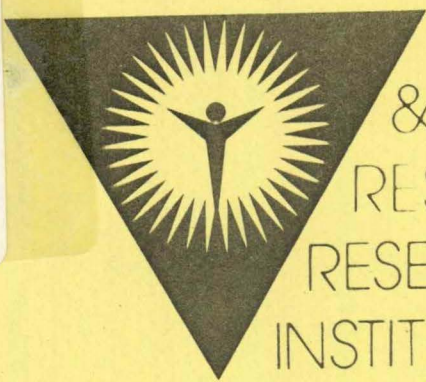


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REPORT ON THE LOCATION AND DISTRIBUTION
OF COAL STRIP MINES IN IOWA AND IMPLICATIONS
FOR FUTURE COAL EXPLORATIONS

Lyle V. A. Sendlein and Peter R. Johnson

MINING AND RESTORATION DIVISION

JULY 1976

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July, 1976

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ABSTRACT

This report is a result of a detailed survey of Iowa's coal strip mines in twenty-four counties of central and southeastern Iowa. A list of the legal location of each strip mine found is included in this report. Accompanying this list is a compilation of where each piece of data was found and in some cases estimated acreages of the sites. The location and distribution pattern of abandoned and active strip mines are shown on maps included within this report. An analysis of the data and the implications for future coal strip mining are included.

REPORT ON THE LOCATION AND DISTRIBUTION OF COAL STRIP MINES
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Introduction:

Iowa's primary energy sources are almost entirely fossil fuels and Iowa is strongly dependent on oil and natural gas, with 84% of its energy derived from these two fuels and only 16% from coal. Paradoxically, Iowa's natural fossil fuel resource is almost exclusively coal. C P

When the Iowa Legislature conceived the plan for the Iowa Coal Project, they wanted to investigate the potential that coal could provide the state with a means of meeting its energy needs. In order to do this, increased production would be necessary and thus the coal industry would be revitalized in the state. P

The development of reserve information is not a goal of the Iowa Coal Project, but rests with the Iowa Geological Survey. Before a strong industry can develop in this state, information on the extent and location of coal reserves within the state is imperative. C

This report is the result of a detailed survey of Iowa's coal strip mines in 24 counties of central and southeastern Iowa. The locations and distribution patterns of abandoned and active strip mines are shown on maps included within this report. Also, an analysis of the data and implications for future coal strip mining are included.

Purpose of Study:

In an attempt to get a first approximation of the reserves of the state, compilation of available information concerning the location, depth, quality and amount of coal present in Iowa had to be developed.

This study represents the first step toward that goal. The major parts of the study are as follows:

1. To locate and map the abandoned and presently active coal strip mines in a 24-county area of central and southeastern Iowa. The counties involved are shown in Figure 1.
2. To create a list of the legal location of the strip mines within the study area and to provide estimated acreages of some of these mines.
3. To create a potential source of data that may be used in future coal exploration plans and future studies on coal stratigraphy and-coal deposition.
4. To provide a source of data that may help form the basis for more accurate coal reserve estimates in Iowa.

Methods of Study:

The study area was limited to the 24 counties shown in Figure 1. The geologic map of Iowa shows that coal-bearing Pennsylvanian rocks underlie these counties and most of the study area is underlain by bedrock that belongs to the Cherokee group of the Pennsylvanian period. Further limiting of the area was accomplished by consulting available maps showing overburden (glacial till, loess, topsoil, etc.) thick-

