved Reserves Reported	0	17,618	18,996	36,614	95,948	169,176
Proved Reserves as of 12/31/07	0	138,291	191,696	329,987	647,767	1,307,741
			Total			
Number of Operators	156	497	288	3,509	9,324	13,774
Proved Reserves as of 12/31/06	18,191,093	1,436,722	9,468	0	0	19,637,283
(+) Revision Increases	1,902,879	218,892	2,831	0	152,032	2,276,634
(-) Revision Decreases	876,019	127,187	2,947	0	72,065	1,078,218
(-) Sales	725,908	83,677	0	0	0	809,585
(+) Acquisitions	469,951	318,256	6,370	0	0	794,577
(+) Extensions	558,787	52,974	366	0	43,635	655,762
(+) New Field Discoveries	65,440	1,594	0	0	718	67,752
(+) New Reservoirs in Old Fields	61,864	10,465	0	0	3,305	75,634
(-) Production With Proved Reserves Reported	1,360,438	126,833	753	0	20,428	1,508,452
(-) Production Without Proved Reserves Reported	7	32,210	19,440	36,614	95,948	184,219
Proved Reserves as of 12/31/07	18,287,661	1,839,781	207,031	329,987	647,767	21,312,227
			Summary			
Total Number of Operators	**156**	**497**	**288**	**3,509**	**9,324**	**13,774**
Percent of Total	**1.1%**	**3.6%**	**2.1%**	**25.5%**	**67.7%**	**100.0%**
Total Production in 2007	**1,360,445**	**159,043**	**20,193**	**36,614**	**116,376**	**1,692,671**
Percent of Total	**80.4%**	**9.4%**	**1.2%**	**2.2%**	**6.9%**	**100.0%**
Total Proved Reserves 12/31/07	**18,287,661**	**1,839,781**	**207,031**	**329,987**	**647,767**	**21,312,227**
Percent of Total	**85.8%**	**8.6%**	**1.0%**	**1.5%**	**3.0%**	**100.0%**

[a]There were 439 noncertainty responses, 50 were used with their sample weights and 389 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," 2007.

Table F5. Summary of Form EIA-23 Reported, Imputed, and Estimated Lease Condensate Data for 2007, (thousand barrels of 42 U.S. gallons)

Level of Reporting	Operator Category I	II	Certainty III	Noncertainty III	Auxillary State Data	Total
Reported						
Number of Operators	156	497	288	439	9,324	10,704
Proved Reserves as of 12/31/06	965,527	231,313	193	0	0	1,197,033
(+) Revision Increases	183,570	63,391	47	0	0	247,008
(-) Revision Decreases	149,518	55,065	31	0	0	204,614
(-) Sales	152,665	17,784	0	0	0	170,449
(+) Acquisitions	132,420	33,364	0	0	0	165,784
(+) Extensions	128,187	43,584	0	0	0	171,771
(+) New Field Discoveries	3,496	3,815	0	0	0	7,311
(+) New Reservoirs in Old Fields	10,875	8,570	0	0	0	19,445
(-) Production With Proved Reserves Reported	134,695	31,231	88	0	0	166,014
(-) Production Without Proved Reserves Reported	30	673	0	0	0	703
Proved Reserves as of 12/31/07	987,311	280,052	190	0	0	1,267,553
Imputed and Estimated						
Number of Operators	-	-	-	3,070	-	3,070
Proved Reserves as of 12/31/06	-	-	-	-	-	-
(+) Revision Increases	0	0	0	0	36,233	36,233
(-) Revision Decreases	0	0	0	0	811	811
(-) Sales	0	0	0	0	0	0
(+) Acquisitions	0	0	0	0	15,894	15,894
(+) Extensions	0	0	0	0	42,527	42,527
(+) New Field Discoveries	0	0	0	0	8,136	8,136
(+) New Reservoirs in Old Fields	0	0	0	0	-4,537	-4,537
(-) Production With Proved Reserves Reported	0	0	0	0	4,434	4,434
(-) Production Without Proved Reserves Reported	0	374	1,552	1,926	7,377	11,229
Proved Reserves as of 12/31/07	0	2,231	8,729	10,960	207,507	229,427
Total						
Number of Operators	156	497	288	3,509	9,324	13,774
Proved Reserves as of 12/31/06	965,527	231,313	193	0	0	1,239,957
(+) Revision Increases	183,570	63,391	47	0	36,233	283,241
(-) Revision Decreases	149,518	55,065	31	0	811	205,425
(-) Sales	152,665	17,784	0	0	0	170,449
(+) Acquisitions	132,420	33,364	0	0	15,894	181,678
(+) Extensions	128,187	43,584	0	0	42,527	214,298
(+) New Field Discoveries	3,496	3,815	0	0	8,136	15,447
(+) New Reservoirs in Old Fields	10,875	8,570	0	0	-4,537	14,908
(-) Production With Proved Reserves Reported	134,695	31,231	88	0	4,434	170,448
(-) Production Without Proved Reserves Reported	30	1,047	1,552	1,926	7,377	11,932
Proved Reserves as of 12/31/07	987,311	282,283	8,919	10,960	207,507	1,496,980
Summary						
Total Number of Operators	**156**	**497**	**288**	**3,509**	**9,324**	**13,774**
Percent of Total	**1.1%**	**3.6%**	**2.1%**	**25.5%**	**67.7%**	**100.0%**
Total Production in 2007	**134,725**	**32,278**	**1,640**	**1,926**	**11,811**	**182,380**
Percent of Total	**73.9%**	**17.7%**	**0.9%**	**1.1%**	**6.5%**	**100.0%**
Total Proved Reserves 12/31/07	**987,311**	**282,283**	**8,919**	**10,960**	**207,507**	**1,496,980**
Percent of Total	**66.0%**	**18.9%**	**0.6%**	**0.7%**	**13.9%**	**100.0%**

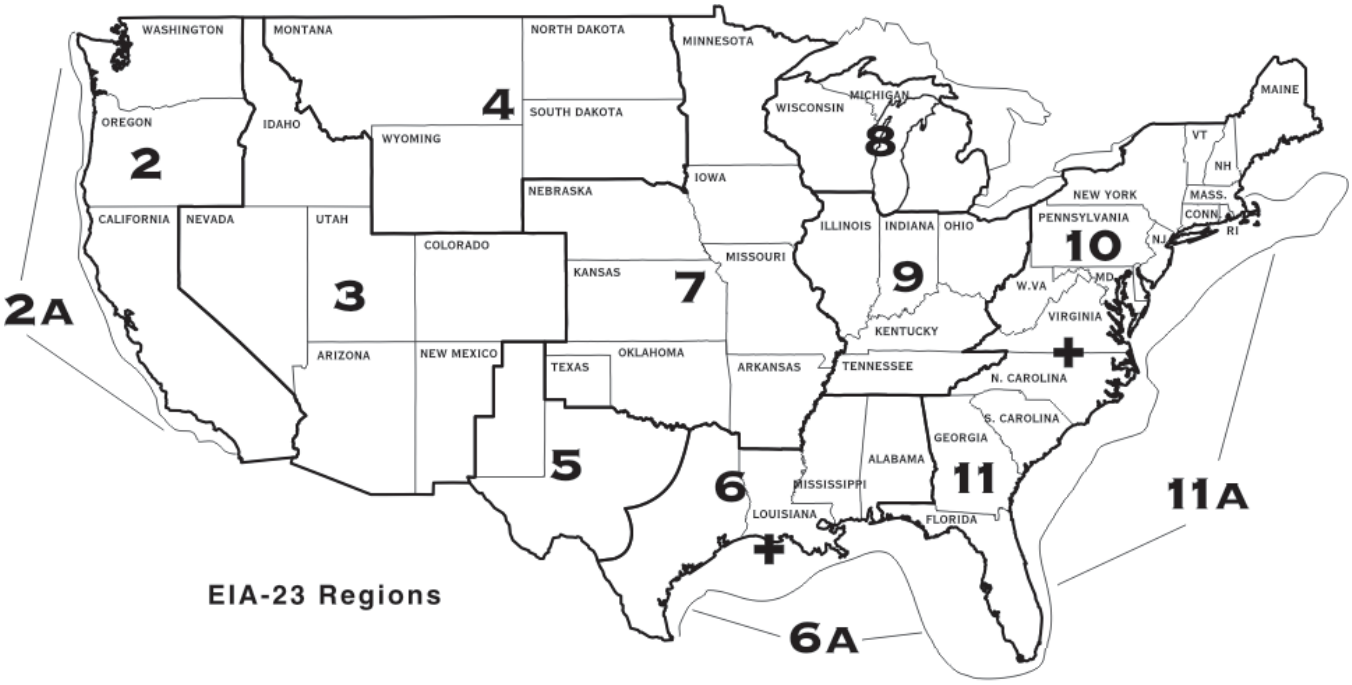
[a]There were 439 noncertainty responses, 50 were used with their sample weights and 389 were treated as Certainty III operators.
– = Not applicable.
Notes: Table 15 totals include imputed and estimated lease condensate proved reserves rounded at the State/subdivision level. Field level data are reported 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," 2007.

