VIRGINIA DIVISION OF MINERAL RESOURCES
PUBLICATION 118

AVAILABLE COAL RESOURCES STUDY OF APPALACHIA 7.5-MINUTE QUADRANGLE, VIRGINIA - KENTUCKY

Roy S. Sites and Karen K. Hostettler

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF MINES, MINERALS AND ENERGY
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Robert C. Milici, State Geologist

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DEPARTMENT OF MINES, MINERALS AND ENERGY
RICHMOND, VIRGINIA
O. Gene Dishner, Director

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AVAILABLE COAL RESOURCES STUDY OF APPALACHIA 7.5-MINUTE QUADRANGLE, VIRGINIA - KENTUCKY

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INTRODUCTION

The majority of Appalachia quadrangle is located in the southwestern Virginia coalfield of western Wise County (Figure 1). There is a very small portion of Lee County in the extreme southwest corner of the quadrangle. There are also portions of Letcher and Harlan Counties, Kentucky, in the extreme northwest corner and along the western boundary of the quadrangle, respectively. The quadrangle lies within the Cumberland Mountains section of the Appalachian Plateaus physiographic province and encompasses a small northeast-trending portion of the Powell Valley anticline in the extreme southeast corner of the quadrangle, adjacent the town of Appalachia. The vast majority of the quadrangle encompasses the gently northwestern-dipping southeastern limb of the Middlesboro syncline with a transition zone (along Pigeon Creek and the northeast trending portion of the Powell River) into the more steeply dipping northwestern limb of the Powell Valley anticline (Nolde and others, 1988). The Big Stone Gap anticline and the Roaring Fork syncline are minor folds developed in the northwestern limb of the Powell Valley anticline southeast of the town of Appalachia.

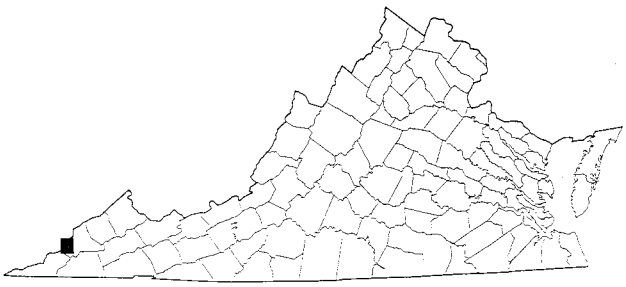


Figure 1. Location map showing the Appalachia 7.5-minute quadrangle, VA-KY.

Topography throughout the quadrangle is principally characterized by dissected uplands, with generally steep ridge slopes and v-shaped valleys. The maximum elevation within the quadrangle is a little more than 3800 feet along the Tennessee Valley Divide, known locally as Black Mountain. Black Mountain is predominantly a north-south trending ridge whose crest defines the Virginia-Kentucky state boundary. Maximum relief in the quadrangle is greater than 2100 feet.

The Available Coal Resources Study undertaken for Appalachia quadrangle involved evaluating nineteen Pennsylvanian age coalbeds which are shown in relative stratigraphic position on Figure 2. All of the coals studied occur above drainage locally with traceable outcrops in the quadrangle. Only those coalbeds found to be more regionally persistent were studied. All nineteen coalbeds are within a stratigraphic interval of about 2485 feet. An additional 1725 feet with nine recognizable coalbeds occurs totally below drainage. There is only one coal-core drill hole penetrating this interval in the quadrangle. It shows all but one of these coalbeds (Kennedy) to be less than 20 inches thick. Consequently, as there are insufficient data and no current mining, nor any future prospects of mining of these coalbeds because they occur at extreme depths, these coalbeds within this lower stratigraphic interval were not considered nor addressed in this study.

This coal availability study was a cooperative effort between the Virginia Division of Mineral Resources and the U.S. Geological Survey. This study was funded in part under contract number 14-08-0001-A0708.

DATA

Outcrop maps of the coalbeds were prepared from the recently published geologic map of Appalachia quadrangle (Nolde and others, 1988). Data for 297 coalbed locations were evaluated. In addition, 174 drill hole summaries were obtained from various coal companies. The data is distributed fairly uniformly throughout the Virginia coalfield portion of the quadrangle. However, in the Kentucky portion of the quadrangle, the data is not distrubited uniformly (Figure 3). Without the kind cooperation of the Kentucky Geological Survey, there would have been no data available for that portion of the quadrangle.

Mined areas were delineated from maps provided by the Virginia Division of Mines. Surface mines were identified from the most recent Appalachia 7.5-minute topographic map and the geologic map of Appalachia quadrangle (Nolde and others, 1988). Outlines of mined areas for each coalbed were superimposed on the corresponding coalbed outcrop map. The outcrops and the mined areas were then digitized. Detailed stratigraphic sections were constructed from the drill hole data throughout the quadrangle to assure accurate coalbed correlations.

Of the coalbeds evaluated (19), coal samples were collected from seven separate coalbeds (37%). Geochemical analyses of those samples indicate that six of the seven coalbeds could be considered compliance coal (containing less than 1.2 pounds of sulfur dioxide per 1 million BTU, Table 1).

RESTRICTIONS

Various restrictions affect both surface and deep mining operations. These restrictions are both land-use oriented and technologically oriented toward coal mining practices. Land-

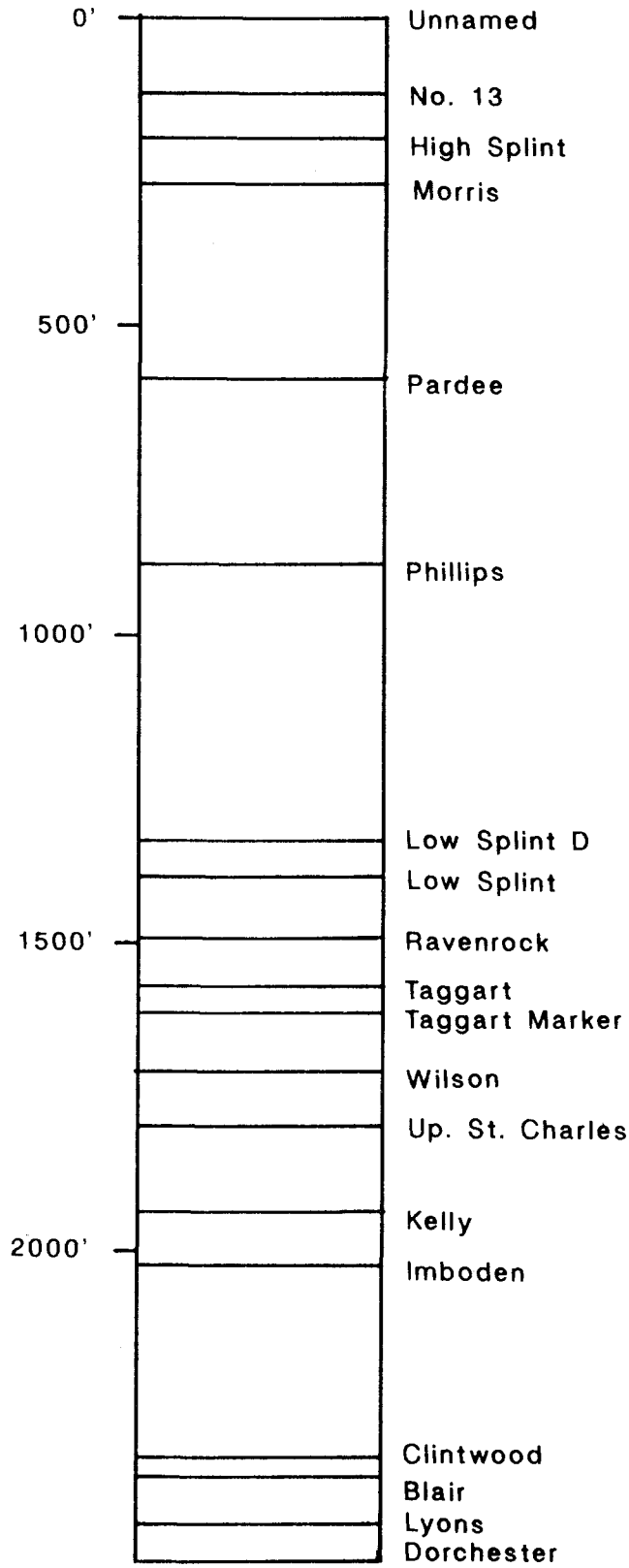


Figure 2. Coalbed columnar section showing coalbeds for which resource calculations were made in the Appalachia quadrangle coal availability study.

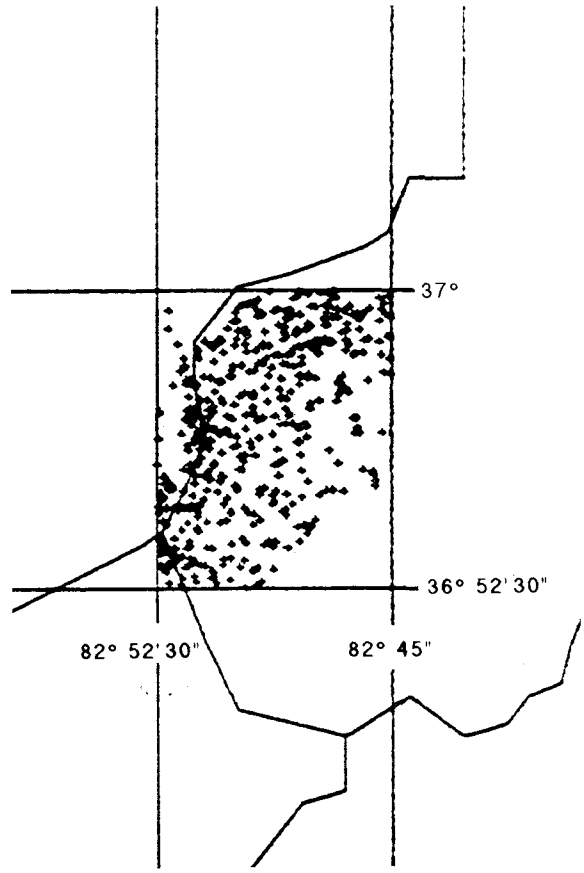


Figure 3. Location map of data distribution of coalbed data throughout the Appalachia quadrangle.

use restrictions primarily affect surface mining and deep mining with less than 200 feet overburden. Technologic restrictions generally affect deep mining practices. Existing oil and gas wells are factors common to both land-use and technologic restrictions applied to mining practices.

Minor faulting in some coalbeds have affected mine roof stability locally. Generally, these areas are mined with caution. Because of this, there were no restrictions to mining practices based on geologic factors applied in this study. Other factors of concern are more geochemically oriented, but there are insufficient data to identify such restricted areas at this time.

All overlap of areas with two or more restrictions to mining practices were removed prior to calculation of the available coal resources.

LAND-USE RESTRICTIONS

OIL AND GAS WELLS

One-hundred and one oil and gas wells had been drilled in the Appalachia quadrangle at the time of this study. These wells were drilled between 1953 and 1988, to depths ranging from 1837 feet to 7108 feet. A buffer zone 200 feet wide was

Table 1. Applicable compliance of those coalbeds sampled in Appalachia quadrangle. (N.S. = not sampled).

NUMBER OF SAMPLES	COALBED	
--	Unnamed	N.S.
--	No. 13	N.S.
--	High Splint	N.S.
2	Morris	Compliance
2	Pardee	50 % Compliance
--	Phillips	N.S.
--	Low Splint D	N.S.
2	Low Splint	Compliance
--	Ravenrock	N.S.
8	Taggart	88 % Compliance
--	Taggart Marker	N.S.
--	Wilson	N.S.
--	Upper St. Charles	N.S.
1	Kelly	Compliance
5	Imboden	Compliance
--	Clintwood	N.S.
--	Blair	N.S.
--	Lyons	N.S.
2	Dorchester	Noncompliance

applied to each well location (Figure 4) as prescribed by the Mine Safety Laws of Virginia (45.1-92-1). It should be noted that mine operators can petition the Gas and Oil Division to mine nearer to, or through well locations. A State Oil and Gas Inspector may approve the exception if it is justified.

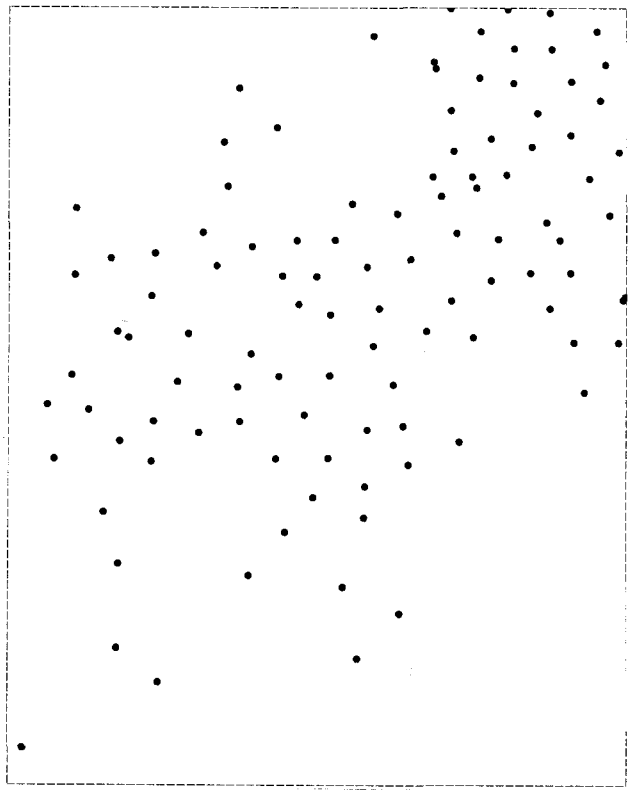


Figure 4. Location of oil and gas wells, with their buffer zones, in Appalachia quadrangle.

CEMETERIES

Although there is no specific mining law prohibiting mining through or beneath existing cemeteries, the Office of Surface Mining (OSM) requests mine operators filing for mining permits to provide a buffer around cemeteries. Therefore, for the purpose of this study, locations of existing cemeteries, including an applied 100-foot buffer zone, were digitized (Figure 5).

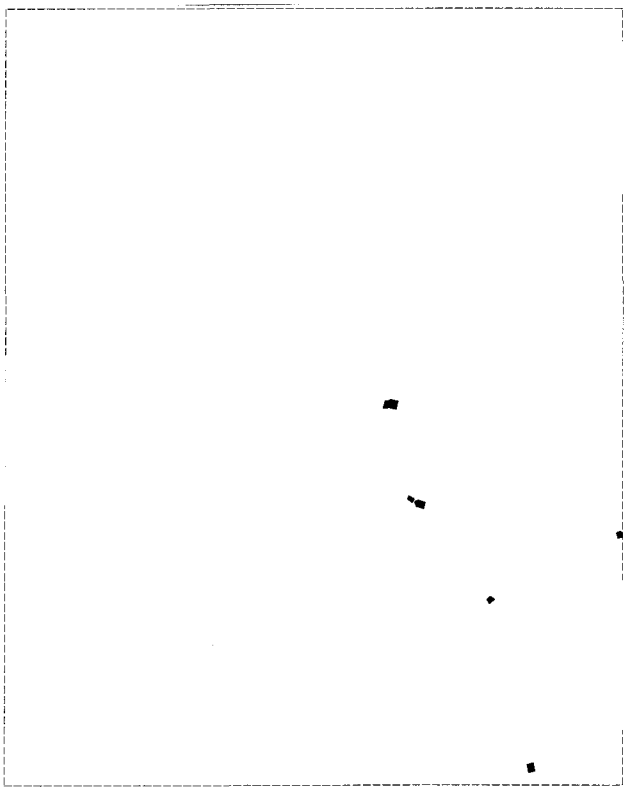


Figure 5. Location of cemeteries, with their buffer zones, in Appalachia quadrangle.

STREAMS

Areas immediately under or within 100 feet of major streams are considered as land-use restrictions primarily to avoid potential surface subsidence and the possible interruption of surface water flow. Appalachia quadrangle contains one major stream, Powell River, in the southeastern portion of the quadrangle. The stream course, including a 100-foot buffer zone on each side, was digitized (Figure 6).

TOWNS

The presence of population centers restricts surface and near surface mining operations, principally due to inaccessibility and the potential for induced surface subsidence from deep mining. As with major streams, OSM recommends mining be excluded from within town limits and population boundaries when filing for mining permits. Municipal boundaries and rural community areas were outlined and digitized as

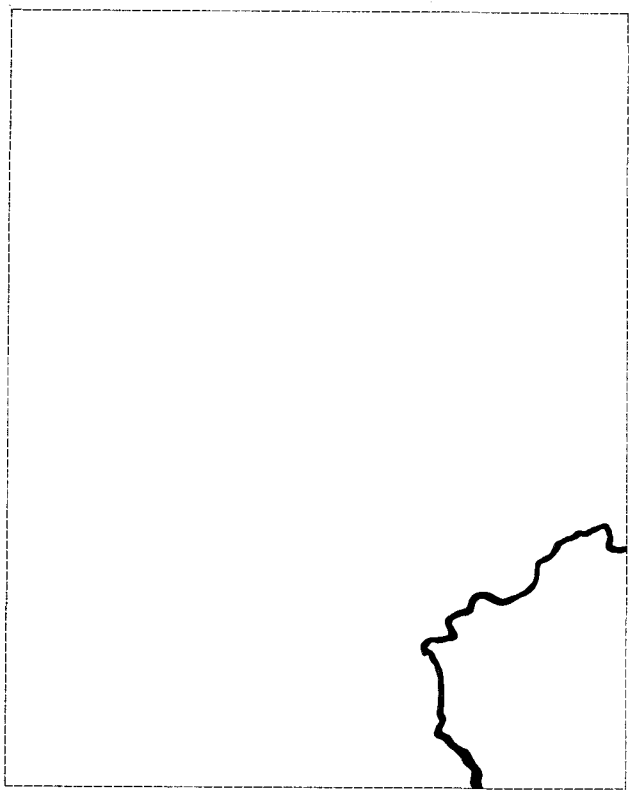


Figure 6. Location of major streams, with accompanying buffer zone, in Appalachia quadrangle.

Figure 7. Location of population centers in Appalachia quadrangle.

land-use restrictions to mining (Figure 7).

HIGHWAYS, PIPELINES, AND POWERLINES

There are no specific laws prohibiting mining through or under these structures in Virginia. Most surface mine operators tend not to disturb highways or pipelines and have mined between powerline poles. Operators do mine beneath all these structures. Due to these practices, those structures listed above were not considered as viable land-use restrictions to mining for this study.

NATIONAL FORESTS

The Surface Mining Control and Reclamation Act of 1977 strictly prohibits surface mining on National Forest lands, particularly within the eastern United States. For this reason, lands of the Jefferson National Forest in Appalachia quadrangle were considered as land-use restrictions (Figure 8). Deep mining is allowed beneath National Forest lands upon approval of a Federal Mineral Mining permit.

A composite map showing all the above listed land-use restrictions, as total land-use restrictions applied to each coalbed, is shown in Figure 9.

TECHNOLOGIC RESTRICTIONS

OIL AND GAS WELLS

The factors mentioned above for land-use restrictions regarding mining near oil and gas wells are considered for safe mining practices, and also apply to deep mining operations.

MINE BUFFERS

Principally for safety, the Mine Safety and Health Administration (MSHA) requires a buffer to be maintained around older mine workings. If active mining encounters an existing mine, the older mine must be either ventilated, pumped if necessary, and/or sealed. For planning purposes, most operators maintain a 100 to 200-foot buffer zone around known mine workings. For this study, a 200-foot buffer zone was added to the area of all deep mine workings within this quadrangle for exclusion as technologic restrictions.

INTERBURDEN

Interburden thickness between coalbeds may affect the mining of the overlying or underlying coalbeds by increasing mining hazards and the cost of mining. Although this interburden effect on mining is somewhat variable, a conservative minimum interburden thickness of 40 feet for zero coal

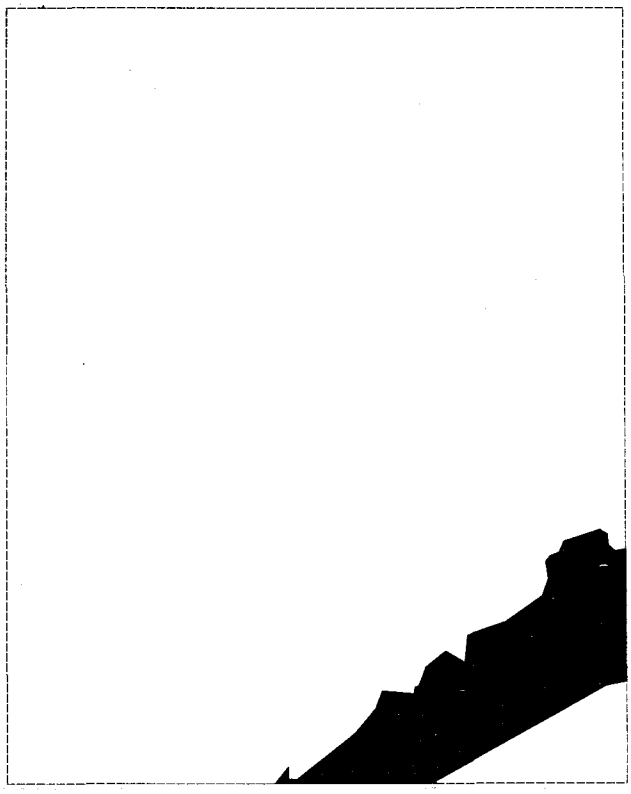


Figure 8. Location of National Forest lands in Appalachia quadrangle.

Figure 9. Location of total land-use restrictions as applied to each coalbed studied in Appalachia quadrangle.

loss was applied as a restriction. Current mining practices experience little to no adverse effects with interburdens greater than this value, thus allowing both coalbeds to be mined. In the case of two unmined coalbeds which are less than 40 feet apart, a decision was made as to which coalbed would most likely be mined in preference to the other. The defined area of coal with less than 40 feet interburden was then removed from the less desirable coalbed on the premise that the mining of this coalbed would be restricted by the mining of the more desirable coalbed.

MINING LESS THAN 40 FEET

Coalbeds that have been or are being mined, and are within 40 feet of another minable coalbed, may affect the potential mining of the other coalbed by reducing the stability of the roof or floor of the other coalbed. Therefore, the areas where mine workings are within 40 feet (a minimum interburden thickness for zero coal loss) of another coalbed, were considered to restrict the mining of the unmined portion of the other coalbed.

Within Appalachia quadrangle it is noteworthy that the mining of the Taggart and Taggart Marker coalbeds has been conducted with an interburden of less than 40 feet. An estimated 30 to 45 percent of the deep mining of both coalbeds overlap and approximately 90 percent of this overlap exhibits an interburden of less than 40 feet. However, according to Zhou (1991), given the interburden strata conditions and coalbed thickness, the height of caving or fracturing (minimum minable interburden) above the Taggart Marker should extend no greater than 20 to 25 feet upward. Where the interburden between the two coalbeds is less than 40 feet, very little is less than 20 feet. There has been, and will be, some minimal effects upon the unmined portion of these coalbeds, but because of the thicknesses of these beds, the potential instability does not appear to have deterred mining of both beds. Also, as nearly all the mining occurred within the Taggart prior to mining the underlying Taggart Marker, effects exerted upon the remaining Taggart coalbed were of little consequence.