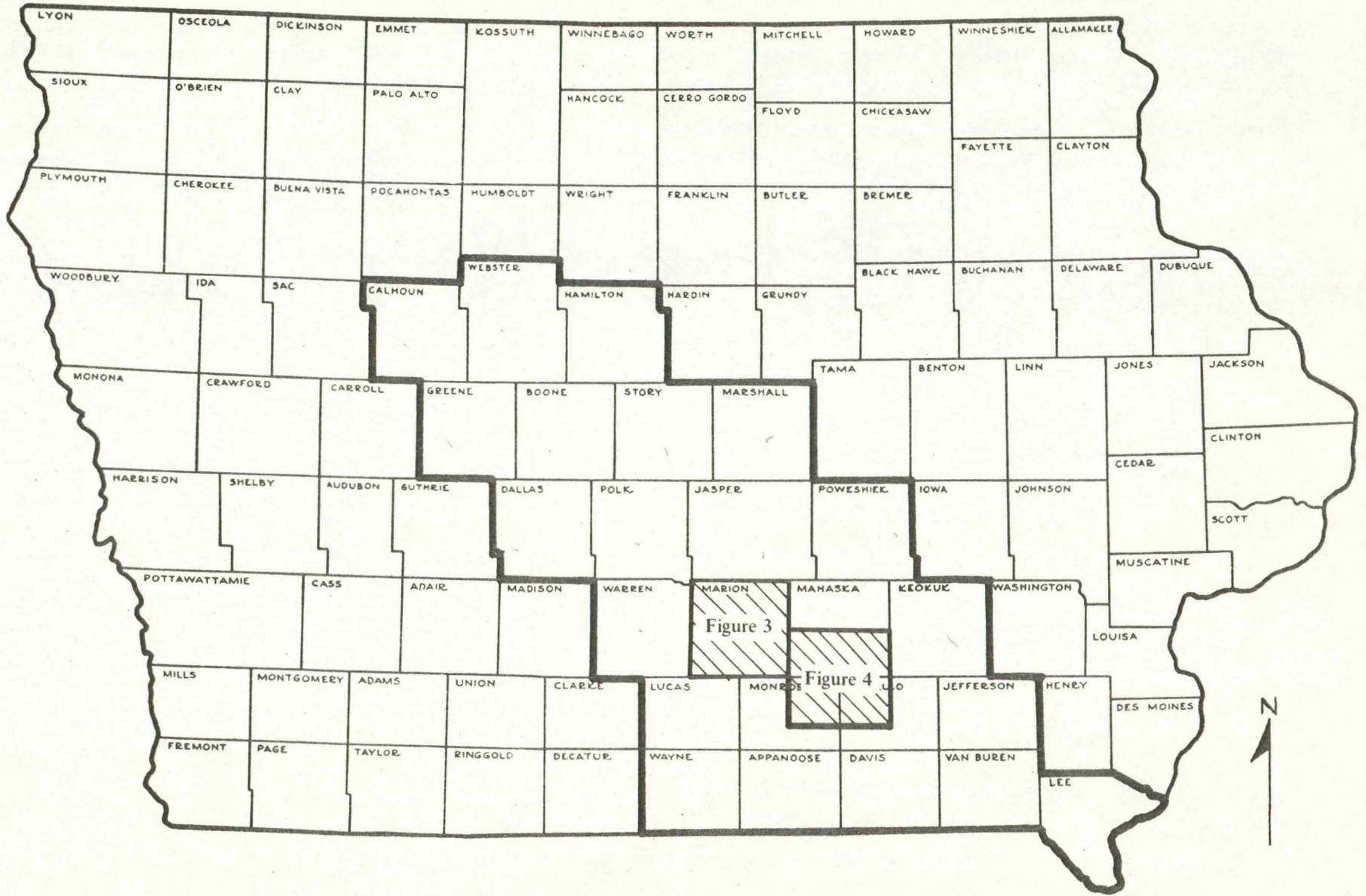


Figure 1

IOWA

ness.* Where the overburden appeared to be more than 100 feet thick, * the area was not included in the present survey. All published 7½ minute quadrangle topographic maps within the study area were subsequently searched for the presence of abandoned and active coal strip mines. Many of the long-abandoned mines were identified by their characteristic topography (spoil banks and piles, steep slopes, and narrow cuts) and by the presence of ponds. In some instances, the acreage of the mine was estimated. Those estimates are listed below.

Only 30% of the study area was covered by recent topographic mapping. Because of this, it was necessary to utilize aerial photographs to survey and locate those mines outside the topographic coverage. The photographs utilized in this study are those belonging to the Iowa Department of Transportation, and may be viewed at the Iowa State Highway Commission, Photogrammetry Department, Ames, Iowa.

Other References Cited:

Obviously, the information gained from the aerial photographs and topographic maps is restricted by the dates those photos and maps were made. To obtain a record of the mining activity in a given county the following procedure was followed.

A list of mining companies in operation after the said date, and prior to 1968 was compiled by searching through the Report of the State

* An isopach map of overburden thickness published in the 11-county report by the Iowa Geological Survey was a primary reference.

Mine Inspectors, 1954-1969. These reports listed all mining activity *
for a biennial period, but failed to list the location of the mine sites.

Information on these companies was then located in the mining records maintained by the Iowa Geological Survey. These unpublished records consist of a card file, listing much of the deep mining and surface mining activity by company name, previous to 1968. Unfortunately, these records are not entirely complete. The consequences of this will be discussed in Restrictions on the Data.

It was found that the Iowa Bureau of Mines has a complete record of all mining since 1968. This record consists of mine registrations and plat (sic?) books delineating the areas of mining activity.

Because the Iowa Geological Survey records were deficient for Marion County, a Soil Survey map, to be published by the U.S.D.A. was consulted. These maps provided limited information on strip mines.

All coal strip mines located by the above methods were checked with the Iowa Department of Transportation's 1975 Aggregate Resources to ensure they were indeed coal mining operations. This book provides an up-to-date computer listing of all sand, gravel, and rock (excluding coal) quarries and operations in the state.

Description of Data Generated by the Study:

Several types of data were created for this study:

1. U.S. Geological Survey 7½ minute quadrangle topographic maps were used to plot the location of the mines. Estimates of acreage were also made on these maps.

2. County road maps prepared by the Iowa Department of Transportation were used to plot the mines located on aerial photographs.
3. A 24-county map, included in this report, shows the geographic location of all coal mines located in this study. The base for this map was prepared by tracing the county outlines and township and range lines from a map of Iowa, published by the United States Geological Survey. It is intended that this map serve to display the distribution and concentration of strip mining activity in Iowa (see Figure 2).
4. Two detailed maps of the mining activity in all of Marion County and portions of Mahaska, Wapello, and Monroe Counties were prepared (see Figures 1, 3, 4). These maps are as complete and accurate as the data would allow, and display in detail the aerial extent of mining in that area.
5. A list of the legal location of all the strip mines found is included at the end of this report. Accompanying this list is a compilation of where each piece of data was found and in some cases estimated acreages of the sites. It should be noted that these estimates may now be obsolete due to mine expansions at a particular site.