Table F6. Statistical Parameters of Reserves Estimation Equation by Region for 2007

Region Number	Region	Number of Nonzero R/P Pairs			Equation Coefficients					
					Oil		Gas		LC	
		Oil	Gas	LC	Alpha	Beta	Alpha	Beta	Alpha	Beta
1	Alaska	7	10	0	-0.1206	0.2625	-0.1328	0.6229	0.0000	0.0000
2	Pacific Coast States	46	55	4	-0.1206	0.2488	-0.1328	0.3327	-0.1267	0.4425
2A	Federal Offshore Pacific	7	7	-	-0.1206	0.1907	-0.1328	0.1994	0.0000	0.0000
3	Western Rocky Mountains	87	142	58	-0.1206	0.1741	-0.1328	0.2729	-0.1267	0.3035
4	Northern Rocky Mountains	168	173	47	-0.1206	0.2445	-0.1328	0.3063	-0.1267	0.2291
5	West Texas and East New Mexico	465	489	174	-0.1206	0.2092	-0.1328	0.3122	-0.1267	0.4342
6	Western Gulf Basin	500	827	542	-0.1206	0.2887	-0.1328	0.3724	-0.1267	0.5177
6A	Gulf of Mexico	70	136	110	-0.1206	0.4535	-0.1328	0.7084	-0.1267	0.7487
7	Mid-Continent	283	369	138	-0.1206	0.4728	-0.1328	0.3223	-0.1267	0.3325
8 + 9	Michigan Basin and Eastern Interior	80	56	11	-0.1206	0.1807	-0.1328	0.1379	-0.1267	0.2064
10 + 11	Appalachians	26	74	10	-0.1206	0.2177	-0.1328	0.1497	-0.1267	0.3731
	United States	1,739	2,338	1,094	-0.1206	0.2857	-0.1328	0.3406	-0.1267	0.4596

Source: Based on data filed on Form EIA-23,"Annual Survey of Domestic Oil and Gas Reserves, 2007".

Figure F1. Form EIA-23 Regional Boundaries



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

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 six states in the 2007 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 2007 than in 2006.
- One or more operators may have reported data incorrectly on Schedule A in 2007 or 2006, but not both, and the error was not detected by edit processing.
- Operation of properties was transferred during 2007 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 V_s and its sampling error by $S.E.(V_s)$, the confidence interval can be expressed as:

$$V_s \pm k\ S.E.(V_s)$$

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:

$$V_s \pm 2\ S.E.(V_s)$$

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 $2S.E.(V_s)$ 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 237,726 ±359 billion cubic feet. The sampling error of V_s is equal to the sampling error of the noncertainty estimate V_{sr} because the certainty total is not subject to sampling error. The estimated sampling error of a noncertainty estimate is the square root of its estimated sampling variance.

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 apprised 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 2007 survey (Appendix E, Table E2) was 2.1 percent and for the noncertainty operators 8.9 percent. An imputation was made for the production and reserves for the 39 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.

Table F7. Factors for Confidence Intervals (2S.E.) for Crude Oil Proved Reserves and Production, 2007
(million barrels of 42 U.S. gallons)

State and Subdivision	2007 Reserves	2007 Production	State and Subdivision	2007 Reserves	2007 Production
United States	7	1	Montana[b]	0	0
Alabama[b]	0	0	Nebraska	0	0
Alaska[a]	0	0	New Mexico[b]	0	0
Arkansas[b]	0	0	North Dakota[b]	0	0
California[b]	0	0	Ohio[b]	0	0
Colorado[b]	0	0	Oklahoma[b]	0	0
Florida[a]	0	0	Pennsylvania	0	0
Illinois	0	0	Texas[b]	0	0
Indiana	0	0	Utah[b]	0	0
Kansas[b]	0	0	Virginia[a]	0	0
Kentucky	0	0	West Virginia	0	0
Louisiana[b]	0	0	Wyoming[b]	0	0
Michigan[b]	0	0	Federal Offshore[a]	0	0
Mississippi[b]	0	0	Miscellaneous[c]	2	0

[a]Sampling rate was 100 percent in Alaska, Florida Onshore, Virginia, and Offshore areas.
[b]Sampling was not used. Estimates for each operator were made using an imputation function.
[c]Includes Arizona, Missouri, Nevada, 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," 2007.

Table F8. Factors for Confidence Intervals (2S.E.) for Natural Gas Proved Reserves and Production, Wet After Lease Separation, 2007 (billion cubic feet at 14.73 psia and 60° Fahrenheit)

State and Subdivision	2007 Reserves	2007 Production	State and Subdivision	2007 Reserves	2007 Production
United States	359	28	New Mexico[b]	0	0
Alabama[b]	0	0	New York[b]	0	0
Alaska[a]	0	0	North Dakota[b]	0	0
Arkansas[b]	0	0	Ohio[b]	0	0
California[b]	0	0	Oklahoma[b]	0	0
Colorado[b]	0	0	Pennsylvania	52	4
Florida[a]	0	0	Texas[b]	0	0
Kansas[b]	0	0	Utah[b]	0	0
Kentucky	0	0	Virginia[a]	0	0
Louisiana[b]	0	0	West Virginia	6	0
Michigan[b]	0	0	Wyoming[b]	0	0
Mississippi[b]	0	0	Federal Offshore[a c]	0	0
Montana[b]	0	0	Miscellaneous[d]	4	0

[a]Sampling rate was 100 percent in Alaska, Florida Onshore, Virginia, and Offshore areas.
[b]Sampling was not used. Estimates for each operator were made using an imputation function.
[c]Includes Federal offshore Alabama.
[d]Includes Arizona, Illinois, Indiana, Maryland, Missouri, Nebraska, Nevada, Oregon, South Dakota, and Tennessee.
Notes: Confidence intervals are associated with Table 8 reserves and production data.
Factors for confidence intervals for each State and the United States are independently estimated and do not add.
Source: Factor estimates based on data filed on Form EIA-23, "Annual Survey of Domestic Oil and Gas Reserves," 2007

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 2007 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, 6.1 percent of the crude oil proved reserve estimates, 4.9 percent of the wet natural gas proved reserve estimates, and 15.3 percent of the lease condensate proved reserve estimates resulted from the imputation and estimation of reserves for those certainty and noncertainty operators who did not provide estimates for all of their properties, in combination with the expansion of the sample of noncertainty operators to the full population. Errors for the latter were quantitatively calculated, as discussed in the previous section. Standard errors, for the former, would tend to cancel each other from operator to operator, and are, therefore, expected to be negligible, especially at the National level of aggregation. In States where a large share of total reserves is accounted for by Category III and smaller Category II operators, the errors are expected to be somewhat larger than in States where a large share of total reserves is accounted for by Category I and larger Category II operators.

Calculation of Reserves of Natural Gas Liquids and Dry Natural Gas

Natural Gas Liquids Reserve Balance

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

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

Natural Gas Reserve Balance

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

The shrinkage volume was then allocated to the plant's reported area or areas of origin. Because shrinkage is, by definition, roughly in proportion to the NGL recovered, i.e. the NGL produced, the allocation was in proportion to the reported NGL volumes for each area of origin. However, these derived shrinkage volumes were rejected if the ratio between the shrinkage and the NGL production (gas equivalents ratio) fell outside certain limits of physical accuracy. The ratio was expected to range between 1.558 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 on which to base its computation. 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 2007 Form EIA-64A survey, the national weighted average gas equivalents ratio was computed to be 1,413 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

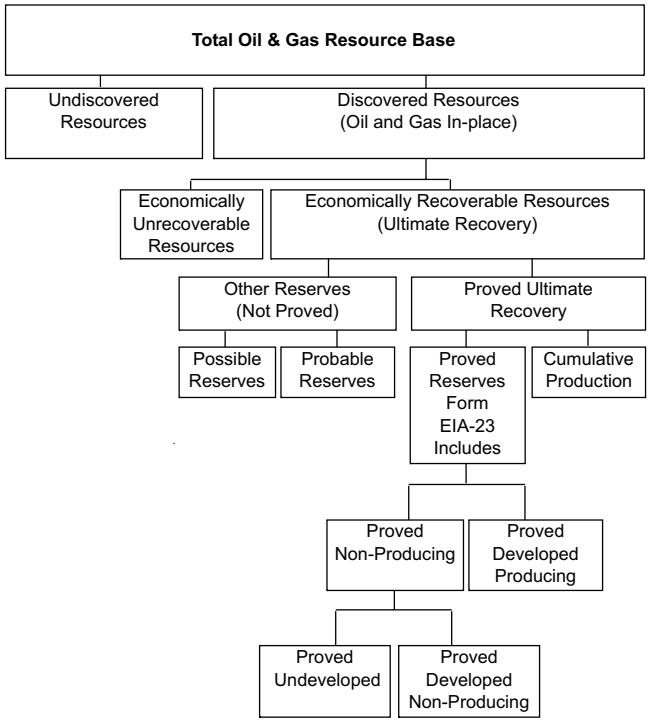
Oil and Gas Resource Base

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 tree diagram presented in **Figure G1** outlines a simplified version of the total resource base and its components in two dimensions. 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 by whether or not they are economically recoverable. Economically unrecoverable resources are sometimes called contingent resources. Economically recoverable resources are then subdivided by proved reserves and unproved reserves categories. Proved reserves are additionally subdivided into subtypes, e.g. proved non-producing reserves.