UNMINABLE THICKNESSES

Some mine operators in Virginia consider that coal less than 40 inches thick is not economically feasible to deep mine if it is necessary to drive a shaft to access the coal (principally below drainage coal). All mines within Appalachia quadrangle have adit entries with one mine within the Dorchester coalbed having a sloped main entrance and a secondary shaft entrance farther into the mine. This mine does appear to have mined, in two places, very small areas of coal less than 40 inches thick (but greater than 28 inches); the vast majority of this coal being mined is greater than 40 inches thick.

Other mines throughout the quadrangle appear to support some mining of coalbeds between 14 and 28 inches thick. However, coalbeds with overburden greater than 1000 feet are generally mined only where more than 28 inches thick. There are areas within local mines where the overburden is

greater than 1000 feet and coalbed thicknesses are less than 28 inches, however these areas are very small and not considered significant. It was therefore determined that any portion of a coalbed with more than 1000 feet overburden and which is less than 28 inches thick would currently be considered a restriction to mining and therefore unminable.

The results of individual restrictions applied, both land-use and technologic, to each coalbed in Appalachia quadrangle are presented in Table 2.

RESOURCE CALCULATIONS

Coal resources were calculated only for that portion of each coalbed with a thickness greater than 14 inches, as determined by thickness isopachs for each coalbed (excluding partings). Categories used for each resource calculation (original, remaining, and available) were as follows:

14-28 inches thick with 0-200 feet overburden,
14-28 inches thick with 200-1000 feet overburden,
14-28 inches thick with greater than 1000 feet overburden;
greater than 28 inches thick with 0-200 feet overburden,
greater than 28 inches thick with 200-1000 feet overburden,
greater than 28 inches thick with greater than 1000 feet overburden.

Strip mined areas were applied to the categories with 0-200 feet overburden. Where present, the volume of coal affected by auger mining was added to the deep mine volume because of the many openings, the closeness of spacing, and the length of boring within the coalbed. Deep mined areas, coupled with strip mines where present, were removed from each original coal resource category resulting in the remaining coal resources for each coalbed. Where strip mining and deep mining occurred with 0-200 feet overburden, the volume of coal removed by deep mining was first calculated. Remaining coal resources for each bed were then calculated. With the deep mine volumes in the 0 to 200-foot overburden category previously calculated, the difference of the original and remaining resources minus this previously calculated deep mine volume then defined the strip mine volumes where applicable. The volumes of mined out coal for categories greater than 200 feet overburden were then determined by subtraction of remaining from original resources.

Three points must be noted in regards to the amount of mined out coal. First, some coal less than 14 inches thick has been strip mined in small areas and very small portions have been deep mined by some mine operators. These small volumes of coal are not considered in the resource calculations. Second, there are small volumes of coal that have been strip mined with overburden greater than 200 feet. These values are incorporated in the strip mined volumes. Third, there is no overlap of area between strip mining and deep mining with 0-200 feet overburden.

Restrictions to mining operations were identified and the volumes of coal affected by each restriction were calculated. Overlap of multiple restrictions were removed and the restricted areas were removed from the remaining areas thus defining the available coal resources for each coalbed. The available resources, per category, were then calculated for each coalbed.

RESULTS

Relative comparisons of original, remaining, and available coal resources for each coalbed are shown in Figure 10. Mining and applied restrictions have, and are, attributed to the actual and potential (respectively) loss of 48 percent of all original coal resources in Appalachia quadrangle (Figure 11). Total calculated original coal resources were 1350.1-million short tons from 19 coalbeds within Appalachia quadrangle. In this quadrangle, 26 percent of the coal has been mined, leaving 1006.4-million short tons of remaining coal resources. After applying specific restrictions, the total available coal resources were calculated to be 703.5-million short tons (Table 3), or 70 percent of the total remaining resources (Figure 12).

From the thirty percent of the remaining resources affected by restrictions, 3 percent were land-use restrictions and 97 percent were technologic restrictions. Within the land-use restrictions, towns comprised 67 percent while the unminable thickness and the interburden restrictions together comprised 76 percent of the technologic restrictions. Restrictions exhibited their greatest affect upon the Clintwood coalbed by restricting 87 percent of the remaining resources; of these restrictions, 99 percent were technologic. It is further noteworthy that four coalbeds account for 50 percent of the original coal resources in this quadrangle. They are the Taggart, Taggart Marker, Imboden, and Dorchester coalbeds. In addition, these four coalbeds account for 86 percent of all mined out coal within this quadrangle. Also, three coalbeds have had 50 percent or greater of their coal mined out: Pardee, Taggart, and Imboden.

In summary, various land-use and technologic restrictions do affect the amount of coal realistically available for mining. In Appalachia quadrangle, 26 percent of the coal has been mined and from the remaining coal 70 percent is available for mining. Of those restrictions applied within Appalachia quadrangle, 97 percent were technologically oriented.

REFERENCES CITED

Nolde, J.E., Henderson, J.A., and Miller, R.L., 1988, Geology of the Virginia portion of the Appalachia and Benham quadrangles: Virginia Division of Mineral Resources, Publication 72, 1 map.

Zhou, Y., 1991, Evaluating the impact of multiseam mining on recoverable coal reserves in an adjacent seam: Virginia Division of Mineral Resources, Publication 104, 22 p.

Table 2. Tonnages of coal affected by individual restrictions within Appalachia quadrangle (thousands of short tons) for each coalbed studied; Unnamed (UNN), No. 13 (N13), High Splint (HSP), Morris (MOR), Pardee (PAR), Phillips (PHL), Low Splint D (LSD), Low Splint (LSP), Ravenrock (RVR), Taggart (TAG), Taggart Marker (TGM), Wilson (WIL), Upper St. Charles (USC), Kelly (KEL), Imboden (IMB), Clintwood (CLW), Blair (BLA), Lyons (LYN), and Dorchester (DOR). Restricted coal is subdivided by overburden categories (0-200 ft., 200-1000 ft., > 1000 ft.)

LAND-USE RESTRICTIONS		TECHNOLOGIC RESTRICTIONS	
Towns	6,438	Less than 28 in. thk. and more than 1000 ft. overburden	144,330
Oil & gas well buffers with 0-200 ft. overburden	1,632	Interburden less than 40 ft. between two coalbeds	121,046
Streams	958	Buffer zones around mine workings	47,816
National forest	465	Previous mining of a coalbed less than 40 ft. above or below	29,772
Cemeteries	115	Oil & gas well buffers with more than 200 ft. overburden	6,634
TOTAL	9,608	TOTAL	349,598

	UNN	N13	HSP	MOR	PAR	PHL	LSD	LSP	RVR	TAG	TGM	WIL	USC	KEL	IMB	CLW	BLA	LYN	DOR	TOTAL
RESTRICTED COAL																				
0-200 ft.																				
Oil & Gas Wells	9	4	16	78	59	51	59	55	36	133	233	418	183	144	146	6	2	---	---	1,632
Mine Buffers	---	---	116	2,501	1,387	---	---	123	---	3,288	3,011	65	---	---	7,007	---	---	---	11	17,509
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	22	36	21	4	32	115
Towns	---	---	---	---	---	---	---	---	---	---	---	114	135	185	1,618	697	895	684	2,110	6,438
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	11	212	735	958
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---	78	160	75	152	465
200-1000 ft.																				
Oil & Gas Wells	10	10	35	25	59	159	242	230	155	175	262	272	196	355	510	342	389	139	971	4,536
Mine Buffers	---	---	429	1,157	3,659	---	---	474	---	5,286	2,963	130	---	---	7,750	---	---	---	1,921	23,769
Interburden < 40 ft.	---	1,959	---	---	---	---	16,448	---	---	---	12,828	---	3,375	---	---	30,993	---	2,280	---	67,883
Mining < 40 ft.	---	536	---	---	---	---	1,313	---	---	5,347	8,608	---	---	---	---	---	---	11	---	15,815
> 1000 ft.																				
Oil & Gas Wells	---	---	---	---	---	12	19	49	55	52	127	170	129	84	330	197	215	74	585	2,098
Mine Buffers	---	---	---	---	---	---	---	27	---	2,905	847	217	---	---	2,525	---	---	---	17	6,538
Interburden < 40 ft.	---	---	---	---	---	---	8,527	---	---	---	12,391	---	5,019	---	---	24,953	---	2,273	---	53,163
Mining < 40 ft.	---	---	---	---	---	---	360	---	---	3,917	9,680	---	---	---	---	---	---	---	---	13,957
Less Than 28 in. thk.	---	---	---	---	---	2,897	5,081	9,013	16,078	537	3,193	6,445	11,920	9,618	5,785	22,739	15,376	7,921	27,727	144,330
TOTAL RESTRICTIONS	19	2,509	596	3,761	5,164	3,119	32,049	9,971	16,324	21,640	54,143	7,831	20,957	10,386	25,693	80,041	17,069	13,673	34,261	359,206
TOTAL RESTRICTIONS with overlap removed	19	1,971	595	3,724	5,141	3,107	29,621	9,931	16,295	19,354	32,116	7,779	18,055	10,302	24,862	58,176	16,959	11,156	33,699	302,862

--- Restriction does not apply.

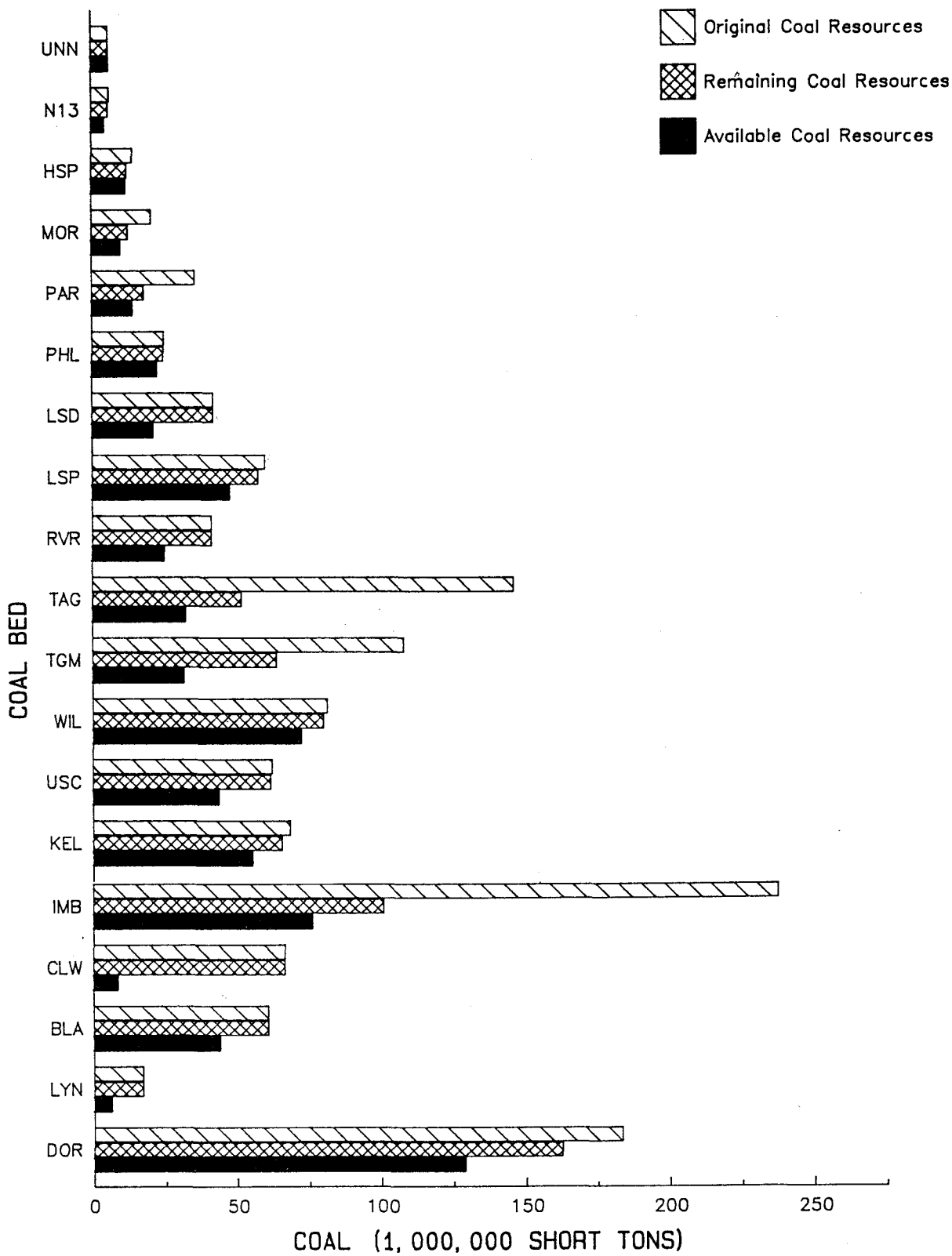


Figure 10. Total amounts of original, remaining, and available resources for each coalbed studied in Appalachia quadrangle; Unnamed (UNN), No. 13 (N13), High Splint (HSP), Morris (MOR), Pardee (PAR), Phillips (PHL), Low Splint D (LSD), Low Splint (LSP), Ravenrock (RVR), Taggart (TAG), Taggart Marker (TGM), Wilson (WIL), Upper St. Charles (USC), Kelly (KEL), Imboden (IMB), Clintwood (CLW), Blair (BLA), Lyons (LYN), and Dorchester (DOR).

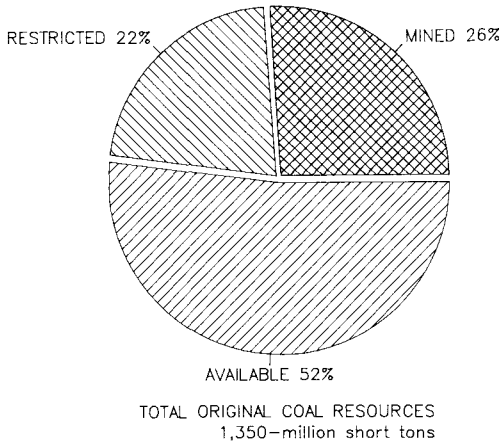


Figure 11. Pie chart showing results of the total coal availability study for all coalbeds of Appalachia quadrangle relative to the total original coal resources.

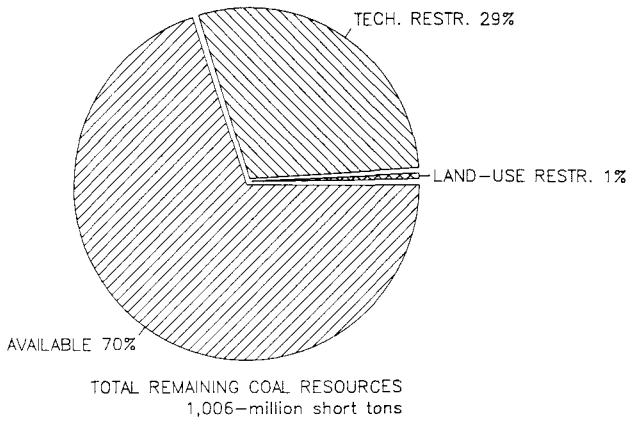


Figure 12. Pie chart showing results of the total coal availability study for all coalbeds of Appalachia quadrangle relative to the total remaining coal resources.

Table 3. Coal resources summary of Appalachia quadrangle. Values are in thousands of short tons.

COALBED	RESOURCES				
	ORIGINAL	MINED	REMAINING	RESTRICTED	AVAILABLE
Unnamed	8,783	0	8,783	19	8,764
No. 13	9,140	545	8,595	1,971	6,624
High Splint	20,487	2,730	17,757	595	17,162
Morris	29,879	11,626	18,253	3,724	14,529
Pardee	51,426	25,956	25,470	5,141	20,329
Phillips	35,888	134	35,754	3,107	32,647
Low Splint D	60,196	0	60,196	29,621	30,575
Low Splint	60,142	2,454	57,688	9,931	47,757
Ravenrock	41,456	0	41,456	16,295	25,161
Taggart	146,037	94,168	51,869	19,354	32,515
Taggart Marker	108,018	44,005	64,013	32,116	31,897
Wilson	81,410	1,299	80,111	7,779	72,332
Upper St. Charles	62,370	479	61,891	18,055	43,836
Kelly	68,504	2,764	65,740	10,302	55,438
Imboden	237,541	136,553	100,988	24,862	76,126
Clintwood	66,750	0	66,750	58,176	8,574
Blair	61,047	0	61,047	16,959	44,088
Lyons	17,350	0	17,350	11,156	6,194
Dorchester	183,649	20,953	162,696	33,699	128,997
TOTAL	1,350,073	343,666	1,006,407	302,862	703,545

APPENDIX

APPALACHIA QUADRANGLE
COAL AVAILABILITY RESULTS

The following maps, charts, and tables show, by coalbed, the results of the coal availability study. Per coalbed, the results are presented as follows: the original coalbed extent, the original coalbed resources, the remaining coalbed resources, the restrictions applied, the available coalbed resources, a pie chart of results, and a summary table showing tonnages of coal affected per category addressed. Also included, at the beginning, is a reference index map (Figure 13) for all coalbed maps that follow and a topographic map (Figure 14).

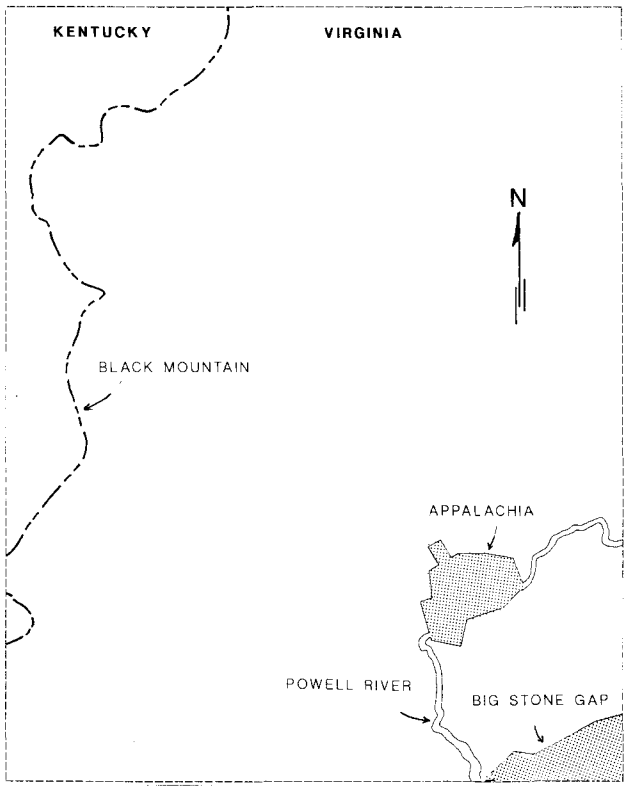
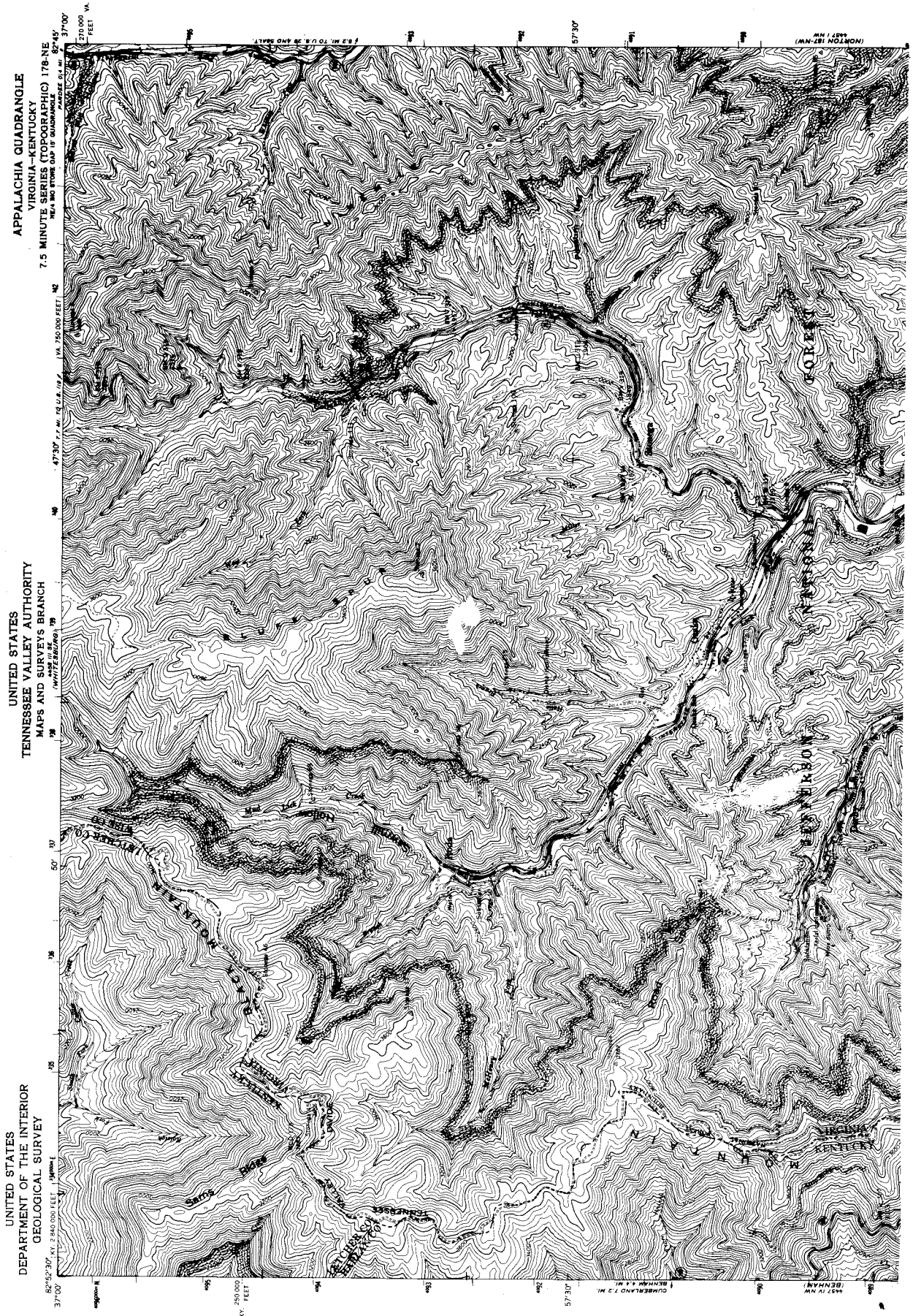


Figure 13. Reference index map of Appalachia quadrangle for all maps within the Appendix.


