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DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY

GEOLOGY AND STRIPPABLE FEDERAL COAL RESOURCES
IN THE SOUTH HALF OF THE DUNN CENTER LIGNITE FIELD,
DUNN COUNTY, NORTH DAKOTA

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This report has not been edited for
conformity with Geological Survey
editorial standards or stratigraphic
nomenclature.

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INTRODUCTION

During the summer of 1975, Natural Gas Pipeline Company of America (NGPL), with the permission of the Bureau of Land Management, drilled 157 coal test holes into federally owned coal in the south half of the Dunn Center lignite field (pl. 1). This report presents the results and evaluations derived from that drilling.

The Dunn Center lignite field lies entirely within Dunn County, North Dakota (fig. 1). The south half of the field is bounded on the east and west by the towns of Halliday and Dunn Center and on the north and south by Spring Creek and Knife River.

Exposures of bedrock within the study area are of the Sentinel Butte Member of the Fort Union Formation (Paleocene). This member contains the four coal beds discussed in detail in this report: from deepest to shallowest, the Dunn Center, "A", "B", and "C" (fig. 2). These beds are, all or in part, shallow enough (within 150 ft; 45.7 m of the surface), thick enough (at least 30 in; 76 cm), and of sufficient lateral extent (pl. 2) to be economically extracted using conventional strip-mining methods.

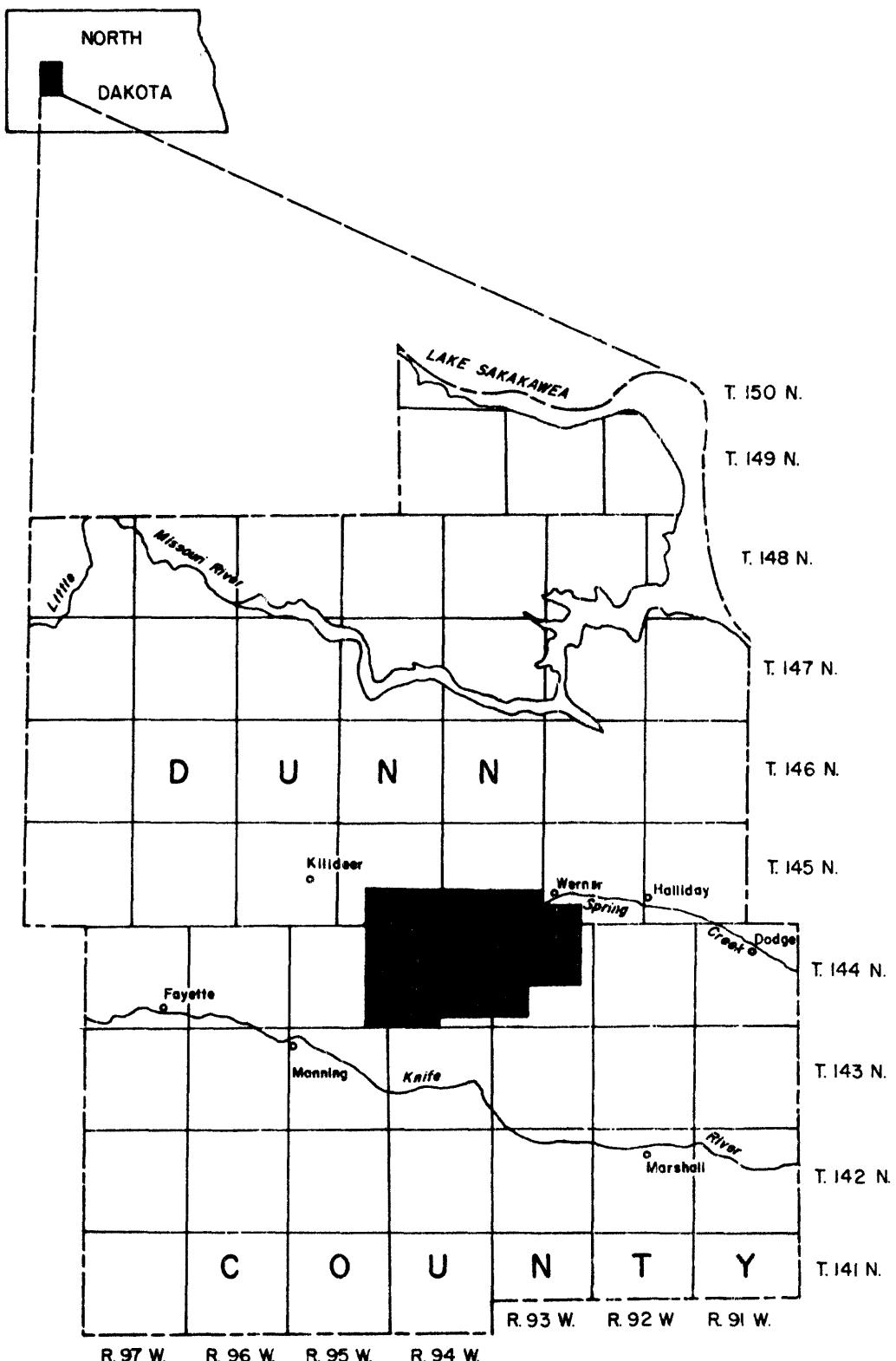


Figure 1.--Index map of Dunn Center lignite field (south half), Dunn County, North Dakota

GENERALIZED COLUMNAR SECTION

DUNN CENTER LIGNITE FIELD, DUNN COUNTY, NORTH DAKOTA

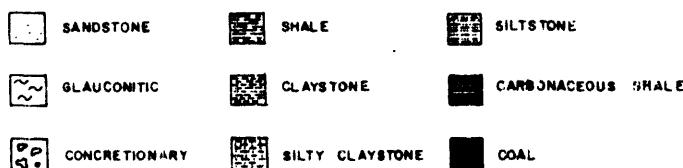
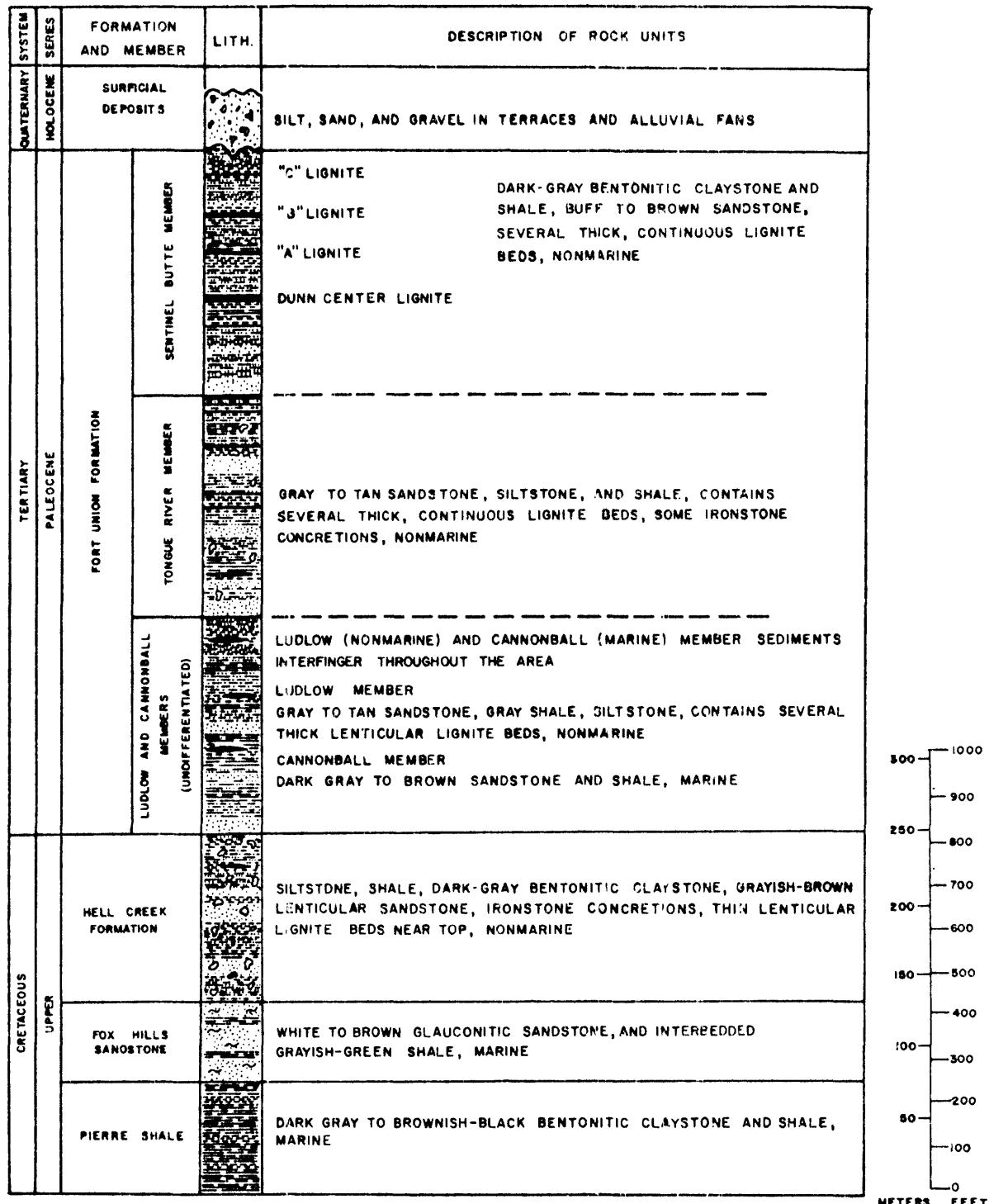


Figure 2.

PREVIOUS WORK

The outcropping lignite beds in the Dunn Center area were first described by Leonard and others (1925). This early report contained coal outcrop descriptions, a few measured sections, and a brief general survey of the local mining operations. A more detailed study of the upper lignite beds was published by Brant (1953). His work contained coal outcrop maps, a written report on each bed, a list of operating mines, and an estimate of the coal reserves for Dunn County. NGPL's general exploration program during late 1971 and early 1972 was followed in 1975 by a much more extensive study which included the drilling of approximately 1,800 coal test holes, of which 157 holes were drilled into federally owned coal. These exploration holes provided the raw data used in this report. The area's deeper coal beds were studied by Rehbein (1977) and Law (1977).

PHYSIOGRAPHY

The south half of the Dunn Center lignite field is situated on the glaciated Missouri Plateau of the Great Plains physiographic province. The region is characterized by gently rolling, grass-covered hills accented by scattered rock-capped prominences. These prominences, or buttes, rise 100-200 ft (30.5-61.0 m) above the average terrain. Spring Creek and Knife River, the only perennial streams in the area, flow eastward along the northern and southern boundaries of the area in broad, shallow valleys. Glacial till in the form of conspicuous erratics covers some of the area.

STRUCTURE

The Dunn Center lignite field is on the southeastern flank of the Williston basin, about 50 mi (80 km) from basin center. The major structural feature influencing the shallow strata in the Dunn Center area is a northeast-trending syncline. The axis of this syncline is located about 20 mi (32 km) to the east (Law, 1977). Beds influenced by this structural feature dip about 18 ft/mi (3.4/1000) toward the east. No faulting has been detected.

STRATIGRAPHY

Two coal-bearing formations underlie the Dunn Center area (fig. 2): the Upper Cretaceous Hell Creek Formation and the Paleocene Fort Union Formation.

The Hell Creek Formation consists of siltstone, shale, bentonitic claystone, ironstone concretions, coal, and lenticular sandstone beds. Coal beds in the formation are few in number, thin, and lenticular. The Hell Creek Formation is conformably overlain by the Fort Union Formation.

The Fort Union contains four members: the Cannonball, Ludlow, Tongue River, and Sentinel Butte. The marine Cannonball is composed of sandstone and shale. This member interfingers with the nonmarine Ludlow throughout the Dunn Center area. The Ludlow Member is made up of siltstone, shale, sandstone, and thin lenticular coal beds. The overlying Tongue River Member consists of sandstone, siltstone, shale, ironstone concretions, and coal beds. Tongue River coal beds are relatively thick and laterally

continuous (Rehbein, 1977). The Tongue River is overlain by the Sentinel Butte Member, which constitutes most bedrock exposures in the south half of the Dunn Center lignite field. The Sentinel Butte is composed of interlayered beds of poorly consolidated sandstone, siltstone, claystone, coal, and limestone. It averages about 225 ft (69 m) in thickness in the Dunn Center area (Law, 1977) and contains all four coal beds that are discussed in this report. The Sentinel Butte is overlain in scattered areas by glacial erratics. These erratics represent the remains of a pre-Wisconsinan drift (Clayton, 1970).

COAL

NGPL's federal coal-drilling program detected the presence of 13 coal beds in the south half of the Dunn Center lignite field. Four were, all or in part, thick enough (at least 30 in; 76 cm), shallow enough (within 150 ft; 45.7 m of the surface), and of sufficient lateral extent to be economically extracted using conventional strip-mining techniques.

The deepest of these is the Dunn Center (DC) bed. The DC bed ranges in thickness from 7 to 25.5 ft (2.1 to 7.8 m) and averages 16 ft (5 m) thick (pl. 3). Overburden on the DC bed ranges from 0 at outcrop to 280 ft (85.3 m). The DC bed has an average dip of 18 ft/mi (3.4/1000) toward the east (pl. 4).

Over most of the area being studied, the next higher coal is the "A" bed. Interburden between the DC and "A" beds ranges from 2 to 124 ft (0.6 to 37.8 m). The "A" ranges in thickness from a pinchout to 8.5 ft (2.6 m) and averages 5 ft (1.5 m) (pl. 5).

Overburden ranges from 0 at outcrop to 260 ft (79.2 m). The "A" has an average dip of 17 ft/mi (3.2/1000) toward the east (pl. 6).

The "B" bed is the next coal bed in the section. The "B" directly overlies both the "A" bed and, in the areas where the "A" is missing, the DC bed. The interburden between the DC and the "B" beds ranges in thickness from 9 to 60 ft (2.7 to 18.3 m). Between the "A" and "B" beds, the interburden ranges from 31 to 113 ft (9.4 to 34.4 m). The "B" ranges in thickness from 2 to 10.5 ft (0.6 to 3.2 m) and averages 7 ft (2.1 m) (pl. 7). Overburden ranges from 0 at outcrop to 240 ft (23.2 m). It has an average dip of 17 ft/mi (3.2/1000) toward the east (pl. 8).

The uppermost economic coal horizon in the Dunn Center area is the "C" bed. Because of both extensive erosion and post-depositional channel-cutting, the "C" bed has been detected only in isolated places within the area. Where present, the "C" directly overlies the "B". The interburden between the two ranges from 6 to 72 ft (1.8 to 21.9 m). The "C" bed ranges in thickness from 1 to 10.5 ft (0.3 to 3.2 m) and averages 4 ft (1.2 m) thick (pl. 9). Overburden ranges from 0 at outcrop to 180 ft (54.9 m). It has an average dip of 15 ft/mi (2.8/1000) toward the east (pl. 10).

The chemical analyses of the coal beds used in this report (table 1) were derived from tests carried out by the Natural Gas Pipeline Company of America (NGPL, 1976). The results

were reported as arithmetic averages for each of the four beds tested. The original samples used for these tests were obtained from 23 core holes drilled in the south half of the Dunn Center field.

The identified Federal coal resources (table 2) were calculated for only those sections of land drilled by NGPL in 1975. These identified resources were determined using U.S. Geological Survey coal resource classification guidelines. These guidelines define identified resources as "beds of subbituminous coal and lignite 30 in (75 cm) or more thick that occur at depths to 6,000 ft (1,800 m), and whose existence and quantity have been delineated within specified degrees of geologic assurance as measured, indicated, or inferred" (U.S. Bureau of Mines and U.S. Geological Survey, 1976).

Table 1. --As-received chemical analyses of the main
 Dunn Center lignite field coal beds (NGPL, 1976)

[Values in percent, except heating value. Analyses represent arithmetic averages from tests on unknown number of samples from 23 core holes]

Coal Bed	Carbon	Hydrogen	Nitrogen	Chlorine	Sulfur	Oxygen	Moisture	Heating Value Btu/lb
Dunn Center---	39.98	2.56	0.57	0.01	0.82	7.20	11.19	37.67
"A"--	37.28	2.52	.48	.01	.88	9.45	11.31	38.07
"B"--	38.28	2.61	.48	.01	1.03	7.95	11.57	38.07
"C"--	39.59	2.63	.47	.03	.88	8.20	11.36	36.79
								5,936

Table 2.-- Identified Federal Coal Resources¹ (in short tons)

[To convert short tons to metric tons multiply by 0.907; to convert feet to meters multiply by 0.3048]

Dunn Center Bed, lower split			
<u>Overburden</u>	<u>Measured</u>	<u>Indicated</u>	<u>Inferred</u>
0 to 25'	106,000	587,000	14,000
25' to 150'	6,589,000	4,507,000	67,000
>150'	2,078,000	956,000	17,000
Dunn Center Bed			
<u>Overburden</u>	<u>Measured</u>	<u>Indicated</u>	<u>Inferred</u>
0 to 25'	7,438,000	12,047,000	1,302,000
25' to 150'	146,083,000	19,855,000	283,000
>150'	35,204,000	1,794,000	0
"A" Bed			
<u>Overburden</u>	<u>Measured</u>	<u>Indicated</u>	<u>Inferred</u>
0 to 25'	4,416,000	1,127,000	0
25' to 150'	33,100,000	1,702,000	0
>150'	4,189,000	102,000	0
"B" Bed			
<u>Overburden</u>	<u>Measured</u>	<u>Indicated</u>	<u>Inferred</u>
0 to 25'	10,006,000	1,728,000	378,000
25' to 150'	27,556,000	9,917,000	119,000
>150'	31,000	430,000	0
"C" Bed			
<u>Overburden</u>	<u>Measured</u>	<u>Indicated</u>	<u>Inferred</u>
0 to 25'	2,761,000	6,005,000	157,000
25' to 150'	5,169,000	2,328,000	17,000
>150'	0	0	0
Four Bed Totals			
<u>Overburden</u>	<u>Measured</u>	<u>Indicated</u>	<u>Inferred</u>
0 to 25;	24,727,000	21,494,000	1,851,000
25' to 150'	218,497,000	38,309,000	487,000
>150'	41,502,000	3,282,000	17,000

¹Identified resources were calculated only in those sections of land containing NGPL Federal coal drilling.

DRILL-HOLE DATA AND EVALUATION

This part of the report presents, for each land section drilled by NGPL in 1975, a series of maps showing thickness, overburden, and structural contours for each potentially economic coal bed, a listing of thickness intervals in each drill-hole, and calculation of identified resources for each bed. All resources were determined using the following formula:

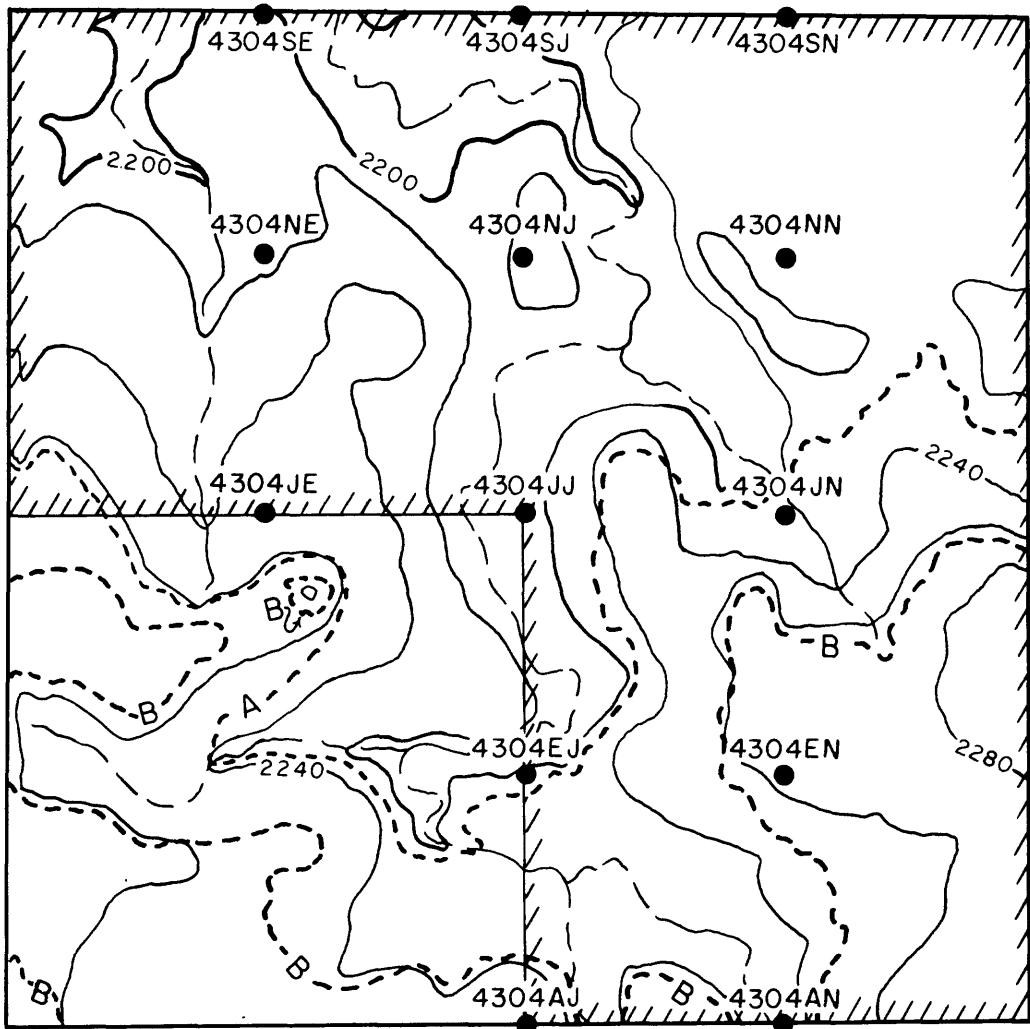
Area x weight constant x thickness = total resources in tons,
where the weight constant of lignite is 1,750 tons/acre-foot.

All measurement units used in the evaluation section of this report are in English units; to convert to metric equivalents use the conversion table below. The scale of the following individual section maps is 1:12,000.

<u>To Convert</u>	<u>Multiply By</u>	<u>To Get</u>
feet	0.3048	meters
miles	1.609	kilometers
tons	0.907	metric tons

SECTION 4

TOWNSHIP 144 NORTH, RANGE 93 WEST

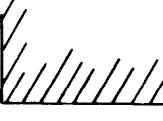


EXPLANATION

 COAL CROP LINE, APPROXIMATELY LOCATED
(LETTER INDICATES BED NAME)

 B - "B" BED

 A - "A" BED

 BOUNDARY OF FEDERAL COAL

4304JJ DRILL HOLE NUMBER

● DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)
 TOWNSHIP 144 NORTH, RANGE 93 WEST, SECTION 4

DUNN CENTER BED

OVERBURDEN	MEASURED	INDICATED	INFERRRED
0' to 25'	819,000	0	0
25' to 150'	9,851,000	182,000	0
>150'	0	0	0

"A" BED

OVERBURDEN	MEASURED	INDICATED	INFERRRED
0' to 25'	236,000	42,000	0
25' to 150'	1,058,000	26,000	0
>150'	0	0	0

"B" BED

OVERBURDEN	MEASURED	INDICATED	INFERRRED
0' to 25'	630,000	105,000	0
25' to 150'	42,000	7,000	0
>150'	0	0	0

SECTION TOTAL

OVERBURDEN	MEASURED	INDICATED	INFERRRED
0' to 25'	1,685,000	147,000	0
25' to 150'	10,913,000	215,000	0
>150'	0	0	0

SECTION 4

TOWNSHIP 144 NORTH, RANGE 93 WEST

DRILL-HOLE DATA

4304SE

4304SJ

4304SN

4304NE

4304NJ

2204

2205

2230

2218

2222

R 21
C 2 (DC)
R 1
C 9.5 (DC)
R 5.5
39TD

R 43
C 12 (DC)
R 9
64TD

R 61
C 11.5 (DC)
R 20
C 1
R 6.5
100TD

R 45
C 14 (DC)
R 9
C 2.5
R 7.5
78TD

R 47
C 12 (DC)
R 10
C 1
R 89
159TD

4304NN

4304JE

4304JJ

4304JN

4304EJ

2235

2250

2218

2228

2221

R 62
C 11.5 (DC)
R 6.5
80TD

R 86
C 13 (DC)
R 5
C 3
R 74
C 4 (DIRTY)
R 15
C 1
R 34
235TD

R 57
C 13 (DC)
R 6
C 2.5
R 21.5
100TD

R 7
C 2 (A)
R 47
C 1
R 2
C 11.5 (DC)
R 11
C 1
R 10.5
93TD

R 85
C 14 (DC)
R 3
C 3
R 15
120TD

4304EN

4304AJ

4304AN

EXPLANATION

2262

2242

2238

4304EN — DRILL HOLE NUMBER

R 6
C 3 (B)
R 2
C 3 (B)
R 31
C 4.5 (A)
R 82
C 13.5 (DC)
R 4
C 3
R 8
160TD

R 10
C 6.5 (B)
R 39
C 6.5 (A)
R 77
C 14 (DC)
R 1
C 2.5
R 4
C 1
R 15.5
177TD

R 50
C 6.5 (A)
R 74
C 14.5 (DC)
R 2
C 3
R 5
C 1
R 14
170TD

2250 — SURFACE ELEVATION

R25 — OVERBURDEN*

C10(A) — COAL BED

R15 — (LETTER INDICATES
BED NAME)

C15(DC) — INTERBURDEN*

R25 — 90TD — TOTAL DEPTH OF HOLE

COAL BEDS

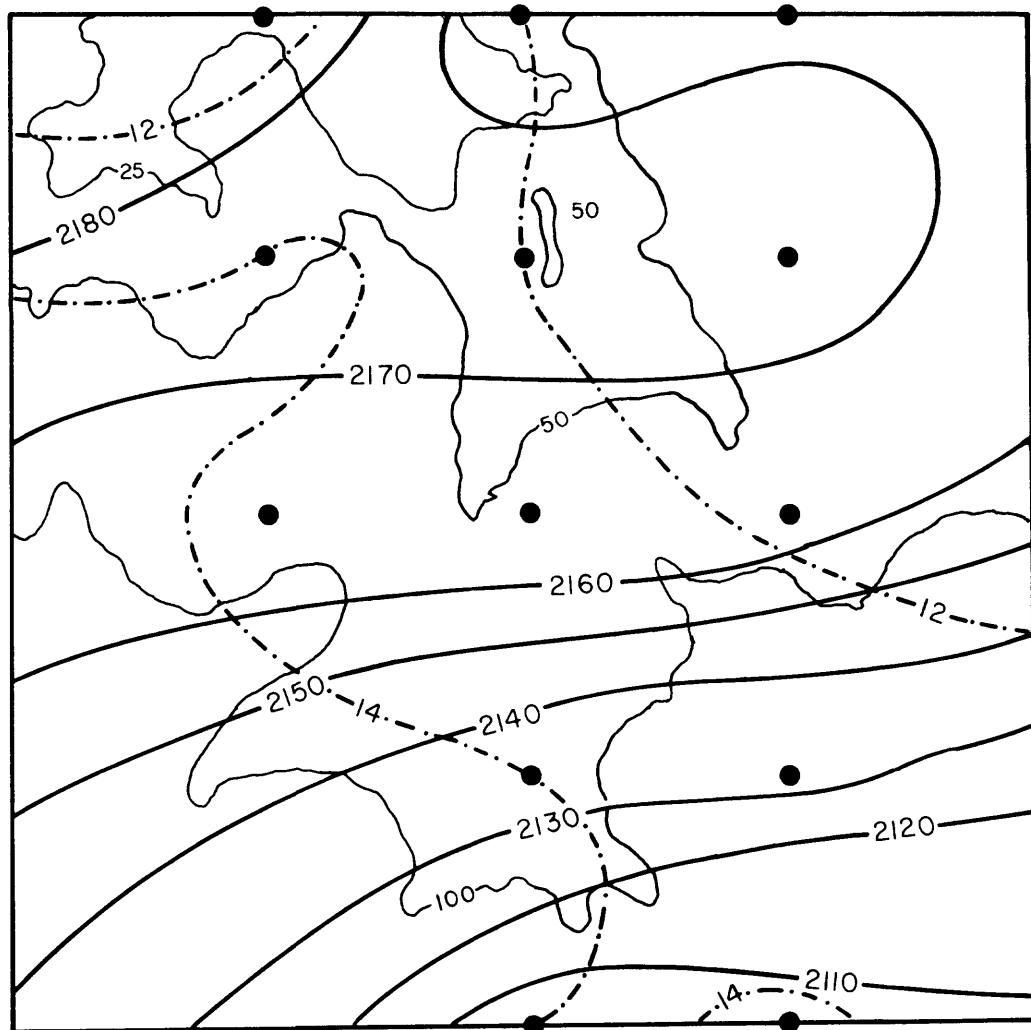
B — "B" BED

A — "A" BED

DC — DUNN CENTER BED

SECTION 4

TOWNSHIP 144 NORTH, RANGE 93 WEST



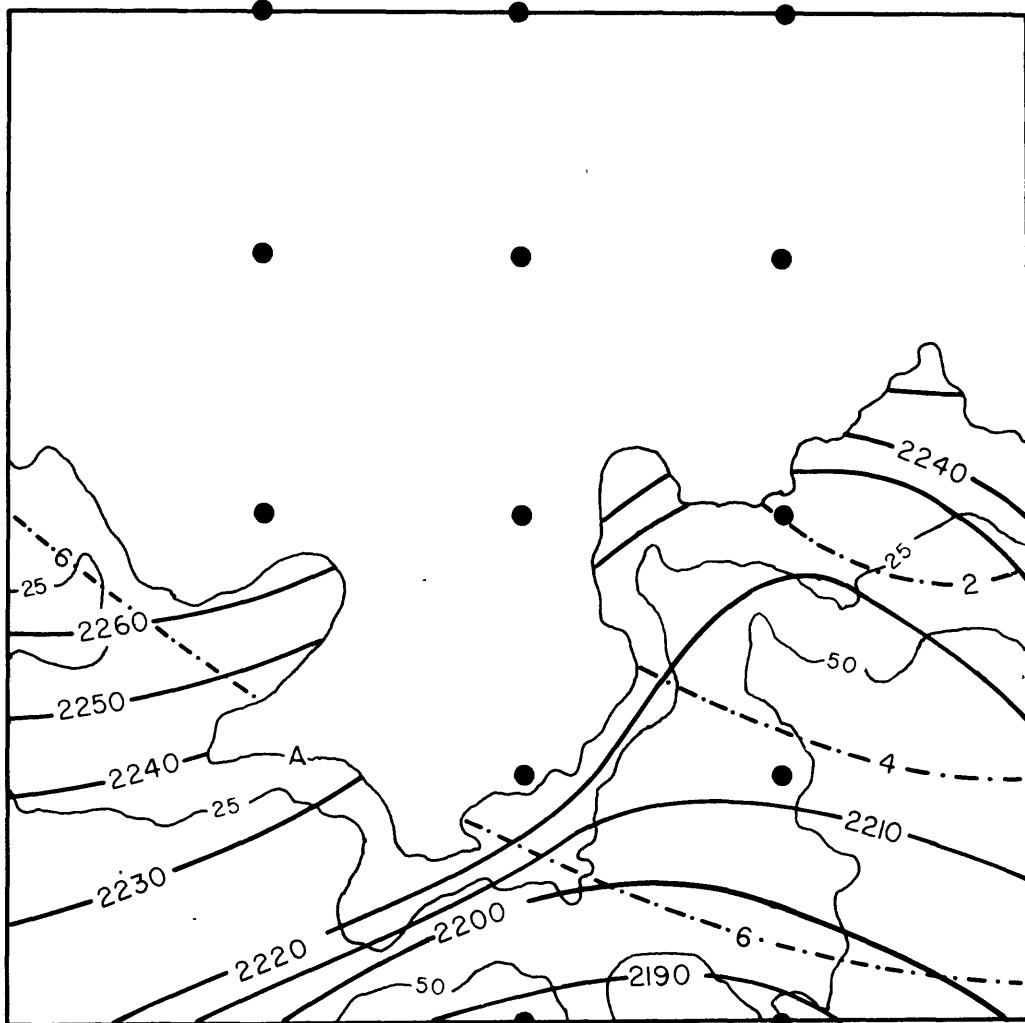
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE
DUNN CENTER LIGNITE BED

EXPLANATION

- 2160 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 18 — COAL ISOPACH LINE (C.I. 2 FEET)
- 100 — OVERBURDEN ISOPACH LINES AT 25, 50, AND 100 FEET
- DRILL HOLE

SECTION 4

TOWNSHIP 144 NORTH, RANGE 93 WEST



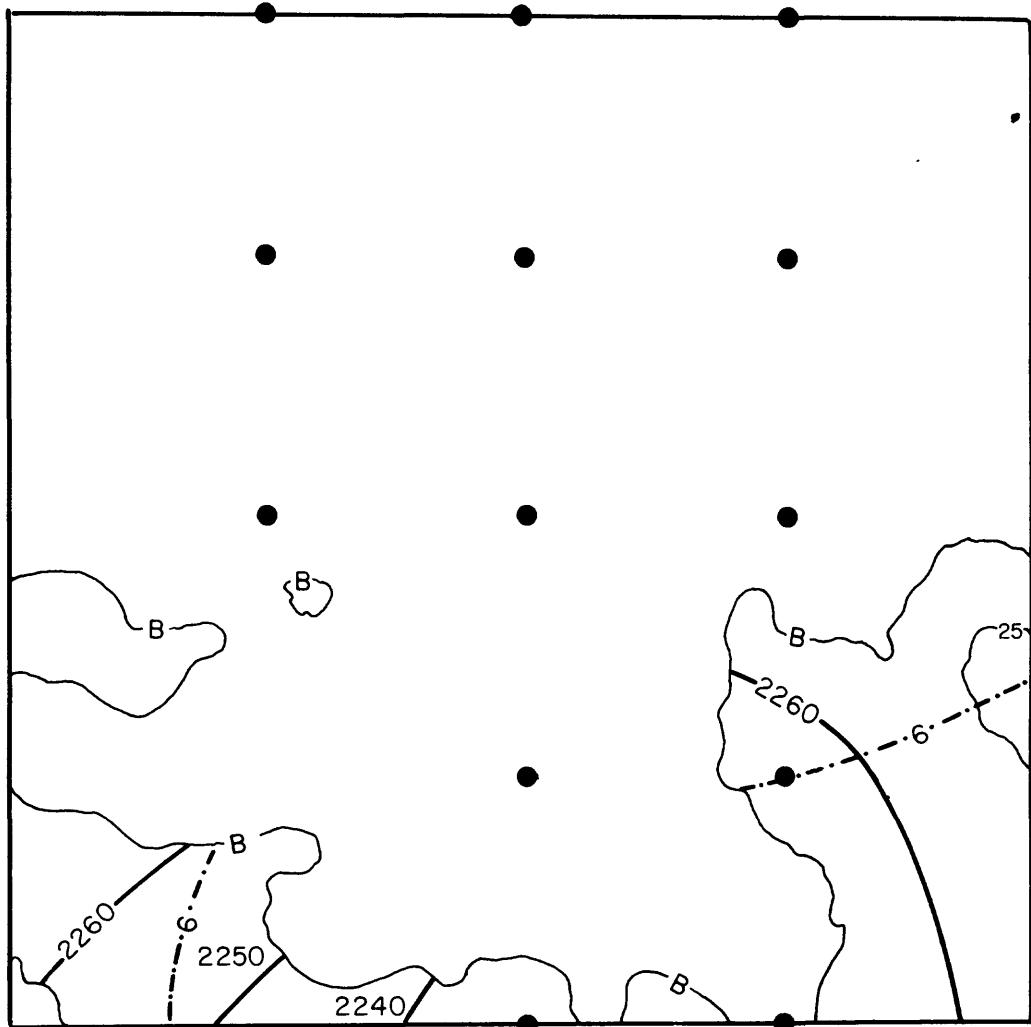
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE "A" LIGNITE BED

EXPLANATION

 A COAL CROP LINE OF THE "A" BED, APPROXIMATELY LOCATED
 2230 STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
 6 COAL ISOPACH LINE (C.I. 2 FEET)
 50 OVERBURDEN ISOPACH LINES AT 25, AND 50 FEET
 DRILL HOLE

SECTION 4

TOWNSHIP 144 NORTH, RANGE 93 WEST



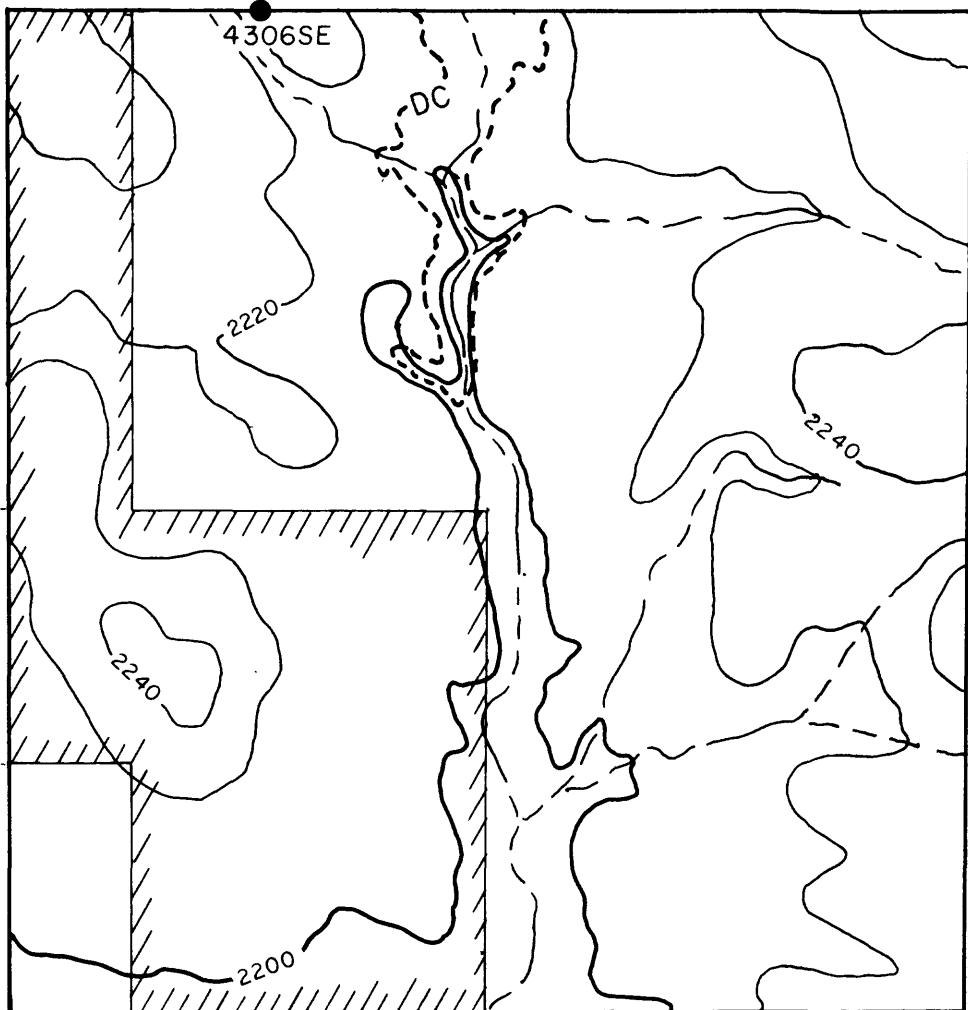
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE
"B" LIGNITE BED

EXPLANATION

- ~~~~~ B ~~~~~ COAL CROP LINE OF THE "B" BED, APPROXIMATELY LOCATED
- ~~~~~ 2260 ~~~~~ STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- ~~~~~ 6 ~~~~~ COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 25 ~~~~~ OVERBURDEN ISOPACH LINES AT 25 FEET
- DRILL HOLE

SECTION 6

TOWNSHIP 144 NORTH, RANGE 93 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

EXPLANATION

 DC - COAL CROP LINE, APPROXIMATELY LOCATED
(LETTER INDICATES BED NAME)

DC - DUNN CENTER BED



BOUNDARY OF FEDERAL COAL

4306SE

DRILL HOLE NUMBER



DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)
TOWNSHIP 144 NORTH, RANGE 93 WEST, SECTION 6

DUNN CENTER BED

OVERBURDEN	MEASURED	INDICATED	INFERRRED
0' to 25'	0	708,000	1,176,000
25' to 150'	294,000	2,073,000	224,000
>150'	0	0	0

SECTION TOTAL

OVERBURDEN	MEASURED	INDICATED	INFERRRED
0' to 25'	0	708,000	1,176,000
25' to 150'	294,000	2,073,000	224,000
>150'	0	0	0

SECTION 6

TOWNSHIP 144 NORTH, RANGE 93 WEST

DRILL HOLE DATA

4306SE

2222
R 30
C 12 (DC)
R 1
C 2 (DC)
R 13
58TD

EXPLANATION

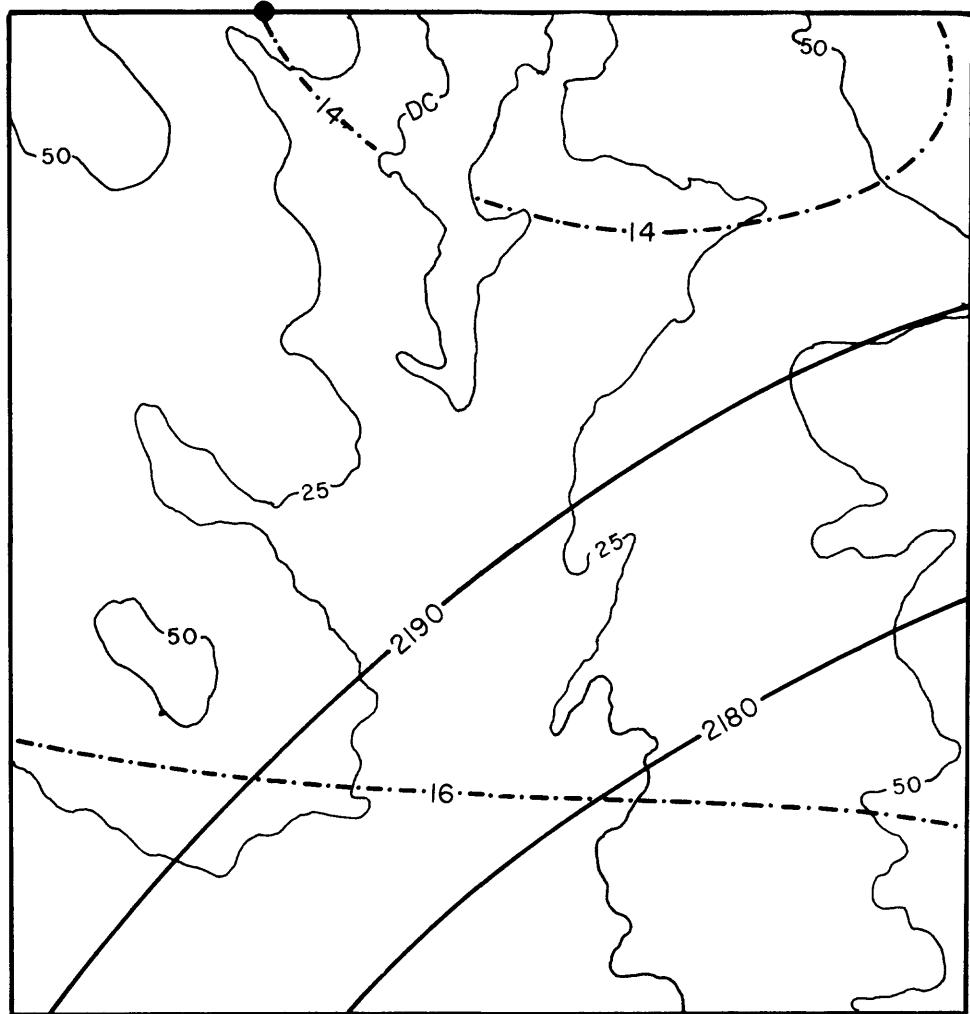
4306SE ————— DRILL HOLE NUMBER
2250 ————— SURFACE ELEVATION
R40 ————— OVERTBURDEN*
C10(A) ————— COAL BED
R20 ————— (LETTER INDICATES
C15(DC) ————— BED NAME)
R25 ————— INTERBURDEN*
110TD ————— TOTAL DEPTH OF HOLE

COAL BEDS

A - "A" BED
DC - DUNN CENTER BED

SECTION 6

TOWNSHIP 144 NORTH, RANGE 93 WEST



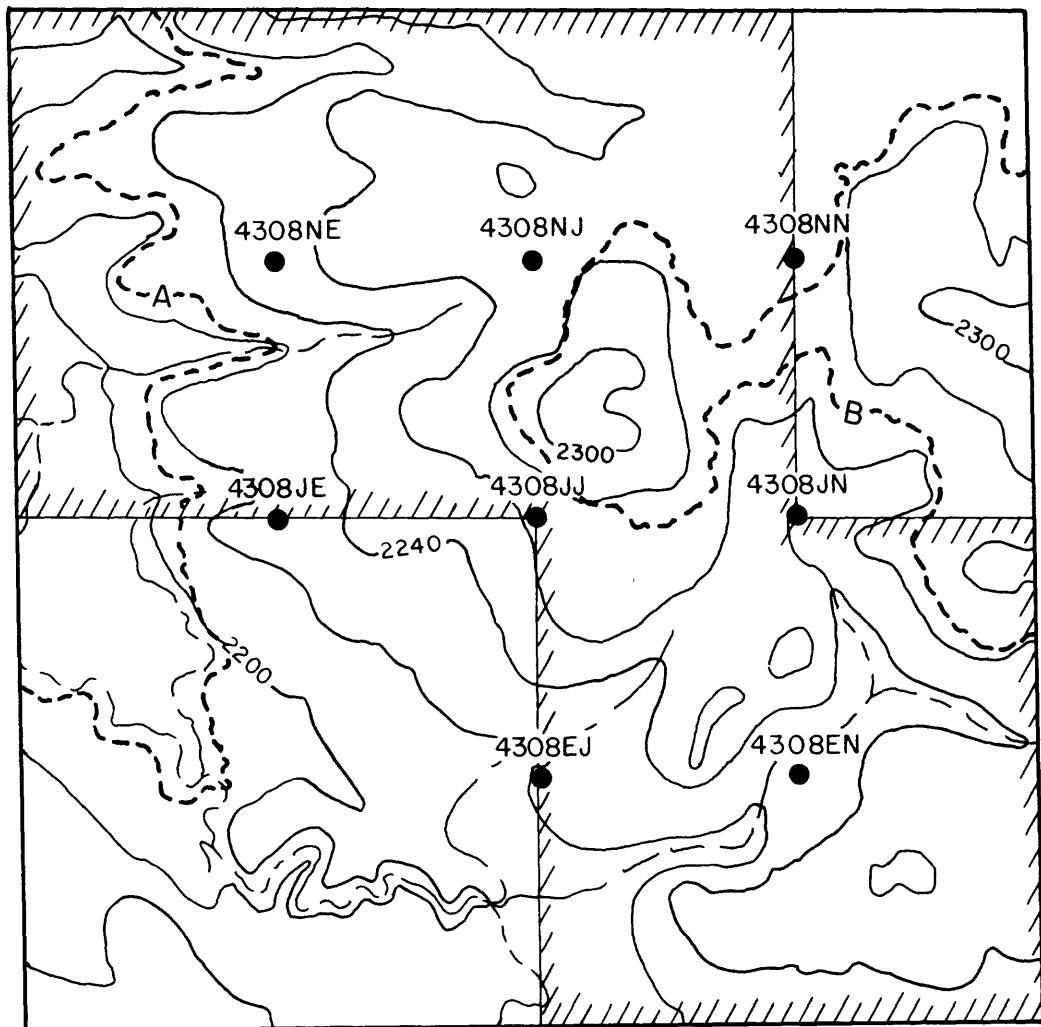
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE
DUNN CENTER LIGNITE BED