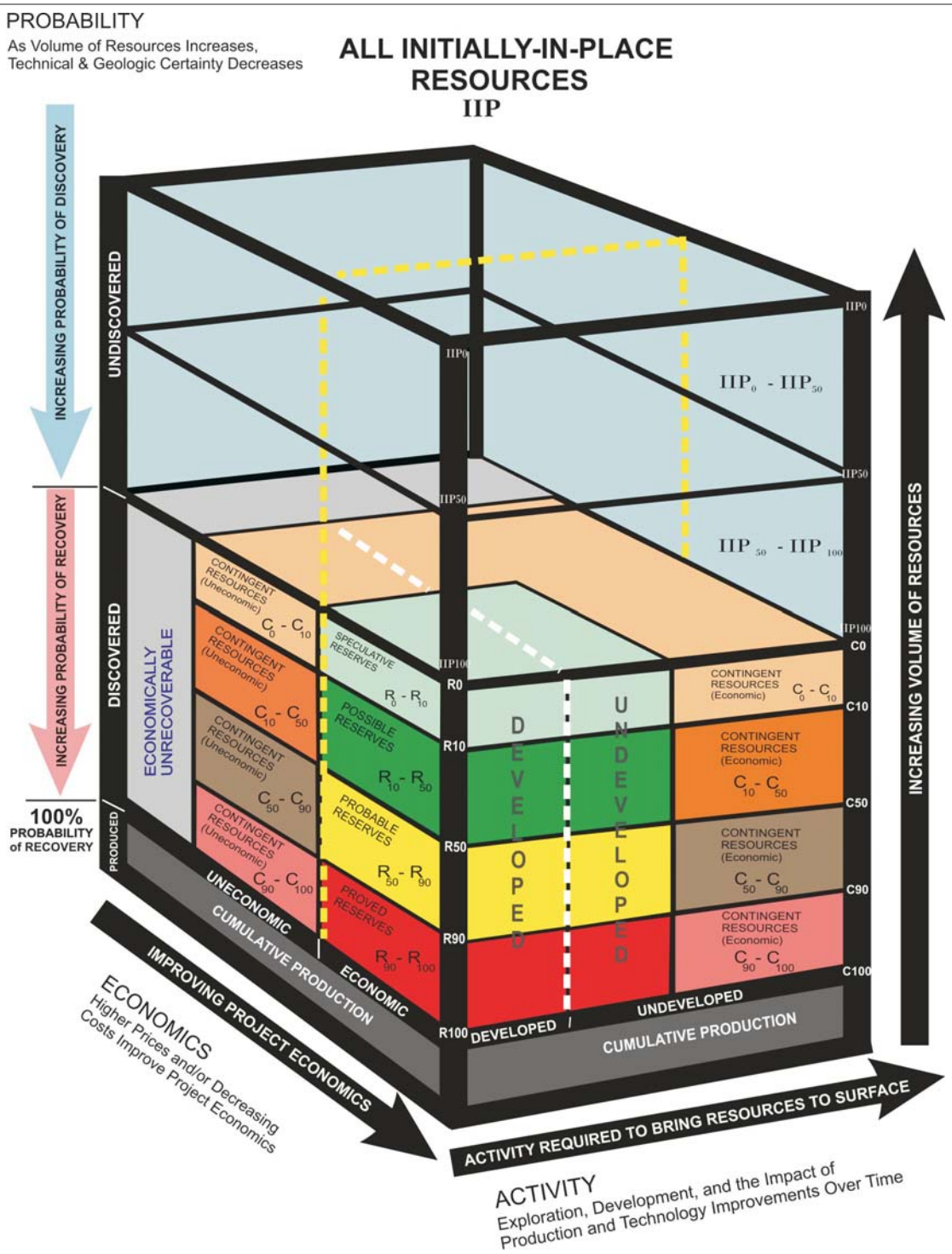
Figure G1. Components of the Oil and Gas Resource Base



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

A three-dimensional diagram of the Total In-Place Resource base is presented in **Figure G2**. This diagram represents the total in-place resource base as mapped over three axes: Probability, Activity, and Economics.

Figure G2. Resource Base



OBSERVE THAT:

- Proved Reserves are a small subset of the Initially-In-Place Resource Base.
- A substantial portion of the Initially-In-Place Resource Base remains to be discovered.
- It is quite possible that future discoveries may exceed current cumulative production.
- The median undiscovered volume, IIP_{50} , which is larger than the expected or mean volume, has a 50 percent probability of being exceeded.

Notes: Variable **R** represents a volume of Reserves, **C** represents Contingent Resources, and **IIP** represents Initially-In-Place Resources. Numeric subscripts (e.g. R_{50}, IIP_{90}) indicate the probability that the associated volume exists. Drawing is not scaled to any volumetric estimates. Probability distributions in this diagram are nonlinear.

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

Illustrated in **Figure G2** are proved, probable, and possible reserves, developed or undeveloped reserves, contingent resources (economic and uneconomic), nonlinear probability distributions for reserves, contingent resources, and undiscovered initially-in-place resources.

The terms in **Figure G2** are consistent with the resource definitions adopted by the Society of Petroleum Engineers (SPE) as set forth in their 2007 document, *Petroleum Resources Management System*, prepared by its Oil and Gas Reserves Committee; reviewed and jointly sponsored by the World Petroleum Council (WPC), the American Association of Petroleum Geologists (AAPG), and the Society of Petroleum Evaluation Engineers (SPEE). {46}

Recoverable Resources

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

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

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

Technically recoverable resources of dry natural gas (discovered, unproved, and undiscovered) are estimated at 1,533 trillion cubic feet (**Table G1**). Adding the 2007 U.S. proved reserves of 248 trillion cubic feet yields a technically recoverable resource target of 1,781 trillion cubic feet. This is about 91 times the 2007 dry gas production level.

Other organizations have also estimated unproven technically recoverable gas resources. For example, the Potential Gas Committee (PGC), an industry sponsored group, provides detailed geology–based gas resource estimates every 2 years. In 2006 the PGC mean estimate of potential gas resources was 1,321 trillion cubic feet, about 211 trillion cubic feet less than the estimates in **Table G1**. The differences among these estimates are usually due to the availability of newer data, differences in coverage or resource category definitions, and legitimate but differing data interpretations.

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

There is a perception that the oil resource base has been more intensively developed than the gas resource base. And in fact, more oil has been produced in the United States than is estimated as remaining recoverable. Nevertheless, the ratio of unproven technically recoverable oil resources to 2007 oil production (**Table G1**) was about 105 to 1, higher than the comparable gas ratio.

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 economically recoverable in the future from known deposits through the eventual application of present or anticipated technology.

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

Area	Crude Oil (billion barrels)	Natural Gas (Dry) (trillion cubic feet)	Natural Gas Liquids (billion barrels)
Undiscovered Conventionally Reservoired Fields			
Alaska Onshore + State Offshore	26.04	126.75	2.23
Alaska Federal Offshore	26.61[a]	132.06	0.00[a]
Lower 48 States Onshore + State Offshore	18.24	178.21	5.56
Lower 48 States Federal Offshore	59.27[a]	287.82	0.00[a]
Alaska Subtotal	52.65	258.81	2.23
Lower 48 States Subtotal	77.51	466.03	5.56
Technically Recoverable Resources in U.S. Undiscovered Conventionally Reservoired Fields	**130.16**	**724.84**	**7.79**
Ultimate Recovery Appreciation			
Alaska Onshore + State Offshore	6.96	12.30	0.41
Lower 48 States Onshore + State Offshore	31.70	442.50	17.85
U.S. Federal Offshore	6.88[a]	30.91	0.00[a]
Technically Recoverable Resources in U.S. from Ultimate Recovery Appreciation in Discovered Conventionally Reservoired Fields	**45.54**	**485.71**	**18.26**
Continuous Type Deposits			
Alaska Non-coal bed	0.00	0.00	0.00
Lower 48 States Non-coal bed	2.13	236.89	3.80
Alaska Coal bed	0.00	18.06	0.00
Lower 48 States Coal bed	0.00	67.32	0.00
Non-coal bed Subtotal	2.13	236.89	3.80
Coal bed Subtotal	0.00	85.38	0.00
Technically Recoverable Resources in U.S. from Continuous Type Deposits	**2.13**	**322.27**	**3.80**
U.S. Totals All Sources			
U.S. Onshore + State Offshore	85.07	1,082.03	29.85
Federal Offshore	92.76[a]	450.79	0.00[a]
U.S. Technically Recoverable Resources	**177.83**	**1,532.82**	**29.85**

[a] The MMS jointly reports natural gas liquids with crude oil for the Federal Offshore.

Additional Notes: Proved Reserves are excluded from these estimates as are undiscovered oil resources in tar deposits and oil shales, and undiscovered gas resources in geopressured brines and gas hydrates.

Zero (0) indicates either that none exists in this area or that no estimate of this resource has been made for this area, or in the instance of Federal offshore natural gas liquids resources that they are jointly reported with crude oil.

Federal Onshore excludes Indian and Native lands even when Federally managed in trust.

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

Data Sources: National Oil and Gas Resource Assessment Team, 2007 Assessment Updates, United States Geological Survey, Washington DC, December 2007 at <http://energy.cr.usgs.gov/oilgas/noga/ass_updates.html>

Resource Evaluation Division, Assessment of Undiscovered Technically Recoverable Oil and Gas Resources of the Nation's Outer Continental Shelf, 2006, MMS Fact Sheet RED-2006-01b, Minerals Management Service, Washington, DC, February 2006 at <http://www.mms.gov/revaldiv/PDFs/2006NationalAssessmentBrochure.pdf>.

