

Open-File Report 98-05

**Demonstrated Reserve Base for Coal in Colorado
Somerset Coal Field**

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Executive Summary

The new demonstrated reserve base (DRB) estimate of coal for the Somerset coal field of Colorado is 3.18 billion short tons. The Energy Information Administration (EIA) will be compiling this updated information into DRB estimates for the entire state and national DRB estimates. The new estimates are derived from revised resource calculations based on a significantly larger drill hole database and adjustments for depletion due to past mining.

The accessible reserve base, which excludes coal restricted by land use or technological considerations, is estimated to be 2.40 billion short tons. Estimated recoverable reserves are 53 percent of the accessible reserve base, or 1.28 billion short tons. The overall recovery factor of 53 percent accounts for in-place coal that cannot be recovered by the longwall mining methods projected to be used.

The Colorado Geological Survey is currently conducting a multiyear study supported by the U.S. Geological Survey to assess the availability of coal for mining in various parts of Colorado. The findings from these coal availability studies are expected to provide additional adjustments to the reserve base.

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Introduction

Background

The Coal Reserves Data Base (CRDB) program is a cooperative data base development program sponsored by the Energy Information Administration (EIA). The objective of the CRDB program is to involve knowledgeable coal resource authorities from the major coal bearing regions in updating the nation's coal reserves data.

The Colorado Geological Survey (CGS) entered into Cooperative Agreement DE-FC01-96EI29138 with the U.S. Department of Energy, Energy Information Administration, to update coal resource estimates for the Somerset coal field. The 18-month project began in October 1996.

Purpose

The CRDB data are used to support analyses of coal supply, policy, and legislative issues. They will be available to both government and non-government analysts. The data will also be part of the information used to supply United States energy data for international databases and to answer inquiries from private industry and the public.

The EIA recognizes that coal resource area maps, drilling records, historical mine boundaries, and site-specific analytical and geologic data are critical for reliable calculations of coal resource quantities. Such information has been used to various degrees in the present study. The objective of this project was to develop CRDB coal resource data for updated estimates of the demonstrated reserve base (DRB) and of recoverable reserves, allocated to specific ranges of sulfur and heat content (see Table 1 for working definitions). The current DRB for Colorado is primarily based on the latest coal resource estimates (Landis, 1959). In accordance with the terms of the CRDB program, the supporting data files and detailed documentation will remain at the CGS, where they will be the basis for future updates and revisions. The EIA will maintain resource calculation figures in their database.

The priority in this DRB update in Colorado is on coal zones currently being mined and coals that will be mined in the next several decades in the Somerset coal field.

<p>Demonstrated reserve base - a collective term for the sum of selected coal resource data in measured and indicated geologic assurance categories; the DRB includes measured and indicated resources in place as of January 1, 1998, in coalbeds thicker than specified minimums and within specified ranges of overburden thickness (depth); bed thickness and depth ranges vary by coal rank and region and may differ for surface- and underground-minable resources; also includes thinner and/or deeper coalbeds for which there is evidence they can be mined at the present time. Note: the DRB concept was introduced in the early 1970s as part of a uniform set of national criteria for coal resource data compilation. The DRB is a baseline of qualified coal resources from which reserves, meeting variable and specific mining criteria, could be calculated. The DRB does not equate to reserves, the coal economically recoverable from in-place resources. Rather, it includes reserves, along with coal that will be left in place or lost in the mining process or that may be left unmined for political, societal, or economic reasons.</p>
<p>Accessible reserve base - a portion of the DRB in a State or region which is estimated would be available for mining at the present time based on information on land-use and/or environmental restrictions and information on technological restrictions.</p>
<p>Estimated recoverable reserves - a portion of the accessible reserve base that is estimated would be recoverable based on data on current recovery rates and/or anticipated changes in recovery rates; recoverable reserves can be estimated without reference to economic feasibility studies.</p>

Table 1. EIA Coal Resource Terminology — Working Definitions

Methodology and Assumptions

Study Area

The coal reserve estimates updated by this study pertain to coals in the Somerset coal field, located in west-central Colorado. Figure 1 shows the location of the Somerset coal field. The second largest active mine in Colorado as well as other significant active mines are within this coal field. The field also contains the highest quality coal currently being mined in the state.

The coals in the Somerset field are from the Cretaceous Mesaverde Formation. Six coal zones (designated A through F) have been identified, as shown on Figure 2. The DRB has been updated for all coals more than 2.3 ft (28 in.) thick in zones A through F.

Factors in Determining Coal Resource Quantities

Data sources Stratigraphic data sources used in determining coal resource quantities include drilling logs, core descriptions, geophysical logs and mine data. Data was obtained from published sources, coal companies, U.S. Geological Survey (USGS) databases, U.S. Bureau of Land Management (BLM) files, and permit documents at the Colorado Division of Minerals and Geology (CDMG).

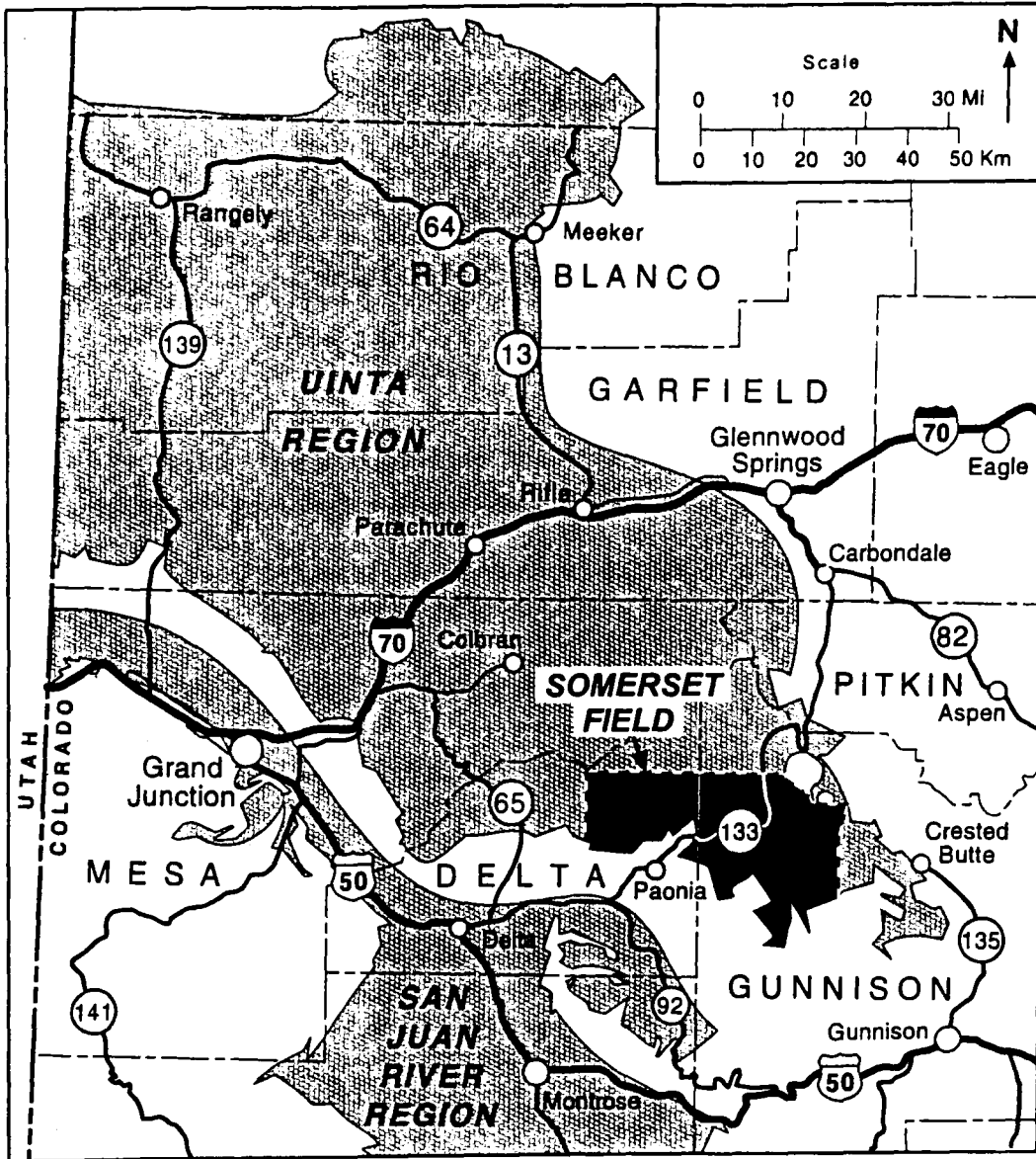


Figure 1. Map showing location of the Uinta Region and the Somerset coal field.