EXPLANATION

- ~~~~~DC~~~~~ COAL CROP LINE OF THE DC BED, APPROXIMATELY LOCATED
- 2190——— STRUCTURAL CONTOUR LINE (C.I. 2 FEET)
- 16----- COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~25~~~~~ OVERBURDEN ISOPACH LINES AT 25 AND 50 FEET
- DRILL HOLE

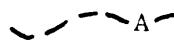
SECTION 8

TOWNSHIP 144 NORTH, RANGE 93 WEST



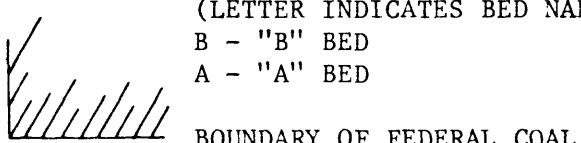
TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

EXPLANATION

 A - COAL CROP LINE, APPROXIMATELY LOCATED
(LETTER INDICATES BED NAME)

B - "B" BED

A - "A" BED



BOUNDARY OF FEDERAL COAL

4308NE DRILL HOLE NUMBER

● DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)
 TOWNSHIP 144 NORTH, RANGE 93 WEST, SECTION 8

DUNN CENTER BED

OVERBURDEN	MEASURED	INDICATED	INFERRED
0' to 25'	166,000	33,000	0
25' to 150'	12,402,000	598,000	0
>150'	166,000	0	0

"A" BED

OVERBURDEN	MEASURED	INDICATED	INFERRED
0' to 25'	493,000	0	0
25' to 150'	3,055,000	208,000	0
>150'	0	0	0

"B" BED

OVERBURDEN	MEASURED	INDICATED	INFERRED
0' to 25'	0	0	378,000
25' to 150'	0	0	21,000
>150'	0	0	0

SECTION TOTAL

OVERBURDEN	MEASURED	INDICATED	INFERRED
0' to 25'	659,000	33,000	378,000
25' to 150'	15,457,000	806,000	21,000
>150'	166,000	0	0

SECTION 8

TOWNSHIP 144 NORTH, RANGE 93 WEST

DRILL HOLE DATA

4308NE

4308NJ

4308NN

4308JE

4308JJ

2250

2270

2275

2228

2264

R 12

R 56

R 62

R 24

R 57

C 1

C 5.5 (A)

C 6.5 (A)

C 7 (A)

C 5.5 (A)

R 11

R 56

R 56

R 35

R 52

C 5.5 (A)

C 18.5 (DC)

C 16 (DC)

C 18.5 (DC)

C 18.5 (DC)

R 48

R 5

R 1

R 5

R 5

C 19 (DC)

C 1

C 3.5 (DC)

C 1

C 1

R 5

R 8

R 5

R 9.5

R 10

C 1

150TD

C 1

100TD

149TD

R 16.5

160TD

4308JN

4308EJ

4308EN

2255

2220

2228

R 45

R 27

R 34

C 6 (A)

C 1

C 1

R 5

R 10

R 1

C 1

C 8 (A)

C 6 (A)

R 49

R 27

R 52

C 19.5 (DC)

C 19 (DC)

C 19 (DC)

R 3

R 4

R 5

C 1.5

C 2

C 1

R 20

R 21

R 20

150TD

119TD

139TD

EXPLANATION

4308NE — DRILL HOLE NUMBER

2250 — SURFACE ELEVATION

R56 — OVERBURDEN*

C5.5(A) — COAL BED

R56 — (LETTER INDICATES

C18.5(DC) — BED NAME)

R5 — INTERBURDEN*

141TD — TOTAL DEPTH OF HOLE

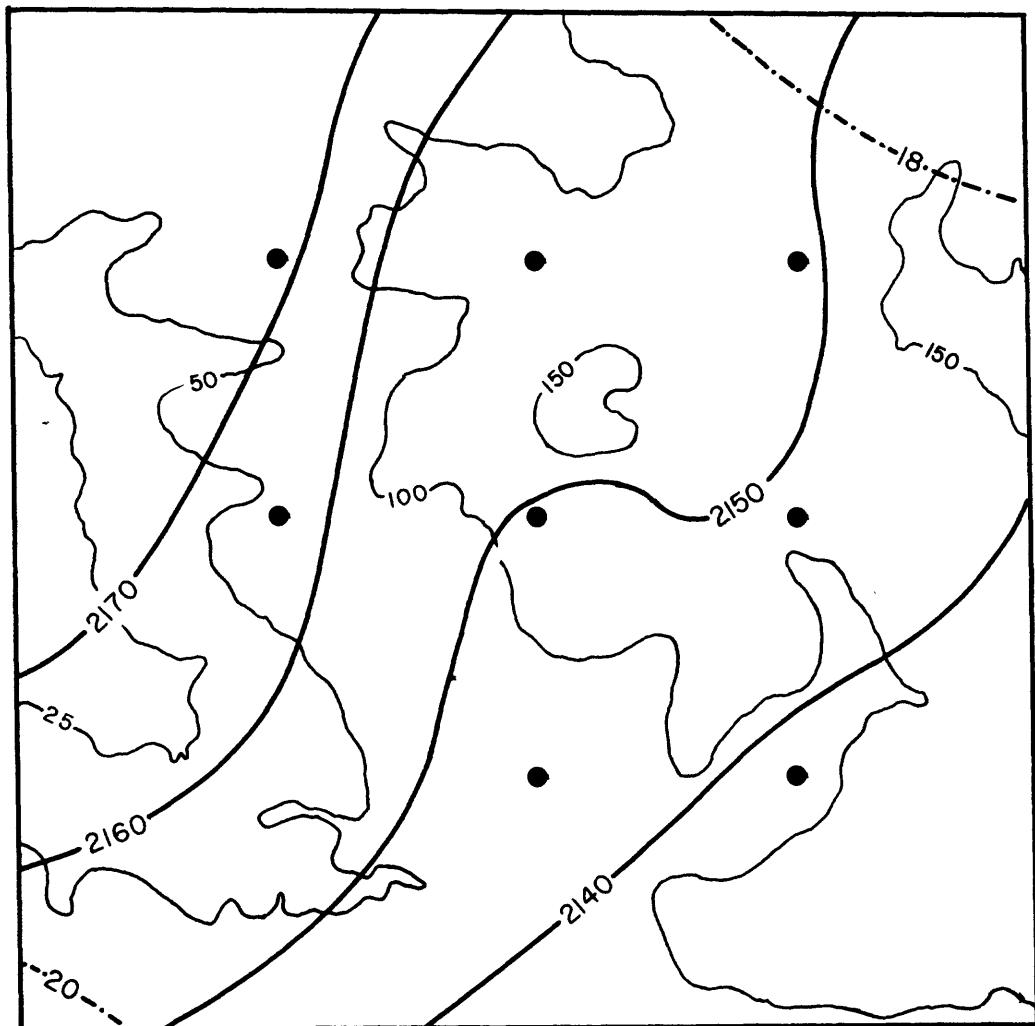
COAL BEDS

A — "A" BED

DC — DUNN CENTER BED

SECTION 8

TOWNSHIP 144 NORTH, RANGE 93 WEST



THICKNESS, OVERBURDEN, AND STRUCTURE OF THE
DUNN CENTER LIGNITE BED

EXPLANATION

— 2140 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)

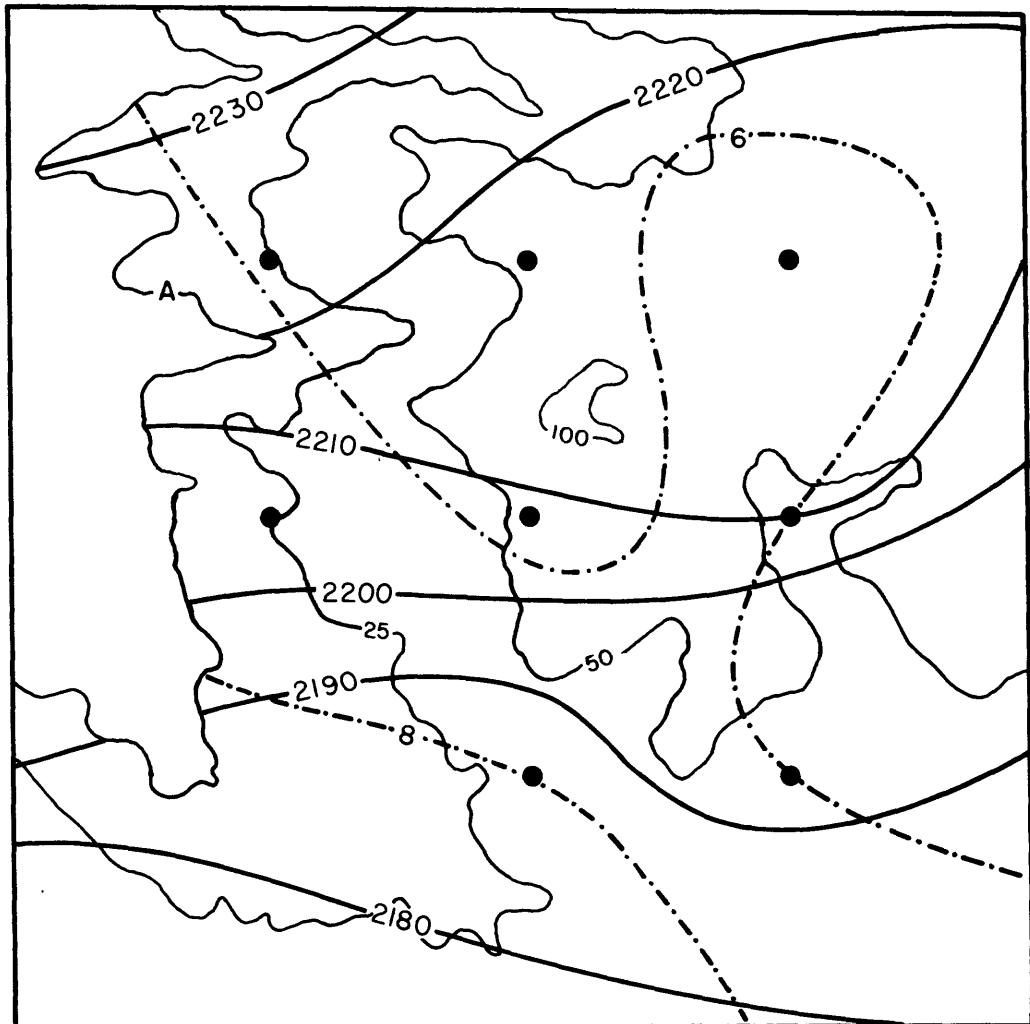
- - - - 20 - - - - COAL ISOPACH LINE (C.I. 2 FEET)

~~~~~ 150 ~~~~~ OVERBURDEN ISOPACH LINES AT 25, 50,  
100, AND 150 FEET

● DRILL HOLE

SECTION 8

TOWNSHIP 144 NORTH, RANGE 93 WEST



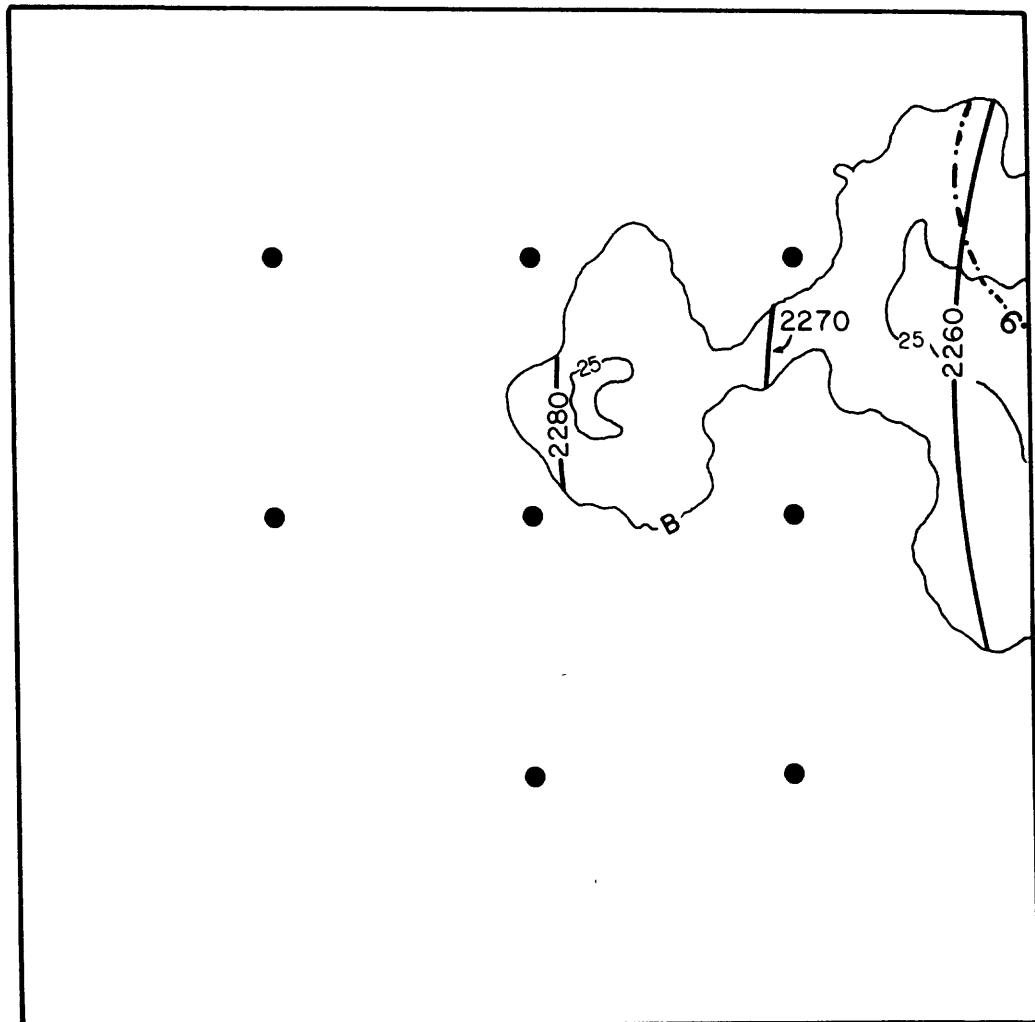
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"A" LIGNITE BED

EXPLANATION

- ~~~~~ A ~~~~~ COAL CROP LINE OF THE "A" BED, APPROXIMATELY LOCATED
- 2200 ——— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 8 ----- COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 50 ~~~~~ OVERBURDEN ISOPACH LINES AT 25, 50, and 100 FEET
- DRILL HOLE

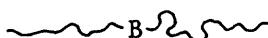
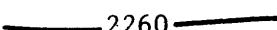
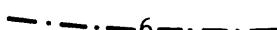
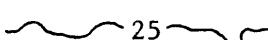
SECTION 8

TOWNSHIP 144 NORTH, RANGE 93 WEST



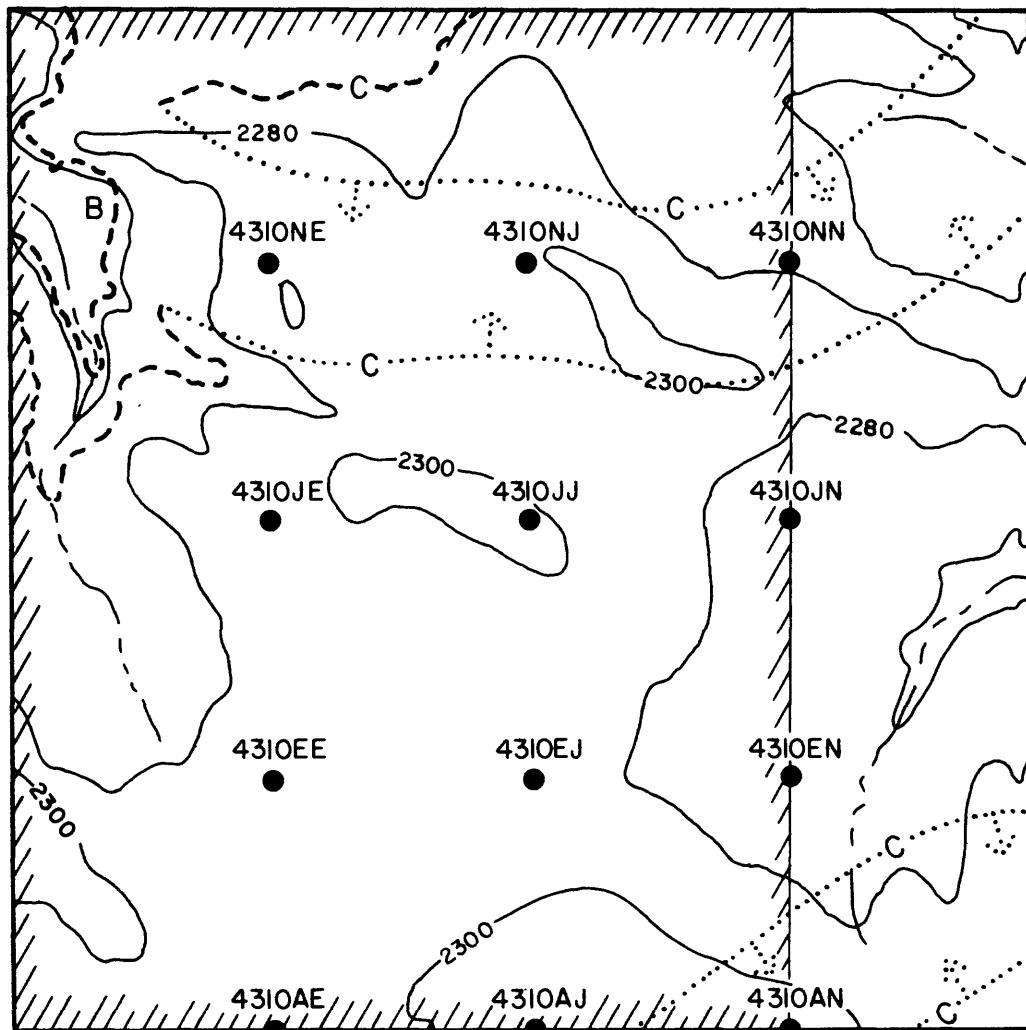
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

-  COAL CROP LINE OF THE "B" BED, APPROXIMATELY LOCATED
-  2260 STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
-  6 COAL ISOPACH LINE (C.I. 2 FEET)
-  25 OVERBURDEN ISOPACH LINE AT 25 FEET
-  DRILL HOLE

SECTION 10

TOWNSHIP 144 NORTH, RANGE 93 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL-HOLE LOCATION MAP

EXPLANATION

— — — B — — —

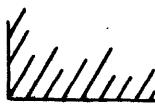
COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)

C - "C" BED

B - "B" BED

..... C .....

SUBSURFACE LIMIT OF COAL, APPROXIMATELY LOCATED  
(COAL MISSING IN DIRECTION OF ARROWS,  
LETTER INDICATES BED NAME)



BOUNDARY OF FEDERAL COAL

4310EE

DRILL-HOLE NUMBER



DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)  
 TOWNSHIP 144 NORTH, RANGE 93 WEST, SECTION 10

DUNN CENTER BED

| OVERBURDEN  | MEASURED   | INDICATED | INFERRRED |
|-------------|------------|-----------|-----------|
| 0' to 25'   | 0          | 0         | 0         |
| 25' to 150' | 0          | 0         | 0         |
| >150'       | 15,627,000 | 560,000   | 0         |

"A" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 0         | 0         | 0         |
| 25' to 150' | 4,819,000 | 220,000   | 0         |
| >150'       | 0         | 0         | 0         |

"B" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 1,064,000 | 84,000    | 0         |
| 25' to 150' | 5,474,000 | 98,000    | 0         |
| >150'       | 0         | 0         | 0         |

"C" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 60,000    | 220,000   | 0         |
| 25' to 150' | 1,121,000 | 84,000    | 0         |
| >150'       | 0         | 0         | 0         |

SECTION TOTAL

| OVERBURDEN  | MEASURED   | INDICATED | INFERRRED |
|-------------|------------|-----------|-----------|
| 0' to 25'   | 1,124,000  | 304,000   | 0         |
| 25' to 150' | 11,414,000 | 402,000   | 0         |
| >150'       | 15,627,000 | 560,000   | 0         |

## SECTION 10

TOWNSHIP 144 NORTH, RANGE 93 WEST

## DRILL-HOLE DATA

4310NE

2298

R 45  
C 5 (B)  
R 3.5  
C 3 (B)  
R 42  
C 5.5 (A)  
R 90  
C 15 (DC)  
R 5  
C 2.5  
R 2  
C 1  
R 44  
C 2.5  
R 2  
C 1  
R 45

314TD

4310NJ

2298

R 53  
C 5 (B)  
R 6  
C 3.5 (B)  
R 44  
C 4.5 (A)  
R 80  
C 14.5 (DC)  
R 2  
C 1  
R 3  
C 3  
R 4  
C 1  
R 5.5

230TD

4310NN

2278

R 67  
C 5.5 (B)  
R 10  
C 4.5 (B)  
R 43  
C 5 (A)  
R 62  
C 1 (DC)  
R 1  
C 14 (DC)  
R 12  
C 2  
R 5  
C 1  
R 27

260TD

4310JE

2290

R 27  
C 3 (C)  
R 13  
C 5 (B)  
R 7  
C 3 (B)  
R 40  
C 6 (A)  
R 124  
C 16 (DC)  
R 1  
C 4 (DC)  
R 3  
C 1  
R 5  
C 1  
R 21

280TD

4310JJ

2302

R 55  
C 3 (C)  
R 21  
C 4.5 (B)  
R 2  
C 3 (B)  
R 40  
C 5.5 (A)  
R 110  
C 15 (DC)  
R 2  
C 3 (DC)  
R 2  
C 1.5  
R 14.5

282TD

4310JN

2273

R 55  
C 4 (C)  
R 10  
C 5.5 (B)  
R 11  
C 4 (B)  
R 44  
C 5.5 (A)  
R 74  
C 14 (DC)  
R 2  
C 1  
R 3  
C 3  
R 4  
C 2  
R 17

259TD

4310EE

2285

R 38  
C 1 (C)  
R 13  
C 5 (B)  
R 6  
C 3 (B)  
R 48  
C 7 (A)  
R 98  
C 16 (DC)  
R 1  
C 3 (DC)  
R 2  
C 2  
R 25

268TD

4310EJ

2290

R 30  
C 3.5 (C)  
R 13  
C 5 (B)  
R 6  
C 3 (B)  
R 40  
C 6.5 (A)  
R 105  
C 16.5 (DC)  
R 1  
C 4 (DC)  
R 2  
C 1  
R 23.5

260TD

4310EN

2270

R 49  
C 4 (C)  
R 18  
C 5.5 (B)  
R 2  
C 3 (B)  
R 38  
C 6 (A)  
R 89  
C 14.5 (DC)  
R 3  
C 3.5 (DC)  
R 3  
C 1  
R 2  
C 1  
R 17.5

260TD

4310AE

2295

R 54  
C 3 (C)  
R 21  
C 9.5 (B)  
R 43  
C 7 (A)  
R 93  
C 16.5 (DC)  
R 1  
C 3 (DC)  
R 4  
C 2  
R 23  
C 2  
R 1  
C 1.5  
R 10  
C 1.5  
R 3  
C 1  
R 17

317TD

## SECTION 10

TOWNSHIP 144 NORTH, RANGE 93 WEST

## DRILL-HOLE DATA

4310AJ

4310AN

| 2310      |
|-----------|
| R 64      |
| C 3.5 (C) |
| R 16      |
| C 4.5 (B) |
| R 7       |
| C 3.5 (B) |
| R 37      |
| C 6.5 (A) |
| R III     |
| C 21 (DC) |
| R 2.5     |
| C 2.5     |
| R II      |
| 290TD     |

| 2305       |
|------------|
| R 96       |
| C 5 (B)    |
| R I        |
| C 3.5 (B)  |
| R 34       |
| C 6 (A)    |
| R 102      |
| C 14 (DC)  |
| R I        |
| C 3.5 (DC) |
| R 3        |
| C 3        |
| R 18       |
| 290TD      |

## EXPLANATION

4310AJ ————— DRILL-HOLE NUMBER

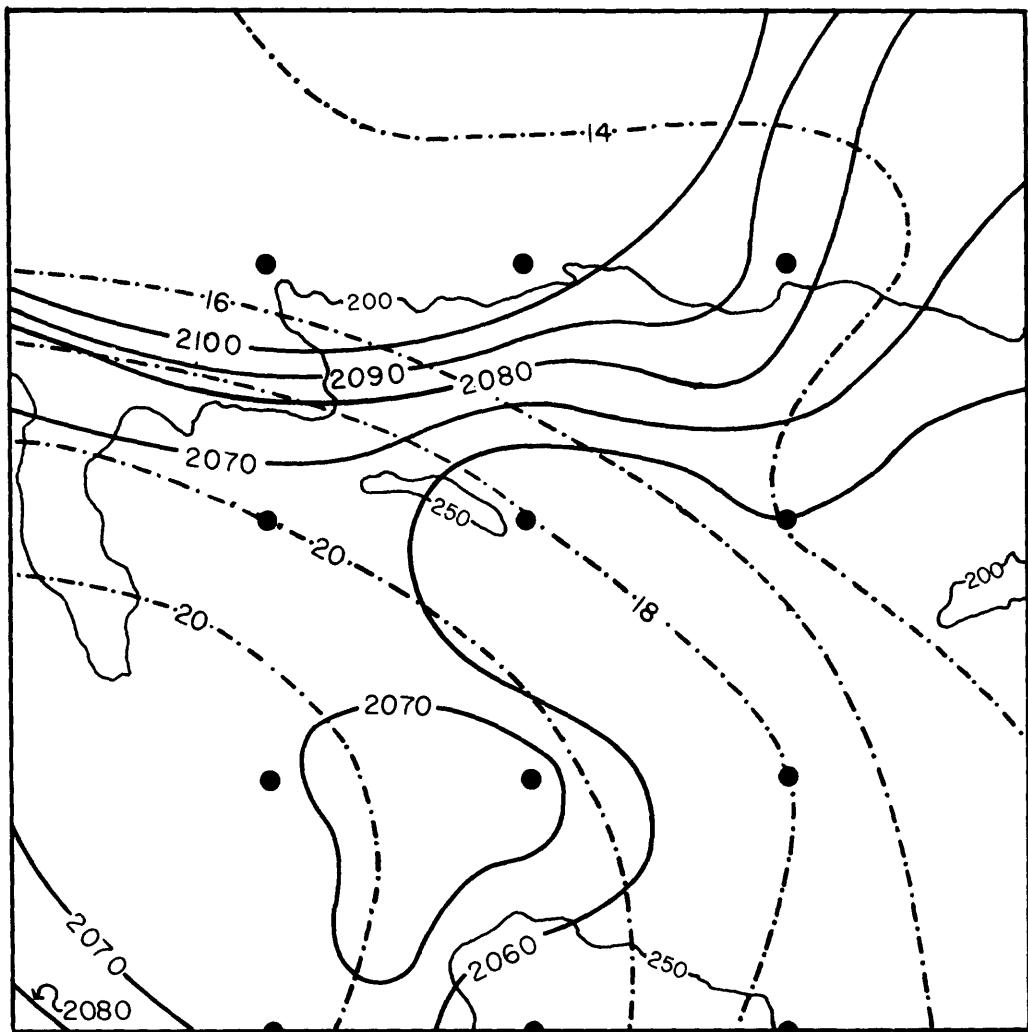
|         |                          |
|---------|--------------------------|
| 2310    | ———— SURFACE ELEVATION   |
| R64     | ———— OVERBURDEN*         |
| C3.5(C) | ———— COAL BED            |
| R16     | ———— (LETTER INDICATES   |
| C4.5(B) | ———— BED NAME)           |
| R15     | ———— INTERBURDEN*        |
| 103TD   | ———— TOTAL DEPTH OF HOLE |

## COAL BEDS

C - "C" BED  
 B - "B" BED  
 A - "A" BED  
 DC - DUNN CENTER BED

SECTION 10

TOWNSHIP 144 NORTH, RANGE 93 WEST



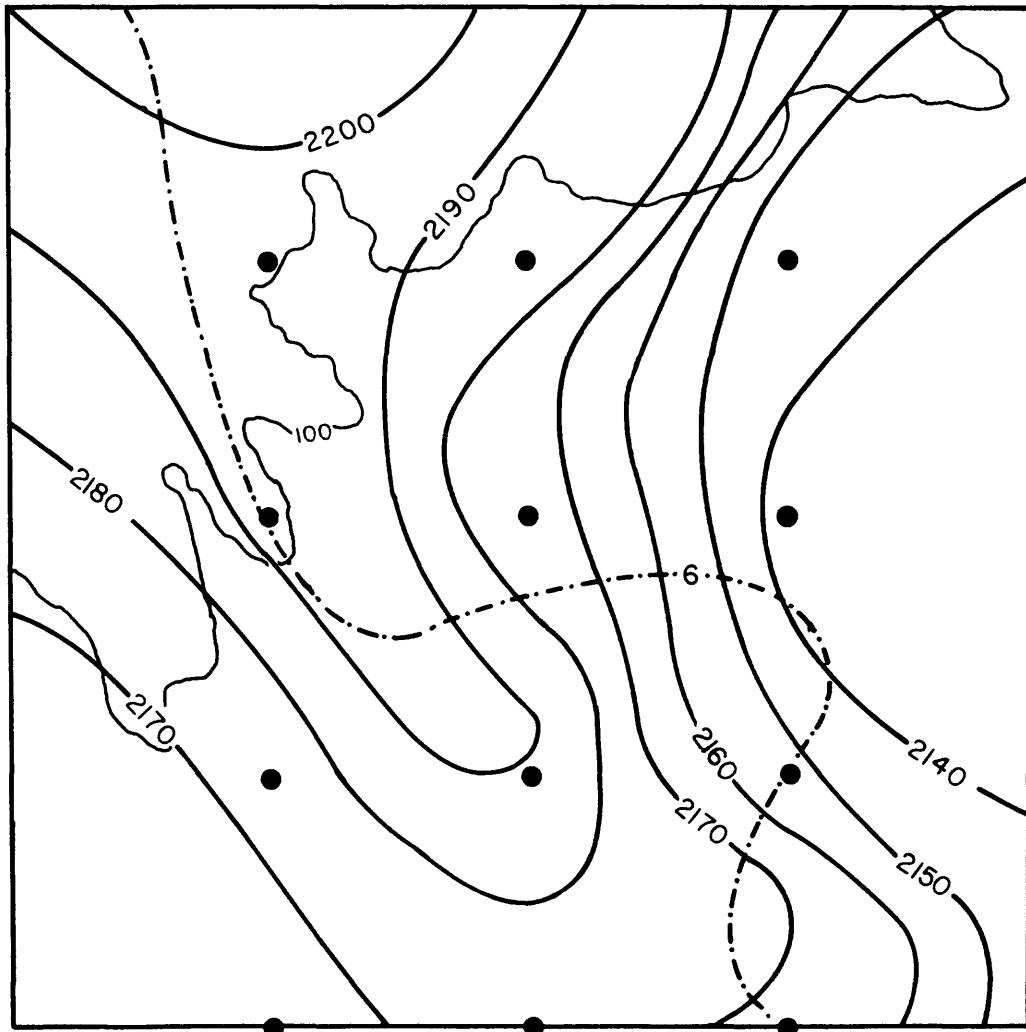
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED

EXPLANATION

- 2100 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 18 — COAL ISOPACH LINE (C.I. 2 FEET)
- 200 — OVERBURDEN ISOPACH LINES AT 200,  
250, AND 300 FEET
- DRILL HOLE

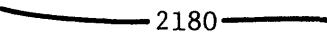
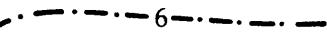
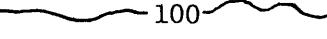
SECTION 10

TOWNSHIP 144 NORTH, RANGE 93 WEST



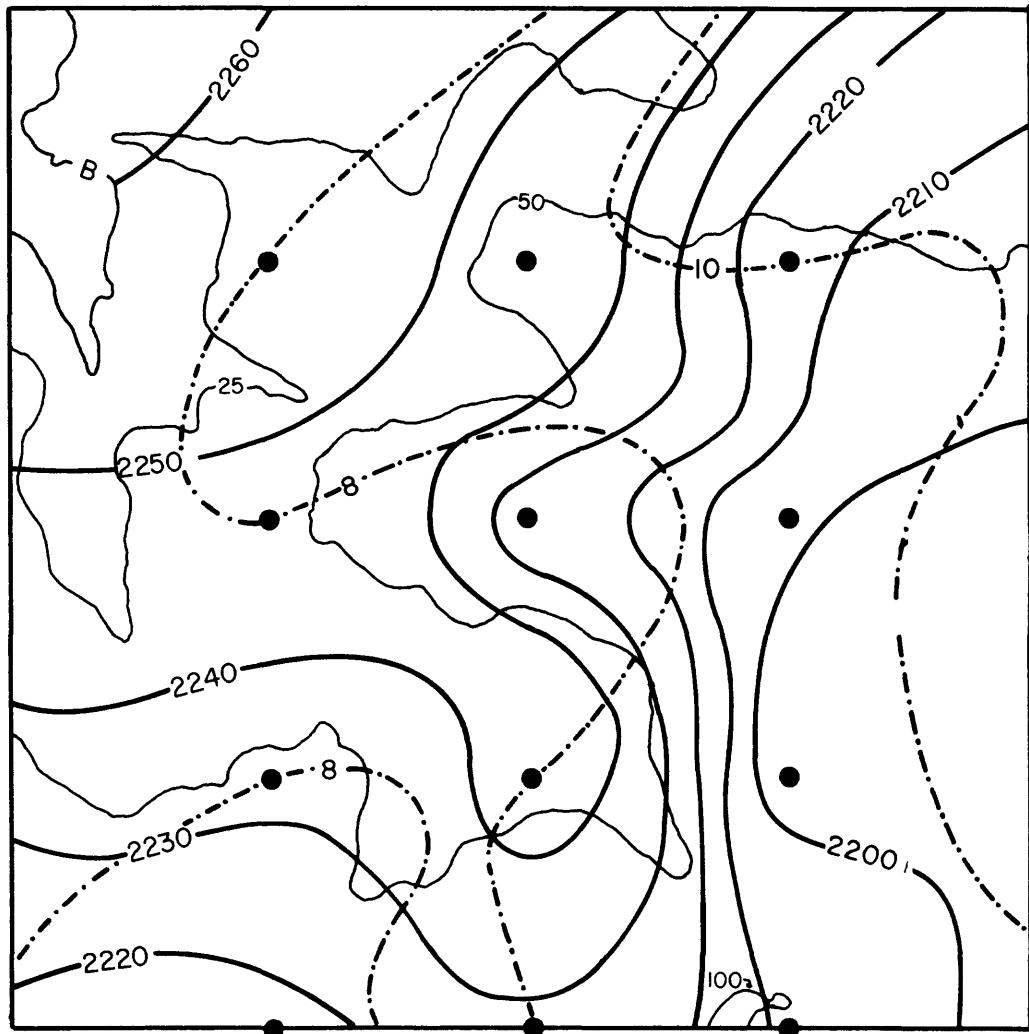
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"A" LIGNITE BED

EXPLANATION

-  2180 ————— STRUCTURAL CONTOUR LINE (C.I. 2 FEET)
-  6 ————— COAL ISOPACH LINE (C.I. 2 FEET)
-  100 ————— OVERBURDEN ISOPACH LINE AT 100 FEET
- DRILL HOLE

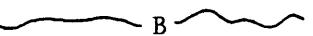
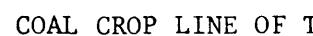
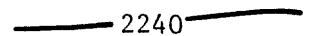
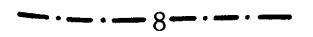
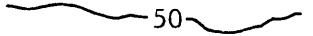
SECTION 10

TOWNSHIP 144 NORTH, RANGE 93 WEST



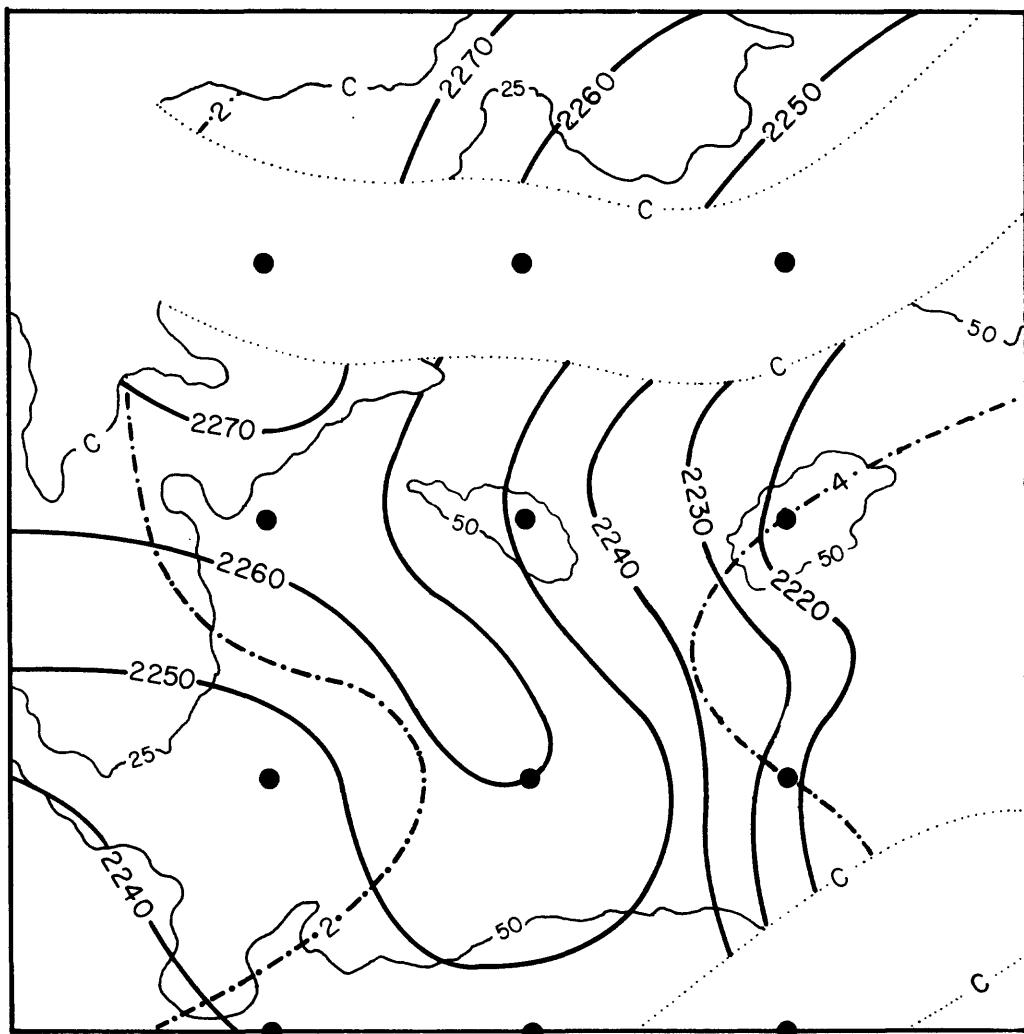
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

-  B  COAL CROP LINE OF THE "B" BED, APPROXIMATELY LOCATED
-  2240  STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
-  8  COAL ISOPACH LINE (C.I. 2 FEET)
-  50  OVERBURDEN ISOPACH LINES AT 25, 50, 100  
AND 150 FEET
- DRILL HOLE

SECTION 10

TOWNSHIP 144 NORTH, RANGE 93 WEST



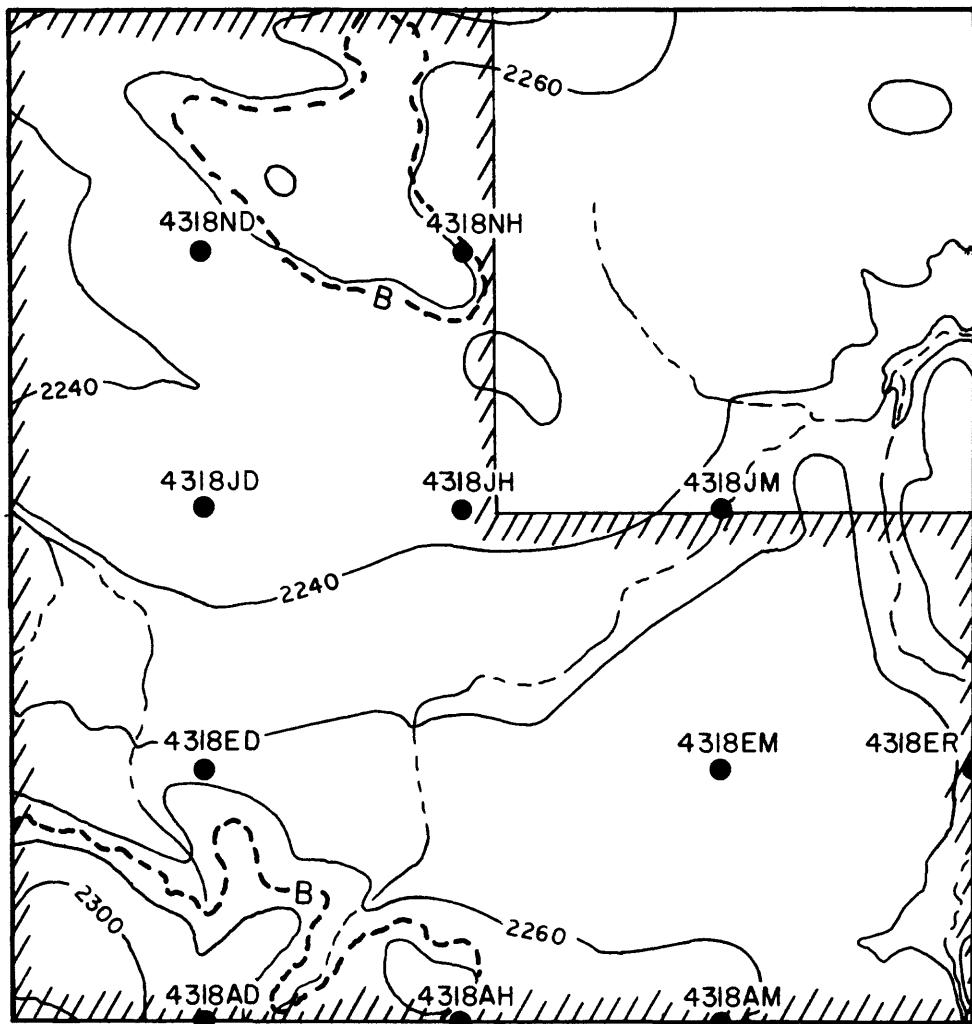
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"C" LIGNITE BED

EXPLANATION

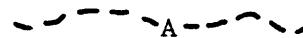
- ~~~~~ C ~~~~~ COAL CROP LINE OF THE "C" BED, APPROXIMATELY LOCATED
- ..... C ..... SUBSURFACE LIMIT OF "C" BED, APPROXIMATELY LOCATED
- 2250 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 4 — COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 50 ~~~~~ OVERBURDEN ISOPACH LINES AT 25 AND 50 FEET
- DRILL HOLE

SECTION 18

TOWNSHIP 144 NORTH, RANGE 93 WEST



EXPLANATION

 COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)

 B - "B" BED

 A - "A" BED

 BOUNDARY OF FEDERAL COAL

4318ND DRILL HOLE NUMBER

● DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)  
 TOWNSHIP 144 NORTH, RANGE 93 WEST, SECTION 18

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DUNN CENTER BED

| OVERBURDEN  | MEASURED   | INDICATED | INFERRRED |
|-------------|------------|-----------|-----------|
| 0' to 25'   | 0          | 0         | 0         |
| 25' to 150' | 15,680,000 | 35,000    | 0         |
| >150'       | 35,000     | 0         | 0         |

---

"A" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 294,000   | 0         | 0         |
| 25' to 150' | 5,936,000 | 70,000    | 0         |
| >150'       | 0         | 0         | 0         |

---

"B" BED

| OVERBURDEN  | MEASURED | INDICATED | INFERRRED |
|-------------|----------|-----------|-----------|
| 0' to 25'   | 525,000  | 31,000    | 0         |
| 25' to 150' | 95,000   | 0         | 0         |
| >150'       | 0        | 0         | 0         |

---

SECTION TOTAL

| OVERBURDEN  | MEASURED   | INDICATED | INFERRRED |
|-------------|------------|-----------|-----------|
| 0' to 25'   | 819,000    | 31,000    | 0         |
| 25' to 150' | 21,711,000 | 105,000   | 0         |
| >150'       | 35,000     | 0         | 0         |

## SECTION 18

TOWNSHIP 144 NORTH, RANGE 93 WEST

## DRILL-HOLE DATA

4318ND

4318NH

4318JD

4318JH

4318JM

2255

2265

2245

2245

2235

R 30

R 3

R 23

R 29

R 42

C 1

C 5.5 (B)

C 1

C 6.5 (A)

C 1.5

R 9

R 57

R 7

R 50

R 11

C 7 (A)

C 8.5 (A)

C 7.5 (A)

C 19.5 (DC)

C 8.5 (A)

R 46

R 32

R 48

R 5

R 17

C 20.5 (DC)

C 19.5 (DC)

C 19 (DC)

C 3

C 20 (DC)

R 5

R 5

R 4

R 6

R 4

C 1

C 1

C 1.5

119 TD

C 2

R 1

R 7.5

R 1

C 1

R 23

C 1

139 TD

R 7

120 TD

C 2.5

R 8.5

130 TD

120 TD

R 18.5

150 TD

4318ED

4318EM

4318ER

4318AD

4318AH

2255

2250

2230

2288

2276

R 43

R 4

R 40

R 16

R 51

C 1.5

C 2

C 1.5

C 6.5 (B)

C 1.5

R 9

R 34

R 11

R 54

R 7

C 8 (A)

C 1

C 8 (A)

C 1

C 7 (A)

R 35

R 10

R 15

R 7

R 40

C 19.5 (DC)

C 7 (A)

C 20 (DC)

C 8 (A)

C 19.5 (DC)

R 3

R 41

R 5

R 22

R 4

C 1.5

C 20.5 (DC)

C 3

C 20 (DC)

C 2.5

R .5

R 4

R 6.5

R 4

R 1

C .5

C 3

110 TD

C 2

C 1

R 17.5

R 1

R 11.5

R 15.5

R 5.5

139 TD

140 TD

156 TD

140 TD

## EXPLANATION

4318ND — DRILL-HOLE NUMBER

4318AM

2262

R 24

C 1

R 28

C 7 (A)

R 40

C 21 (DC)

R 3

C 2.5

R 1

C 1

R 11.5

140 TD

2255 — SURFACE ELEVATION

R30 — OVERBURDEN\*

C6.5(A) — COAL BED

R50 — (LETTER INDICATES

C19.5(DC) — BED NAME)

R25 — INTERBURDEN\*

131TD — TOTAL DEPTH OF HOLE

COAL BEDS

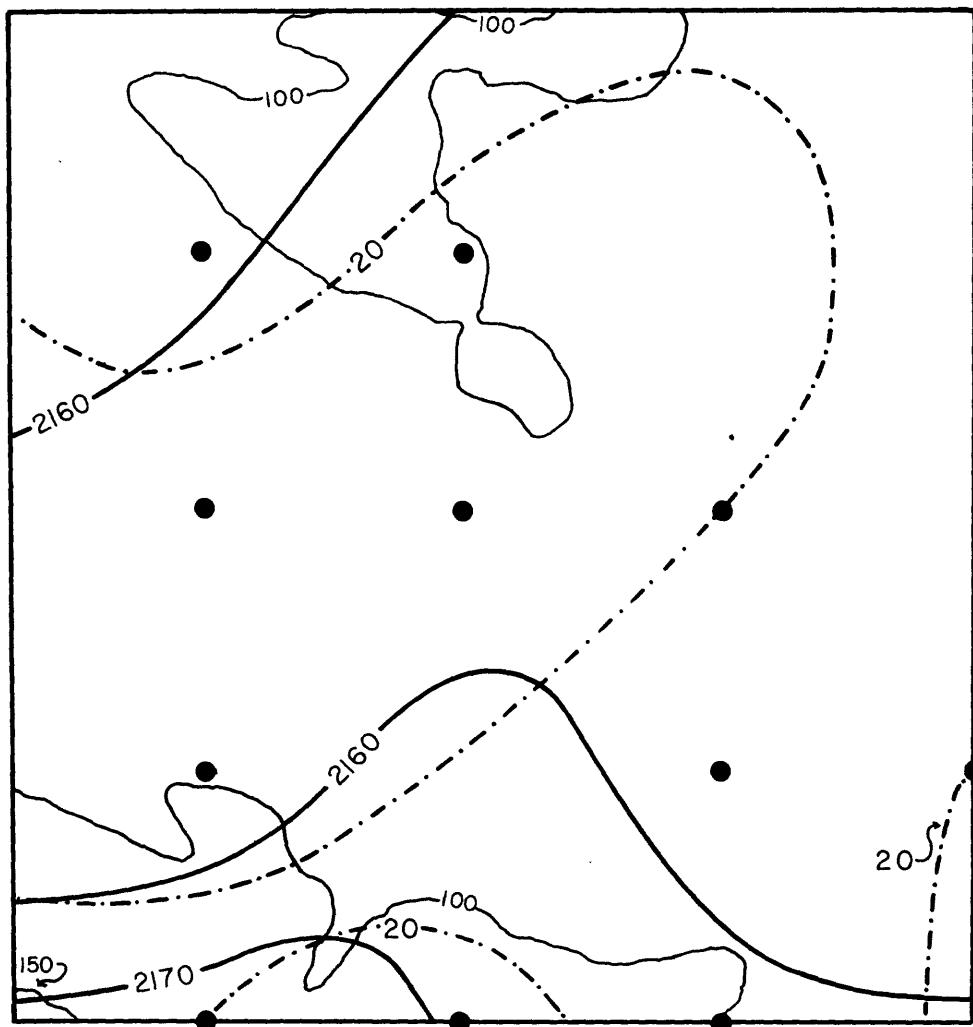
B - "B" BED

A - "A" BED

DC - DUNN CENTER BED

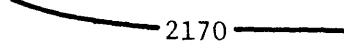
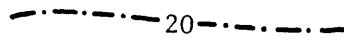
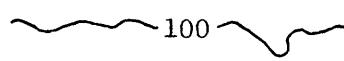
SECTION 18