The ultimate recovery appreciation estimates for Alaska and the Lower 48 States Onshore Plus State Waters were developed by the Reserves and Production Division, Office of Oil and Gas, Energy Information Administration, based on data available as of year-end 2006.

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*, *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.{47} They are similarly defined by the MMS, although its system also subdivides them by degree of development and producing status.{48} 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.{47} Inferred reserves are considered equivalent to "probable reserves" by many analysts, for example, those of the PGC.

Proved Reserves

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

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

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

Reserve Estimation Methodologies

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

Data Used in Making Reserve Estimates

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

available, enabling proved reserves estimates to become more accurate.

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

Reserve Estimation Techniques

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

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

Table G2. Reserve Estimation Techniques

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

Judgmental Factors in Reserve Estimation

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

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

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

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

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

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

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

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

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

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

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

Reservoir limits: The initial proved reserves estimate made from the discovery well is subject to significant uncertainty because one well provides little information on the size of the reservoir. The area proved by a discovery well is frequently estimated on the basis of experience in a given producing region. Where there is continuity of the producing formation over wide geographic areas, a relatively large proved area may be assigned. In some cases where reliable geophysical and geological data are available, a

reasonable estimate of the extent of the reservoir can be made by drilling a relatively small number of delineation wells. Conversely, a relatively small proved area may be assigned when the producing formation is of limited continuity, owing to either structural or lithological factors.

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

Unconventional Production and Proved Reserves

Last year for the 2006 survey, a new Form EIA-23L data element called *Type Code* replaced the underutilized *MMS Code*. The *Type Code* is used to categorize proved reserves and production from a field as either *Conventional* (C) or one of four types of *Unconventional* reservoirs: *Coal Bed* (CB); *Chalk* (CH); *Shale* (SH); or *other Low Permeability* (LP) reservoirs (permeability of 0.1 millidarcy or less).

Type Code was added because the importance of unconventional resources of natural gas and crude oil to domestic energy supply continues to increase.

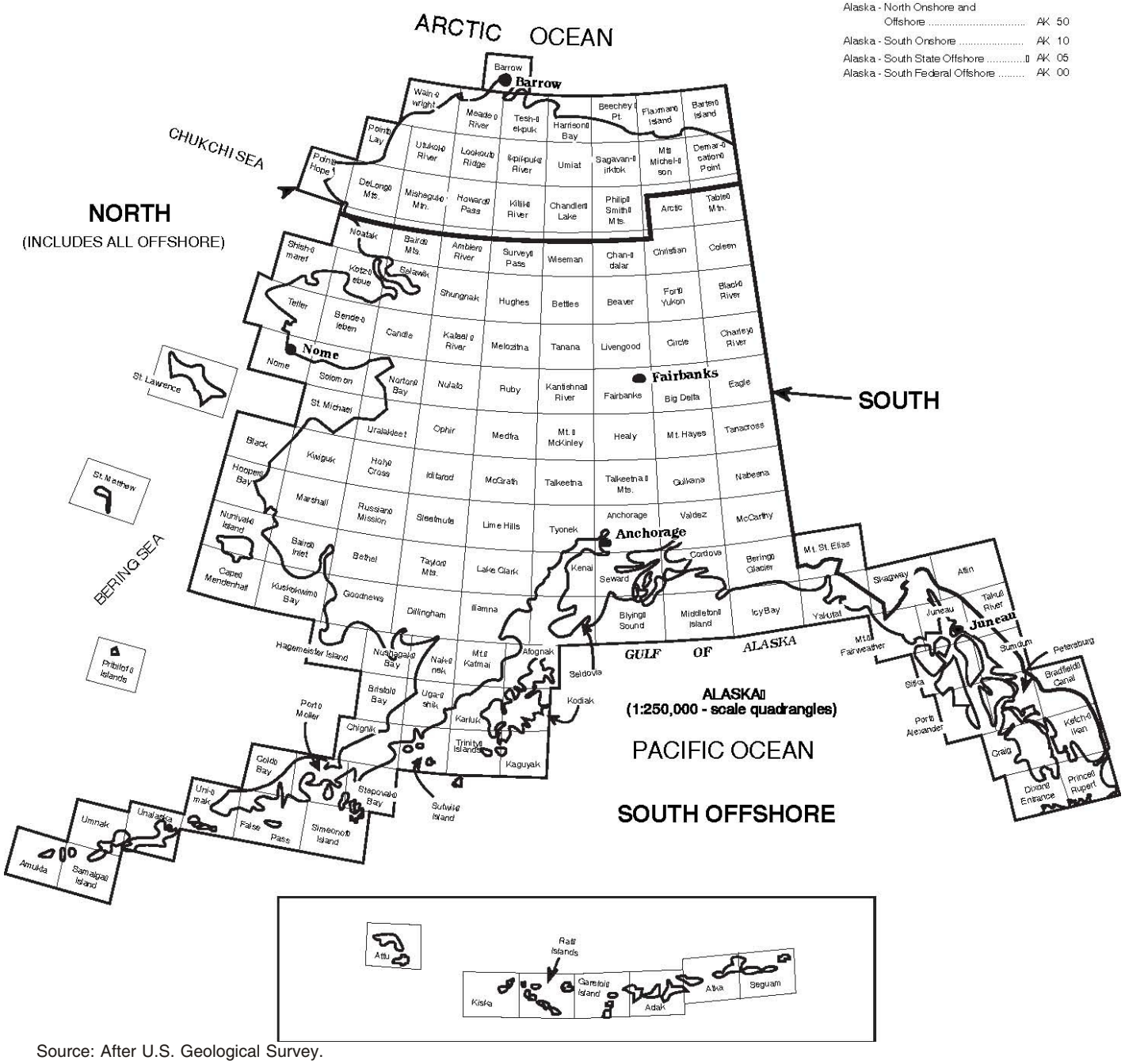
For the 2007 survey, the data received were considered incomplete for certain categories of unconventional proved reserves and production. Only the reported volumes of coalbed natural gas and shale natural gas are published in this 2007 report. (see Table 12, Chapter 4).

In future reports, as operators familiarize themselves with the *Type Code*, we expect increased coverage and reliability from the reported volumes.

Appendix H

Maps of Selected State Subdivisions

Figure H1. Subdivisions of Alaska

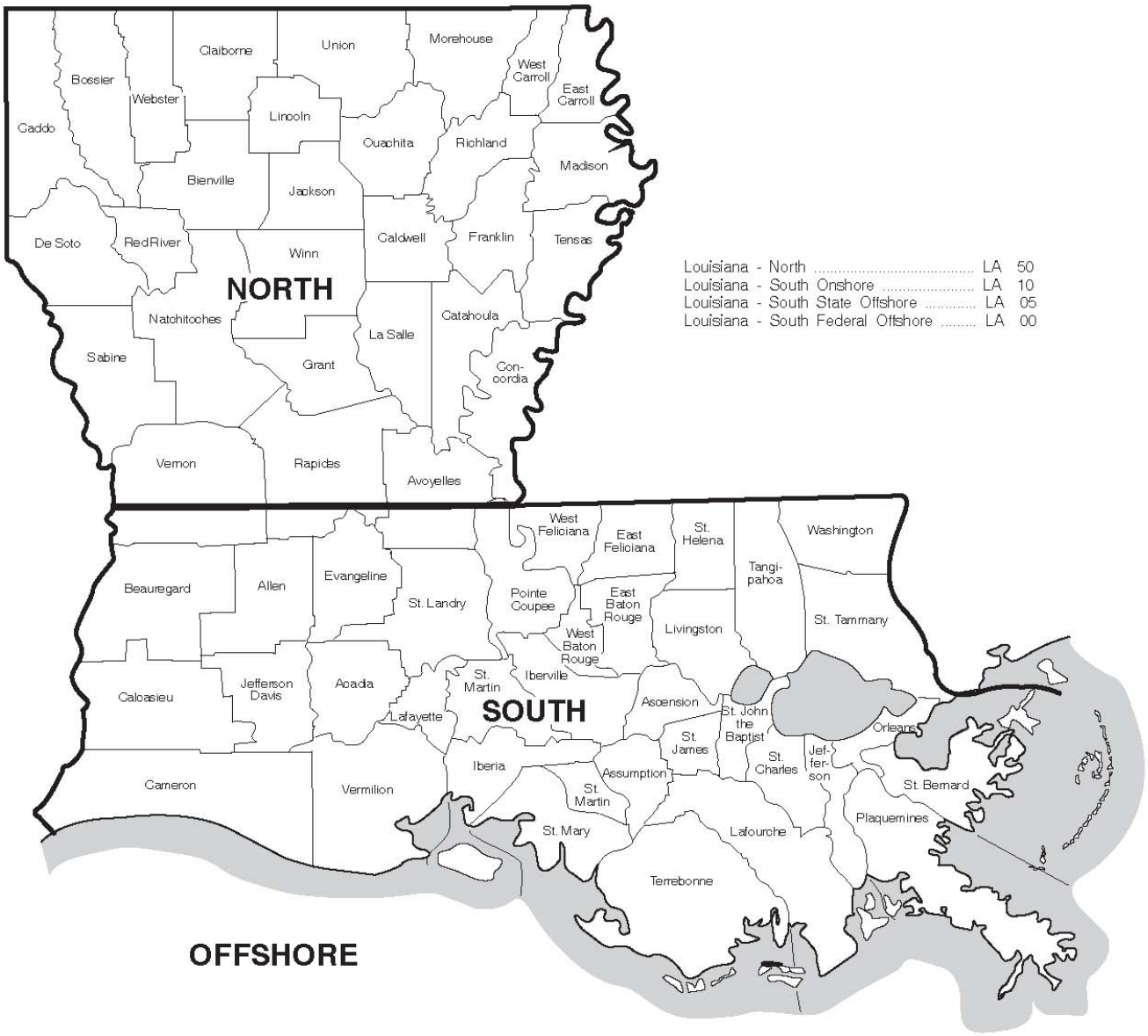


Source: After U.S. Geological Survey.