Restrictions on the Data:

Although the listing of strip mines included in this report is essentially complete and accurate, there may be some errors. Sources of these errors include:

Distribution of COAL STRIP MINES in Iowa

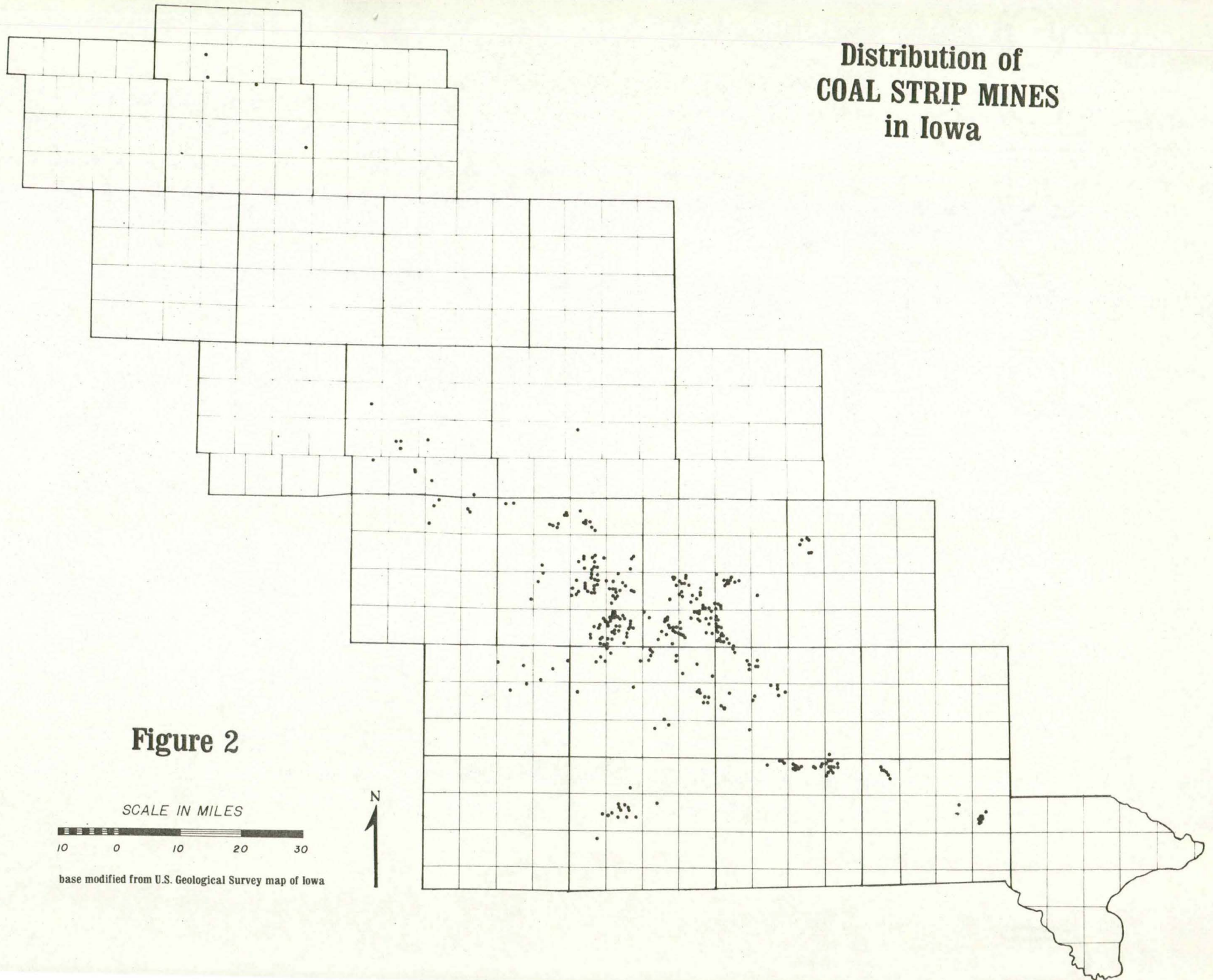


Figure 2

SCALE IN MILES

10 0 10 20 30

base modified from U.S. Geological Survey map of Iowa

MARION COUNTY

R-21W

R-20W

R-19W

R-18W

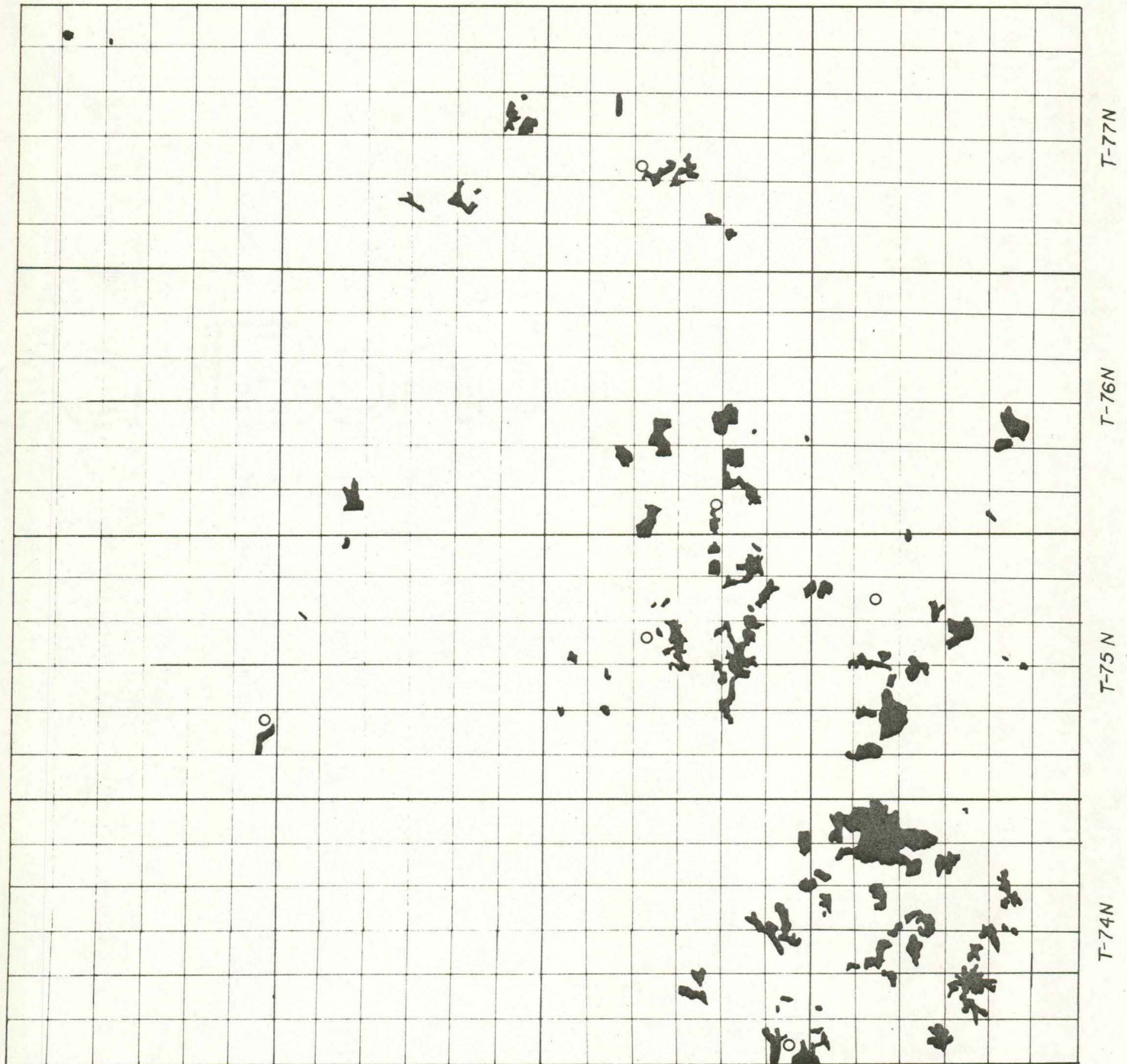
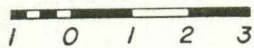