TOWNSHIP 144 NORTH, RANGE 93 WEST



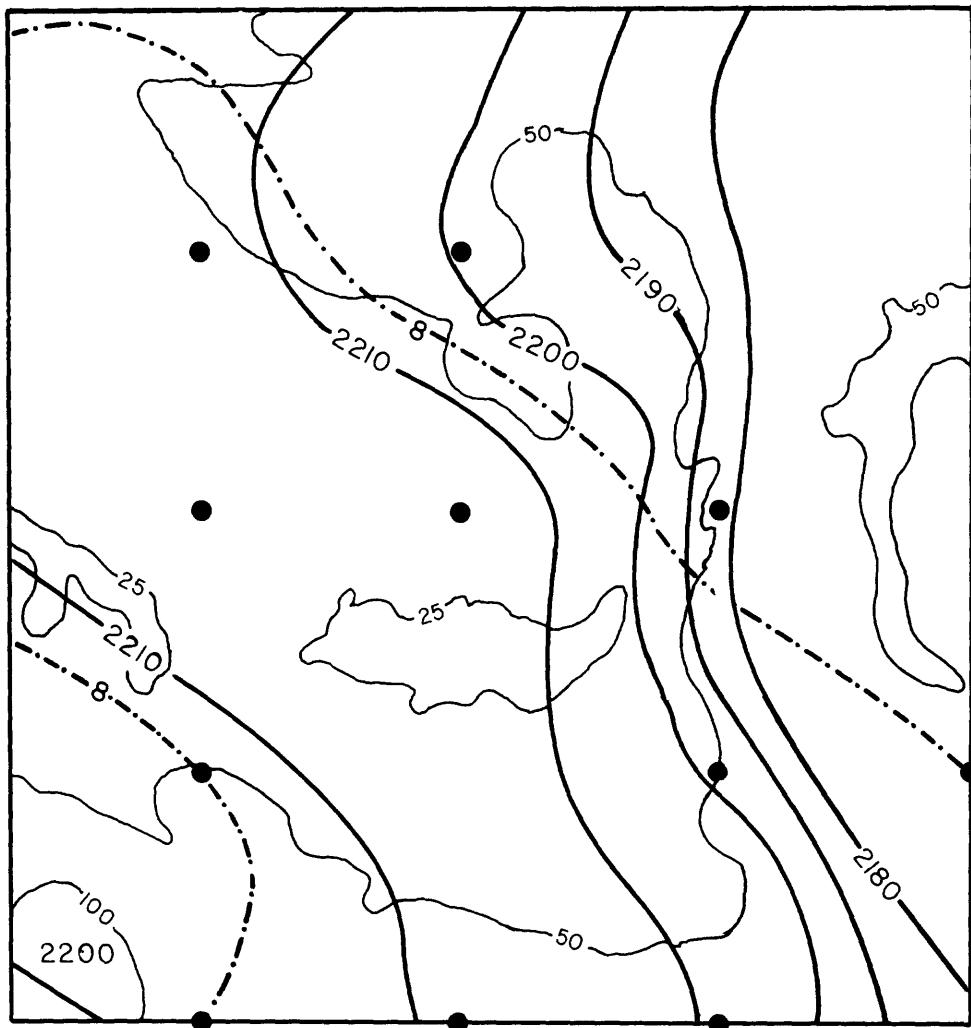
THICKNESS, OVERBURDEN AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED

EXPLANATION

-  2170 ————— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
-  20 ————— COAL ISOPACH LINE (C.I. 2 FEET)
-  100 ————— OVERBURDEN ISOPACH LINES AT 100 AND 150 FEET
- DRILL HOLE

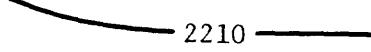
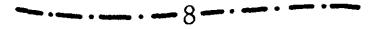
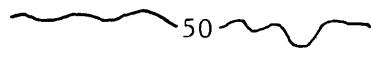
SECTION 18

TOWNSHIP 144 NORTH, RANGE 93 WEST



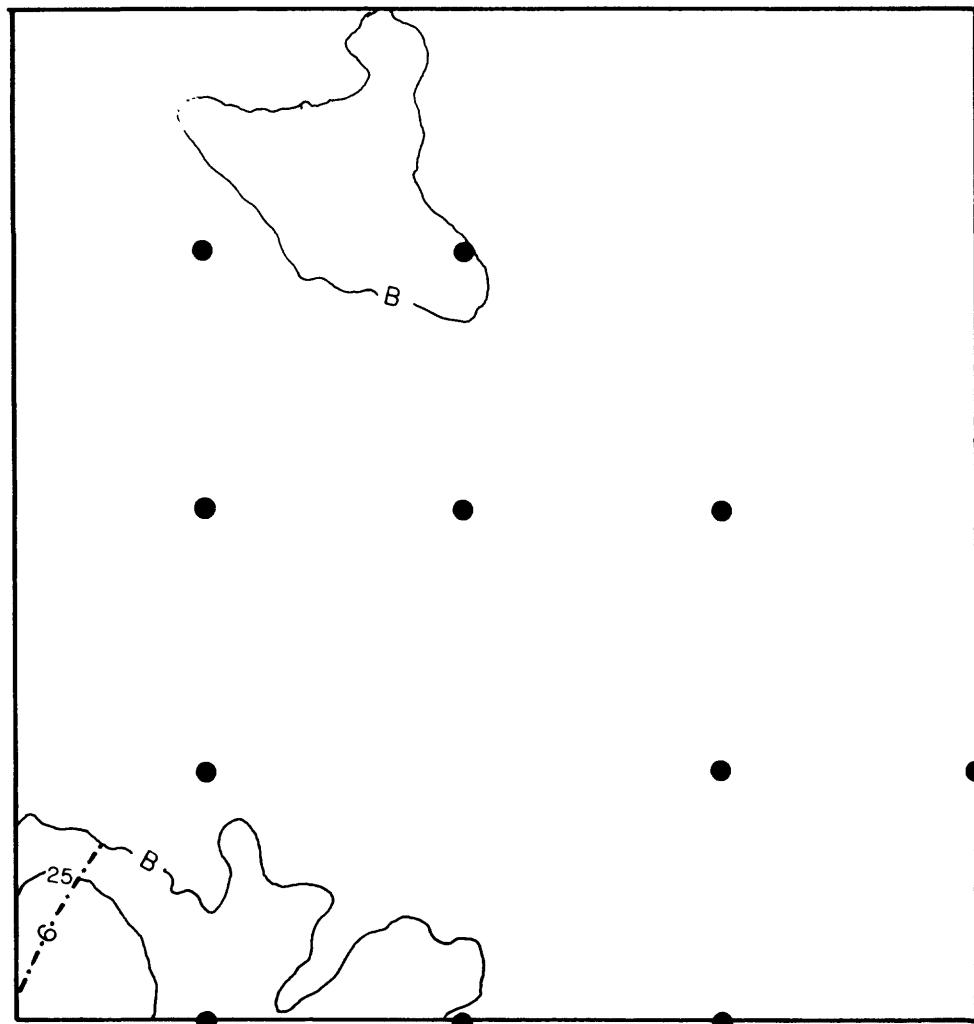
THICKNESS, OVERBURDEN AND STRUCTURE OF THE  
"A" LIGNITE BED

EXPLANATION

-  2210 ————— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
-  8 ----- COAL ISOPACH LINE (C.I. 2 FEET)
-  50 ----- OVERBURDEN ISOPACH LINES AT 25, 50  
AND 100 FEET
-  DRILL HOLE

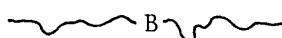
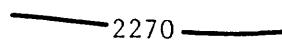
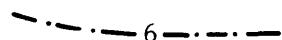
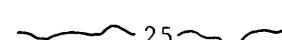
SECTION 18

TOWNSHIP 144 NORTH, RANGE 93 WEST



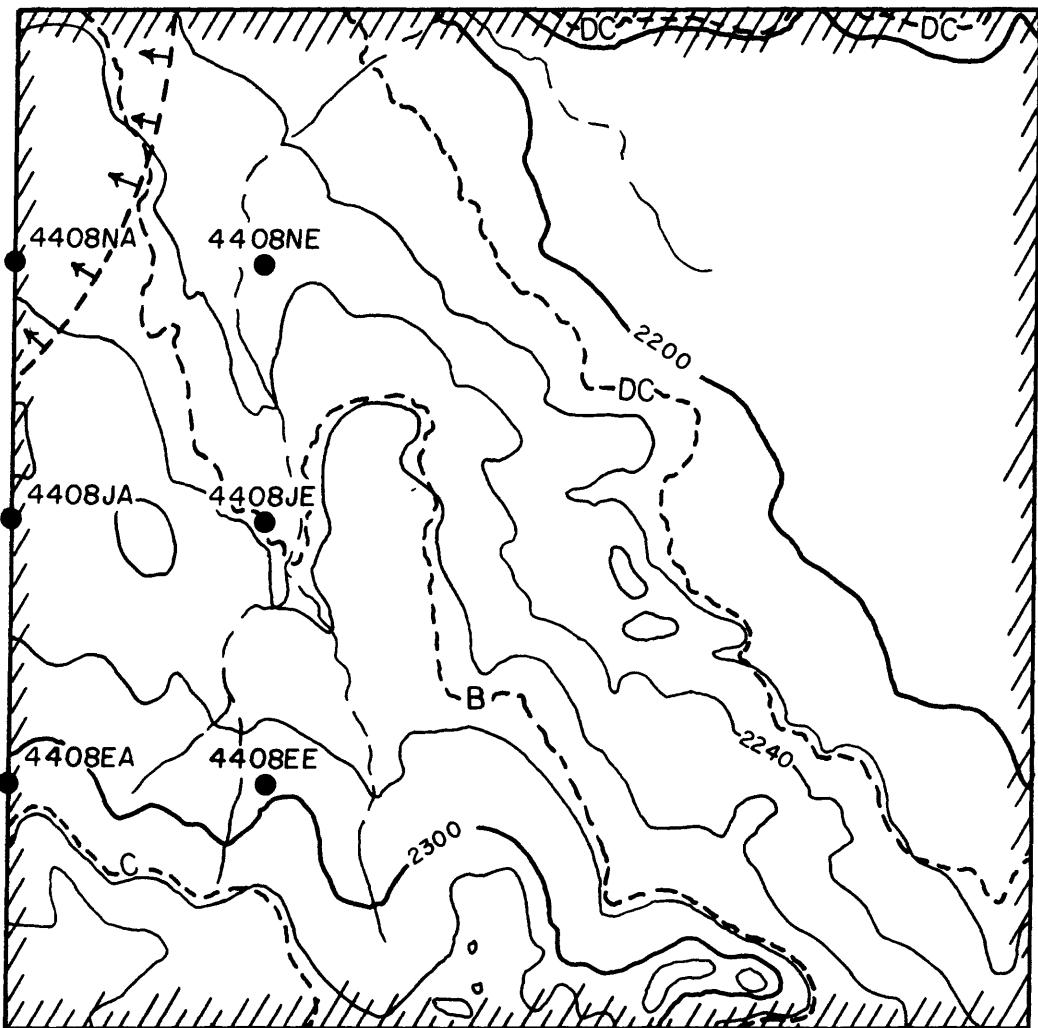
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

-  B  COAL CROP LINE OF THE "B" BED, APPROXIMATELY LOCATED
-  2270  STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
-  6  COAL ISOPACH LINE (C.I. 2 FEET)
-  25  OVERBURDEN ISOPACH LINE AT 25 FEET
-  DRILL HOLE

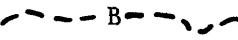
SECTION 8

TOWNSHIP 144 NORTH, RANGE 94 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL-HOLE LOCATION MAP

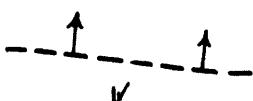
EXPLANATION

 COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)

C - "C" BED

B - "B" BED

DC - DUNN CENTER BED

 DUNN CENTER BED SPLIT BOUNDARY  
(BED SPLITS IN DIRECTION OF ARROWS)

 BOUNDARY OF FEDERAL COAL

4408EE DRILL-HOLE NUMBER

 DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)  
 TOWNSHIP 144 NORTH, RANGE 94 WEST, SECTION 8

---

DUNN CENTER BED (LOWER SPLIT)

| OVERBURDEN  | MEASURED | INDICATED | INFERRRED |
|-------------|----------|-----------|-----------|
| 0' to 25'   | 12,000   | 12,000    | 0         |
| 25' to 150' | 269,000  | 12,000    | 0         |
| >150'       | 0        | 0         | 0         |

---

DUNN CENTER BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 1,322,000 | 1,482,000 | 0         |
| 25' to 150' | 6,175,000 | 2,058,000 | 0         |
| >150'       | 0         | 0         | 0         |

---

"B" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 1,018,000 | 105,000   | 0         |
| 25' to 150' | 1,050,000 | 147,000   | 0         |
| >150'       | 0         | 0         | 0         |

---

"C" BED

| OVERBURDEN  | MEASURED | INDICATED | INFERRRED |
|-------------|----------|-----------|-----------|
| 0' to 25'   | 0        | 330,000   | 0         |
| 25' to 150' | 0        | 157,000   | 0         |
| >150'       | 0        | 0         | 0         |

---

SECTION TOTAL

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 2,352,000 | 1,929,000 | 0         |
| 25' to 150' | 7,494,000 | 3,180,000 | 0         |
| >150'       | 0         | 0         | 0         |

## SECTION 8

TOWNSHIP 144 NORTH, RANGE 94 WEST

## DRILL HOLE DATA

| 4408NA    | 4408NE      | 4408JA      | 4408JE      | 4408EA    |
|-----------|-------------|-------------|-------------|-----------|
| 2255      | 2232        | 2275        | 2258        | 2305      |
| R 16      | R 20        | R 29        | R 3         | R 47      |
| C 3.5 (B) | C 14.5 (DC) | C 4 (B)     | C 1 (B)     | C 3 (B)   |
| R 1       | R 15.5      | R 1         | R 1         | R 1       |
| C 3.5 (B) | 50TD        | C 3.5 (B)   | C 3.5 (B)   | C 3.5 (B) |
| R 13      |             | R 22        | R 30        | R 27      |
| C 7 (DC)  |             | C 16.5 (DC) | C 14.5 (DC) | C 15 (DC) |
| R .5      |             | R 24        | R 17        | R 22.5    |
| C 7 (DC2) |             | 100TD       | 70TD        | 119TD     |
| R 12      |             |             |             |           |
| C 1       |             |             |             |           |
| R 15.5    |             |             |             |           |
| 80TD      |             |             |             |           |

## EXPLANATION

4408EE

4308NE — DRILL HOLE NUMBER

2295  
 R 27  
 C 2.5 (B)  
 R 1  
 C 2.5 (B)  
 R 42  
 C 14.5 (DC)  
 R 30.5

120TD

2250 — SURFACE ELEVATION  
 R56 — OVERBURDEN\*  
 C5.5(A) — COAL BED  
 R56 — (LETTER INDICATES  
 C18.5(DC) — BED NAME)  
 R5 — INTERBURDEN\*  
 141TD — TOTAL DEPTH OF HOLE

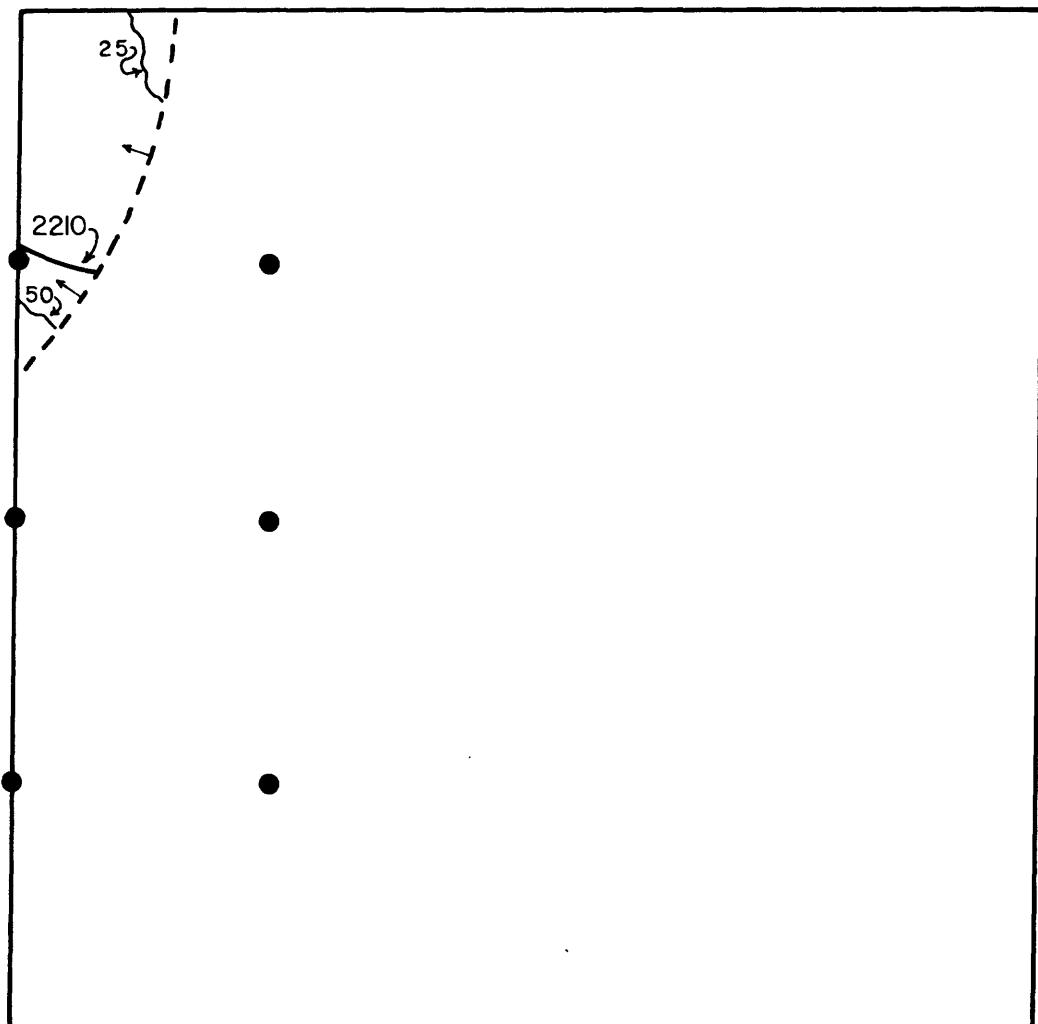
COAL BEDS

A - "A" BED

DC - DUNN CENTER BED

SECTION 8

TOWNSHIP 144 NORTH, RANGE 94 WEST

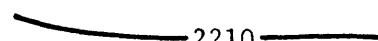


THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED  
"LOWER SPLIT"

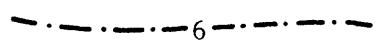
EXPLANATION



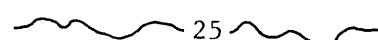
SPLIT BOUNDARY OF DUNN CENTER BED  
(DUNN CENTER BED SPLITS IN  
DIRECTION OF ARROWS)



STRUCTURAL CONTOUR LINE (C.I. 10 FEET)



COAL ISOPACH LINE (C.I. 2 FEET)



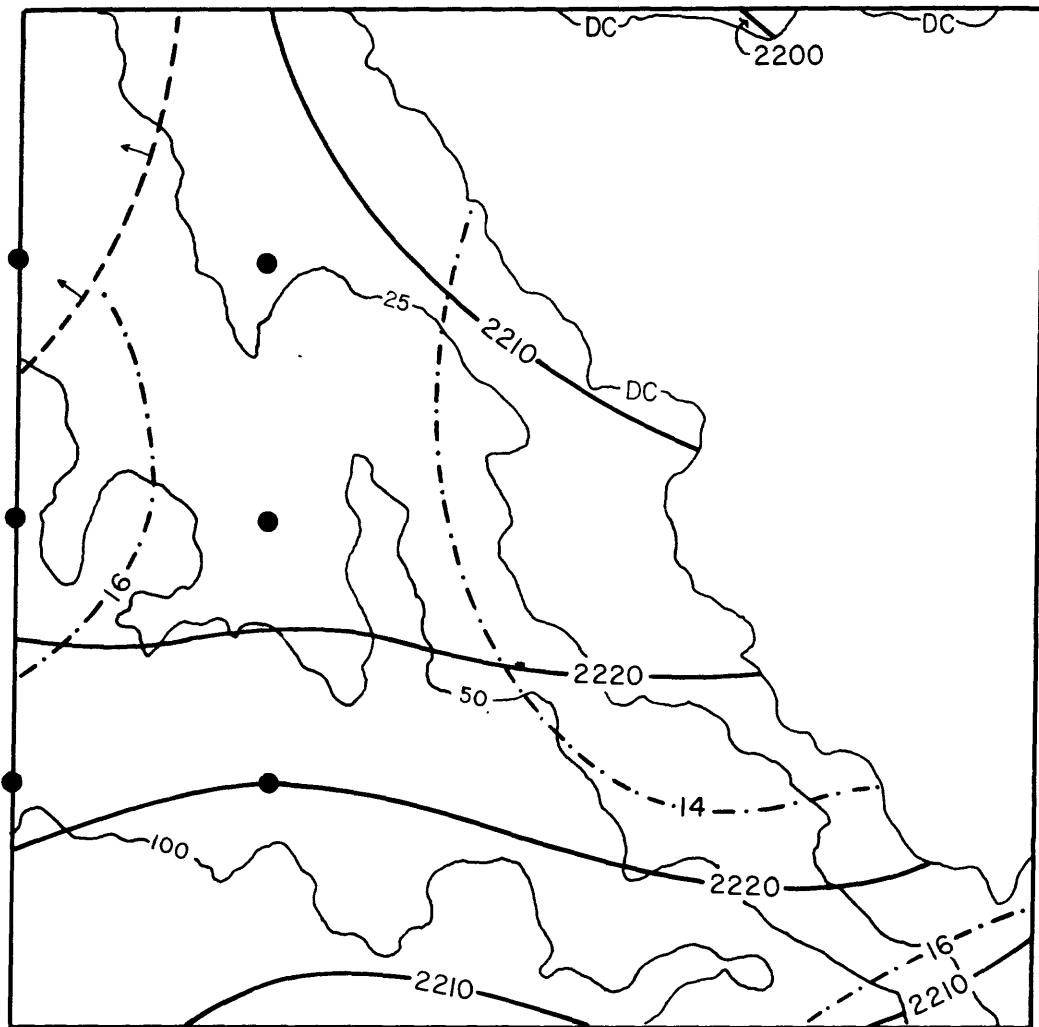
OVERBURDEN ISOPACH LINES AT 25 AND 50 FEET



DRILL HOLE

SECTION 8

TOWNSHIP 144 NORTH, RANGE 94 WEST



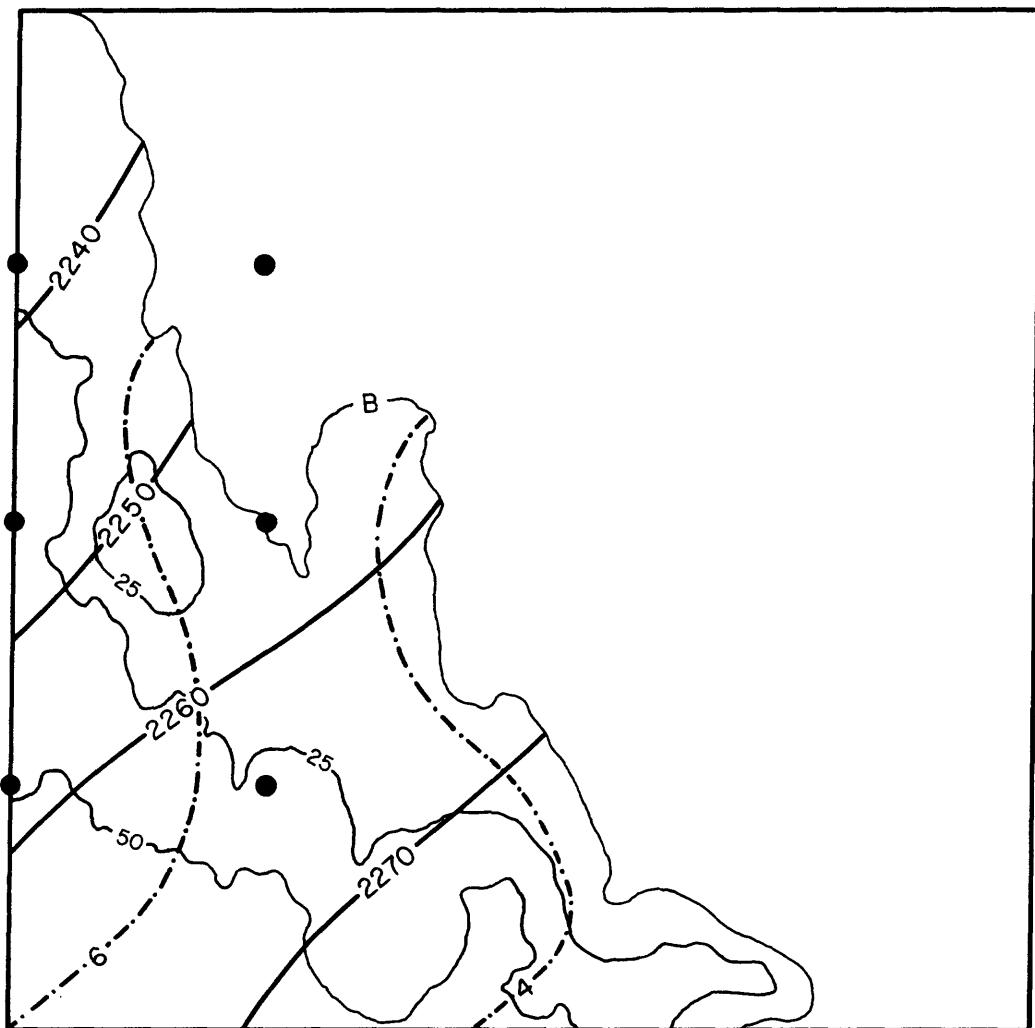
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED  
(ALSO "UPPER SPLIT" OF DUNN CENTER LIGNITE BED)

EXPLANATION

- ~~~~~ DC ~~~~~ COAL CROP LINE OF THE "DC" BED, APPROXIMATELY LOCATED
- T — T — T — SPLIT BOUNDARY OF "DC" BED  
("DC" BED SPLITS IN DIRECTION OF ARROWS)
- 2210 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 16 — COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 50 ~~~~~ OVERBURDEN ISOPACH LINES AT 25, 50, and 100 FEET
- DRILL HOLE

SECTION 8

TOWNSHIP 144 NORTH, RANGE 94 WEST



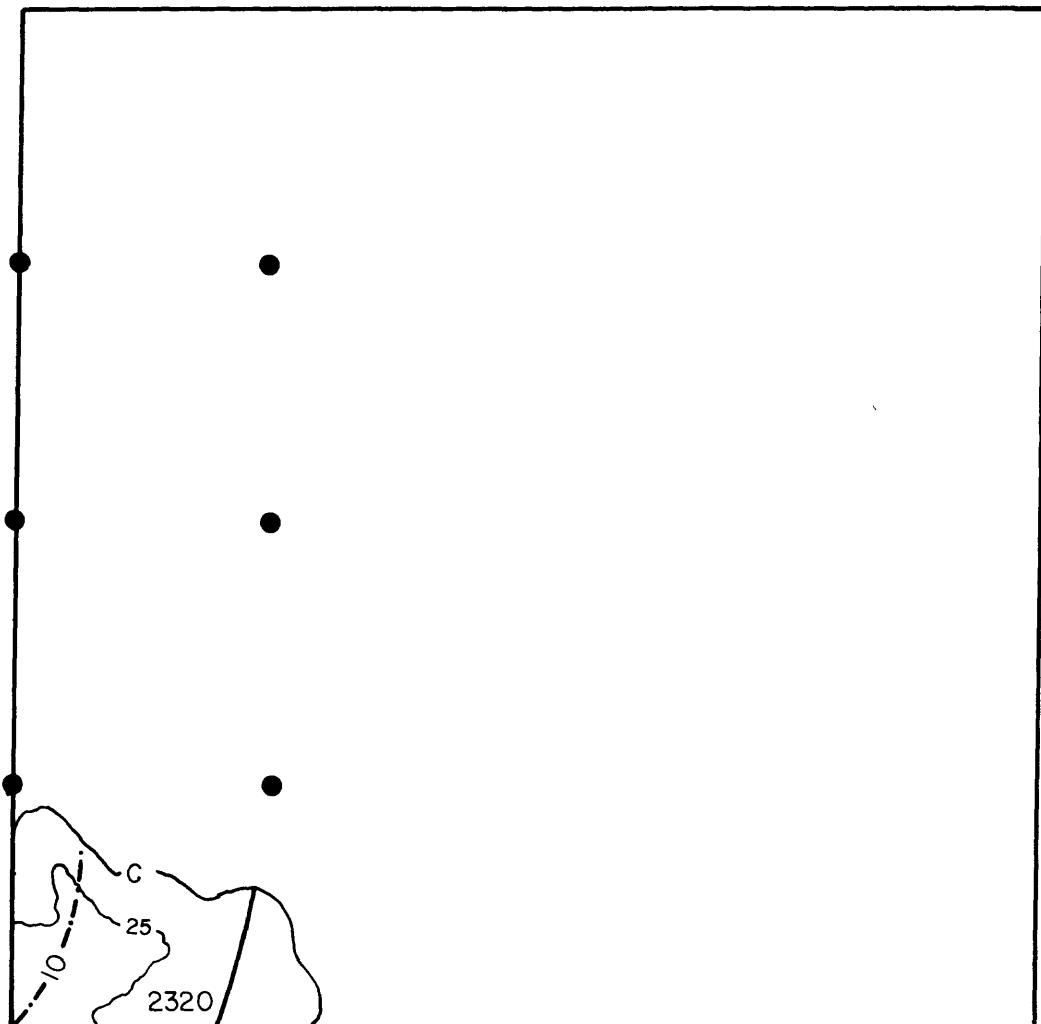
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

- ~~~~~ B ~~~~~ COAL CROP LINE OF THE "B" BED, APPROXIMATELY LOCATED
- 2270 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- - - - - 4 - - - - COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 25 ~~~~~ OVERBURDEN ISOPACH LINES AT 25 AND 50 FEET
- DRILL HOLE

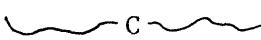
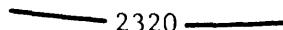
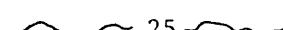
SECTION 8

TOWNSHIP 144 NORTH, RANGE 94 WEST



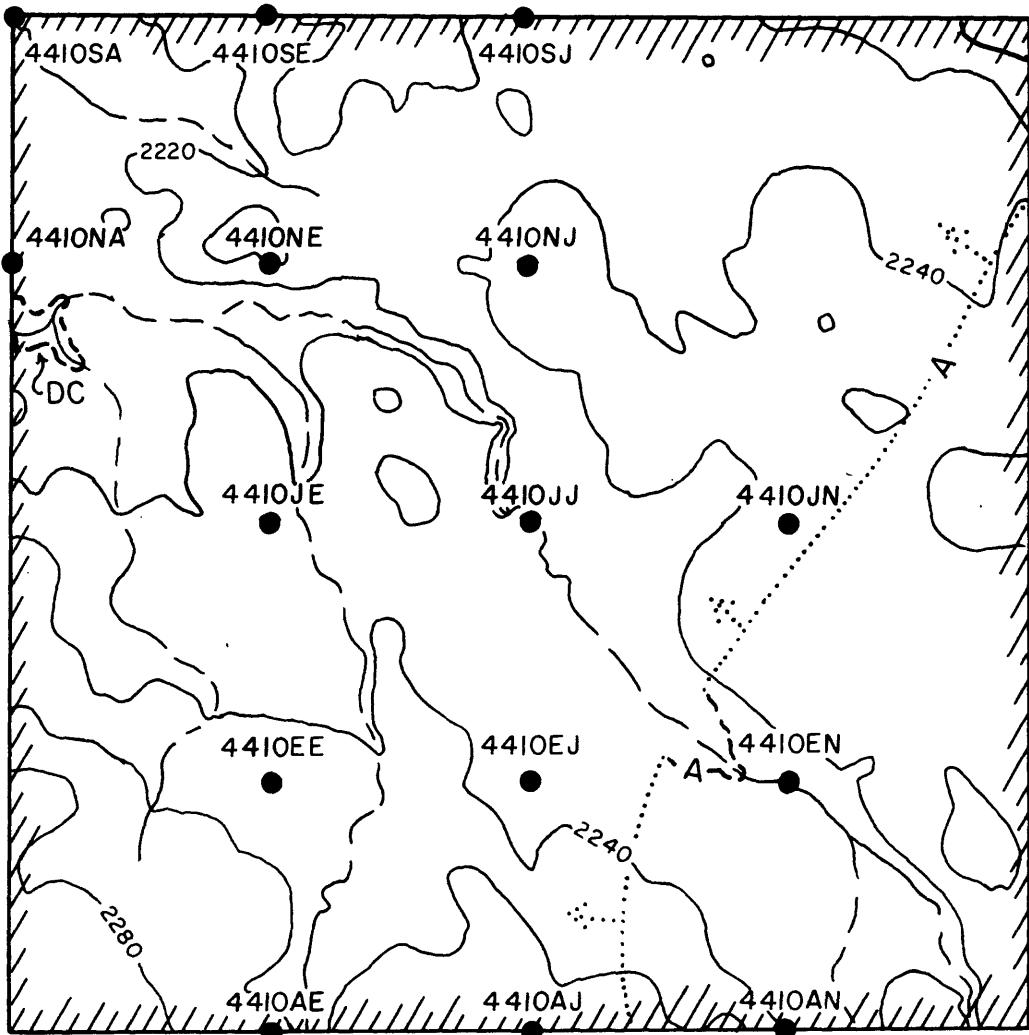
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"C" LIGNITE BED

EXPLANATION

-  C  COAL CROP LINE OF THE "C" BED, APPROXIMATELY LOCATED
-  2320  STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
-  10  COAL ISOPACH LINE (C.I. 2 FEET)
-  25  OVERBURDEN ISOPACH LINE AT 25 FEET
-  DRILL HOLE

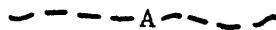
SECTION 10

TOWNSHIP 144 NORTH, RANGE 94 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

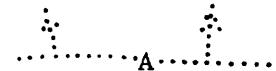
EXPLANATION



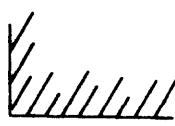
COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)

A - "A" BED

DC - DUNN CENTER BED



SUBSURFACE LIMIT OF COAL, APPROXIMATELY LOCATED  
(COAL MISSING IN DIRECTION OF ARROWS,  
LETTER INDICATES BED NAME)



BOUNDARY OF FEDERAL COAL

4410EE

DRILL-HOLE NUMBER



DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)  
TOWNSHIP 144 NORTH, RANGE 94 WEST, SECTION 10

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DUNN CENTER BED

| OVERBURDEN  | MEASURED   | INDICATED | INFERRED |
|-------------|------------|-----------|----------|
| 0' to 25'   | 2,107,000  | 294,000   | 0        |
| 25' to 150' | 12,993,000 | 1,963,000 | 0        |
| >150'       | 0          | 0         | 0        |

---

"A" BED

| OVERBURDEN  | MEASURED | INDICATED | INFERRED |
|-------------|----------|-----------|----------|
| 0' to 25'   | 126,000  | 7,000     | 0        |
| 25' to 150' | 31,000   | 5,000     | 0        |
| >150'       | 0        | 0         | 0        |

---

SECTION TOTAL

| OVERBURDEN  | MEASURED   | INDICATED | INFERRED |
|-------------|------------|-----------|----------|
| 0' to 25'   | 2,233,000  | 301,000   | 0        |
| 25' to 150' | 13,024,000 | 1,968,000 | 0        |
| >150'       | 0          | 0         | 0        |

## SECTION 10

TOWNSHIP 144 NORTH, RANGE 94 WEST

## DRILL-HOLE DATA

4410SA

4410SE

4410SJ

4410NA

4410NE

2210

2238

2232

2208

2238

R 29  
C 17.5 (DC)R 56  
C 17 (DC)R 36  
C 1  
R 1  
C 17 (DC)R 7  
C 11.5 (DC)  
R 4  
C 1.5R 28  
C 17.5 (DC)  
R 4  
C 1  
R 7.5R 3  
C 2.5  
R 6  
58TDR 4  
C 2  
R 8  
87TDR 4  
C 2  
R 8  
69TDR 14  
38TD

4410NJ

4410JE

4410JJ

4410JN

4410EE

2245

2222

2222

2243

2250

R 50  
C 18.5 (DC)  
R 4  
C 1.5  
R 15  
89TDR 21  
C 12 (DC)  
R 5  
C 1  
R 36  
C 4.5  
R 39.5  
119TDR 23  
C 7 (DC)  
R 5  
C 1  
R 35  
71TDR 32  
C 25.5 (DC)  
R 5  
C 1  
R 5.5  
69TDR 52  
C 16.5 (DC)  
R 10.5  
79TD

4410EJ

4410EN

4410AE

4410AJ

4410AN

2238

2238

2262

2275

2240

R 31  
C 2 (DC)  
R 1  
C 9.5 (DC)  
R 15.5  
59TDR 8  
C 2 (A)  
R 16  
C 16 (DC)  
R 17  
59TDR 77  
C 10 (DC)  
R 1  
C 4 (DC)  
R 27  
119TDR 83  
C 15 (DC)  
R 17  
115TDR 13  
C 1 (A)  
R 1  
C .5 (A)  
R 25  
C 1  
R 16  
C 5 (DC)  
R 1  
C 5 (DC)  
R 1  
C 4 (DC)  
R 16.5  
90TD

## EXPLANATION

4410AN ————— DRILL-HOLE NUMBER

COAL BEDS

2250 ————— SURFACE ELEVATION

A - "A" BED

R20 ————— OVERBURDEN\*

DC - DUNN CENTER BED

C5(A) ————— COAL BED

R30 ————— (LETTER INDICATES

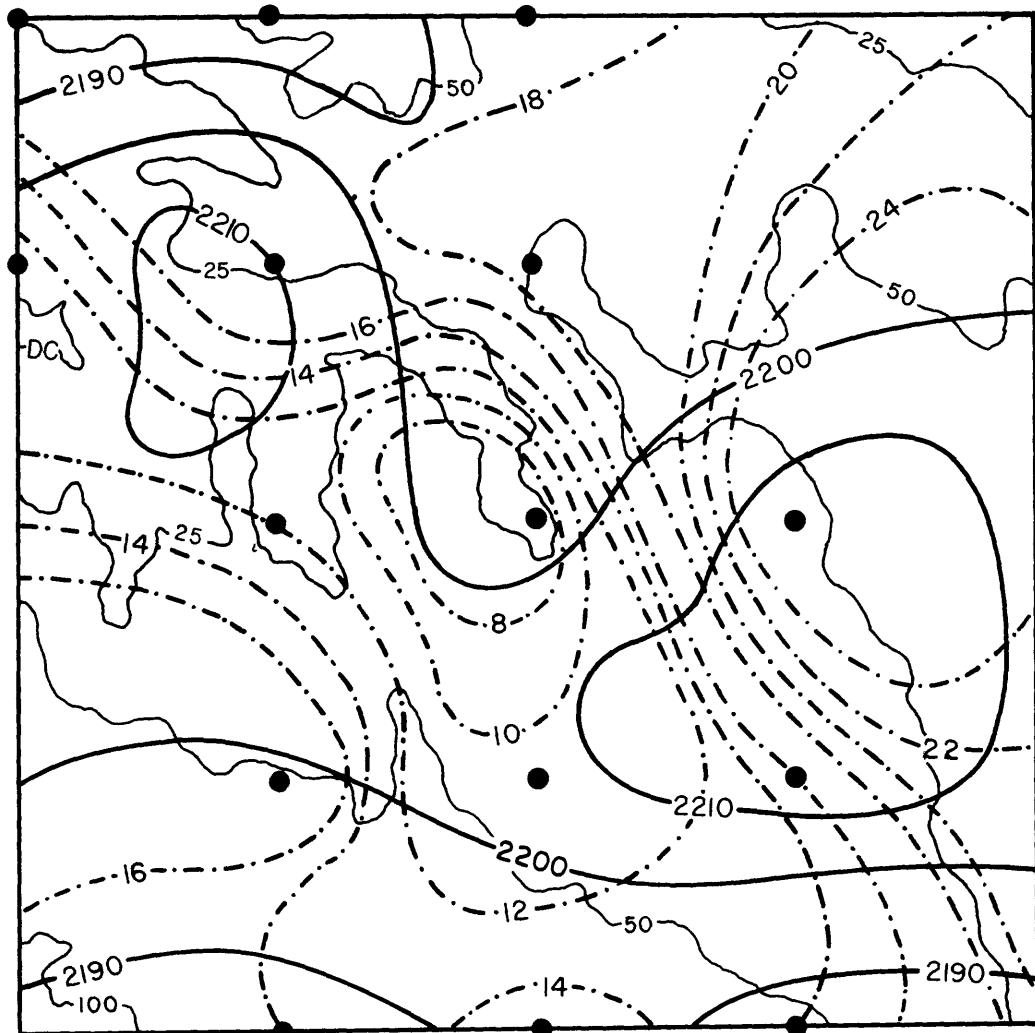
C12(DC) ————— BED NAME)

R25 ————— INTERBURDEN\*

92TD ————— TOTAL DEPTH OF HOLE

SECTION 10

TOWNSHIP 144 NORTH, RANGE 94 WEST



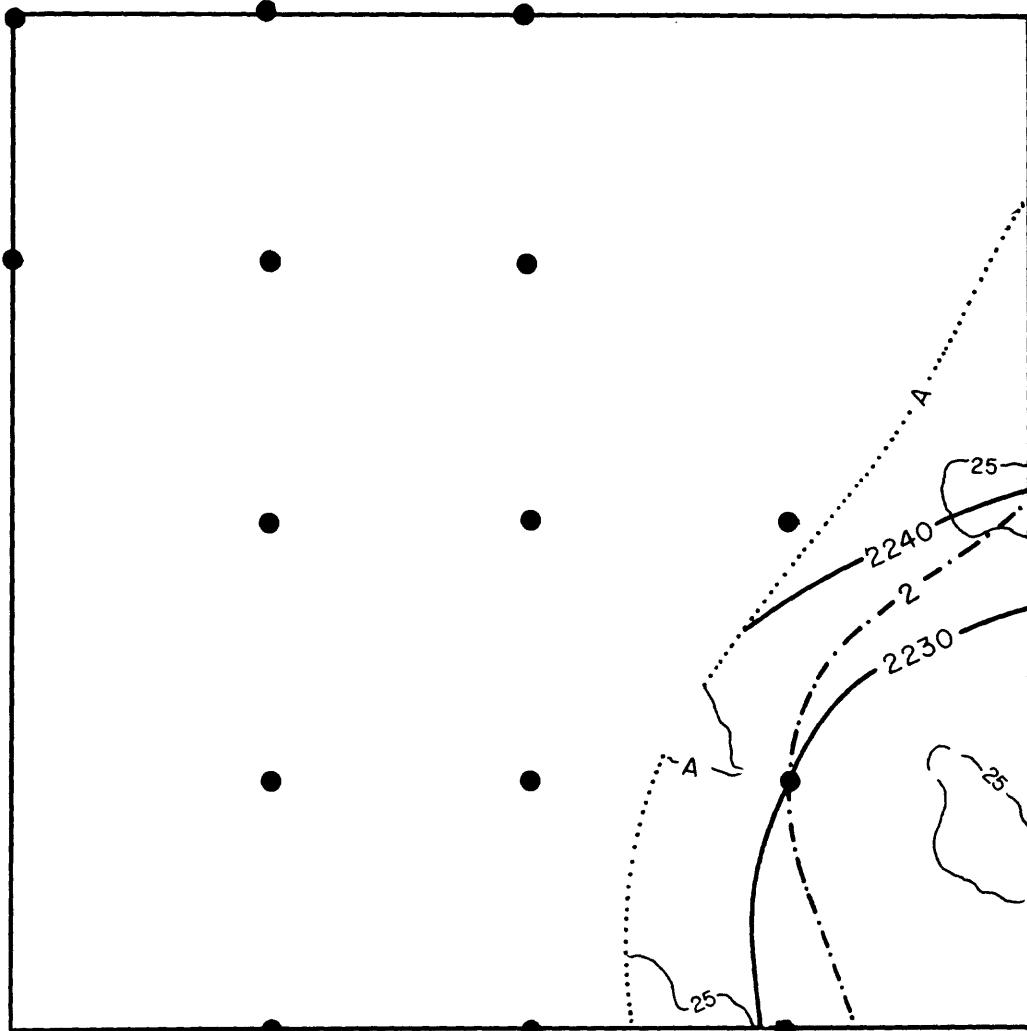
THICKNESS, OVERTURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED

EXPLANATION

- ~~~~DC~~~~ COAL CROP LINE OF THE "DC" BED, APPROXIMATELY LOCATED
- \_\_\_\_\_ 2210 \_\_\_\_\_ STRUCTURAL CONTOUR LINES (C.I. 10 FEET)
- 10 ----- COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 25 ~~~~~ OVERBURDEN ISOPACH LINES AT 25, 50, AND 100 FEET
- DRILL HOLE

SECTION 10

TOWNSHIP 144 NORTH, RANGE 94 WEST



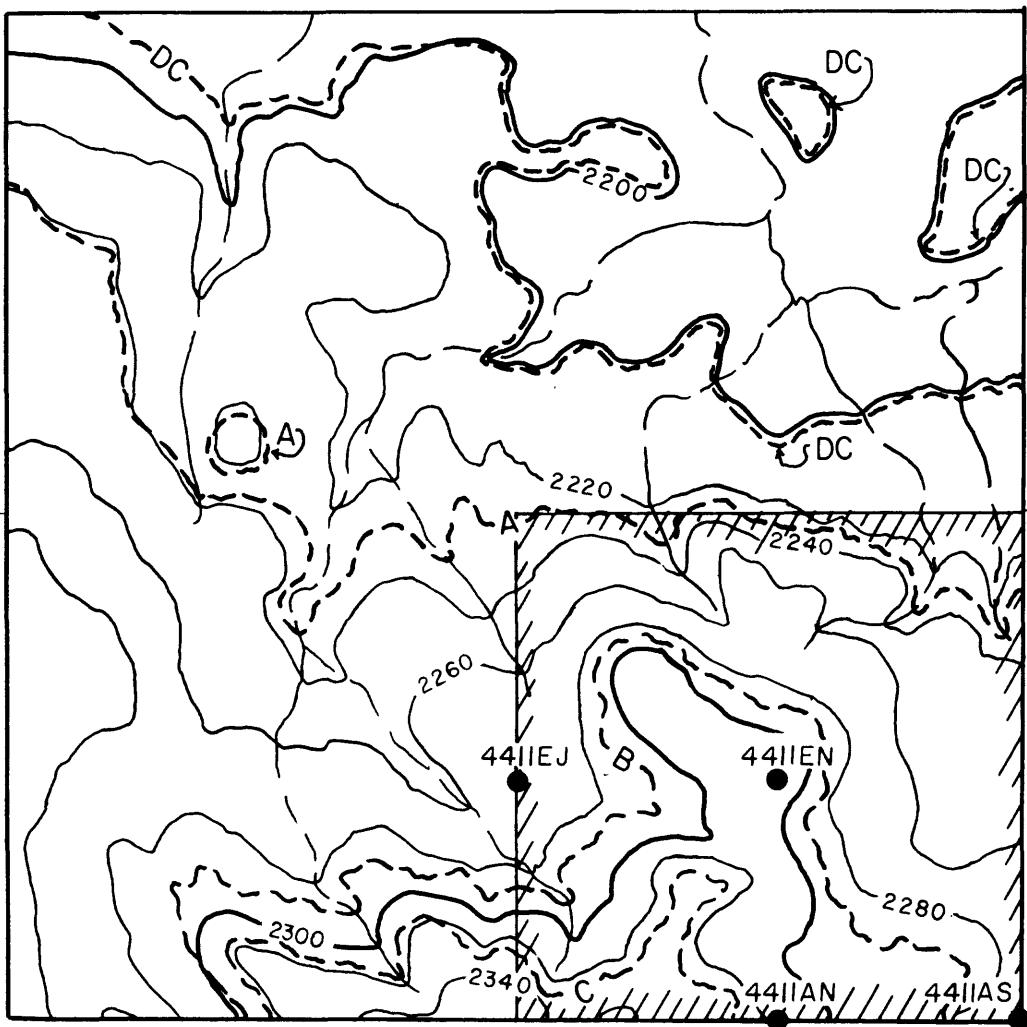
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"A" LIGNITE BED

EXPLANATION

- ~~~A~~~ COAL CROP LINE OF THE "A" BED, APPROXIMATELY LOCATED
- .....A..... SUBSURFACE LIMIT OF "A" BED, APPROXIMATELY LOCATED
- 2240— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 2— COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~25~~~ OVERBURDEN ISOPACH LINE AT 25 FEET
- DRILL HOLE

SECTION 11

TOWNSHIP 144 NORTH, RANGE 94 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

EXPLANATION

— — — B — — — COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)

