THE GEOLOGICAL SURVEY OF WYOMING
Gary B. Glass, State Geologist

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DEMONSTRATED RESERVE BASE OF COAL IN WYOMING AS OF JANUARY 1, 1991

by

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and
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Abstract

The Geological Survey of Wyoming's estimate of remaining demonstrated reserve base of coal in Wyoming, as of January 1, 1991, is 69.542 billion short tons. This estimate includes 26.998 billion short tons of strippable coal located in only five of the State's coal fields and 42.545 billion short tons of underground coal located in all ten of the State's coal fields. The strippable coal estimate is a new assessment by the Geological Survey of Wyoming that quantifies those reserves by both sulfur content (pounds of sulfur per million Btu) and heating value (million Btu per short ton). The estimate of underground coal is based on previously derived estimates of the Energy Information Administration, updated to reflect adjustments based on recent mining.

About 15.8 billion short tons, or 58.5 percent, of the nearly 27 billion short tons of remaining demonstrated reserve base of strippable coal is compliant coal that emits 1.2 or less pounds of sulfur dioxide (0.6 pounds of sulfur) per million Btu when it is burned. This is about 8.0 billion tons more strippable compliant coal than has been reported in earlier studies. The new allocation of demonstrated reserve base of strippable coal in Wyoming places 5.2 billion short tons, or 19.2 percent, into the Energy Information Administration's lowest sulfur category (≤0.40 pounds of sulfur/million Btu) and 2.6 billion short tons, or 9.8 percent, into the Energy Information Administration's highest sulfur category (>2.50 pounds of sulfur/ million Btu). All but 215 million tons of the demonstrated reserve base of strippable, compliant coal are subbituminous in rank.

The Geological Survey of Wyoming evaluated accessibility for mining in the areas of the demonstrated reserve base of strippable coal, and derived estimated minable reserves of 26.351 billion short tons. This tonnage, adjusted by various local recovery factors, yields estimated recoverable reserves, (of strippable coal) of 23.314 billion short tons. About 13.8 billion short tons of these strippable, recoverable reserves are compliant coal.

Although the Geological Survey of Wyoming did not analyze either the accessibility or the recovery factors for the demonstrated reserve base of underground coal, the minable reserves and the recoverable reserves for underground coal were calculated using the Energy Information Administration's accessibility and recovery factors. Of the 42.5 billion short tons in the underground demonstrated reserve base, about 38.3 billion short tons are minable reserves and about 23.0 billion short tons are recoverable reserves.

A total of 64.6 billion short tons of both strippable and underground coal in Wyoming are minable reserves and a total of 46.3 billion short tons of both strippable and underground coal in Wyoming are recoverable reserves. Underground and strippable compliant coal in Wyoming total 36.4 billion short tons of demonstrated reserve base, 34.0 billion short tons of minable reserves, and 24.9 billion short tons of recoverable reserves.

Introduction

Background

The Geological Survey of Wyoming (GSW) entered into Cooperative Agreement DE-FG01-90EI21952 with the U.S. Department of Energy, Energy Information Administration (EIA), to update coal reserve estimates for Wyoming. The study is part of EIA's Coal Reserves Data Base (CRDB) Program, whose objective is to involve knowledgeable coal resource authorities from the major coal-bearing regions in EIA's effort to update the Nation's coal reserves data. The year-long project used funds furnished by a grant from the EIA and from the GSW's operating budget.

Purpose

This study was undertaken to update existing estimates of Wyoming's coal reserves and to reallocate the State's reserves according to coal quality parameters. The coal reserves data developed in this study are intended for use in coal supply analyses and to support analyses of policy and legislative issues. The data also will be part of the information used to supply United States energy data for international data bases and for inquiries from private industry and the public.

Maps of coal beds and deposits, drilling records, historical mine maps, site specific analytical data, and structural geology are critical to reliable characterizations of coal reserves. These types of data have been used to various extents in the current study, as described in the sections below.

The information in this report was compiled under guidelines that emphasize utilization of readily available coal resource and coal analytical data that can be assimilated during a short-term (12-month) project. The GSW's project addressed only the revision of the CRDB for the strippable reserve base in Wyoming. Data on the underground reserve base are from the EIA estimate of underground demonstrated reserve base (DRB), and on EIA's coal quality allocations and accessibility and recovery rate adjustments (Energy Information Administration, 1989). The EIA estimates are included in this report in order to present in one place the complete summary of data, updated to the base year 1991.

Acknowledgments

This report, plus the data and interpretations used to assess and estimate resources in individual coal deposits, could not have been prepared without the assistance of Wayne M. Sutherland, Holly S. Cunningham, Eric L. Nielsen, and Michael J. Bell. The report benefited greatly by the technical review and guidance of Richard Bonskowski, EIA's technical project officer. Rebecca S. Hasselman and Teresa L. Beck assisted with word processing and preparation of the technical reports and Teresa L. Beck assisted with preparation of this report.

Assumptions and Methodology

Terminology

The reserve base is defined as "those parts of the identified [coal] resources that meet specified minimum physical and chemical criteria related to current mining and production practices, including those for quality, depth, thickness, rank, and distance from points of measurement" (Wood and others, 1983). The demonstrated reserve base is composed of identified coal resources (those resources whose location, rank, quality, and quantity are known or estimated from specific geologic evidence) in both the measured and the indicated categories of reliability. "A measured reserve base is determined by projection of thicknesses of coal data and overburden, rank, and quality data from points of measurement and sampling on the basis of geologic evidence for a radius of 1/4 mile (0.4 km)..." (Wood and others, 1983). "An indicated reserve base is determined by projection of thicknesses of coal and overburden, rank, and quality data from points of measurement and sampling on the basis of geologic evidence [when]... individual points of measurement are bounded by measured coal of 1/4 mile (0.4 km) succeeded by indicated coal from 1/4 mile (0.4 km) to 3/4 mile (1.2 km)..." (Wood and others, 1983).

Minable reserves are those reserves in the demonstrated reserve base "capable of being mined under current mining technology and environmental and legal restrictions, rules, and regulations" (Wood and others, 1983). This term is equivalent to EIA's "accessible reserves," which excludes those parts of the reserve base that are illegal or inaccessible, such as those resources in or near alluvial valleys, national parks, historical and archeological sites, under towns or properties where subsidence is a concern. Other resources that are not minable are those due to geological complications (e.g. faults, extreme dips, and other structural complications) and those surface minable resources that cannot be properly reclaimed (Energy Information Administration, 1989).

Recoverable reserves are those minable reserves that can actually be extracted or recovered during mining. A recovery factor is used to represent the fraction of the total reserves that can be extracted from a given mine site (Energy Information Administration, 1989). The term recoverable reserves is equivalent to the U.S. Geological Survey's "reserves," which is defined as "virgin and(or) accessed parts of a reserve base which could be economically extracted or produced at the time of determination..." (Wood and others, 1983). Wood and others (1983) consider the term recoverable reserves redundant, in that reserves, by their definition, include only recoverable coal.

Reliability criteria

Only estimates of coal tonnages considered to be in the "demonstrated" reliability category (includes both measured and indicated coal resources) were used in this study. However, chemical analyses from data points beyond the demonstrated category were also used to allocate the resources by categories of coal quality. In areas of intensive drilling, such as in mine permit areas and within detailed coal exploration projects, the number and spacing of data points were assumed to be sufficient for characterization of the demonstrated reserve base without using data points beyond the explored areas. All data sources for this study that used the terms measured, indicated, and demonstrated for reliability categories of the reserve base are believed to be consistent with the definitions in U.S. Geological Survey Circular 891 (Wood, and others, 1983).