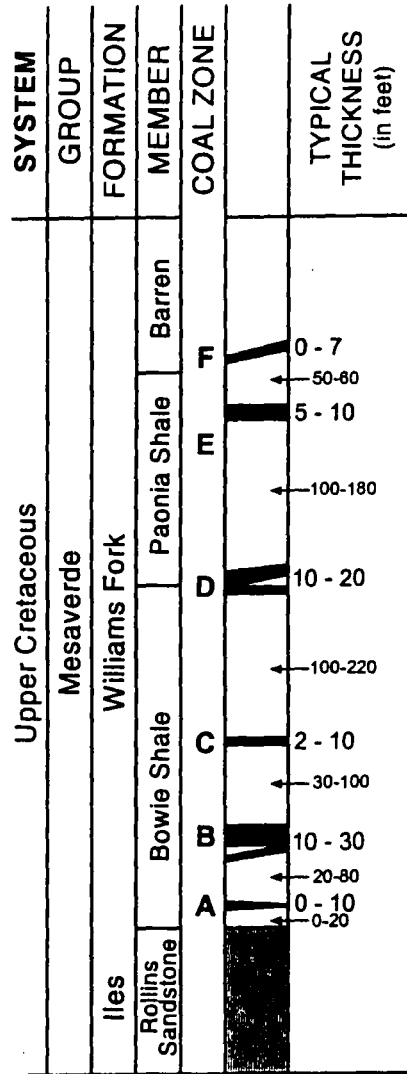


Figure 2. Generalized composite stratigraphic section of the principle coal-bearing rock units of the Somerset coal field. Thicknesses are averages, in feet. Non-coal rocks are sandstones, shales, and siltstones.

Cretaceous coal beds of Colorado are highly lenticular and their minable thicknesses frequently extend laterally relatively short distances. Because of this lenticularity, correlation within coal zones is difficult. Coal zone correlations differed in some cases among the various data sources. Where discrepancies existed, coals were correlated in accordance with published regional correlations. Mines and coal quality data have in some cases been reassigned to a different coal zone than the one originally assigned.

Categories of coal rank All coal in the Somerset field has been assigned the rank of bituminous. The USGS criteria for density factors (Wood and others, 1983) were used; therefore, a density factor of 1800 tons/acre-ft was applied.

Mining categories Resources are assigned to a mining category based on the most likely method of extracting the coal. Because of the steep terrain and no history of surface mining within the coal field, the single mining category used for this study is underground minable.

Reliability categories Reliability estimates were based on USGS Circular 891 (Wood and others, 1983). Figures 3 and 4 illustrate the reliability categories. Coals within the demonstrated category (measured and indicated) are within $\frac{3}{4}$ mile of a data point. Measured and indicated resources have not been segregated in this report; only demonstrated resources are reported.

Categories of coal thickness Coal resource estimates were allocated to USGS standard categories of coal thickness (Wood and others, 1983). These categories are

- 28-42 in
- 42-84 in
- 84-168 in
- 168+ in

The actual thickness cutoffs used for computerized mapping of bituminous coal were in feet and tenths of a foot, rather than inches, as follows: 2.3 ft, 3.5 ft, 7 ft, and 14 ft. The coal thickness calculated for each coal zone represents the total thickness of all beds in the coal zone, excluding partings.

The USGS standard (Wood and others, 1983) was used as guidance in determining the net thickness of coal beds to include in resource calculations. Individual beds less than 2.3 ft thick were not included in the total coal thickness calculation for the zone. Beds and parts of beds made up of alternating layers of thin coal and partings were omitted if the bed was thinner than either adjacent parting, or if beds in proximity to each other did not total 2.3 feet.

Depth of coal Coal reserve estimates were itemized by USGS standard categories of coal depth (Wood and others, 1983). These are

- 0-500 ft
- 500-1000 ft
- 1000-2000 ft

RESOURCES OF COAL
 AREA: (MINE, DISTRICT, FIELD, STATE, ETC.) UNITS: (SHORT TONS)

CUMULATIVE PRODUCTION	IDENTIFIED RESOURCES			UNDISCOVERED RESOURCES	
	DEMONSTRATED		INFERRED	PROBABILITY RANGE <small>(or)</small>	
	MEASURED	INDICATED		HYPOTHETICAL	SPECULATIVE
	ECONOMIC	RESERVE BASE		INFERRED RESERVE BASE	
MARGINALLY ECONOMIC	+				
SUBECONOMIC	SUBECONOMIC RESOURCES		INFERRED SUBECONOMIC RESOURCES		+

OTHER OCCURRENCES	INCLUDES	NONCONVENTIONAL MATERIALS
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BY: (AUTHOR)

DATE:

A PORTION OF RESERVES OR ANY RESOURCE CATEGORY MAY BE RESTRICTED FROM EXTRACTION BY LAWS OR REGULATIONS.

Figure 3. Format and classification of coal resources by reserve and inferred reserve bases and subeconomic and inferred subeconomic resources categories (from Wood and others, 1983).