APPALACHIA QUADRANGLE
VIRGINIA–KENTUCKY
7.5 MINUTE SERIES (TOPOGRAPHIC) 178-NE
UNITED STATES
TENNESSEE VALLEY AUTHORITY
MAPS AND SURVEYS BRANCH
UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
JEFFERSON NATIONAL FOREST
VIRGINIA
KENTUCKY
TENNESSEE
Sams Ridge
37°00'
82°45'
57'30"
47'30"
50'
82°52'30"

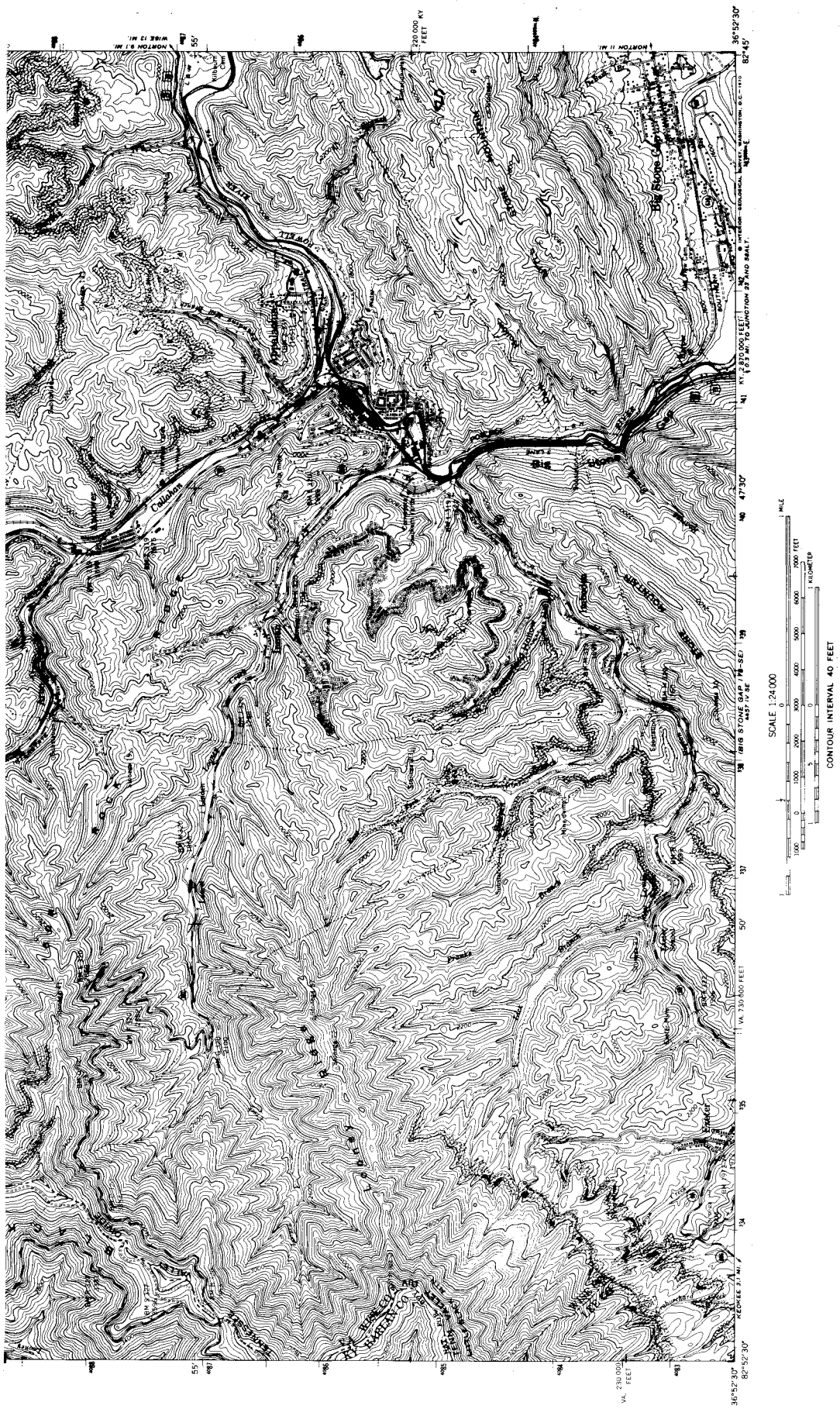


Figure 14. Appalachia 7.5-minute topographic map.

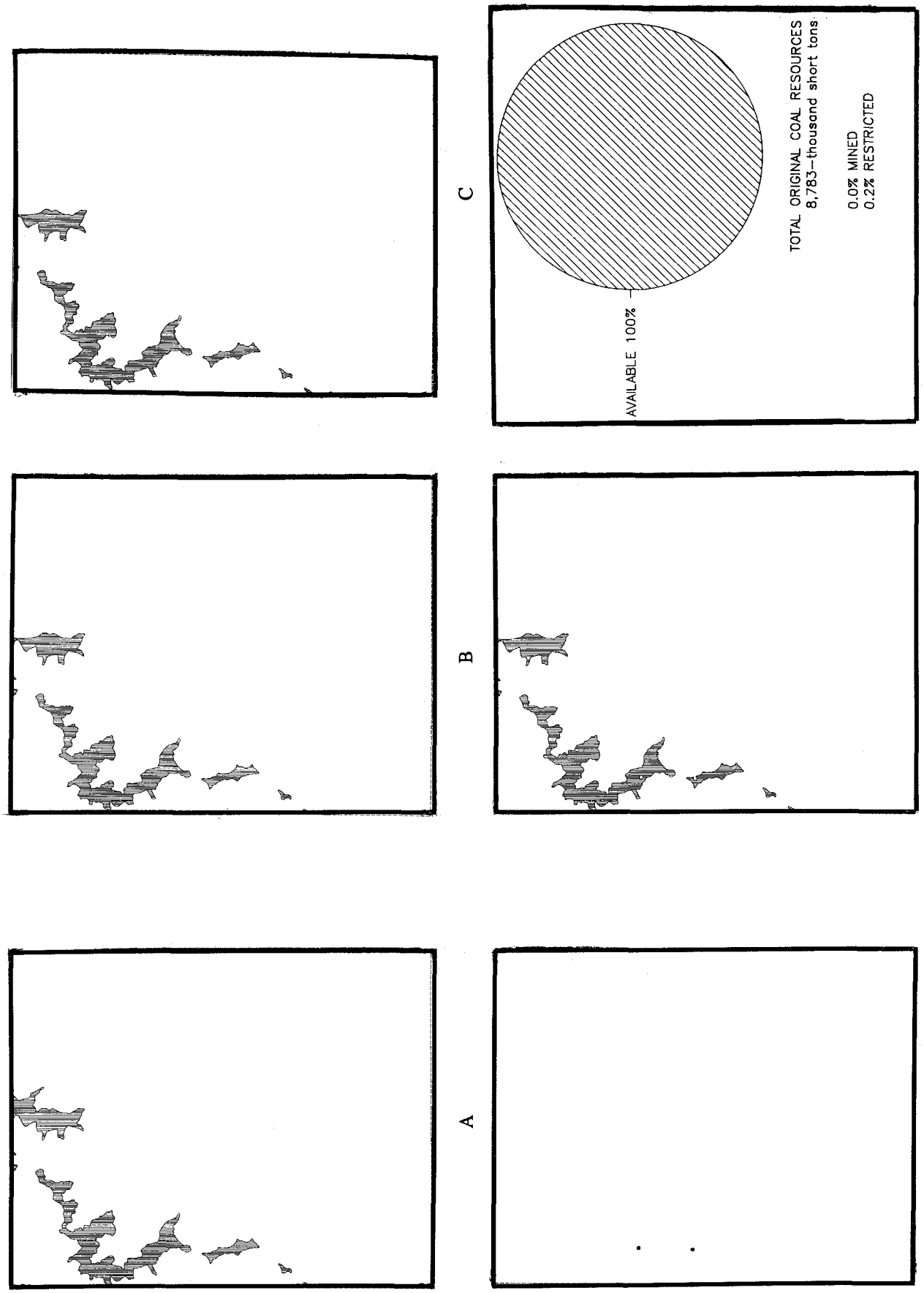


Figure 15. Coal availability study for the Unnamed coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 4. Calculated coal resources for the Unnamed coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	693	2,391	3,084	578	2,496	3,074	0	107	107	0	0	0	1,271	4,994	6,265
200-1000 ft.	343	728	1,071	232	1,215	1,447	0	0	0	0	0	0	575	1,943	2,518
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,036	3,119	4,155	810	3,711	4,521	0	107	107	0	0	0	1,846	6,937	8,783
MINED COAL															
STRIP MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP MINED															
0-200 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
REMAINING COAL															
0-200 ft.	693	2,391	3,084	578	2,496	3,074	0	107	107	0	0	0	1,271	4,994	6,265
200-1000 ft.	343	728	1,071	232	1,215	1,447	0	0	0	0	0	0	575	1,943	2,518
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,036	3,119	4,155	810	3,711	4,521	0	107	107	0	0	0	1,846	6,937	8,783
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	9	---	9	0	---	0	0	---	0	0	---	0	9	---	9
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	9	---	9	0	---	0	0	---	0	0	---	0	9	---	9
200-1000 ft.															
Oil & Gas Wells	8	---	8	2	---	2	0	---	0	0	---	0	10	---	10
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	8	---	8	2	---	2	0	---	0	0	---	0	10	---	10
> 1000 ft.															
Oil & Gas Wells	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
***TOTAL RESTRICTED**	17	---	17	2	---	2	0	---	0	0	---	0	19	---	19
AVAILABLE COAL															
0-200 ft.	684	2,391	3,075	578	2,496	3,074	0	107	107	0	0	0	1,262	4,994	6,256
200-1000 ft.	335	728	1,063	230	1,215	1,445	0	0	0	0	0	0	565	1,943	2,508
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,019	3,119	4,138	808	3,711	4,519	0	107	107	0	0	0	1,827	6,937	8,764

* Values have overlap removed. --- Does not apply.

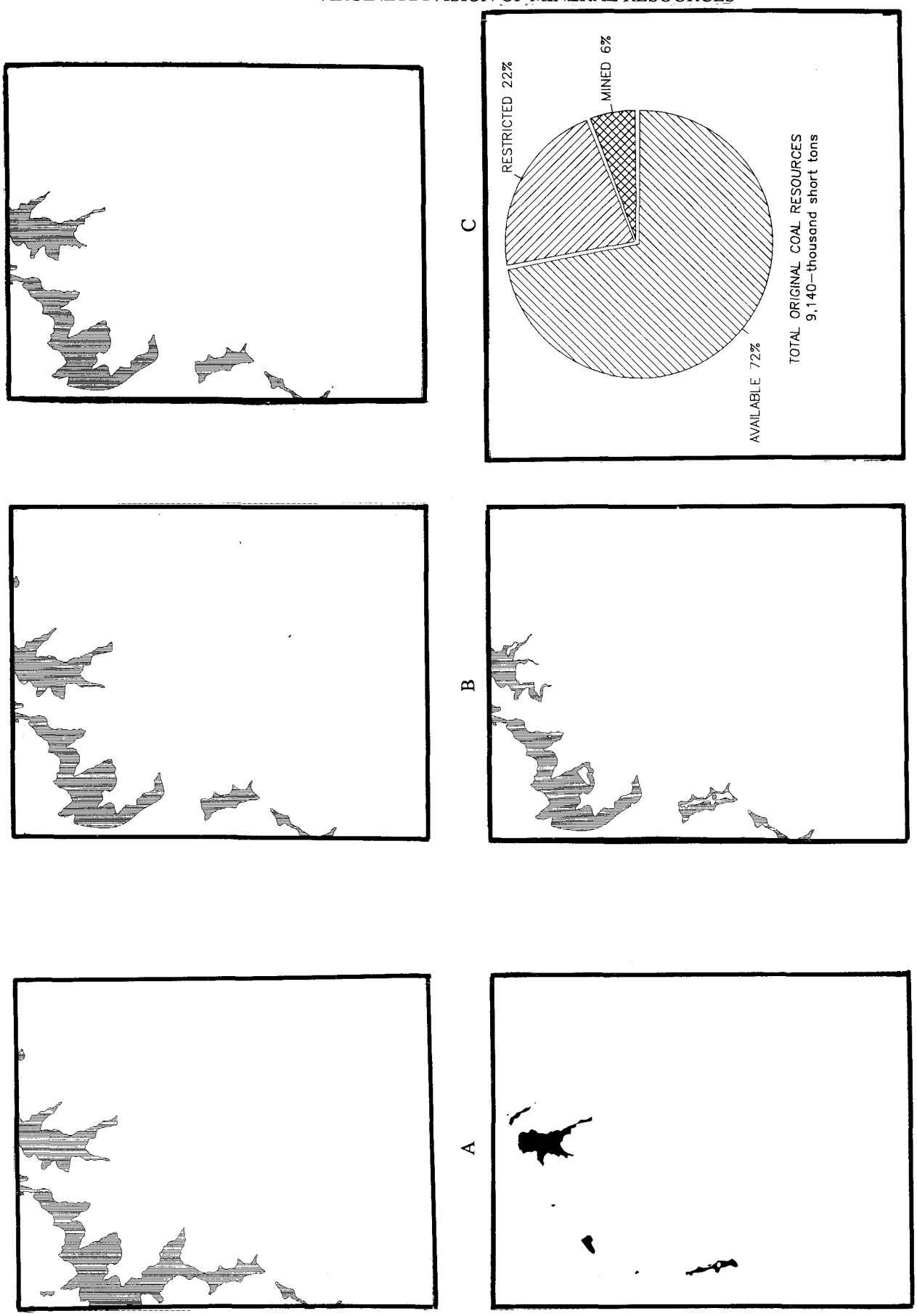


Figure 16. Coal availability study for the No. 13 coalbed; A. Original extent, B Original resources, C. Remaining resources, D) Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 5. Calculated coal resources for the No. 13 coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	1,144	706	1,850	1,845	578	2,423	51	0	51	0	0	0	3,040	1,284	4,324
200-1000 ft.	878	1,255	2,133	1,111	1,192	2,303	268	112	380	0	0	0	2,257	2,559	4,816
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	2,022	1,961	3,983	2,956	1,770	4,726	319	112	431	0	0	0	5,297	3,843	9,140
MINED COAL															
STRIP MINED + DEEP MINED	27	134	161	0	272	272	0	112	112	0	0	0	27	518	545
0-200 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL MINED	27	134	161	0	272	272	0	112	112	0	0	0	27	518	545
REMAINING COAL															
0-200 ft.	1,117	671	1,788	1,845	562	2,407	51	0	51	0	0	0	3,013	1,233	4,246
200-1000 ft.	878	1,156	2,034	1,111	936	2,047	268	0	268	0	0	0	2,257	2,092	4,349
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,995	1,827	3,822	2,956	1,498	4,454	319	0	319	0	0	0	5,270	3,325	8,595
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	3	0	3	0	1	1	0	0	0	0	0	0	3	1	4
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	3	0	3	0	1	1	0	0	0	0	0	0	3	1	4
200-1000 ft.															
Oil & Gas Wells	3	---	3	7	---	7	0	---	0	0	---	0	10	---	10
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	348	781	1,129	88	742	830	0	0	0	0	0	0	436	1,523	1,959
Mining < 40 ft.	87	242	329	0	207	207	0	0	0	0	0	0	87	449	536
*TOTAL	351	781	1,132	93	742	835	0	0	0	0	0	0	444	1,523	1,967
> 1000 ft.															
Oil & Gas Wells	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
***TOTAL RESTRICTED**	354	781	1,135	93	743	836	0	0	0	0	0	0	447	1,524	1,971
AVAILABLE COAL															
0-200 ft.	1,114	671	1,785	1,845	561	2,406	51	0	51	0	0	0	3,010	1,232	4,242
200-1000 ft.	527	375	902	1,018	194	1,212	268	0	268	0	0	0	1,813	569	2,382
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,641	1,046	2,687	2,863	755	3,618	319	0	319	0	0	0	4,823	1,801	6,624

* Values have overlap removed. --- Does not apply. + Includes strip mining with greater than 200 ft. overburden.

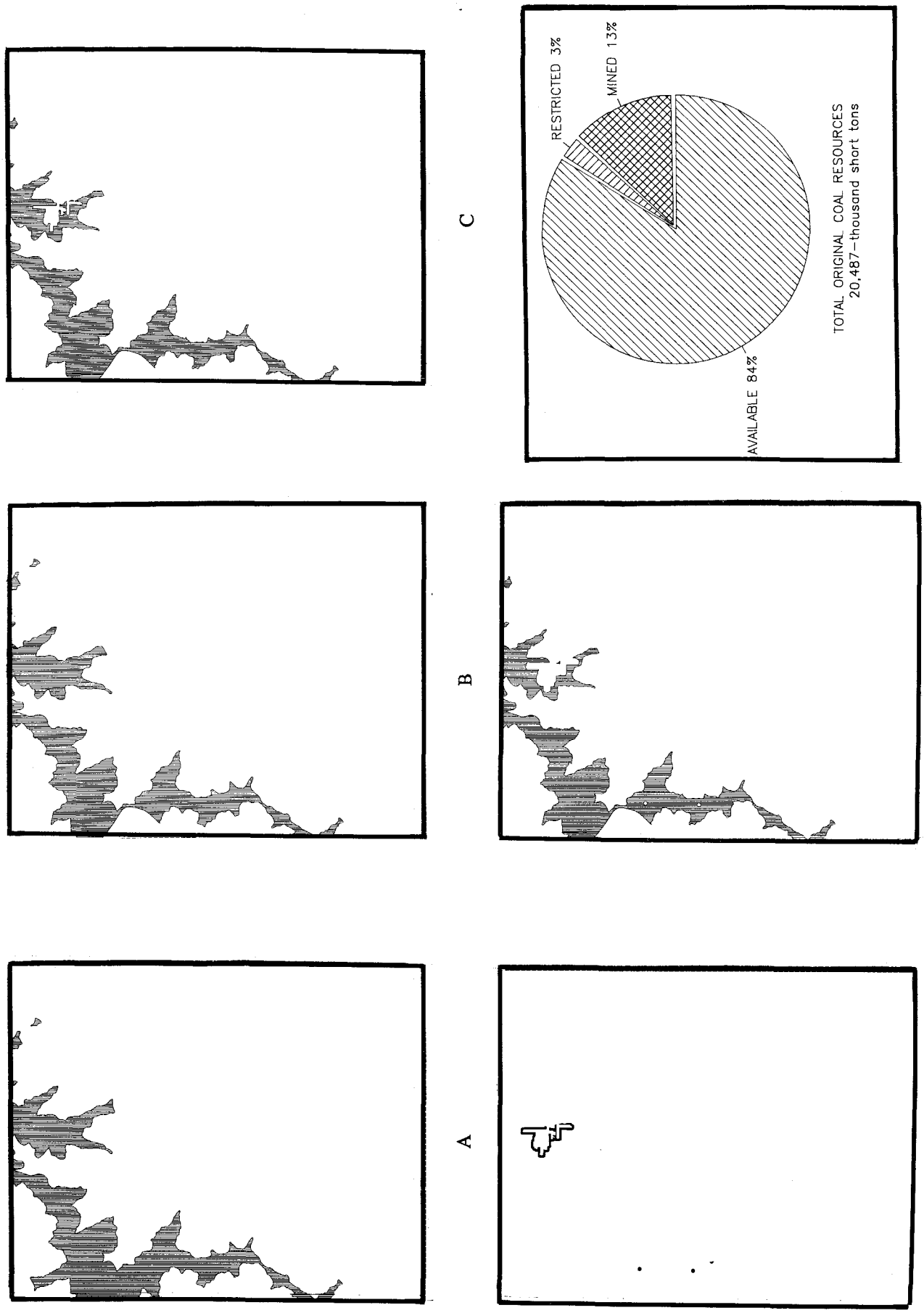


Figure 17. Coal availability study for the High Splint coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 6. Calculated coal resources for the High Splint coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	446	5,755	6,201	861	3,715	4,576	65	32	97	0	0	0	1,372	9,502	10,874
200-1000 ft.	1,664	4,449	6,113	1,907	1,571	3,478	22	0	22	0	0	0	3,593	6,020	9,613
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	2,110	10,204	12,314	2,768	5,286	8,054	87	32	119	0	0	0	4,965	15,522	20,487
MINED COAL															
STRIP MINED	29	959	988	19	688	707	19	29	48	0	0	0	67	1,676	1,743
DEEP MINED															
0-200 ft.	0	19	19	0	93	93	0	0	0	0	0	0	0	112	112
200-1000 ft.	58	594	652	0	223	223	0	0	0	0	0	0	58	817	875
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	58	613	671	0	316	316	0	0	0	0	0	0	58	929	987
TOTAL MINED	87	1,572	1,659	19	1,004	1,023	19	29	48	0	0	0	125	2,605	2,730
REMAINING COAL															
0-200 ft.	417	4,777	5,194	842	2,934	3,776	46	3	49	0	0	0	1,305	7,714	9,019
200-1000 ft.	1,606	3,855	5,461	1,907	1,348	3,255	22	0	22	0	0	0	3,535	5,203	8,738
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	2,023	8,632	10,655	2,749	4,282	7,031	68	3	71	0	0	0	4,840	12,917	17,757
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	---	16	16	---	0	0	---	0	0	---	0	0	---	16	16
Mine Buffers	4	27	31	0	85	85	0	0	0	0	0	0	4	112	116
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	4	42	46	0	85	85	0	0	0	0	0	0	4	127	131
200-1000 ft.															
Oil & Gas Wells	2	31	33	2	0	2	0	0	0	0	0	0	4	31	35
Mine Buffers	41	281	322	0	107	107	0	0	0	0	0	0	41	388	429
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	43	312	355	2	107	109	0	0	0	0	0	0	45	419	464
> 1000 ft.															
Oil & Gas Wells	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
***TOTAL RESTRICTED**	47	354	401	2	192	194	0	0	0	0	0	0	49	546	595
AVAILABLE COAL															
0-200 ft.	413	4,735	5,148	842	2,849	3,691	46	3	49	0	0	0	1,301	7,587	8,888
200-1000 ft.	1,563	3,543	5,106	1,905	1,241	3,146	22	0	22	0	0	0	3,490	4,784	8,274
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,976	8,278	10,254	2,747	4,090	6,837	68	3	71	0	0	0	4,791	12,371	17,162

* Values have overlap removed. --- Does not apply.