Table 1. Estimated original and remaining demonstrated reserve base (DRB) of strippable coal in Wyoming, as of January 1, 1991 (in million short tons). Numbers in parentheses are negative.

Strippable Deposit name & Coal Bed name	Original Strippable DRB	Production & Mining Losses	Remaining Strippable DRB	References
		Powder River Coal Field		
Dave Johnston/Glenrock				
Badger	9.5	(6.6)	2.9	Smith and others, 1972
School	126.2	(85.4)	40.8	Smith and others, 1972
subtotal all beds	135.7	(92.0)	43.7	
Wyodak/Caballo Creek				
Wyodak	19,000.0	(1,473.7)	17,526.3	Smith and others, 1972
	3.8[1]	-	3.8[1]	Jones and Glass, this report
	(1,012.6)[2]	-	(1,012.6)[2]	Jones and Glass, this report
	1,369.3[3]	-	1,369.3[3]	Grazis, 1977
subtotal Wyodak	19,360.5	(1,473.7)	17,886.8	
Felix	1,060.0	-	1,060.0	Grazis, 1977
Lower Ulm	43.8	-	43.8	Grazis, 1977
Scott	13.5	-	13.5	Grazis, 1977
C	11.1	-	11.1	Grazis, 1977
C'	115.2	-	115.2	Grazis, 1977
C	26.3	-	26.3	Grazis, 1977
subtotal entire deposit	20,630.4	(1,473.7)	19,156.7	
Canyon				
Canyon	184.9	-	184.9	Smith and others, 1972
Dry Cheyenne				
F	179.5	-	179.5	Smith and others, 1972
Lake DeSmet/Healy				
Lake DeSmet/Healy	790.0[4]	-	790.0[4]	Mapel, 1959, and Smith and others, 1972
Other Wasatch Fm. coals	210.0	-	210.0	Mapel, 1959, and Smith and others, 1972
subtotal all beds	1,000.0	-	1,000.0	Smith and others, 1972
Acme-Kleenburn				
Monarch & Dietz #3	125.0	(45.7)	79.3	Glass, 1985
Spotted Horse				
Truman	74.5	-	74.5	)
Parnell	30.6	-	30.6	) Kent and others, 1977 and
Scott	17.9	-	17.9	) Haddock and others, 1976
Daly	11.2	-	11.2	)
Felix	821.3	-	821.3	Glass, 1985
Other Ft.Union Fm. coals[5]	58.3	-	58.3	Smith and others, 1972
Other Wasatch Fm. coals[6]	4.8	-	4.8	Kent and others, 1977
Smith	178.0	-	178.0	Smith and others, 1972
subtotal all beds	1,196.6	-	1,196.6	
Sussex				
Fort Union Fm. coals	13.6	-	13.6	Smith and others, 1972
Wyarno-Verona				
PK	200.0	-	200.0	Culbertson and Mapel, 1976
Ulm 1	543.0	-	543.0	Culbertson and Mapel, 1976
Ulm 2	990.0	-	990.0	Culbertson and Mapel, 1976

Strippable Deposit name & Coal Bed name	Original Strippable DRB	Production & Mining Losses	Remaining Strippable DRB	References
Other Wasatch Fm. coals	67.0	-	67.0	Culbertson and Mapel, 1976
subtotal all beds	1,800.0	-	1,800.0	
Coal field total	25,265.7	(1,611.4)	23,654.3	
		Hams Fork Coal Field		
Adaville/Kemmerer				
Adaville Fm. coals	1,000.0	(130.3)	869.7	Smith and others, 1972
South Haystack				
Adaville Fm. coals	64.9	-	64.9	Cumberland Coal Co., 1977
Coal field total	1,064.9	(130.3)	934.6	
		Green River Coal Field		
Red Desert				
Hadsell 2	39.8	-	39.8	Smith and others, 1972
Battle 2&3	38.1	-	38.1	Smith and others, 1972
Sourdough, Monument, & Tierney	458.9	-	458.9	Smith and others, 1972
Creston 2&3	125.6	-	125.6	Smith and others, 1972
Latham 3&4	70.7	-	70.7	Smith and others, 1972
subtotal all beds	733.1	-	733.1	
Creston-Cherokee				
Cherokee B&C	200.9	-	200.9	Smith and others, 1972
Other Fort Union Fm. coals	159.1	-	159.1	Jones and Glass, this report
subtotal all beds	360.0	-	360.0	Rocky Mountain Energy Co.,1976
Northern Little Snake River				
Fort Union & Lance Fm.	223.6	-	223.6	Glass, 1981
Mesaverde Fm. coals	46.0	-	46.0	Glass, 1981
subtotal all beds	269.6	-	269.6	
Jim Bridger				
Deadman coals	250.0	(98.8)	151.2	Smith and others, 1972
Leucite Hills				
Almond Fm. coals	168.0	(5.8)	162.2	Rocky Mountain Energy Co., 1976
Black Butte				
Fort Union Fm. coals	79.2	(42.1)	37.1	Black Butte Coal Co., 1976
Lance Fm. coals	48.8	(12.8)	36.0	Black Butte Coal Co., 1976
Almond Fm. coals	17.6	(2.2)	15.4	Black Butte Coal Co., 1976
subtotal all beds	145.6	(57.1)	88.5	
Salt Wells				
Almond Fm. coals	60.0	-	60.0	Rocky Mountain Energy Co., 1976
Coal field total	1,986.3	(161.7)	1,824.6	
		Hanna Coal Field		
Corral Creek District				
Medicine Bow Fm. coals	1.1	-	1.1	Glass and Roberts, 1979

Strippable Deposit name & Coal Bed name	Original Strippable DRB	Production & Mining Losses	Remaining Strippable DRB	References
Almond Fm. coals	16.0	-	16.0	Glass and Roberts, 1979
subtotal all beds	17.1	-	17.1	
Carbon MIning District				
Hanna Fm. coals	118.9	-	118.9	Glass and Roberts, 1979
Hanna Mining District				
Hanna Fm. coals	273.9	(45.4)	228.5	Glass and Roberts, 1979
Seminoe Mining District				
Hanna Fm. coals	5.3	-	5.3	Glass and Roberts, 1979
Ferris Fm. coals	233.2	(36.9)	196.3	Glass and Roberts, 1979
subtotal all beds	238.5	(39.9)	201.6	
Coal field total	648.4	(82.3)	566.1	
		Bighorn Coal Field		
Grass Creek				
Fort Union Fm. coals	18.6	(0.6)	18.0	Glass and others, 1975
Coal field total	18.6	(0.6)	18.0	
Grand total, all coal fields	28,983.8	(1,986.3)	26,997.5	

[1] Additional reserves determined by planimetering orginal isopach map of Wyodak coal bed by Smith and others, 1972.

[2] Reserves in Caballo Creek area determined by planimetering original isopach map of Wyodak coal bed by Smith and others, 1972.

[3] Reserves added in Caballo Creek area to replace those subtracted above.

[4] Based on a percentage of the entire reserve within 1,000 feet of the surface in the demonstrated category for that coal bed.

[5] Local coal beds below the Smith coal bed.

[6] Local coal beds above and below the Felix coal bed.

Use of existing data

With some minor exceptions, no recalculation or redelineation of strippable coal resources was attempted during this study. Coal resources added to previous estimates were based on reinterpretation or correction of errors in existing data. Revised coal recovery factors for some coal deposits resulted in new estimates of depleted resources. The revised demonstrated reserve base (DRB) tonnages were allocated to appropriate categories of sulfur content and heating value on the basis of all the coal quality data available to the GSW.