C - "C" BED

B - "B" BED

A - "A" BED

DC - DUNN CENTER BED



BOUNDARY OF FEDERAL COAL

44IEJ DRILL-HOLE NUMBER

● DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)  
TOWNSHIP 144 NORTH, RANGE 94 WEST, SECTION 11

DUNN CENTER BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 148,000   | 208,000   | 0        |
| 25' to 150' | 4,375,000 | 29,000    | 0        |
| >150'       | 0         | 0         | 0        |

"A" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 406,000   | 28,000    | 0        |
| 25' to 150' | 1,433,000 | 0         | 0        |
| >150'       | 0         | 0         | 0        |

"B" BED

| OVERBURDEN  | MEASURED | INDICATED | INFERRED |
|-------------|----------|-----------|----------|
| 0' to 25'   | 574,000  | 0         | 0        |
| 25' to 150' | 280,000  | 0         | 0        |
| >150'       | 0        | 0         | 0        |

"C" BED

| OVERBURDEN  | MEASURED | INDICATED | INFERRED |
|-------------|----------|-----------|----------|
| 0' to 25'   | 70,000   | 0         | 0        |
| 25' to 150' | 0        | 0         | 0        |
| >150'       | 0        | 0         | 0        |

SECTION TOTAL

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 1,198,000 | 236,000   | 0        |
| 25' to 150' | 6,088,000 | 29,000    | 0        |
| >150'       | 0         | 0         | 0        |

## SECTION 11

TOWNSHIP 144 NORTH, RANGE 94 WEST

## DRILL HOLE DATA

| 4411EJ      | 4411EN      | 4411AN    | 4411AS      |
|-------------|-------------|-----------|-------------|
| 2272        | 2304        | 2318      | 2275        |
| R 48        | R 21        | R 23      | R 35        |
| C 1 (A)     | C 5 (B)     | C 10 (B)  | C 1         |
| R 2         | R 54        | R 27      | R 25        |
| C 7 (A)     | C 7.5 (A)   | C 5.5     | C 8 (A)     |
| R 4         | R 6         | R 23      | R 9         |
| C 17.5 (DC) | C 17.5 (DC) | C 8 (A)   | C 18.5 (DC) |
| R 19.5      | R 19        | R 6       | R 22.5      |
| 99TD        | 130TD       | C 16.5 DC | 119TD       |
|             |             | R 8       |             |
|             |             | C 1       |             |
|             |             | R 11      |             |
|             |             | 139TD     |             |

## EXPLANATION

4411EJ — DRILL HOLE NUMBER

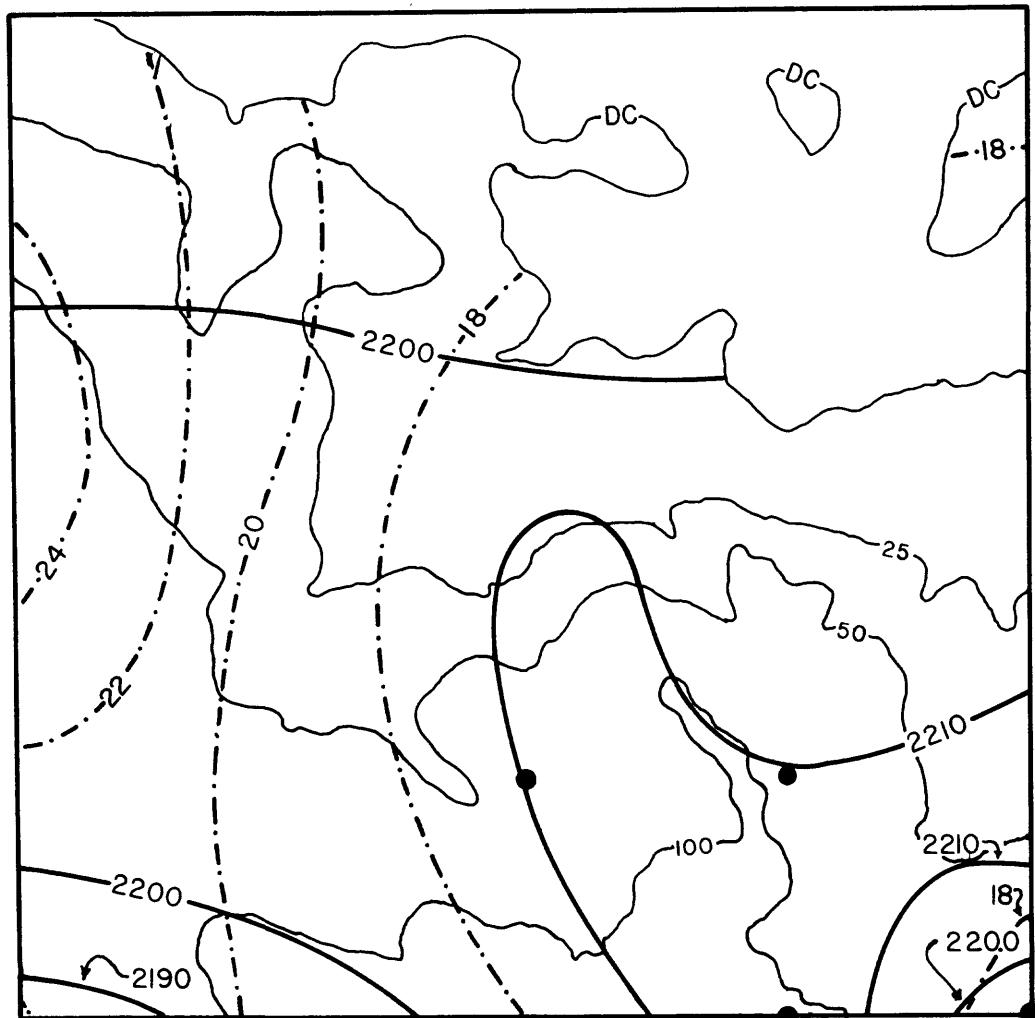
|         |                     |
|---------|---------------------|
| 2272    | SURFACE ELEVATION   |
| R48     | OVERBURDEN*         |
| C10(B)  | COAL BED            |
| R40     | (LETTER INDICATES   |
| C16(DC) | BED NAME)           |
| R24     | INTERBURDEN*        |
| 138TD   | TOTAL DEPTH OF HOLE |

## COAL BEDS

- C - "C" BED
- B - "B" BED
- A - "A" BED
- DC - DUNN CENTER BED

SECTION 11

TOWNSHIP 144 NORTH, RANGE 94 WEST



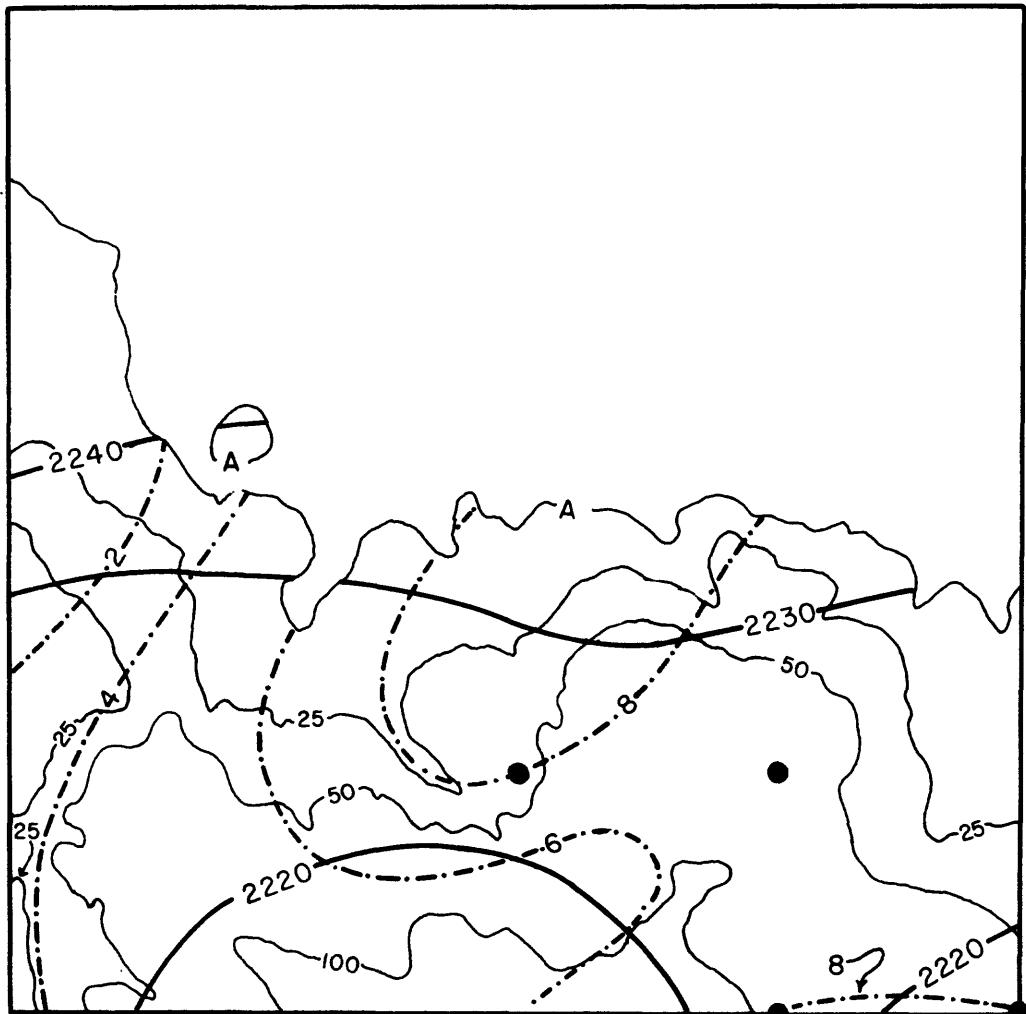
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED

EXPLANATION

- DC— COAL CROP LINE OF THE "DC" BED, APPROXIMATELY LOCATED
- 2200— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 18— COAL ISOPACH LINE (C.I. 2 FEET)
- 50— OVERBURDEN ISOPACH LINES AT 25, 50, AND 100 FEET
- DRILL HOLE

SECTION 11

TOWNSHIP 144 NORTH, RANGE 94 WEST



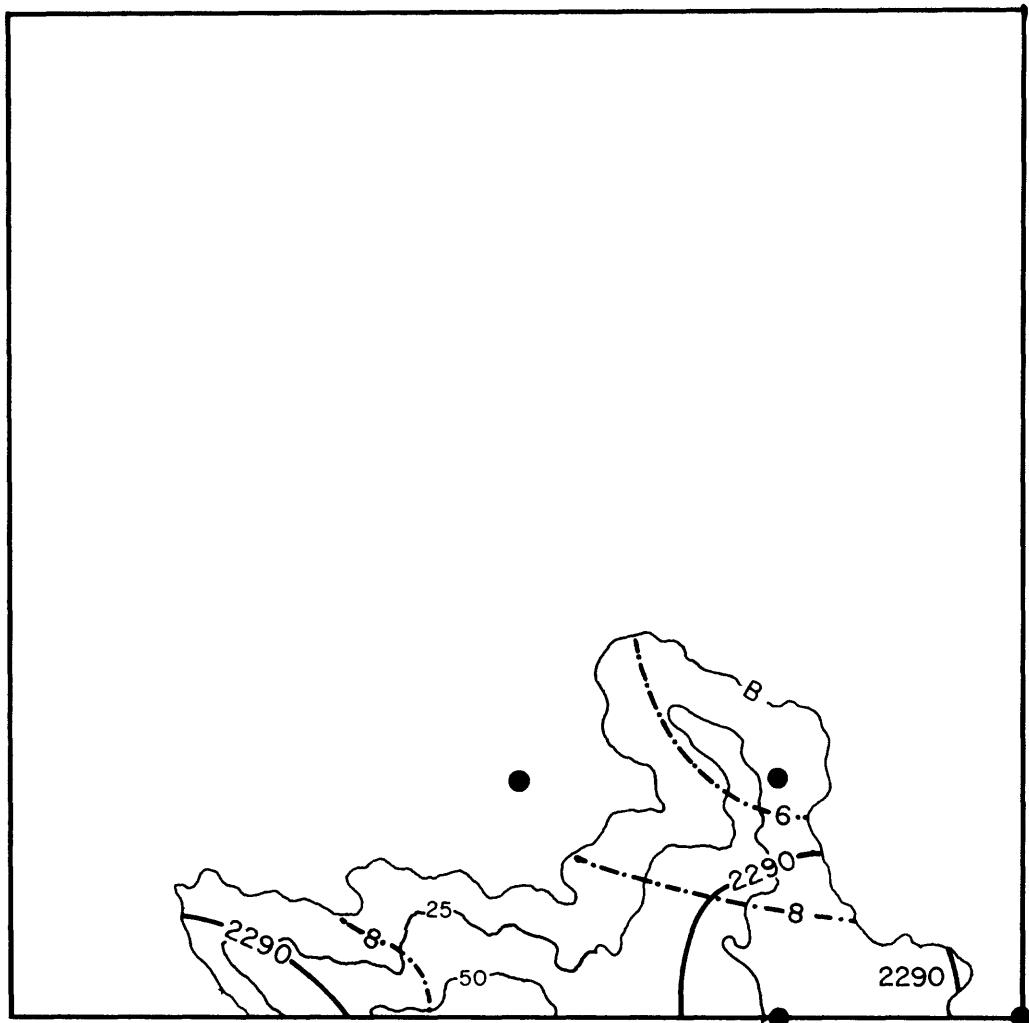
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"A" LIGNITE BED

EXPLANATION

- ~~~~~ A ~~~~~ COAL CROP LINE OF THE "A" BED, APPROXIMATELY LOCATED
- 2220 —— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- · · · 8 · · — COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 50 ~~~~~ OVERBURDEN ISOPACH LINES AT 25, 50, AND 100 FEET
- DRILL HOLE

SECTION 11

TOWNSHIP 144 NORTH, RANGE 94 WEST



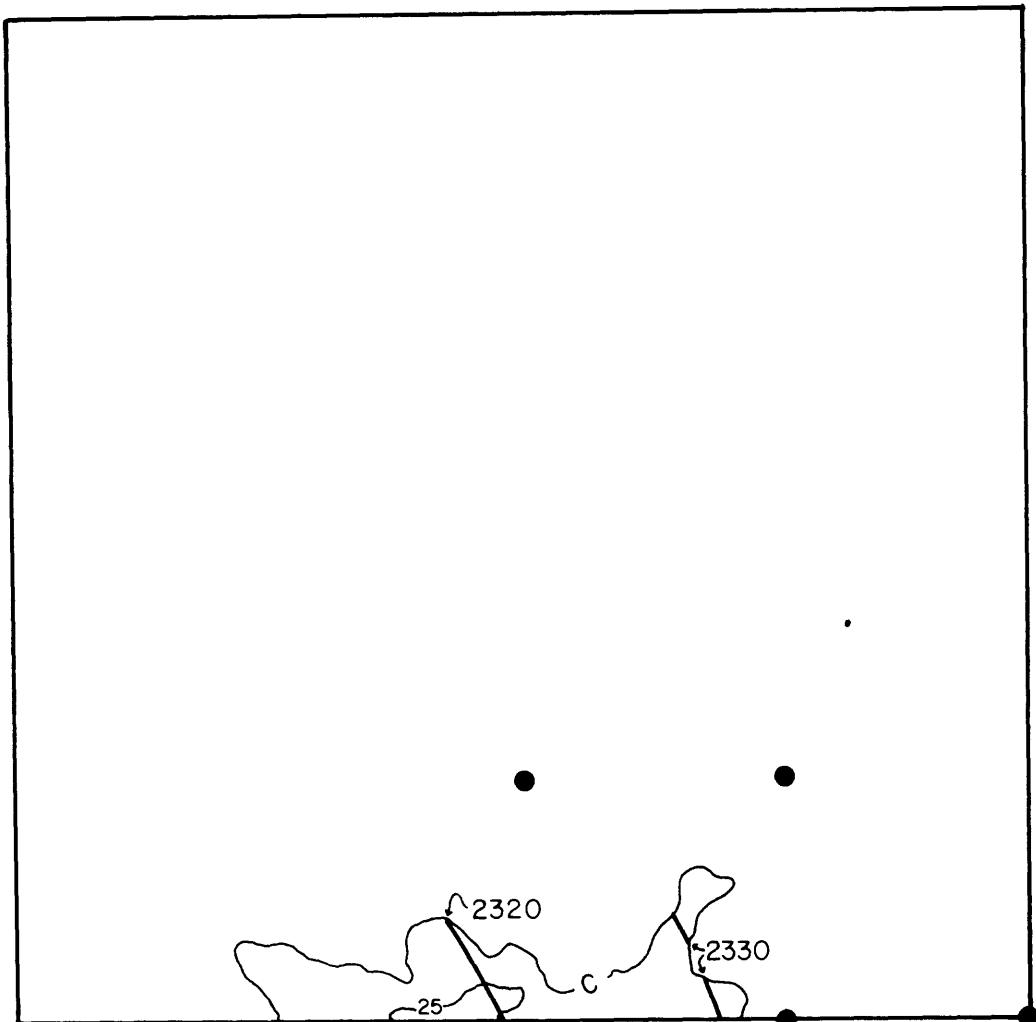
THICKNESS, OVERBURDEN AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

- B — COAL CROP LINE OF THE "B" BED, APPROXIMATELY LOCATED
- 2290 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 6 — COAL ISOPACH LINE (C.I. 2 FEET)
- 50 — OVERBURDEN ISOPACH LINES AT 25 AND 50 FEET
- DRILL HOLE

SECTION 11

TOWNSHIP 144 NORTH, RANGE 94 WEST



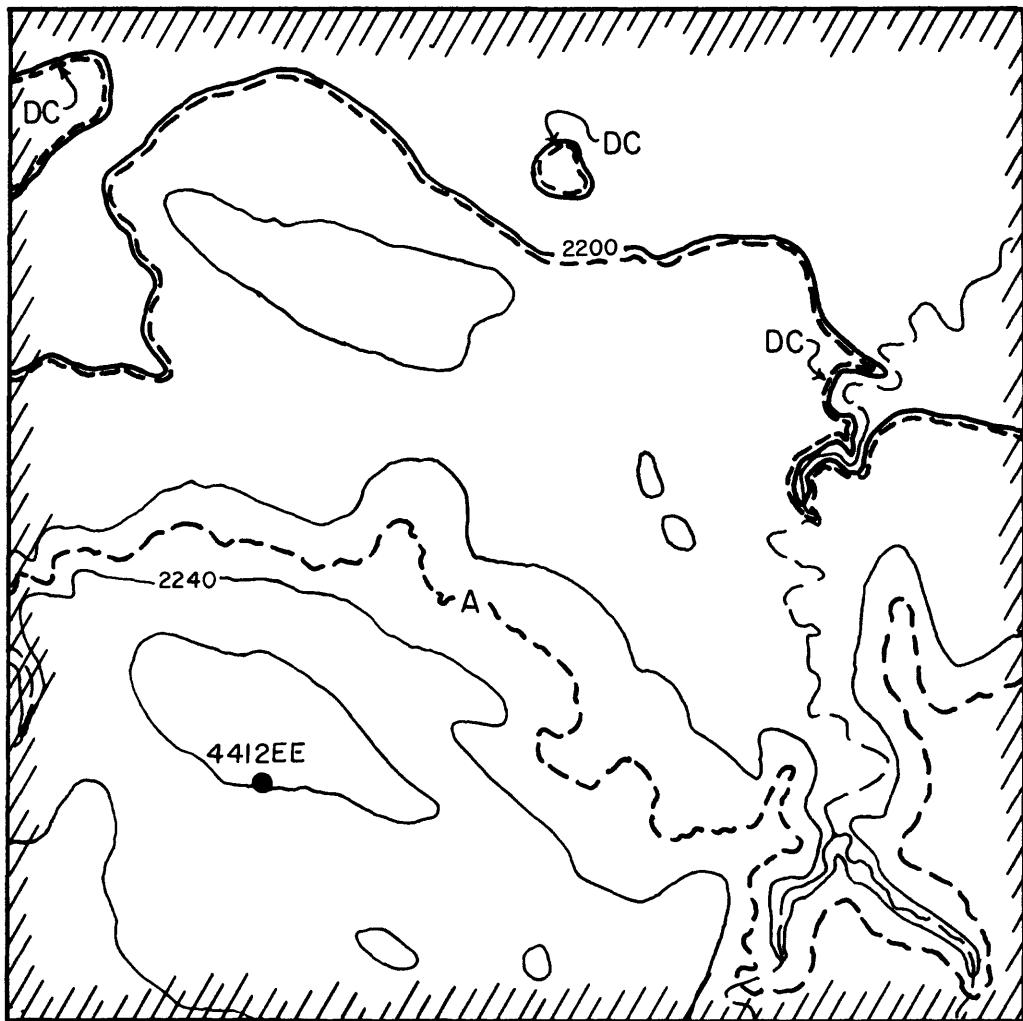
THICKNESS, OVERBURDEN AND STRUCTURE OF THE  
"C" LIGNITE BED

EXPLANATION

- ~~~~~C~~~~~ COAL CROP LINE OF THE "C" BED, APPROXIMATELY LOCATED
- 2320——— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 4----- COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~25~~~~~ OVERBURDEN ISOPACH LINE AT 25 FEET
- DRILL HOLE

SECTION 12

TOWNSHIP 144 NORTH, RANGE 94 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

EXPLANATION

DC - COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)

A - "A" BED

DC - DUNN CENTER BED



BOUNDARY OF FEDERAL COAL

4412EE DRILL-HOLE NUMBER

● DRILL HOLE

IDENTIFIED COAL RESOURCES (IN SHORT TONS)  
TOWNSHIP 144 NORTH, RANGE 94 WEST, SECTION 12

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DUNN CENTER BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 0         | 7,371,000 | 126,000   |
| 25' to 150' | 3,748,000 | 4,347,000 | 0         |
| >150'       | 0         | 0         | 0         |

---

"A" BED

| OVERBURDEN  | MEASURED | INDICATED | INFERRRED |
|-------------|----------|-----------|-----------|
| 0' to 25'   | 756,000  | 980,000   | 0         |
| 25' to 150' | 938,000  | 350,000   | 0         |
| >150'       | 0        | 0         | 0         |

---

SECTION TOTAL

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 756,000   | 8,351,000 | 0         |
| 25' to 150' | 4,686,000 | 4,697,000 | 0         |
| >150'       | 0         | 0         | 0         |

SECTION 12

TOWNSHIP 144 NORTH, RANGE 94 WEST

DRILL-HOLE DATA

4412EE

2260

R 32  
C 8 (A)  
R 9  
C 17 (DC)  
R 13  
79TD

EXPLANATION

4412EE ————— DRILL-HOLE NUMBER

2260 ————— SURFACE ELEVATION

R32 ————— OVERBURDEN\*  
C8(A) ————— COAL BED  
R9 ————— (LETTER INDICATES  
C17(DC) ————— BED NAME)  
R13 ————— INTERBURDEN\*  
79TD ————— TOTAL DEPTH OF HOLE

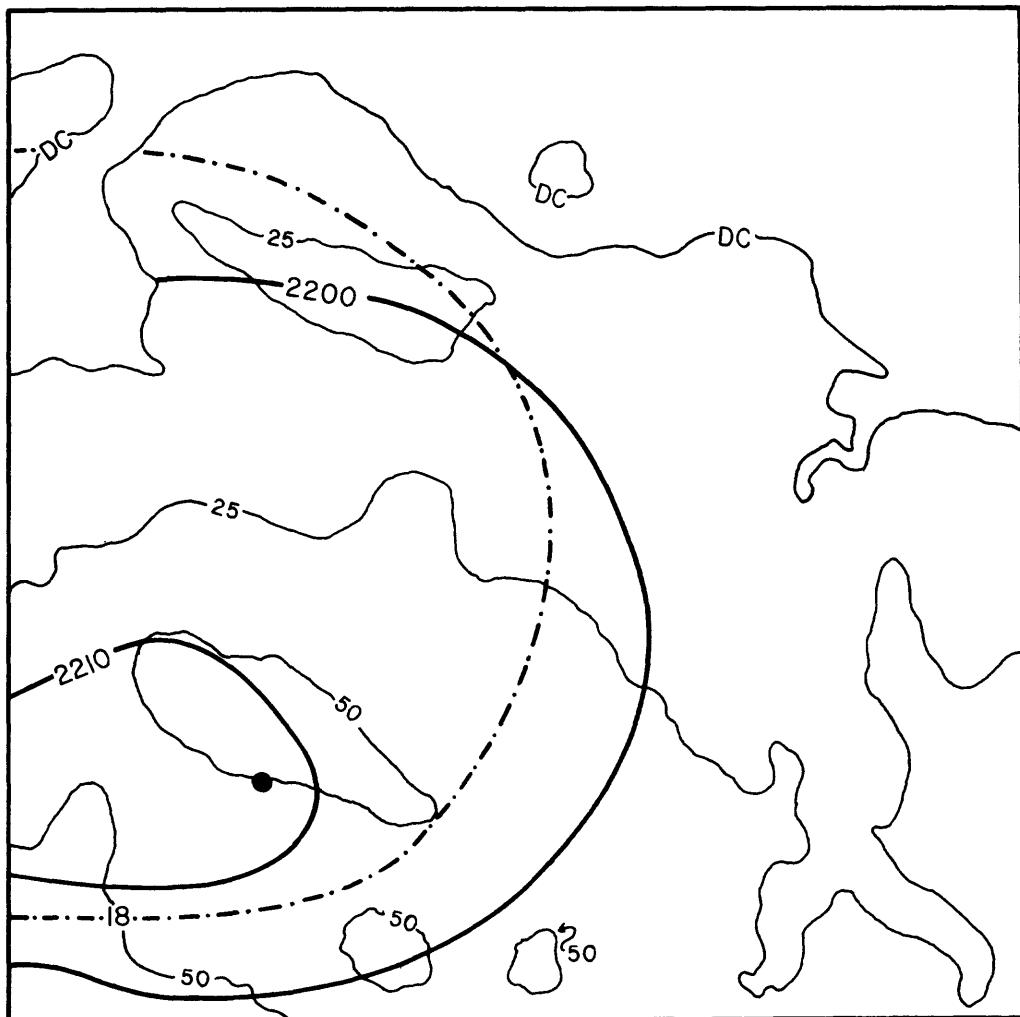
COAL BEDS

A - "A" BED

DC - DUNN CENTER BED\*

SECTION 12

TOWNSHIP 144 NORTH, RANGE 94 WEST



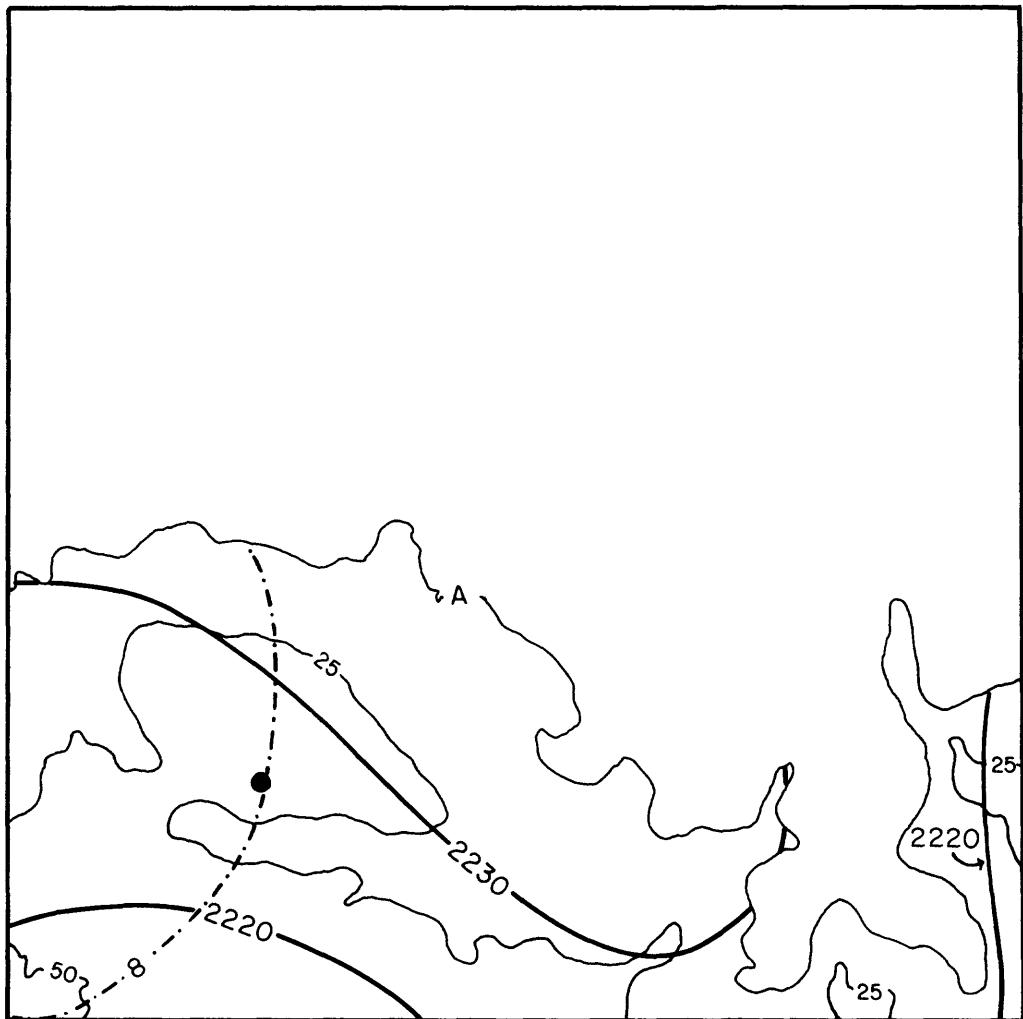
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED

EXPLANATION

- ~~~~DC~~~~ COAL CROP LINE OF THE "DC" BED, APPROXIMATELY LOCATED
- 2210——— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 18----- COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~50~~~~ OVERBURDEN ISOPACH LINES AT 25 AND 50 FEET
- DRILL HOLE

SECTION 12

TOWNSHIP 144 NORTH, RANGE 94 WEST



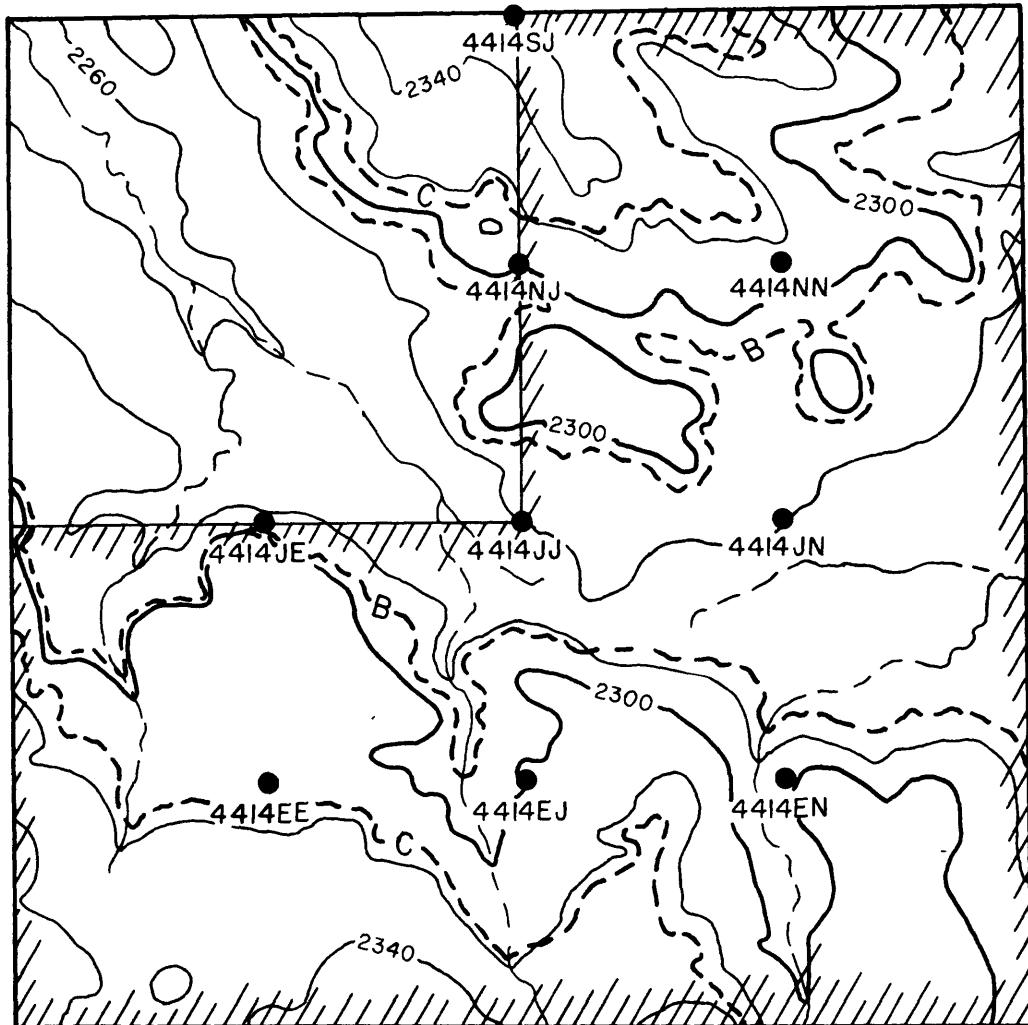
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"A" LIGNITE BED

EXPLANATION