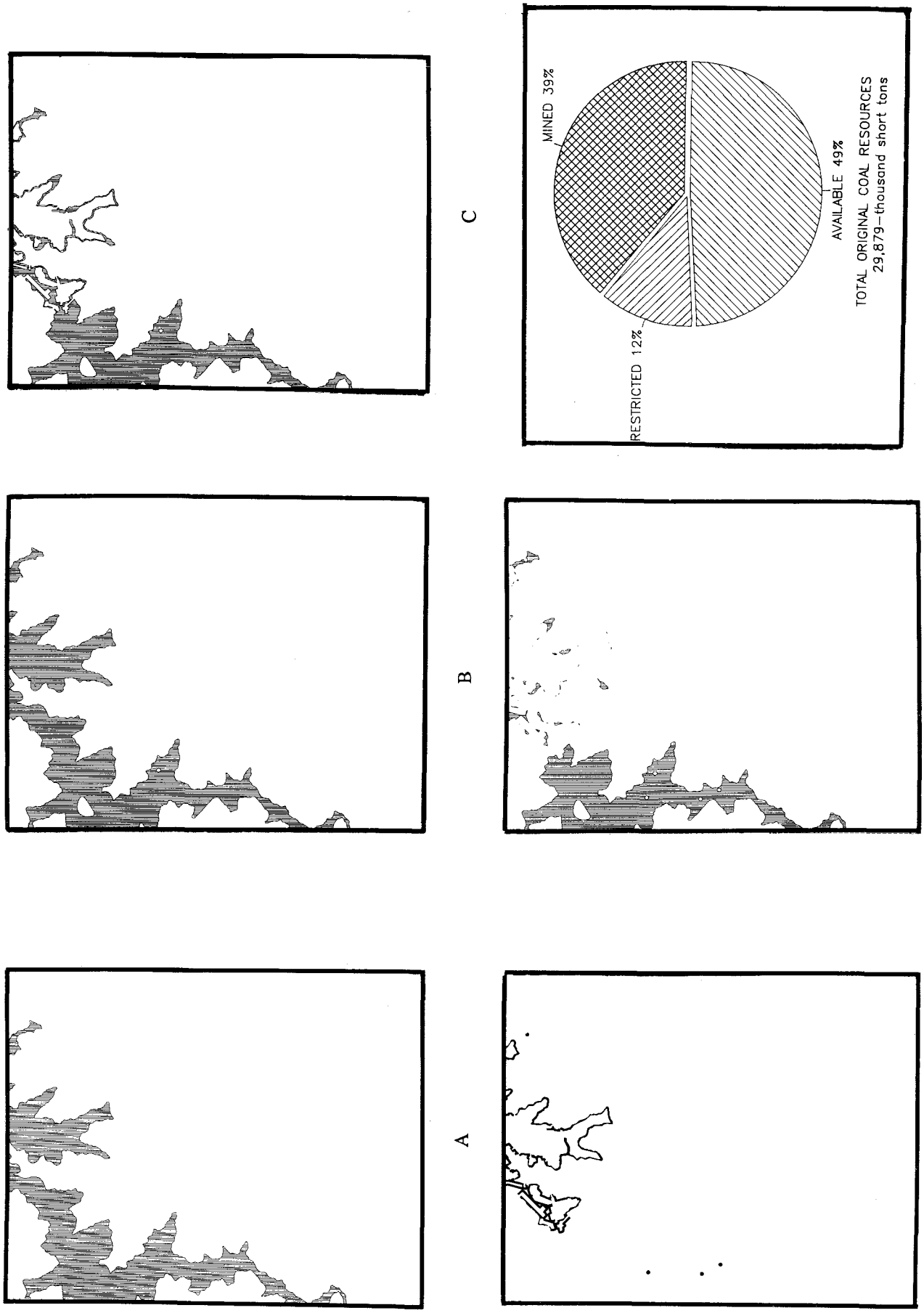


Figure 18. Coal availability study for the Morris coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 7. Calculated coal resources for the Morris coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	377	7,752	8,129	525	3,141	3,666	0	742	742	0	0	0	902	11,635	12,537
200-1000 ft.	1,049	9,369	10,418	1,166	5,546	6,712	1	211	212	0	0	0	2,216	15,126	17,342
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,426	17,121	18,547	1,691	8,687	10,378	1	953	954	0	0	0	3,118	26,761	29,879
MINED COAL															
STRIP MINED	0	525	525	25	157	182	0	0	0	0	0	0	25	682	707
DEEP MINED															
0-200 ft.	0	2,123	2,123	0	920	920	0	94	94	0	0	0	0	3,137	3,137
200-1000 ft.	0	5,187	5,187	0	2,508	2,508	0	87	87	0	0	0	0	7,782	7,782
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	0	7,310	7,310	0	3,428	3,428	0	181	181	0	0	0	0	10,919	10,919
TOTAL MINED	0	7,835	7,835	25	3,585	3,610	0	181	181	0	0	0	25	11,601	11,626
REMAINING COAL															
0-200 ft.	377	5,104	5,481	500	2,064	2,564	0	648	648	0	0	0	877	7,816	8,693
200-1000 ft.	1,049	4,182	5,231	1,166	3,038	4,204	1	124	125	0	0	0	2,216	7,344	9,560
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,426	9,286	10,712	1,666	5,102	6,768	1	772	773	0	0	0	3,093	15,160	18,253
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	0	23	23	7	9	16	0	39	39	0	0	0	7	71	78
Mine Buffers	0	1,658	1,658	0	737	737	0	106	106	0	0	0	0	2,501	2,501
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	0	1,662	1,662	7	742	749	0	132	132	0	0	0	7	2,536	2,543
200-1000 ft.															
Oil & Gas Wells	8	12	20	2	3	5	0	0	0	0	0	0	10	15	25
Mine Buffers	---	760	760	---	397	397	---	0	0	---	0	0	---	1,157	1,157
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	8	772	780	2	399	401	0	0	0	0	0	0	10	1,171	1,181
> 1000 ft.															
Oil & Gas Wells	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
***TOTAL RESTRICTED**	8	2,434	2,442	9	1,141	1,150	0	132	132	0	0	0	17	3,707	3,724
AVAILABLE COAL															
0-200 ft.	377	3,442	3,819	493	1,322	1,815	0	516	516	0	0	0	870	5,280	6,150
200-1000 ft.	1,041	3,410	4,451	1,164	2,639	3,803	1	124	125	0	0	0	2,206	6,173	8,379
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,418	6,852	8,270	1,657	3,961	5,618	1	640	641	0	0	0	3,076	11,453	14,529

* Values have overlap removed. --- Does not apply.

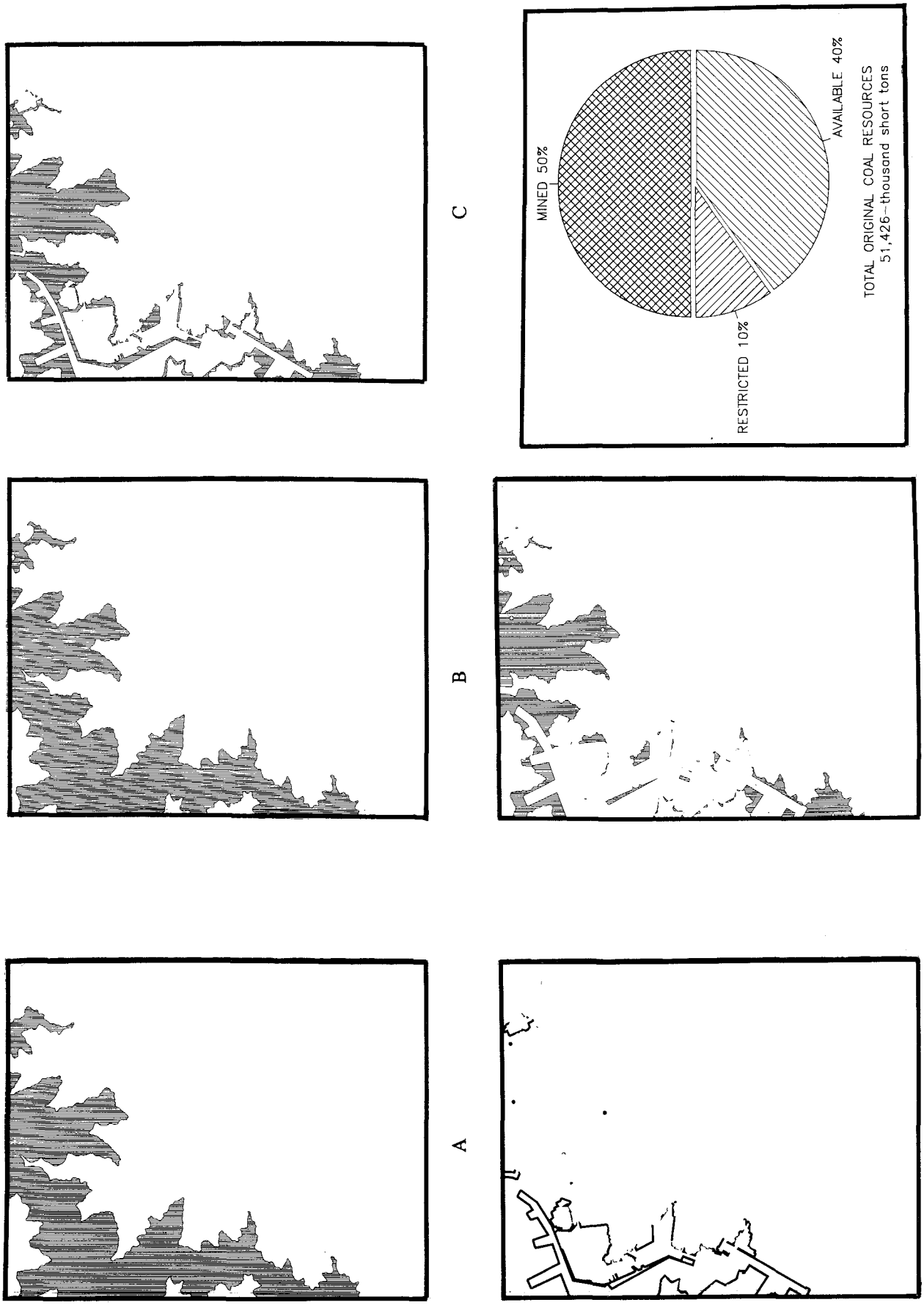


Figure 19. Coal availability study for the Pardee coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 8. Calculated coal resources for the Pardee coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	221	6,596	6,817	101	5,664	5,765	0	1,150	1,150	0	0	0	322	13,410	13,732
200-1000 ft.	1,254	13,436	14,690	800	20,853	21,653	0	1,351	1,351	0	0	0	2,054	35,640	37,694
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,475	20,032	21,507	901	26,517	27,418	0	2,501	2,501	0	0	0	2,376	49,050	51,426
MINED COAL															
STRIP MINED	6	1,819	1,825	7	1,262	1,269	0	97	97	0	0	0	13	3,178	3,191
DEEP MINED +															
0-200 ft.	32	1,116	1,148	15	1,258	1,273	0	523	523	0	0	0	47	2,897	2,944
200-1000 ft.	124	6,076	6,200	98	12,288	12,386	0	1,235	1,235	0	0	0	222	19,599	19,821
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	156	7,192	7,348	113	13,546	13,659	0	1,758	1,758	0	0	0	269	22,496	22,765
TOTAL MINED	162	9,011	9,173	120	14,808	14,928	0	1,855	1,855	0	0	0	282	25,674	25,956
REMAINING COAL															
0-200 ft.	183	3,661	3,844	79	3,144	3,223	0	530	530	0	0	0	262	7,335	7,597
200-1000 ft.	1,130	7,360	8,490	702	8,565	9,267	0	116	116	0	0	0	1,832	16,041	17,873
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,313	11,021	12,334	781	11,709	12,490	0	646	646	0	0	0	2,094	23,376	25,470
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	0	38	38	0	21	21	0	0	0	0	0	0	0	59	59
Mine Buffers	30	623	653	24	397	421	0	313	313	0	0	0	54	1,333	1,387
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	30	649	679	24	418	442	0	313	313	0	0	0	54	1,380	1,434
200-1000 ft.															
Oil & Gas Wells	3	54	57	2	0	2	0	0	0	0	0	0	5	54	59
Mine Buffers	50	1,238	1,288	17	2,288	2,305	0	66	66	0	0	0	67	3,592	3,659
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	52	1,284	1,336	17	2,288	2,305	0	66	66	0	0	0	69	3,638	3,707
> 1000 ft.															
Oil & Gas Wells	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
***TOTAL RESTRICTED**	82	1,933	2,015	41	2,706	2,747	0	379	379	0	0	0	123	5,018	5,141
AVAILABLE COAL															
0-200 ft.	153	3,012	3,165	55	2,726	2,781	0	217	217	0	0	0	208	5,955	6,163
200-1000 ft.	1,078	6,076	7,154	685	6,277	6,962	0	50	50	0	0	0	1,763	12,403	14,166
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL	1,231	9,088	10,319	740	9,003	9,743	0	267	267	0	0	0	1,971	18,358	20,329

* Values have overlap removed. --- Does not apply. + Auger values included.

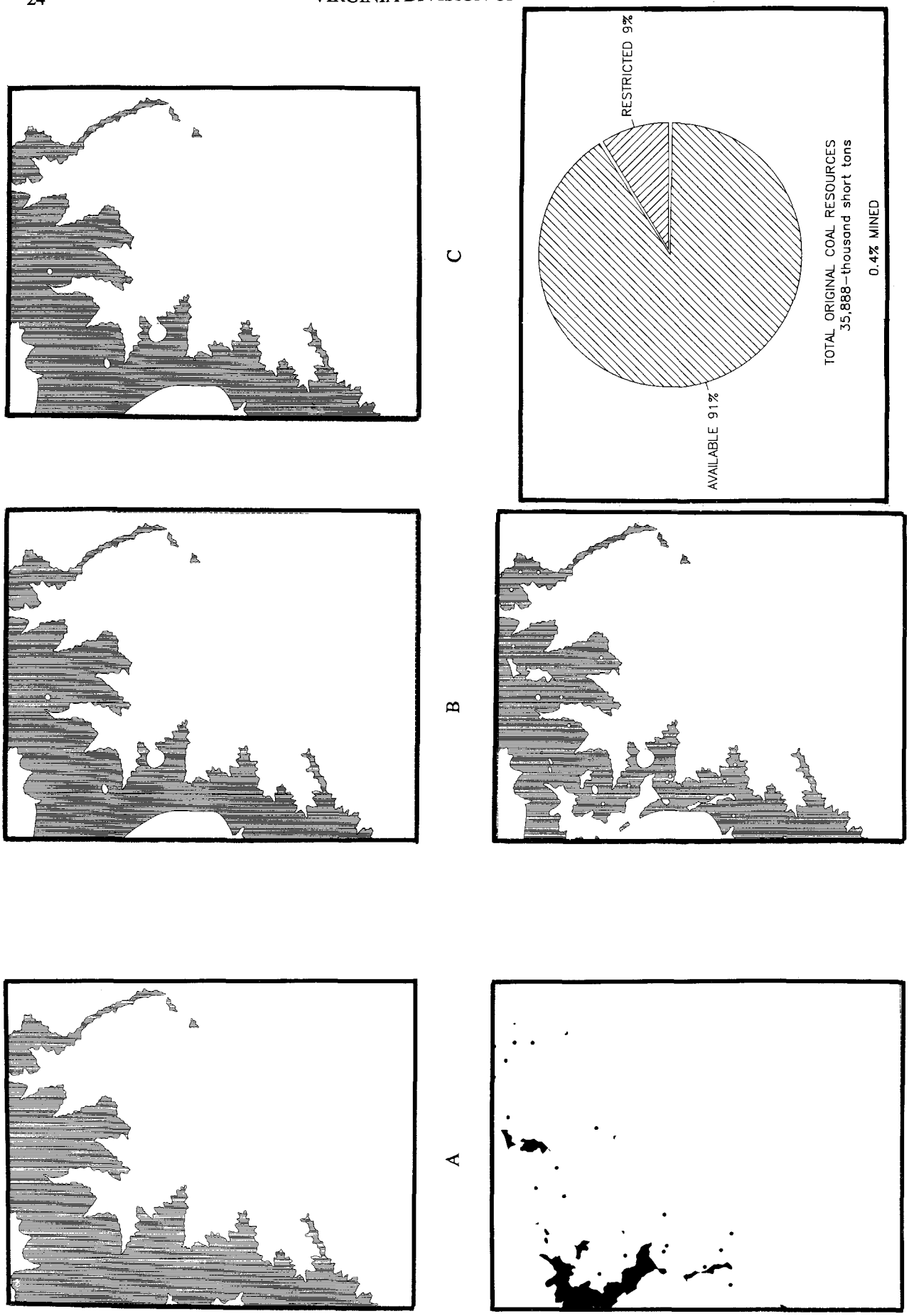


Figure 20. Coal availability study for the Phillips coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 9. Calculated coal resources for the Phillips coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	1,280	872	2,152	3,139	1,581	4,720	1,260	721	1,981	0	0	0	5,679	3,174	8,853
200-1000 ft.	3,740	3,634	7,374	8,928	5,894	14,822	949	310	1,259	0	0	0	13,617	9,838	23,455
> 1000 ft.	359	210	569	2,047	473	2,520	491	0	491	0	0	0	2,897	683	3,580
TOTAL	5,379	4,716	10,095	14,114	7,948	22,062	2,700	1,031	3,731	0	0	0	22,193	13,695	35,888
MINED COAL															
STRIP MINED	0	20	20	0	114	114	0	0	0	0	0	0	0	134	134
DEEP MINED															
0-200 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL MINED	0	20	20	0	114	114	0	0	0	0	0	0	0	134	134
REMAINING COAL															
0-200 ft.	1,280	852	2,132	3,139	1,467	4,606	1,260	721	1,981	0	0	0	5,679	3,040	8,719
200-1000 ft.	3,740	3,634	7,374	8,928	5,894	14,822	949	310	1,259	0	0	0	13,617	9,838	23,455
> 1000 ft.	359	210	569	2,047	473	2,520	491	0	491	0	0	0	2,897	683	3,580
TOTAL	5,379	4,696	10,075	14,114	7,834	21,948	2,700	1,031	3,731	0	0	0	22,193	13,561	35,754
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	19	0	19	11	10	21	4	7	11	0	0	0	34	17	51
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	19	0	19	11	10	21	4	7	11	0	0	0	34	17	51
200-1000 ft.															
Oil & Gas Wells	14	16	30	63	58	121	8	0	8	0	0	0	85	74	159
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	14	16	30	63	58	121	8	0	8	0	0	0	85	74	159
> 1000 ft.															
Oil & Gas Wells	0	---	0	12	---	12	0	---	0	0	---	0	12	---	12
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	359	---	359	2,047	---	2,047	491	---	491	0	---	0	2,897	---	2,897
*TOTAL	359	---	359	2,047	---	2,047	491	---	491	0	---	0	2,897	---	2,897
***TOTAL RESTRICTED**	392	16	408	2,121	68	2,189	503	7	510	0	0	0	3,016	91	3,107
AVAILABLE COAL															
0-200 ft.	1,261	852	2,113	3,128	1,457	4,585	1,256	714	1,970	0	0	0	5,645	3,023	8,668
200-1000 ft.	3,726	3,618	7,344	8,865	5,836	14,701	941	310	1,251	0	0	0	13,532	9,764	23,296
> 1000 ft.	0	210	210	0	473	473	0	0	0	0	0	0	0	683	683
TOTAL	4,987	4,680	9,667	11,993	7,766	19,759	2,197	1,024	3,221	0	0	0	19,177	13,470	32,647

* Values have overlap removed. --- Does not apply.

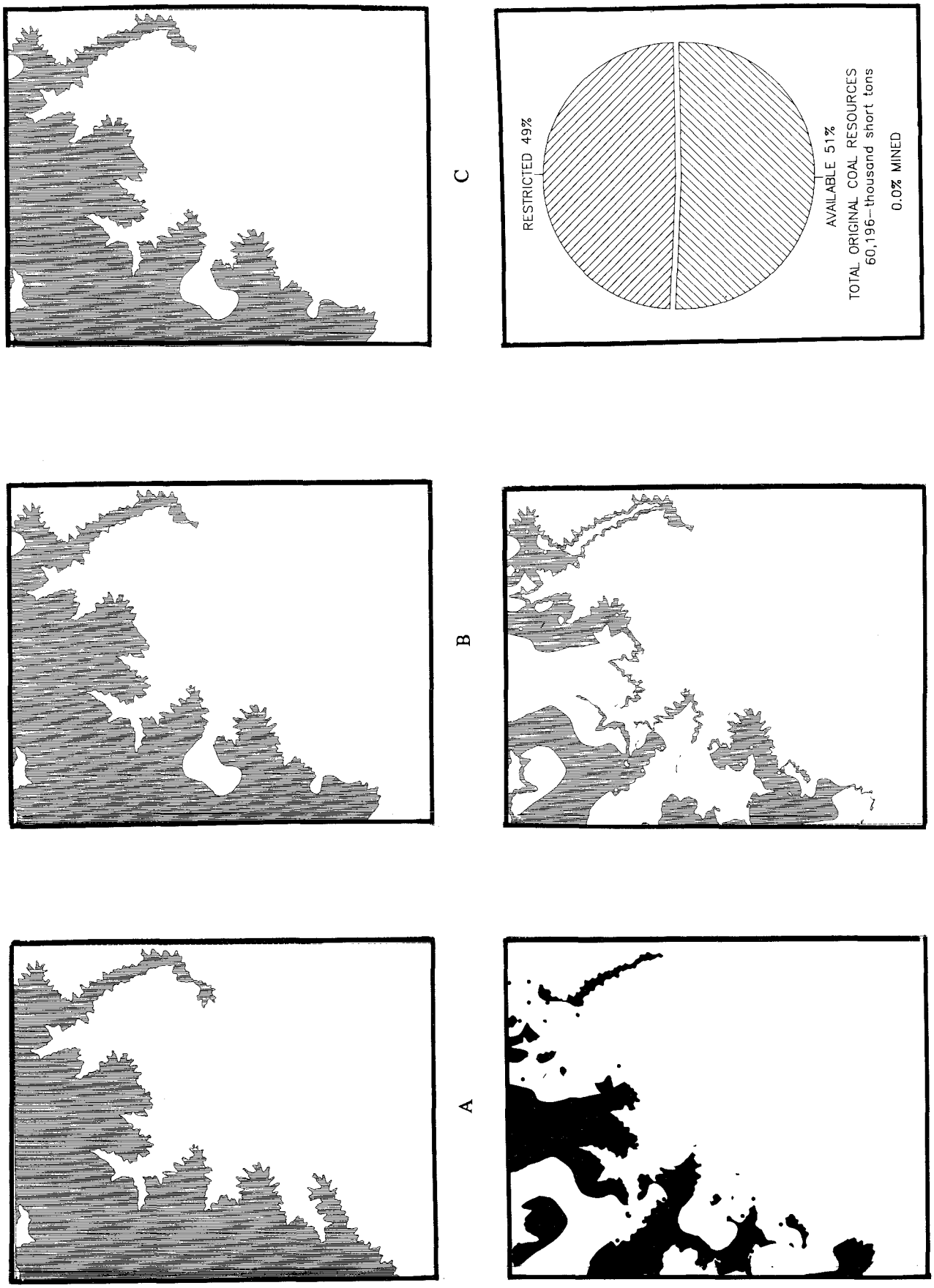


Figure 21. Coal availability study for the Low Splint D coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 10. Calculated coal resources for the Low Splint D coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	579	592	1,171	981	2,142	3,123	1,234	678	1,912	0	0	0	2,794	3,412	6,206
200-1000 ft.	3,954	5,385	9,339	4,400	11,792	16,192	2,674	2,880	5,554	0	0	0	11,028	20,057	31,085
> 1000 ft.	205	4,670	4,875	3,133	12,094	15,227	1,743	1,060	2,803	0	0	0	5,081	17,824	22,905
TOTAL	4,738	10,647	15,385	8,514	26,028	34,542	5,651	4,618	10,269	0	0	0	18,903	41,293	60,196
MINED COAL															
STRIP MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP MINED															
0-200 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
REMAINING COAL															
0-200 ft.	579	592	1,171	981	2,142	3,123	1,234	678	1,912	0	0	0	2,794	3,412	6,206
200-1000 ft.	3,954	5,385	9,339	4,400	11,792	16,192	2,674	2,880	5,554	0	0	0	11,028	20,057	31,085
> 1000 ft.	205	4,670	4,875	3,133	12,094	15,227	1,743	1,060	2,803	0	0	0	5,081	17,824	22,905
TOTAL	4,738	10,647	15,385	8,514	26,028	34,542	5,651	4,618	10,269	0	0	0	18,903	41,293	60,196
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	6	17	23	10	22	32	4	0	4	0	0	0	20	39	59
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	6	17	23	10	22	32	4	0	4	0	0	0	20	39	59
200-1000 ft.															
Oil & Gas Wells	62	24	86	90	55	145	10	1	11	0	0	0	162	80	242
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	1,141	2,944	4,085	1,762	8,229	9,991	1,134	1,238	2,372	0	0	0	4,037	12,411	16,448
Mining < 40 ft.	189	509	698	1	614	615	0	0	0	0	0	0	190	1,123	1,313
*TOTAL	1,181	2,952	4,133	1,827	8,242	10,069	1,137	1,239	2,376	0	0	0	4,145	12,433	16,578
> 1000 ft.															
Oil & Gas Wells	0	0	0	17	2	19	0	0	0	0	0	0	17	2	19
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	31	1,449	1,480	507	5,662	6,169	90	788	878	0	0	0	628	7,899	8,527
Mining < 40 ft.	0	184	184	0	176	176	0	0	0	0	0	0	0	360	360
Less Than 28 in. thk.	205	---	205	3,133	---	3,133	1,743	---	1,743	0	---	0	5,081	---	5,081
*TOTAL	205	1,450	1,655	3,133	5,665	8,798	1,743	788	2,531	0	0	0	5,081	7,903	12,984
***TOTAL RESTRICTED**	1,392	4,419	5,811	4,970	13,929	18,899	2,884	2,027	4,911	0	0	0	9,246	20,375	29,621
AVAILABLE COAL															
0-200 ft.	573	575	1,148	971	2,120	3,091	1,230	678	1,908	0	0	0	2,774	3,373	6,147
200-1000 ft.	2,773	2,433	5,206	2,573	3,550	6,123	1,537	1,641	3,178	0	0	0	6,883	7,624	14,507
> 1000 ft.	0	3,220	3,220	0	6,429	6,429	0	272	272	0	0	0	0	9,921	9,921
TOTAL	3,346	6,228	9,574	3,544	12,099	15,643	2,767	2,591	5,358	0	0	0	9,657	20,918	30,575

* Values have overlap removed. --- Does not apply.