Estimates of the DRB for each strippable coal deposit in Wyoming were compiled, where possible, from the original published sources (**Table 1**). Revisions, corrections, and additions to the original sources of data are also noted on **Table 1**. Publications in the **List of references** (below) were used to compile

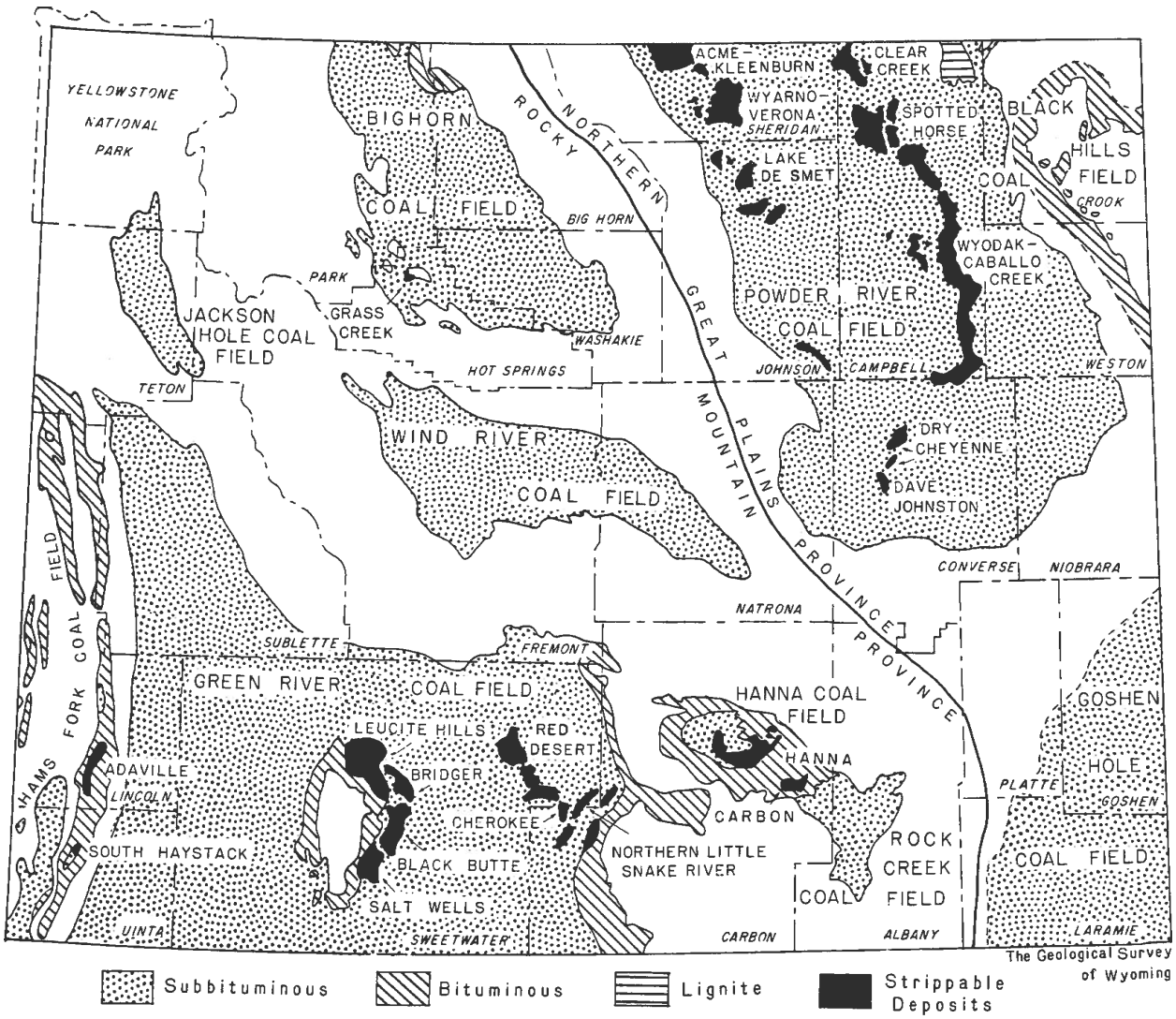

Figure 1. Index map of Wyoming coal fields and locations of strippable coal deposits.

Table 1 and the rest of this report. This **List of references** also includes reports used in calculating and assessing coal resources for individual strippable deposits. The **Results** section (below) discusses specific problems and/or corrections in the data used to compile this report. Production and mining losses in **Table 1** for those strippable deposits (or coal beds within a deposit) that have been depleted by significant amounts of coal mining were calculated using recovery factors appropriate to the specific deposit, rather than using a Statewide average. The remaining DRB for each coal deposit (or coal bed) was calculated by subtracting production and mining losses from the original DRB.

All the strippable deposits in Wyoming, which occur in five of Wyoming's ten coal fields (**Figure 1**), were evaluated by GSW, using its own data, judgments, and calculations. In the Powder River Coal Field, nine specific strippable coal deposits were examined, including the Dave Johnston deposit, the Wyodak-Caballo Creek deposit, and seven other deposits. Two strippable coal deposits in the Hams Fork Coal

Field, seven strippable deposits in the Green River Coal Field, four strippable deposits in the Hanna Coal Field, and one strippable deposit in the Bighorn Coal Field, were examined.

Estimates of original coal resources and reserves for underground mining were not made by the GSW. The estimates of the underground DRB and the associated minable reserves and recoverable reserves, which include underground coal deposits in all ten of Wyoming's coal fields, are based on EIA data and derivations (Energy Information Administration, 1989). The GSW updated these estimates to January 1, 1991, with depletion adjustments for limited deep mining from 1987 through 1990.

Mapping and physical criteria

All mapping and physical criteria for tonnage estimates are given in the sources (**List of references**) used to compile the DRB for each strippable coal deposit. Criteria for classifying resources as "strippable" may vary from one coal field to another and in many instances, may vary between coal deposits within a coal field. Neither additional/new physical criteria nor revised definitions of strippable coal limits were introduced in this report.

Selection and integration of coal quality data

Information on coal quality came from site specific data from drill holes, outcrops, and mines; tipple and delivered coal analyses; mine permit and coal development projects; and both publicly-available and proprietary data available in the GSW files. The proprietary data were aggregated or averaged to avoid disclosure of individual data. The type of sampling represented by these data ranges from small, incremental coal analyses from coal cores to delivered coal quality data representative of millions of tons of coal produced during several years. Only analyses on an "as-received" or "as-delivered" basis were used in this report.

Analyses used to characterize the coal in a particular deposit included solitary sulfur analyses and/or heating values, short proximate analyses, standard proximate analyses, or ultimate and proximate analyses plus heating values. Questionable data or data that could not be located accurately in a geographic or stratigraphic sense were not used. Coal analyses derived from weathered, burned, or oxidized coal beds and from significant non-coaly materials present in sampled coal beds were not used to characterize a coal deposit.

Coal beds, groups of coal beds, or coal zones in each coal deposit were assigned to an appropriate category of sulfur content and heating value used by the EIA for resource and reserve characterization. Sulfur contents and heating values for an individual coal bed, a group of related coal beds, or a coal zone were determined by one of several methods, described below, depending on the coal deposit. The different methods are considered compatible for resource characterization, even though different levels of reliability and accuracy may exist.

In some deposits, variation in sulfur contents and heating values of a coal bed(s) or coal zone(s) was determined by constructing iso-sulfur and iso-Btu maps. Allocation of resources by coal quality was accomplished by calculating the percentage of the total resources contained in a particular coal quality

category. This method is best suited for coal deposits with a large number of coal analyses and a wide range of sulfur contents and heating values.