Figure H2. Subdivisions of California

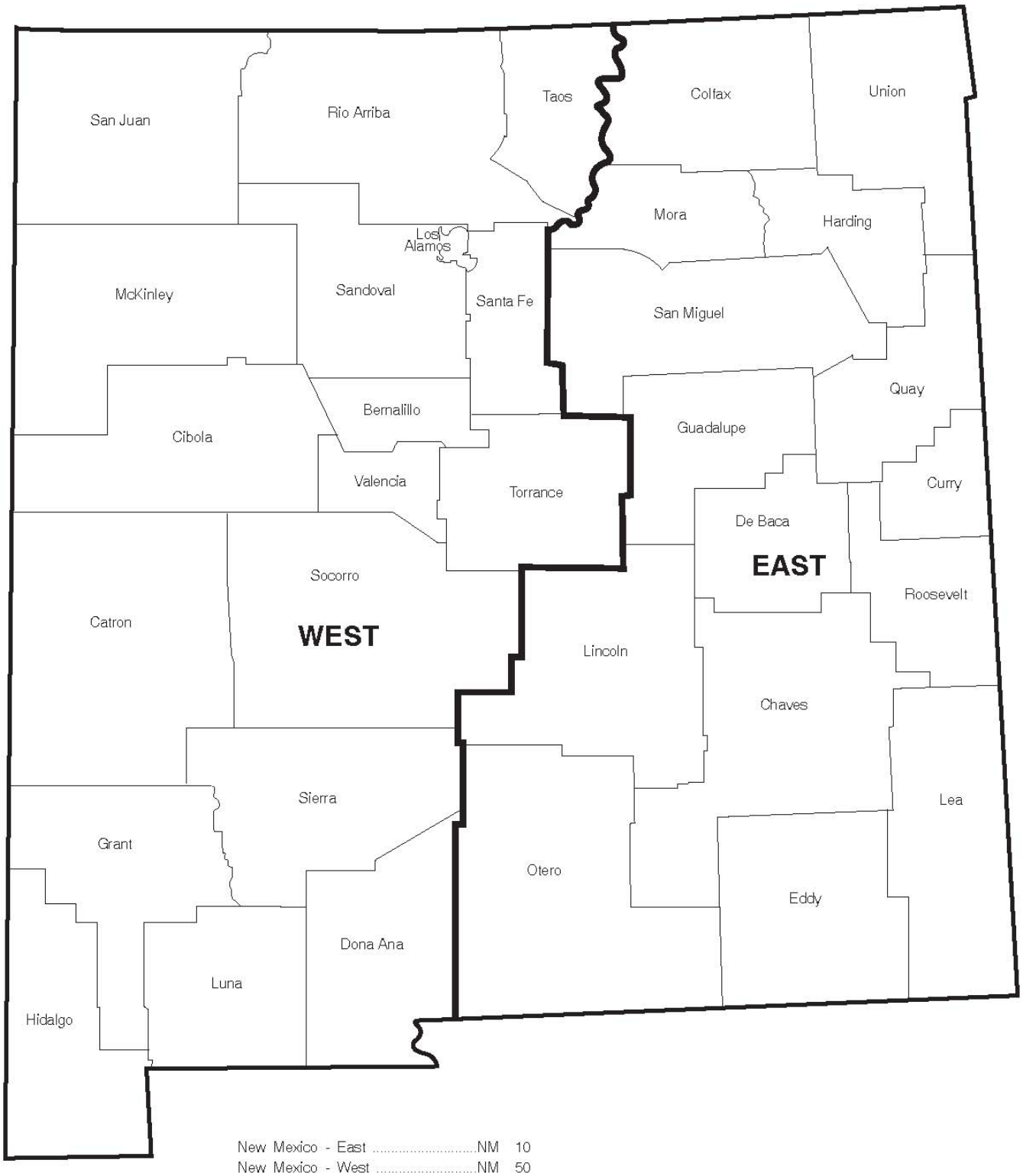
Source: Energy Information Administration, Office of Oil and Gas.