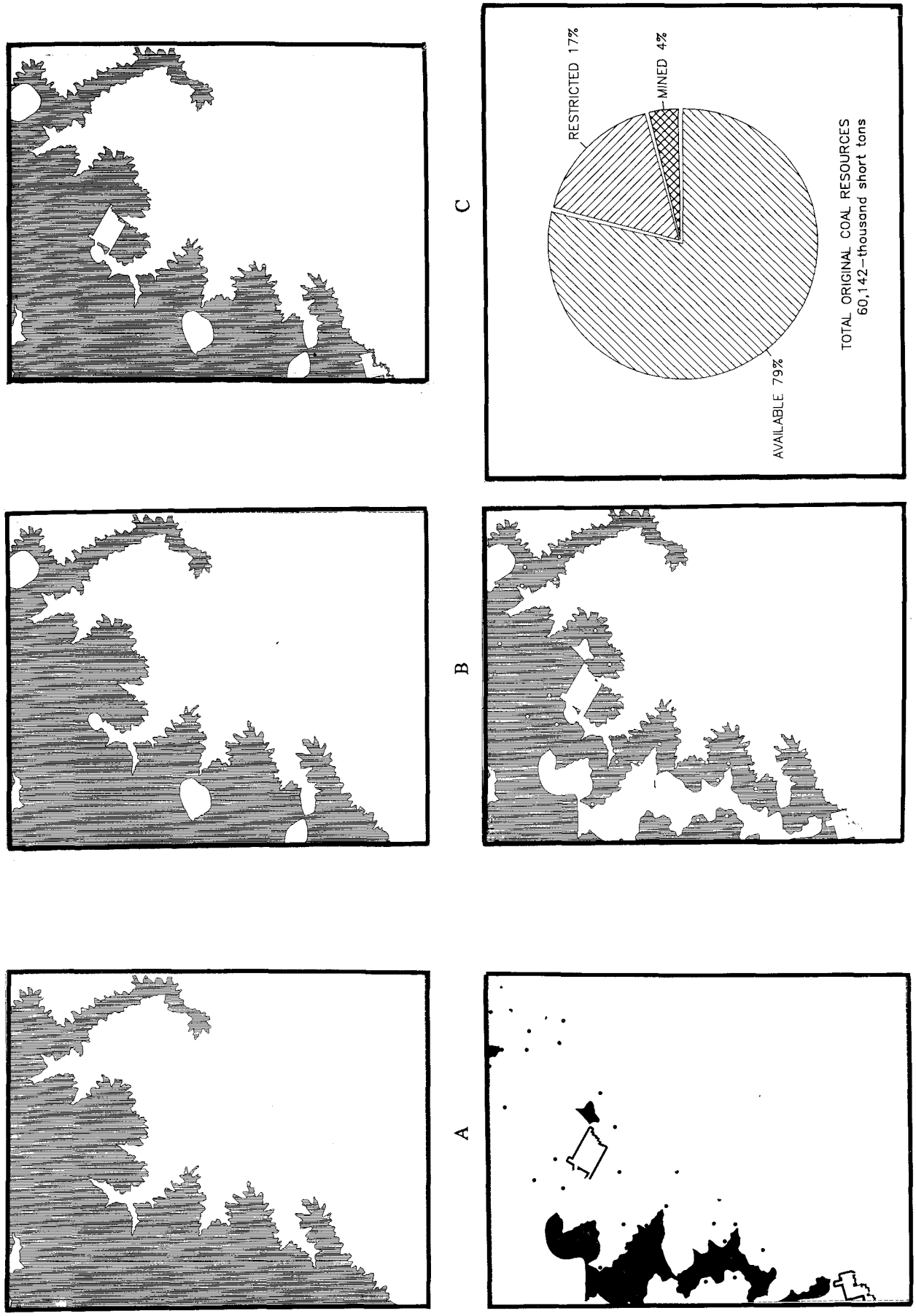


Figure 22. Coal availability study for the Low Splint coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 11. Calculated coal resources for the Low Splint coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	2,057	1,202	3,259	3,688	936	4,624	1,109	399	1,508	0	0	0	6,854	2,537	9,391
200-1000 ft.	6,026	5,791	11,817	6,484	6,080	12,564	1,645	2,695	4,340	0	0	0	14,155	14,566	28,721
> 1000 ft.	1,502	3,245	4,747	5,640	8,653	14,293	1,896	1,094	2,990	0	0	0	9,038	12,992	22,030
TOTAL	9,585	10,238	19,823	15,812	15,669	31,481	4,650	4,188	8,838	0	0	0	30,047	30,095	60,142
MINED COAL															
STRIP MINED	143	138	281	278	35	313	65	0	65	0	0	0	486	173	659
DEEP MINED +															
0-200 ft.	59	162	221	28	19	47	0	0	0	0	0	0	87	181	268
200-1000 ft.	207	651	858	361	221	582	0	0	0	0	0	0	568	872	1,440
> 1000 ft.	0	0	0	25	62	87	0	0	0	0	0	0	25	62	87
DEEP TOTAL	266	813	1,079	414	302	716	0	0	0	0	0	0	680	1,115	1,795
TOTAL MINED	409	951	1,360	692	337	1,029	65	0	65	0	0	0	1,166	1,288	2,454
REMAINING COAL															
0-200 ft.	1,855	902	2,757	3,382	882	4,264	1,044	399	1,443	0	0	0	6,281	2,183	8,464
200-1000 ft.	5,819	5,140	10,959	6,123	5,859	11,982	1,645	2,695	4,340	0	0	0	13,587	13,694	27,281
> 1000 ft.	1,502	3,245	4,747	5,615	8,591	14,206	1,896	1,094	2,990	0	0	0	9,013	12,930	21,943
TOTAL	9,176	9,287	18,463	15,120	15,332	30,452	4,585	4,188	8,773	0	0	0	28,881	28,807	57,688
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	13	10	23	23	0	23	9	0	9	0	0	0	45	10	55
Mine Buffers	42	59	101	22	0	22	0	0	0	0	0	0	64	59	123
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	54	69	123	44	0	44	9	0	9	0	0	0	107	69	176
200-1000 ft.															
Oil & Gas Wells	52	31	83	83	51	134	13	0	13	0	0	0	148	82	230
Mine Buffers	71	161	232	80	162	242	0	0	0	0	0	0	151	323	474
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	123	192	315	163	213	376	13	0	13	0	0	0	299	405	704
> 1000 ft.															
Oil & Gas Wells	2	0	2	37	10	47	0	0	0	0	0	0	39	10	49
Mine Buffers	---	0	0	---	27	27	---	0	0	---	0	0	---	27	27
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	1,502	---	1,502	5,615	---	5,615	1,896	---	1,896	0	---	0	9,013	---	9,013
*TOTAL	1,502	0	1,502	5,615	38	5,653	1,896	0	1,896	0	0	0	9,013	38	9,051
***TOTAL RESTRICTED**	1,679	261	1,940	5,822	251	6,073	1,918	0	1,918	0	0	0	9,419	512	9,931
AVAILABLE COAL															
0-200 ft.	1,801	833	2,634	3,338	882	4,220	1,035	399	1,434	0	0	0	6,174	2,114	8,288
200-1000 ft.	5,696	4,948	10,644	5,960	5,646	11,606	1,632	2,695	4,327	0	0	0	13,288	13,289	26,577
> 1000 ft.	0	3,245	3,245	0	8,553	8,553	0	1,094	1,094	0	0	0	0	12,892	12,892
TOTAL	7,497	9,026	16,523	9,298	15,081	24,379	2,667	4,188	6,855	0	0	0	19,462	28,295	47,757

* Values have overlap removed. --- Does not apply. + Auger values included.

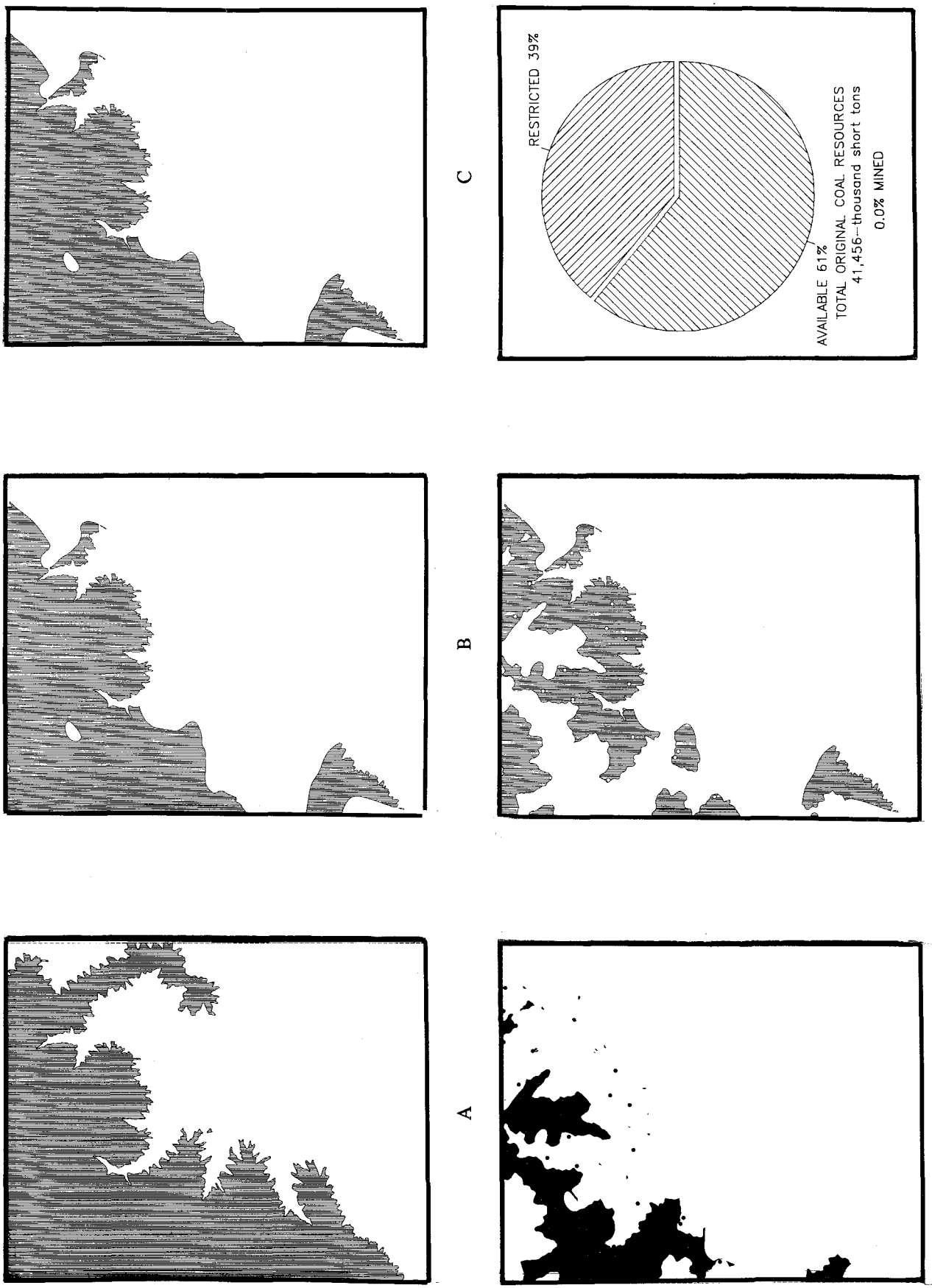


Figure 23. Coal availability study for the Ravenrock coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 12. Calculated coal resources for the Ravenrock coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	723	190	913	1,783	370	2,153	1,251	75	1,326	0	0	0	3,757	635	4,392
200-1000 ft.	4,201	1,631	5,832	6,955	1,553	8,508	4,022	1,060	5,082	0	0	0	15,178	4,244	19,422
> 1000 ft.	3,455	387	3,842	9,828	1,104	10,932	2,795	73	2,868	0	0	0	16,078	1,564	17,642
TOTAL	8,379	2,208	10,587	18,566	3,027	21,593	8,068	1,208	9,276	0	0	0	35,013	6,443	41,456
MINED COAL															
STRIP MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP MINED															
0-200 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
REMAINING COAL															
0-200 ft.	723	190	913	1,783	370	2,153	1,251	75	1,326	0	0	0	3,757	635	4,392
200-1000 ft.	4,201	1,631	5,832	6,955	1,553	8,508	4,022	1,060	5,082	0	0	0	15,178	4,244	19,422
> 1000 ft.	3,455	387	3,842	9,828	1,104	10,932	2,795	73	2,868	0	0	0	16,078	1,564	17,642
TOTAL	8,379	2,208	10,587	18,566	3,027	21,593	8,068	1,208	9,276	0	0	0	35,013	6,443	41,456
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	13	0	13	13	1	14	9	0	9	0	0	0	35	1	36
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	13	0	13	13	1	14	9	0	9	0	0	0	35	1	36
200-1000 ft.															
Oil & Gas Wells	33	0	33	82	14	96	20	6	26	0	0	0	135	20	155
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	33	0	33	82	14	96	20	6	26	0	0	0	135	20	155
> 1000 ft.															
Oil & Gas Wells	4	0	4	25	26	51	0	0	0	0	0	0	29	26	55
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	3,455	---	3,455	9,828	---	9,828	2,795	---	2,795	0	---	0	16,078	---	16,078
*TOTAL	3,455	0	3,455	9,828	26	9,854	2,795	0	2,795	0	0	0	16,078	26	16,104
***TOTAL RESTRICTED**	3,501	0	3,501	9,923	41	9,964	2,824	6	2,830	0	0	0	16,248	47	16,295
AVAILABLE COAL															
0-200 ft.	710	190	900	1,770	369	2,139	1,242	75	1,317	0	0	0	3,722	634	4,356
200-1000 ft.	4,168	1,631	5,799	6,873	1,539	8,412	4,002	1,054	5,056	0	0	0	15,043	4,224	19,267
> 1000 ft.	0	387	387	0	1,078	1,078	0	73	73	0	0	0	0	1,538	1,538
TOTAL	4,878	2,208	7,086	8,643	2,986	11,629	5,244	1,202	6,446	0	0	0	18,765	6,396	25,161

* Values have overlap removed. --- Does not apply.

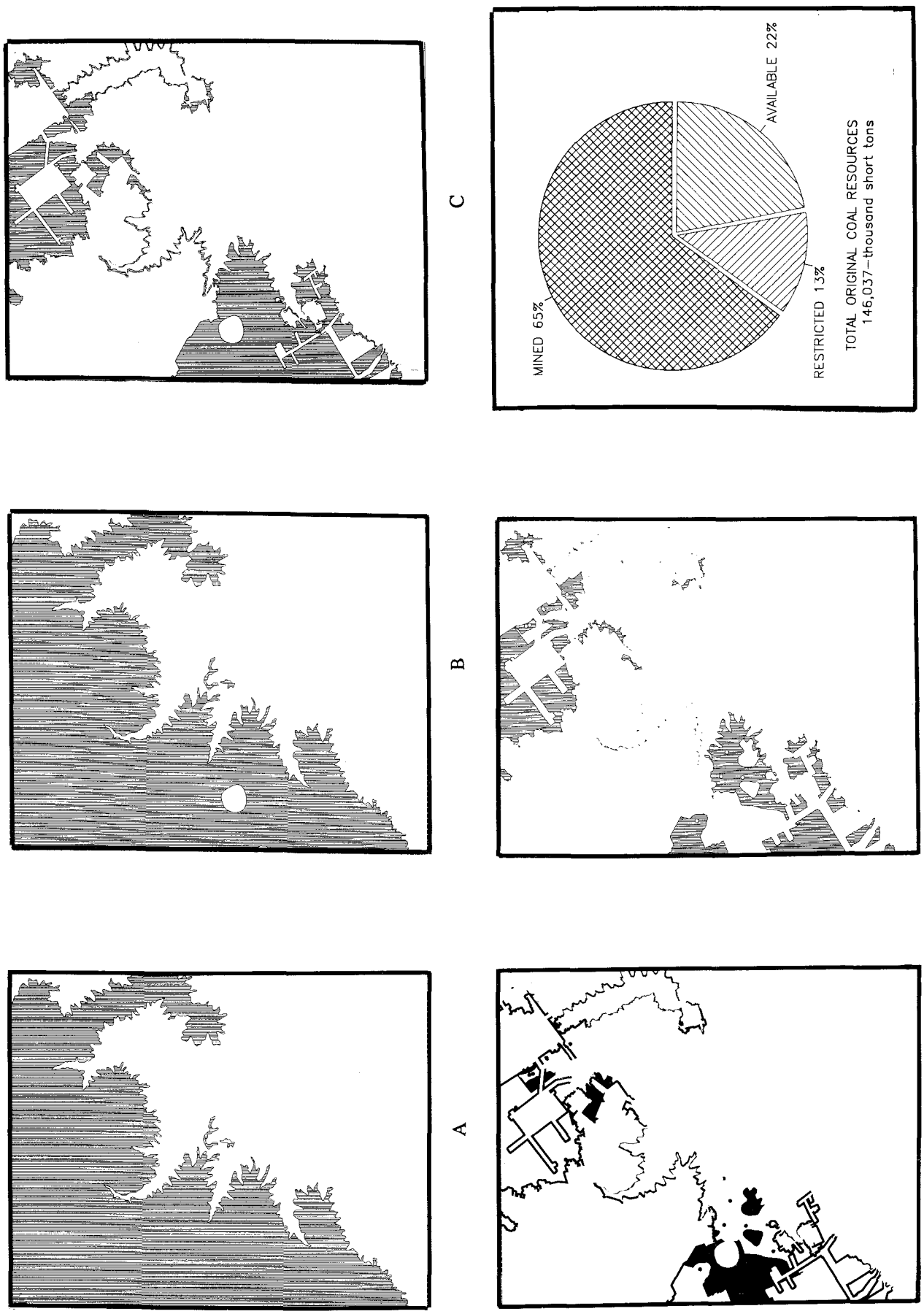


Figure 24. Coal availability study for the Taggart coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 13. Calculated coal resources for the Taggart coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	547	12,306	12,853	500	8,873	9,373	0	1,179	1,179	0	0	0	1,047	22,358	23,405
200-1000 ft.	339	35,166	35,505	160	28,821	28,981	20	5,017	5,037	0	0	0	519	69,004	69,523
> 1000 ft.	77	18,398	18,475	483	29,508	29,991	12	4,631	4,643	0	0	0	572	52,537	53,109
TOTAL	963	65,870	66,833	1,143	67,202	68,345	32	10,827	10,859	0	0	0	2,138	143,899	146,037
MINED COAL															
STRIP MINED	111	3,336	3,447	217	3,053	3,270	0	349	349	0	0	0	328	6,738	7,066
DEEP MINED +															
0-200 ft.	130	4,036	4,166	41	3,445	3,486	0	762	762	0	0	0	171	8,243	8,414
200-1000 ft.	79	20,460	20,539	73	21,541	21,614	0	2,508	2,508	0	0	0	152	44,509	44,661
> 1000 ft.	35	9,684	9,719	0	20,097	20,097	0	4,211	4,211	0	0	0	35	33,992	34,027
DEEP TOTAL	244	34,180	34,424	114	45,083	45,197	0	7,481	7,481	0	0	0	358	86,744	87,102
TOTAL MINED	355	37,516	37,871	331	48,136	48,467	0	7,830	7,830	0	0	0	686	93,482	94,168
REMAINING COAL															
0-200 ft.	306	4,934	5,240	242	2,375	2,617	0	68	68	0	0	0	548	7,377	7,925
200-1000 ft.	260	14,706	14,966	87	7,280	7,367	20	2,509	2,529	0	0	0	367	24,495	24,862
> 1000 ft.	42	8,714	8,756	483	9,411	9,894	12	420	432	0	0	0	537	18,545	19,082
TOTAL	608	28,354	28,962	812	19,066	19,878	32	2,997	3,029	0	0	0	1,452	50,417	51,869
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	9	84	93	3	35	38	0	2	2	0	0	0	12	121	133
Mine Buffers	67	2,131	2,198	25	998	1,023	0	67	67	0	0	0	92	3,196	3,288
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	75	2,215	2,290	26	1,008	1,034	0	67	67	0	0	0	101	3,290	3,391
200-1000 ft.															
Oil & Gas Wells	2	79	81	0	74	74	0	20	20	0	0	0	2	173	175
Mine Buffers	36	3,807	3,843	3	1,264	1,267	0	176	176	0	0	0	39	5,247	5,286
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	154	1,865	2,019	57	2,012	2,069	20	1,239	1,259	0	0	0	231	5,116	5,347
*TOTAL	166	5,082	5,248	57	2,886	2,943	20	1,414	1,434	0	0	0	243	9,382	9,625
> 1000 ft.															
Oil & Gas Wells	0	16	16	2	34	36	0	0	0	0	0	0	2	50	52
Mine Buffers	18	1,581	1,599	0	1,306	1,306	0	0	0	0	0	0	18	2,887	2,905
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	0	556	556	422	2,608	3,030	12	319	331	0	0	0	434	3,483	3,917
Less Than 28 in. thk.	42	---	42	483	---	483	12	---	12	0	---	0	537	---	537
*TOTAL	42	1,892	1,934	483	3,590	4,073	12	319	331	0	0	0	537	5,801	6,338
***TOTAL RESTRICTED**	283	9,189	9,472	566	7,484	8,050	32	1,800	1,832	0	0	0	881	18,473	19,354
AVAILABLE COAL															
0-200 ft.	231	2,719	2,950	216	1,367	1,583	0	1	1	0	0	0	447	4,087	4,534
200-1000 ft.	94	9,624	9,718	30	4,394	4,424	0	1,095	1,095	0	0	0	124	15,113	15,237
> 1000 ft.	0	6,822	6,822	0	5,821	5,821	0	101	101	0	0	0	0	12,744	12,744
TOTAL	325	19,165	19,490	246	11,582	11,828	0	1,197	1,197	0	0	0	571	31,944	32,515

* Values have overlap removed. --- Does not apply. + Auger values included.