In other coal deposits, coal quality variation within a coal bed(s) or coal zone(s) was not large enough to assign more than one coal quality category to the resources. The data that were used included aggregated data from detailed industry development projects (based on hundreds or thousands of coal analyses from drill holes and/or historical coal production and delivery data), numerous coal analyses from regional exploration programs, or widely-spaced coal analyses from reconnaissance-type exploration programs. Average or weighted average sulfur contents and heating values were determined and each coal bed(s) or coal zone(s) was assigned to an appropriate coal quality category. In all cases, the available coal quality data are considered representative of production attainable from resources and reserves.

Use of judgment and/or extrapolation

For all coal deposits evaluated in this report, professional judgment was used in both the resource assessment techniques and in determining the reliability and usefulness of the available data. Resource estimation methods and projections of data used in this study were specific to each strippable coal deposit, but followed standard coal evaluation procedures wherever possible.

Results

Results by coal field

A summary of the revised DRB of strippable coal in Wyoming, by coal field and category of coal quality, as of January 1, 1991, is given in **Table 2**. This table was compiled from calculations and interpretations made for individual coal deposits (**Table 1**, above, and reports on specific coal deposits, on file at the GSW).

About 15.8 billion tons, or 58 percent, of Wyoming's strippable DRB occurs in EIA's two lowest sulfur categories. These two sulfur categories constitute compliance coal that emits 1.2 or less pounds of sulfur dioxide (0.6 or less pounds of sulfur) when it is burned. The GSW's estimate also places 2.6 billion tons, or 9.8 percent, of the strippable DRB into the highest sulfur category. While only about 3.0 billion short tons of Wyoming's strippable DRB occur in the lowest heating value category (<15.00 million Btu per short ton), 86 percent or 23.3 billion tons occur in the 15.00-19.99 million Btu per short ton category. According to the GSW's estimates, no strippable coal occurs in the EIA's highest heating value category (23.00-25.99 million Btu per short ton).

The Powder River Coal Field contains about 23.7 billion short tons, or 87.6 percent, of Wyoming's total remaining strippable DRB. The Green River Coal Field contains about 1.8 billion short tons, or 6.8 percent, of the State's remaining strippable DRB; the Hams Fork Coal Field contains 935 million short tons, or 3.5 percent, of the strippable DRB; and the Hanna Coal Field contains 566 million short tons, or 2.1 percent, of the State's remaining strippable DRB.

Table 2. Summary of the GSW's estimate of remaining demonstrated reserve base (DRB) of strippable coal deposits in Wyoming coal fields, as of January 1, 1991 (in million short tons).

	Btu Content million Btu/ short ton	Sulfur Content (lbs sulfur/million Btu) ≤0.40	0.41-0.60	0.61-0.83	0.84-1.67	1.68-2.50	>2.50	Total all sulfur categories
				Powder River Coal Field				
	<15.00	—	—	—	1,127.40	210.00	1,606.50	2,943.90
	15.00-19.99	5,128.40	9,440.00	4,161.30	1,644.10	16.80	319.80	20,710.40
	20.00-22.99	—	—	—	—	—	—	—
Subtotal		5,128.40	9,440.00	4,161.30	2,771.50	226.80	1,926.30	23,654.30
				Hams Fork Coal Field				
	<15.00	—	—	—	—	—	—	—
	15.00-19.99	63.00	331.54	320.00	1.85	—	—	716.39
	20.00-22.99	—	—	218.20	—	—	—	218.20
Subtotal		63.00	331.54	538.20	1.85	—	—	934.59
				Green River Coal Field				
	<15.00	—	—	—	—	—	39.80	39.80
	15.00-19.99	—	438.30	187.20	—	398.10	655.20	1,678.80
	20.00-22.99	—	60.00	46.00	—	—	—	106.00
Subtotal		—	498.30	233.20	—	398.10	695.00	1,824.60
				Hanna Coal Field				
	<15.00	—	—	—	—	—	—	—
	15.00-19.99	—	95.37	11.37	6.38	28.74	13.92	155.78
	20.00-22.99	55.08	170.57	67.15	84.24	33.20	—	410.24
Subtotal		55.08	265.94	78.52	90.62	61.94	13.92	566.02
				Bighorn Coal Field				
	<15.00	—	—	—	—	—	—	—
	15.00-19.99	—	—	—	—	—	—	—
	20.00-22.99	—	17.99	—	—	—	—	17.99
Subtotal		—	17.99	—	—	—	—	17.99
				All Coal Fields				
Powder River		5,128.40	9,440.00	4,161.30	2,771.50	226.80	1,926.30	23,654.30
Hams Fork		63.00	331.54	538.20	1.85	—	—	934.59
Green River		—	498.30	233.20	—	398.10	695.00	1,824.60
Hanna		55.08	265.94	78.52	90.62	61.94	—	566.02
Bighorn		—	17.99	—	—	—	—	17.99
Total		5,246.48	10,553.77	5,011.22	2,863.97	686.84	2,621.30	26,997.50
				All Coal Fields by Btu content				
	<15.00	—	—	—	1,127.40	210.00	1,646.30	2,983.70
	15.00-19.99	5,191.40	10,305.21	4,679.87	1,652.33	443.64	988.92	23,261.37
	20.00-22.99	55.08	248.56	331.35	84.24	33.20	—	752.43
	Total	5,246.48	10,553.77	5,011.22	2,863.97	686.84	2,635.22	26,997.50

Results by coal rank

The DRB of strippable and underground coal in Wyoming is detailed in **Table 3** by rank of coal for the EIA's different categories of Btu and sulfur content. **Table 3** also contains a detailed assessment of minable reserves and recoverable reserves for strippable coal. To calculate the minable reserves of strippable coal, the inaccessible percentages for land usage and for environmental restrictions were first determined separately, using map measurements, field observations, and published land use plans for individual coal deposits. Once this was done, the minable reserves were aggregated and averaged in **Table 3** according to coal rank, Btu range, and sulfur range. Similarly, recovery factors (used in calculating amounts of recoverable reserves) for strippable coal were first determined for individual coal deposits, based on published and unpublished data and the GSW's best estimates, and then aggregated and averaged in **Table 3**.

The distribution of underground reserves by coal rank, Btu range, and sulfur range (also in **Table 3)** is primarily that used by the Energy Information Administration (1989); minor adjustments for recent underground coal production have been incorporated into these estimates by the GSW. The GSW did not develop the underground DRB data and has neither reviewed nor verified its accuracy or validity. In addition, the GSW has neither evaluated the inaccessibility percentages for determining underground minable reserves nor assessed the recovery factors for underground recoverable reserves as used by the EIA for Wyoming coal deposits. Those areas of information were beyond the scope of study of this project, but are included to permit a statewide summary of the data currently available.

The last two pages of **Table 3** summarize all Wyoming coal reserves by ranges of Btu content and by ranges of sulfur content, respectively. These two pages contain statewide totals for all categories of coal resources as well as final totals for demonstrated reserve base, minable reserves, and recoverable reserves.

The inaccessible percentages and recovery factors for strippable coal reported in **Table 3** are averages derived from aggregating the various resources and reserves for all sulfur ranges within a standard Btu range. The average inaccessible percentage or recovery factor as reported in **Table 3** cannot be used to derive individual minable reserves or recoverable reserves for a particular Btu and sulfur range.

Results by strippable and underground coal

The demonstrated reserve base (DRB) of strippable coal in Wyoming is summarized in **Table 4** by rank of coal and ranges of Btu and sulfur content. All but about 0.5 billion short tons of strippable DRB coal in Wyoming is subbituminous.