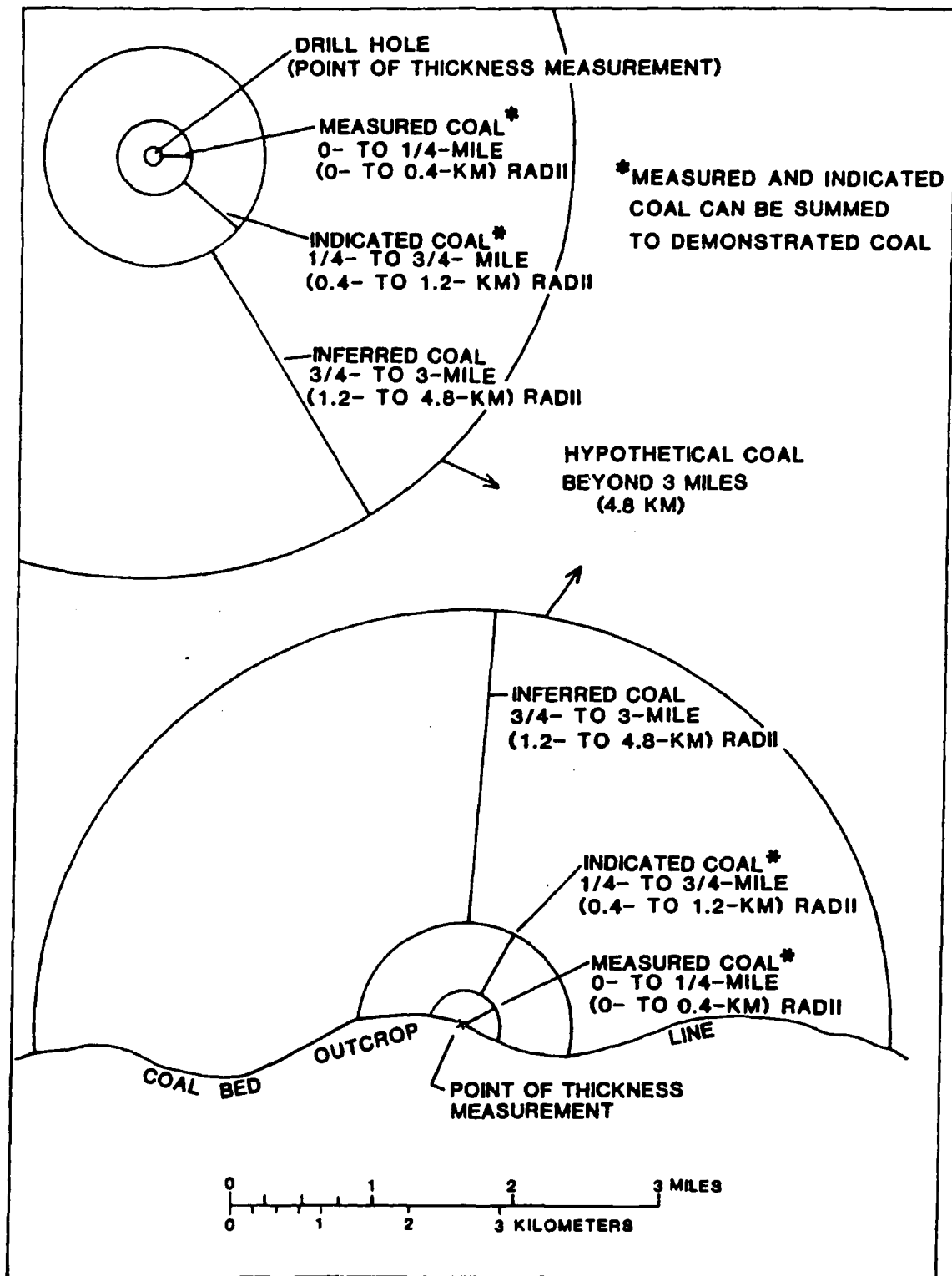


Figure 4. Diagram showing reliability categories based solely on distance from points of measurement (from Wood and others, 1983).

The depth to each coal zone was derived from the coal zone structure map and from digital topographic data. Structure maps were based on the elevation of the top coal in each coal zone, calculated for all available data points. The accuracy of coal zone depths between data points is variable and depends on data density and structural complexity. Coal depths are considered to be adequately known to calculate regional resource estimates.

A maximum depth of 2000 ft was selected for coal included in the DRB update for two primary reasons. This depth is a reasonable cutoff for the depth limit of minable coal. In addition, few data points are available at depths approaching greater than 2000 ft.

Depletion Adjustments

Depletion adjustments were based exclusively on the mapping of mined-out areas. Production data was not used in the depletion adjustments.

The CGS, with assistance from the USGS, established a digital database of the extent of mined-out areas for the Somerset field. Information on the extent of mining was obtained from individual mine maps or previously-compiled 1:24,000 scale maps available at the CGS, from maps within mine permit documents at the Colorado Division of Minerals and Geology, or from mine operators. Boundaries of active mines were updated to January 1, 1998, in part based on mine plans through the end of 1997.

Depleted reserves consist of the coal tonnage that was originally present in areas that have been mined. These reserves have been extracted by mining or left as pillars within underground mines. Coalbeds spoiled during mining of adjacent beds were also considered depleted. Because of the close vertical proximity of beds within zones A through F, the reserves from the entire coal zone were generally depleted based on mining from an individual bed within the zone. Coal that has been left in place around abandoned mines has not been excluded from resources because it may be available for future mining. Colorado law requires that a barrier pillar at least 500 feet wide be left around active mines; however, mining may be permitted up to abandoned workings of inactive mines.

Coal Quality Characterizations

Estimated reserves were allocated to coal quality categories of sulfur, rank, heat content and ash as specified in EIA's procedural guidelines and as shown in Table 2. The areas where each coal quality category applied were established by mapping for each coal zone, using available coal quality data.

No coal quality data were available for the F coal zone. The predominant coal quality categories for the underlying E coal zone were assigned to the F zone, which were 20-22.99 million British thermal units (Btu)/lb, 0.41– 0.6 lbs sulfur/million Btu, and 5-10% ash. This assumed quality data applies to less than 3 percent of the total demonstrated resources, none of which is recoverable.

Coal Quality Parameter	Units	Categories
• Heat Value	MBtu/ton	15-19.99
		20-22.99
		23-25.99
		26+
• Sulfur	lbs/MBtu	0.40 or less
		0.41-0.6
		0.61-0.83
		0.84-1.24
		1.25-1.67
		1.68-2.5
• Ash	%	2.5+
		0-5.00
		5.01-10
		10.01-15
		15+

Table 2. Coal quality categories (Mbtu – million British thermal units)

Resources tabulated by the ranges of heat value/sulfur and ash listed in Table 2 are provided in the appendix.

The coal quality table for the Somerset region is in an Excel spreadsheet with a filename of Sommap.xls. The hardcopy table is not included with this report, but is available in electronic format. The coal quality table contains: sample point identifying numbers; sample dates; mine or corehole names; bed and coal zone names; coal rank; ash and sulfur percentages; Btu; million Btu per short ton; pounds of sulfur per million Btu; latitude, longitude; sections, townships and ranges of sample locations; names of source databases. However, not all of the samples contain data for all coal quality parameters, because certain analyses were not run on every sample.

The area covered by the database includes Townships 13-15 South and Ranges 89-93 West.

A total of approximately 520 individual analyses at 68 locations were available for the Somerset coal field. Where the same seam was sampled multiple times at a single location, average ash percentage, average million Btu per short ton, and average pounds of sulfur per million Btu were applied.

Sources of coal quality data include: 1) USGS stratigraphic databases [USALYT], which also contain coal quality data (USGS, NCRDS, unpub. data), 2) two databases with data on mine samples — one originally developed by the USBM and EIA [BMEIALYT] (USGS, NCRDS, unpub. data) and one digitized by the CGS from USBM technical paper 574 (U.S. Bureau of Mines, 1937), 3) a database containing analyses of coal cores taken

by the CGS as part of a late 1970s to early 1980s coalbed methane desorption program [COPET] (USGS, NCRDS, unpub. data), and 4) the USCHEM trace element database of mixed core and mine samples published by the USGS in open file report 94-205 (USGS, 1994). All the coal quality data was converted, if necessary, to an as-received basis for this study.

Coal Accessibility Adjustments

The accessible reserve base is the portion of the DRB that could be mined at present, when local or regional mining practices and technologies, physical or geological conditions, and societal constraints are considered (Table 3). Factors restricting accessibility have been divided into two broad categories for this report: land use restrictions and technological restrictions. A relatively large number of factors were evaluated as possible restrictions. Specific factors evaluated as potential restrictions, the size of the buffer zone (if any applies), and comments related to the inclusion or exclusion of each restriction are summarized on Table 3. Restrictions relevant to the Somerset coal field have been *italicized*.