Figure 3

Scale in Miles



COAL STRIP MINES

-  aerial extent known
-  aerial extent unknown

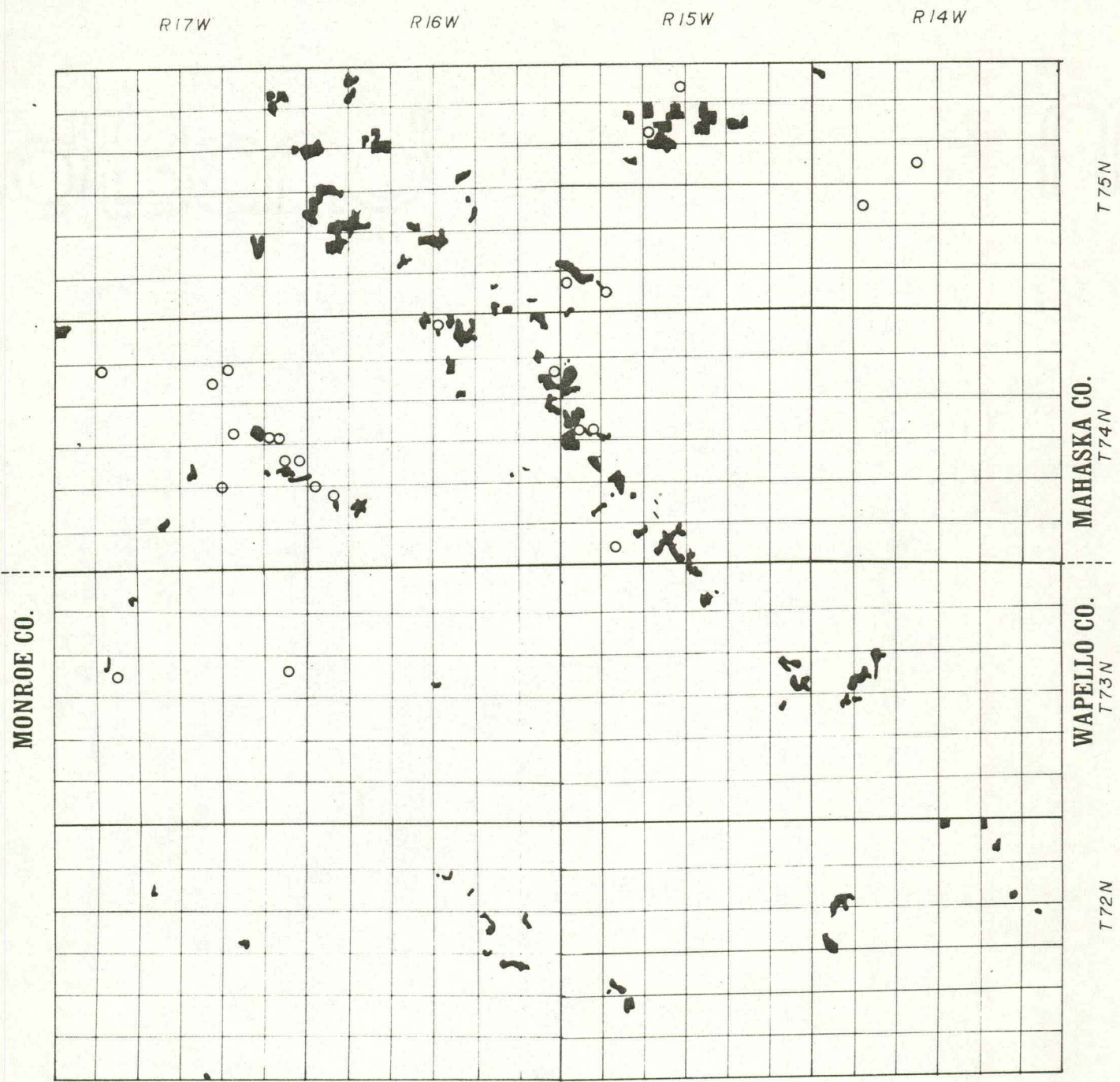
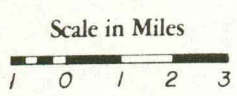


Figure 4



COAL STRIP MINES
 ■ Aerial Extent Known
 ○ Aerial Extent Unknown

MONROE CO.

WAPELLO CO.

MONROE CO.

MAHASKA CO.
T74N

WAPELLO CO.
T73N

T72N

T75N

R17W

R16W

R15W

R14W

1. Faulty source data. This is especially true concerning the Iowa Geological Survey records, which are incomplete and often vague.
2. Misinterpretation of aerial photographs. Although an attempt was made to eliminate this by referring to 1975 Aggregate Resources described above, in some cases conflicting information was found. For example, in Marion County a few instances occurred when the 1975 Aggregate Resources listed a site as a pit or quarry, and the Soils Survey maps (described above) listed the site as a coal strip mine. In such cases, the site was examined more carefully. Criterion for decision included:
 - a) Whether or not the site had the characteristic topography of a surface mine.
 - b) Association with other mining activity in the area.
 - c) Evaluation of the data source.
 - d) Cross-references with other data sources.
3. The self-imposed limit of overburden thickness may mean that the survey did not include some areas of mining activity. Local fluctuations in the overburden thickness may not be represented by the Iowa Geological Survey Isopachous map of overburden used in this study.

Additional discrepancies in the data may have come from the fact that the Iowa Geological Survey records were essentially complete except in the following cases. In Wapello County there were no records of seven mining operations between 1956-1968. In Van Buren County, records are

lacking for three mining operations between 1957-1959. Also, there were no records of the Jude Mine operations in Mahaska County in 1966-1967. Records of Jude operations in 1968 are available.

Finally, there is a possibility that urban expansion and, recently, land restoration have destroyed the physical records of mining activity. It is believed that this is largely insignificant and the major area where this occurs is in the immediate vicinity of Des Moines, Iowa.

Analysis of the Data:

Geologic Setting of Study Area

The study area is included in the stable midcontinent region. The bedrock is mostly Pennsylvanian in age and most of the mines surveyed in this study are located in the Cherokee group. In Appanoose County, the Cherokee, Marmaton, and Pleasanton groups are all present and have been mined in the past. The Marmaton group has also been mined in Monroe County.

Rock types are varied and include shales (multicolored), siltstone, clay, sandstone, coal, and some limestone. Shales are most abundant, and the coal seams tend to be discontinuous over large geographic areas. (For further discussion of coal seams refer to Implications for Future Mining). The sedimentary sequences common to the study area were deposited in a cyclical manner and represent both marine and nonmarine environments. Most of the overburden is glacial till of Wisconsin and Kansan Age and loess is of Wisconsin Age.

All the mines surveyed and located are within the boundaries of the

coal belt as shown in the Iowa Geological Survey publication "Coal Resources of Iowa" (1965). Generally speaking, the strip mines mapped for this study display a clustered pattern of distribution on a local scale. There are several possible reasons for the formation of such a pattern: 1) the coal seams are discontinuous laterally and are thick enough to mine economically only over small geographic areas, 2) the present landscape and variable overburden thickness may act as an economic deterrent to stripping large areas and relatively thick coal deposits and 3) land ownership and access to mining rights on some properties may have caused past and present mining operations to appear clustered. For a comparison of the patterns formed by coal mining in Iowa on a regional scale (24-county area), refer to Implications for Future Mining.