Table 5 summarizes the State's minable reserves of strippable coal. This comprises those portions of the DRB estimated to be free of land-use and regulatory restrictions, and therefore considered accessible for mining.

Table 3. EIA COAL RESERVES DATA BASE - DATA MATRIX

State: Wyoming Region: Statewide (summary) Remaining as of: January 1, 1991

COAL QUANTITY AND QUALITY

Coal Rank: Subbituminous (<15.00 million Btu/short ton)

	Std. Btu Range	Std. Sulfur Range	Demonstrated Reserve Base	Minable* Reserves	Recoverable Reserves
			(millions of short tons)		
(Remaining) Total	<15.00	0.84-1.67	1,127.40	1,018.40	909.80
Underground			0.00	0.00	0.00
Surface			1,127.40	1,018.40	909.80
(Remaining) Total	<15.00	1.68-2.50	210.00	189.00	170.10
Underground			0.00	0.00	0.00
Surface			210.00	189.00	170.10
(Remaining) Total	<15.00	>2.50	1,646.30	1,639.00	1,393.40
Underground			0.00	0.00	0.00
Surface			1,646.30	1,639.00	1,393.40
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total	<15.00	All Ranges	2,983.70	2,846.40	2,473.30
Underground			0.00	0.00	0.00
Surface			2,983.70	2,846.40	2,473.30

Inaccessible Percentage

	Land use*	Environmental*
Underground		
Surface	0.88	3.69

Recovery Factor

Underground	
Surface	0.8689

*Notes: Minable. This describes reserves capable of being mined under current environmental and legal restrictions, rules, and regulations. The demonstrated reserve base has been adjusted for inaccessibilty due to land use and environmental restrictions.

Land Use. Includes municipal boundaries, highway and other rights-of-way, buffers around oil and gas wells and at property boundaries; parks, cemeteries, reservoirs, etc. Includes those lands excluded from coal development through BLM's Unsuitability Criteria #1-18 and #20.

Environmental. State and Federal mining, reclamation, and discharge restrictions; Alluvial valley floors (BLM's Unsuitability Criterion #19); Steep slopes, etc.

Table 3. EIA COAL RESERVES DATA BASE - DATA MATRIX

State: Wyoming Region: Statewide (summary) Remaining as of: January 1, 1991

COAL QUANTITY AND QUALITY

Coal Rank: Subbituminous (15.00-19.99 million Btu/short ton)

	Std. Btu Range	Std. Sulfur Range	Demonstrated Reserve Base	Minable* Reserves	Recoverable Reserves
			(millions of short tons)		
(Remaining) Total	15.00-19.99	≤0.40	8,972.80	8,484.86	6,597.56
Underground			3,781.40	3,403.26	2,014.96
Surface			5,191.40	5,081.60	4,555.60
(Remaining) Total	15.00-19.99	0.41-0.60	25,526.02	23,777.71	17,206.60
Underground			15,223.00	13,700.70	8,220.42
Surface			10,303.02	10,077.01	8,986.18
(Remaining) Total	15.00-19.99	0.61-0.83	14,371.77	13,315.01	9,329.57
Underground			9,691.90	8,722.71	5,233.63
Surface			4,679.87	4,592.30	4,095.94
(Remaining) Total	15.00-19.99	0.84-1.67	10,426.65	9,506.58	6,143.86
Underground			8,780.70	7,902.63	4,741.58
Surface			1,645.95	1,603.95	1,402.28
(Remaining) Total	15.00-19.99	1.68-2.50	1,603.04	1,455.21	970.81
Underground			1,186.10	1,067.49	640.49
Surface			416.94	337.72	330.32
(Remaining) Total	15.00-19.99	>2.50	975.00	970.90	831.10
Underground			0.00	0.00	0.00
Surface			975.00	970.90	831.10
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total	15.00-19.99	All Ranges	61,875.28	57,510.27	41,079.50
Underground			38,663.10	34,796.79	20,878.08
Surface			23,212.18	22,713.48	20,201.42

Inaccessible Percentage

	Land use*	Environmental*
Underground	5.00	5.00
Surface	1.64	0.50

Recovery Factor

Underground	0.6000
Surface	0.8895

*Notes: Minable. This describes reserves capable of being mined under current environmental and legal restrictions, rules, and regulations. The demonstrated reserve base has been adjusted for inaccessibilty due to land use and environmental restrictions.

Land Use. Includes municipal boundaries, highway and other rights-of-way, buffers around oil and gas wells and at property boundaries; parks, cemeteries, reservoirs, etc. Includes those lands excluded from coal development through BLM's Unsuitability Criteria #1-18 and #20.

Environmental. State and Federal mining, reclamation, and discharge restrictions; Alluvial valley floors (BLM's Unsuitability Criterion #19); Steep slopes, etc.

Table 3. EIA COAL RESERVES DATA BASE - DATA MATRIX

State: Wyoming Region: Statewide (summary) Remaining as of: January 1, 1991

COAL QUANTITY AND QUALITY

Coal Rank: Subbituminous (20.00-22.99 million Btu/short ton)

	Std. Btu Range	Std. Sulfur Range	Demonstrated Reserve Base	Minable* Reserves	Recoverable Reserves
			(millions of short tons)		
(Remaining) Total	20.00-22.99	≤0.40	46.61	46.14	36.91
Underground			0.00	0.00	0.00
Surface			46.61	46.14	36.91
(Remaining) Total	20.00-22.99	0.41-0.60	44.17	43.73	34.98
Underground			0.00	0.00	0.00
Surface			44.17	43.73	34.98
(Remaining) Total	20.00-22.99	0.61-0.83	218.20	217.55	174.04
Underground			0.00	0.00	0.00
Surface			218.20	217.55	174.04
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total	20.00-22.99	All Ranges	308.98	307.42	245.93
Underground			0.00	0.00	0.00
Surface			308.98	307.42	245.93

Inaccessible Percentage

	Land use*	Environmental*
Underground		
Surface	0.50	0.00

Recovery Factor

Underground	0.6000
Surface	0.8000

*Notes: Minable. This describes reserves capable of being mined under current environmental and legal restrictions, rules, and regulations. The demonstrated reserve base has been adjusted for inaccessibility due to land use and environmental restrictions.

Land Use. Includes municipal boundaries, highway and other rights-of-way, buffers around oil and gas wells and at property boundaries; parks, cemeteries, reservoirs, etc. Includes those lands excluded from coal development through BLM's Unsuitability Criteria #1-18 and #20.

Environmental. State and Federal mining, reclamation, and discharge restrictions; Alluvial valley floors (BLM's Unsuitability Criterion #19); Steep slopes, etc.

Table 3. EIA COAL RESERVES DATA BASE - DATA MATRIX

State: Wyoming Region: Statewide (summary) Remaining as of: January 1, 1991

COAL QUANTITY AND QUALITY

Coal Rank: Subbituminous summary

	Std. Btu Range	Std. Sulfur Range	Demonstrated Reserve Base (millions of short tons)	Minable* Reserves (millions of short tons)	Recoverable Reserves (millions of short tons)
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total	All Ranges	All Ranges	65,167.96	60,664.09	43,798.73
Underground			38,663.10	34,796.79	20,878.08
Surface			26,504.86	25,867.30	22,920.65

Inaccessible Percentage

	Land use*	Environmental*
Underground	5.00	5.00
Surface	1.55	0.86

Recovery Factor

Underground	0.6000
Surface	0.8861

*Notes: Minable. This describes reserves capable of being mined under current environmental and legal restrictions, rules, and regulations. The demonstrated reserve base has been adjusted for inaccessibilty due to land use and environmental restrictions.

