



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

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at The Honorable Henry S. Reuss
R House of Representatives

Dear Mr. Reuss:

In response to your request of December 20, 1974, and as your office agreed, we are enclosing information concerning your four questions on the Federal coal-leasing program administered by the Department of the Interior. The information pertains to (1) the validity of various coal reserve estimates, (2) the coal production trends for lands east and west of the Mississippi River, (3) the production and reserve data on Federal leases, and (4) the monitoring of Federal leases for compliance with statutory limitations. 32

The Geological Survey has informed us that the recoverable reserve data for each lessee is considered subject to exemptions four and nine of the Freedom of Information Act (5 U.S.C. 552(b)(4) and (9)). It stated, however, that the total recoverable reserves for oil, coal, utility and other companies as a group, and the overall recoverable reserves (10,353 million tons) could be publicly disclosed. Therefore, we are forwarding the data on individual lessees under separate cover.

Sincerely yours,

Comptroller General
of the United States

Enclosure

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QUESTION 1

In the judgement of GAO, what is the best estimate of our coal reserves by type (sulfur content), tons, and BTU content? What percentages of these reserves by type, tons, and BTU content are east and west of the Mississippi? How long might the reserves on each side of the Mississippi be expected to last? In brief, how does the estimate of coal reserves which you think is best compare to other government, industry, and private estimates? How good do you think it is?

ANSWER

The Department of the Interior is the primary source for the U.S. coal resource and reserve information. The most recent (January 1, 1974) published estimate of U.S. coal reserves is the demonstrated coal reserve base reported by the Bureau of Mines. Three recent studies on coal reserves, which we reviewed, based their estimates on the Bureau of Mines or the Geological Survey data generally developed in the 1960s or used a different basis for defining reserves.

Estimates of how long the U.S. coal will last depends on many variables, such as mining methods and technologies to be used, environmental restraints on the mining and burning of coal, the identification of new coal deposits, the level of production, and the demand for coal. Because of these many variables, any estimate would be highly speculative.

The following table shows coal reserves by tons, sulfur content, and British thermal unit (Btu) value for the States east and west of the Mississippi River. The Bureau of Mines estimated the coal reserve to be 434 billion tons, and we computed the sulfur content and Btu value of that estimate. We discussed our method of computing sulfur content and Btu value with an Interior official and he agreed with our approach.

Demonstrated Coal Reserve Base
As Of January 1, 1974

	<u>Tons</u> (billions)	<u>Percent</u>
East	202	46.5
West	<u>232</u>	<u>53.5</u>
Total	434	100.0

Sulfur Content

	<u>Less than 1%</u>		<u>1 to 3%</u>		<u>More than 3%</u>	
	<u>Tons</u> (billions)	<u>Percent</u>	<u>Tons</u> (billions)	<u>Percent</u>	<u>Tons</u> (billions)	<u>Percent</u>
East	40	9	71	16	91	21
West	<u>209</u>	<u>48</u>	<u>8</u>	<u>2</u>	<u>15</u>	<u>4</u>
Total	249	57	79	18	106	25

British Thermal Unit Value

	<u>Btu's</u> (quadrillions)	<u>Percent</u>	<u>Btu's of coal with</u> <u>less than 1% sulfur</u> (quadrillions)	<u>Percent</u>
	East	5,282	53.8	1,021
West	<u>4,530</u>	<u>46.2</u>	<u>3,992</u>	<u>79.6</u>
Total	9,812	100.0	5,013	100.0

Raw data currently available for estimating coal reserves is limited. For example, such factors as sulfur content and Btu value have not been determined for much of the U.S. coal. In the following sections, which deal with the demonstrated coal reserve base and its corresponding sulfur content and Btu value, we discuss how the estimates were determined and some of the estimates' limitations.

Demonstrated coal reserve base

The demonstrated coal reserve base, according to the Bureau of Mines, includes coalbeds thick enough and near enough to the surface to be mined by conventional methods. It includes that coal which has been estimated by the Bureau of Mines and the Geological Survey using some sample analyses and physical measurements. The estimates include coal to a maximum depth of 1,000 feet, except lignite which is included to a maximum depth of 120 feet. Coalbed thicknesses included are 28 inches or more for bituminous and anthracite and 60 inches or more for subbituminous and lignite. Some coalbeds that did not meet the depth and thickness criteria were included in the estimate because they either were being mined or were judged to be capable of being mined commercially.

The demonstrated coal reserve base of 434 billion tons is part of the identified coal resources which the Department of the Interior estimated at 1,581 billion tons. Although identified coal resources are known quantities based on geologic evidence supported by engineering measurements, they are not necessarily currently mineable. The identified coal resources are part of the total coal resources in existence in the United States. The Department of the Interior estimates that there are 3,244 billion tons of coal in existence in the United States, including both identified and hypothetical deposits.