It is apparent in some county locations that more than one coal seam may have been or still is being mined. In some instances two coal seams separated by small (10 - 15 feet) thicknesses of shale or some other rock material are being mined.

Study of the 24-county map shows that most of the mines surveyed occur in the south central and southeast part of the state. Fewer mines are located in the northern part of the study area.

Implications for Future Mining Prospects:

When the study was begun, it was suggested that additional coal could be mined in areas adjacent to old strip mines. This idea is supported by the fact that the Jude mine and the ICO mine recently

moved their mines to locations adjacent to old strip mines. Two factors have changed to make these sites economical.

1. Greater overburden thickness is now being removed.
2. Property not available from an earlier landowner is now available for mining.

To get an idea of the potential size of a coal field in Iowa, an analysis of mined out areas was made in the spring of 1975 (Cecil). By studying USGS quadrangle maps, the data tabulated in Table 1 give an idea of the size of Iowa mines and Table 2 gives an idea of sizes of "clusters" of Iowa strip mines.

The "clusters" of mines were rather subjectively decided upon. If three or more mines fell within the same general area, they were considered to be a "cluster". Thus, the "clusters" ranged in size from 3 mines to over 13 mines. Some consideration was given to the topographic features of the area in an attempt to group the mines that would be most likely to be located in the same "coal field".

Campbell (1973) reports that 2,000 acres or 3.22 square miles of coal at a thickness of 4' are needed to make it economically feasible * to open a mining facility. He lists reports of coal fields documented by early coal producers and geologists ranging from 2,500 acres to 7,000 acres. Thus, he concludes that there are deposits of the size required for new mining operations.

An example of how one might use the data in this report is as follows:

Table 1
Average Size of Strip-Mine

<u>Quadrangle</u>	<u>Number of Mines</u>	<u>Area (Acres)</u>	<u>Ave. Size</u>
Rising Sun	1	9	9.0
Hartford	2	36	18.0
Otley	6	316	52.6
Knoxville SW	4	185	47.0
Knoxville	27	1064	40.2
Oskaloosa	17	693	40.76
University Park	7	480	68.57
Eddyville	14	547	39.07
Kirkville	7	283	40.43
Chillicothe	6	137	22.8
Ottumwa N.	5	109	21.8
Ottumwa S.	4	68	17.0
Agency	1	57	57.0
Libertyville	1	15	15.0
Douds	4	69	17.25
Mystic	<u>1</u>	<u>38</u>	<u>38.0</u>
	107	4106	38.3

Quadrangles sampled without strip-mines:

Altoona, Mitchellville, Runnels, Colfax, Monroe, Prairie City, Newton, Milo, Pleasantville, Beech, Farson, Blakesburg, Blakesburg NE, Eldon, Hiattsville, Unionville, Paris, Selma, Milton, Cantril, Keosauqua, Bonapart, West Point, Keokuk, Argyle, Donnellson, Farmington, Nauvoo

Table 2
Strip-Mine "Clusters"

<u>Quadrangle</u>	<u>Number of Mines per group</u>	<u>Location</u>	<u>Dimensions (ft)</u>
Hartford	2	R22W77N	3500 x 1400
Otley	2	R20W77N	5000 x 2500
Otley	4	R19W77N	11,000 x 6000
Knoxville SW	2	R20W76N	7000 x 2500
Knoxville	2	R19W76N	6500 x 4000
Knoxville	4	R19W76N	12,000 x 3000
Knoxville	13	R19W75N	20,000 x 9500
Knoxville	4	R19W77N	8000 x 3000
Knoxville	4	R19W77N	7000 x 7000
Oskaloosa	4	R16W75N	9000 x 7000
Oskaloosa	4 (Hull site)	R16W75N	6000 x 7500
Oskaloosa	6	R16W75N	10,000 x 6000
Oskaloosa	2	R15W75N	7000 x 1500
University Park	6	R15W74N	15,000 x 9000
Eddyville	4	R16W74N	11,000 x 6000
Eddyville	9	R15W74N	17,000 x 5000
Kirkville	5	R15W74N	14,000 x 500
Chillicothe	6	R14W73N	9000 x 8000
Ottumwa N	3	R14W72N	8300 x 3000
Douds	5	--	12,000 x 6500
Ottumwa S	3	R14W70N	5000 x 2000

Average Dimensions: 16840 x 4970 (17,000 x 5,000)

Range (feet): Length: 20,000 to 3,500
Width: 9,500 to 500

First - Refer to Figures 2, 3 and 4 and locate old strip mines.

Second - Obtain the USGS topographic map or the air photos (whichever is available for the area) and see if a "cluster" can be defined. Figure 5 represents a "cluster" from the USGS University Park sheet which is located along the south Skunk River.

Third - Note that the mines in Figure 5 have two types of boundaries. One type represented by property lines are very rectangular and regular and a second type is more curved.