Land Use. Includes municipal boundaries, highway and other rights-of-way, buffers around oil and gas wells and at property boundaries; parks, cemeteries, reservoirs, etc. Includes those lands excluded from coal development through BLM's Unsuitability Criteria #1-18 and #20.

Environmental. State and Federal mining, reclamation, and discharge restrictions; Alluvial valley floors (BLM's Unsuitability Criterion #19); Steep slopes, etc.

Table 3. EIA COAL RESERVES DATA BASE - DATA MATRIX

State: Wyoming Region: Statewide (summary) Remaining as of: January 1, 1991

COAL QUANTITY AND QUALITY

Coal Rank: Bituminous (15.00-19.99 million Btu/short ton)

	Std. Btu Range	Std. Sulfur Range	Demonstrated Reserve Base	Minable* Reserves	Recoverable Reserves
			(millions of short tons)		
(Remaining) Total	15.00-19.99	0.41-0.60	2.19	2.17	1.73
Underground			0.00	0.00	0.00
Surface			2.19	2.17	1.73
(Remaining) Total	15.00-19.99	0.84-1.67	6.38	6.32	5.05
Underground			0.00	0.00	0.00
Surface			6.38	6.32	5.05
(Remaining) Total	15.00-19.99	1.68-2.50	26.70	26.63	21.30
Underground			0.00	0.00	0.00
Surface			26.70	26.63	21.30
(Remaining) Total	15.00-19.99	>2.50	13.92	13.92	11.14
Underground			0.00	0.00	0.00
Surface			13.92	13.92	11.14
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total	15.00-19.99	All Ranges	49.19	49.04	39.22
Underground			0.00	0.00	0.00
Surface			49.19	49.04	39.22

Inaccessible Percentage

	Land use*	Environmental*
Underground		
Surface	0.30	0.00

Recovery Factor

Underground	
Surface	0.8000

*Notes: Minable. This describes reserves capable of being mined under current environmental and legal restrictions, rules, and regulations. The demonstrated reserve base has been adjusted for inaccessibilty due to land use and environmental restrictions.

Land Use. Includes municipal boundaries, highway and other rights-of-way, buffers around oil and gas wells and at property boundaries; parks, cemeteries, reservoirs, etc. Includes those lands excluded from coal development through BLM's Unsuitability Criteria #1-18 and #20.

Environmental. State and Federal mining, reclamation, and discharge restrictions; Alluvial valley floors (BLM's Unsuitability Criterion #19); Steep slopes, etc.

Table 3. EIA COAL RESERVES DATA BASE - DATA MATRIX

State: Wyoming Region: Statewide (summary) Remaining as of: January 1, 1991

COAL QUANTITY AND QUALITY

Coal Rank: Bituminous (20.00-22.99 million Btu/short ton)

	Std. Btu Range	Std. Sulfur Range	Demonstrated Reserve Base	Minable* Reserves	Recoverable Reserves
			(millions of short tons)		
(Remaining) Total	20.00-22.99	≤0.40	502.17	452.72	273.31
Underground			493.70	444.33	266.60
Surface			8.47	8.39	6.71
(Remaining) Total	20.00-22.99	0.41-0.60	709.09	654.17	436.69
Underground			504.70	454.23	272.54
Surface			204.39	199.94	164.15
(Remaining) Total	20.00-22.99	0.61-0.83	800.55	728.84	461.48
Underground			637.40	618.66	371.20
Surface			113.15	110.18	90.28
(Remaining) Total	20.00-22.99	0.34-1.67	451.34	413.79	264.95
Underground			367.10	330.39	198.23
Surface			84.24	83.40	66.72
(Remaining) Total	20.00-22.99	1.68-2.50	33.20	32.87	26.30
Underground			0.00	0.00	0.00
Surface			33.20	32.87	26.30
(Remaining) Total	20.00-22.99	>2.50	61.10	54.99	32.99
Underground			61.10	54.99	32.99
Surface			0.00	0.00	0.00
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total	20.00-22.99	All Ranges	2,557.45	2,337.38	1,495.72
Underground			2,114.00	1,902.60	1,141.56
Surface			443.45	434.78	354.16

Inaccessible Percentage

	Land use*	Environmental*
Underground	5.00	5.00
Surface	1.96	0.00

Recovery Factor

Underground	0.6000
Surface	0.8146

*Notes: Minable. This describes reserves capable of being mined under current environmental and legal restrictions, rules, and regulations. The demonstrated reserve base has been adjusted for inaccessibilty due to land use and environmental restrictions.

Land Use. Includes municipal boundaries, highway and other rights-of-way, buffers around oil and gas wells and at property boundaries; parks, cemeteries, reservoirs, etc. Includes those lands excluded from coal development through BLM's Unsuitability Criteria #1-18 and #20.

Environmental. State and Federal mining, reclamation, and discharge restrictions; Alluvial valley floors (BLM's Unsuitability Criterion #19); Steep slopes, etc.

Table 3. EIA COAL RESERVES DATA BASE - DATA MATRIX

State: Wyoming Region: Statewide (summary) Remaining as of: January 1, 1991

COAL QUANTITY AND QUALITY

Coal Rank: Bituminous (23.00-25.99 million Btu/short ton)

	Std. Btu Range	Std. Sulfur Range	Demonstrated Reserve Base	Minable* Reserves	Recoverable Reserves
			(millions of short tons)		
(Remaining) Total	23.00-25.99	≤0.40	82.70	74.43	44.65
Underground			82.70	74.43	44.65
Surface			0.00	0.00	0.00
(Remaining) Total	23.00-25.99	0.41-0.60	506.80	456.12	273.67
Underground			506.80	456.12	273.67
Surface			0.00	0.00	0.00
(Remaining) Total	23.00-25.99	0.61-0.83	835.00	751.50	450.90
Underground			835.00	751.50	450.90
Surface			0.00	0.00	0.00
(Remaining) Total	23.00-25.99	0.84-1.67	343.10	308.79	185.27
Underground			343.10	308.79	185.27
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total	23.00-25.99	All Ranges	1,767.60	1,590.84	954.49
Underground			1,767.60	1,590.84	954.49
Surface			0.00	0.00	0.00

Inaccessible Percentage

	Land use*	Environmental*
Underground	5.00	5.00
Surface		

Recovery Factor

Underground	0.6000
Surface	

*Notes: Minable. This describes reserves capable of being mined under current environmental and legal restrictions, rules, and regulations. The demonstrated reserve base has been adjusted for inaccessibilty due to land use and environmental restrictions.

Land Use. Includes municipal boundaries, highway and other rights-of-way, buffers around oil and gas wells and at property boundaries; parks, cemeteries, reservoirs, etc. Includes those lands excluded from coal development through BLM's Unsuitability Criteria #1-18 and #20.

Environmental. State and Federal mining, reclamation, and discharge restrictions; Alluvial valley floors (BLM's Unsuitability Criterion #19); Steep slopes, etc.

Table 3. EIA COAL RESERVES DATA BASE - DATA MATRIX

State: Wyoming Region: Statewide (summary) Remaining as of: January 1, 1991

COAL QUANTITY AND QUALITY

Coal Rank: Bituminous summary

	Std. Btu Range	Std. Sulfur Range	Demonstrated Reserve Base (millions of short tons)	Minable* Reserves (millions of short tons)	Recoverable Reserves (millions of short tons)
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total	All Ranges	All Ranges	4,374.24	3,977.26	2,489.43
Underground			3,881.60	3,493.44	2,096.05
Surface			492.64	483.82	393.38

Inaccessible Percentage

	Land use*	Environmental*
Underground	5.00	5.00
Surface	1.79	0.00

Recovery Factor

Underground	0.6000
Surface	0.8131

*Notes: Minable. This describes reserves capable of being mined under current environmental and legal restrictions, rules, and regulations. The demonstrated reserve base has been adjusted for inaccessibilty due to land use and environmental restrictions.