- ~~~~~A~~~~~ COAL CROP LINE OF THE "A" BED, APPROXIMATELY LOCATED
- ~~~~~2220~~~~~ STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 8----- COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~25~~~~~ OVERBURDEN ISOPACH LINES AT 25 AND 50 FEET
- DRILL HOLE

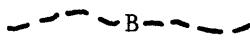
SECTION 14

TOWNSHIP 144 NORTH, RANGE 94 WEST



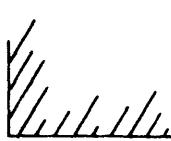
TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

EXPLANATION

 COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)

C - "C" BED

B - "B" BED



BOUNDARY OF FEDERAL COAL

**4414EE** DRILL-HOLE NUMBER

● DRILL HOLE

IDENTIFIED COAL RESOURCES (IN SHORT TONS)  
 TOWNSHIP 144 NORTH, RANGE 94 WEST, SECTION 14

---

DUNN CENTER BED

| OVERBURDEN  | MEASURED   | INDICATED | INFERRED |
|-------------|------------|-----------|----------|
| 0' to 25'   | 0          | 0         | 0        |
| 25' to 150' | 13,450,000 | 661,000   | 0        |
| >150'       | 567,000    | 346,000   | 0        |

---

"A" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 0         | 0         | 0        |
| 25' to 150' | 5,377,000 | 428,000   | 0        |
| >150'       | 0         | 0         | 0        |

---

"B" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 2,338,000 | 189,000   | 0        |
| 25' to 150' | 2,030,000 | 196,000   | 0        |
| >150'       | 0         | 0         | 0        |

---

"C" BED

| OVERBURDEN  | MEASURED | INDICATED | INFERRED |
|-------------|----------|-----------|----------|
| 0' to 25'   | 161,000  | 455,000   | 157,000  |
| 25' to 150' | 0        | 63,000    | 0        |
| >150'       | 0        | 0         | 0        |

---

SECTION TOTAL

| OVERBURDEN  | MEASURED   | INDICATED | INFERRED |
|-------------|------------|-----------|----------|
| 0' to 25'   | 2,499,000  | 644,000   | 157,000  |
| 25' to 150' | 20,857,000 | 1,348,000 | 0        |
| >150'       | 598,000    | 377,000   | 0        |

## SECTION 14

TOWNSHIP 144 NORTH, RANGE 94 WEST

## DRILL-HOLE DATA

4414SJ

4414NJ

4414NN

4414JE

4414JJ

2345

2300

2310

2290

2280

R 24

R 13

R 21

R 35

R 71

C 5 (C)

C 6.5 (B)

C 9.5 (B)

C 1

C 3 (A)

R 29

R 33

R 34

R 50

R .5

C 9.5 (B)

C 1

C 1

C 4 (A)

C 4 (A)

R 61

R 42

R 35

R 3

R 4

C 1

C 3 (A)

C 8 (A)

C .5 (A)

C 17 (DC)

R 4

R 1

R 5

R .5

R 7

C 3 (A)

C 3 (A)

C 17 (DC)

C 1 (A)

C .5

R .5

R 4

R 19.5

R 1

R 10

C 3 (A)

C 19 (DC)

150 TD

C 2 (A)

117 TD

R 4

R 27.5

153 TD

R 22

140 TD

179 TD

4414JN

4414EE

4414EJ

4414EN

2280

2315

2300

2295

R 53

R 18

R 21

R 16

C 1

C 8.5 (B)

C 7.5 (B)

C 7.5 (B)

R 14

R 14

R 55

R 66

C 2.5 (A)

C 1

C 2

C 1.5

R .5

R 51

R 24

R 15

C 4 (A)

C 3.5 (A)

C 3.5 (A)

C 3 (A)

R 5

R 1

R .5

R .5

C 17.5 (DC)

C 1 (A)

C 1 (A)

C 4 (A)

R 12.5

R .5

R .5

R 4

110 TD

C 1 (A)

C 2 (A)

C 18.5 (DC)

165 TD

R 1

R 4

R 3

C 1 (A)

C 1 (A)

C 17.5 (DC)

C 1

R 3

R 3

R 6

R 14

C 17 (DC)

C 17 (DC)

C 1

154 TD

R 8

R 8

R 12.5

158 TD

C 1

C 1

R 12.5

165 TD

R 34.5

165 TD

## EXPLANATION

4414SJ — DRILL-HOLE NUMBER

COAL BEDS

2345 — SURFACE ELEVATION

C - "C" BED

R24 — OVERBURDEN\*

B - "B" BED

C5(C) — COAL BED

A - "A" BED

R20 — (LETTER INDICATES

DC - DUNN CENTER BED

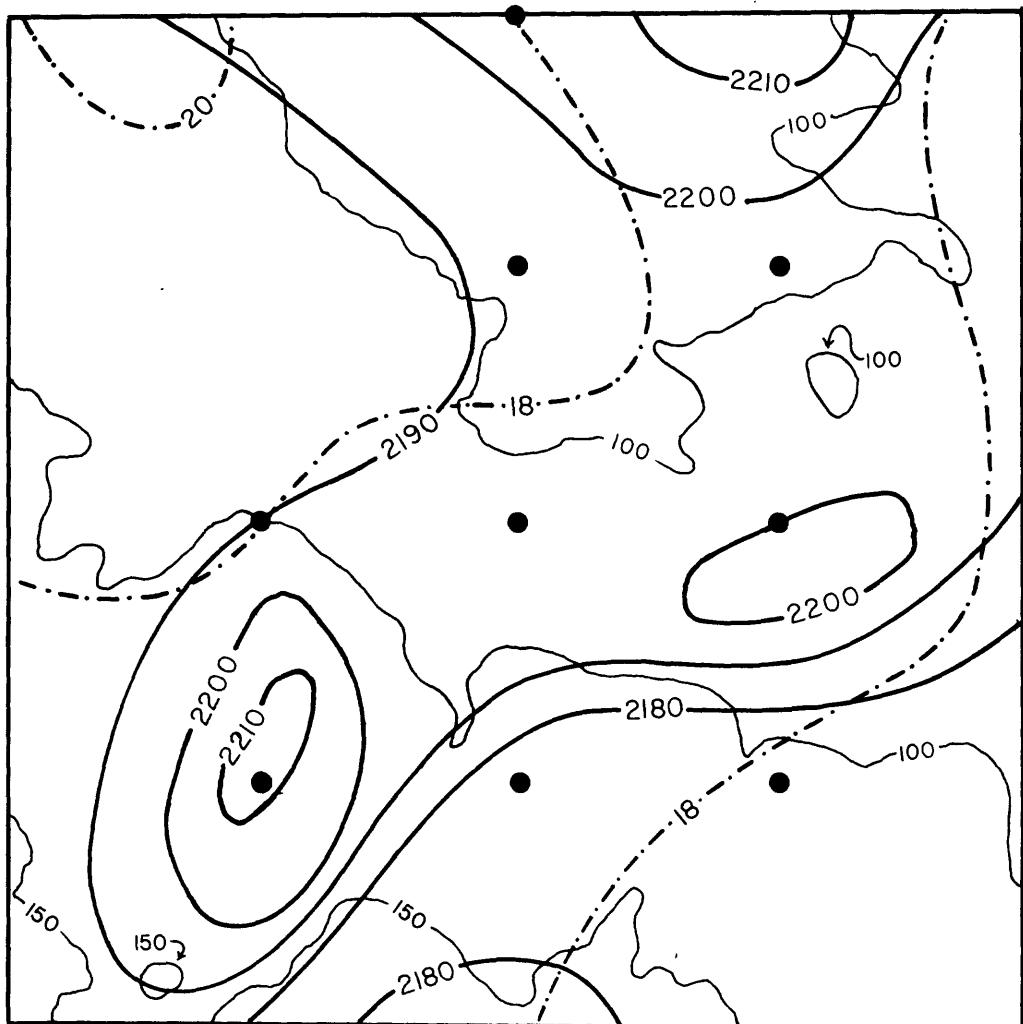
C9.5(B) — BED NAME)

R21.5 — INTERBURDEN\*

80TD — TOTAL DEPTH OF HOLE

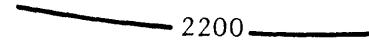
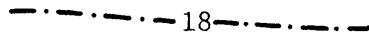
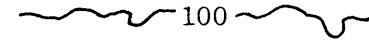
SECTION 14

TOWNSHIP 144 NORTH, RANGE 94 WEST



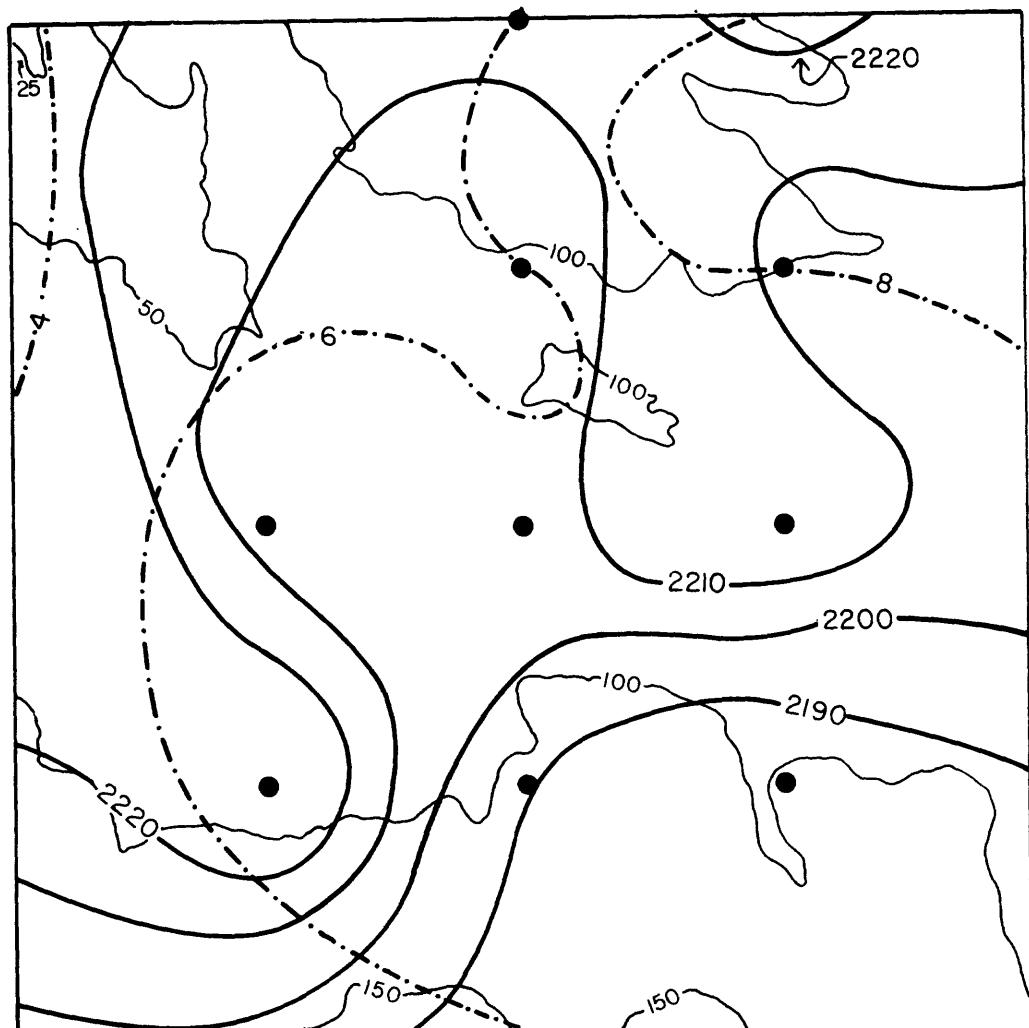
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED

EXPLANATION

-  2200 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
-  18 — COAL ISOPACH LINE (C.I. 2 FEET)
-  100 — OVERBURDEN ISOPACH LINES AT 100 AND 150 FEET
- DRILL HOLE

SECTION 14

TOWNSHIP 144 NORTH, RANGE 94 WEST



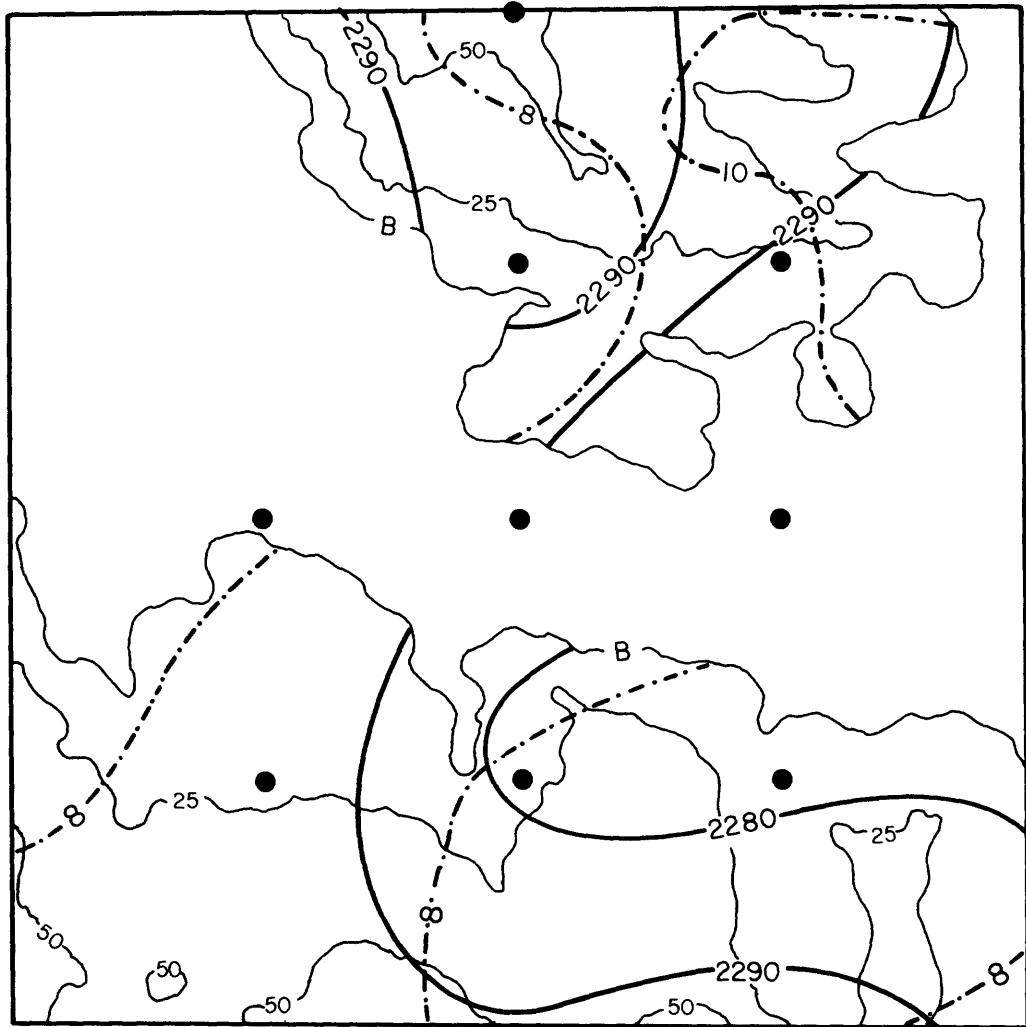
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"A" LIGNITE BED

EXPLANATION

- 2190 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 6 — COAL ISOPACH LINE (C.I. 2 FEET)
- 50 — OVERBURDEN ISOPACH LINES AT 25, 50,  
100, AND 150 FEET
- DRILL HOLE

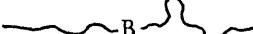
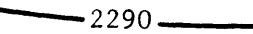
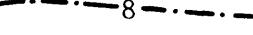
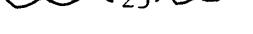
SECTION 14

TOWNSHIP 144 NORTH, RANGE 94 WEST



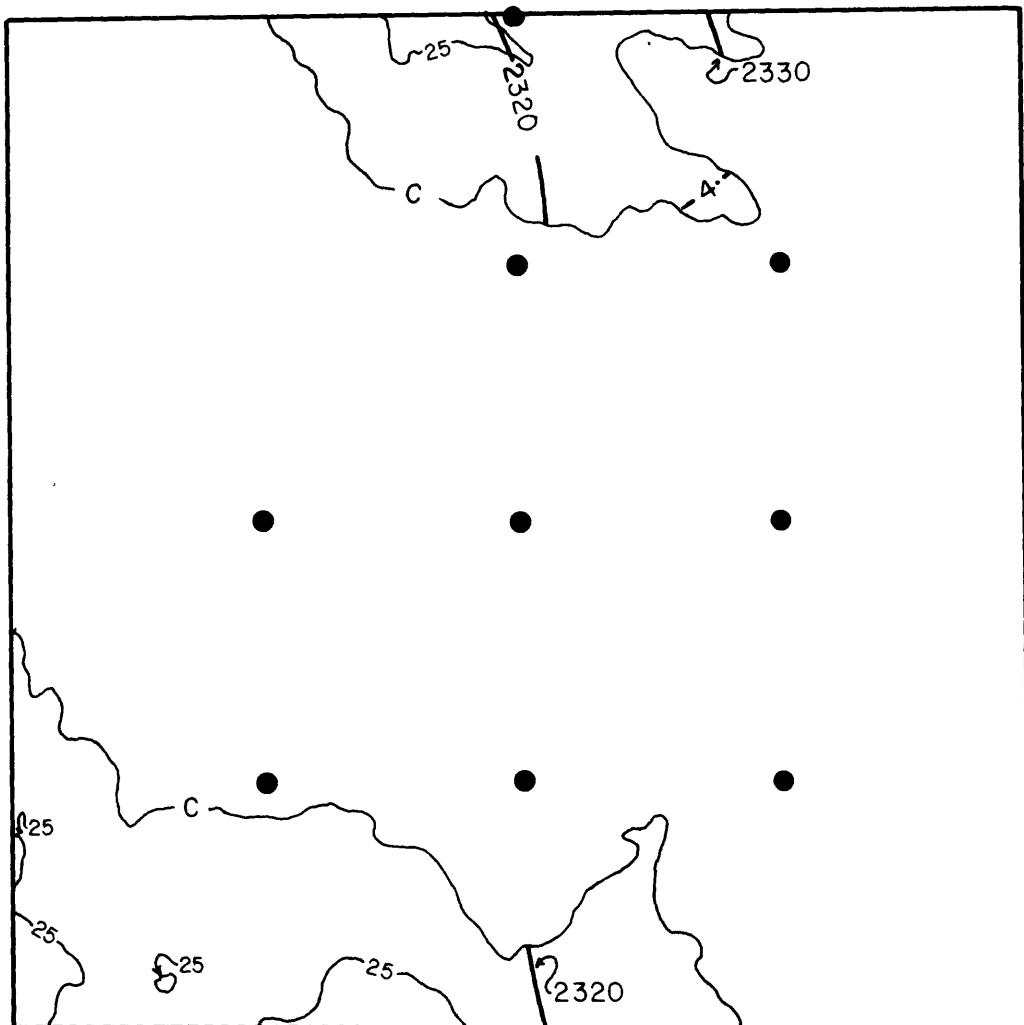
THICKNESS, OVERBURDEN AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

-  COAL CROP LINE OF THE "B" BED, APPROXIMATELY LOCATED
-  STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
-  COAL ISOPACH LINE (C.I. 2 FEET)
-  OVERBURDEN ISOPACH LINES AT 25 AND 50 FEET
-  DRILL HOLE

SECTION 14

TOWNSHIP 144 NORTH, RANGE 94 WEST



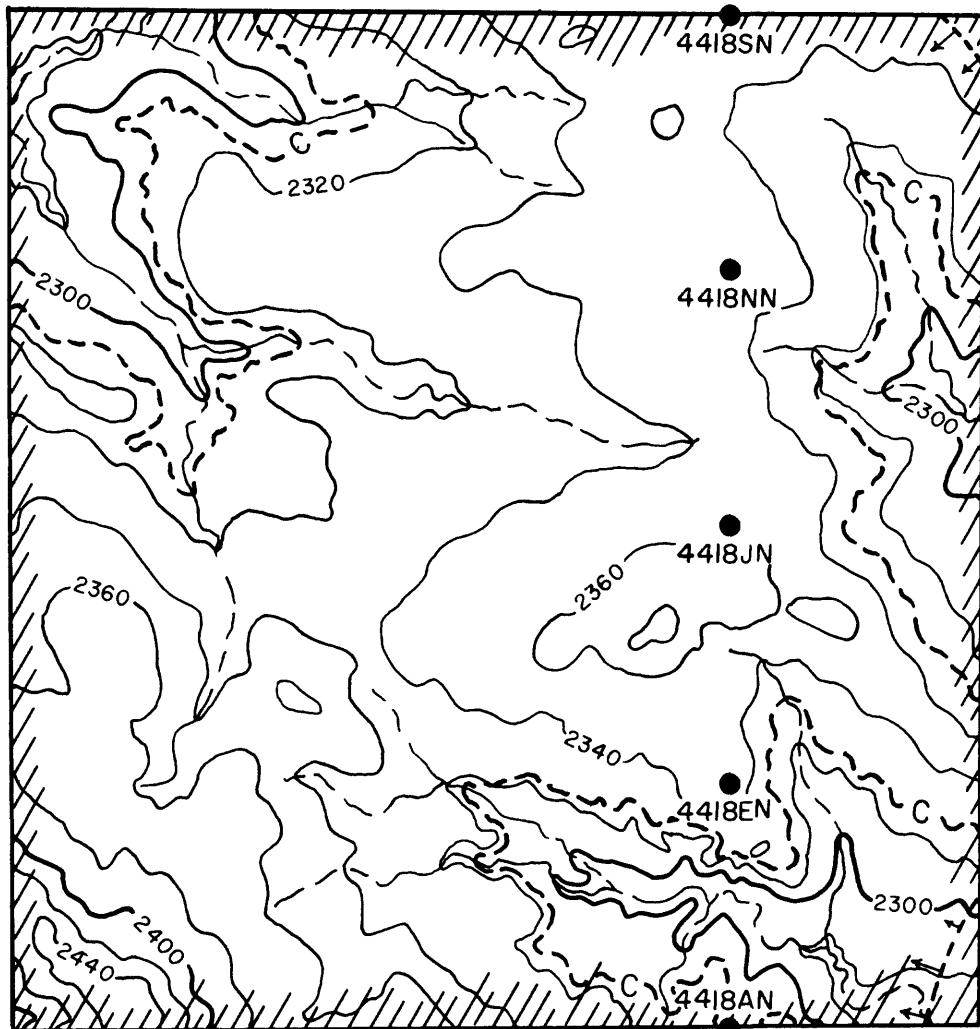
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"C" LIGNITE BED

EXPLANATION

- C — COAL CROP LINE OF THE "C" BED, APPROXIMATELY LOCATED
- 2320 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 4 — COAL ISOPACH LINE (C.I. 2 FEET)
- 25 — OVERBURDEN ISOPACH LINE AT 25 FEET
- DRILL HOLE

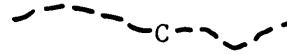
SECTION 18

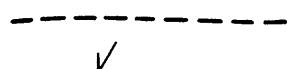
TOWNSHIP 144 NORTH, RANGE 94 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

EXPLANATION

 COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)  
C - "C" BED

 DUNN CENTER BED SPLIT BOUNDARY  
(BED SPLITS IN DIRECTION OF ARROWS)



BOUNDARY OF FEDERAL COAL

4418NN DRILL HOLE NUMBER

● DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)  
 TOWNSHIP 144 NORTH, RANGE 94 WEST, SECTION 18

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DUNN CENTER BED (LOWER SPLIT)

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 0         | 0         | 0        |
| 25' to 150' | 2,068,000 | 1,575,000 | 5,000    |
| >150'       | 1,228,000 | 761,000   | 17,000   |

---

DUNN CENTER BED (AND UPPER SPLIT)

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 0         | 0         | 0        |
| 25' to 150' | 4,522,000 | 1,855,000 | 10,000   |
| >150'       | 0         | 220,000   | 0        |

---

"B" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 0         | 0         | 0        |
| 25' to 150' | 3,328,000 | 3,976,000 | 28,000   |
| >150'       | 0         | 406,000   | 0        |

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"C" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 1,338,000 | 4,795,000 | 0        |
| 25' to 150' | 2,257,000 | 1,890,000 | 17,000   |
| >150'       | 0         | 0         | 0        |

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SECTION TOTAL

| OVERBURDEN  | MEASURED   | INDICATED | INFERRED |
|-------------|------------|-----------|----------|
| 0' to 25'   | 1,338,000  | 4,795,000 | 0        |
| 25' to 150' | 12,175,000 | 9,296,000 | 60,000   |
| >150'       | 1,228,000  | 1,387,000 | 17,000   |

## SECTION 18

TOWNSHIP 144 NORTH, RANGE 94 WEST

## DRILL HOLE DATA

| 4418SN       | 4418NN       | 4418JN           | 4418EN       | 4418AN       |
|--------------|--------------|------------------|--------------|--------------|
| <u>2345</u>  | <u>2344</u>  | <u>2355</u>      | <u>2342</u>  | <u>2310</u>  |
| R 10         | R 26         | R 19             | R 5          | R 76         |
| C 4.5        | C 10 (C)     | C 3.5            | C 3          | C 3.5 (B)    |
| R 18         | R 12         | R 10             | R 8          | R 2          |
| C 10.5 (C)   | C 1          | C 9 (C)          | C 7.5 (C)    | C 3 (B)      |
| R 53         | R 36         | R 27             | R 72         | R 3          |
| C 4 (B)      | C 3 (B)      | C 1              | C 3.5 (B)    | C 1 (B)      |
| R 1          | R 1          | R 25             | R 1          | R 9          |
| C 4 (B)      | C 1.5 (B)    | C 2.5 (B)        | C 2.5 (B)    | C 8 (DC)     |
| R 21         | R 44         | R 1              | R 11         | R 28         |
| C 8 (DC)     | C 7 (DC)     | C 2 (B)          | C 8 (DC)     | C 7.5 (DC2)  |
| R 10         | R 20         | R 45             | R 22         | R 4          |
| C 6 (DC2)    | C 6.5 (DC2)  | C 8.5 (DC)       | C 7 (DC2)    | C 2.5        |
| R 29         | R 8          | R 11             | R 8          | R 15         |
| <u>179TD</u> | <u>C 1</u>   | <u>C 7 (DC2)</u> | <u>C 1</u>   | <u>C 4.5</u> |
|              | <u>R 25</u>  | <u>R 9</u>       | <u>R 18</u>  | <u>R 32</u>  |
|              | <u>C 4</u>   | <u>C 1</u>       | <u>C 4.5</u> |              |
|              | <u>R 13</u>  | <u>R 4</u>       | <u>R 16</u>  |              |
|              | <u>219TD</u> | <u>C 1</u>       | <u>C 1</u>   |              |
|              |              | <u>R 12.5</u>    | <u>R 21</u>  |              |
|              |              | <u>199TD</u>     | <u>220TD</u> |              |

## EXPLANATION

4418NN ————— DRILL HOLE NUMBER

2344 ————— SURFACE ELEVATION

R20 ————— OVERBURDEN\*

C8(B) ————— COAL BED

R32 ————— (LETTER INDICATES  
C7(DC) ————— BED NAME)

R14 ————— INTERBURDEN\*

81TD ————— TOTAL DEPTH OF HOLE

## COAL BEDS

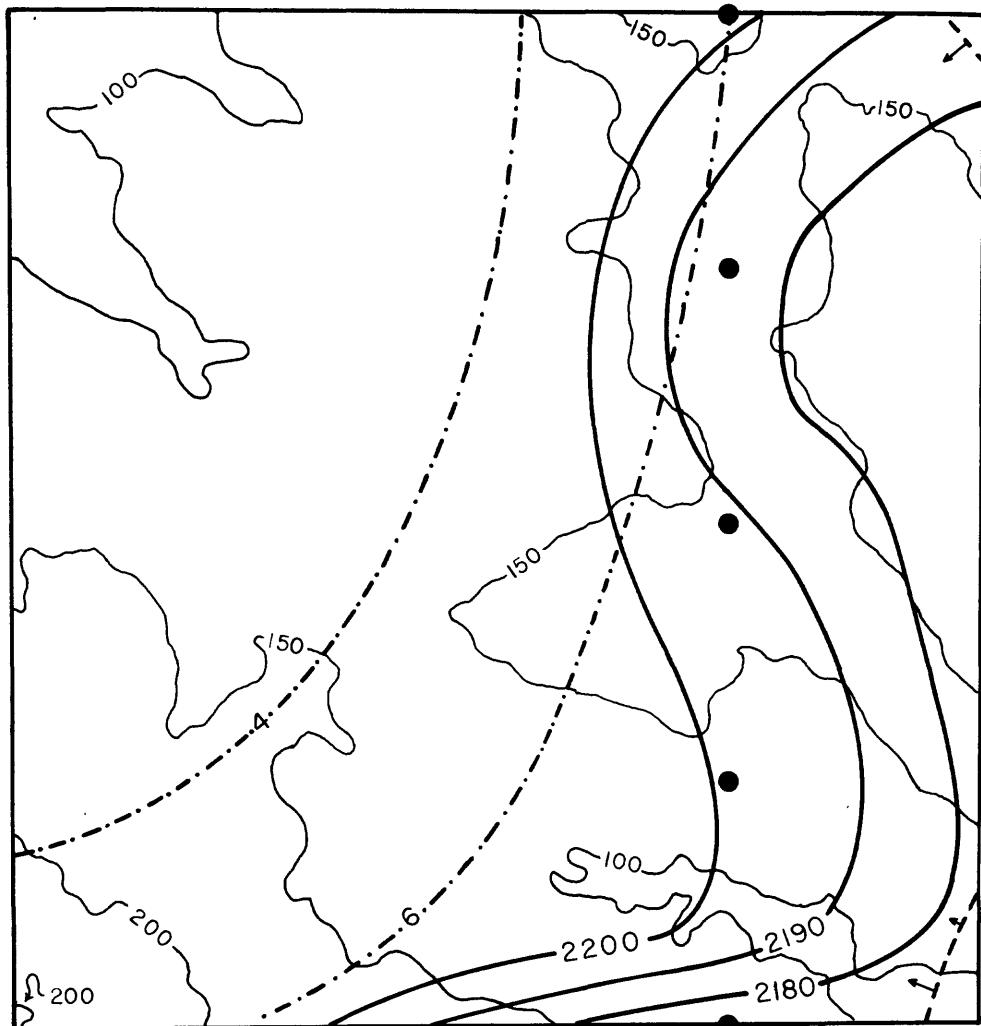
C - "C" BED

B - "B" BED

DC - DUNN CENTER BED

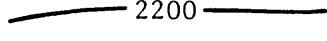
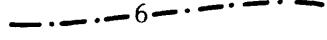
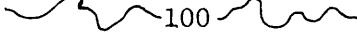
SECTION 18

TOWNSHIP 144 NORTH, RANGE 94 WEST



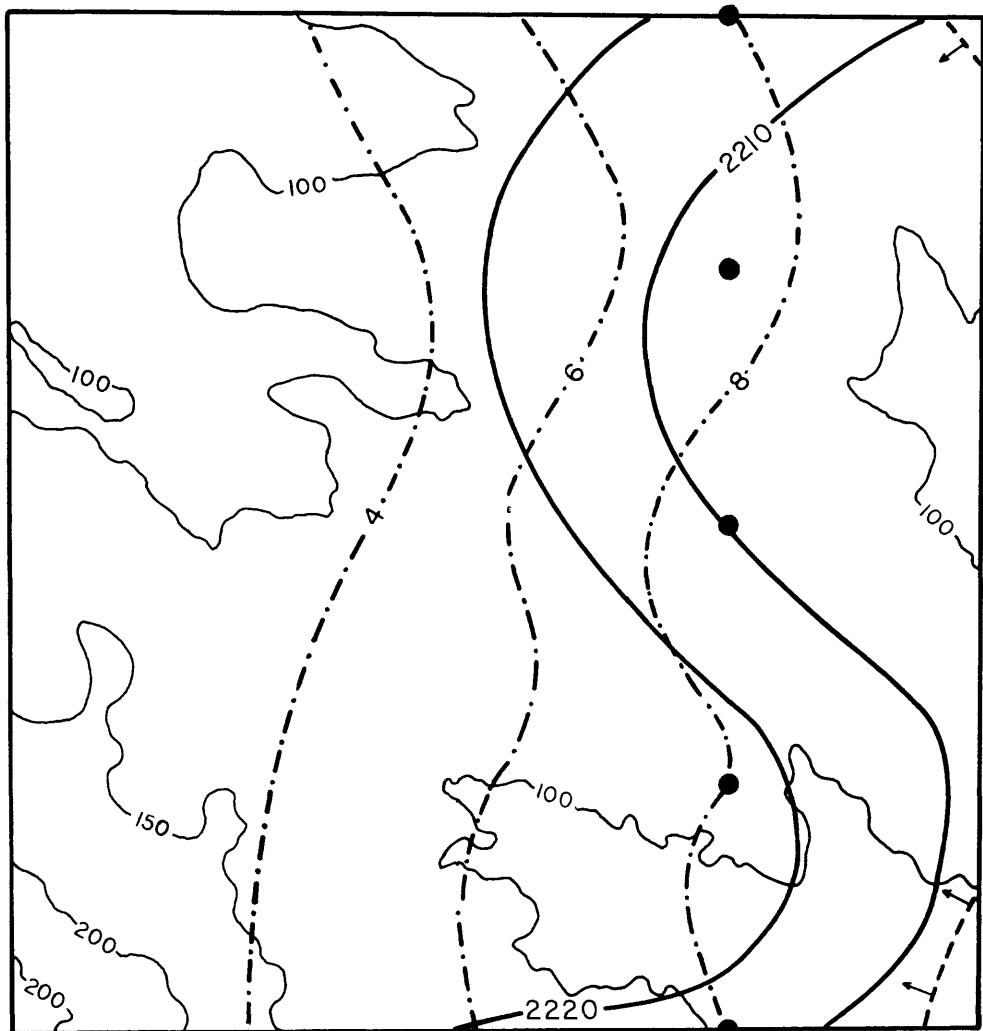
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED  
(LOWER SPLIT)

EXPLANATION

-  DUNN CENTER BED SPLIT BOUNDARY  
(BED SPLITS IN DIRECTION OF ARROWS)
-  2200 STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
-  6 COAL ISOPACH LINE (C.I. 2 FEET)
-  100 OVERBURDEN ISOPACH LINES AT 100,  
150, and 200 FEET
- DRILL HOLE

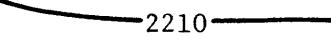
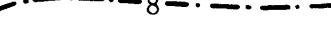
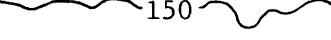
SECTION 18

TOWNSHIP 144 NORTH, RANGE 94 WEST



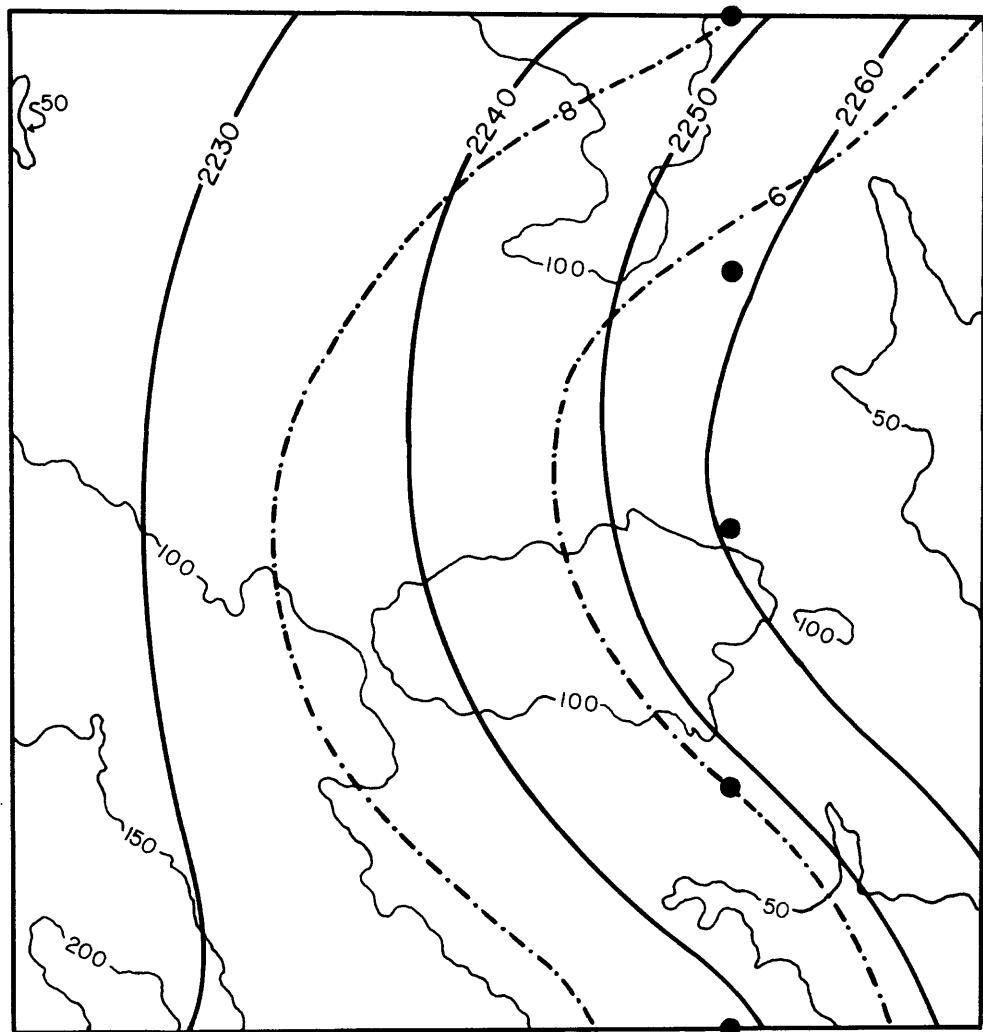
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED AND THE UPPER SPLIT  
OF THE DUNN CENTER LIGNITE BED

EXPLANATION

- 
DUNN CENTER BED SPLIT BOUNDARY  
(BED SPLITS IN DIRECTION OF ARROWS)
- 
STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 
COAL ISOPACH LINE (C.I. 2 FEET)
- 
OVERBURDEN ISOPACH LINES AT 100,  
150, and 200 FEET
- 
DRILL HOLE

SECTION 18

TOWNSHIP 144 NORTH, RANGE 94 WEST



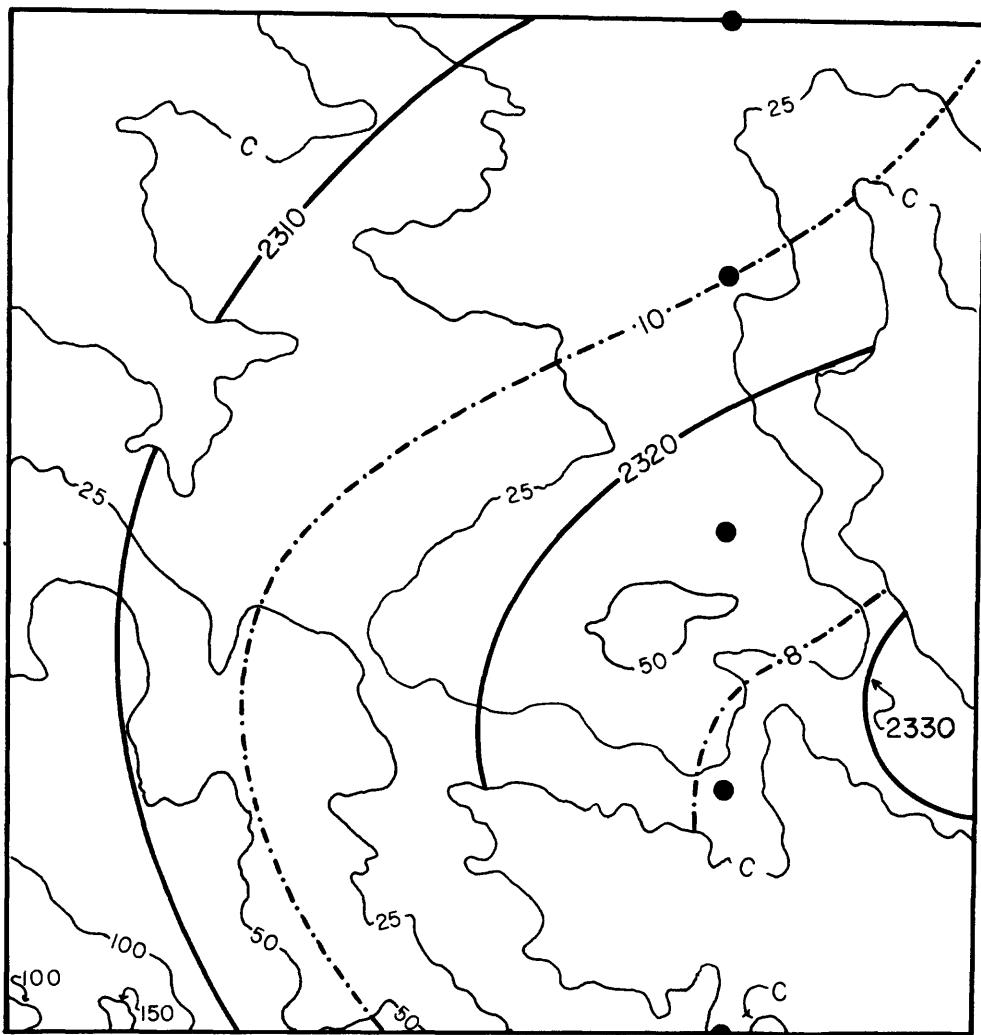
THICKNESS, OVERTURDEN, AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

- 2260 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 8 — COAL ISOPACH LINE (C.I. 2 FEET)
- 200 — OVERTURDEN ISOPACH LINES AT 50, 100,  
150, AND 200 FEET
- DRILL HOLE

SECTION 18

TOWNSHIP 144 NORTH, RANGE 94 WEST



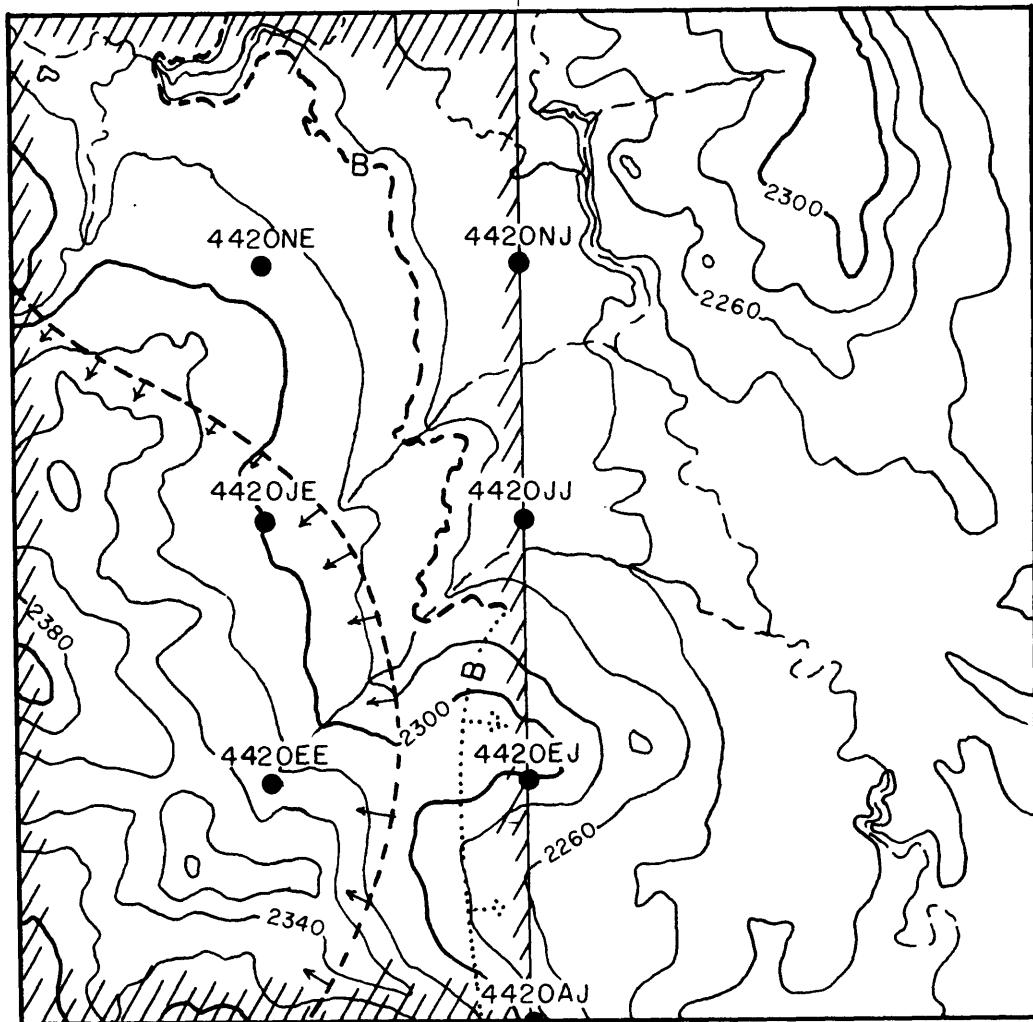
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"C" LIGNITE BED

EXPLANATION

- C — COAL CROP LINE OF THE "C" BED, APPROXIMATELY LOCATED
- 2310 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 8 — COAL ISOPACH LINE (C.I. 2 FEET)
- 25 — OVERBURDEN ISOPACH LINES AT 25, 50,  
100, AND 150 FEET
- DRILL HOLE

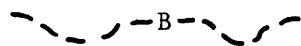
SECTION 20

TOWNSHIP 144 NORTH, RANGE 94 WEST

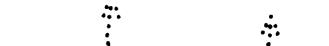


TOPOGRAPHIC, OUTCROP, AND DRILL-HOLE LOCATION MAP

EXPLANATION



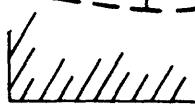
COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)  
B - "B" BED



SUBSURFACE LIMIT OF COAL, APPROXIMATELY LOCATED  
(COAL MISSING IN DIRECTION OF ARROWS,  
LETTER INDICATES BED NAME)



DUNN CENTER BED SPLIT BOUNDARY  
(BED SPLITS IN DIRECTION OF ARROWS)



BOUNDARY OF FEDERAL COAL

4420JJ DRILL-HOLE NUMBER

● DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)  
 TOWNSHIP 144 NORTH, RANGE 94 WEST, SECTION 20

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DUNN CENTER BED (LOWER SPLIT)

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 0         | 0         | 0        |
| 25' to 150' | 1,102,000 | 157,000   | 0        |
| >150'       | 850,000   | 31,000    | 0        |

---

DUNN CENTER BED (UPPER SPLIT)

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 0         | 0         | 0        |
| 25' to 150' | 6,562,000 | 336,000   | 0        |
| >150'       | 336,000   | 10,000    | 0        |

---

"B" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 661,000   | 52,000    | 0        |
| 25' to 150' | 2,168,000 | 131,000   | 0        |
| >150'       | TRACE     | 10,000    | 0        |

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SECTION TOTAL

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 661,000   | 52,000    | 0        |
| 25' to 150' | 9,832,000 | 624,000   | 0        |
| >150'       | 1,186,000 | 51,000    | 0        |

## SECTION 20

TOWNSHIP 144 NORTH, RANGE 94 WEST

## DRILL-HOLE DATA

| 4420NE      | 4420NJ    | 4420JE    | 4420JJ      | 4420EE      |
|-------------|-----------|-----------|-------------|-------------|
| 2290        | 2250      | 2300      | 2255        | 2325        |
| R 29        | R 65      | R 41      | R 63        | R 68        |
| C 3 (B)     | C 18 (DC) | C 4 (B)   | C 17.5 (DC) | C 2.5 (B)   |
| R 4         | R 1       | R 2       | R 2         | R 1         |
| C 1 (B)     | C 1.5     | C 1.5 (B) | C 2.5       | C 1 (B)     |
| R 1         | R 7       | R 1       | R 5         | R 1         |
| C 1.5 (B)   | C 3.5     | C 2 (B)   | 90TD        | C 1 (B)     |
| R 60        | R 4       | R 1       |             | R 2         |
| C 17.5 (DC) | 100TD     | C 1 (B)   |             | C 1 (B)     |
| R 3         |           | R 59      |             | R .5        |
| C 3         |           | C 6 (DC)  |             | C .5 (B)    |
| R 15        |           | R 1       |             | R 44        |
| C 4         |           | C 9 (DC2) |             | C 6 (DC)    |
| R 6         |           | R 2       |             | R 3         |
|             |           | C 3       |             | C 9.5 (DC2) |
|             |           | R 12      |             | R 1         |
|             |           | C 4.5     |             | C 1.5       |
|             |           | R 9       |             | R 6.5       |
|             |           | 159TD     |             | 150TD       |
| 148TD       |           |           |             |             |

4420EJ

4420AJ

|             |           |
|-------------|-----------|
| 2300        | 2290      |
| R 106       | R 94      |
| C 15.5 (DC) | C 18 (DC) |
| R 1         | R .5      |
| C 2         | C 2       |
| R 10.5      | R 15.5    |
| 135TD       | 130TD     |

## EXPLANATION

4420NE — DRILL-HOLE NUMBER

2290 — SURFACE ELEVATION  
 R41 — OVERBURDEN\*  
 C6(B) — COAL BED  
 R20 — (LETTER INDICATES  
 C12(DC) — BED NAME)  
 R33 — INTERBURDEN\*  
 112TD — TOTAL DEPTH OF HOLE

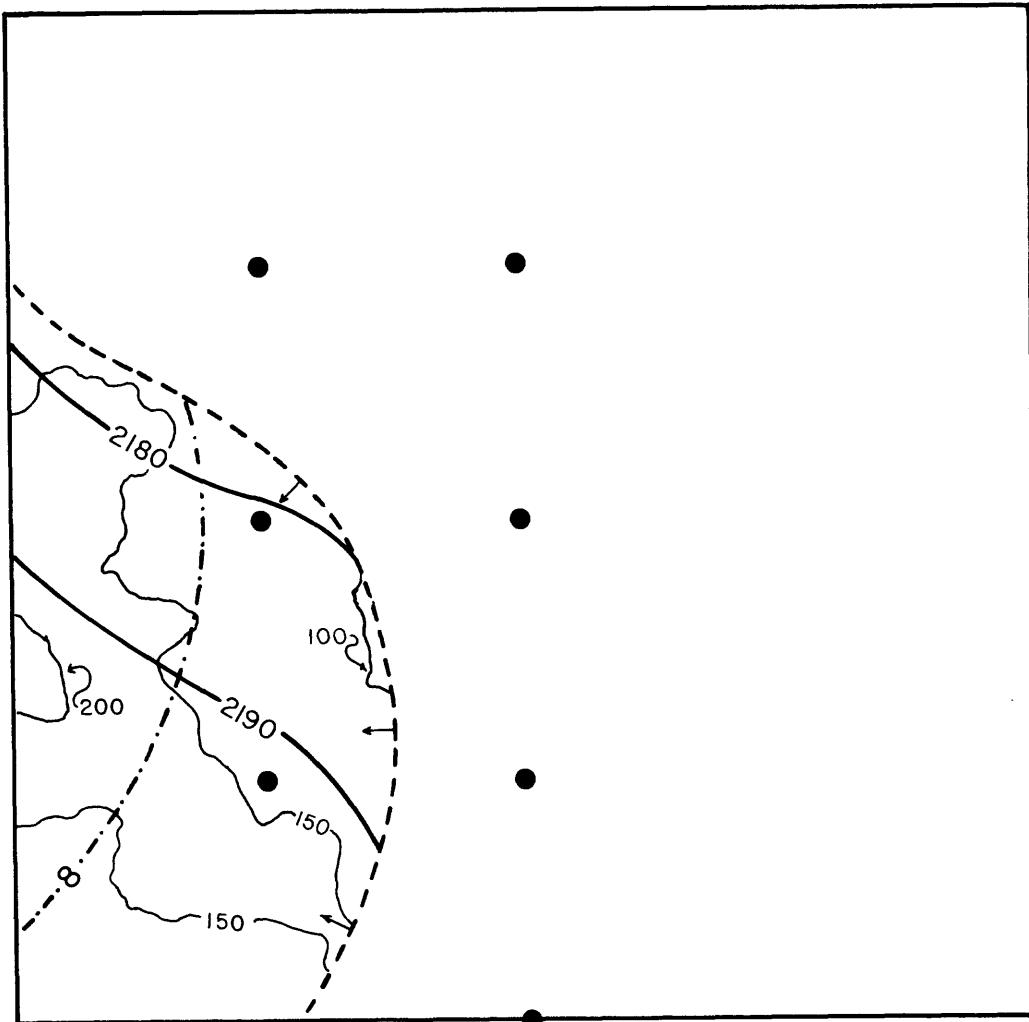
## COAL BEDS

B — "B" BED

DC — DUNN CENTER BED

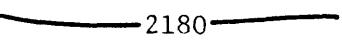
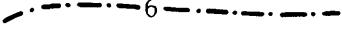
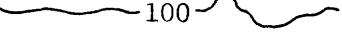
SECTION 20

TOWNSHIP 144 NORTH, RANGE 94 WEST



THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED  
(LOWER SPLIT)

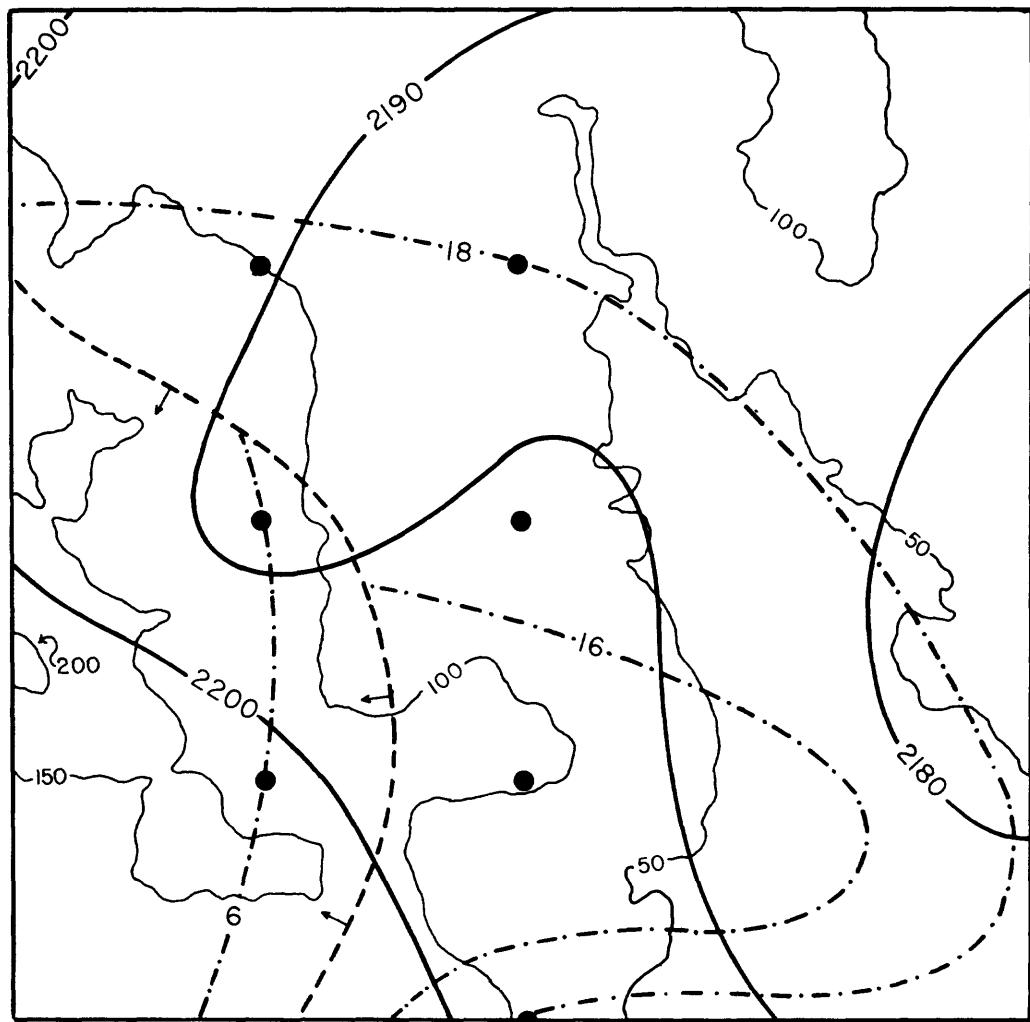
EXPLANATION

-  DUNN CENTER BED SPLIT BOUNDARY  
(BED SPLITS IN DIRECTION OF ARROWS)
-  STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
-  COAL ISOPACH LINE (C.I. 2 FEET)
-  OVERBURDEN ISOPACH LINES AT 100,  
150, AND 200 FEET

DRILL HOLE

SECTION 20

TOWNSHIP 144 NORTH, RANGE 94 WEST



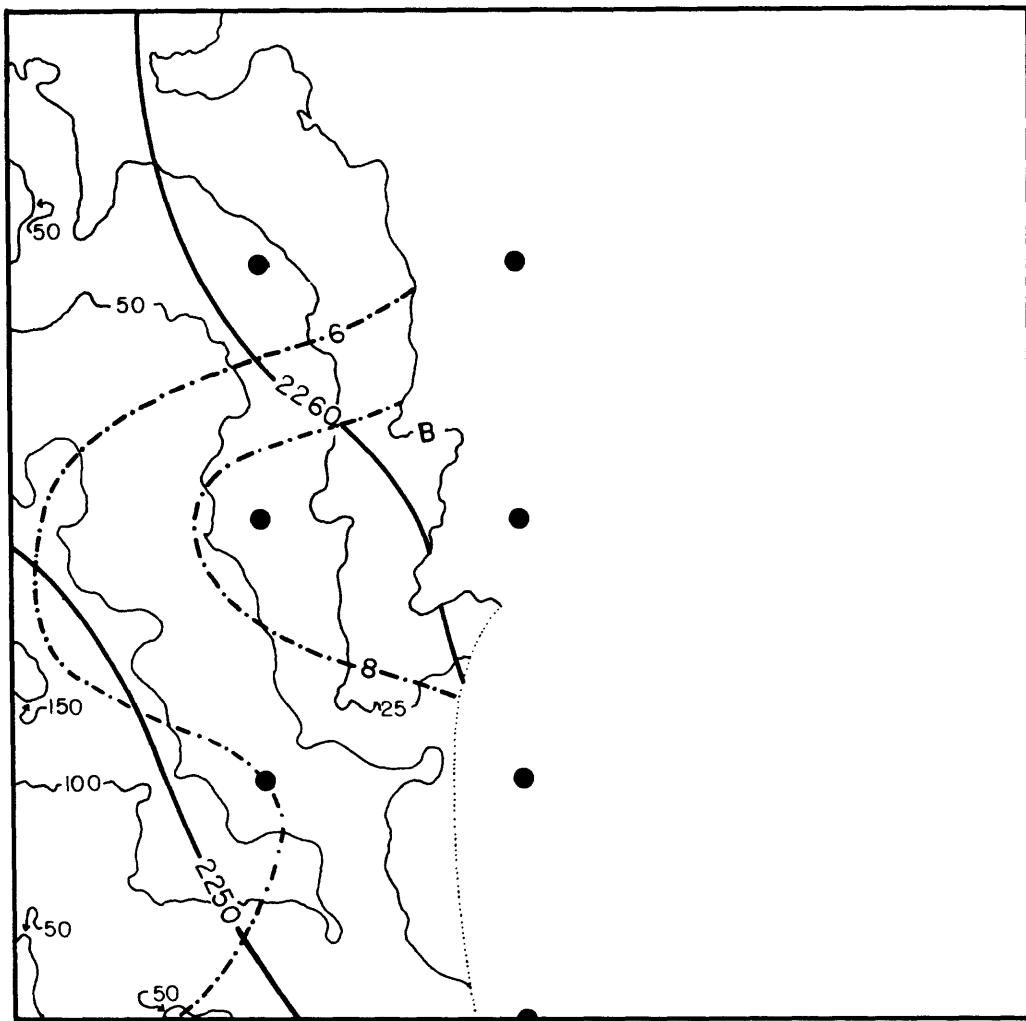
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED AND THE UPPER SPLIT  
OF THE DUNN CENTER LIGNITE BED

EXPLANATION

- DUNN CENTER BED SPLIT BOUNDARY (BED SPLITS IN DIRECTION OF ARROWS)
- 2200 STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 16 COAL ISOPACH LINE (C.I. 2 FEET)
- 100, 150, 200, 2200 OVERBURDEN ISOPACH LINES AT 50, 100, 150, AND 200 FEET
- DRILL HOLE

SECTION 20

TOWNSHIP 144 NORTH, RANGE 94 WEST



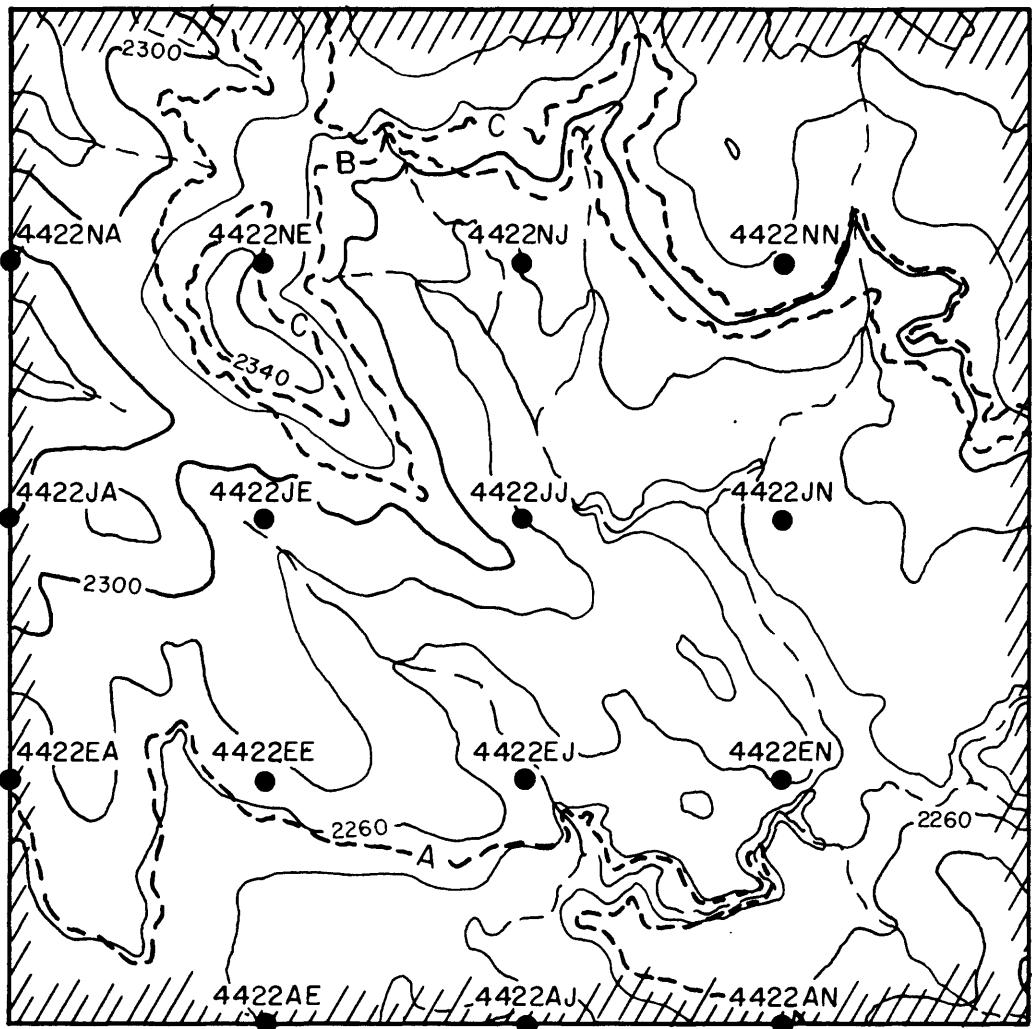
THICKNESS, OVERTURDEN, AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

- B — COAL CROP LINE OF THE "B" BED, APPROXIMATELY LOCATED
- .... B .... SUBSURFACE LIMIT OF "B" BED, APPROXIMATELY LOCATED
- 2260 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 8 — COAL ISOPACH LINE (C.I. 2 FEET)
- 25 — OVERTURDEN ISOPACH LINES AT 25, 50  
100, AND 150 FEET
- DRILL HOLE

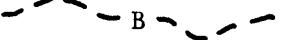
SECTION 22

TOWNSHIP 144 NORTH, RANGE 94 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL-HOLE LOCATION MAP

EXPLANATION

 COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)

C - "C" BED

B - "B" BED

A - "A" BED



BOUNDARY OF FEDERAL COAL

4422JJ DRILL-HOLE NUMBER

● DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)  
 TOWNSHIP 144 NORTH, RANGE 94 WEST, SECTION 22

DUNN CENTER BED

| OVERBURDEN  | MEASURED   | INDICATED | INFERRRED |
|-------------|------------|-----------|-----------|
| 0' to 25'   | 0          | 0         | 0         |
| 25' to 150' | 15,400,000 | 196,000   | 0         |
| >150'       | 1,988,000  | 336,000   | 0         |

"A" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 623,000   | 7,000     | 0         |
| 25' to 150' | 3,227,000 | 140,000   | 0         |
| >150'       | TRACE     | 28,000    | 0         |

"B" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 1,064,000 | 112,000   | 0         |
| 25' to 150' | 686,000   | 266,000   | 0         |
| >150'       | 0         | 0         | 0         |

"C" BED

| OVERBURDEN  | MEASURED | INDICATED | INFERRRED |
|-------------|----------|-----------|-----------|
| 0' to 25'   | 245,000  | 203,000   | 0         |
| 25' to 150' | 175,000  | 91,000    | 0         |
| >150'       | 0        | 0         | 0         |

SECTION TOTAL

| OVERBURDEN  | MEASURED   | INDICATED | INFERRRED |
|-------------|------------|-----------|-----------|
| 0' to 25'   | 1,932,000  | 322,000   | 0         |
| 25' to 150' | 19,488,000 | 693,000   | 0         |
| >150'       | 1,988,000  | 364,000   | 0         |

## SECTION 22

TOWNSHIP 144 NORTH, RANGE 94 WEST

## DRILL-HOLE DATA

4422NA

4422NE

4422NJ

4422NN

4422JA

2298

R 37  
C 4 (A)  
R 77  
C 17 (DC)  
R 5  
C 1.5  
R 17.5

159TD

2338

R 20  
C 7 (B)  
R 51  
C 1  
R 6  
C 4 (A)  
R 73

199TD

2280

R 76  
C 5.5 (A)  
R 24  
C 17.5 (DC)  
R 5  
C 2  
R 9

139TD

2318

R 16  
C 4.5 (C)  
R 6  
C 8.5 (B)  
R 30  
C 1  
R 18  
C 1  
R 41  
C 4.5 (A)  
R 10  
C 1  
R 6  
C 17 (DC)  
R 5  
C 1  
R 19.5

190TD

2300

R 54  
C 4.5 (A)  
R 66  
C 17 (DC)  
R 2  
C 1  
R 4  
C .5  
R 10

159TD

4422JE

4422JJ

4422JN

4422EA

4422EE

2290

R 63  
C 5 (A)  
R 20  
C 1.5  
R 31  
C 17 (DC)  
R 2  
C 1  
R 4  
C 1  
R 14.5

160TD

2280

R 84  
C 5 (A)  
R 14  
C 1  
R 10  
C 17.5 (DC)  
R 2  
C 1.5  
R 4  
C 1  
R 10

150TD

2262

R 53  
C 1  
R 11  
C 5 (A)  
R 9  
C 1  
R 7  
C 17 (DC)  
R 3  
C 1  
R 3  
C 1  
R 8

120TD

2268

R 5  
C 4 (A)  
R 60  
C 16 (DC)  
R 2  
C 1  
R 2  
C 1  
R 7

98TD

2270

R 23  
C 4 (A)  
R 28  
C 1  
R 23  
C 1  
C 1  
R 2  
C 17 (DC)  
R 2  
C 1  
R 2  
C 1  
R 3

108TD

## SECTION 22

TOWNSHIP 144 NORTH, RANGE 94 WEST

## DRILL-HOLE DATA

| 4422EJ      | 4422EN      | 4422AE      | 4422AJ      | 4422AN      |
|-------------|-------------|-------------|-------------|-------------|
| <u>2248</u> | <u>2260</u> | <u>2240</u> | <u>2246</u> | <u>2258</u> |
| R 14        | R 28        | R 28        | R 40        | R 46        |
| C 3 (A)     | C 5.5 (A)   | C 1         | C .5        | C 14 (DC)   |
| R 13        | R 9         | R 3         | R 3         | R 2         |
| C 1         | C 1         | C 15.5 (DC) | C 17.5 (DC) | C 1.5       |
| R 34        | R 26        | R 4         | R 4         | R 1         |
| C 17 (DC)   | C 17.5 (DC) | C 1         | C 1         | C 1.5       |
| R 2         | R 1         | R 1         | R 2         | R 19        |
| C 1         | C 1         | C 1         | C 1.5       |             |
| R 2         | R 1         | R 5.5       | R 9.5       |             |
| C 1         | C 1         | 60TD        | 79TD        |             |
| <u>R 12</u> | <u>R 9</u>  |             |             |             |
| 100TD       | 100TD       |             |             | 85TD        |

## EXPLANATION

4422NA ————— DRILL HOLE NUMBER

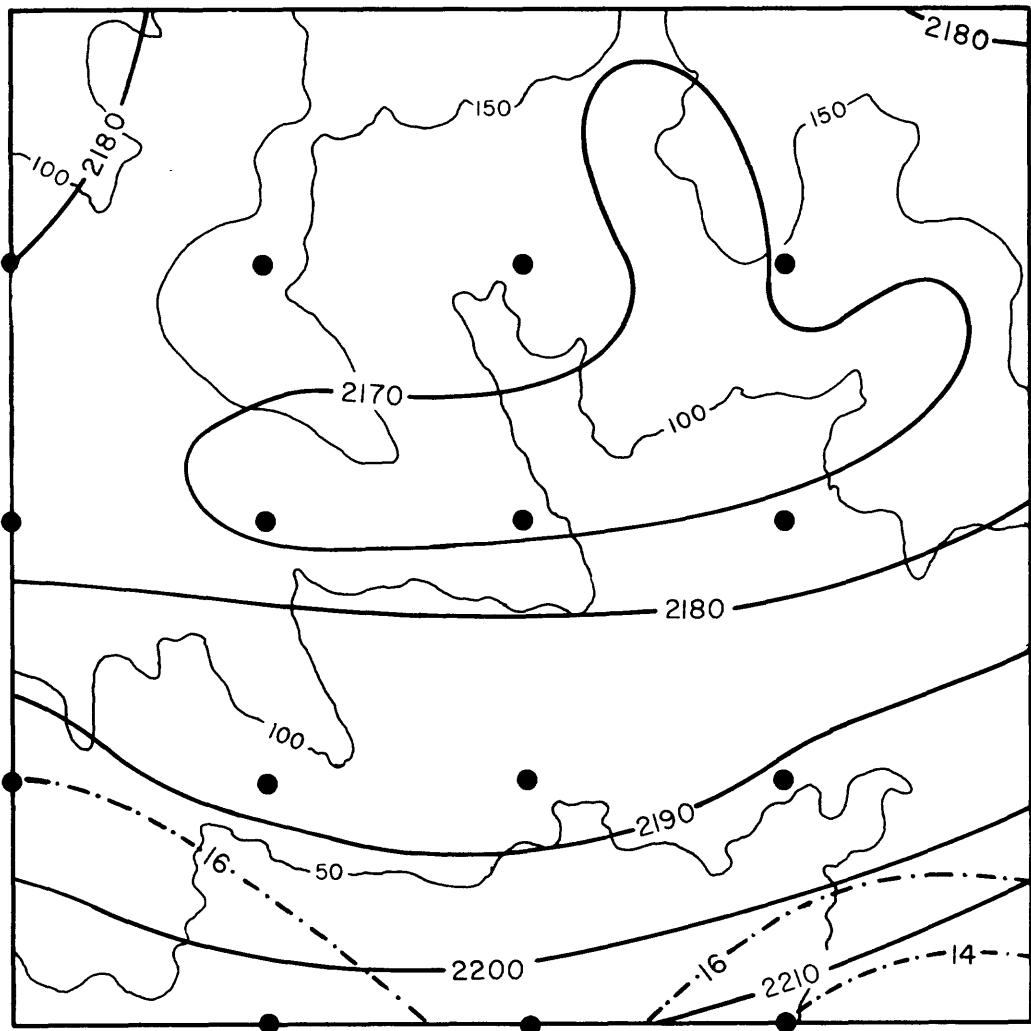
|                |                          |
|----------------|--------------------------|
| <u>2310</u>    | ———— SURFACE ELEVATION   |
| <u>R43</u>     | ———— OVERBURDEN*         |
| <u>C7(A)</u>   | ———— COAL BED            |
| <u>R24</u>     | ———— (LETTER INDICATES   |
| <u>C16(DC)</u> | ———— BED NAME)           |
| <u>R16</u>     | ———— INTERBURDEN*        |
| <u>106TD</u>   | ———— TOTAL DEPTH OF HOLE |

## COAL BEDS

C - "C" BED  
 B - "B" BED  
 A - "A" BED  
 DC - DUNN CENTER BED

SECTION 22

TOWNSHIP 144 NORTH, RANGE 94 WEST



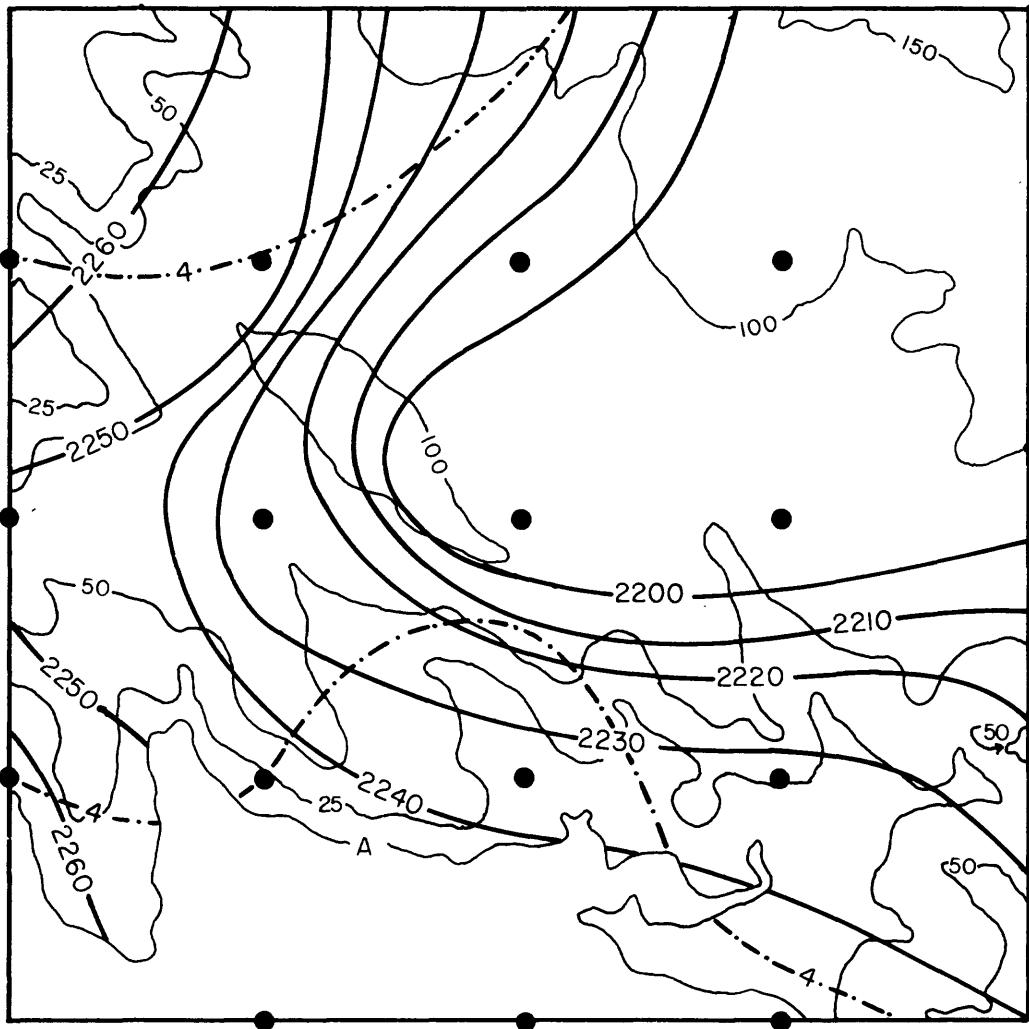
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED

EXPLANATION

- 2180 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 16 — COAL ISOPACH LINE (C.I. 2 FEET)
- 100 — OVERBURDEN ISOPACH LINES AT 50, 100  
AND 150 FEET
- DRILL HOLE

SECTION 22

TOWNSHIP 144 NORTH, RANGE 94 WEST



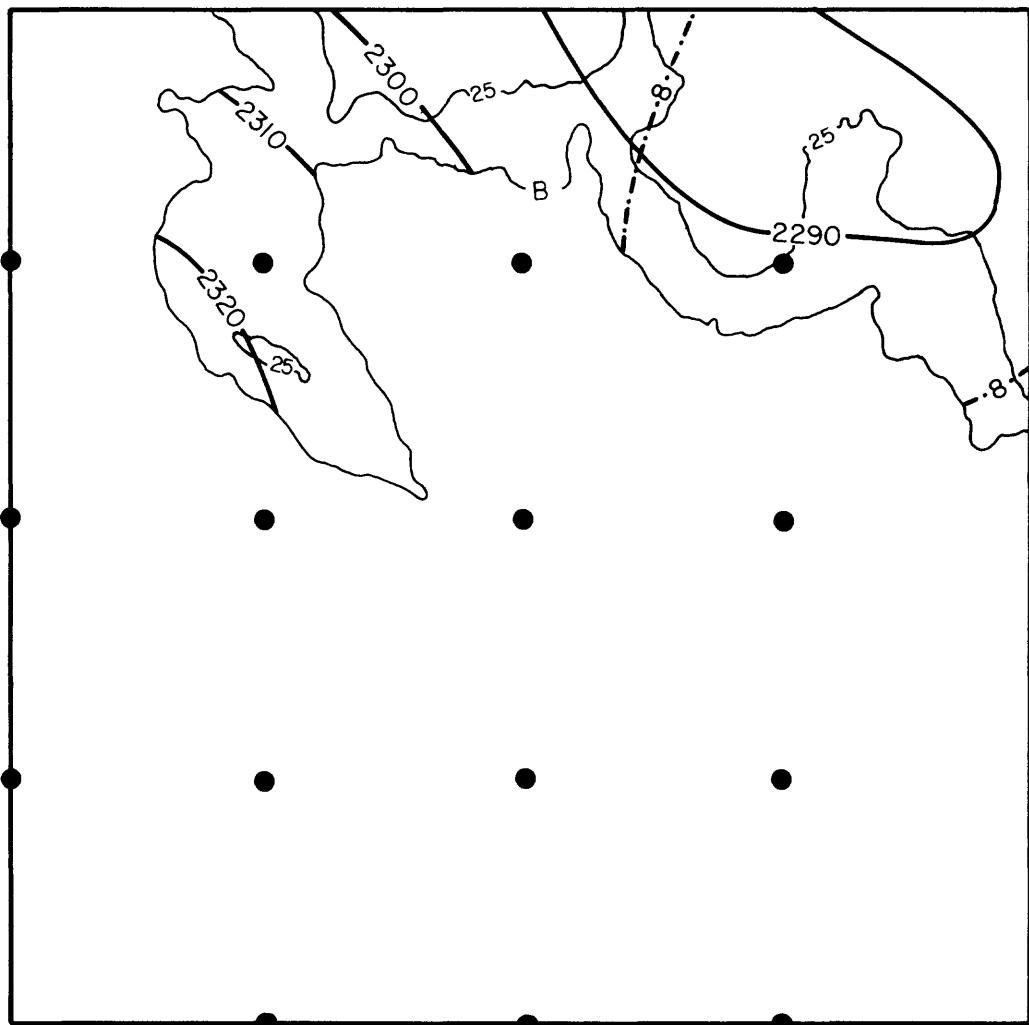
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"A" LIGNITE BED

EXPLANATION