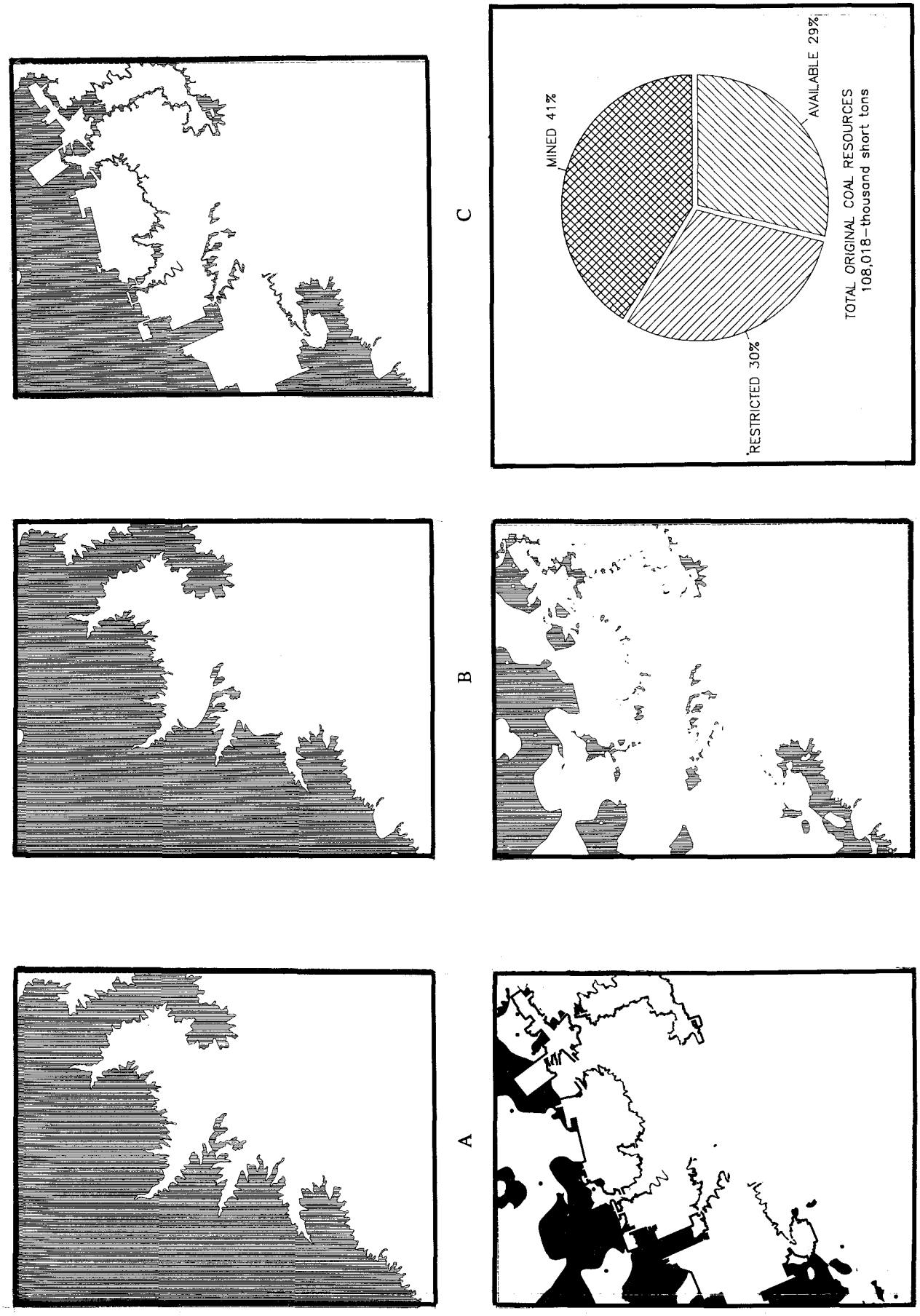


Figure 25. Coal availability study for the Taggart Marker coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 14. Calculated coal resources for the Taggart Marker coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	442	6,590	7,032	627	9,023	9,650	337	1,444	1,781	0	0	0	1,406	17,057	18,463
200-1000 ft.	1,388	19,939	21,327	778	25,637	26,415	137	4,799	4,936	0	0	0	2,303	50,375	52,678
> 1000 ft.	765	9,160	9,925	2,134	20,494	22,628	294	4,030	4,324	0	0	0	3,193	33,684	36,877
TOTAL	2,595	35,689	38,284	3,539	55,154	58,693	768	10,273	11,041	0	0	0	6,902	101,116	108,018
MINED COAL															
STRIP MINED	72	863	935	88	1,993	2,081	156	441	597	0	0	0	316	3,297	3,613
DEEP MINED +															
0-200 ft.	76	2,637	2,713	121	3,700	3,821	0	670	670	0	0	0	197	7,007	7,204
200-1000 ft.	56	9,798	9,854	288	14,040	14,328	0	856	856	0	0	0	344	24,694	25,038
> 1000 ft.	0	2,052	2,052	0	5,846	5,846	0	252	252	0	0	0	0	8,150	8,150
DEEP TOTAL	132	14,487	14,619	409	23,586	23,995	0	1,778	1,778	0	0	0	541	39,851	40,392
TOTAL MINED	204	15,350	15,554	497	25,579	26,076	156	2,219	2,375	0	0	0	857	43,148	44,005
REMAINING COAL															
0-200 ft.	294	3,090	3,384	418	3,330	3,748	181	333	514	0	0	0	893	6,753	7,646
200-1000 ft.	1,332	10,141	11,473	490	11,597	12,087	137	3,943	4,080	0	0	0	1,959	25,681	27,640
> 1000 ft.	765	7,108	7,873	2,134	14,648	16,782	294	3,778	4,072	0	0	0	3,193	25,534	28,727
TOTAL	2,391	20,339	22,730	3,042	29,575	32,617	612	8,054	8,666	0	0	0	6,045	57,968	64,013
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	10	80	90	15	104	119	5	19	24	0	0	0	30	203	233
Mine Buffers	43	1,026	1,069	116	1,635	1,751	0	191	191	0	0	0	159	2,852	3,011
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	52	1,085	1,137	132	1,692	1,824	5	193	198	0	0	0	189	2,970	3,159
200-1000 ft.															
Oil & Gas Wells	---	68	68	---	194	194	---	0	0	---	0	0	---	262	262
Mine Buffers	8	1,547	1,555	2	1,352	1,354	0	54	54	0	0	0	10	2,953	2,963
Interburden < 40 ft.	662	5,566	6,228	141	5,862	6,003	0	597	597	0	0	0	803	12,025	12,828
Mining < 40 ft.	444	3,971	4,415	65	3,832	3,897	0	296	296	0	0	0	509	8,099	8,608
*TOTAL	666	6,054	6,720	143	6,716	6,859	0	614	614	0	0	0	809	13,384	14,193
> 1000 ft.															
Oil & Gas Wells	---	15	15	---	112	112	---	0	0	---	0	0	---	127	127
Mine Buffers	---	470	470	---	328	328	---	49	49	---	0	0	---	847	847
Interburden < 40 ft.	640	3,838	4,478	448	6,401	6,849	0	1,064	1,064	0	0	0	1,088	11,303	12,391
Mining < 40 ft.	221	2,715	2,936	348	5,421	5,769	0	975	975	0	0	0	569	9,111	9,680
Less Than 28 in. thk.	765	---	765	2,134	---	2,134	294	---	294	0	---	0	3,193	---	3,193
*TOTAL	765	3,896	4,661	2,134	6,578	8,712	294	1,097	1,391	0	0	0	3,193	11,571	14,764
***TOTAL RESTRICTED**	1,483	11,035	12,518	2,409	14,986	17,395	299	1,904	2,203	0	0	0	4,191	27,925	32,116
AVAILABLE COAL															
0-200 ft.	242	2,005	2,247	286	1,638	1,924	176	140	316	0	0	0	704	3,783	4,487
200-1000 ft.	666	4,087	4,753	347	4,881	5,228	137	3,329	3,466	0	0	0	1,150	12,297	13,447
> 1000 ft.	0	3,212	3,212	0	8,070	8,070	0	2,681	2,681	0	0	0	0	13,963	13,963
TOTAL	908	9,304	10,212	633	14,589	15,222	313	6,150	6,463	0	0	0	1,854	30,043	31,897

* Values have overlap removed. --- Does not apply. + Auger values included.

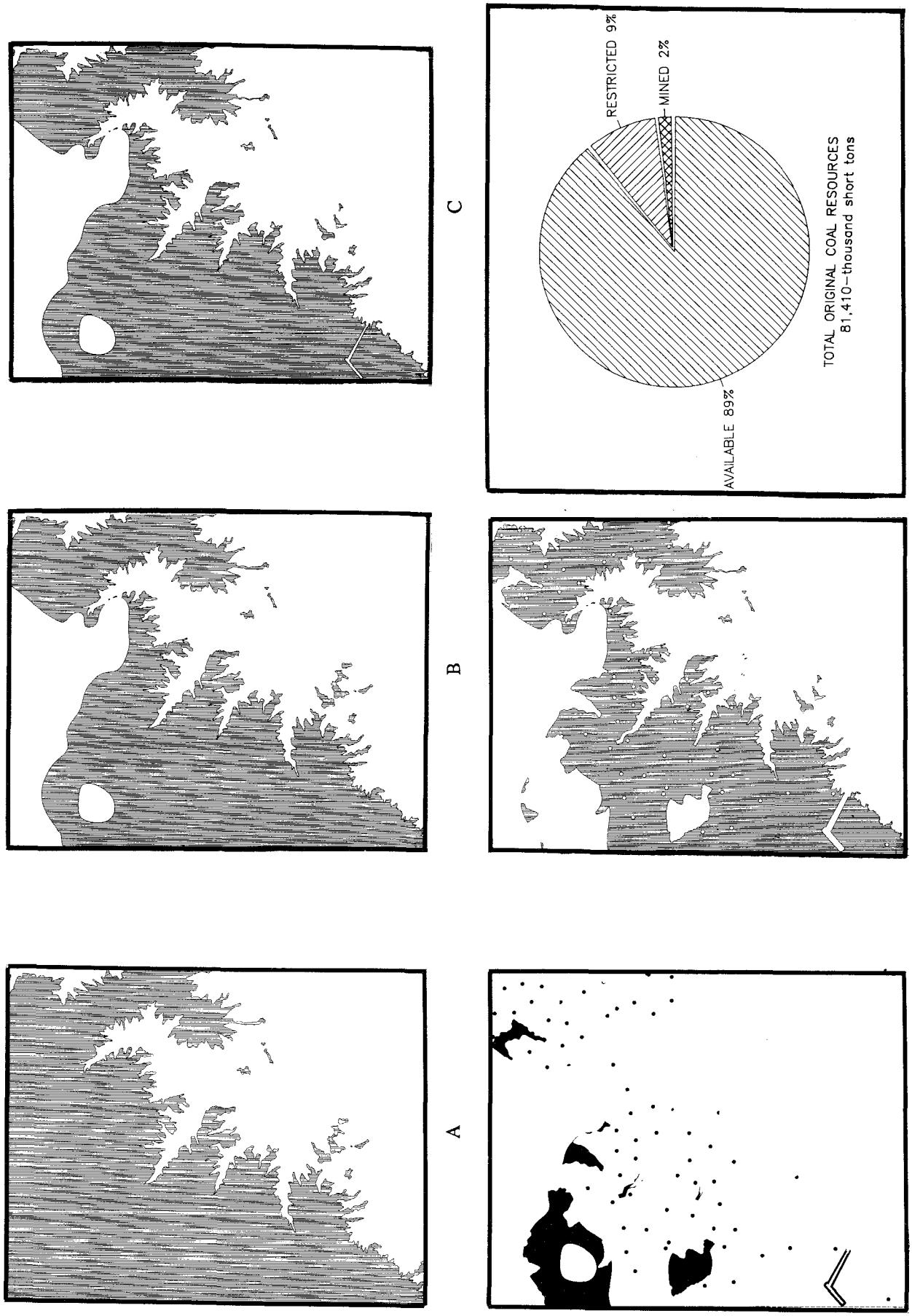


Figure 26. Coal availability study for the Wilson coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 15. Calculated coal resources for the Wilson coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	1,342	6,227	7,569	2,004	7,053	9,057	1,280	4,226	5,506	0	28	28	4,626	17,534	22,160
200-1000 ft.	1,405	10,773	12,178	6,506	11,565	18,071	2,037	5,039	7,076	0	0	0	9,948	27,377	37,325
> 1000 ft.	703	1,036	1,739	3,566	10,599	14,165	2,176	3,845	6,021	0	0	0	6,445	15,480	21,925
TOTAL	3,450	18,036	21,486	12,076	29,217	41,293	5,493	13,110	18,603	0	28	28	21,019	60,391	81,410
MINED COAL															
STRIP MINED	70	489	559	8	371	379	0	35	35	0	0	0	78	895	973
DEEP MINED +															
0-200 ft.	27	53	80	0	19	19	0	0	0	0	0	0	27	72	99
200-1000 ft.	---	3	3	---	78	78	---	0	0	---	0	0	---	81	81
> 1000 ft.	---	0	0	---	144	144	---	2	2	---	0	0	---	146	146
DEEP TOTAL	27	56	83	0	241	241	0	2	2	0	0	0	27	299	326
TOTAL MINED	97	545	642	8	612	620	0	37	37	0	0	0	105	1,194	1,299
REMAINING COAL															
0-200 ft.	1,245	5,685	6,930	1,996	6,663	8,659	1,280	4,191	5,471	0	28	28	4,521	16,567	21,088
200-1000 ft.	1,405	10,770	12,175	6,506	11,487	17,993	2,037	5,039	7,076	0	0	0	9,948	27,296	37,244
> 1000 ft.	703	1,036	1,739	3,566	10,455	14,021	2,176	3,843	6,019	0	0	0	6,445	15,334	21,779
TOTAL	3,353	17,491	20,844	12,068	28,605	40,673	5,493	13,073	18,566	0	28	28	20,914	59,197	80,111
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	37	109	146	45	113	158	39	75	114	0	0	0	121	297	418
Mine Buffers	---	27	27	---	38	38	---	0	0	---	0	0	---	65	65
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	12	5	17	52	45	97	0	0	0	0	0	0	64	50	114
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	49	141	190	97	196	293	39	75	114	0	0	0	185	412	597
200-1000 ft.															
Oil & Gas Wells	9	96	105	70	11	81	41	45	86	0	0	0	120	152	272
Mine Buffers	---	13	13	---	117	117	---	0	0	---	0	0	---	130	130
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	9	109	118	70	128	198	41	45	86	0	0	0	120	282	402
> 1000 ft.															
Oil & Gas Wells	0	21	21	44	82	126	8	15	23	0	0	0	52	118	170
Mine Buffers	---	0	0	---	216	216	---	1	1	---	0	0	---	217	217
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	703	---	703	3,566	---	3,566	2,176	---	2,176	0	---	0	6,445	---	6,445
*TOTAL	703	21	724	3,566	298	3,864	2,176	16	2,192	0	0	0	6,445	335	6,780
***TOTAL RESTRICTED**	761	271	1,032	3,733	622	4,355	2,256	136	2,392	0	0	0	6,750	1,029	7,779
AVAILABLE COAL															
0-200 ft.	1,196	5,544	6,740	1,899	6,467	8,366	1,241	4,116	5,357	0	28	28	4,336	16,155	20,491
200-1000 ft.	1,396	10,661	12,057	6,436	11,359	17,795	1,996	4,994	6,990	0	0	0	9,828	27,014	36,842
> 1000 ft.	0	1,015	1,015	0	10,157	10,157	0	3,827	3,827	0	0	0	0	14,999	14,999
TOTAL	2,592	17,220	19,812	8,335	27,983	36,318	3,237	12,937	16,174	0	28	28	14,164	58,168	72,332

* Values have overlap removed. --- Does not apply. + Auger values included.

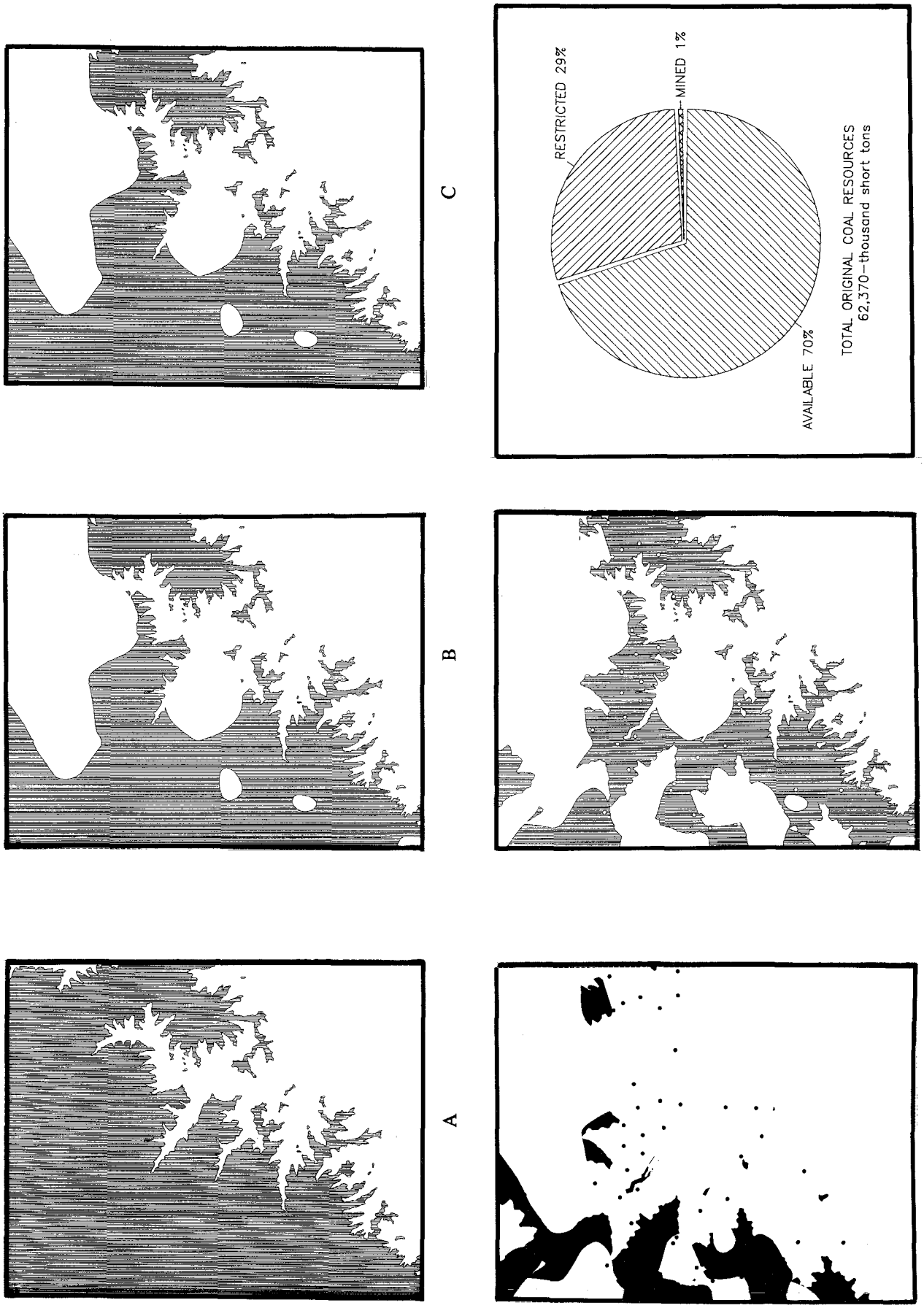


Figure 27. Coal availability study for the Upper St. Charles coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 16. Calculated coal resources for the Upper St. Charles coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	2,110	326	2,436	2,865	1,462	4,327	3,865	4,723	8,588	59	7	66	8,899	6,518	15,417
200-1000 ft.	4,697	234	4,931	10,197	2,663	12,860	2,988	4,773	7,761	0	0	0	17,882	7,670	25,552
> 1000 ft.	1,579	1,114	2,693	6,935	4,704	11,639	3,406	3,663	7,069	0	0	0	11,920	9,481	21,401
TOTAL	8,386	1,674	10,060	19,997	8,829	28,826	10,259	13,159	23,418	59	7	66	38,701	23,669	62,370
MINED COAL															
STRIP MINED	0	0	0	0	0	0	208	271	479	0	0	0	208	271	479
DEEP MINED															
0-200 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL MINED	0	0	0	0	0	0	208	271	479	0	0	0	208	271	479
REMAINING COAL															
0-200 ft.	2,110	326	2,436	2,865	1,462	4,327	3,657	4,452	8,109	59	7	66	8,691	6,247	14,938
200-1000 ft.	4,697	234	4,931	10,197	2,663	12,860	2,988	4,773	7,761	0	0	0	17,882	7,670	25,552
> 1000 ft.	1,579	1,114	2,693	6,935	4,704	11,639	3,406	3,663	7,069	0	0	0	11,920	9,481	21,401
TOTAL	8,386	1,674	10,060	19,997	8,829	28,826	10,051	12,888	22,939	59	7	66	38,493	23,398	61,891
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	29	0	29	47	30	77	35	42	77	0	0	0	111	72	183
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	65	---	65	70	---	70	0	---	0	0	---	0	135	---	135
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	94	0	94	117	30	147	35	42	77	0	0	0	246	72	318
200-1000 ft.															
Oil & Gas Wells	46	2	48	47	1	48	0	100	100	0	0	0	93	103	196
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	114	37	151	1,618	767	2,385	688	151	839	0	0	0	2,420	955	3,375
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	157	38	195	1,658	768	2,426	688	251	939	0	0	0	2,503	1,057	3,560
> 1000 ft.															
Oil & Gas Wells	11	10	21	51	39	90	0	18	18	0	0	0	62	67	129
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	99	90	189	706	547	1,253	2,024	1,553	3,577	0	0	0	2,829	2,190	5,019
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	1,579	---	1,579	6,935	---	6,935	3,406	---	3,406	0	---	0	11,920	---	11,920
*TOTAL	1,579	100	1,679	6,935	586	7,521	3,406	1,571	4,977	0	0	0	11,920	2,257	14,177
***TOTAL RESTRICTED**	1,830	138	1,968	8,710	1,384	10,094	4,129	1,864	5,993	0	0	0	14,669	3,386	18,055
AVAILABLE COAL															
0-200 ft.	2,016	326	2,342	2,748	1,432	4,180	3,622	4,410	8,032	59	7	66	8,445	6,175	14,620
200-1000 ft.	4,540	196	4,736	8,539	1,895	10,434	2,300	4,522	6,822	0	0	0	15,379	6,613	21,992
> 1000 ft.	0	1,014	1,014	0	4,118	4,118	0	2,092	2,092	0	0	0	0	7,224	7,224
TOTAL	6,556	1,536	8,092	11,287	7,445	18,732	5,922	11,024	16,946	59	7	66	23,824	20,012	43,836

* Values have overlap removed. --- Does not apply.