Potential Restriction	Size of Buffer Zone (ft)	Comments
Land Use Restrictions		
<i>Streams, Lakes, Reservoirs</i>	500	This buffer size is conservative but is useful as an average restriction for regional calculations. The actual size will be based on the angle of draw and regulatory approval. A single major river (North Fork of the Gunnison River) and several lakes over 20 acres in size were considered as restricted. 1:100,000 scale digital coverages were obtained for streams. Lakes and reservoirs were digitized from 1:24,000 scale topographic maps.
Residences, <i>Towns</i> , Public Buildings	300	Town of Somerset only, which contains all the public buildings. Digitized from the Somerset 1:24,000 scale topographic map. Individual residences were not considered a restriction.
Historic Sites and Non-Federal Parks		None identified.
<i>Highways and Railroads</i>	200	Only state and federal highways should be restricted. Colorado Hwy. 133 was the only restricted highway in the coal field. 1:100,000 scale digital coverages were obtained for highways and Highway 133 was selected. The single railroad was digitized from 1:24,000 scale topographic maps. Actual buffers will be 100 ft outside right-of-ways. Right-of-way sizes for highways and railroads are not consistent in width from one area to another; therefore an alternate buffer size of 200 ft was applied to both.
Powerlines and Pipelines		Only major utilities were evaluated. There are no major powerlines or pipelines within the Somerset coal field.
Federal Lands and Endangered Species Habitat		None identified.
Oil and Gas Wells		Mitigation is possible. There are no areas of dense oil and gas

Potential Restriction	Size of Buffer Zone (ft)	Comments
		activity that would apparently preclude mining.
Alluvial Valley Floors		Applies to surface mines only. Underground coal may be minable under an alluvial valley floor.
<i>Cemeteries</i>	100	Small miners' cemetery north of Somerset. This cemetery was digitized from the Somerset 1:24,000 scale topographic map.
<i>Wilderness</i>	N/A	West Elk Wilderness, in the southeast part of the Somerset coal field. Digitized from 1:24,000 scale topographic maps.
Technological Restrictions		
<i>Coalbed Thickness</i>	N/A	Minimum bed thickness — 7 ft. (84 in.) Maximum bed thickness — not a restriction, but adjustment made in recovery rate for coals exceeding 20 ft in thickness.
<i>Proximity to Another Coalbed, (whether mined or not)</i>	40	Note that the buffer is "vertical."
Geologic Conditions that Impact Mining	X	Faulting and dip of beds may impact mining. These restrictions were not considered for this reserve base update.
Coalbed Depth	X	Maximum depth — 2000 ft. Because only coal to a depth of 2000 ft was evaluated, coalbed depth is not a restriction for this DRB update.

Table 3. Factors potentially affecting coal accessibility

Lakes and reservoirs, towns, railroads and cemeteries were marked on 1:24,000 scale topographic maps for digitizing by CGS. Data sources for other land use restrictions are indicated in the comments column of Table 3.

Restrictions and exclusions to coal mining were evaluated from Colorado regulations (CRS 34-33-101 et. seq.). These restrictions and exclusions (Table 4) have been considered and applied in Table 3 where they are relevant. Exclusions are factors, which cannot be mitigated and will prevent coal mining. Restrictions are factors, which may be mitigated, and therefore do not prevent mining

Restriction/Exclusion (R/E)	Explanation of Restriction or Exclusion	Rule No. (CRS 34-33-101 et. seq.)	Comments
E	Lands within national park system, national wildlife refuges, national system of trails, national wilderness preservation system, wild and scenic rivers, and national recreation areas	2.07.6(2)(d)(iii)(A)	None identified in study area.
E	Within 300 ft of public building (school, church, hospital, courthouse, government building ...) community or institutional building or any public park	2.07.6(2)(d)(iii)(B)	Town of Somerset is the only site for such buildings.

Restriction/ Exclusion (R/E)	Explanation of Restriction or Exclusion	Rule No. (CRS 34-33-101 et. seq.)	Comments
E	Within 100 ft of a cemetery	2.07.6(2)(d)(iii)(C)	Restriction applies.
E	Lands designated unsuitable for mining	2.07.6(2)(d)(i)	None have been designated in Colorado, according to Colorado Division of Minerals and Geology.
E	Operations which affect the continued existence of threatened and endangered species	2.07.6(2)(n)	No qualifying sites in study area.
R	Mining on steep slopes (has to meet specific performance standards)	2.06.4	Not applicable to underground mining.
R	Lands within national forest	2.07.6(2)(d)(iii)(D)	There is national forest land within the study area. This restriction is not applicable to underground mining.
R	Will not adversely affect a publicly owned park or a place eligible to be included in the National Register of Historic Places.	2.07.6(2)(e)(i)	No publicly owned parks or places eligible for National Register of Historic Places.
R	Within 100 ft of public road right-of-way.	2.07.6(2)(d)(iv)	Restriction applies.
R	Within 300 ft of an occupied dwelling (unless owner waives)	2.07.6(2)(d)(v)	Not considered a general accessibility exclusion.
R	500 ft, measured horizontally, from active or abandoned underground mines	4.19(1)	Restriction can be waived, according to Colorado Division of Minerals and Geology.
R	Beneath or adjacent to any perennial stream, or impoundment or other body of water >20 acre-feet	4.20.4	Used 500 ft buffer based on DMG input; angles of draw are reviewed and buffer widths are approved on a case-by-case basis according to Colorado Division of Minerals and Geology.
R	Mining in alluvial valley floors and prime farm land	2.07.6(2)(K)	Alluvial valley floors are identified during permitting process, according to Colorado Division of Minerals and Geology.
R	Operations where subsidence is projected to cause material damage	2.05.6(6)(b)(iii) 4.20	According to Colorado Division of Minerals and Geology, operators essentially must avoid or leave support pillars to protect aquifers, agricultural land and occupied residential dwellings and noncommercial buildings.
R	Blasting within 1000 ft of schools, churches, hospitals and nursing facilities and within 500 ft of wells, pipelines and storage tanks for oil, gas or water	4.08.4(7)	Not an issue with underground mining.
R	Surface disturbance within 100 ft of perennial streams with biological communities in them	4.05.18	Not an issue with underground mining.

Table 4. Evaluation of Colorado regulations for restrictions and exclusions to mining.

Recovery Rates

The EIA provided recent confidential data on reported recovery rates for individual mines in Colorado that cannot be disclosed. In addition, information on surface and underground mining recovery rates was provided to the CGS by mine operators in the Somerset field. Three operators in the study area cited recovery rates of 50 percent for continuous miners and 65 to 70 percent for longwall mining (not including lower recovery rates for longwall development). A current maximum thickness of 13 feet is being mined.

Based on the current recovery rates, a 60 percent rate was applied in calculating estimated recoverable reserves for underground mining for coal zones up to 20 ft thick. A 40 percent recovery rate was applied to areas where coal zones exceed 20 ft in thickness to account for the inability to recover all of the coal in thicker beds. Recovery rates between 40 percent and 60 percent were assigned for different ratios of over 20 ft to under 20 ft coal zone thicknesses within an area being calculated. These recovery rates for underground mining account for the predominant use of longwall mining techniques in current and planned mines in the Somerset coal field and for limitations in recovering coal from thick coal beds.

Calculation of Coal Tonnages

Coal tonnages were derived for specified categories by first producing computer-generated isopach, structure, and coal quality maps for each coal zone. A stratigraphic database of drill hole data and several coal quality databases were used to compile the maps. Only individual coals thicker than 2.3 ft, or close-lying coal beds totaling 2.3 ft or more in thickness, were selected for inclusion in each coal zone. It is assumed that all coal in beds greater than the minimum minable thickness of 7 ft will be mined, but any coal in excess of 20 ft thick may not be mined. Recovery factors have been applied based on this assumption.