Figure H3. Subdivisions of Louisiana



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

Figure H4. Subdivisions of New Mexico

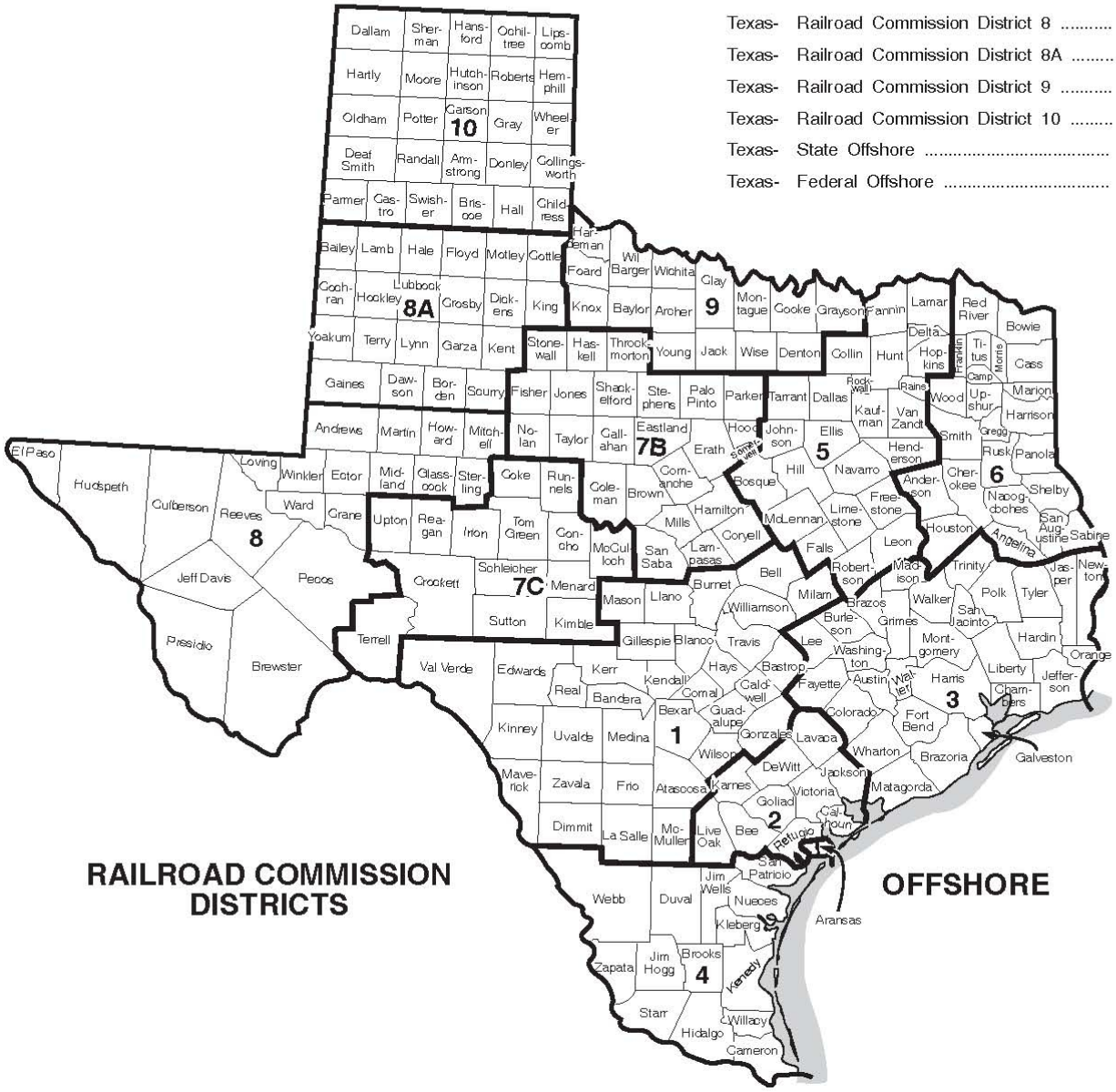


New Mexico - East .....NM 10
New Mexico - West .....NM 50

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

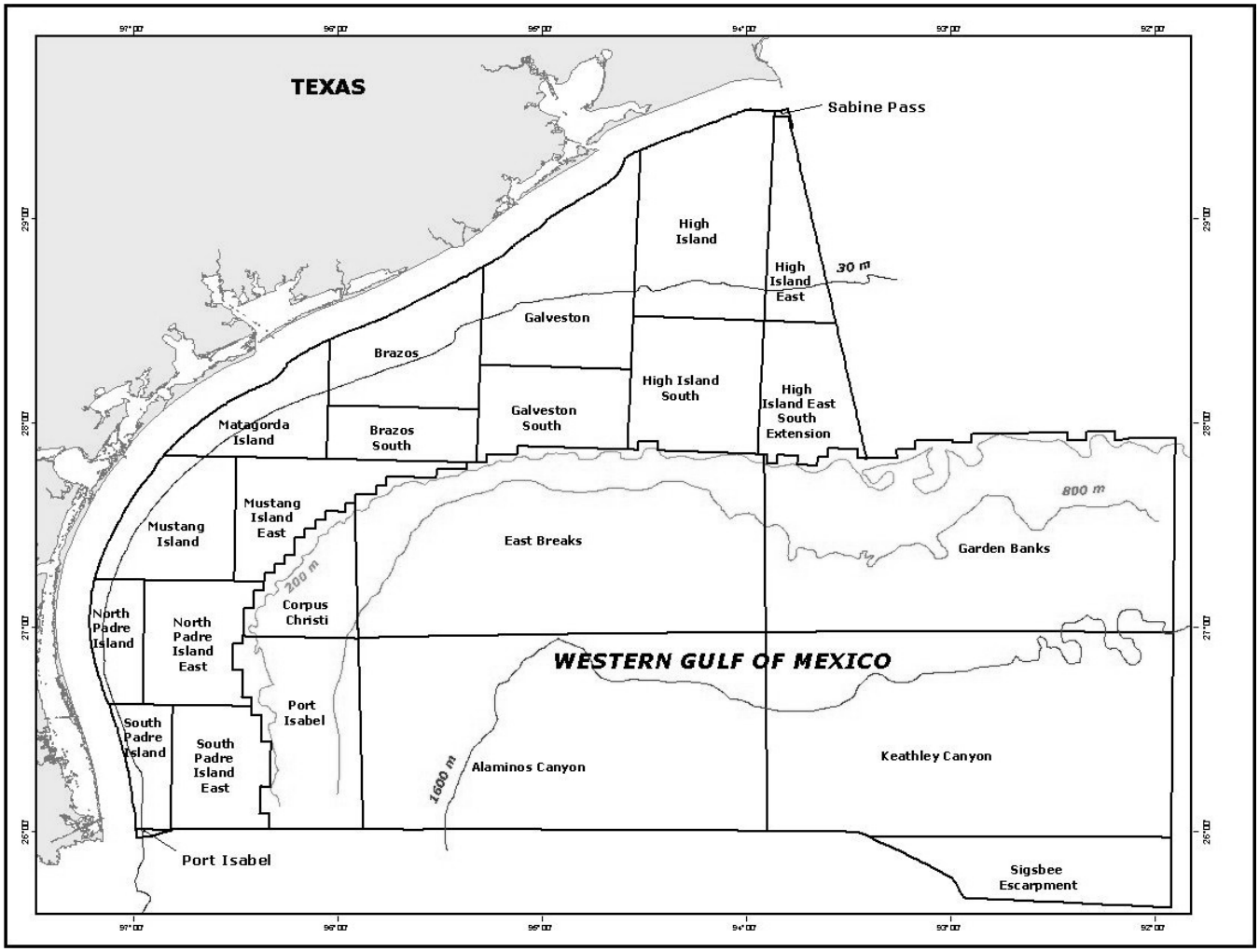
Figure H5. Subdivisions of Texas

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



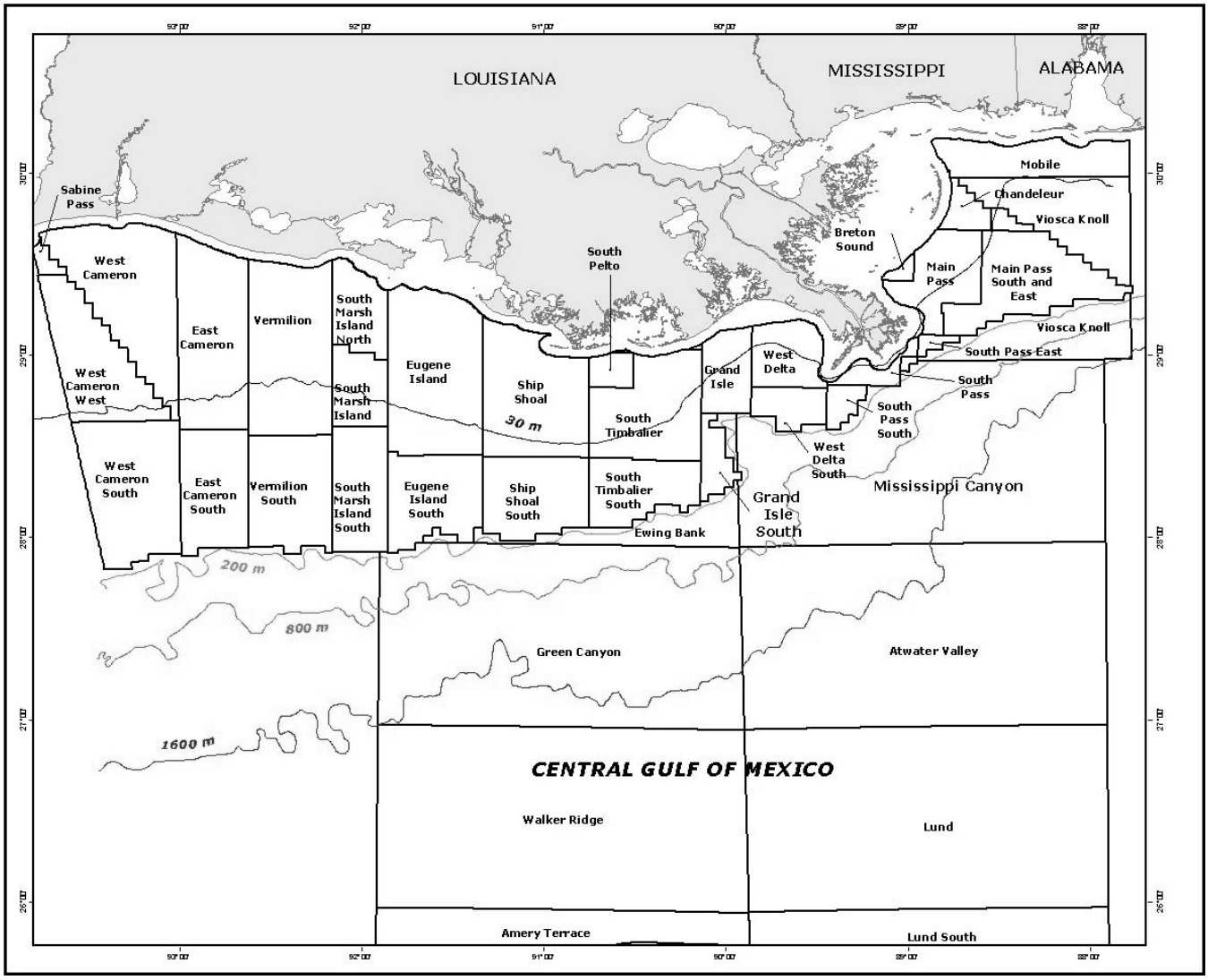
Source: Energy Information Administration, Office of Oil and Gas.

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



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

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



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

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

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

Appendix I

Annual Survey Forms for Domestic Oil and Natural Gas Reserves

Figure I1. Form EIA-23, Cover Page

www.eia.doe.gov Energy Information Administration

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

Form Approved
OMB No. 1905-0057
Expiration Date: 02/28/2010
(Revised 2007)

FORM EIA-23S
ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES
REPORT YEAR 2007

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

PART I. IDENTIFICATION

Complete and return by April 15, 2008 to:

Energy Information Administration
U.S. Department of Energy
P O Box 8279
Silver Spring, MD 20907-8279
Attn: Form EIA-23
OR
Fax to: (202) 586-1076/ATTN: FORM EIA-23

Questions? Call 1-800-879-1470

Enter mailing address and EIA ID number, if not shown

EIA Identification Number: 0 0 0 0

Company Name:

Street or P.O Box:

City, State, Zip Code:

1. Contact Information ***(person most knowledgeable about the reported data)***
Contact Person:
Phone Number: ( ) - Ext.
Fax Number: ( ) -
E-mail Address:

2. Was your company an oil and gas field operator at any time during calendar year 2006? ***(See definition of an operator, page 1)***
(1) ☐ No... *Complete only items 3 through14 below and return this page.*
(2) ☐ Yes... *Complete rest of form.*

3. Company Status, Name, and/or Address Change or Correction. (Check appropriate box.)
☐ Name and address on mailing label are correct.
☐ Change company name, contact person, and/or mailing address,as indicated below.
☐ Company was sold to or merged with company entered below.
☐ Company went out of business. Operations transferred to company entered below.

4. Change Company Name, Address, and/or Contact Information to:
Company Name:
Street or P. O. Box:
City, State, Zip Code:
Contact Person (*Please Print*):
Phone Number: ( ) - Ext. | Fax number: ( ) - | E-Mail Address:
Comments:

SAMPLE

PART II. PARENT COMPANY IDENTIFICATION

5. Is there a parent company which exercises ultimate control over your company?
(1) ☐ No... Answer 11 through 14.
(2) ☐ Yes... Answer 6 through 14.