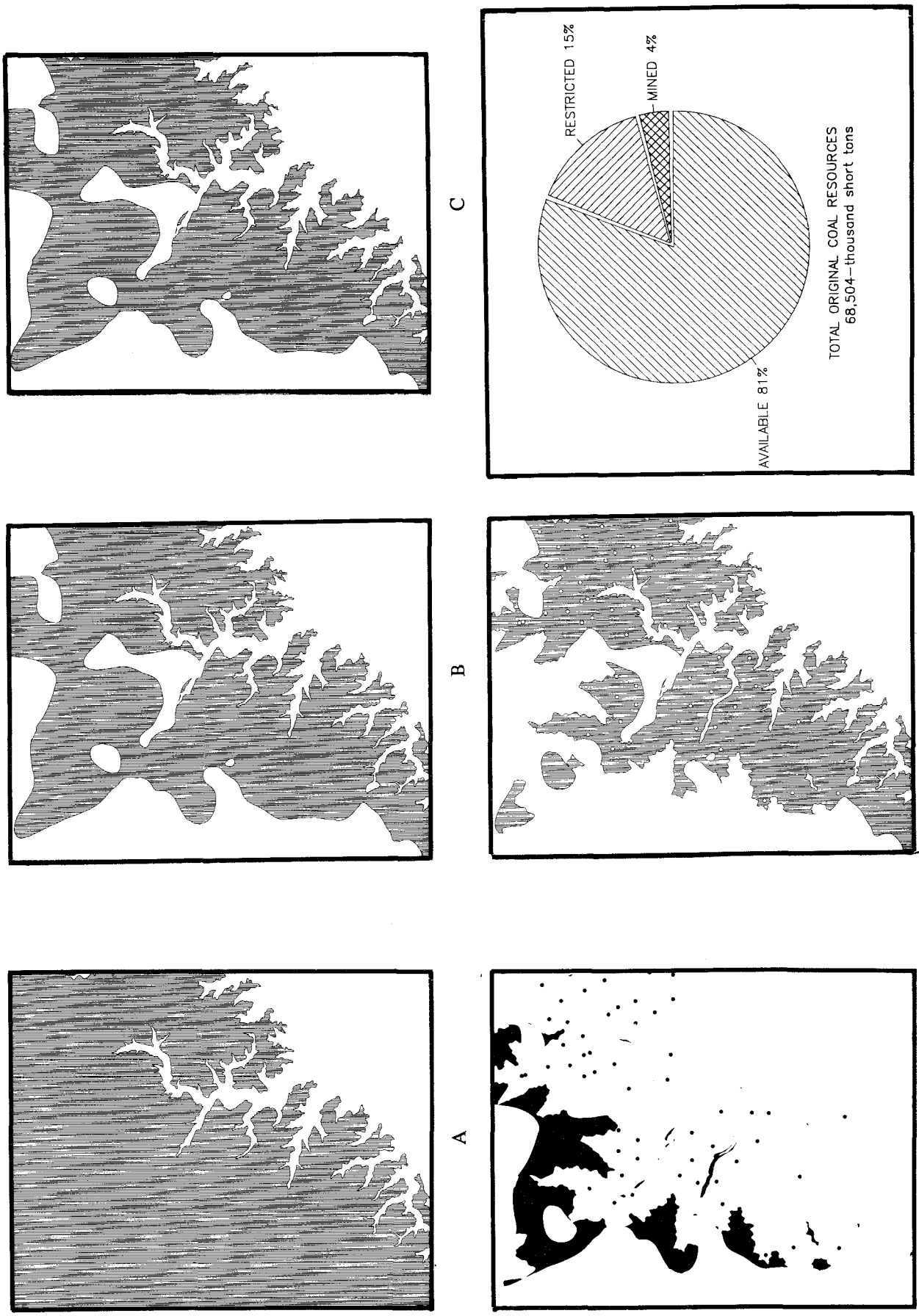


Figure 28. Coal availability study for the Kelly coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 17. Calculated coal resources for the Kelly coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	2,428	1,222	3,650	4,164	3,925	8,089	3,648	10,980	14,628	0	0	0	10,240	16,127	26,367
200-1000 ft.	7,466	734	8,200	13,448	2,074	15,522	3,300	4,300	7,600	0	0	0	24,214	7,108	31,322
> 1000 ft.	1,029	284	1,313	7,288	913	8,201	1,301	0	1,301	0	0	0	9,618	1,197	10,815
TOTAL	10,923	2,240	13,163	24,900	6,912	31,812	8,249	15,280	23,529	0	0	0	44,072	24,432	68,504
MINED COAL															
STRIP MINED + DEEP MINED	2	123	125	59	500	559	71	2,009	2,080	0	0	0	132	2,632	2,764
0-200 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL MINED	2	123	125	59	500	559	71	2,009	2,080	0	0	0	132	2,632	2,764
REMAINING COAL															
0-200 ft.	2,426	1,099	3,525	4,105	3,425	7,530	3,577	9,000	12,577	0	0	0	10,108	13,524	23,632
200-1000 ft.	7,466	734	8,200	13,448	2,074	15,522	3,300	4,271	7,571	0	0	0	24,214	7,079	31,293
> 1000 ft.	1,029	284	1,313	7,288	913	8,201	1,301	0	1,301	0	0	0	9,618	1,197	10,815
TOTAL	10,921	2,117	13,038	24,841	6,412	31,253	8,178	13,271	21,449	0	0	0	43,940	21,800	65,740
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	11	0	11	41	2	43	27	63	90	0	0	0	79	65	144
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cemeteries	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Towns	98	---	98	85	---	85	2	---	2	0	---	0	185	---	185
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	109	0	109	126	2	128	29	63	92	0	0	0	264	65	329
200-1000 ft.															
Oil & Gas Wells	99	0	99	138	16	154	53	49	102	0	0	0	290	65	355
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	99	0	99	138	16	154	53	49	102	0	0	0	290	65	355
> 1000 ft.															
Oil & Gas Wells	8	---	8	65	---	65	11	---	11	0	---	0	84	---	84
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	1,029	---	1,029	7,288	---	7,288	1,301	---	1,301	0	---	0	9,618	---	9,618
*TOTAL	1,029	---	1,029	7,288	---	7,288	1,301	---	1,301	0	---	0	9,618	---	9,618
***TOTAL RESTRICTED**	1,237	0	1,237	7,552	18	7,570	1,383	112	1,495	0	0	0	10,172	130	10,302
AVAILABLE COAL															
0-200 ft.	2,317	1,099	3,416	3,979	3,423	7,402	3,548	8,937	12,485	0	0	0	9,844	13,459	23,303
200-1000 ft.	7,367	734	8,101	13,310	2,058	15,368	3,247	4,222	7,469	0	0	0	23,924	7,014	30,938
> 1000 ft.	0	284	284	0	913	913	0	0	0	0	0	0	0	1,197	1,197
TOTAL	9,684	2,117	11,801	17,289	6,394	23,683	6,795	13,159	19,954	0	0	0	33,768	21,670	55,438

* Values have overlap removed. --- Does not apply. + Includes strip mining with greater than 200 ft. overburden.

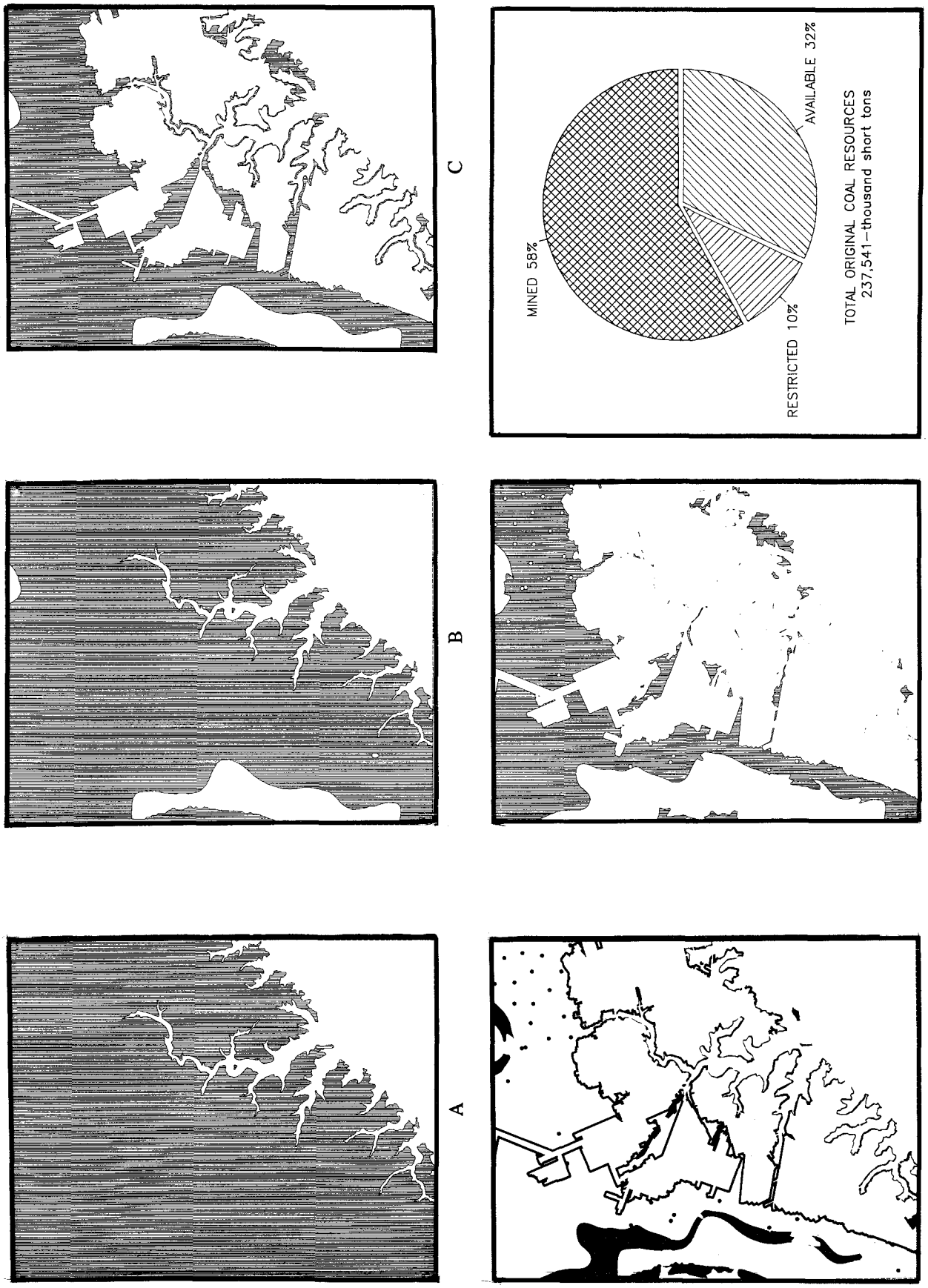


Figure 29. Coal availability study for the Imboden coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 18. Calculated coal resources for the Imboden coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	143	16,963	17,106	119	17,521	17,640	64	598	662	0	0	0	326	35,082	35,408
200-1000 ft.	682	59,679	60,361	246	76,273	76,519	341	8,450	8,791	0	0	0	1,269	144,402	145,671
> 1000 ft.	574	10,687	11,261	3,401	32,910	36,311	1,810	7,080	8,890	0	0	0	5,785	50,677	56,462
TOTAL	1,399	87,329	88,728	3,766	126,704	130,470	2,215	16,128	18,343	0	0	0	7,380	230,161	237,541
MINED COAL															
STRIP MINED	35	1,248	1,283	14	2,990	3,004	28	250	278	0	0	0	77	4,488	4,565
DEEP MINED															
0-200 ft.	63	8,257	8,320	45	8,405	8,450	19	199	218	0	0	0	127	16,861	16,988
200-1000 ft.	99	40,630	40,729	49	59,563	59,612	0	5,260	5,260	0	0	0	148	105,453	105,601
> 1000 ft.	---	2,827	2,827	---	5,773	5,773	---	799	799	---	0	0	---	9,399	9,399
DEEP TOTAL	162	51,714	51,876	94	73,741	73,835	19	6,258	6,277	0	0	0	275	131,713	131,988
TOTAL MINED	197	52,962	53,159	108	76,731	76,839	47	6,508	6,555	0	0	0	352	136,201	136,553
REMAINING COAL															
0-200 ft.	45	7,458	7,503	60	6,126	6,186	17	149	166	0	0	0	122	13,733	13,855
200-1000 ft.	583	19,049	19,632	197	16,710	16,907	341	3,190	3,531	0	0	0	1,121	38,949	40,070
> 1000 ft.	574	7,860	8,434	3,401	27,137	30,538	1,810	6,281	8,091	0	0	0	5,785	41,278	47,063
TOTAL	1,202	34,367	35,569	3,658	49,973	53,631	2,168	9,620	11,788	0	0	0	7,028	93,960	100,988
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	0	95	95	0	51	51	0	0	0	0	0	0	0	146	146
Mine Buffers	31	3,854	3,885	13	2,987	3,000	17	105	122	0	0	0	61	6,946	7,007
Cemeteries	---	22	22	---	0	0	---	0	0	---	0	0	---	22	22
Towns	0	1,199	1,199	15	404	419	0	0	0	0	0	0	15	1,603	1,618
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	31	4,604	4,635	28	3,350	3,378	17	105	122	0	0	0	76	8,059	8,135
200-1000 ft.															
Oil & Gas Wells	---	227	227	---	261	261	---	22	22	---	0	0	---	510	510
Mine Buffers	---	5,276	5,276	---	2,474	2,474	---	0	0	---	0	0	---	7,750	7,750
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	---	5,458	5,458	---	2,707	2,707	---	22	22	---	0	0	---	8,187	8,187
> 1000 ft.															
Oil & Gas Wells	0	44	44	35	213	248	8	30	38	0	0	0	43	287	330
Mine Buffers	---	475	475	---	1,830	1,830	---	220	220	---	0	0	---	2,525	2,525
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	574	---	574	3,401	---	3,401	1,810	---	1,810	0	---	0	5,785	---	5,785
*TOTAL	574	512	1,086	3,401	1,994	5,395	1,810	249	2,059	0	0	0	5,785	2,755	8,540
***TOTAL RESTRICTED**	605	10,574	11,179	3,429	8,051	11,480	1,827	376	2,203	0	0	0	5,861	19,001	24,862
AVAILABLE COAL															
0-200 ft.	14	2,854	2,868	32	2,776	2,808	0	44	44	0	0	0	46	5,674	5,720
200-1000 ft.	583	13,591	14,174	197	14,003	14,200	341	3,168	3,509	0	0	0	1,121	30,762	31,883
> 1000 ft.	0	7,348	7,348	0	25,143	25,143	0	6,032	6,032	0	0	0	0	38,523	38,523
TOTAL	597	23,793	24,390	229	41,922	42,151	341	9,244	9,585	0	0	0	1,167	74,959	76,126

* Not necessarily sum. Overlap removed. --- Does not apply.

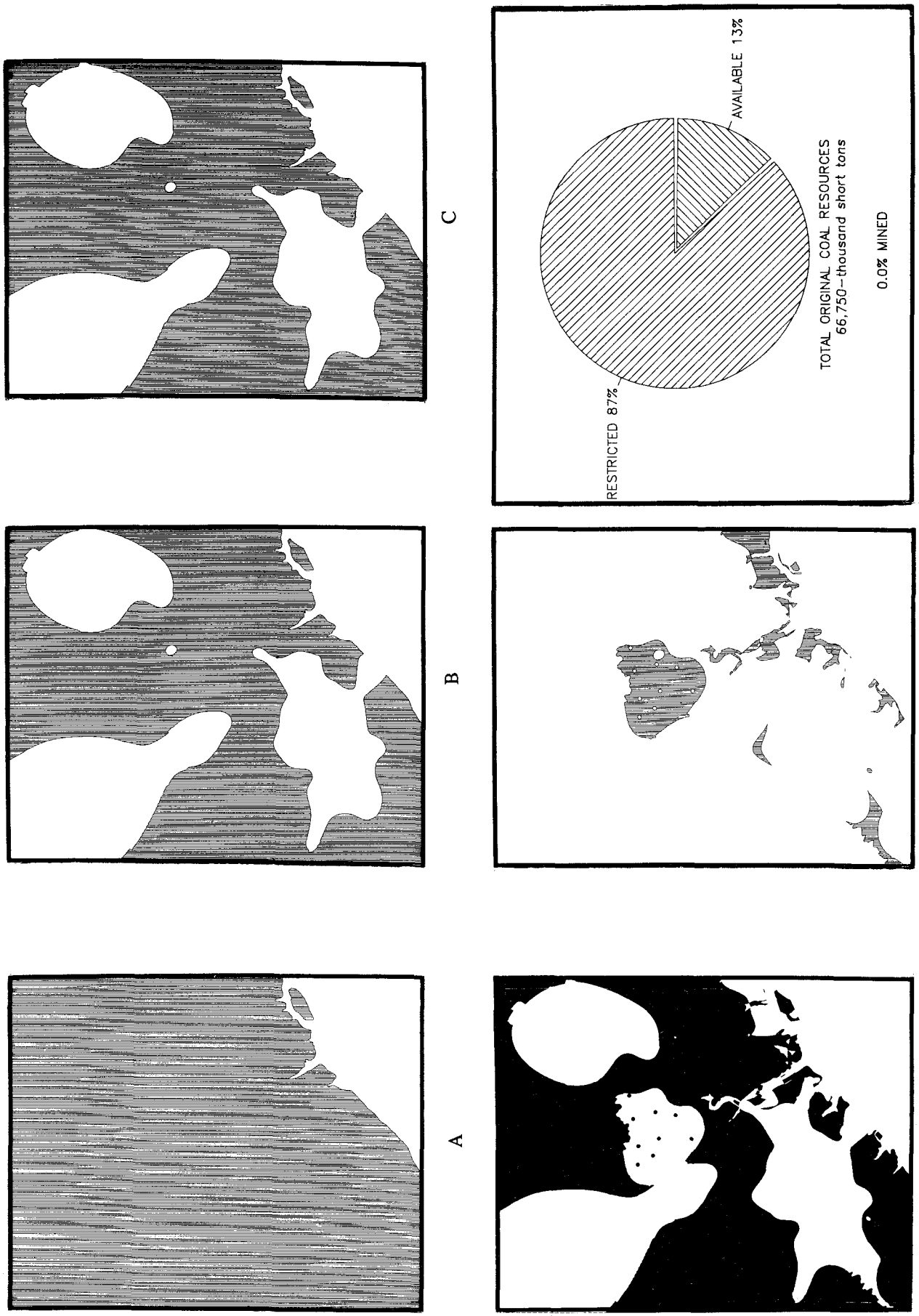


Figure 30. Coal availability study for the Clintwood coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 19. Calculated coal resources for the Clintwood coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	863	235	1,098	1,024	514	1,538	0	0	0	0	0	0	1,887	749	2,636
200-1000 ft.	6,537	2,753	9,290	17,622	5,772	23,394	4,812	186	4,998	146	0	146	29,117	8,711	37,828
> 1000 ft.	1,031	218	1,249	5,793	2,043	7,836	15,915	1,286	17,201	0	0	0	22,739	3,547	26,286
TOTAL	8,431	3,206	11,637	24,439	8,329	32,768	20,727	1,472	22,199	146	0	146	53,743	13,007	66,750
MINED COAL															
STRIP MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP MINED															
0-200 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
REMAINING COAL															
0-200 ft.	863	235	1,098	1,024	514	1,538	0	0	0	0	0	0	1,887	749	2,636
200-1000 ft.	6,537	2,753	9,290	17,622	5,772	23,394	4,812	186	4,998	146	0	146	29,117	8,711	37,828
> 1000 ft.	1,031	218	1,249	5,793	2,043	7,836	15,915	1,286	17,201	0	0	0	22,739	3,547	26,286
TOTAL	8,431	3,206	11,637	24,439	8,329	32,768	20,727	1,472	22,199	146	0	146	53,743	13,007	66,750
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	0	---	0	6	---	6	0	---	0	0	---	0	6	---	6
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cemeteries	32	---	32	4	---	4	0	---	0	0	---	0	36	---	36
Towns	133	9	142	179	376	555	0	0	0	0	0	0	312	385	697
Streams	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
National Forest	14	---	14	64	---	64	0	---	0	0	---	0	78	---	78
*TOTAL	179	9	188	254	376	630	0	0	0	0	0	0	433	385	818
200-1000 ft.															
Oil & Gas Wells	37	29	66	177	14	191	82	3	85	0	0	0	296	46	342
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	5,274	2,740	8,014	12,938	5,614	18,552	4,095	186	4,281	146	0	146	22,453	8,540	30,993
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	5,276	2,740	8,016	13,004	5,618	18,622	4,102	186	4,288	146	0	146	22,528	8,544	31,072
> 1000 ft.															
Oil & Gas Wells	10	0	10	8	22	30	116	41	157	0	0	0	134	63	197
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	936	218	1,154	4,962	2,043	7,005	15,508	1,286	16,794	0	0	0	21,406	3,547	24,953
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	1,031	---	1,031	5,793	---	5,793	15,915	---	15,915	0	---	0	22,739	---	22,739
*TOTAL	1,031	218	1,249	5,793	2,043	7,836	15,915	1,286	17,201	0	0	0	22,739	3,547	26,286
***TOTAL RESTRICTED**	6,486	2,967	9,453	19,051	8,037	27,088	20,017	1,472	21,489	146	0	146	45,700	12,476	58,176
AVAILABLE COAL															
0-200 ft.	684	226	910	770	138	908	0	0	0	0	0	0	1,454	364	1,818
200-1000 ft.	1,261	13	1,274	4,618	154	4,772	710	0	710	0	0	0	6,589	167	6,756
> 1000 ft.	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL	1,945	239	2,184	5,388	292	5,680	710	0	710	0	0	0	8,043	531	8,574

* Values have overlap removed. --- Does not apply.