Rectangular Boundaries - These represent the property line boundaries and are thus artificial. Examples are shown in Sections 9 and 10 in Figure 5. In some cases, the amount of coal available may have been very small such as shown in Section 10 and not worth the miner's effort to go after that piece on the adjacent property. However, in Section 9, it appears that there is a large piece of coal that could have been obtained had the property been made available to the miner.

Curved Boundaries - There are two types of curved boundaries. The first or lower elevation curved boundary represents the outcrop of the coal. The mine normally starts at this lower elevation and works upward toward the higher elevation. The upper curved boundary is an arbitrary boundary defined by the miner as the maximum thickness of overburden that he could take under the economic constraints at the time he is mining. Reference to Figure 5 shows that there are many areas between strip mines that probably have coal and thus could be mined if the economic conditions are proper. It appears from this

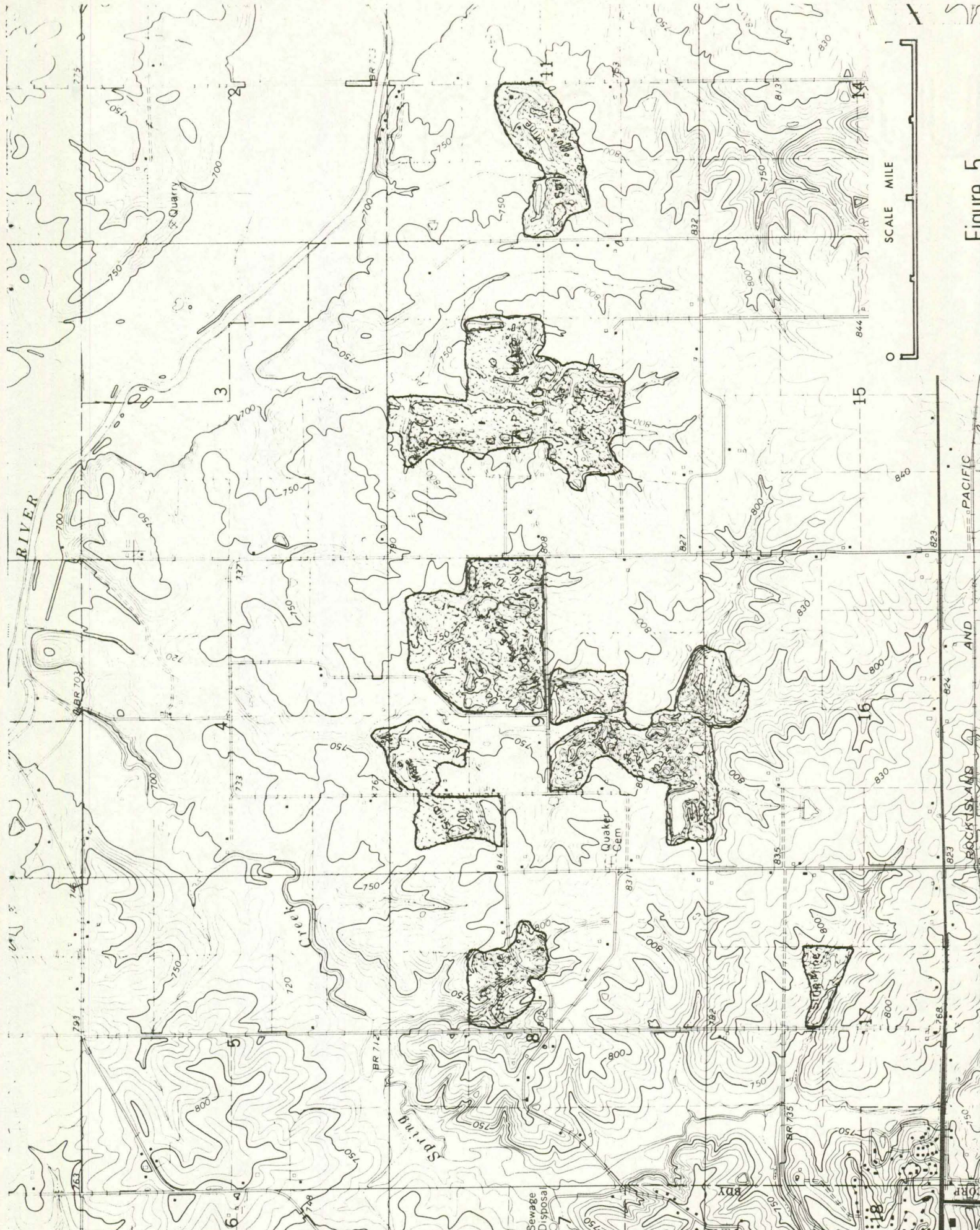


Figure 5

example that the overburden thickness could be as much as 100 feet in many areas. However, 100 feet is economical if the coal seam is in excess of 4 feet.

Fourth - Once one has decided that there are potential coal areas in the region, a detailed geological study would be required. The geological study would include compilation of existing well information from the area as well as definition of an exploration drilling program.