The amount of recoverable demonstrated coal reserves is estimated to range from 217 to 258 billion tons. The Department of the Interior based the lower estimate on mining experience which indicated that at least half of the demonstrated reserve was recoverable on a national basis and based the higher estimate on an 80-percent recoverability factor for surface coal. Although estimates of coal resources will remain relatively constant, estimates of reserves are likely to change because changes in technology, economics, and law affect mineability.

Sulfur content

We used a 1966 Bureau of Mines study entitled "Sulfur Content of United States Coals" to determine sulfur content of the demonstrated coal reserve base. This was the only study which analyzed coal tonnages in terms of sulfur content. The study was based principally upon analyses of cleaned coals from individual coal mines. The percentages of coal in each of the three sulfur content categories shown on page 2 were developed from statistics in the above-mentioned study. We applied these percentages to the demonstrated coal reserve base as of January 1, 1974, to estimate the tonnage in each sulfur content category.

The study pointed out several inherent difficulties in making sulfur content estimates that cannot be overcome because of the limitations of the basic data. Among those limitations are

- the lack of basic information on reserves in some geographic areas,
- variations of sulfur content within a coalbed in a given State or even within a given mine,
- the lack of recent analyses for some coalbeds, and
- the lack of sufficient data on coal samples so that sulfur levels could be assigned to reserves rather than clean coal.

British thermal unit value

We used average Btu values for various types of coal, developed by the Geological Survey, to assess the Btu value of the demonstrated coal reserve base. We had no basis on which to judge whether other values would be more appropriate. The average Btu values, by type of coal, follow.

<u>Type of coal</u>	<u>British thermal units per pound</u>
Anthracite	12,700
Bituminous	13,100
Subbituminous	9,500
Lignite	6,700

We applied these Btu values to the demonstrated coal reserve base as of January 1, 1974.

QUESTION 2

What are the figures in tons and percentages for production east and west of the Mississippi for recent years? If these figures indicate an east to west shift, what information can you provide to explain or put the shift in perspective?

ANSWER

From 1968 to 1973, the Western States' share of U.S. coal production increased from 5 to 13 percent, as shown in the following table.

<u>Year</u>	<u>Eastern States</u>		<u>Western States</u>		<u>Total U.S. production</u> (000 omitted)
	<u>Tons produced</u> (000 omitted)	<u>Percent of U.S. production</u>	<u>Tons produced</u> (000 omitted)	<u>Percent of U.S. production</u>	
1960	394,213	95	21,299	5	415,512
1965	484,663	95	27,425	5	512,088
1967	523,718	95	28,908	5	552,626
1968	515,528	95	29,717	5	545,245
1969	527,203	94	33,302	6	560,505
1970	558,029	93	44,903	7	602,932
1971	501,199	91	50,993	9	552,192
1972	531,050	89	64,336	11	595,386
1973	515,303	87	76,435	13	591,738

Officials of the Department of the Interior, the Environmental Protection Agency, and the United Mine Workers of America told us that generally western coal is easier and more economical to produce because usually it is strip-mined. Strip mining, compared to underground mining, which is generally used in the East, requires less manpower, equipment, and leadtime to begin coal production. Also western lands usually are more easily obtainable in large tracts than eastern lands and therefore can be more efficiently mined.

Western coal has also been in greater demand in recent years because of its low sulfur content. The Clean Air Act (42 U.S.C. 1857), as amended on December 31, 1970, by Public Law 91-604, directed the Environmental Protection Agency to establish air quality standards designed to reduce pollution and protect the public welfare. The act requires States to develop air cleanup programs and submit them to the Environmental Protection Agency for approval. The States' plans are required to describe the methods and procedures to be used to comply with the Environmental Protection Agency requirements. One method used to meet this requirement has been to substitute low-sulfur coal for other fuels for use in public utilities.

Bureau of Mines officials told us that the transition to low-sulfur coal had contributed to the increased demand for coal produced in the Western States. Also a January 1974 Bureau of Mines report assessing the impact of air quality requirements on coal through 1980 estimated large increases in western low-sulfur coal production.

The relationship between the Btu value and the sulfur contents of coal is crucial. Use of Western low-sulfur coal usually means a reduction in sulfur emissions for each ton of coal burned. There is an inverse affect on sulfur emissions, however, because on the average more Western coal must be used to produce the same amount of energy

QUESTION 3

What is the total acreage leased to date by the Interior Department and the best estimate of the tons of coal contained in those lands? How much coal was mined from these lands in the last year for which data is available, and what has been the trend in production from their leased lands from the early 1960's to the present? Which of the major leaseholders are oil, coal, and utility companies or companies controlled by them? How much in acres and percentages do they have of the total Federal lands leased? What are the same figures for the three industries as groups? How many tons of coal do these industries control by virtue of their Federal leases? How much coal did they produce from these leased lands in the last year for which data is available, and what has been the trend in production from their leased lands from the early 1960's to the present?