Computer-generated maps were checked, stratigraphic or elevation data were modified as necessary, and a second set of maps was produced. After the structure map was checked, the data was used to produce depth-to-coal maps for each zone, which show the depth to the top coal more than 2.3 ft thick in each zone. These maps were hand contoured at critical intervals: 2.3, 3.5, 7 and 14 ft total coal thicknesses for the isopach maps and 500, 1000 and 2000 ft depths on the depth to coal maps. Hand contouring of isopach and structure lines was necessary due to edge of map effects on computer-generated contours. Coal quality maps were hand contoured for ranges of Btu, sulfur and ash shown in Table 2. Computer maps of data points and coal quality values were used for the contouring. The outcrop lines for each zone and areas of no coal deposition were hand drawn using the geologic map (modified from Dunrud, 1989). (Tertiary intrusives replaced coals from all zones in the southeast part of the coal field.). The hand-contoured lines representing limits of the coal zone, thickness, depth and the three coal quality parameters were then digitized.

Although not used as criteria in the summary tables, thickness and depth maps are necessary to establish limits to resource calculations, and the average thickness was calculated in order to calculate tonnages. The 2000-ft depth line for each zone is used as a limit for resource calculations, as is the 2.3-ft thickness line.

Coal resource categories were established as follows:

Demonstrated reserve base (DRB) Areas of coal within ¼ mile of a data point used in the particular zone were plotted. Mined-out areas were subtracted, leaving the area of demonstrated coal resources for that zone.

Accessible reserve base Areas of coal (within the area of demonstrated coal) that are not restricted are included in the accessible reserve base. All coal that is not technologically restricted and not land-use restricted will be identified for each bed as accessible resources. Only the thickness in excess of the minimum minable thickness of 7 ft will be applied in calculations.

Estimated recoverable reserves Recovery rates ranging from 40 percent to 60 percent, depending on average coal thickness as previously explained, were applied to the accessible reserve base.

To calculate the total tonnage of coal, the tonnages from each coal zone must be compiled. Within each zone, all areas meeting the desired criteria (for example: not restricted, 23-24.99 million BTU/ton and 0.41-0.6 lbs sulfur/million Btu) would be identified. Coal quality (combinations of Btu and sulfur ranges shown in Table 2) and coal accessibility restrictions are criteria used in calculating tonnages. For each area, an acreage and average thickness is calculated. The acreage and thickness are multiplied for each, then summed to produce a total number of acre-ft. The density factor is then applied: the number of acre-ft is multiplied by 1800 tons/acre-ft, yielding the number of tons. These calculations are repeated for all combinations of criteria in order to produce the summary tables for each of the two counties.

Coal tonnages have been displayed to the nearest 0.1 million tons in the summary tables. Subtotals do not always add up to the totals, due to rounding.

Summary of Resources Calculated

Resources in the DRB and the accessible reserve base and estimated recoverable reserves have been calculated for the Somerset coal field for coal zones A through F. These resources and reserves have been assigned to either of the two counties, Delta and Gunnison, underlain by the coal field. Summary totals are provided for each of the six coal zones, by county and for the entire coal field, in Tables 5 through 12 (see appendix). In these eight tables, resources are presented for four parameters (Btu/sulfur, ash, thickness and depth) either for the DRB or for the accessible reserve base and estimated recoverable reserves.

In some cases, calculated values for estimated recoverable reserves vary slightly for different parameters. This slight variance results from assigning recovery factors that have two significant figures. For totals of all zones, the estimated recoverable reserves calculated for thickness were used.

No accessible or recoverable coal is assigned to the F zone. Several isolated areas less than 50 acres contain F zone coal slightly more than 7 ft thick. It was determined that coal in these areas would not be minable; therefore, this coal is not assigned to the accessible category.

All coal in the Somerset coal field is bituminous in rank and assigned to the underground minable category. Extent-of-mining for active mines has been mapped based on mine plans through the end of 1997; therefore, resource estimates presented in the appendix are as of January 1, 1998.

Summary totals for all coal zones in the Somerset coal field are:

- DRB: 3.18 billion tons
- Accessible Reserve Base: 2.40 billion tons, or 75.5 percent of the DRB
- Estimated Recoverable Reserves: 1.28 billion tons, or 40 percent of the DRB and 53 percent of the accessible reserve base

A summary of the total DRB, accessible reserve base, and estimated recoverable reserves for each coal zone is provided in Table 5. For all coal zones, approximately 58 percent of the DRB in the Somerset field underlies Gunnison County and the remaining 42 percent is in Delta County. Approximately 55 percent of the accessible reserve base and 57 percent of the estimated recoverable reserves are within Gunnison County.

Coal Zone	DRB	Percent of DRB	Accessible Reserve Base	Percent of Accessible Reserve Base	Estimated Recoverable Reserves	Percent of Estimated Recoverable Reserves
A	376.3	11.8	133.1	5.5	75.6	5.9
B	1086.4	34.1	999.8	41.7	472.5	37.0
C	477.1	15.0	249.9	10.4	147.1	11.5
D	841.6	26.4	812.5	33.8	457.2	35.8
E	321.0	10.0	205.3	8.5	123.2	9.7
F	81.4	2.6	0.0	0	0.0	0
Total	3183.7	99.9	2400.6	99.9	1275.5	99.9

Table 5. DRB, accessible reserve base, and estimated recoverable reserves by coal zone. All figures are in millions of tons.

The B and D coal zones together represent more than 75 percent of the accessible reserve base. These two coal zones have significant areas of coal greater than 20 ft thick; therefore, recovery factors are somewhat lower than those for thinner coal zones. The B and D coal zones account for less than 73 percent of the estimated recoverable reserves.

Approximately 87 percent of the DRB contains less than 0.6 percent sulfur, 77 percent contains less than 10 percent ash, and 68 percent exceeds heating values of 23 million Btu/lb. Detailed data on coal quality is provided in the appendix.

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Table 6. DRB assigned to Btu and sulfur categories, Somerset coal field, Colorado, as of 1-1-98, in millions of short tons.

County	BTU and Sulfur Categories		Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	All Zones
	Million BTU/lb	Lbs Sulfur/ Million BTU							
Delta	15-19.99	<0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	0.40-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	0.61-.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	20-22.99	<0.40	0.0	0.0	0.0	9.4	0.0	0.0	9.4
	20-22.99	0.40-0.6	52.5	73.1	3.8	261.7	0.0	0.0	391.1
	20-22.99	0.61-.83	135.1	14.6	0.0	0.0	0.0	0.0	149.7
	20-22.99	0.84-1.24	17.7	0.0	0.0	0.0	0.0	0.0	17.7
	20-22.99	1.25-1.67	20.3	0.0	0.0	0.0	0.0	0.0	20.3
	20-22.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	20-22.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	<0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	0.40-0.6	0.0	179.4	225.5	0.1	76.2	37.6	518.8
	23-25.99	0.61-.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	1.25-1.67	4.2	0.0	0.0	0.0	0.0	0.0	4.2
	23-25.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	<0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	0.40-0.6	0.0	231.0	0.0	0.0	0.0	0.0	231.0
	>26	0.61-.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total		229.8	498.1	229.3	271.1	76.2	37.6	1342.2

All coal is underground minable and bituminous. Data is presented for coal zones A through F.

Table 6. DRB assigned to Btu and sulfur categories, Somerset coal field, Colorado, as of 1-1-98, in millions of short tons.