Land Use. Includes municipal boundaries, highway and other rights-of-way, buffers around oil and gas wells and at property boundaries; parks, cemeteries, reservoirs, etc. Includes those lands excluded from coal development through BLM's Unsuitability Criteria #1-18 and #20.

Environmental. State and Federal mining, reclamation, and discharge restrictions; Alluvial valley floors (BLM's Unsuitability Criterion #19); Steep slopes, etc.

Table 3. EIA COAL RESERVES DATA BASE - DATA MATRIX

State: Wyoming Region: Statewide (summary) Remaining as of: January 1, 1991

COAL QUANTITY AND QUALITY

Coal Rank: Bituminous & Subbituminous summary (by Btu range)

	Std. Btu Range	Std. Sulfur Range	Demonstrated Reserve Base	Minable* Reserves	Recoverable Reserves
			(millions of short tons)		
(Remaining) Total	<15.00	All Ranges	2,983.70	2,846.40	2,473.30
Underground			0.00	0.00	0.00
Surface			2,983.70	2,846.40	2,473.30
(Remaining) Total	15.00-19.99	All Ranges	61,866.17	57,502.81	41,070.72
Underground			38,663.10	34,796.79	20,240.64
Surface			23,261.37	22,762.52	20,192.64
(Remaining) Total	20.00-22.99	All Ranges	2,866.43	2,644.80	1,741.65
Underground			2,114.00	1,902.60	1,141.56
Surface			752.43	742.20	600.09
(Remaining) Total	23.00-25.99	All Ranges	1,767.60	1,590.84	954.49
Underground			1,767.60	1,590.84	954.49
Surface			0.00	0.00	0.00
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total	All Ranges	All Ranges	69,542.20	64,641.35	46,288.16
Underground			42,544.70	38,290.23	22,974.13
Surface			26,997.50	26,351.12	23,314.03

Inaccessible Percentage

	Land use*	Environmental*
Underground	5.00	5.00
Surface	1.54	0.85

Recovery Factor

Underground	0.6000
Surface	0.8847

*Notes: Minable. This describes reserves capable of being mined under current environmental and legal restrictions, rules, and regulations. The demonstrated reserve base has been adjusted for inaccessibilty due to land use and environmental restrictions.

Land Use. Includes municipal boundaries, highway and other rights-of-way, buffers around oil and gas wells and at property boundaries; parks, cemeteries, reservoirs, etc. Includes those lands excluded from coal development through BLM's Unsuitability Criteria #1-18 and #20.

Environmental. State and Federal mining, reclamation, and discharge restrictions; Alluvial valley floors (BLM's Unsuitability Criterion #19); Steep slopes, etc.

Table 3. EIA COAL RESERVES DATA BASE - DATA MATRIX

State: Wyoming Region: Statewide (summary) Remaining as of: January 1, 1991

COAL QUANTITY AND QUALITY

Coal Rank: Bituminous & Subbituminous (by sulfur range)

	Std. Btu Range	Std. Sulfur Range	Demonstrated Reserve Base	Minable* Reserves	Recoverable Reserves
			(millions of short tons)		
(Remaining) Total	All Ranges	≤0.40	9,604.28	9,058.15	6,952.43
Underground			4,357.80	3,922.02	2,353.21
Surface			5,246.48	5,136.13	4,599.22
(Remaining) Total		0.41-0.60	26,788.27	24,933.90	17,953.67
Underground			16,234.50	14,611.05	8,766.63
Surface			10,553.77	10,322.85	9,187.04
(Remaining) Total		0.61-0.83	16,225.52	15,012.90	10,415.99
Underground			11,214.30	10,092.87	6,055.73
Surface			5,011.22	4,920.03	4,360.26
(Remaining) Total		0.84-1.67	12,354.87	11,253.88	7,508.93
Underground			9,490.90	8,541.81	5,125.08
Surface			2,863.97	2,712.07	2,383.85
(Remaining) Total		1.68-2.50	1,872.94	1,703.71	1,188.51
Underground			1,186.10	1,067.49	640.49
Surface			686.84	636.22	548.02
(Remaining) Total		>2.50	2,696.32	2,678.81	2,268.63
Underground			61.10	54.99	32.99
Surface			2,635.22	2,623.82	2,235.64
(Remaining) Total					
Underground					
Surface					
(Remaining) Total					
Underground					
Surface					
(Remaining) Total	All Ranges	All Ranges	69,542.20	64,641.35	46,288.16
Underground			42,544.70	38,290.23	22,974.13
Surface			26,997.50	26,351.12	23,314.03

Inaccessible Percentage

	Land use*	Environmental*
Underground	5.00	5.00
Surface	1.54	0.85

Recovery Factor

Underground	0.6000
Surface	0.8847

*Notes: Minable. This describes reserves capable of being mined under current environmental and legal restrictions, rules, and regulations. The demonstrated reserve base has been adjusted for inaccessibilty due to land use and environmental restrictions.

Land Use. Includes municipal boundaries, highway and other rights-of-way, buffers around oil and gas wells and at property boundaries; parks, cemeteries, reservoirs, etc. Includes those lands excluded from coal development through BLM's Unsuitability Criteria #1-18 and #20.

Environmental. State and Federal mining, reclamation, and discharge restrictions; Alluvial valley floors (BLM's Unsuitability Criterion #19); Steep slopes, etc.

Table 4. Summary of the GSW's demonstrated reserve base of strippable coal in Wyoming, as of January 1, 1991 (in million short tons).

Btu Content million Btu/ short ton	Sulfur Content (lbs sulfur/million Btu)						Total all sulfur categories
	≤0.40	0.41-0.60	0.61-0.83	0.84-1.67	1.68-2.50	>2.50	
				Subbituminous coal			
<15.00	—	—	—	1,127.40	210	1,646.30	2,983.70
15.00-19.99	5,191.40	10,303.02	4,679.87	1,645.95	416.94	975.00	23,212.18
20.00-22.99	46.61	44.17	218.20	—	—	—	308.98
Subtotal	5,238.01	10,347.19	48,98.07	2,773.35	626.94	2,621.30	26,504.86
				Bituminous coal			
15.00-19.99	—	2.19	—	6.38	26.70	13.92	49.19
20.00-22.99	8.47	204.39	113.15	84.24	33.20	—	443.45
Subtotal	8.47	206.58	113.15	90.62	59.90	13.92	492.64
				All coal			
<15.00	—	—	—	1,127.40	210	1,646.30	2,983.70
15.00-19.99	5,191.40	10,305.21	4,679.87	16,52.33	443.64	988.92	23,261.37
20.00-22.99	55.08	248.56	331.35	84.24	33.20	—	752.43
Total	5,246.48	10,553.77	5,011.22	2,863.97	686.84	2,635.22	26,997.50

Table 5. Summary of the GSW's estimate of minable reserves of strippable coal in Wyoming, as of January 1, 1991 (in million short tons).