ANSWER

As of December 31, 1974, the Department had 533 outstanding coal leases on about 785,000 acres of Federal land. The Department estimated that these leases contained about 16 billion tons of coal (recoverable reserves). Coal production from Federal lands has increased in recent years. The following information on coal production from Federal lands, supplied by the Geological Survey, illustrates this trend.

Coal Production From Federal Lands

<u>Year</u>	<u>Production tons</u> (000 omitted)
1960	5,122
1965	5,723
1969	7,482
1970	7,445
1971	10,073
1972	10,246
1973	14,033
1974	20,631

Fifteen lessees hold 254 of the 533 Federal coal leases and control almost 466,000 acres of land. The Geological Survey has estimated that these 15 lessees control 10,353 million tons of recoverable coal reserves.^{1/} Of this amount, oil companies control about 41 percent, coal companies control about 32 percent, utility companies control about 19 percent and other companies control about 8 percent. During 1974 eight of these lessees produced about 6.9 million tons of coal; the other seven produced no coal.

Information on the 15 largest acreage holders is shown in the following tabulation.

^{1/} Reserves on known resources which can be extracted at a profit with existing technology and at existing prices. Increases in coal prices can be expected to increase the computed amount of reserves recoverable from the resources in these leases.

Fifteen Largest Acreage Holders of Federal Coal Leases

<u>Lessee (Controlling Co.)</u>	<u>Number of leases</u>	<u>Federal acres leased</u>	<u>Percent of Federal lands leased</u>	<u>Production</u>	
				<u>1960</u> (note a)	<u>1974</u> (tons)
Oil companies:					
Sun Oil Co.	2	21,239.97		-	-
Atlantic Richfield	6	19,145.98		52,100	134,287
Carter Oil Co. (Exxon Corp.)	3	15,490.50		-	-
Consolidation Coal Co. (Continental Oil Co.) (note b)	30	54,825.09		-	14,298
Total	41	110,701.54	14.10	52,100	148,585
Coal companies:					
Peabody Coal Co. (Kennecott Copper Co.)	49	82,021.29		7,710	2,196,106
Garland Coal Co.	28	45,992.24		2,088	120,159
Utah International	26	24,229.61		-	-
Kemmerer Coal Co. (Lincoln Corp.) (note b)	21	32,227.70		-	451,406
Total	124	184,470.84	23.51	9,798	2,767,671
Utility companies:					
El Paso Natural Gas	15	27,018.72		-	-
Resources Co. (Arizona Public Service Co. and San Diego Gas and Electric Co.)	20	39,355.19		-	-
Pacific Power and Light	19	35,078.15		520,233	2,880,947
Total	54	101,452.06	12.93	520,233	2,880,947
Other:					
Richard D. Bass	1	20,700.71		-	-
United States Steel	19	18,919.15		932,342	810,849
Industrial Resources	6	14,929.33		-	-
Kaiser Steel (Kaiser Industries Corp.)	9	14,617.26		159,246	281,362
Total	35	69,166.45	8.81	1,091,588	1,092,211
Total	254	465,790.89	59.35	1,673,719	6,889,414

^aWe could not readily obtain from agency records the number of leases and the acreage held in 1960 by these 15 companies.

^bConsolidation Coal Co. and Kemmerer Coal Co. jointly own, on a 50-50 basis, 10 coal leases in Utah involving 18,745.94 acres. For reporting purposes the number of leases and acres have been divided equally between the two companies.

ENCLOSURE

ENCLOSURE

QUESTION 4

What are the legal limits for the acreage that can be leased by any company, and how does the Department monitor the application of these limits?

ANSWER

The Mineral Leasing Act (30 U.S.C. 184) authorizes the Secretary of the Interior to divide the Federal coal lands into leasing tracts of 40 acres each or multiples thereof, which will permit the most economical mining of coal in such tracts. Coal leases are awarded by competitive bidding and are issued for indeterminate periods, subject at 20-year intervals to such adjustment of terms and conditions as the Secretary may require.

Under the act, when prospecting work is necessary to determine the existence of coal, the Secretary may issue a prospecting permit for a 2-year term and not exceeding 5,120 acres. The act states that no person, association, or corporation may hold, at any one time in any one State, more than 46,080 acres in coal leases and prospecting permits.

Interior officials told us that the Bureau of Land Management State offices monitored Federal coal leases to insure that lessees do not exceed statutory acreage limitations. They said that this was done by personal knowledge of the leasing activity and by reviewing quarterly computer listings which show the number of leases and acres held by each lessee. State office personnel told us, however, that no lessees had exceeded the statutory acreage limitation. Only two lessees hold more than 46,080 acres of Federal land in the entire United States. However, we found the two lessees did not hold more than 46,080 in any one State. We did not test the adequacy or effectiveness of the Bureau's program to monitor coal lease acreage limitations.