County	BTU and Sulfur Categories		Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	All Zones	
	Million BTU/lb	Lbs Sulfur/ Million BTU								
Gunnison	15-19.99	<0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	0.40-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	0.61-.83	0.5	0.0	0.0	0.0	0.0	0.0	0.5	
	15-19.99	0.84-1.24	5.7	0.0	0.0	0.0	0.0	0.0	5.7	
	15-19.99	1.25-1.67	3.7	0.0	0.0	0.0	0.0	0.0	3.7	
	15-19.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	20-22.99	<0.40	0.0	1.6	4.6	7.0	2.3	0.0	15.5	
	20-22.99	0.40-0.6	0.1	27.5	7.8	155.9	72.3	0.0	263.6	
	20-22.99	0.61-.83	2.6	0.1	6.5	0.3	23.1	0.0	32.6	
	20-22.99	0.84-1.24	12.4	0.0	0.4	0.0	15.2	0.0	28.0	
	20-22.99	1.25-1.67	13.2	0.0	0.0	0.0	0.4	0.0	13.6	
	20-22.99	1.68-2.5	12.5	0.0	0.0	0.0	0.0	0.0	12.5	
	20-22.99	>2.5	2.7	0.0	0.0	0.0	0.0	0.0	2.7	
	23-25.99	<0.40	0.0	15.4	0.2	3.6	13.4	0.0	32.6	
	23-25.99	0.40-0.6	0.6	395.6	169.7	379.3	92.4	43.8	1037.6	
	23-25.99	0.61-.83	27.1	0.1	4.1	24.4	4.7	0.0	60.5	
	23-25.99	0.84-1.24	31.7	0.0	0.0	0.0	0.0	0.0	31.7	
	23-25.99	1.25-1.67	28.2	0.0	0.0	0.0	0.0	0.0	28.2	
	23-25.99	1.68-2.5	0.8	0.0	0.0	0.0	0.0	0.0	0.8	
	23-25.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	>26	<0.40	0.0	18.9	0.0	0.0	0.3	0.0	19.2	
	>26	0.40-0.6	4.7	140.2	35.4	0.0	12.9	0.0	193.2	
	>26	0.61-.83	0.0	0.0	14.3	0.0	7.7	0.0	22.0	
	>26	0.84-1.24	0.0	0.0	4.8	0.0	0.0	0.0	4.8	
	>26	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	>26	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	>26	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
		Total		146.4	599.5	247.8	570.5	244.7	43.8	1852.7

Table 6. DRB assigned to Btu and sulfur categories, Somerset coal field, Colorado, as of 1-1-98, in millions of short tons.

County	BTU and Sulfur Categories		Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	All Zones	
	Million BTU/lb	Lbs Sulfur/ Million BTU								
All Counties	15-19.99	<0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	0.40-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	0.61-.83	0.5	0.0	0.0	0.0	0.0	0.0	0.5	
	15-19.99	0.84-1.24	5.7	0.0	0.0	0.0	0.0	0.0	5.7	
	15-19.99	1.25-1.67	3.7	0.0	0.0	0.0	0.0	0.0	3.7	
	15-19.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	20-22.99	<0.40	0.0	1.6	4.6	16.4	2.3	0.0	24.9	
	20-22.99	0.40-0.6	52.6	100.6	11.7	417.6	72.3	0.0	654.7	
	20-22.99	0.61-.83	137.7	14.7	6.5	0.3	23.1	0.0	182.3	
	20-22.99	0.84-1.24	30.1	0.0	0.4	0.0	15.2	0.0	45.7	
	20-22.99	1.25-1.67	33.5	0.0	0.0	0.0	0.4	0.0	33.9	
	20-22.99	1.68-2.5	12.5	0.0	0.0	0.0	0.0	0.0	12.5	
	20-22.99	>2.5	2.7	0.0	0.0	0.0	0.0	0.0	2.7	
	23-25.99	<0.40	0.0	15.4	0.2	3.6	13.4	0.0	32.6	
	23-25.99	0.40-0.6	0.6	575.0	395.1	379.4	168.7	81.4	1600.2	
	23-25.99	0.61-.83	27.1	0.1	4.1	24.4	4.7	0.0	60.5	
	23-25.99	0.84-1.24	31.7	0.0	0.0	0.0	0.0	0.0	31.7	
	23-25.99	1.25-1.67	32.4	0.0	0.0	0.0	0.0	0.0	32.4	
	23-25.99	1.68-2.5	0.8	0.0	0.0	0.0	0.0	0.0	0.8	
	23-25.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	>26	<0.40	0.0	18.9	0.0	0.0	0.3	0.0	19.2	
	>26	0.40-0.6	4.7	371.2	35.4	0.0	12.9	0.0	424.2	
	>26	0.61-.83	0.0	0.0	14.3	0.0	7.7	0.0	22.0	
	>26	0.84-1.24	0.0	0.0	4.8	0.0	0.0	0.0	4.8	
	>26	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	>26	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	>26	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
		Grand Total		376.3	1097.6	477.1	841.6	321.0	81.4	3194.9

All coal is underground minable and bituminous. Data is presented for coal zones A through F.

Table 7. DRB assigned to ash categories, Somerset coal field, Colorado, as of 1-1-01 in millions of short tons.

County	Category (%Ash)	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	All Zones
Delta	5%	0.0	0.0	155.4	0.0	76.2	0.0	231.7
	5-10%	76.7	486.9	73.9	268.6	0.0	37.6	943.7
	10-15%	153.1	0.0	0.0	2.5	0.0	0.0	155.6
	>15%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	229.8	486.9	229.3	271.1	76.2	37.6	1331.0
Gunnison	5%	0.0	2.4	0.0	3.4	87.0	0.0	92.9
	5-10%	5.1	533.0	31.3	495.1	77.5	43.8	1185.8
	10-15%	85.9	59.2	209.9	71.7	52.6	0.0	479.3
	>15%	55.4	4.9	14.6	0.3	27.7	0.0	102.8
	Total	146.4	599.5	255.8	570.5	244.7	43.8	1860.8
All Counties	5%	0.0	2.4	155.4	3.4	163.3	0.0	324.5
	5-10%	81.9	1019.9	105.2	763.7	77.5	81.4	2129.5
	10-15%	239.0	59.2	209.9	74.1	52.6	0.0	634.9
	>15%	55.4	4.9	14.6	0.3	27.7	0.0	102.8
	Grand Total	376.3	1086.4	485.1	841.6	321.0	81.4	3191.8

Table 8. DRB assigned to thickness categories, Somerset coal field, Colorado, as of 1-1-98, in millions of short tons.

County	Thickness Category	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	All Zones
Delta	2.3-3.5 ft	3.4	0.0	0.0	1.1	3.7	8.3	16.5
	3.5-7 ft	23.4	6.3	25.4	7.3	57.6	29.3	149.3
	7-14 ft	52.4	75.3	155.3	49.2	15.0	0.0	347.2
	>14 ft	150.6	405.3	48.6	213.5	0.0	0.0	818.0
	Total	229.8	486.9	229.3	271.1	76.2	37.6	1331.0
Gunnison	2.3-3.5 ft	41.2	1.7	28.8	0.4	0.7	8.4	81.2
	3.5-7 ft	76.7	19.3	90.2	5.5	47.0	24.5	263.1
	7-14 ft	26.9	160.2	126.4	119.6	170.1	11.0	614.1
	>14 ft	1.6	418.3	14.6	445.0	27.0	0.0	906.5
	Total	146.4	599.5	247.8	570.5	244.7	43.8	1852.7
All Counties	2.3-3.5 ft	44.6	1.7	28.8	1.5	4.3	16.7	97.7
	3.5-7 ft	100.1	25.6	115.6	12.8	104.6	53.7	412.4
	7-14 ft	79.3	235.5	281.7	168.8	185.1	11.0	961.3
	>14 ft	152.3	823.6	63.1	658.5	27.0	0.0	1724.5
	Grand Total	376.3	1086.3	489.3	841.6	321.0	81.4	3195.9

Table 9. DRB assigned to depth categories, Somerset coal field, Colorado, as of 1-1-98, in millions of short tons.