Btu Content million Btu/ short ton	Sulfur Content (lbs sulfur/million Btu)						Total all sulfur categories
	≤0.40	0.41-0.60	0.61-0.83	0.84-1.67	1.68-2.50	>2.50	
				Subbituminous coal			
<15.00	—	—	—	1,018.40	189.00	1,639.00	2,846.40
15.00-19.99	5,081.60	10,077.01	4,592.30	1,603.95	387.72	970.90	22,713.48
20.00-22.99	46.14	43.73	217.55	—	—	—	307.42
Subtotal	5,127.74	10,120.74	4,809.85	2,622.35	576.72	2,609.90	25,867.30
				Bituminous coal			
15.00-19.99	—	2.17	—	6.32	26.63	13.92	49.04
20.00-22.99	8.39	199.94	110.18	83.40	32.87	—	434.78
Subtotal	8.39	202.11	110.18	89.72	59.5	13.92	483.82
				All coal			
<15.00	—	—	—	1,018.40	189.00	1,639.00	2,846.40
15.00-19.99	5,081.60	10,079.18	4,592.3	1,610.27	414.35	984.82	22,762.52
20.00-22.99	54.53	243.67	327.73	83.40	32.87	—	742.20
Total	5,136.13	10,322.85	4,920.03	2,712.07	636.22	2,623.82	26,351.12

Table 6 summarizes the State's recoverable reserves of strippable coal. These data represent the amount of coal in each rank and Btu or sulfur range that is expected to be recoverable from in-place deposits of the minable reserves. The recoverable coal estimates were compiled by applying estimated recovery factors for individual coal deposits, as described above.

Tables 7, 8, and **9** contain estimates for demonstrated reserve base and reserves of underground coal in Wyoming. Inaccessible underground coal due to land usage and environmental restrictions was calculated using factors developed by the EIA; recovery factors for underground coal are also those used by the EIA. The GSW can neither agree nor disagree with the accuracy or validity of these factors.

Sources

Many of the sources of data used to estimate the original demonstrated reserve base (DRB) tonnages for strippable coal deposits in Wyoming are no longer accurate, reliable, or adequate. Recent geologic and coal resource mapping, as well as numerous coal analyses and drill holes must all be incorporated into any new DRB estimates. Detailed coal deposit maps that did not exist at the time many of the original DRB reports were written can now be constructed and used to redefine and recalculate the DRB. This project could only incorporate the recent coal quality data into the DRB. A longer term project would allow this new coal quality data to be matched with new tonnage estimates to redefine both the strippable and underground DRB.

Table 6. Summary of the GSW's estimate of recoverable reserves of strippable coal in Wyoming, as of January 1, 1991 (in million short tons).

Btu Content million Btu/ short ton	Sulfur Content (lbs sulfur/million Btu)						Total all sulfur categories
	≤0.40	0.41-0.60	0.61-0.83	0.84-1.67	1.68-2.50	>2.50	
Subbituminous coal							
<15.00	—	—	—	909.80	170.10	1,393.40	2,473.30
15.00-19.99	4,555.60	8,986.18	4,095.94	1,402.28	330.32	831.10	20,201.42
20.00-22.99	36.91	34.98	174.04	—	—	—	245.93
Subtotal	4,592.51	9,021.16	4,269.98	2,312.08	500.42	2,224.50	22,920.65
Bituminous coal							
15.00-19.99	—	1.73	—	5.05	21.30	11.14	39.22
20.00-22.99	6.71	164.15	90.28	66.72	26.30	—	354.16
Subtotal	6.71	165.88	90.28	71.77	47.60	11.14	393.38
All coal							
<15.00	—	—	—	909.80	170.10	1,393.40	2,473.30
15.00-19.99	4,555.60	8,987.91	4,095.94	1,407.33	351.62	842.24	20,240.64
20.00-22.99	43.62	199.13	264.32	66.72	26.30	—	600.09
Total	4,599.22	9,187.04	4,360.26	2,383.85	548.02	2,235.64	23,314.03

Table 7. Summary of the EIA's demonstrated reserve base of underground coal in Wyoming, as of January 1, 1991 (in million short tons).

Btu Content million Btu/ short ton	Sulfur Content (lbs sulfur/million Btu) ≤0.40	0.41-0.60	0.61-0.83	0.84-1.67	1.68-2.50	>2.50	Total all sulfur categories
			Subbituminous coal				
15.00-19.99	3,781.40	15,223.00	9,691.90	8,780.70	1,186.10	—	38,663.10
Subtotal	3,781.40	15,223.00	9,691.90	8,780.70	1,186.10	0.00	38,663.10
			Bituminous coal				
20.00-22.99	493.70	504.70	687.40	367.10	—	61.10	2,114.00
23.00-25.99	82.70	506.80	835.00	343.10	—	—	1,767.60
Subtotal	576.40	1,011.50	1,522.40	710.20	0.00	61.10	3,881.60
			All coal				
15.00-19.99	3,781.40	15,223.00	9,691.90	8,780.70	1,186.10	—	38,663.10
20.00-22.99	493.70	504.70	687.40	367.10	—	61.10	2,114.00
23.00-25.99	82.70	506.80	835.00	343.10	—	—	1,767.60
Total	4,357.80	16,234.50	11,214.30	9,490.90	1,186.10	61.10	42,544.70

Table 8. Summary of the EIA's estimate of minable reserves of underground coal in Wyoming, as of January 1, 1991 (in million short tons).

Btu Content million Btu/ short ton	Sulfur Content (lbs sulfur/million Btu) ≤0.40	0.41-0.60	0.61-0.83	0.84-1.67	1.68-2.50	>2.50	Total all sulfur categories
			Subbituminous coal				
15.00-19.99	3,403.26	13,700.70	8,722.71	7,902.63	1,067.49	—	34,796.79
Subtotal	3,403.26	13,700.70	8,722.71	7,902.63	1,067.49	0.00	34,796.79
			Bituminous coal				
20.00-22.99	444.33	454.23	618.66	330.39	—	54.99	1,902.60
23.00-25.99	74.43	456.12	751.50	308.79	—	—	1,590.84
Subtotal	518.76	910.35	1,370.16	639.18	0.00	54.99	3,493.44
			All coal				
15.00-19.99	3,403.26	13,700.70	8,722.71	7,902.63	1,067.49	—	34,796.79
20.00-22.99	444.33	454.23	618.66	330.39	—	54.99	1,902.60
23.00-25.99	74.43	456.12	751.50	308.79	—	—	1,590.84
Total	3,922.02	14,611.05	10,092.87	8,541.81	1,067.49	54.99	38,290.23

Table 9. Summary of the EIA's estimate of recoverable reserves of underground coal in Wyoming, as of January 1, 1991 (in million short tons).

Btu Content million Btu/ short ton	Sulfur Content (lbs sulfur/million Btu) ≤0.40	0.41-0.60	0.61-0.83	0.84-1.67	1.68-2.50	>2.50	Total all sulfur categories
			Subbituminous coal				
15.00-19.99	2,041.96	8,220.42	5,233.63	4,741.58	640.49	—	20,878.08
Subtotal	2,041.96	8,220.42	5,233.63	4,741.58	640.49	0.00	20,878.08
			Bituminous coal				
20.00-22.99	266.60	272.54	371.20	198.23	—	32.99	1,141.56
23.00-25.99	44.65	273.67	450.90	185.27	—	—	954.49
Subtotal	311.25	546.21	822.10	383.50	0.00	32.99	2,096.05
			All coal				
15.00-19.99	2,041.96	8,220.42	5,233.63	4,741.58	640.49	—	20,878.08
20.00-22.99	266.60	272.54	371.20	198.23	—	32.99	1,141.56
23.00-25.99	44.65	273.67	450.90	185.27	—	—	954.49
Total	2,353.21	8,766.63	6,055.73	5,125.08	640.49	32.99	22,974.13

This report used coal analyses from at least 5,230 channel, tipple, and core samples and over 1,500 delivered samples. Those data are derived from a variety of different sources, which are detailed in reports on individual coal deposits (on file at the Geological Survey of Wyoming). Other references used to compile this report are listed below.

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