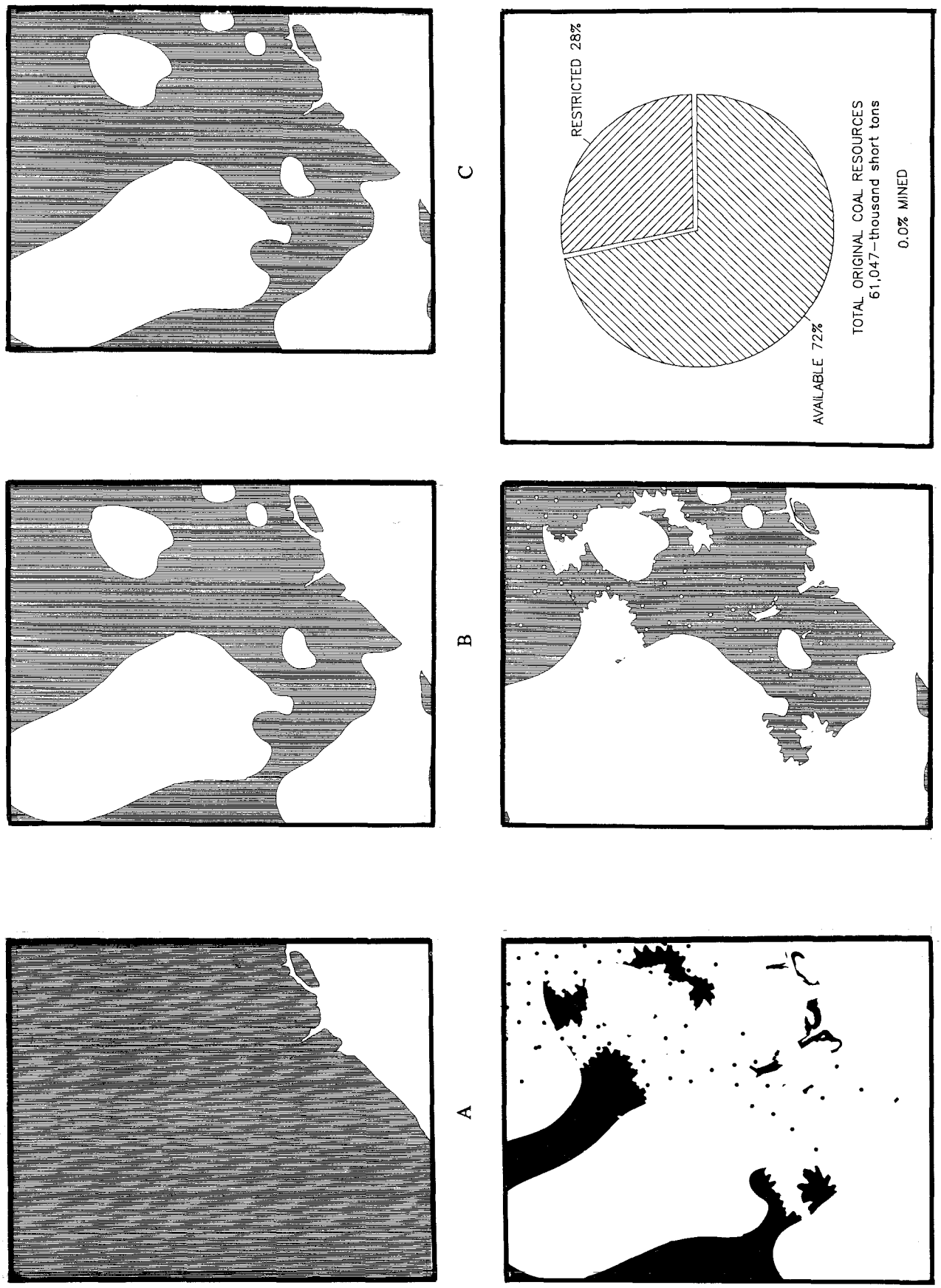


Figure 31. Coal availability study for the Blair coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 20. Calculated coal resources for the Blair coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	753	430	1,183	859	720	1,579	0	4	4	0	0	0	1,612	1,154	2,766
200-1000 ft.	5,116	1,223	6,339	15,268	1,251	16,519	6,003	1,946	7,949	0	281	281	26,387	4,701	31,088
> 1000 ft.	312	674	986	2,216	4,015	6,231	12,848	7,128	19,976	0	0	0	15,376	11,817	27,193
TOTAL	6,181	2,327	8,508	18,343	5,986	24,329	18,851	9,078	27,929	0	281	281	43,375	17,672	61,047
MINED COAL															
STRIP MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP MINED															
0-200 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
REMAINING COAL															
0-200 ft.	753	430	1,183	859	720	1,579	0	4	4	0	0	0	1,612	1,154	2,766
200-1000 ft.	5,116	1,223	6,339	15,268	1,251	16,519	6,003	1,946	7,949	0	281	281	26,387	4,701	31,088
> 1000 ft.	312	674	986	2,216	4,015	6,231	12,848	7,128	19,976	0	0	0	15,376	11,817	27,193
TOTAL	6,181	2,327	8,508	18,343	5,986	24,329	18,851	9,078	27,929	0	281	281	43,375	17,672	61,047
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	0	---	0	2	---	2	0	---	0	0	---	0	2	---	2
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cemeteries	20	---	20	1	---	1	0	---	0	0	---	0	21	---	21
Towns	238	44	282	273	340	613	0	0	0	0	0	0	511	384	895
Streams	4	0	4	1	6	7	0	0	0	0	0	0	5	6	11
National Forest	0	30	30	21	105	126	0	4	4	0	0	0	21	139	160
*TOTAL	262	74	336	297	445	742	0	4	4	0	0	0	559	523	1,082
200-1000 ft.															
Oil & Gas Wells	48	16	64	117	0	117	138	70	208	0	0	0	303	86	389
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	48	16	64	117	0	117	138	70	208	0	0	0	303	86	389
> 1000 ft.															
Oil & Gas Wells	6	0	6	0	17	17	96	95	191	0	0	0	102	112	214
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	312	---	312	2,216	---	2,216	12,848	---	12,848	0	---	0	15,376	---	15,376
*TOTAL	312	0	312	2,216	17	2,233	12,848	95	12,943	0	0	0	15,376	112	15,488
***TOTAL RESTRICTED**	622	90	712	2,630	462	3,092	12,986	169	13,155	0	0	0	16,238	721	16,959
AVAILABLE COAL															
0-200 ft.	491	356	847	562	275	837	0	0	0	0	0	0	1,053	631	1,684
200-1000 ft.	5,068	1,207	6,275	15,151	1,251	16,402	5,865	1,876	7,741	0	281	281	26,084	4,615	30,699
> 1000 ft.	0	674	674	0	3,998	3,998	0	7,033	7,033	0	0	0	0	11,705	11,705
TOTAL	5,559	2,237	7,796	15,713	5,524	21,237	5,865	8,909	14,774	0	281	281	27,137	16,951	44,088

* Values have overlap removed. --- Does not apply.

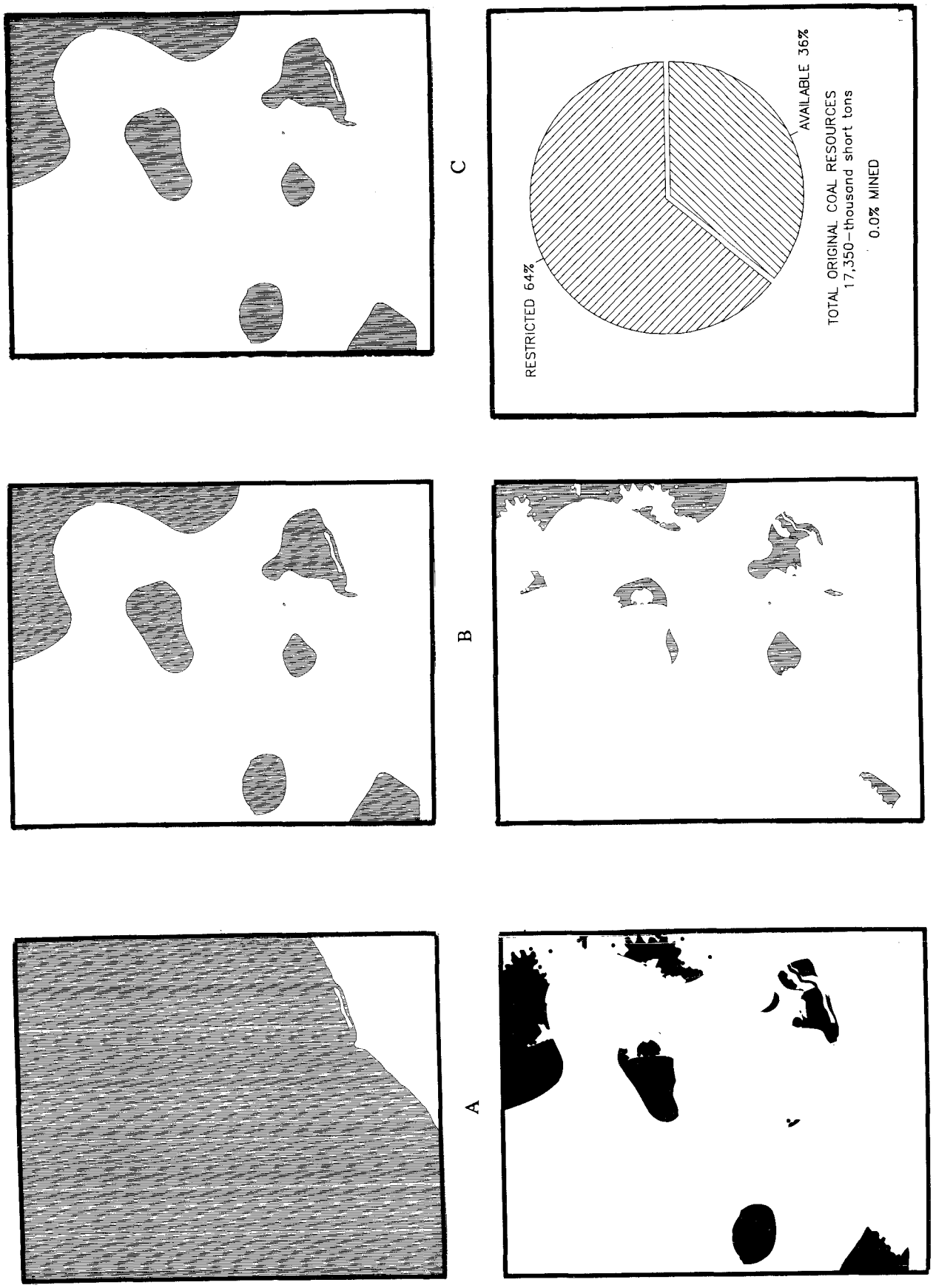


Figure 32. Coal availability study for the Lyons coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 21. Calculated coal resources for the Lyons coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	47	---	47	1,087	---	1,087	134	---	134	0	---	0	1,268	---	1,268
200-1000 ft.	1,432	---	1,432	3,696	---	3,696	2,893	---	2,893	140	---	140	8,161	---	8,161
> 1000 ft.	333	---	333	2,418	---	2,418	5,170	---	5,170	0	---	0	7,921	---	7,921
TOTAL	1,812	---	1,812	7,201	---	7,201	8,197	---	8,197	140	---	140	17,350	---	17,350
MINED COAL															
STRIP MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP MINED															
0-200 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
TOTAL MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
REMAINING COAL															
0-200 ft.	47	---	47	1,087	---	1,087	134	---	134	0	---	0	1,268	---	1,268
200-1000 ft.	1,432	---	1,432	3,696	---	3,696	2,893	---	2,893	140	---	140	8,161	---	8,161
> 1000 ft.	333	---	333	2,418	---	2,418	5,170	---	5,170	0	---	0	7,921	---	7,921
TOTAL	1,812	---	1,812	7,201	---	7,201	8,197	---	8,197	140	---	140	17,350	---	17,350
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Cemeteries	0	---	0	4	---	4	0	---	0	0	---	0	4	---	4
Towns	6	---	6	625	---	625	53	---	53	0	---	0	684	---	684
Streams	0	---	0	212	---	212	0	---	0	0	---	0	212	---	212
National Forest	0	---	0	54	---	54	21	---	21	0	---	0	75	---	75
*TOTAL	6	---	6	771	---	771	74	---	74	0	---	0	851	---	851
200-1000 ft.															
Oil & Gas Wells	2	---	2	58	---	58	79	---	79	0	---	0	139	---	139
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	212	---	212	1,734	---	1,734	334	---	334	0	---	0	2,280	---	2,280
Mining < 40 ft.	0	---	0	11	---	11	0	---	0	0	---	0	11	---	11
*TOTAL	213	---	213	1,764	---	1,764	407	---	407	0	---	0	2,384	---	2,384
> 1000 ft.															
Oil & Gas Wells	0	---	0	7	---	7	67	---	67	0	---	0	74	---	74
Mine Buffers	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Interburden < 40 ft.	134	---	134	1,353	---	1,353	786	---	786	0	---	0	2,273	---	2,273
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	333	---	333	2,418	---	2,418	5,170	---	5,170	0	---	0	7,921	---	7,921
*TOTAL	333	---	333	2,418	---	2,418	5,170	---	5,170	0	---	0	7,921	---	7,921
***TOTAL RESTRICTED**	552	---	552	4,953	---	4,953	5,651	---	5,651	0	---	0	11,156	---	11,156
AVAILABLE COAL															
0-200 ft.	41	---	41	316	---	316	60	---	60	0	---	0	417	---	417
200-1000 ft.	1,219	---	1,219	1,932	---	1,932	2,486	---	2,486	140	---	140	5,777	---	5,777
> 1000 ft.	0	---	0	0	---	0	0	---	0	0	---	0	0	---	0
TOTAL	1,260	---	1,260	2,248	---	2,248	2,546	---	2,546	140	---	140	6,194	---	6,194

* Values have overlap removed. --- Does not apply.

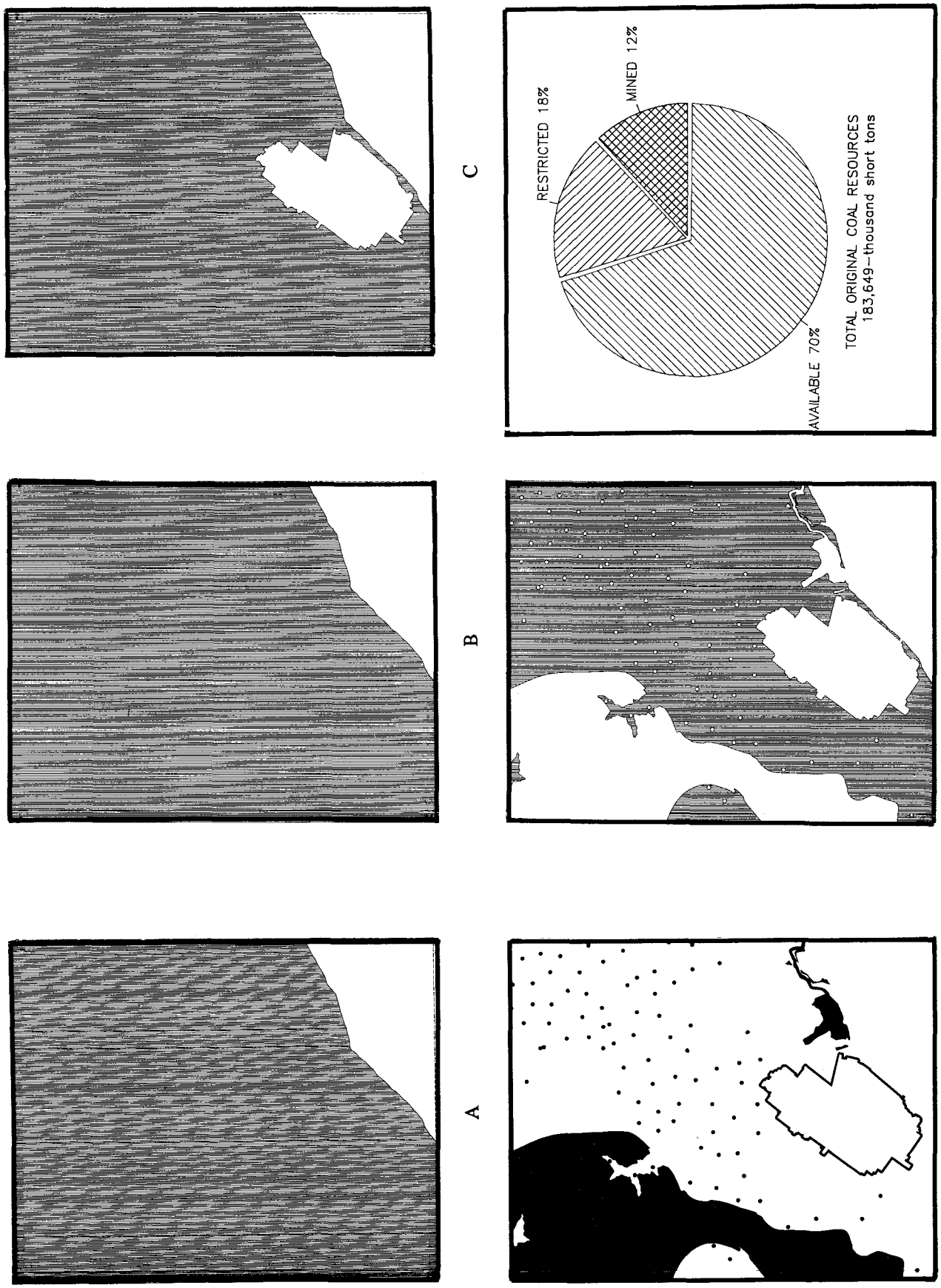


Figure 33. Coal availability study for the Dorchester coalbed; A. Original extent, B. Original resources, C. Remaining resources, D. Restrictions applied, E. Available resources, and F. Pie chart showing percentages of original resources.

Table 22. Calculated coal resources for the Dorchester coalbed (thousands of short tons). Resources are subdivided into categories of overburden thickness (0-200 ft., 200-1000 ft., >1000 ft.) and coal thickness probability of occurrence (measured, indicated, inferred, hypothetical).

	MEASURED			INDICATED			INFERRED			HYPOTHETICAL			TOTAL		
	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL	14-28 in.	> 28 in.	TOTAL
ORIGINAL COAL															
0-200 ft.	24	553	577	80	3,191	3,271	35	308	343	0	0	0	139	4,052	4,191
200-1000 ft.	739	33,981	34,720	1,331	51,134	52,465	735	14,596	15,331	0	336	336	2,805	100,047	102,852
> 1000 ft.	886	2,690	3,576	6,177	14,205	20,382	20,664	31,984	52,648	0	0	0	27,727	48,879	76,606
TOTAL	1,649	37,224	38,873	7,588	68,530	76,118	21,434	46,888	68,322	0	336	336	30,671	152,978	183,649
MINED COAL															
STRIP MINED	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP MINED															
0-200 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
200-1000 ft.	93	12,351	12,444	20	8,489	8,509	0	0	0	0	0	0	113	20,840	20,953
> 1000 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
DEEP TOTAL	93	12,351	12,444	20	8,489	8,509	0	0	0	0	0	0	113	20,840	20,953
TOTAL MINED	93	12,351	12,444	20	8,489	8,509	0	0	0	0	0	0	113	20,840	20,953
REMAINING COAL															
0-200 ft.	24	553	577	80	3,191	3,271	35	308	343	0	0	0	139	4,052	4,191
200-1000 ft.	646	21,630	22,276	1,311	42,645	43,956	735	14,596	15,331	0	336	336	2,692	79,207	81,899
> 1000 ft.	886	2,690	3,576	6,177	14,205	20,382	20,664	31,984	52,648	0	0	0	27,727	48,879	76,606
TOTAL	1,556	24,873	26,429	7,568	60,041	67,609	21,434	46,888	68,322	0	336	336	30,558	132,138	162,696
RESTRICTED COAL															
0-200 ft.															
Oil & Gas Wells	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mine Buffers	2	5	7	1	3	4	0	0	0	0	0	0	3	8	11
Cemeteries	0	0	0	5	19	24	6	2	8	0	0	0	11	21	32
Towns	2	189	191	5	1,815	1,820	0	99	99	0	0	0	7	2,103	2,110
Streams	0	0	0	0	702	702	12	21	33	0	0	0	12	723	735
National Forest	---	0	0	---	107	107	---	45	45	---	0	0	---	152	152
*TOTAL	2	194	196	10	2,268	2,278	18	162	180	0	0	0	30	2,624	2,654
200-1000 ft.															
Oil & Gas Wells	0	163	163	51	339	390	12	406	418	0	0	0	63	908	971
Mine Buffers	40	1,544	1,584	13	324	337	0	0	0	0	0	0	53	1,868	1,921
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
*TOTAL	40	1,680	1,720	64	663	727	12	406	418	0	0	0	116	2,749	2,865
> 1000 ft.															
Oil & Gas Wells	0	13	13	10	70	80	138	354	492	0	0	0	148	437	585
Mine Buffers	---	8	8	---	9	9	---	0	0	---	0	0	---	17	17
Interburden < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Mining < 40 ft.	---	---	---	---	---	---	---	---	---	---	---	---	---	---	---
Less Than 28 in. thk.	886	---	886	6,177	---	6,177	20,664	---	20,664	0	---	0	27,727	---	27,727
*TOTAL	886	21	907	6,177	78	6,255	20,664	354	21,018	0	---	0	27,727	453	28,180
***TOTAL RESTRICTED**	928	1,895	2,823	6,251	3,009	9,260	20,694	922	21,616	0	0	0	27,873	5,826	33,699
AVAILABLE COAL															
0-200 ft.	22	359	381	70	923	993	17	146	163	0	0	0	109	1,428	1,537
200-1000 ft.	606	19,950	20,556	1,247	41,982	43,229	723	14,190	14,913	0	336	336	2,576	76,458	79,034
> 1000 ft.	0	2,669	2,669	0	14,127	14,127	0	31,630	31,630	0	0	0	0	48,426	48,426
TOTAL	628	22,978	23,606	1,317	57,032	58,349	740	45,966	46,706	0	336	336	2,685	126,312	128,997

* Values have overlap removed. --- Does not apply.

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