- ~~~~~ A ~~~~~ COAL CROP LINE OF THE "A" BED, APPROXIMATELY LOCATED
- 2210 ——— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- · · · 4 · · · — COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 50 ~~~~~ OVERBURDEN ISOPACH LINES AT 25, 50, 100 AND 150 FEET
- DRILL HOLE

SECTION 22

TOWNSHIP 144 NORTH, RANGE 94 WEST



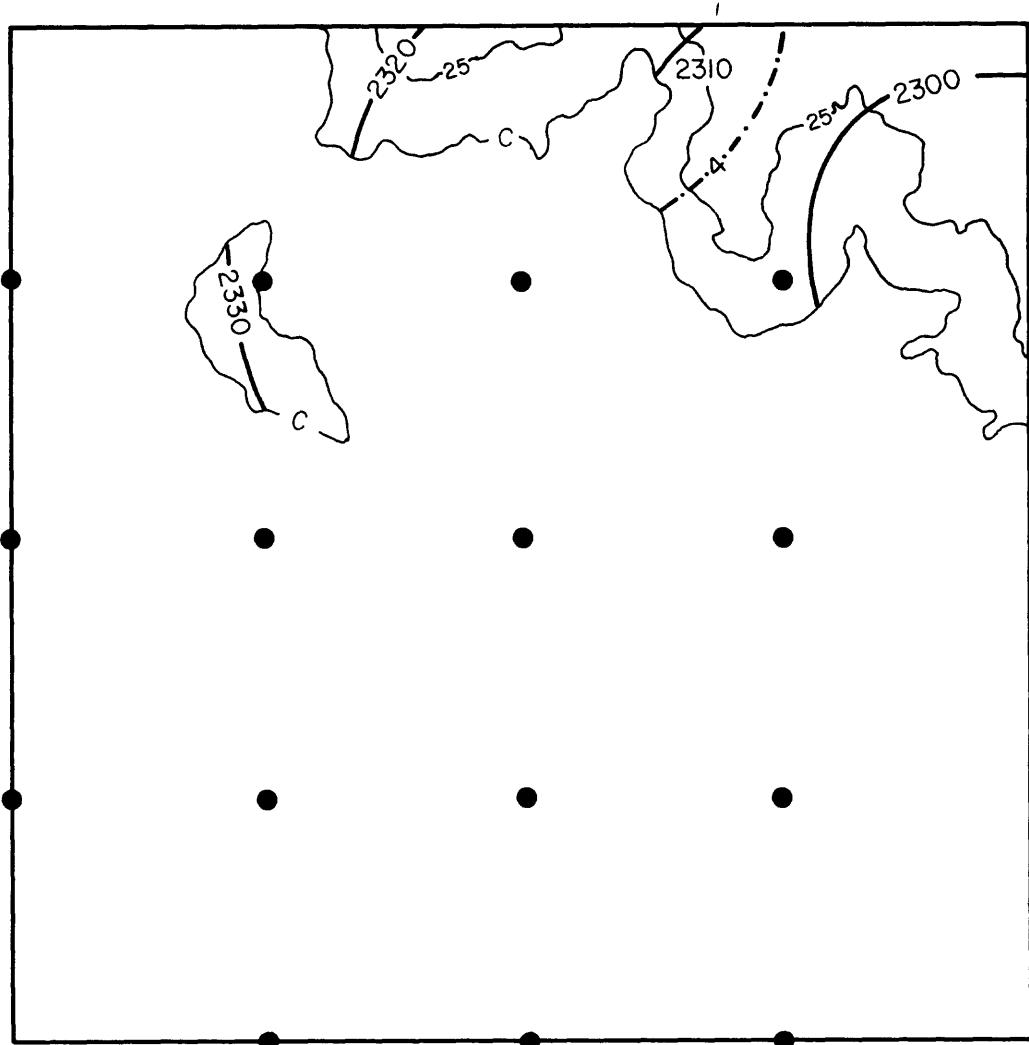
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

- B — COAL CROP LINE OF THE "B" BED, APPROXIMATELY LOCATED
- 2300 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 8 — COAL ISOPACH LINE (C.I. 2 FEET)
- 25 — OVERBURDEN ISOPACH LINE AT 25 FEET
- DRILL HOLE

SECTION 22

TOWNSHIP 144 NORTH, RANGE 94 WEST



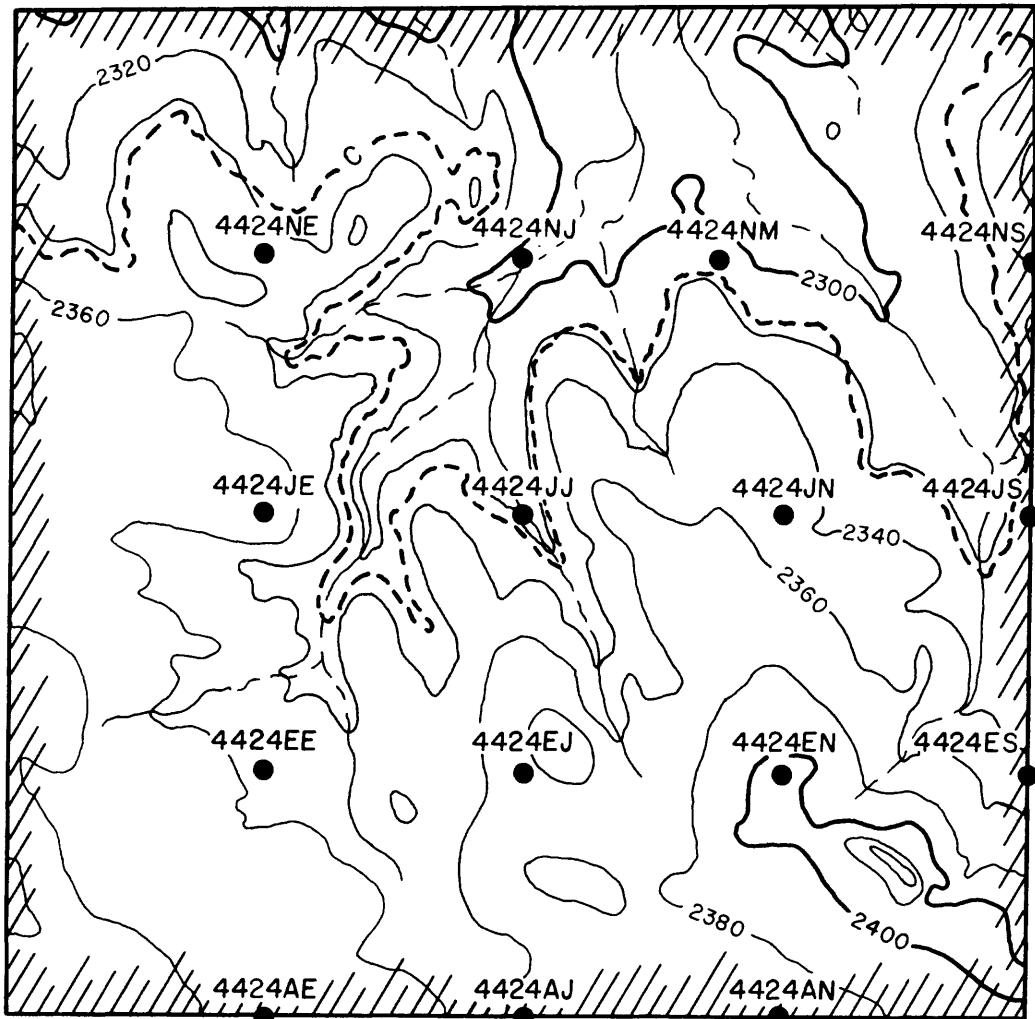
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"C" LIGNITE BED

EXPLANATION

- ~~~~~ C ~~~~~ COAL CROP LINE OF THE "C" BED, APPROXIMATELY LOCATED
- 2320 ——— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 4 ----- COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 25 ~~~~~ OVERBURDEN ISOPACH LINE AT 25 FEET
- DRILL HOLE

SECTION 24

TOWNSHIP 144 NORTH, RANGE 94 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

EXPLANATION

-----C----- COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)



C - "C" BED BOUNDARY OF FEDERAL COAL

4424NE DRILL HOLE NUMBER

● DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)  
 TOWNSHIP 144 NORTH, RANGE 94 WEST, SECTION 24

DUNN CENTER BED

| OVERBURDEN  | MEASURED   | INDICATED | INFERRED |
|-------------|------------|-----------|----------|
| 0' to 25'   | 0          | 0         | 0        |
| 25' to 150' | 5,215,000  | 490,000   | 0        |
| >150'       | 16,485,000 | 210,000   | 0        |

"A" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 0         | 0         | 0        |
| 25' to 150' | 3,136,000 | 224,000   | 0        |
| >150'       | 4,158,000 | 42,000    | 0        |

"B" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 766,000   | 42,000    | 0        |
| 25' to 150' | 8,599,000 | 252,000   | 0        |
| >150'       | 31,000    | 0         | 0        |

"C" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 887,000   | 2,000     | 0        |
| 25' to 150' | 1,616,000 | 43,000    | 0        |
| >150'       | 0         | 0         | 0        |

SECTION TOTAL

| OVERBURDEN  | MEASURED   | INDICATED | INFERRED |
|-------------|------------|-----------|----------|
| 0' to 25'   | 1,653,000  | 44,000    | 0        |
| 25' to 150' | 18,566,000 | 1,009,000 | 0        |
| >150'       | 20,674,000 | 252,000   | 0        |

## SECTION 24

TOWNSHIP 144 NORTH, RANGE 94 WEST

## DRILL-HOLE DATA

| 4424NE      | 4424NJ        | 4424NM        | 4424NS       | 4424JE      |
|-------------|---------------|---------------|--------------|-------------|
| <u>2350</u> | <u>2298</u>   | <u>2310</u>   | <u>2340</u>  | <u>2362</u> |
| R 13        | R 26          | R 19          | R 16         | R 31        |
| C 3.5 (C)   | C 9 (B)       | C 6 (B)       | C 4 (C)      | C 4 (C)     |
| R 37        | R 50          | R 55          | R 31         | R 29        |
| C 8.5 (B)   | C 2           | C 2           | C 8.5 (B)    | C 8.5 (B)   |
| R 42        | R 30          | R 31          | R 66         | R 113       |
| C 1         | C 8 (A)       | C 8 (A)       | C 1          | C 6 (A)     |
| R 58        | R 7           | R 7           | R 20         | R 7         |
| C 7 (A)     | C 20 (DC)     | C 20 (DC)     | C 8 (A)      | C 19.5 (DC) |
| R 6         | R 4           | R 4           | R 9          | R 2         |
| C 19.5 (DC) | C 2           | C 2           | C 20.5 (DC)  | C 1         |
| R 1         | R .5          | R .5          | R 3.5        | R .5        |
| C 1.5       | C 1           | C 1           | C 2          | C .5        |
| R 1         | <u>R 19.5</u> | <u>R 24.5</u> | <u>R 9.5</u> | <u>R 18</u> |
| C 1         | 179TD         | 180TD         | 199TD        | 240TD       |
| <u>R 18</u> |               |               |              |             |
| 218TD       |               |               |              |             |

| 4424JJ      | 4424JN        | 4424JS      | 4424EE      | 4424EJ      |
|-------------|---------------|-------------|-------------|-------------|
| <u>2320</u> | <u>2350</u>   | <u>2328</u> | <u>2355</u> | <u>2375</u> |
| R 23        | R 33          | R 3         | R 17        | R 44        |
| C 7.5 (B)   | C 3 (C)       | C 3 (C)     | C 2.5 (C)   | C 4.5 (C)   |
| R 46        | R 25          | R 29        | R 1         | R 27        |
| C 1         | C 2.5 (B)     | C 9 (B)     | C 1 (C)     | C 4.5 (B)   |
| R 53        | R .5          | R 53        | R 40        | R 1         |
| C 7 (A)     | C 3.5 (B)     | C 2         | C 6.5 (B)   | C 4 (B)     |
| R 8         | R .5          | R 39        | R .5        | R 59        |
| C 20 (DC)   | C 3 (B)       | C 7 (A)     | C 2.5 (B)   | C 1         |
| R 2         | R 55          | R 9         | R 75        | R 1         |
| C 1         | C 2           | C 20 (DC)   | C 2.5       | C 1         |
| R .5        | R 46          | R 3         | R 14        | R 30        |
| C .5        | C 6.5 (A)     | C 2.5       | C 4 (A)     | C 5 (A)     |
| R 10.5      | R 8           | R 17.5      | R 1         | R 1         |
| 180TD       | C 20 (DC)     | 197TD       | C 2 (A)     | C 1.5 (A)   |
|             | R 1           |             | R 1         | R 1         |
|             | C 3           |             | C 1 (A)     | C 1 (A)     |
|             | <u>R 27.5</u> |             | R 5         | R 7         |
|             | 240TD         |             | C 20 (DC)   | C 20 (DC)   |
|             |               |             | R 1         | R 1         |
|             |               |             | C 2.5       | C 3         |
|             |               |             | R 15        | R 11.5      |
|             |               |             | 215TD       | 229TD       |

## SECTION 24

TOWNSHIP 144 NORTH, RANGE 94 WEST

## DRILL HOLE DATA

| 4424EN       | 4424ES       | 4424AE       | 4424AJ       | 4424AN       |
|--------------|--------------|--------------|--------------|--------------|
| <u>2405</u>  | <u>2345</u>  | <u>2375</u>  | <u>2362</u>  | <u>2370</u>  |
| R 92         | R 36         | R 43         | R 30         | R 54         |
| C 1.5 (C)    | C 3 (C)      | C 6 (C)      | C 4.5 (C)    | C 3.5 (C)    |
| R 35.5       | R 38         | R 27         | R 42         | R 43         |
| C 1 (B)      | C 9.5 (B)    | C 10.5 (B)   | C 1 (B)      | C 10 (B)     |
| R .5         | R 52         | R 55         | R 1          | R 55         |
| C 2 (B)      | C 1          | C 1          | C 8.5 (B)    | C 1          |
| R 1          | R 14         | R 24         | R 55         | R 11         |
| C 2 (B)      | C 7 (A)      | C 5 (A)      | C 5 (A)      | C 3 (A)      |
| R 1          | R 10         | R 6          | R 20         | R .5         |
| C 3 (B)      | C 20 (DC)    | C 1 (A)      | C 1 (A)      | C 1 (A)      |
| R 56         | R 1          | R 6          | R 1          | R 4          |
| C 1.5        | C 2.5        | C 19 (DC)    | C .5 (A)     | C 1.5 (A)    |
| R 1          | R 14         | R 2          | R 7          | R .5         |
| C 1          | <u>208TD</u> | C 2.5        | C 19.5 (DC)  | C .5 (A)     |
| R 22         |              | R 3          | R 2          | R 6          |
| C 4 (A)      |              | C 1          | C 2.5        | C 19 (DC)    |
| R 1          |              | R 18         | R 10.5       | R 1          |
| C 2.5 (A)    |              | <u>230TD</u> | <u>211TD</u> | C 2.5        |
| R 1          |              |              |              | R 23         |
| C 1 (A)      |              |              |              | <u>240TD</u> |
| R 8          |              |              |              |              |
| C 20 (DC)    |              |              |              |              |
| R 1          |              |              |              |              |
| C 3          |              |              |              |              |
| R 1          |              |              |              |              |
| C 1          |              |              |              |              |
| R 15.5       |              |              |              |              |
| <u>280TD</u> |              |              |              |              |

## EXPLANATION

4424EN ————— DRILL HOLE NUMBER

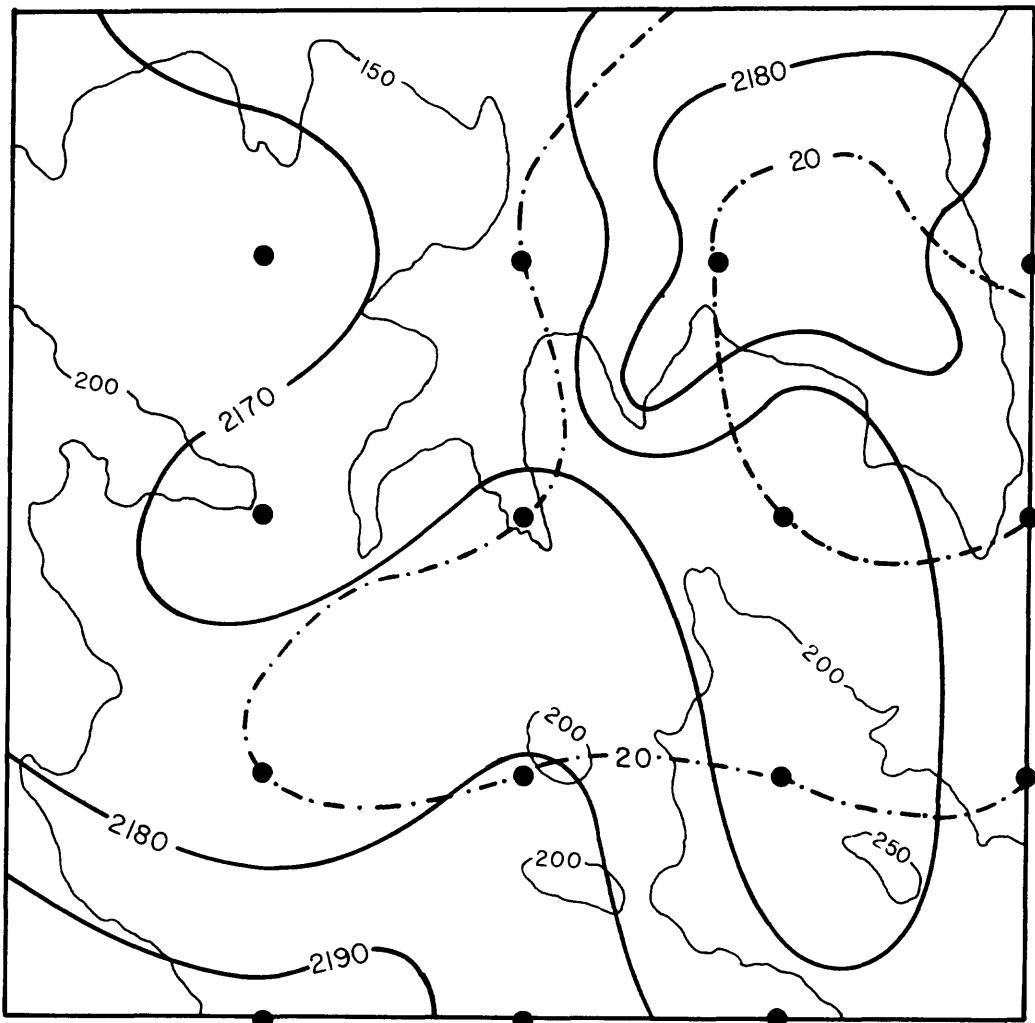
|         |       |                     |
|---------|-------|---------------------|
| 2405    | ————— | SURFACE ELEVATION   |
| R92     | ————— | OVERBURDEN*         |
| C5(A)   | ————— | COAL BED            |
| R35     | ————— | (LETTER INDICATES   |
| C19(DC) | ————— | BED NAME)           |
| R18     | ————— | INTERBURDEN*        |
| 169TD   | ————— | TOTAL DEPTH OF HOLE |

## COAL BEDS

C - "C" BED  
 B - "B" BED  
 A - "A" BED  
 DC - DUNN CENTER BED

SECTION 24

TOWNSHIP 144 NORTH, RANGE 94 WEST



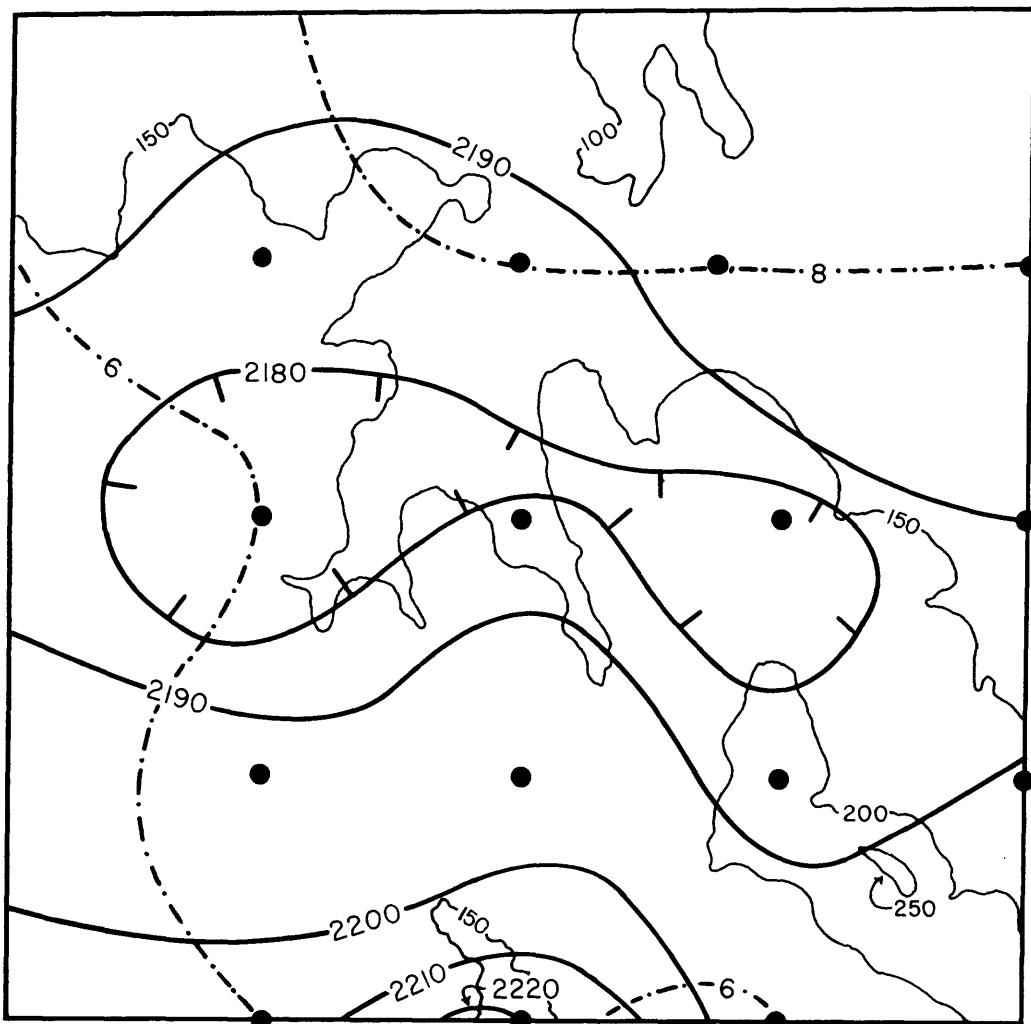
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED

EXPLANATION

- 2170 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 20 — COAL ISOPACH LINE (C.I. 2 FEET)
- ~ 200 ~ OVERBURDEN ISOPACH LINES AT 150,  
200, AND 250 FEET
- DRILL HOLE

SECTION 24

TOWNSHIP 144 NORTH, RANGE 94 WEST



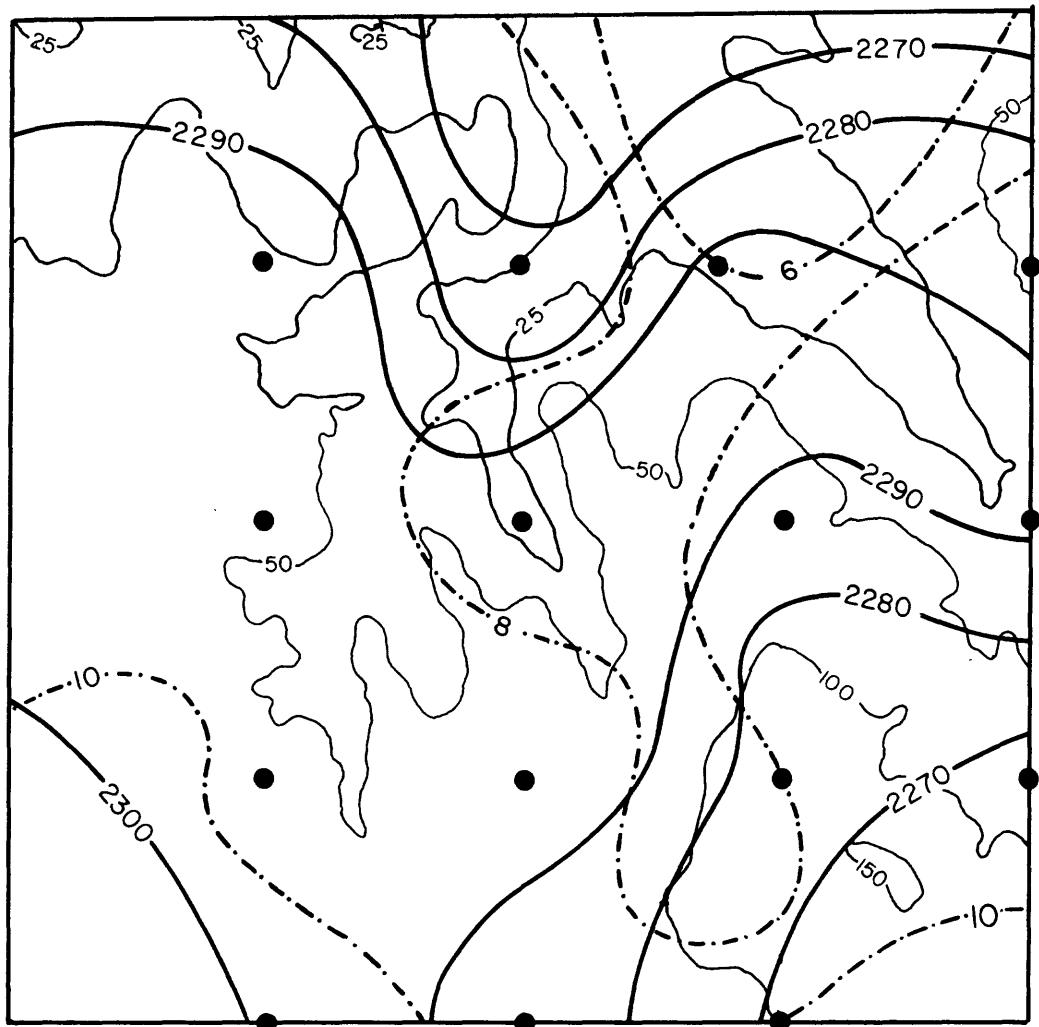
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"A" LIGNITE BED

EXPLANATION

- 2190 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- - - 8 - - - COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 100 ~~~~ OVERBURDEN ISOPACH LINES AT 100,  
150, 200, and 250 FEET
- DRILL HOLE

SECTION 24

TOWNSHIP 144 NORTH, RANGE 94 WEST



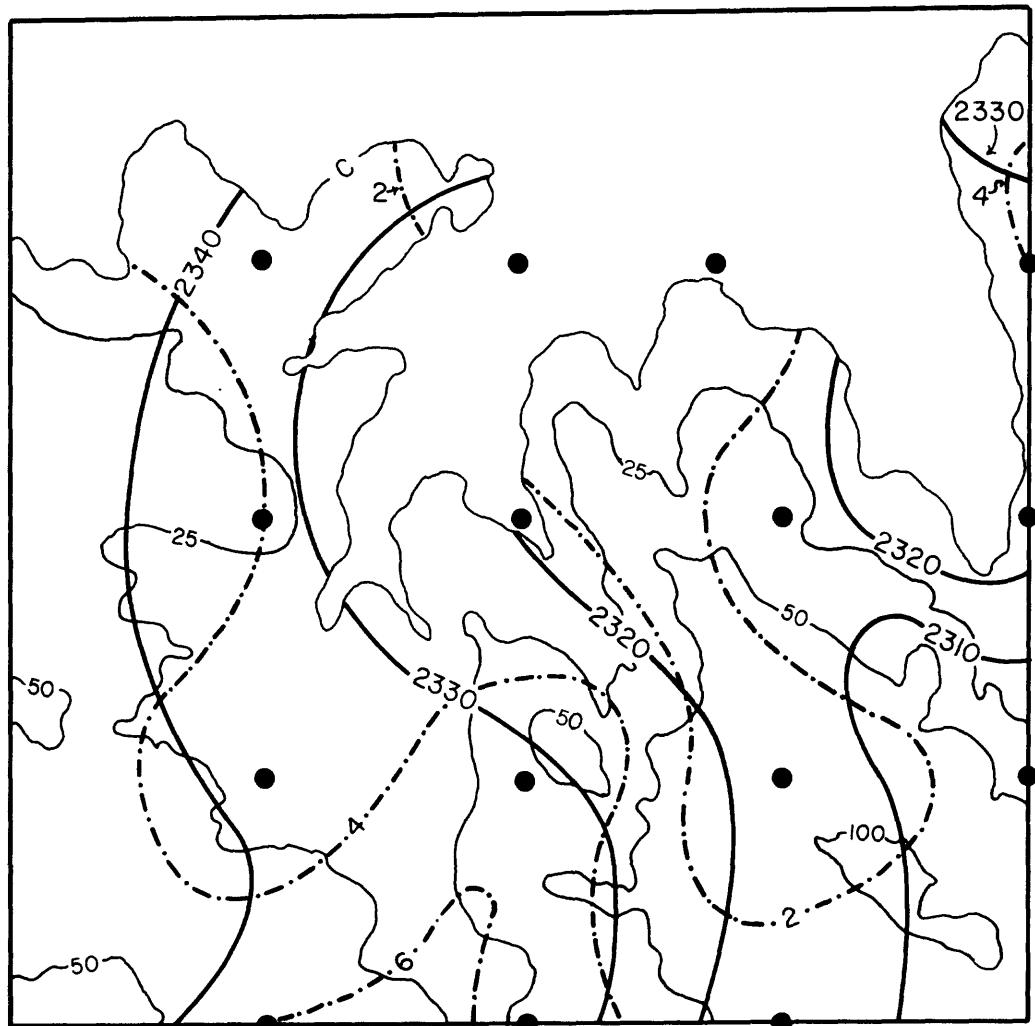
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

- 2280 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- - - 10 - - - COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 100 ~~~~ OVERBURDEN ISOPACH LINES AT 25, 50,  
100, AND 150 FEET
- DRILL HOLE

## SECTION 24

TOWNSHIP 144 NORTH, RANGE 94 WEST



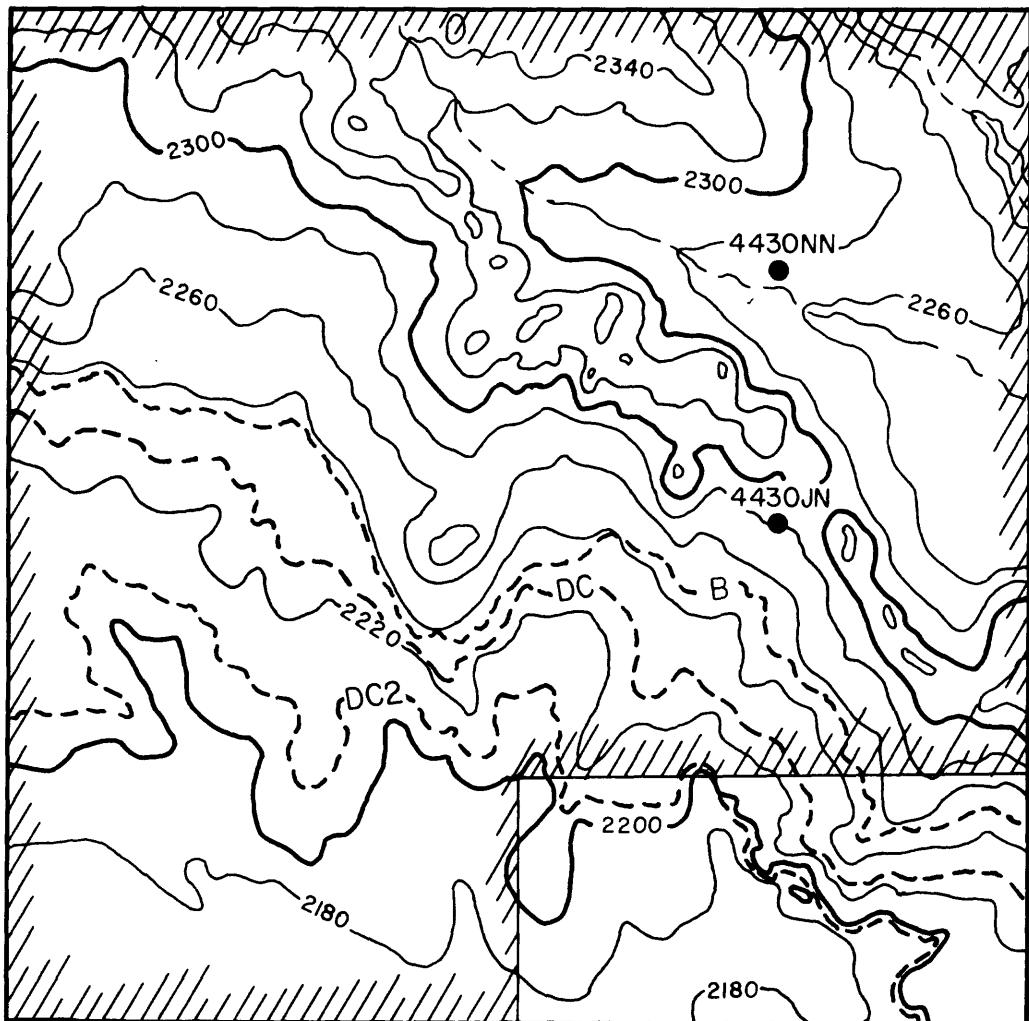
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"C" LIGNITE BED

## EXPLANATION

 C COAL CROP LINE OF THE "C" BED, APPROXIMATELY LOCATED  
 2340 STRUCTURAL CONTOUR LINE (C.I. 10 FEET)  
 4 COAL ISOPACH LINE (C.I. 2 FEET)  
 25 OVERBURDEN ISOPACH LINES AT 25, 50, AND 100 FEET  
 DRILL HOLE

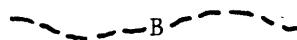
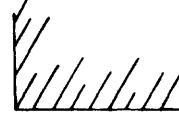
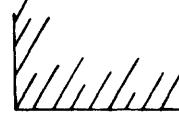
SECTION 30

TOWNSHIP 144 NORTH, RANGE 94 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

EXPLANATION

-  COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)  
B - "B" BED
-  DC - DUNN CENTER BED AND UPPER SPLIT  
OF THE DUNN CENTER BED  
DC2 - LOWER SPLIT OF THE DUNN CENTER BED
-  BOUNDARY OF FEDERAL COAL
- 4430NN DRILL HOLE NUMBER
- DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)  
 TOWNSHIP 144 NORTH, RANGE 94 WEST, SECTION 30

DUNN CENTER BED (LOWER SPLIT)

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 73,000    | 463,000   | 14,000   |
| 25' to 150' | 2,702,000 | 1,671,000 | 35,000   |
| >150'       | 0         | 52,000    | 0        |

DUNN CENTER BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 308,000   | 288,000   | TRACE    |
| 25' to 150' | 2,352,000 | 1,382,000 | 21,000   |
| >150'       | 0         | 0         | 0        |

"B" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 624,000   | 406,000   | TRACE    |
| 25' to 150' | 1,270,000 | 1,792,000 | 56,000   |
| >150'       | 0         | 0         | 0        |

SECTION TOTAL

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 1,005,000 | 1,157,000 | 14,000   |
| 25' to 150' | 6,324,000 | 4,845,000 | 112,000  |
| >150'       | 0         | 52,000    | 0        |

## SECTION 30

TOWNSHIP 144 NORTH, RANGE 94 WEST

## DRILL HOLE DATA

4430NN

2278

|           |
|-----------|
| R 40      |
| C 3 (B)   |
| R 1       |
| C 2.5 (B) |
| R 16      |
| C 8 (DC)  |
| R 10      |
| C 8 (DC2) |
| R 4       |
| C 3       |
| R 14.5    |
| 110TD     |

4430JN

2290

|             |
|-------------|
| R 40        |
| C 6 (B)     |
| R 1         |
| C 1 (B)     |
| R 18        |
| C 8 (DC)    |
| R 17        |
| C 7.5 (DC2) |
| R 5         |
| C 3         |
| R 12.5      |
| 119TD       |

## EXPLANATION

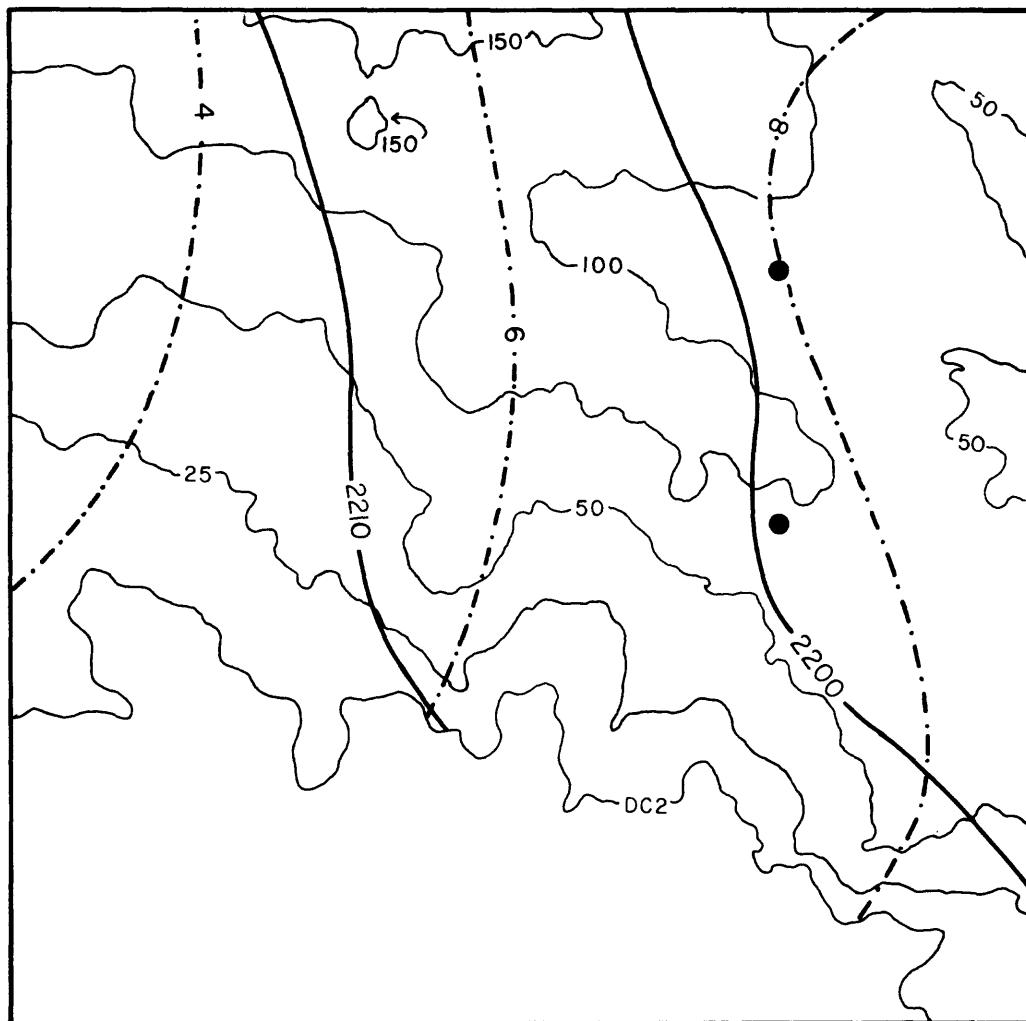
4430NN ————— DRILL HOLE NUMBER  
 2278 ————— SURFACE ELEVATION  
 R40 ————— OVERBURDEN\*  
 C8(B) ————— COAL BED  
 R18 ————— (LETTER INDICATES  
 C10(DC) ————— BED NAME)  
 R31 ————— INTERBURDEN\*  
 107TD ————— TOTAL DEPTH OF HOLE

## COAL BEDS

B - "B" BED  
 DC - DUNN CENTER BED

SECTION 30

TOWNSHIP 144 NORTH, RANGE 94 WEST



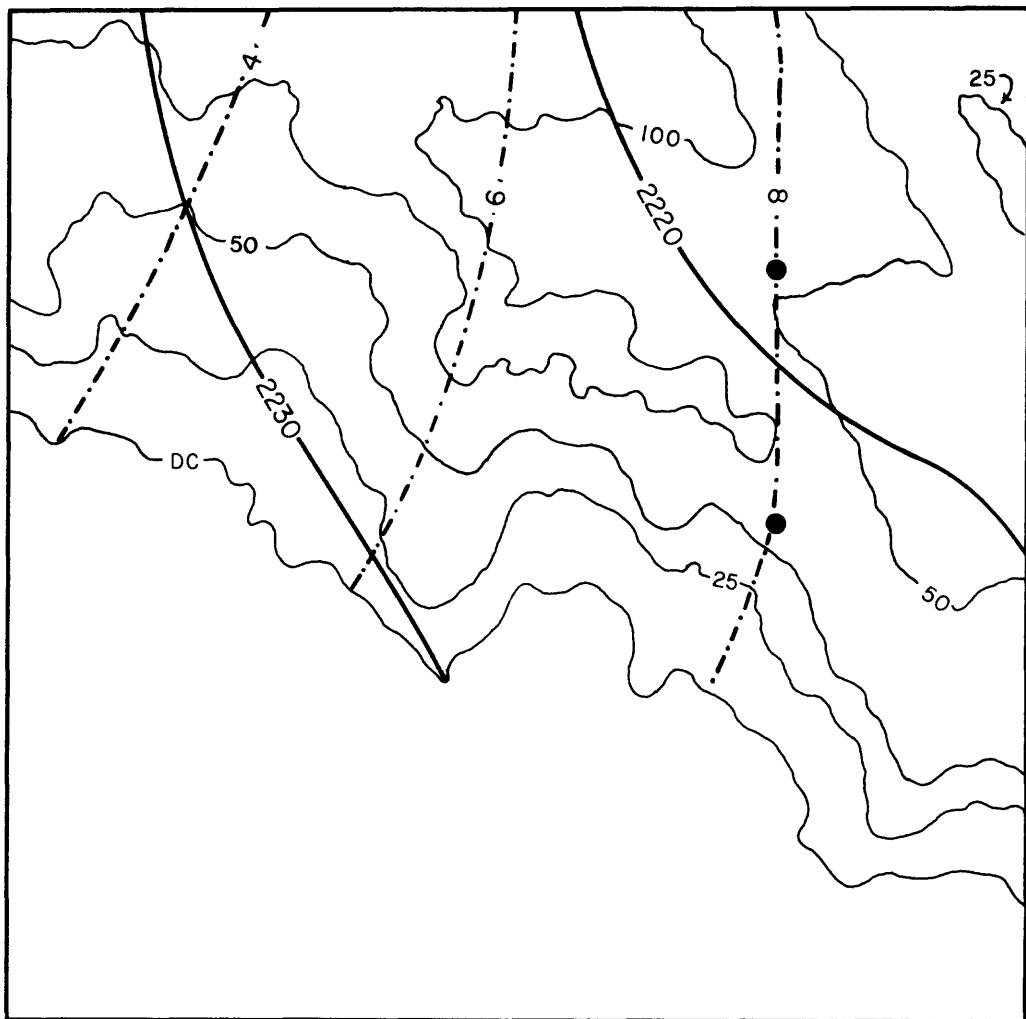
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED  
(LOWER SPLIT)

EXPLANATION