6. Parent Company Name
7. Street or P.O. Box
8. City | **9.** State | **10.** Zip Code

PART III. APPROVAL

11. Reviewed and approved by: (*Please Print*) | **12.** Title
13. Signature | **14.** Date

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

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

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

OFFICIAL USE ONLY

2007 FORM EIA-23S ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES

SUMMARY REPORT

PAGE 1 OF 2

Form Approved
OMB No. 1905-0057
Expiration Date: 2/28/2010
(Revised 2007)

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

1.0 OPERATOR AND REPORT IDENTIFICATION DATA

1.1 OPERATOR EIA ID CODE		1.2 OPERATOR NAME		REPORT DATE			1.3 ORIGINAL	1.4 RESUBMISSION
				12	31	07		

2.0 PRODUCTION AND RESERVES DATA

STATE OR GEOGRAPHIC SUBDIVISION		CRUDE OIL			NATURAL GAS			LEASE CONDENSATE		
		RESERVES	2007 PRODUCTION		RESERVES	20067PRODUCTION		RESERVES	2007 PRODUCTION	
		Proved Reserves Dec. 31, 2007 (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, 2007 (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, 2007 (MBbls) (G)	(From properties for which reserves were Estimated) (MBbls) (H)	(From properties for which reserves were Not Estimated) (MBbls) (I)
ALABAMA-ONSHORE	AL									
ALABAMA-STATE OFFSHORE	AL05									
ALASKA-NORTH ONSHORE AND OFFSHORE	AK50									
ALASKA-SOUTH ONSHORE	AK10									
ALASKA-SOUTH STATE OFFSHORE	AK05									
ARIZONA	AZ									
ARKANSAS	AR									
CALIFORNIA-COASTAL REGION ONSHORE	CA50									
CALIFORNIA-LOS ANGELES BASIN ONSHORE	CA90									
CALIFORNIA-SAN JOAQUIN BASIN ONSHORE	CA10									
CALIFORNIA-STATE OFFSHORE	CA05									
COLORADO	CO									
FLORIDA-ONSHORE	FL									
FLORIDA-STATE OFFSHORE	FL05									
ILLINOIS	IL									
INDIANA	IN									
KANSAS	KS									
KENTUCKY	KY									
LOUISIANA-NORTH	LA50									
LOUISIANA-SOUTH ONSHORE	LA10									
LOUISIANA-STATE OFFSHORE	LA05									
MARYLAND	MD									
MICHIGAN	MI									
MISSISSIPPI-ONSHORE	MS									
MISSISSIPPI-STATE OFFSHORE	MS05									
MISSOURI	MO									
MONTANA	MT									
NEBRASKA	NE									
NEVADA	NV									
NEW MEXICO-EAST	NM10									
NEW MEXICO-WEST	NM50									
NEW YORK	NY									
NORTH DAKOTA	ND									
OHIO	OH									

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

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

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2007

FORM EIA-23S
ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES
SUMMARY REPORT
PAGE 2 OF 2

Form Approved
OMB No. 1905-0057
Expiration Date: 2/8/2010
(Revised 2007)

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

1.0 OPERATOR AND REPORT IDENTIFICATION DATA

1.1 OPERATOR I.D. CODE	1.2 OPERATOR NAME	REPORT DATE			1.3 ORIGINAL	1.4 AMENDED
		12	31	07		

2.0 PRODUCTION AND RESERVES DATA

STATE OR GEOGRAPHIC SUBDIVISION		CRUDE OIL			NATURAL GAS			LEASE CONDENSATE		
		RESERVES	2007 PRODUCTION		RESERVES	2007 PRODUCTION		RESERVES	2007 PRODUCTION	
		Proved Reserves Dec. 31, 2007 (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, 2007 (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, 2007 (MBbls) (G)	(From properties for which reserves were Estimated) (MBbls) (H)	(From properties for which reserves were Not Estimated) (MBbls) (I)
OKLAHOMA	OK									
PENNSYLVANIA	PA									
SOUTH DAKOTA	SD									
TENNESSEE	TN									
TEXAS-RRC DISTRICT 1	TX10									
TEXAS-RRC DISTRICT 2 ONSHORE	TX20									
TEXAS-RRC DISTRICT 3 ONSHORE	TX30									
TEXAS-RRC DISTRICT 4 ONSHORE	TX40									
TEXAS-RRC DISTRICT 5	TX50									
TEXAS-RRC DISTRICT 6	TX60									
TEXAS-RRC DISTRICT 7B	TX70									
TEXAS-RRC DISTRICT 7C	TX75									
TEXAS-RRC DISTRICT 8	TX80									
TEXAS-RRC DISTRICT 8A	TX85									
TEXAS-RRC DISTRICT 9	TX90									
TEXAS-RRC DISTRICT 10	TX95									
TEXAS-STATE OFFSHORE	TX05									
UTAH	UT									
VIRGINIA	VA									
WEST VIRGINIA	WV									
WYOMING	WY									
FEDERAL OFFSHORE-GULF OF MEXICO (ALABAMA)	AL00									
FEDERAL OFFSHORE-GULF OF MEXICO (FLORIDA)	FL00									
FEDERAL OFFSHORE-GULF OF MEXICO (LOUISIANA)	LA00									
FEDERAL OFFSHORE-GULF OF MEXICO (MISSISSIPPI)	MS00									
FEDERAL OFFSHORE-GULF OF MEXICO (TEXAS)	TX00									
FEDERAL OFFSHORE-PACIFIC (ALASKA)	AK00									
FEDERAL OFFSHORE-PACIFIC (CALIFORNIA)	CA00									
FEDERAL OFFSHORE-PACIFIC (OREGON)	OR00									
OTHER STATE (SPECIFY)										
TOTAL (SUM EACH COLUMN)	US									

SAMPLE

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

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

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Form Approved
OMB No. 1905-0057
Expiration Date: 2/28/2010
(Revised 2007)

2007

FORM EIA-23L
ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES
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 EIA ID CODE	1.2 OPERATOR NAME	REPORT DATE	1.3 ORIGINAL	1.4 AMENDED	1.5 PAGE
		12 31 07			____ OF ____

2.0 FIELD DATA (OPERATED BASIS)

2.1

1. STATE ABBR.	2. SUBDIV. CODE	3. COUNTY CODE	4. FIELD CODE	5. TYPE CODE	6. FIELD NAME

9. WATER DEPTH | 10. FIELD DISCOVERY YEAR | 11. PROSPECT NAME (OPTIONAL)

TYPE OF HYDROCARBON	TOTAL PROVED RESERVES DECEMBER 31, 2006 (A)	REVISION INCREASES (B)	REVISION DECREASES (C)	SALES (D)	7. PROVED NONPRODUCING RESERVES – DECEMBER 31, 2007 ACQUISITIONS (E)	EXTENSIONS (F)	NEW FIELD DISCOVERIES (G)	NEW RESERVOIRS IN OLD FIELDS (H)	CALENDAR YEAR PRODUCTION (I)	TOTAL PROVED RESERVES DECEMBER 31, 2007 (J)	8. FOOTNOTE
						CRUDE OIL (MBbls) (a)	ASSOC-DISSOLVED GAS (MMCF) (b)	NONASSOCIATED GAS (MMCF) (c)	LEASE CONDENSATE (MBbls) (d)		
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. TYPE CODE	6. FIELD NAME

9. WATER DEPTH | 10. FIELD DISCOVERY YEAR | 11. PROSPECT NAME (OPTIONAL)

TYPE OF HYDROCARBON	TOTAL PROVED RESERVES DECEMBER 31, 2006 (A)	REVISION INCREASES (B)	REVISION DECREASES (C)	SALES (D)	7. PROVED NONPRODUCING RESERVES – DECEMBER 31, 2007 ACQUISITIONS (E)	EXTENSIONS (F)	NEW FIELD DISCOVERIES (G)	NEW RESERVOIRS IN OLD FIELDS (H)	CALENDAR YEAR PRODUCTION (I)	TOTAL PROVED RESERVES DECEMBER 31, 2007 (J)	8. FOOTNOTE
						CRUDE OIL (MBbls) (a)	ASSOC-DISSOLVED GAS (MMCF) (b)	NONASSOCIATED GAS (MMCF) (c)	LEASE CONDENSATE (MBbls) (d)		
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. TYPE CODE	6. FIELD NAME