County	Depth Category	Zone A	Zone B	Zone C	Zone D	Zone E	Zone F	All Zones
Delta	0-500 ft	21.4	72.3	28.1	54.5	17.2	16.1	209.6
	500-1000 ft	80.0	156.1	81.2	99.5	30.2	14.2	461.2
	1000-2000 ft	128.5	258.6	120.0	117.1	28.9	7.3	660.3
	Total	229.8	486.9	229.3	271.1	76.2	37.6	1331.1
Gunnison	0-500 ft	21.7	80.0	35.9	111.1	53.9	14.4	316.9
	500-1000 ft	46.7	176.3	87.3	246.2	123.0	20.8	700.4
	1000-2000 ft	78.0	343.2	124.5	213.3	67.8	8.6	835.4
	Total	146.4	599.5	247.8	570.5	244.7	43.8	1852.8
All Counties	0-500 ft	43.1	152.3	64.0	165.6	71.0	30.5	526.5
	500-1000 ft	126.7	332.4	168.6	345.7	153.2	35.0	1161.6
	1000-2000 ft	208.4	601.8	244.6	330.3	96.7	15.9	1495.8
	Grand Total	376.3	1086.4	477.1	841.6	321.0	81.4	3183.8

Table 10. Accessible reserve base and estimated recoverable reserves assigned to Btu and sulfur categories, Somerset coal field, Colorado as of 1-1-98, in millions of short tons.

County	Btu and Sulfur Categories Million Btu/lb Lbs Sulfur/ Lb Million Btu		Zone A		Zone B		Zone C		Zone D		Zone E		Zone F		All Zones	
			ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR
Delta	15-19.99	<0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	0.40-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	0.61-.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	20-22.99	<0.40	0.0	0.0	0.0	0.0	0.0	0.0	9.4	5.6	0.0	0.0	0.0	0.0	9.4	5.6
	20-22.99	0.40-0.6	25.1	14.6	72.0	39.6	0.0	0.0	253.3	139.3	0.0	0.0	0.0	0.0	350.4	193.5
	20-22.99	0.61-.83	96.9	54.3	3.4	2.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	100.3	56.3
	20-22.99	0.84-1.24	3.6	2.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	3.6	2.1
	20-22.99	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	20-22.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	20-22.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	<0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	0.40-0.6	0.0	0.0	168.6	75.9	198.9	115.4	0.1	0.0	15.0	9.0	0.0	0.0	382.6	200.4
	23-25.99	0.61-.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	<0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	0.40-0.6	0.0	0.0	231.0	94.7	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	231.0	94.7
	>26	0.61-.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total			125.6	71.0	475.0	212.2	198.9	115.4	262.7	145.0	15.0	9.0	1077.3	552.5	

All coal is underground-minable and bituminous. First figure for each coal zone applies to accessible reserve base (ARB). Second figure applies to estimated recoverable reserves (ERR).

Table 10. Accessible reserve base and estimated recoverable reserves assigned to Btu and sulfur categories, Somerset coal field, Colorado as of 1-1-98, in millions of short tons.

County	Btu and Sulfur Categories Million Btu/lb Lbs Sulfur/ Lb Million Btu		Zone A		Zone B		Zone C		Zone D		Zone E		Zone F		All Zones	
			ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR
			Gunnison	15-19.99	<0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	0.40-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	0.61-.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	15-19.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	20-22.99	<0.40	0.0	0.0	1.6	0.6	4.3	2.6	7.0	2.8	1.3	0.8	0.0	0.0	14.1	6.7
	20-22.99	0.40-0.6	0.0	0.0	19.8	10.1	5.7	3.4	153.8	89.2	59.8	35.9	0.0	0.0	239.1	138.6
	20-22.99	0.61-.83	0.0	0.0	0.1	0.0	0.0	0.0	0.3	0.2	19.0	11.4	0.0	0.0	19.4	11.5
	20-22.99	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	11.2	6.7	0.0	0.0	11.2	6.7
	20-22.99	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0
	20-22.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	20-22.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	<0.40	0.0	0.0	13.6	6.1	0.0	0.0	3.3	1.5	9.1	5.5	0.0	0.0	26.1	13.1
	23-25.99	0.40-0.6	0.0	0.0	347.2	163.2	37.9	22.7	365.3	208.2	71.9	43.1	0.0	0.0	822.3	437.3
	23-25.99	0.61-.83	0.0	0.0	0.1	0.0	0.0	0.0	20.1	10.5	4.1	2.5	0.0	0.0	24.4	12.9
	23-25.99	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	23-25.99	1.25-1.67	5.2	3.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.2	3.1
	23-25.99	1.68-2.5	2.3	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.4
	23-25.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	<0.40	0.0	0.0	18.9	11.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	19.0	11.3
	>26	0.40-0.6	0.0	0.0	123.3	69.0	3.1	1.9	0.0	0.0	8.8	5.3	0.0	0.0	135.3	76.2
	>26	0.61-.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	3.0	0.0	0.0	5.0	3.0
	>26	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	>26	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total		7.5	4.5	524.8	260.3	51.0	30.6	549.8	312.3	190.2	114.1	0.0	0.0	1323.3	721.9

All coal is underground-minable and bituminous. First figure for each coal zone applies to accessible reserve base (ARB). Second figure applies to estimated recoverable reserves (ERR).

Table 10. Accessible reserve base and estimated recoverable reserves assigned to Btu and sulfur categories, Somerset coal field, Colorado as of 1-1-98, in millions of short tons.

County	Btu and Sulfur Categories		Zone A		Zone B		Zone C		Zone D		Zone E		Zone F		All Zones		
	Million Btu/Lb	Lbs Sulfur/ Million Btu	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	
All Counties	15-19.99	<0.40	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	0.40-0.6	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	0.61-.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	15-19.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	20-22.99	<0.40	0.0	0.0	1.6	0.6	4.3	2.6	16.4	8.4	1.3	0.8	0.0	0.0	23.5	12.3	
	20-22.99	0.40-0.6	25.1	14.6	91.8	49.7	5.7	3.4	407.1	228.5	59.8	35.9	0.0	0.0	589.5	332.1	
	20-22.99	0.61-.83	96.9	54.3	3.6	2.0	0.0	0.0	0.3	0.2	19.0	11.4	0.0	0.0	119.7	67.8	
	20-22.99	0.84-1.24	3.6	2.1	0.0	0.0	0.0	0.0	0.0	0.0	11.2	6.7	0.0	0.0	14.8	8.9	
	20-22.99	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.0	
	20-22.99	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	20-22.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	23-25.99	<0.40	0.0	0.0	13.6	6.1	0.0	0.0	3.3	1.5	9.1	5.5	0.0	0.0	26.1	13.1	
	23-25.99	0.40-0.6	0.0	0.0	515.8	239.1	236.8	138.1	365.3	208.2	86.9	52.2	0.0	0.0	1204.9	637.6	
	23-25.99	0.61-.83	0.0	0.0	0.1	0.0	0.0	0.0	20.1	10.5	4.1	2.5	0.0	0.0	24.4	12.9	
	23-25.99	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	23-25.99	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	23-25.99	1.68-2.5	2.3	1.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.3	1.4	
	23-25.99	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	>26	<0.40	0.0	0.0	18.9	11.3	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	19.0	11.3	
	>26	0.40-0.6	0.0	0.0	354.3	163.7	3.1	1.9	0.0	0.0	8.8	5.3	0.0	0.0	366.3	170.9	
	>26	0.61-.83	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	5.0	3.0	0.0	0.0	5.0	3.0	
	>26	0.84-1.24	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	>26	1.25-1.67	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	>26	1.68-2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	>26	>2.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	
	Grand Total			133.1	75.5	999.8	472.5	249.9	146.0	812.5	457.3	205.3	123.2	0.0	0.0	2400.6	1274.4

All coal is underground-minable and bituminous. First figure for each coal zone applies to accessible reserve base (ARB). Second figure applies to estimated recoverable reserves (ERR).