- ~~~~~ DC2 ~~~~ COAL CROP LINE OF THE LOWER SPLIT OF THE DUNN CENTER BED, APPROXIMATELY LOCATED
- ~~~~~ 2210 ~~~~ STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- ~~~~~ 6 ~~~~ COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 50 ~~~~ OVERBURDEN ISOPACH LINES AT 25, 50, 100, AND 150 FEET
- DRILL HOLE

SECTION 30

TOWNSHIP 144 NORTH, RANGE 94 WEST



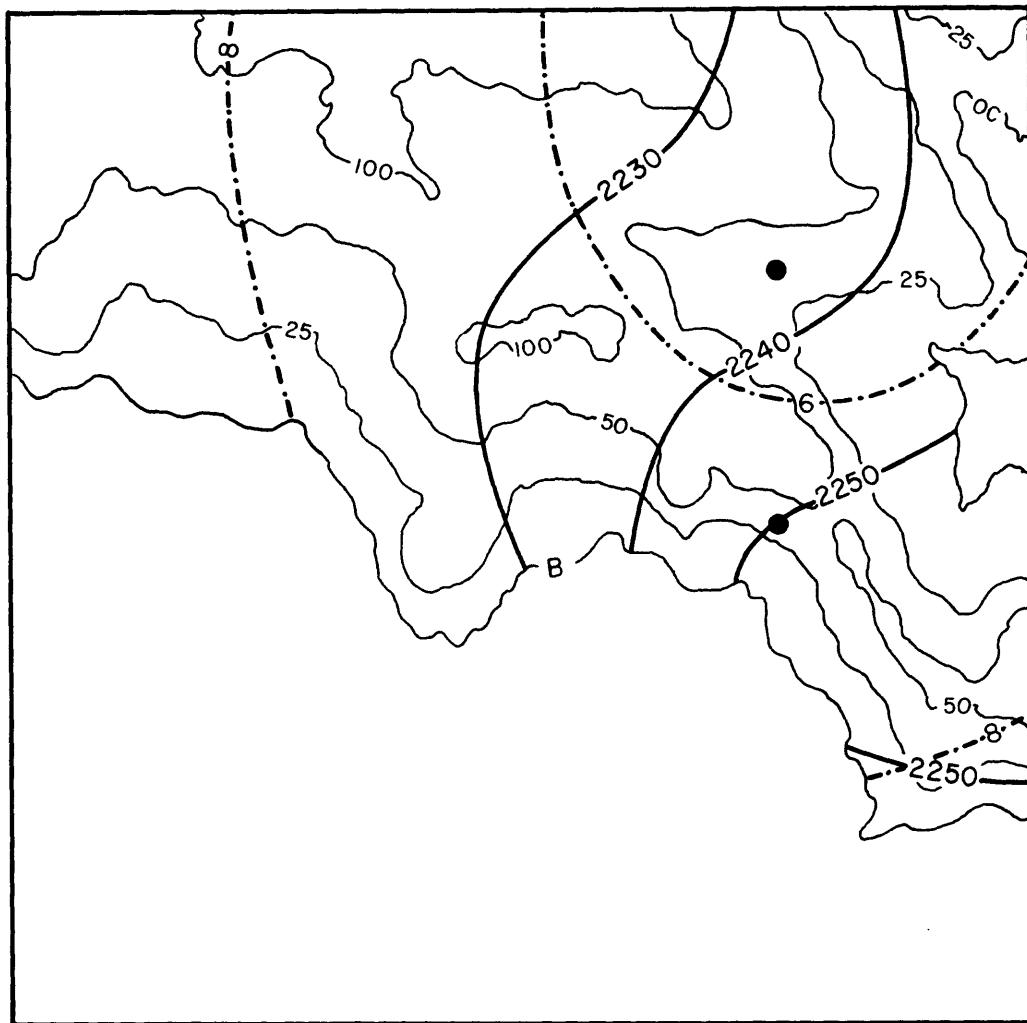
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE DUNN CENTER  
LIGNITE BED AND THE UPPER SPLIT OF THE DUNN CENTER  
LIGNITE BED

EXPLANATION

- ~~~~~ DC ~~~~~ COAL CROP LINE OF THE "DC" BED, APPROXIMATELY LOCATED
- 2230 ——— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 8 ----- COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~ 25 ~~~~~ OVERBURDEN ISOPACH LINES AT 25, 50, and  
100 FEET
- DRILL HOLE

SECTION 30

TOWNSHIP 144 NORTH, RANGE 94 WEST



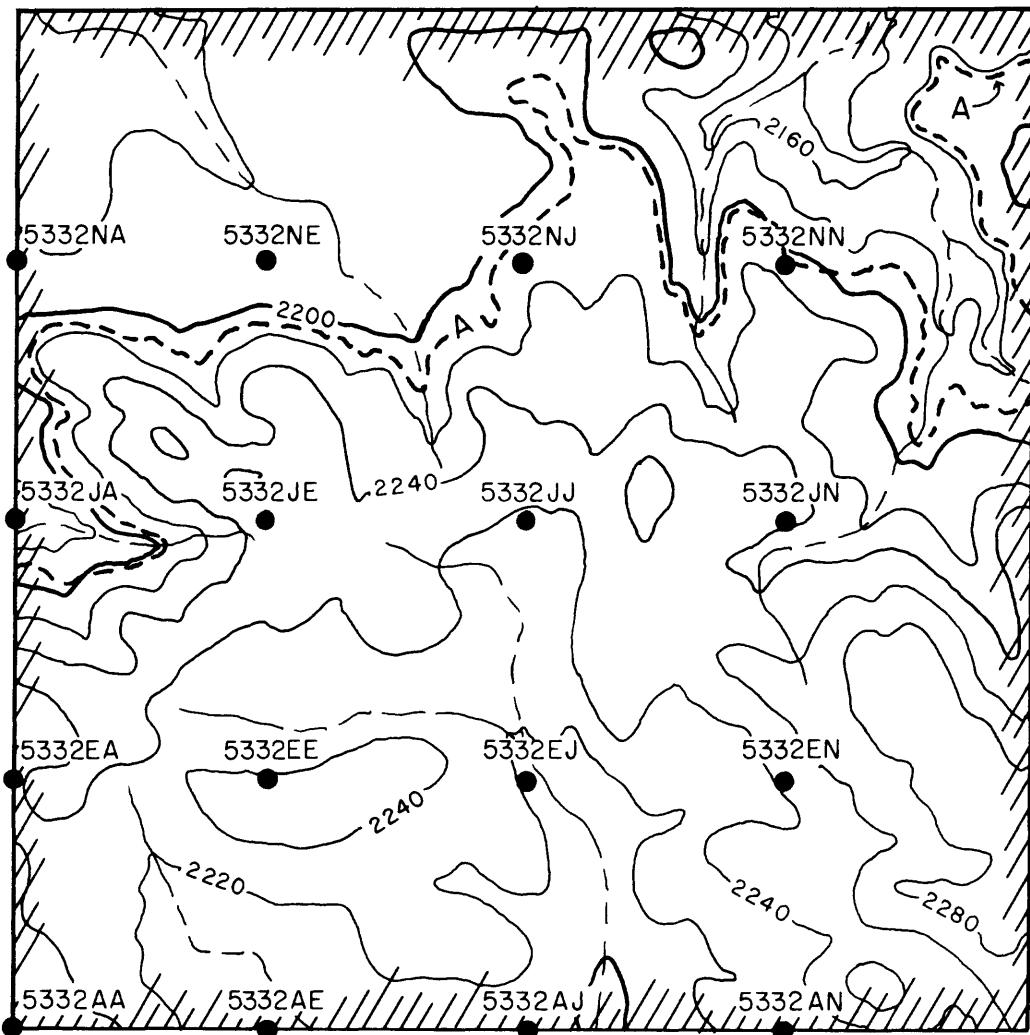
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

- B — COAL CROP LINE OF THE "B" BED APPROXIMATELY LOCATED
- 2240 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 6 — COAL ISOPACH LINE (C.I. 2 FEET)
- 50 — OVERBURDEN ISOPACH LINES AT 25, 50, and 100 FEET
- DRILL HOLE

SECTION 32

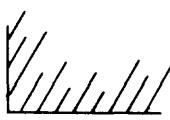
TOWNSHIP 145 NORTH, RANGE 93 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

EXPLANATION

 COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)  
A - "A" BED



BOUNDARY OF FEDERAL COAL

5332NE DRILL HOLE NUMBER

● DRILL HOLE

IDENTIFIED FEDERAL COAL RESOURCES (IN SHORT TONS)  
 TOWNSHIP 145 NORTH, RANGE 93 WEST, SECTION 32

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DUNN CENTER BED

| OVERBURDEN  | MEASURED   | INDICATED | INFERRED |
|-------------|------------|-----------|----------|
| 0' to 25'   | 850,000    | 189,000   | 0        |
| 25' to 150' | 18,742,000 | 378,000   | 0        |
| >150'       | 0          | 0         | 0        |

---

"A" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 1,482,000 | 63,000    | 0        |
| 25' to 150' | 4,128,000 | 31,000    | 0        |
| >150'       | 0         | 0         | 0        |

---

SECTION TOTAL

| OVERBURDEN  | MEASURED   | INDICATED | INFERRED |
|-------------|------------|-----------|----------|
| 0' to 25'   | 2,332,000  | 252,000   | 0        |
| 25' to 150' | 22,870,000 | 409,000   | 0        |
| >150'       | 0          | 0         | 0        |

## SECTION 32

TOWNSHIP 145 NORTH, RANGE 93 WEST

## DRILL-HOLE DATA

5332NA

2185  
 R 40  
 C 19 (DC)  
R 14  
 73TD

5332NE

2192  
 R 54  
 C 17.5 (DC)  
 R 10  
 C 2  
R 16.5  
 100TD

5332NJ

2212  
 R 7  
 C 5 (A)  
 R 2  
 C 1  
 R 47  
 C 2.5 (DC)  
 R .5  
 C 15 (DC)  
 R 6  
 C 2  
R 7  
 95TD

5332NN

2210  
 R 54  
 C 18.5 (DC)  
 R 10  
 C 2  
R 5.5  
 90TD

5332JA

2160  
 R 25  
 C 17 (DC)  
 R 7  
 C 1.5  
R 9.5  
 60TD

5332JE

2245  
 R 44  
 C 1 (A)  
 R 4  
 C 5.5 (A)  
 R 2  
 C 2 (A)  
 R 48  
 C 3 (DC)  
 R 1  
 C 14 (DC)  
 R 7  
 C 2  
R 11.5  
 145TD

5332JJ

2238  
 R 31  
 C 1.5 (A)  
 R 2  
 C 2 (A)  
 R 1  
 C 3 (A)  
 R 51  
 C 17.5 (DC)  
 R 11  
 C 2  
R 7  
 129TD

5332JN

2242  
 R 45  
 C 7 (A)  
 R 50  
 C 18 (DC)  
R 15  
 135TD

5332EA

2238  
 R 51  
 C 1.5  
 R 8  
 C 6.5 (A)  
 R 5  
 C 1  
 R 12  
 C 18.5 (DC)  
 R 9  
 C 2  
R 14.5  
 129TD

5332EE

2240  
 R 58  
 C 1  
 R 7  
 C 8 (A)  
 R 18  
 C 17.5 (DC)  
 R 10  
 C 1  
R 9.5  
 130TD

## SECTION 32

TOWNSHIP 145 NORTH, RANGE 93 WEST

## DRILL HOLE DATA

5332EJ

5332EN

5332AA

5332AE

5332AJ

2219

R 26

C 7 (A)

R 37

C 18 (DC)

R 9

C 2

R 8

107TD

2242

R 16

C 6.5 (A)

R 54

C 18.5 (DC)

R 15

110TD

2240

R 54

C 1

R 8

C 6 (A)

R .5

C 2 (A)

R 1

C 1 (A)

R 10

C 3 (DC)

R .5

C 14 (DC)

R 7

C 2

R 10

120TD

2210

R 28

C 6.5 (A)

R .5

C 1.5 (A)

R 12

C 17 (DC)

R 9

C 1.5

R 3

79TD

2210

R 35

C 4.5 (A)

R .5

C 3 (A)

R 16

C 17 (DC)

R 11

87TD

5332AN

2222

R 14

C 5 (A)

R 44

C 17.5 (DC)

R 9.5

90TD

## EXPLANATION

5332NA — DRILL HOLE NUMBER

2242 — SURFACE ELEVATION

R45 — OVERBURDEN\*

C7(A) — COAL BED

R50 — (LETTER INDICATES

C18(DC) — BED NAME

R15 — INTERBURDEN\*

135TD — TOTAL DEPTH OF HOLE

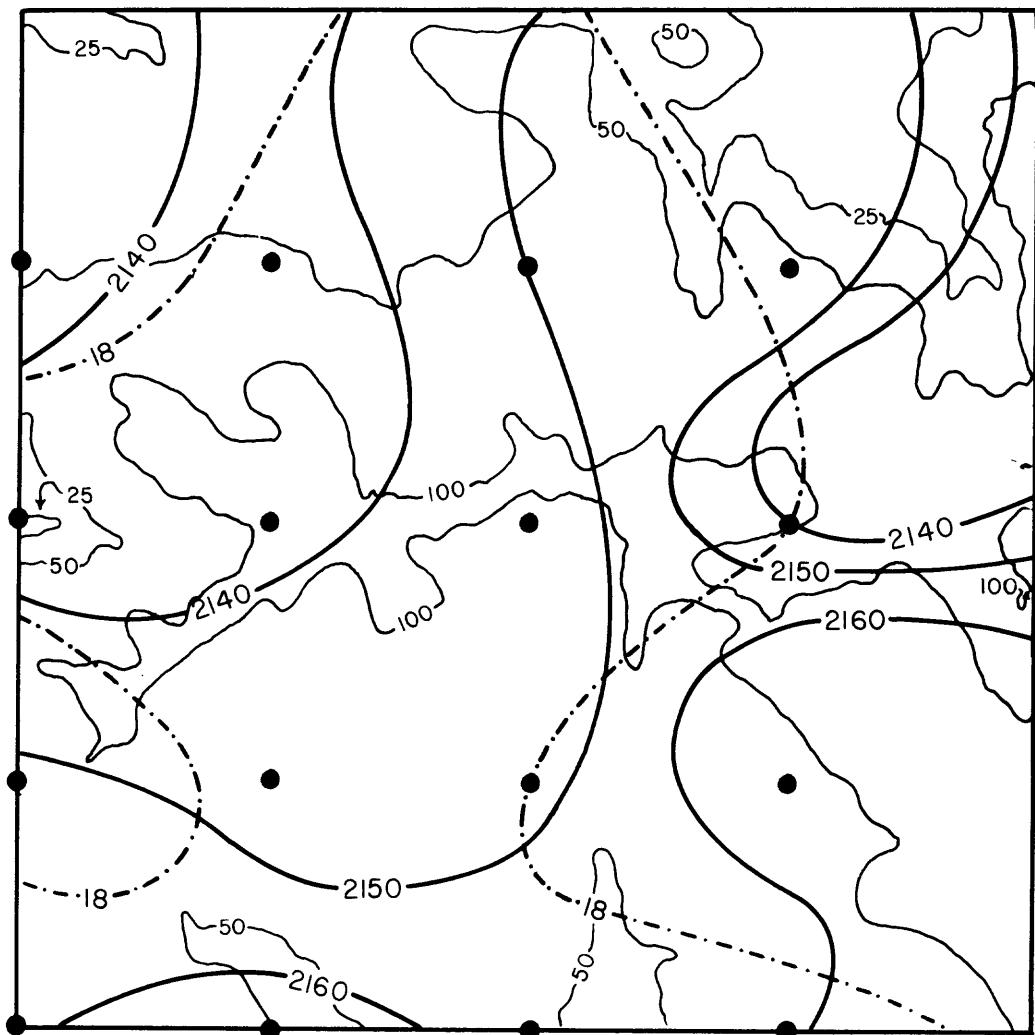
## COAL BEDS

A — "A" BED

DC — DUNN CENTER BED

SECTION 32

TOWNSHIP 145 NORTH, RANGE 93 WEST



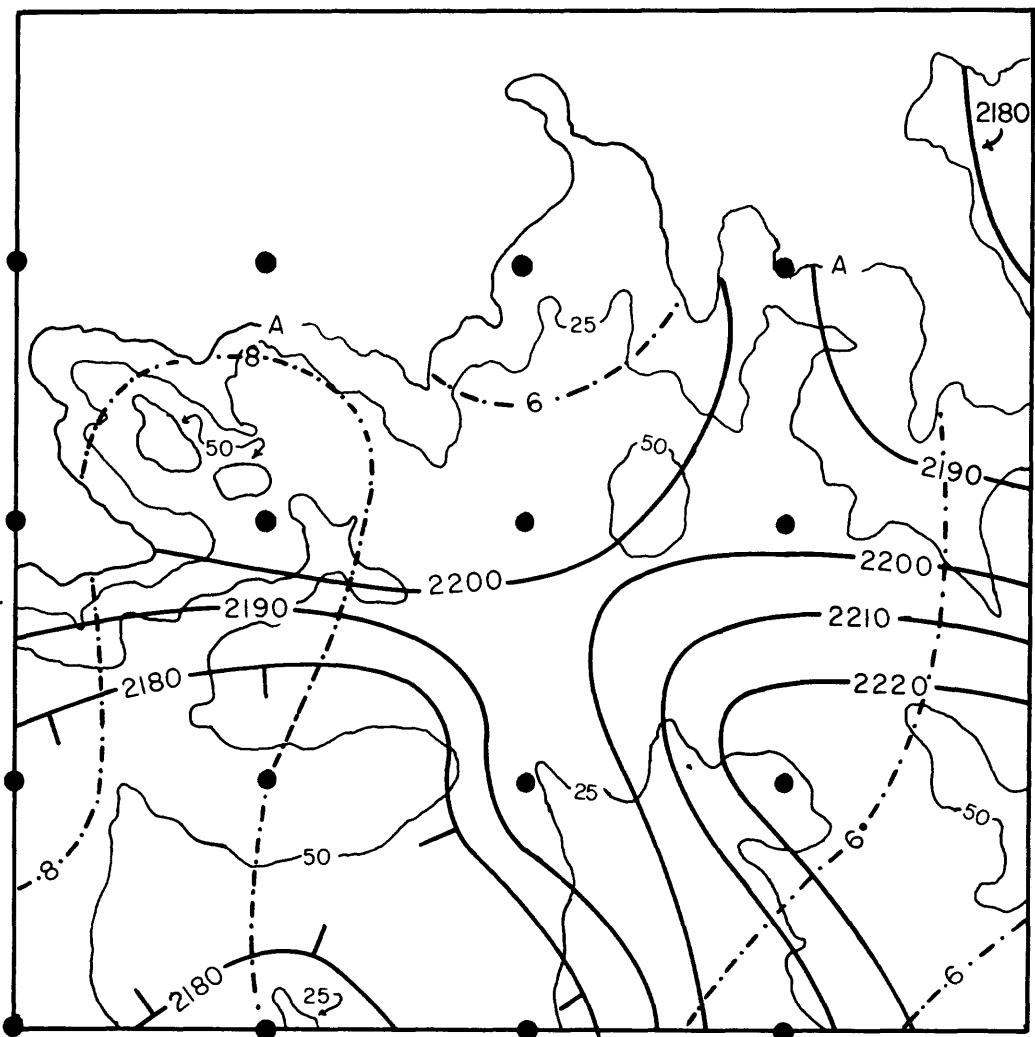
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED

EXPLANATION

- 2140 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 18 — COAL ISOPACH LINE (C.I. 2 FEET)
- 100 — OVERBURDEN ISOPACH LINES AT 25, 50, AND 100 FEET
- DRILL HOLE

SECTION 32

TOWNSHIP 145 NORTH, RANGE 93 WEST



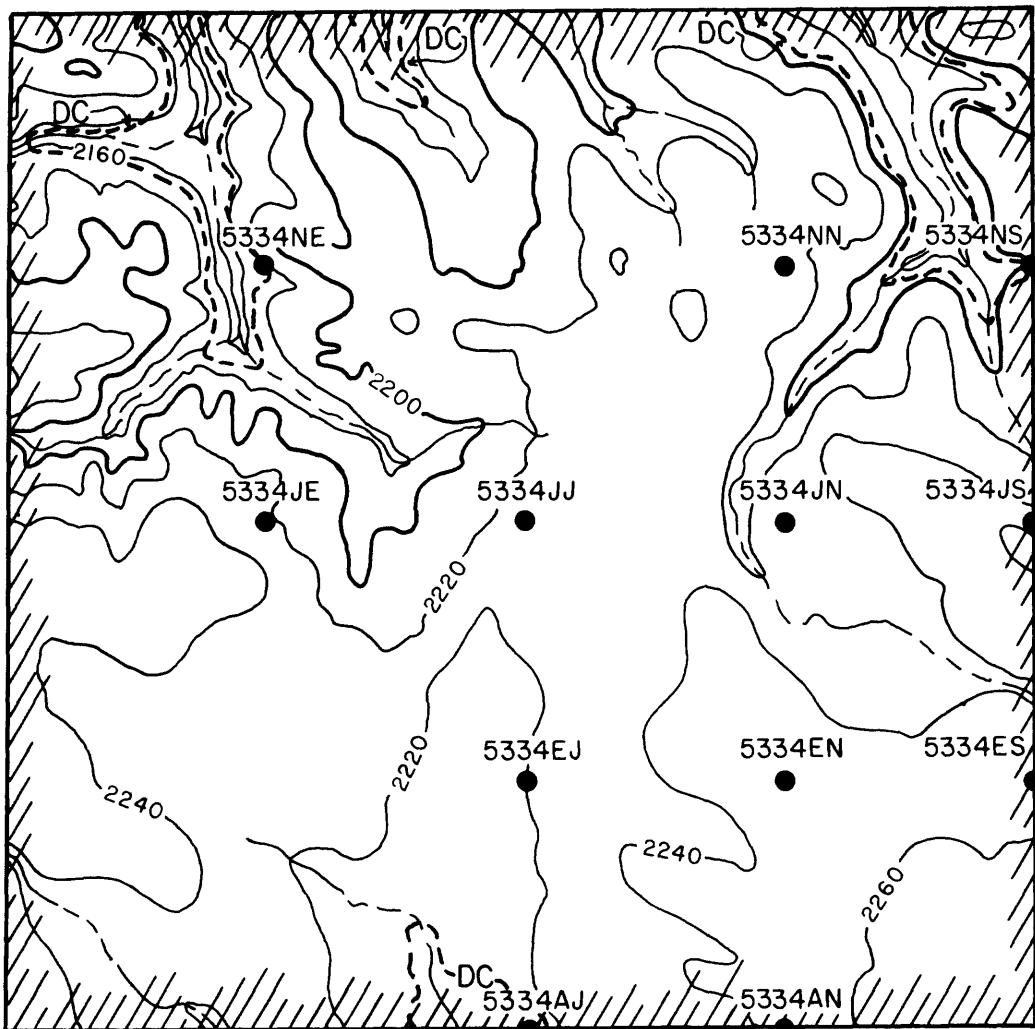
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"A" LIGNITE BED

EXPLANATION

- A— COAL CROP LINE OF THE "A" BED, APPROXIMATELY LOCATED
- 2190 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 8 — COAL ISOPACH LINE (C.I. 2 FEET)
- 50 — OVERBURDEN ISOPACH LINES AT 25 and 50 FEET
- DRILL HOLE

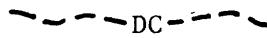
SECTION 34

TOWNSHIP 145 NORTH, RANGE 93 WEST

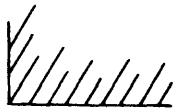


TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

EXPLANATION



COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)  
DC - DUNN CENTER BED



BOUNDARY OF FEDERAL COAL

5334NE

DRILL HOLE NUMBER



DRILL HOLE

IDENTIFIED COAL RESOURCES (IN SHORT TONS)  
TOWNSHIP 145 NORTH, RANGE 93 WEST, SECTION 34

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DUNN CENTER BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 1,617,000 | 1,247,000 | 0        |
| 25' to 150' | 9,304,000 | 2,180,000 | 0        |
| >150'       | 0         | 0         | 0        |

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SECTION TOTAL

| OVERBURDEN  | MEASURED  | INDICATED | INFERRED |
|-------------|-----------|-----------|----------|
| 0' to 25'   | 1,617,000 | 1,247,000 | 0        |
| 25' to 150' | 9,304,000 | 2,180,000 | 0        |
| >150'       | 0         | 0         | 0        |

## SECTION 34

TOWNSHIP 145 NORTH, RANGE 93 WEST

## DRILL HOLE DATA

| 5334NE | 5334NN    | 5334NS | 5334JE      | 5334JJ      |
|--------|-----------|--------|-------------|-------------|
| 2180   | 2222      | 2200   | 2223        | 2224        |
| R 12   | R 42      | R 52   | R 48        | R 60        |
| C 5    | C 13 (DC) | C 1    | C 15.5 (DC) | C 13.5 (DC) |
| R 4    | R 13      | R 5    | R 5         | R 6         |
| C 1    | 68TD      | C 1.5  | C 1.5       | C 1         |
| R 2    |           | R 19.5 | R 29        | R 2         |
| C 1.5  |           | 79TD   | 99TD        | C 1.5       |
| R 6    |           |        |             | R 3         |
| C 1.5  |           |        |             | 87TD        |
| R 17   |           |        |             |             |
| C 5    |           |        |             |             |
| R 102  |           |        |             |             |
| 157TD  |           |        |             |             |

| 5334JN    | 5334JS    | 5334EJ     | 5334EN      | 5334ES    |
|-----------|-----------|------------|-------------|-----------|
| 2225      | 2250      | 2220       | 2248        | 2252      |
| R 46      | R 57      | R 34       | R 58        | R 53      |
| C 14 (DC) | C 1       | C 5 (DC)   | C 13.5 (DC) | C 14 (DC) |
| R 18      | R .5      | R .5       | R 5         | R 2       |
| 78TD      | C 12 (DC) | C 5.5 (DC) | C 2         | C 1       |
|           | R 11      | R 5        | R 7.5       | R 2       |
|           | C 1       | C 2        | 86TD        | C 1.5     |
|           | R 3       | R 7        |             | R 2       |
|           | C 2       | 59TD       |             | C 1       |
|           | R 11.5    |            |             | R 22.5    |
|           | 99TD      |            |             | 99TD      |

## EXPLANATION

| 5334AJ | 5334AN      |
|--------|-------------|
| 2216   | 2242        |
| R 20   | R 45        |
| C 3    | C 13.5 (DC) |
| R .5   | R 3         |
| C 2    | C 1.5       |
| R .5   | R 15        |
| C .5   |             |
| R 12.5 | 78TD        |
| 39TD   |             |

|         |                     |
|---------|---------------------|
| 5334NE  | DRILL HOLE NUMBER   |
| 2180    | SURFACE ELEVATION   |
| R60     | OVERBURDEN*         |
| C5 (A)  | COAL BED            |
| R36     | (LETTER INDICATES   |
| C14(DC) | BED NAME)           |
| R19     | INTERBURDEN*        |
| 134TD   | TOTAL DEPTH OF HOLE |

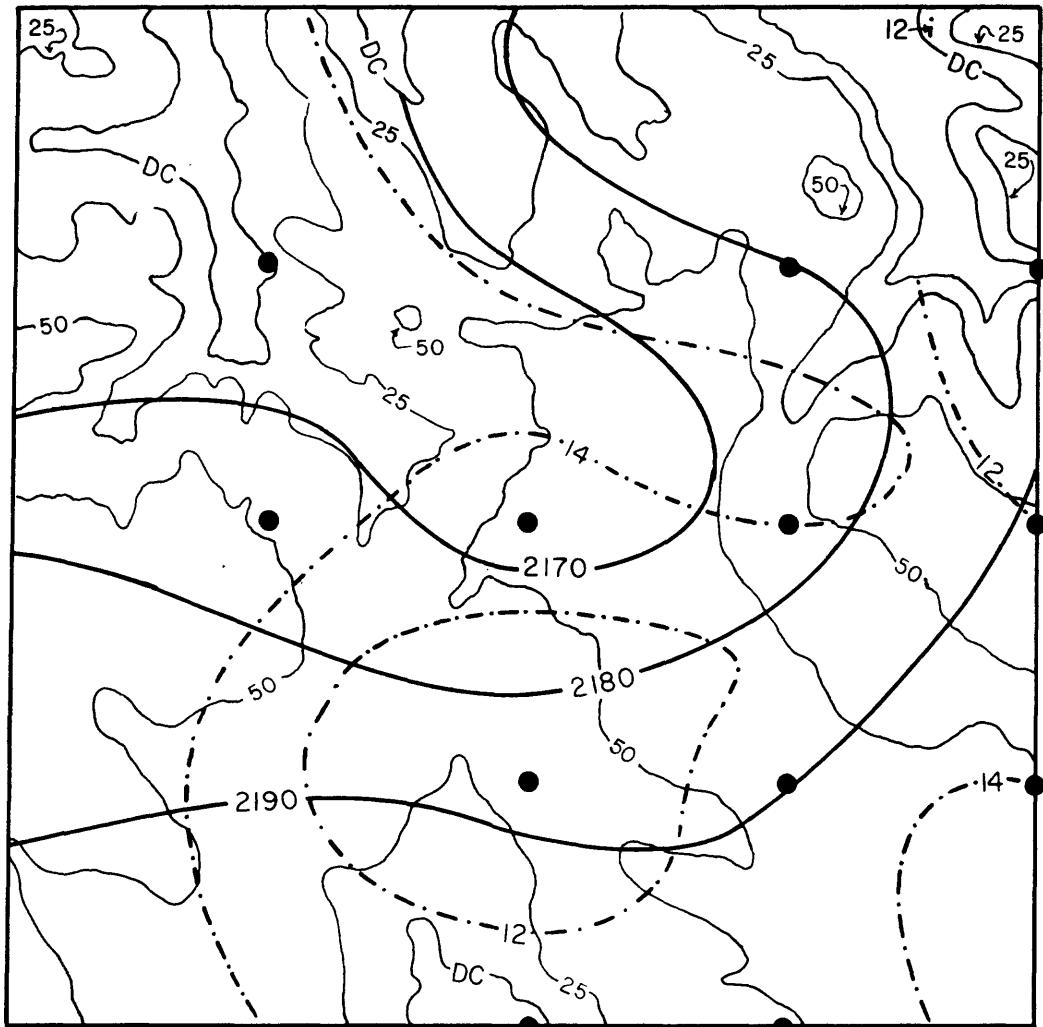
COAL BEDS

A - "A" BED

DC - DUNN CENTER BED

SECTION 34

TOWNSHIP 145 NORTH, RANGE 93 WEST



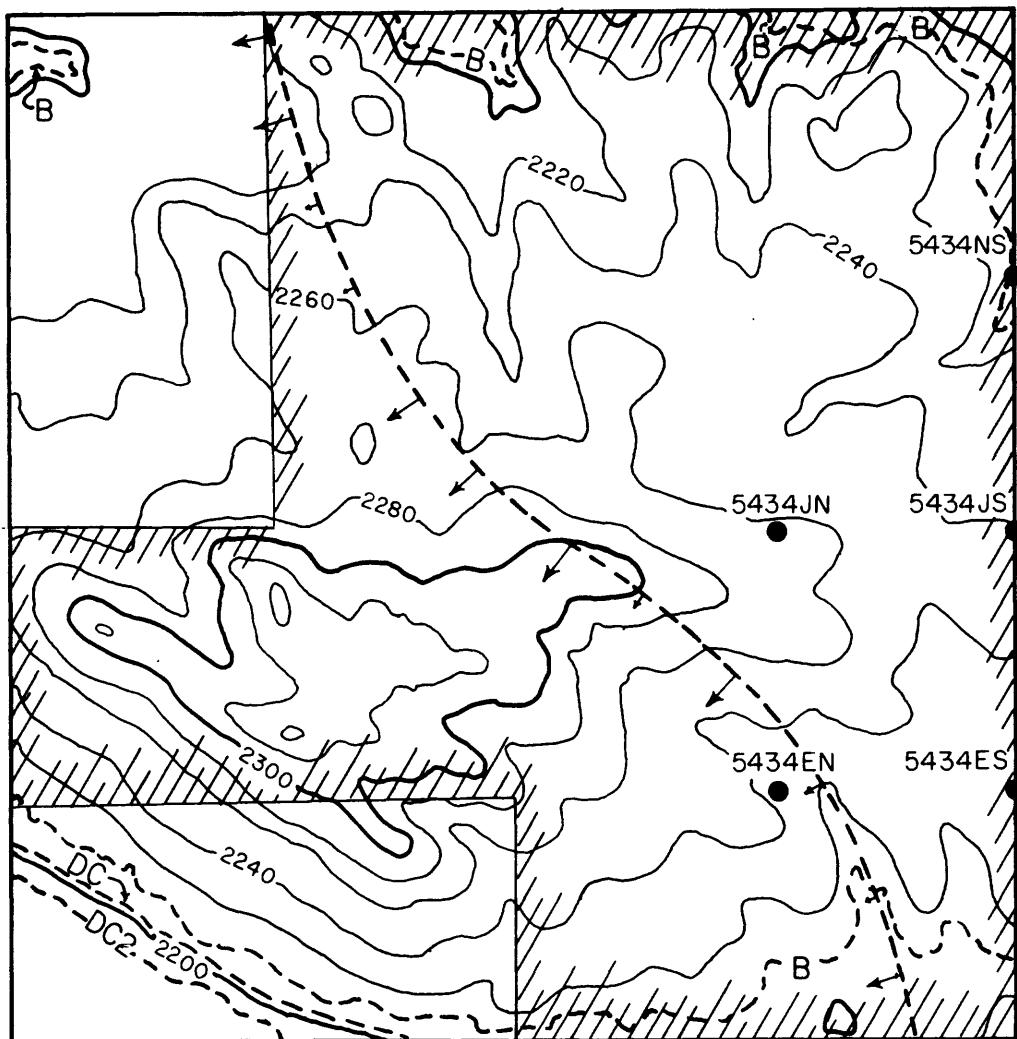
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED