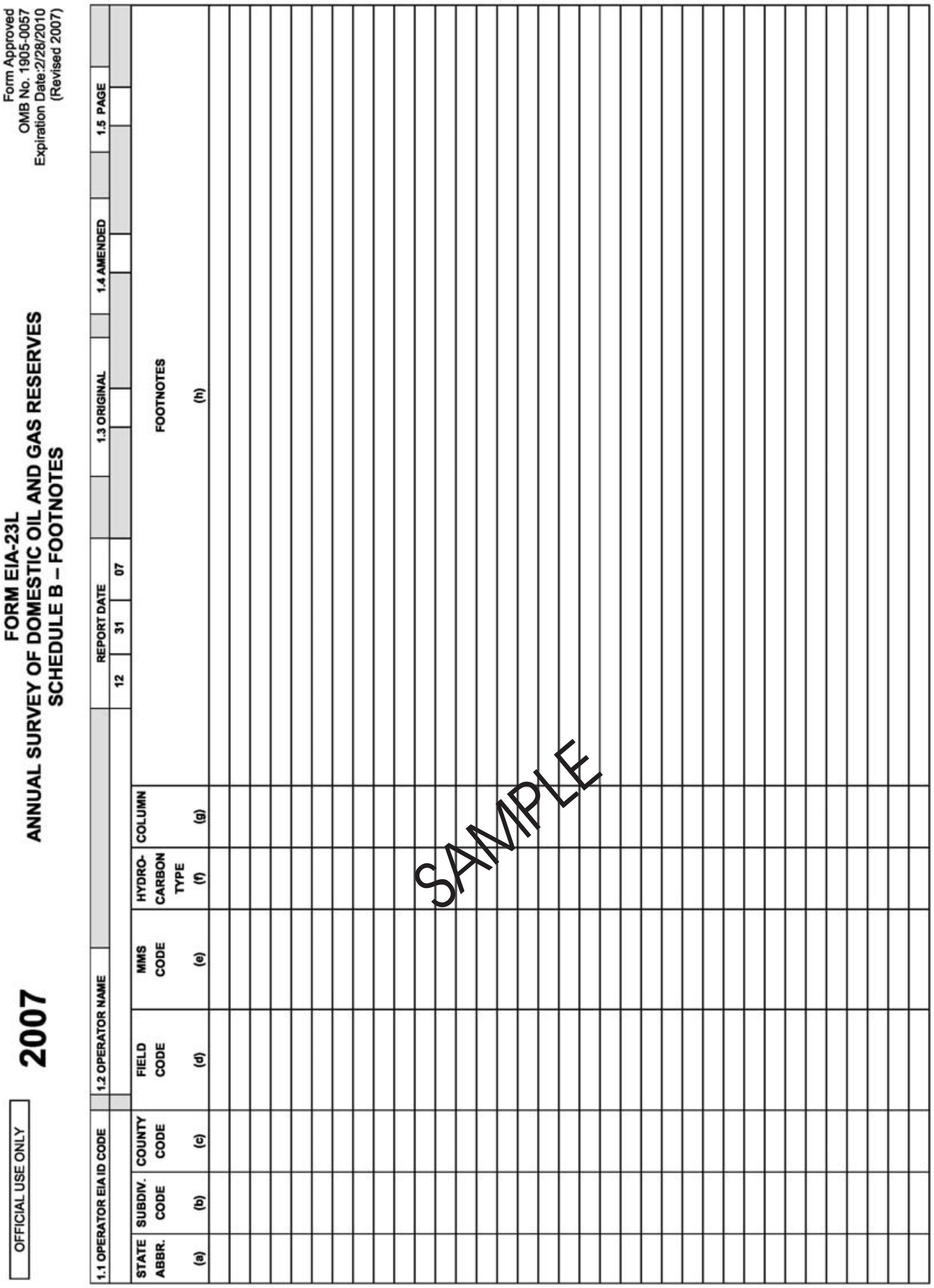
9. WATER DEPTH | 10. FIELD DISCOVERY YEAR | 11. PROSPECT NAME (OPTIONAL)

TYPE OF HYDROCARBON	TOTAL PROVED RESERVES DECEMBER 31, 2006 (A)	REVISION INCREASES (B)	REVISION DECREASES (C)	SALES (D)	7. PROVED NONPRODUCING RESERVES – DECEMBER 31, 2007 ACQUISITIONS (E)	EXTENSIONS (F)	NEW FIELD DISCOVERIES (G)	NEW RESERVOIRS IN OLD FIELDS (H)	CALENDAR YEAR PRODUCTION (I)	TOTAL PROVED RESERVES DECEMBER 31, 2007 (J)	8. FOOTNOTE
						CRUDE OIL (MBbls) (a)	ASSOC-DISSOLVED GAS (MMCF) (b)	NONASSOCIATED GAS (MMCF) (c)	LEASE CONDENSATE (MBbls) (d)		
12. CRUDE OIL (MBbls)											
13. ASSOCIATED-DISSOLVED GAS (MMCF)											
14. NONASSOCIATED GAS (MMCF)											
15. LEASE CONDENSATE (MBbls)											

SAMPLE

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

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



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2007

FORM EIA-23L
ANNUAL SURVEY OF DOMESTIC OIL AND GAS RESERVES
SCHEDULE B – FOOTNOTES

Form Approved
OMB No. 1905-0057
Expiration Date:2/28/2010
(Revised 2007)

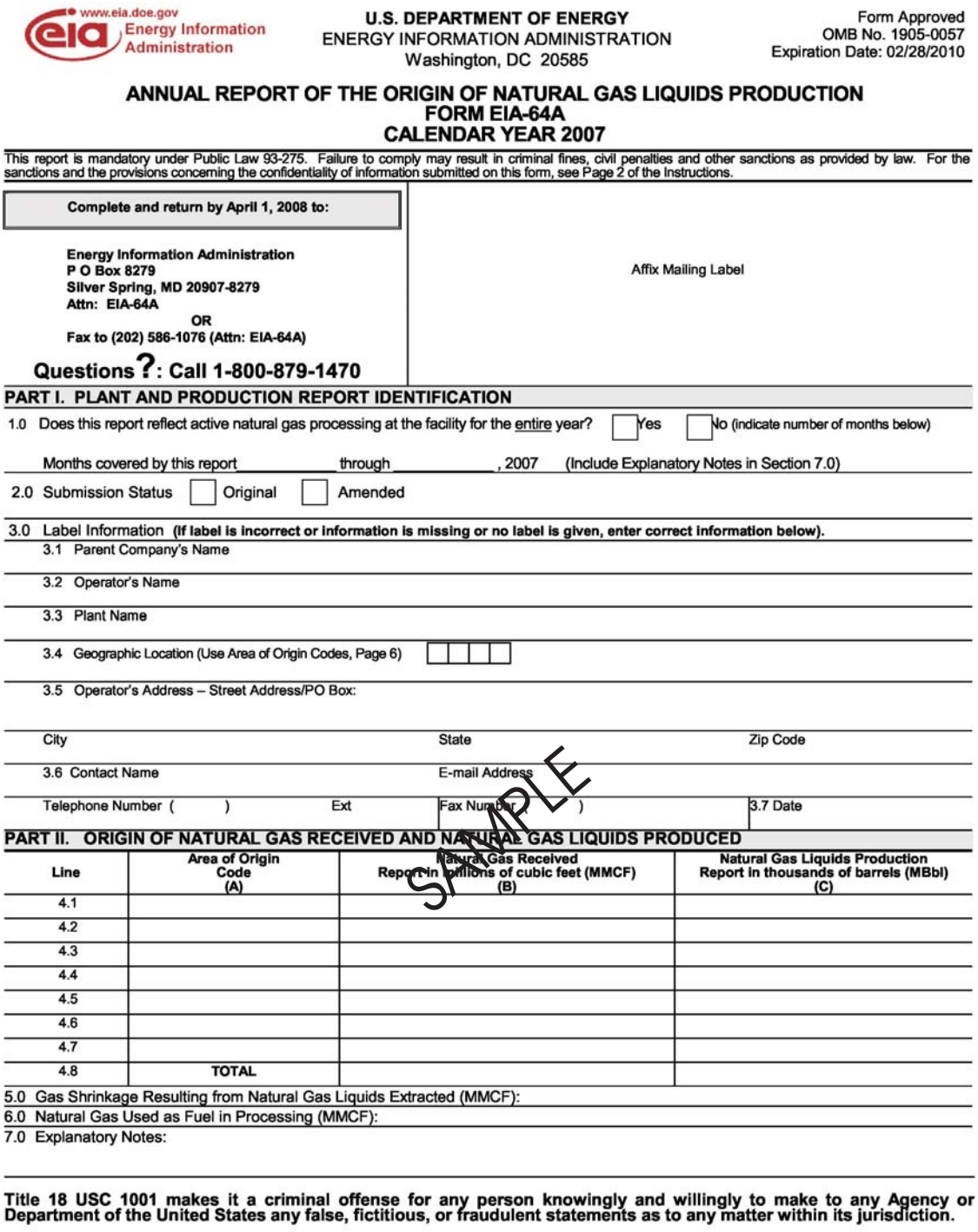
1.1 OPERATOR EIA ID CODE	1.2 OPERATOR NAME	REPORT DATE 12 31 07	1.3 ORIGINAL	1.4 AMENDED	1.5 PAGE

STATE ABBR. (a)	SUBDIV. CODE (b)	COUNTY CODE (c)	FIELD CODE (d)	MMS CODE (e)	HYDRO-CARBON TYPE (f)	COLUMN (g)	FOOTNOTES (h)

SAMPLE

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

Figure I6. Form EIA-64A



www.eia.doe.gov
Energy Information Administration

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

Form Approved
OMB No. 1905-0057
Expiration Date: 02/28/2010

ANNUAL REPORT OF THE ORIGIN OF NATURAL GAS LIQUIDS PRODUCTION
FORM EIA-64A
CALENDAR YEAR 2007

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, 2008 to:

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

Questions ?: Call 1-800-879-1470

Affix Mailing Label

PART I. PLANT AND PRODUCTION REPORT IDENTIFICATION

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

Months covered by this report _____ through _____, 2007 (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 Address – Street Address/PO Box:

City State Zip Code

3.6 Contact Name E-mail Address

Telephone Number ( ) Ext Fax Number ( ) 3.7 Date

SAMPLE

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

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

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

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

7.0 Explanatory Notes:

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

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

Glossary

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**)

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 at a specified point in time. It measures the maximum recoverable volume *known* at that time and is a dynamic quantity that is expected to change over time for any field, group of fields, State, or Country. In most instances, therefore, an estimate of Proved Ultimate Recovery does not represent the all-time maximum recoverable volume of resources for a given field or area.

Also, the proved ultimate recovery of a field, a group of fields, a State, or a Country grows (appreciates) over time in most instances.

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.