Table 11. Accessible reserve base and estimated recoverable reserves assigned to ash categories, Somerset coal field, Colorado as of 1-1-98, in millions of short tons.

County	Category (%Ash)	Zone A		Zone B		Zone C		Zone D		Zone E		Zone F		All Zones	
		ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR
Delta	<5%	0.0	0.0	0.0	0.0	135.8	78.7	0.0	0.0	15.0	9.0	0.0	0.0	150.8	87.8
	5-10%	42.2	21.1	475.0	213.8	63.2	37.9	260.2	143.1	0.0	0.0	0.0	0.0	840.6	415.9
	10-15%	83.4	50.1	0.0	0.0	0.0	0.0	2.5	1.5	0.0	0.0	0.0	0.0	85.9	51.5
	>15%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
	Total	125.6	71.1	475.0	213.8	198.9	116.8	262.7	144.6	15.0	9.0	0.0	0.0	1077.3	555.2
Gunnison	<5%	0.0	0.0	2.4	1.4	0.0	0.0	3.2	0.0	71.9	43.2	0.0	0.0	77.5	44.6
	5-10%	0.0	0.0	14.6	232.9	49.0	29.4	474.6	1.9	51.6	31.0	0.0	0.0	589.8	295.2
	10-15%	7.5	4.5	45.2	24.9	2.0	1.2	71.7	270.5	41.1	24.6	0.0	0.0	167.5	325.8
	>15%	0.0	0.0	1.8	1.1	0.0	0.0	0.3	39.4	25.6	15.4	0.0	0.0	27.7	55.9
	Total	7.5	4.5	63.9	260.3	51.0	30.6	549.8	311.9	190.2	114.1	0.0	0.0	862.5	721.4
All Counties	<5%	0.0	0.0	2.4	1.4	135.8	78.7	3.2	0.0	87.0	52.2	0.0	0.0	228.3	132.4
	5-10%	42.2	21.1	489.6	446.7	112.2	67.3	734.9	145.0	51.6	31.0	0.0	0.0	1430.4	711.1
	10-15%	90.9	54.6	45.2	24.9	2.0	1.2	74.1	272.0	41.1	24.6	0.0	0.0	253.4	377.3
	>15%	0.0	0.0	1.8	1.1	0.0	0.0	0.3	39.4	25.6	15.4	0.0	0.0	27.7	55.9
	Grand Total	133.1	75.6	538.9	474.0	249.9	147.2	812.5	456.5	205.3	123.2	0.0	0.0	1939.8	1276.6

All coal is underground-minable and bituminous. First figure for each coal zone applies to accessible reserve base (ARB). Second figure applies to estimated recoverable reserves (ERR).

Table 12. Accessible reserve base and estimated recoverable reserves assigned to thickness categories, Somerset coal field, Colorado as of 1-1-98, in millions of short tons.

County	Thickness Category	Zone A		Zone B		Zone C		Zone D		Zone E		Zone F		All Zones	
		ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR
Delta	7-14 ft	72.6	43.5	69.7	42.0	162.6	97.6	49.2	29.5	15.0	9.0	0.0	0.0	369.1	221.6
	>14 ft	53.0	27.6	405.3	170.2	36.3	18.9	213.5	115.3	0.0	0.0	0.0	0.0	708.2	332.0
	Total	125.6	71.1	475.0	212.2	198.9	116.4	262.7	144.8	15.0	9.0	0.0	0.0	1077.3	553.6
Gunnison	7-14 ft	7.5	4.5	135.2	81.1	51.0	30.6	112.3	67.4	164.2	98.5	0.0	0.0	470.2	282.1
	>14 ft	0.0	0.0	389.6	179.2	0.0	0.0	437.4	245.0	26.0	15.6	0.0	0.0	853.1	439.8
	Total	7.5	4.5	524.8	260.3	51.0	30.6	549.8	312.4	190.2	114.1	0.0	0.0	1323.3	721.9
All Counties	7-14 ft	80.1	48.0	14.6	123.1	213.6	128.2	161.5	96.9	179.3	107.6	0.0	0.0	649.0	503.8
	>14 ft	53.0	27.6	794.9	349.4	36.3	18.9	651.0	360.3	26.0	15.6	0.0	0.0	1561.2	771.8
	Grand Total	133.1	75.6	999.8	472.5	249.9	147.1	812.5	457.2	205.3	123.2	0.0	0.0	2400.6	1275.5

All coal is underground-minable and bituminous. First figure for each coal zone applies to accessible reserve base (ARB). Second figure applies to estimated recoverable reserves (ERR).

Table 13. Accessible reserve base and estimated recoverable reserves assigned to depth categories, Somerset coal field, Colorado as of 1-1-98, in millions of short tons.

County	Depth Category	Zone A		Zone B		Zone C		Zone D		Zone E		Zone F		All Zones	
		ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR	ARB	ERR
Delta	0-500 ft	9.1	5.2	72.3	33.3	22.7	13.4	51.7	30.0	2.4	1.5	0.0	0.0	158.4	83.4
	500-1000 ft	40.1	20.8	153.4	69.0	70.1	41.3	97.7	53.7	7.1	4.3	0.0	0.0	368.3	189.2
	1000-2000 ft	76.4	45.1	249.3	109.7	106.1	61.5	113.3	61.2	5.5	3.3	0.0	0.0	550.6	280.8
	Total	125.6	71.1	475.0	212.0	198.9	116.3	262.7	144.9	15.0	9.0	0.0	0.0	1077.3	553.4
Gunnison	0-500 ft	2.7	1.6	57.3	29.8	8.3	5.0	99.4	57.7	37.4	22.4	0.0	0.0	205.1	116.5
	500-1000 ft	2.9	1.7	154.3	74.1	18.7	11.2	240.8	137.3	102.3	61.4	0.0	0.0	519.0	285.7
	1000-2000 ft	1.9	1.1	313.2	156.6	24.0	14.4	209.5	117.3	50.6	30.3	0.0	0.0	599.2	319.8
	Total	7.5	4.5	14.6	260.5	51.0	30.6	549.8	312.3	190.2	114.1	0.0	0.0	813.1	722.0
All Counties	0-500 ft	11.8	6.8	129.6	63.1	31.1	18.4	151.2	87.7	39.9	23.9	0.0	0.0	363.5	199.9
	500-1000 ft	43.0	22.6	307.7	143.1	88.8	52.6	338.5	191.0	109.4	65.6	0.0	0.0	887.3	474.9
	1000-2000 ft	78.3	46.2	562.5	266.3	130.1	75.9	322.8	178.5	56.1	33.6	0.0	0.0	1149.7	600.6
	Grand Total	133.1	75.6	489.6	472.5	249.9	146.9	812.5	457.2	205.3	123.2	0.0	0.0	1890.4	1275.4

All coal is underground-minable and bituminous. First figure for each coal zone applies to accessible reserve base (ARB). Second figure applies to estimated recoverable reserves (ERR).