EXPLANATION

- ~~~~~DC~~~~~ COAL CROP LINE OF THE DC BED, APPROXIMATELY LOCATED
- 2190——— STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 14—·— COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~50~~~~~ OVERBURDEN ISOPACH LINES AT 25 and 50 FEET
- DRILL HOLE

SECTION 34

TOWNSHIP 145 NORTH, RANGE 94 WEST



TOPOGRAPHIC, OUTCROP, AND DRILL HOLE LOCATION MAP

EXPLANATION

- B —— COAL CROP LINE, APPROXIMATELY LOCATED  
(LETTER INDICATES BED NAME)  
B - "B" BED  
DC - DUNN CENTER BED AND UPPER SPLIT  
OF THE DUNN CENTER BED  
DC2 - LOWER SPLIT OF THE DUNN CENTER SPLIT
- ↑ — DUNN CENTER BED SPLIT BOUNDARY  
(BED SPLITS IN DIRECTION OF ARROWS)
- / / / / — BOUNDARY OF FEDERAL COAL
- 5434ES DRILL HOLE NUMBER
- DRILL HOLE

INDICATED FEDERAL COAL RESOURCES (IN SHORT TONS)  
 TOWNSHIP 145 NORTH, RANGE 94 WEST, SECTION 34

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DUNN CENTER BED (LOWER SPLIT)

| OVERBURDEN  | MEASURED | INDICATED | INFERRRED |
|-------------|----------|-----------|-----------|
| 0' to 25'   | 21,000   | 112,000   | TRACE     |
| 25' to 150' | 448,000  | 1,092,000 | 28,000    |
| >150'       | 0        | 112,000   | 0         |

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DUNN CENTER BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 101,000   | 227,000   | TRACE     |
| 25' to 150' | 5,054,000 | 3,017,000 | TRACE     |
| >150'       | 0         | 3,000     | 0         |

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"B" BED

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 742,000   | 602,000   | TRACE     |
| 25' to 150' | 2,534,000 | 3,052,000 | 14,000    |
| >150'       | 0         | 14,000    | 0         |

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SECTION TOTAL

| OVERBURDEN  | MEASURED  | INDICATED | INFERRRED |
|-------------|-----------|-----------|-----------|
| 0' to 25'   | 864,000   | 941,000   | TRACE     |
| 25' to 150' | 8,036,000 | 7,161,000 | 42,000    |
| >150'       | 0         | 126,000   | 0         |

## SECTION 34

TOWNSHIP 145 NORTH, RANGE 94 WEST

## DRILL HOLE DATA

| 5434NS      | 5434JN      | 5434JS      | 5434EN      | 5434ES        |
|-------------|-------------|-------------|-------------|---------------|
| <u>2217</u> | <u>2262</u> | <u>2240</u> | <u>2238</u> | <u>2228</u>   |
| R 8         | R 28        | R 21        | R 39        | R 15          |
| C 2 (B)+    | C 1.5       | C 4 (B)     | C 5 (B)     | C 3 (B)       |
| R 31        | R 44        | R 1         | R .5        | R 1           |
| C 16.5 (DC) | C 4 (B)     | C 2 (B)     | C 3.5 (B)   | C 3.5 (B)     |
| R 2         | R 1         | R .5        | R 10        | R 31          |
| C 1         | C 4 (B)     | C .5 (B)    | C 2 (DC)    | C 16 (DC)     |
| R 19.5      | R 9         | R 44        | R .5        | R 5           |
| 80TD        | C 15.5 (DC) | C 16 (DC)   | C 4.5 (DC2) | C 1           |
|             | R 3         | R 3         | R 3         | <u>R 24.5</u> |
|             | C 1         | C 1         | C 8         | 100TD         |
|             | R 19        | R 17        | R 5         |               |
|             | 130TD       | 110TD       | C 1         |               |
|             |             |             | R 8         |               |
|             |             |             | 90TD        |               |

## EXPLANATION

5434EN ————— DRILL HOLE NUMBER

2262 ————— SURFACE ELEVATION  
 R47 ————— OVERBURDEN\*  
 C6(B) ————— COAL BED  
 R37 ————— (LETTER INDICATES  
 C14(DC) ————— BED NAME)  
 R14 ————— INTERBURDEN\*  
 118TD ————— TOTAL DEPTH OF HOLE

## COAL BEDS

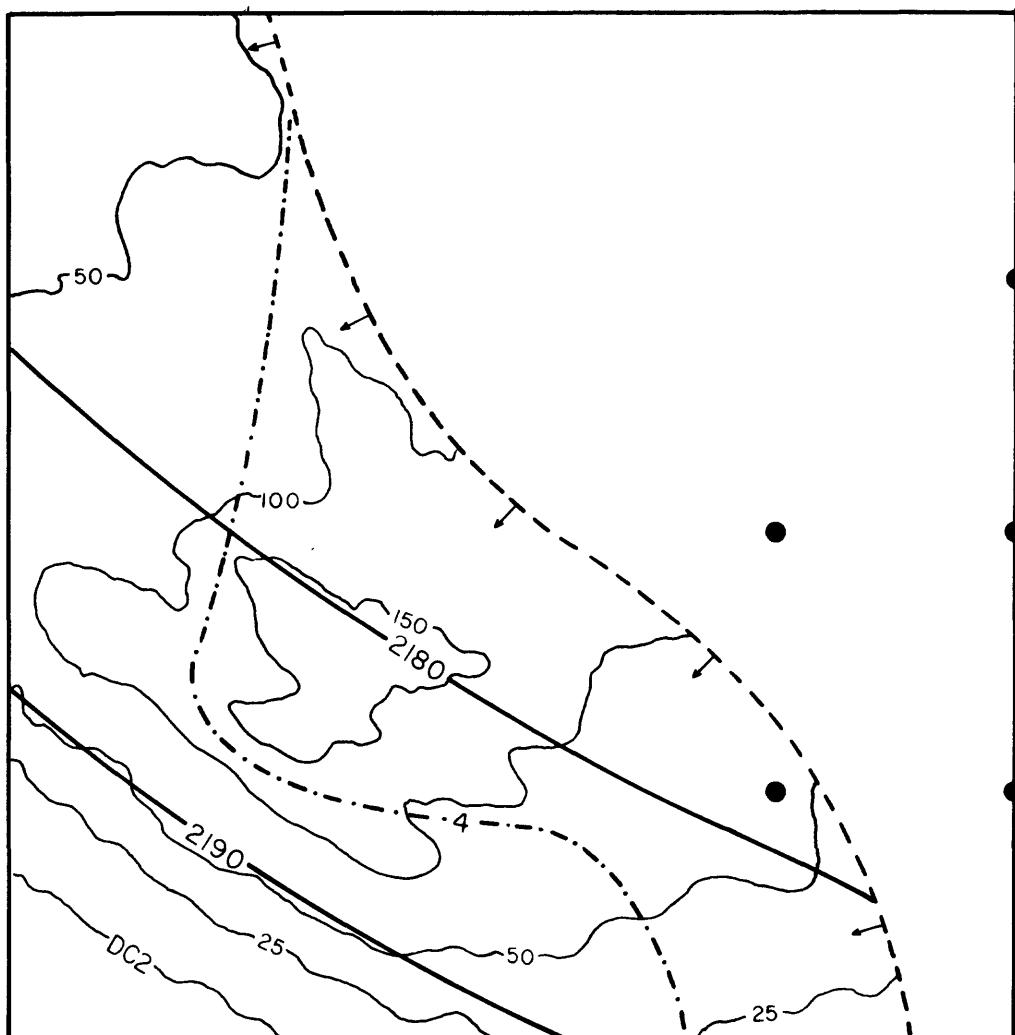
B - "B" BED  
 DC - DUNN CENTER BED

+MOST OF THE B BED HAS BEEN WEATHERED AWAY

\*OVERBURDEN AND INTERBURDEN INTERVALS  
 MAY INCLUDE SOME THIN LOCAL COAL BEDS

SECTION 34

TOWNSHIP 145 NORTH, RANGE 94 WEST



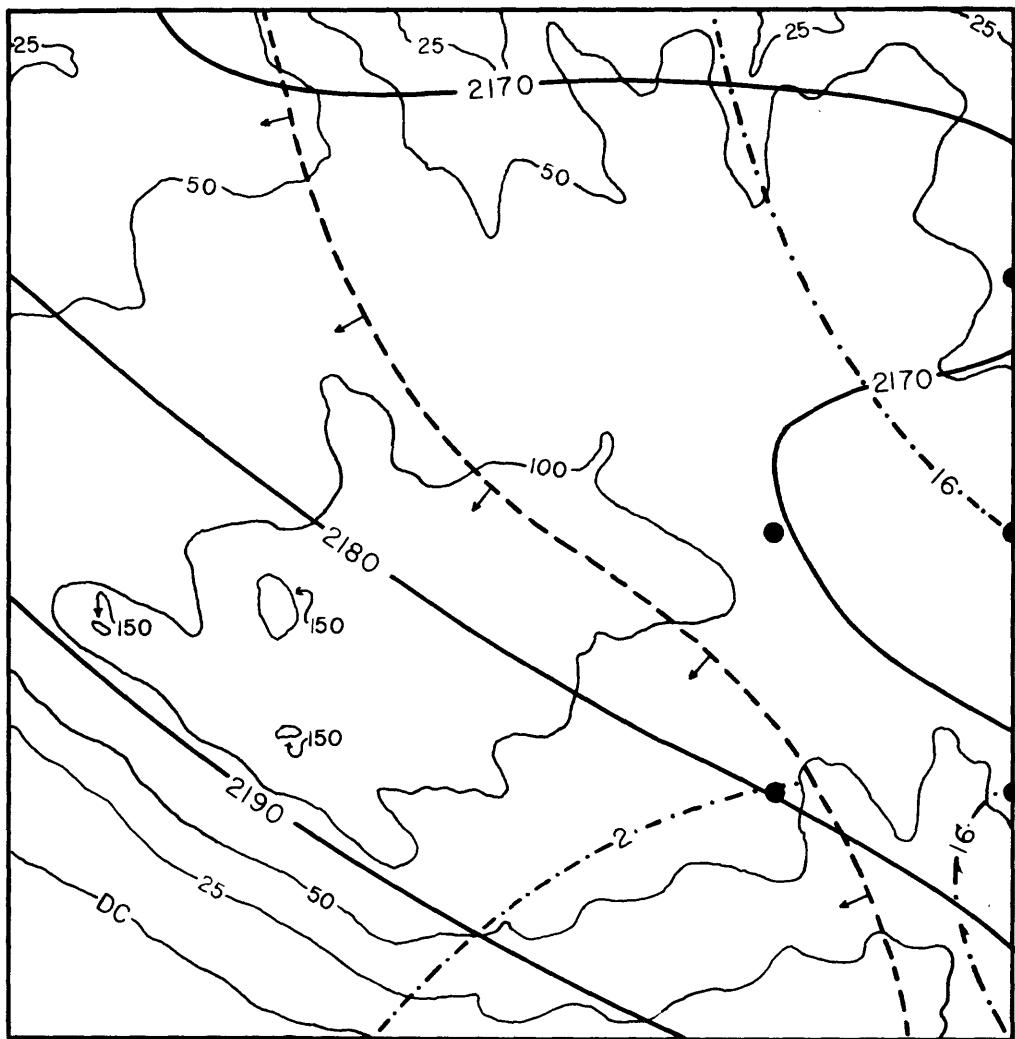
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED  
(LOWER SPLIT)

EXPLANATION

- DUNN CENTER BED SPLIT BOUNDARY (BED SPLITS IN DIRECTION OF ARROWS)
- DC2 ~~~ COAL CROP LINE OF THE LOWER SPLIT OF THE DUNN CENTER BED, APPROXIMATELY LOCATED
- 2190 STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- 4 COAL ISOPACH LINE (C.I. 2 FEET)
- 50 OVERBURDEN ISOPACH LINES AT 25, 50, 100 AND 150 FEET
- DRILL HOLE

SECTION 34

TOWNSHIP 145 NORTH, RANGE 94 WEST



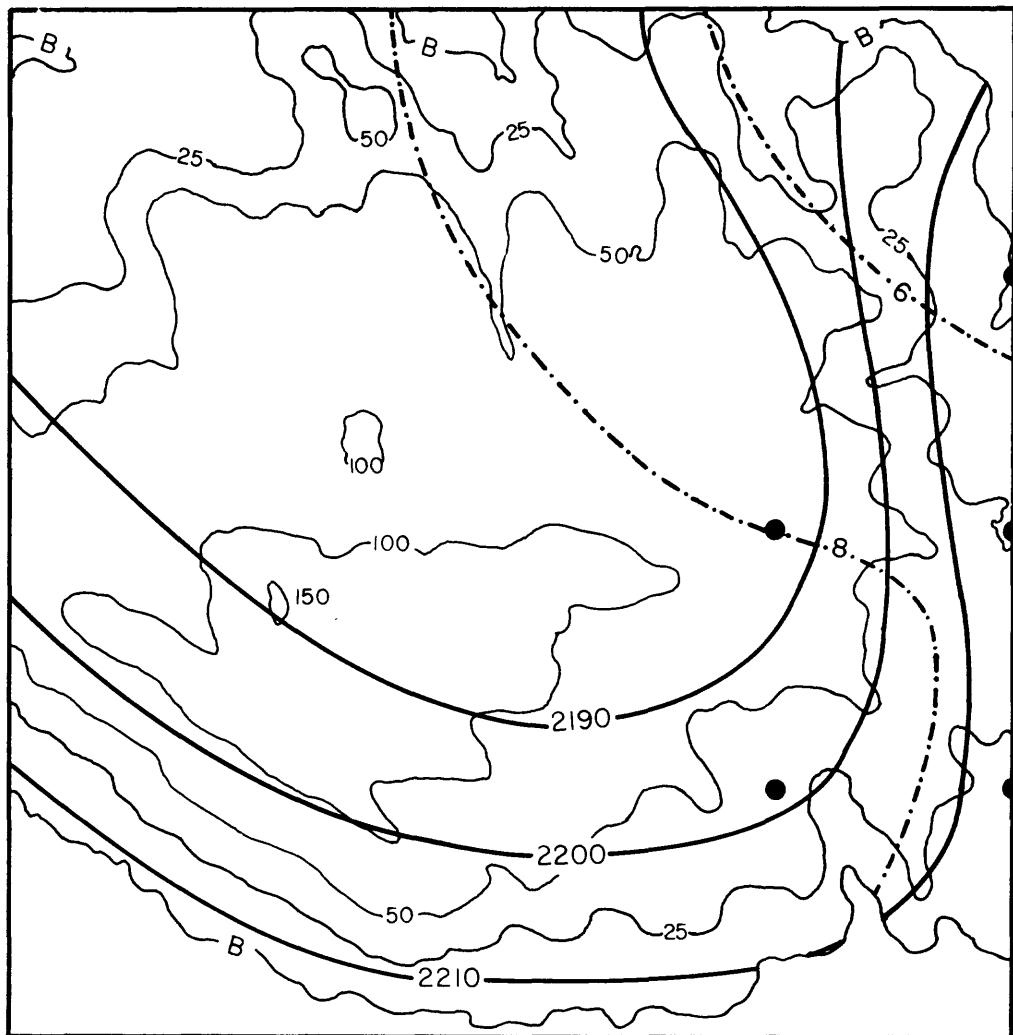
THICKNESS, OVERTURDEN, AND STRUCTURE OF THE  
DUNN CENTER LIGNITE BED AND THE UPPER SPLIT  
OF THE DUNN CENTER LIGNITE BED

EXPLANATION

- DUNN CENTER BED SPLIT BOUNDARY (BED SPLITS IN DIRECTION OF ARROWS)
- COAL CROP LINE OF THE DUNN CENTER BED AND THE UPPER SPLIT OF THE DUNN CENTER BED, APPROXIMATELY LOCATED
- STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- COAL ISOPACH LINE (C.I. 2 FEET)
- OVERTURDEN ISOPACH LINES AT 25, 50, 100 AND 150 FEET
- DRILL HOLE

SECTION 34

TOWNSHIP 145 NORTH, RANGE 94 WEST



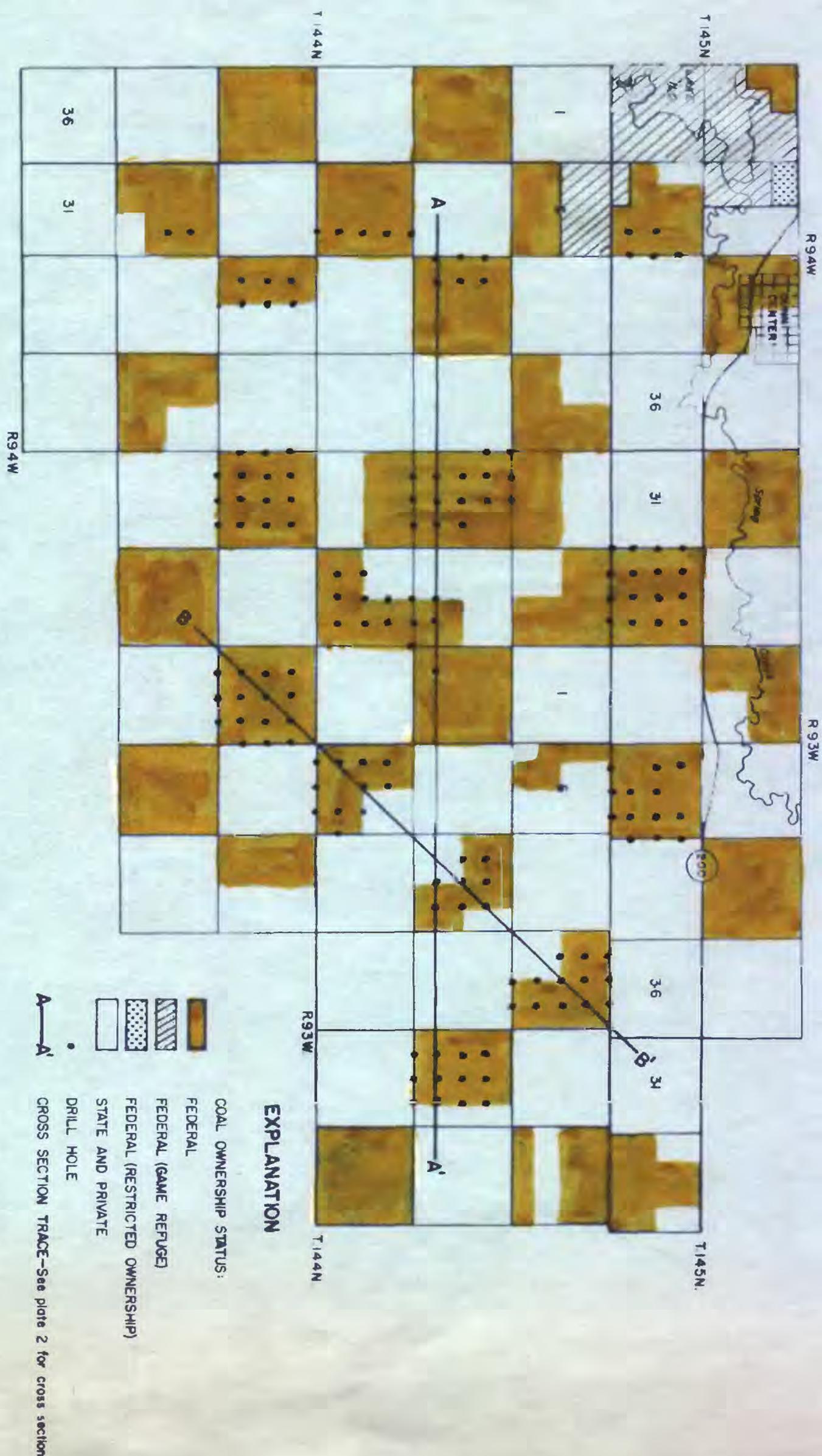
THICKNESS, OVERBURDEN, AND STRUCTURE OF THE  
"B" LIGNITE BED

EXPLANATION

- ~~~~~B~~~~~ COAL CROP LINE OF THE "B" BED, APPROXIMATELY LOCATED
- 2210 — STRUCTURAL CONTOUR LINE (C.I. 10 FEET)
- - - 8 - - - COAL ISOPACH LINE (C.I. 2 FEET)
- ~~~~~25~~~~~ OVERBURDEN ISOPACH LINES AT 25, 50, 100  
AND 150 FEET
- DRILL HOLE

## References

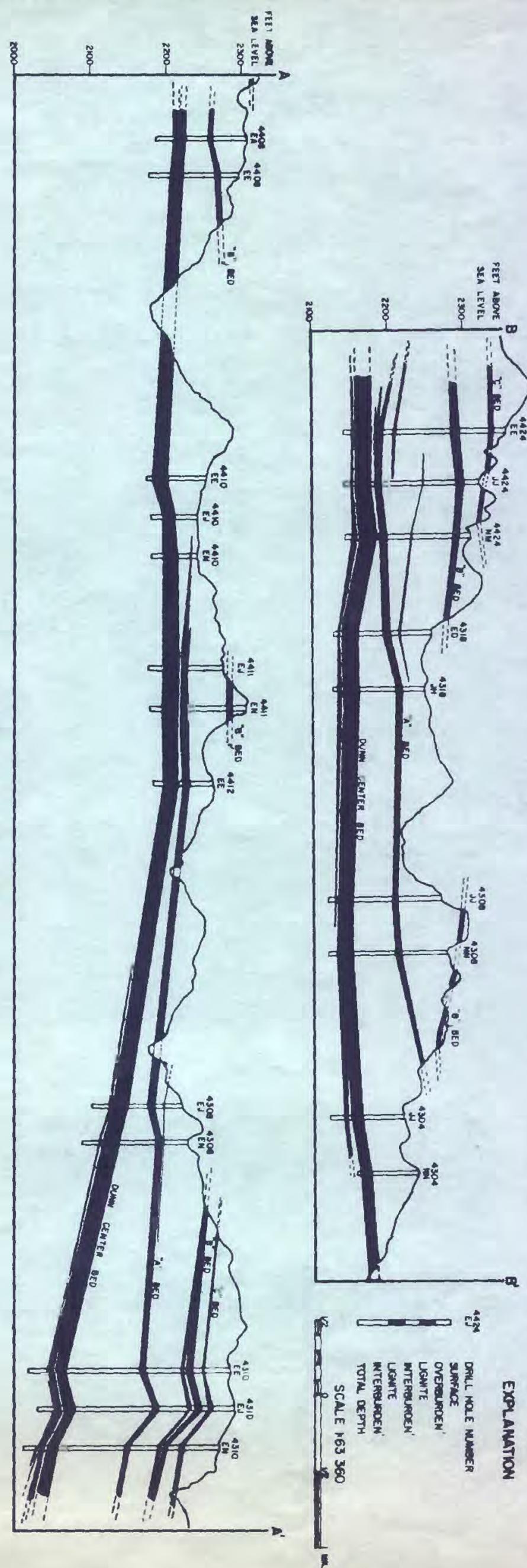
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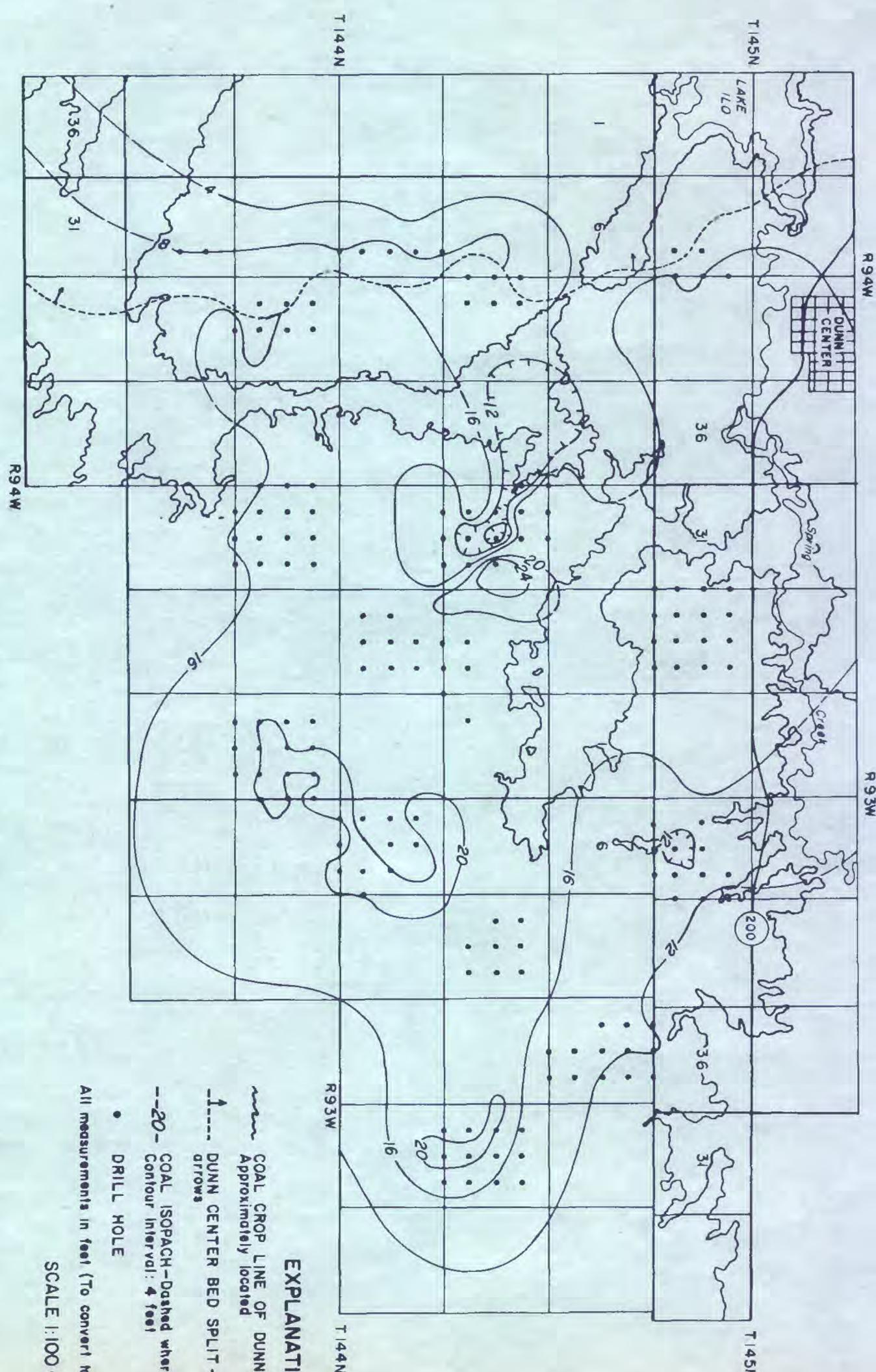


DUNN CENTER LIGNITE FIELD (SOUTH HALF), DUNN COUNTY, NORTH DAKOTA

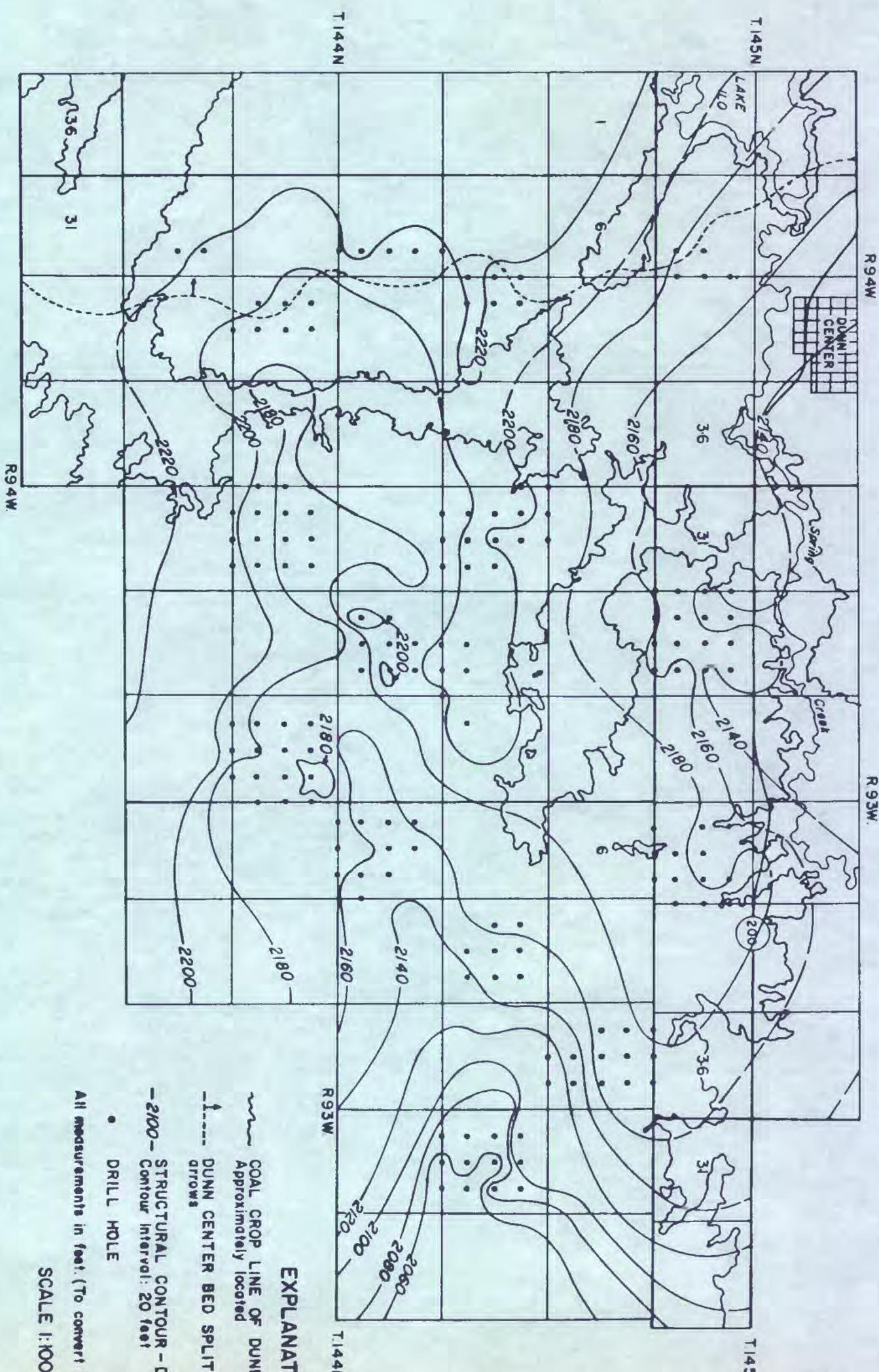
COAL OWNERSHIP STATUS

SCALE 1:100 000



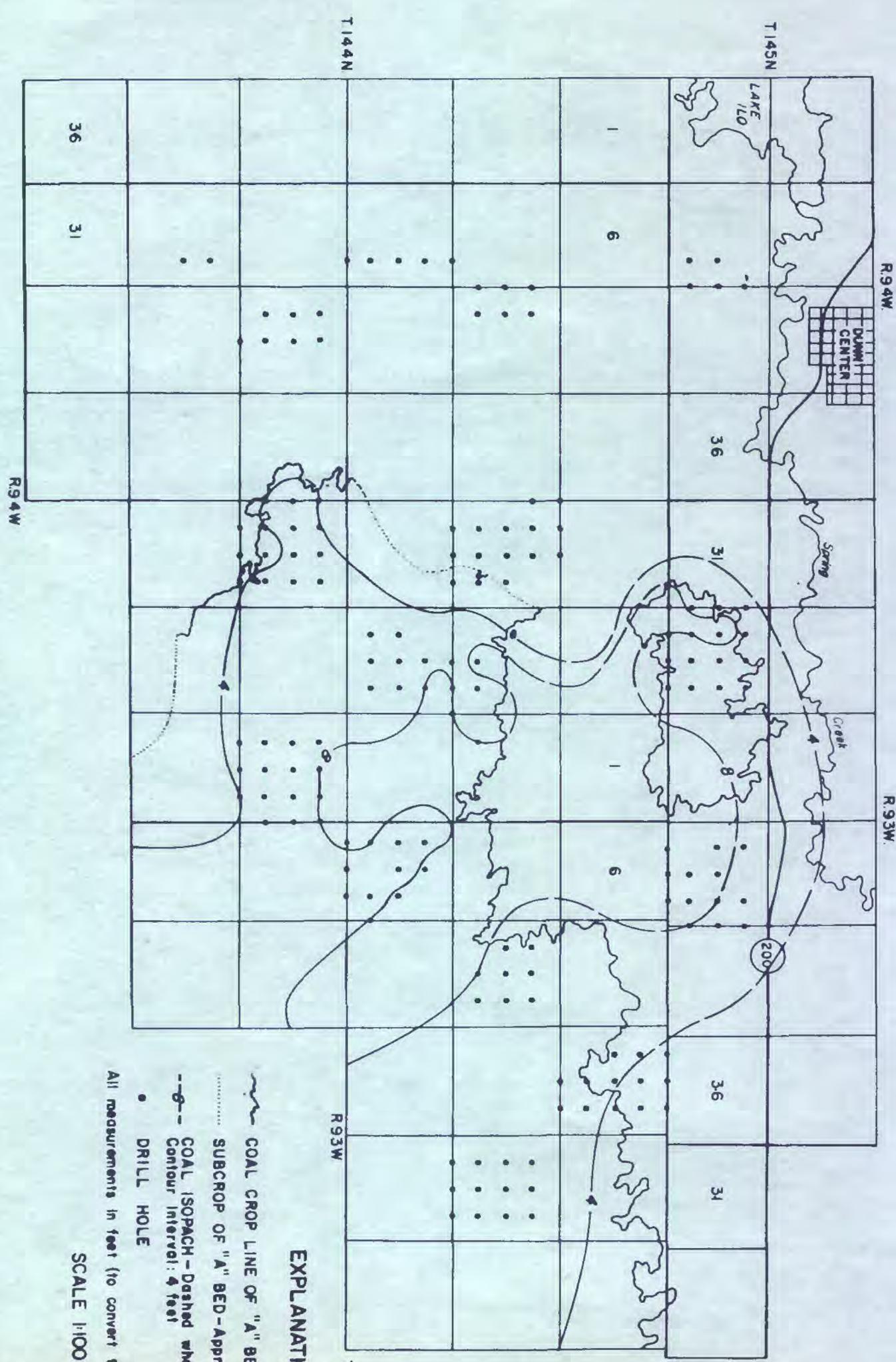


ISOPACH MAP OF THE DUNN CENTER AND UPPER SPLIT OF THE DUNN CENTER LIGNITE BED  
DUNN CENTER LIGNITE FIELD (SOUTH HALF), DUNN COUNTY, NORTH DAKOTA



STRUCTURAL CONTOUR MAP ON THE DUNN CENTER AND UPPER SPLIT OF THE DUNN CENTER LIGNITE BED

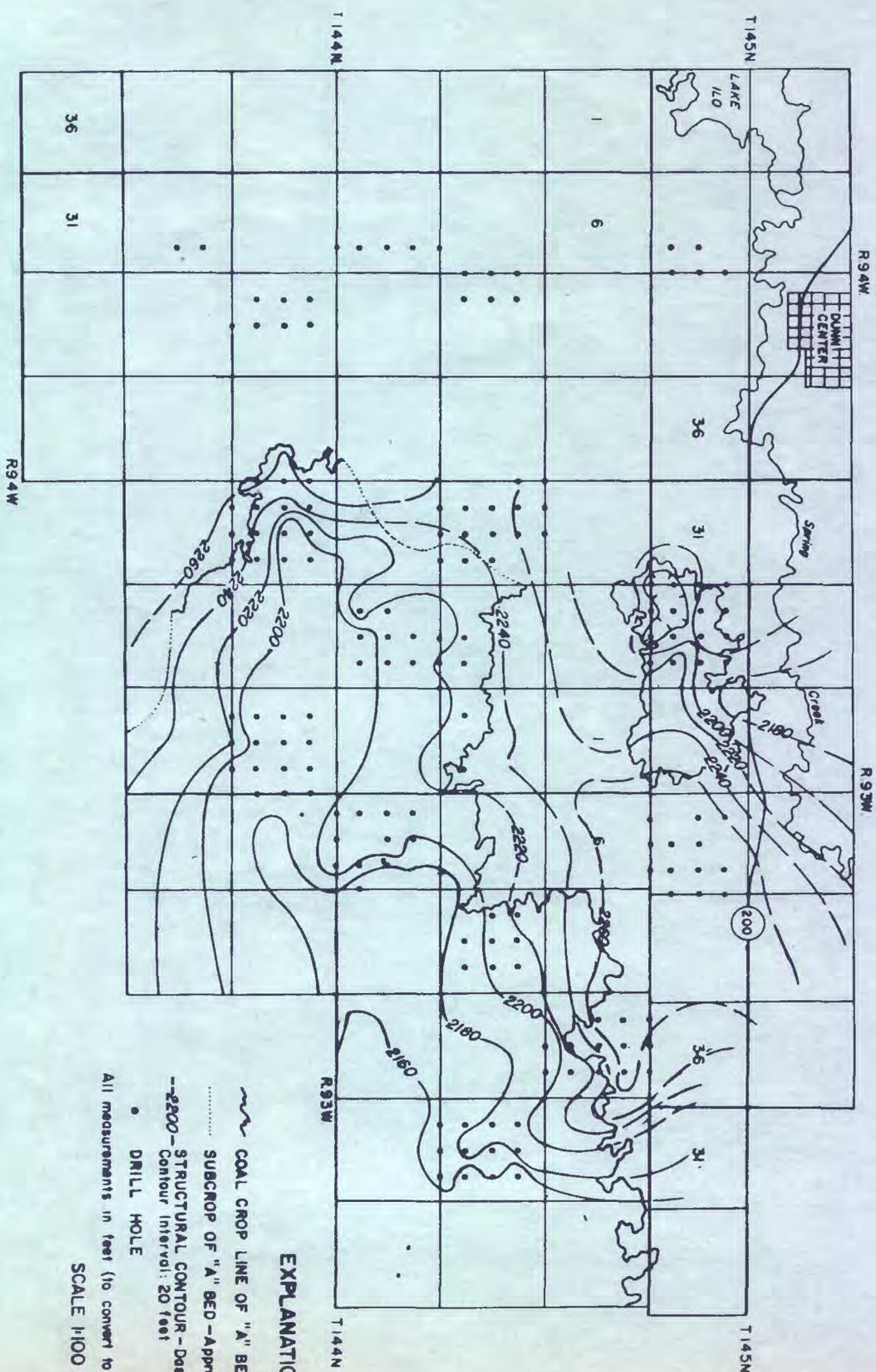
DUNN CENTER LIGNITE FIELD (SOUTH HALF), DUNN COUNTY, NORTH DAKOTA



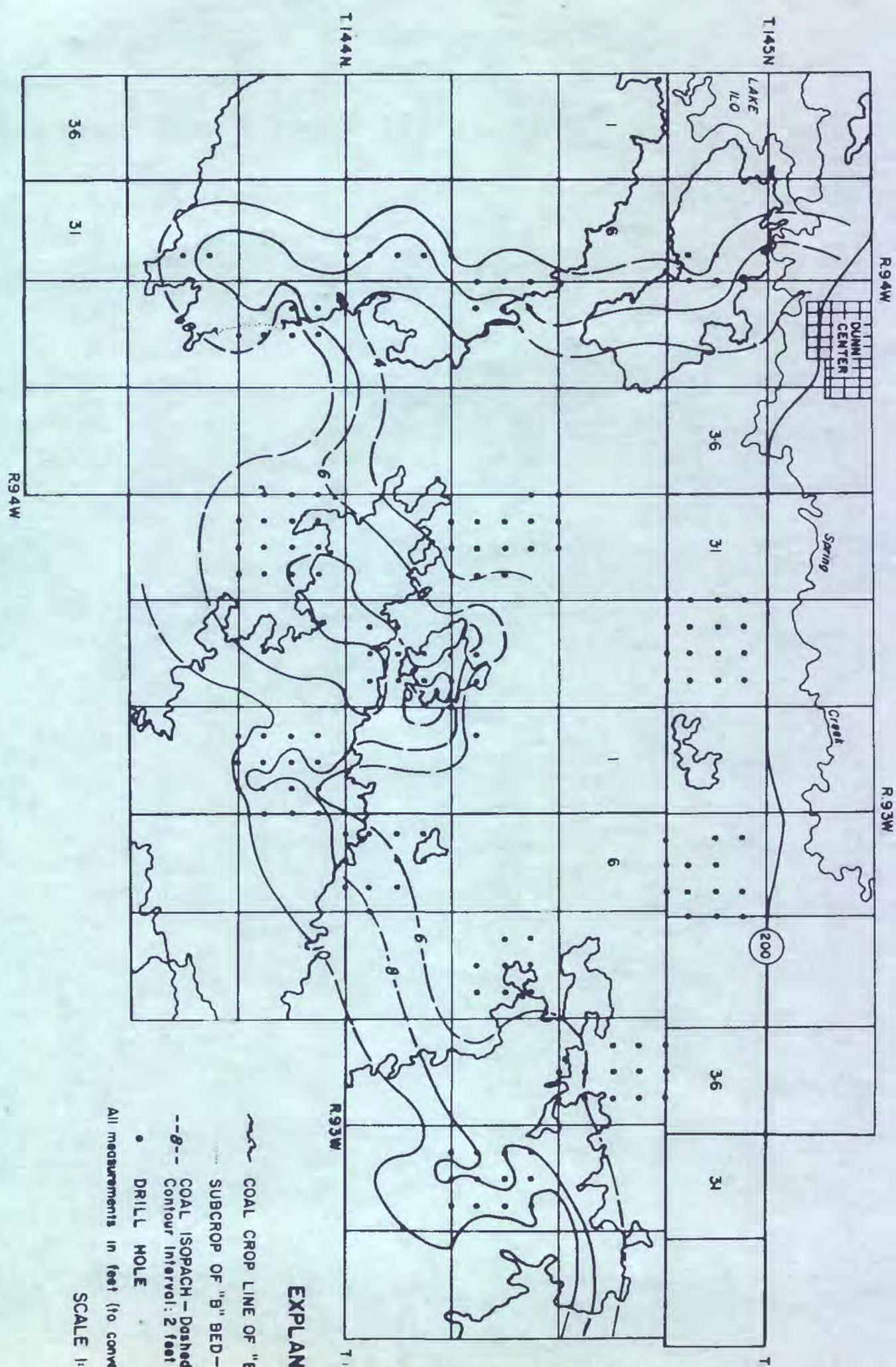
DUNN CENTER LIGNITE FIELD (SOUTH HALF), DUNN COUNTY, NORTH DAKOTA

ISOPACH MAP OF THE "A" LIGNITE BED

36 31

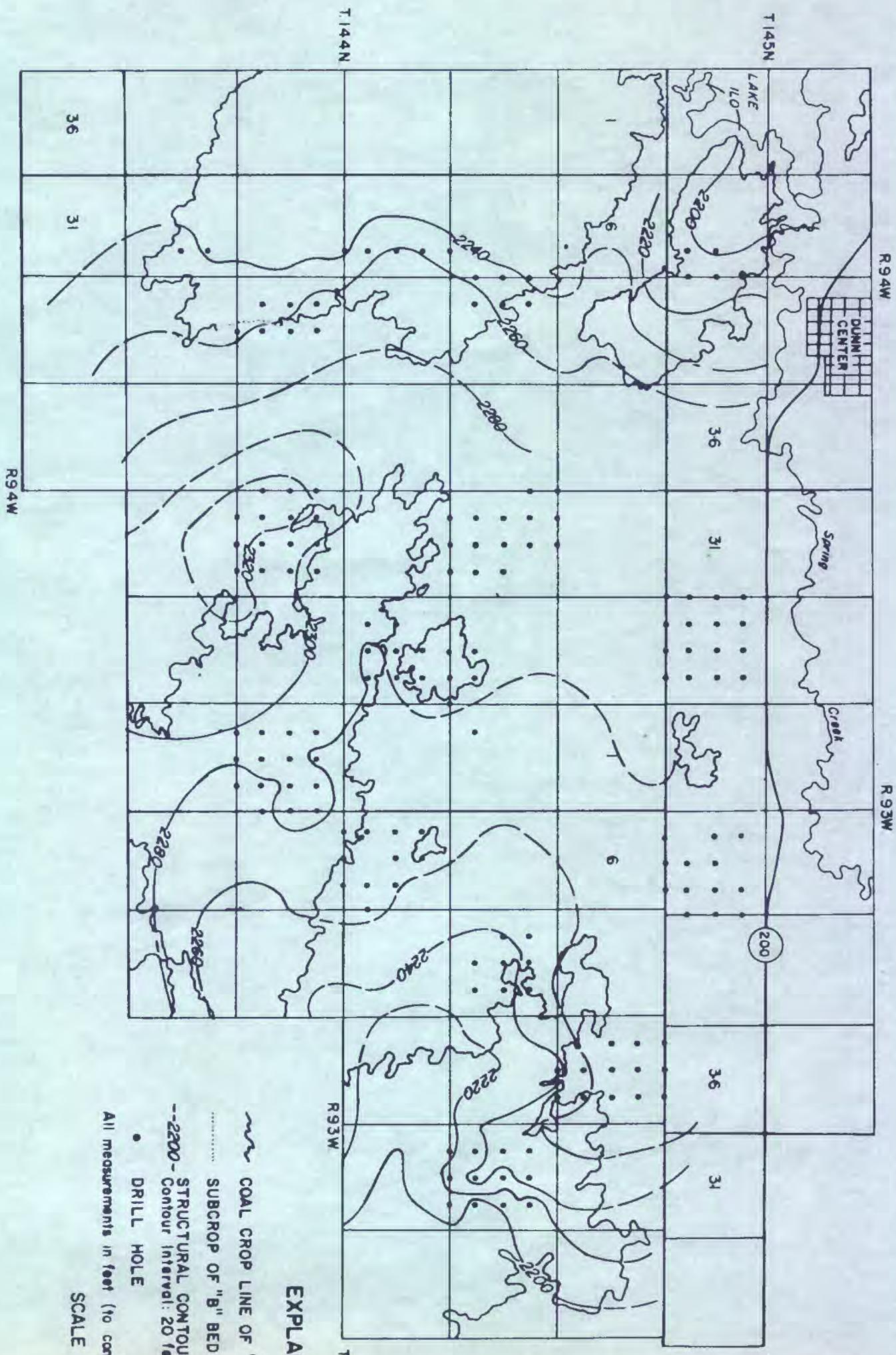


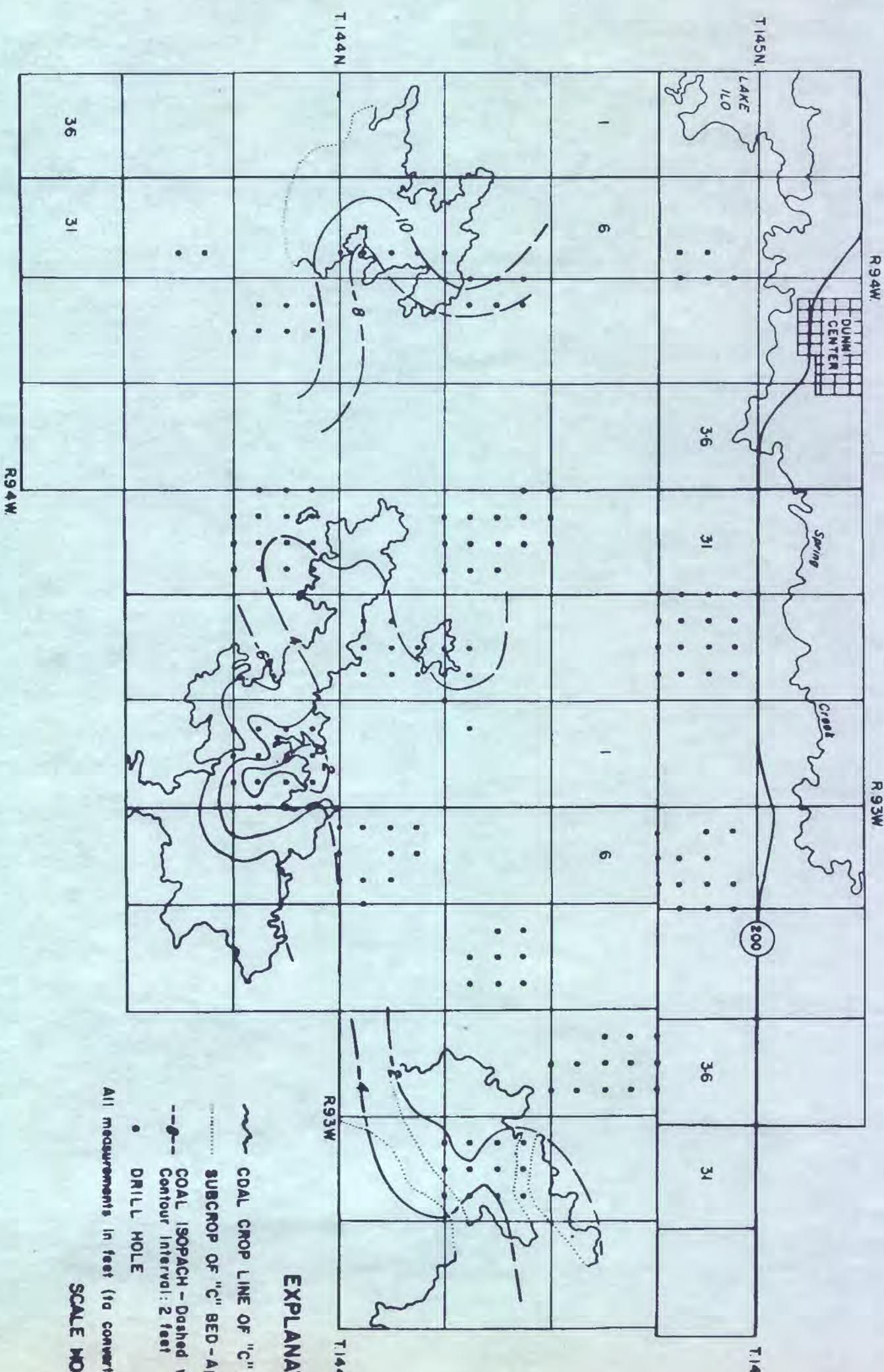
STRUCTURAL CONTOUR MAP ON THE "A" LIGNITE BED  
DUNN CENTER LIGNITE FIELD (SOUTH HALF), DUNN COUNTY, NORTH DAKOTA



DUNN CENTER LIGNITE FIELD (SOUTH HALF), DUNN COUNTY, NORTH DAKOTA

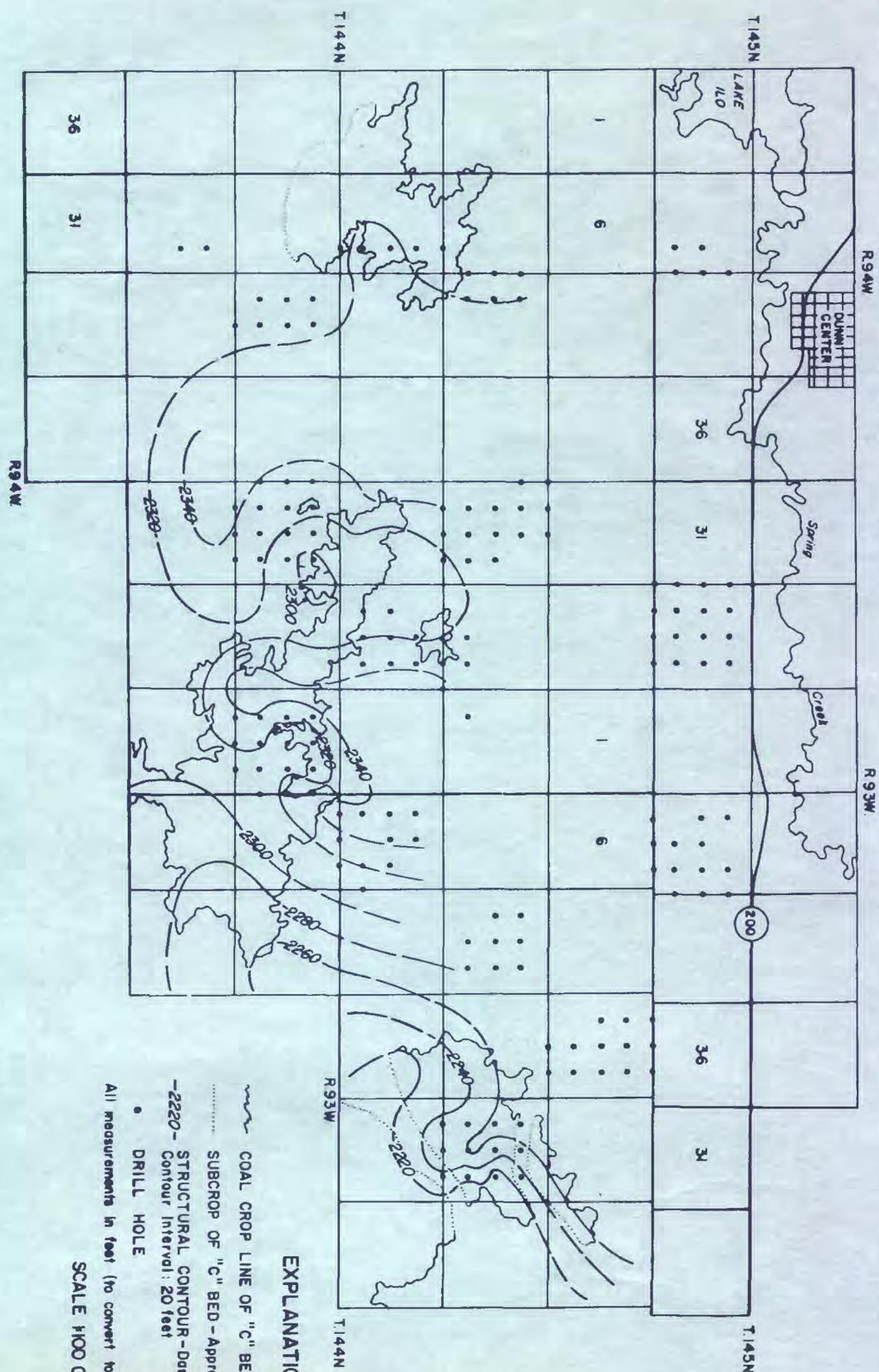
ISOPACH MAP OF THE "B" LIGNITE BED





DUNN CENTER LIGNITE FIELD (SOUTH HALF), DUNN COUNTY, NORTH DAKOTA

ISOPACH MAP OF THE "C" LIGNITE BED



STRUCTURAL CONTOUR MAP ON THE "C" LIGNITE BED  
DUNN CENTER LIGNITE FIELD (SOUTH HALF), DUNN COUNTY, NORTH DAKOTA