Summary and Conclusions:

1. All strip mines have been located on maps included in this report and their legal locations tabulated in the appendix of this paper.
2. The distribution of strip mines in Iowa has been controlled by the overburden thickness and the concentrations observed in Marion, Mehaska, Monroe and Wapello counties are related to the fact that the overburden is thinnest in this region and that if one were to follow this trend, northwest and southeast, additional mines may be located.
3. By using abandoned strip mines as a place to start exploration for coal, two types of conditions should be looked for. They are property boundary controls and overburden thickness controls. Additional coal can be mined from these already mined out areas because the economic conditions have changed since the time these mines were in operation.
4. A generalized stepwise method of approach for the location of new mines is outlined in the report.

Campbell, R. B. 1973. The Feasibility of Exploration and Development of the Coal Resources in Iowa. Unpublished PhD thesis. University of Iowa, Iowa City, Iowa. *

Iowa State College. 1953. First Annual Report to Iowa Coal Research Association on Revegetation of Coal Strip-Mine Areas in Iowa. Iowa State College Agricultural Experiment Station, Ames, Iowa.

Struck, D. L. and L. V. A. Sendlein. 1975. Potential Coal Strip Areas in Iowa. Unpub. Lithograph. Iowa Coal Research Project. Iowa State University, Ames, Iowa.

Cecil, Steve. 1975. Preliminary Estimate of the Average Size of an Iowa Strip Mine. Iowa Coal Project, Iowa State University, Ames, Iowa.

APPENDIX

Introduction

The mines are listed by county and subdivided within the county on township and range basis. Under the column "remarks" bits of information are given. They may be one or a combination of the following:

1. Topo sheet name, i.e. Ottumwa south 15 quad, which means the Ottumwa south 15 minute quadrangle.
2. Specific photo numbers.
3. Marvin Ross, Director of Mines and Minerals,
Iowa State Department of Soil Conservation
4. Photo series, for example, BJZ/1961 means the 1961 BJZ series, however, the specific photo number is not noted.
5. IGS means the Iowa Geological Survey file.
6. IGS map means a map in the Iowa Geological Survey file.
7. USDA means that this is a map from a USDA publication.

All of the above sources are explained in the "source" section of the card file which is available in the EMRRI office with the original of this report. When two or more sources were consulted they were both listed. For example, IGS maps/What Cheer 7.5' quadrangle, the slash separates the two sources. In the case of Marion County both highway commission photos and USDA soils maps were consulted and thus are shown as BKH/USDA.

The word "partial" means that the boundaries of the particular mine extended across township and range lines, section lines, and in some cases quarter-section lines. In order to list everything in the sequence that is in this report one had to break up the mine. Another portion of the mine would be listed as "partial" somewhere else in the list. The phrase "partial of 155 acres" means that it is a partial mine and that the total acreage of the mine was measured as 155 acres. "Mine expansion" means that two sources were consulted and that the physical dimensions of that particular mine were different on the sources consulted. Any acreage listed with this comment may be incorrect. "13 acres" means that the area of the mine was measured as 13 acres on a topo map.

In the case of Dallas County, a cross reference to verify the existence of coal mines was not available so an estimate was listed under the remarks.

COUNTY : APPANOCSE

TOWNSHIP	RANGE	SECTION	QUARTER
68N REMARKS	19W AJC-IP-126	11	NE
69N REMARKS	17W IOWA GEOL. SURVEY	9	
69N REMARKS	18W MYSTIC 7.5 QUAD	9	SE SW
69N REMARKS	18W MYSTIC 7.5 QUAD	10	SW SW
69N REMARKS	18W MYSTIC 7.5 QUAD	15	NE NE
69N REMARKS	18W MYSTIC 7.5 QUAD	16	SE NE
69N REMARKS	18W MYSTIC 7.5 QUAD	16	NE NW
69N REMARKS	18W MYSTIC 7.5 PARTIAL	17	SE
69N REMARKS	18W MYSTIC 7.5 QUAD	19	NW SW
69N REMARKS	18W MYSTIC 7.5 PARTIAL	20	NE
69N REMARKS	18W MYSTIC 7.5 QUAD	20	SE NW
69N REMARKS	18W MYSTIC 7.5 QUAD	21	SW
69N REMARKS	18W MYSTIC 7.5 QUAD	22	SE
69N REMARKS	18W MYSTIC 7.5 QUAD	24	SW SW
69N REMARKS	19W MYSTIC 7.5 QUAD	24	NW NE
70N REMARKS	18W MYSTIC 7.5 QUAD	26	SW

COUNTY : BOONE

TOWNSHIP	RANGE	SECTION	QUARTER
ON REMARKS	0W	0	
	NO STRIP MINES FOUND		

COUNTY : CALHOUN

TOWNSHIP	RANGE	SECTION	QUARTER
ON REMARKS	0W	0	
	NO STRIP MINES FOUND		

COUNTY : DALLAS

TOWNSHIP	RANGE	SECTION	QUARTER
79N REMARKS	26W	23	SE SW
	GRIMES 7.5 QUAD PCS STRIPPED SPOILS DEEP MINE		
79N REMARKS	28W	34	
	BJZ/1961 POSSIBLE A GRAVEL PIT		

COUNTY : DAVIS

TOWNSHIP	RANGE	SECTION	QUARTER
70N REMARKS	12W	5	NW
	OTTUMWA SOUTH 15 QUAD		
70N REMARKS	12W	5	SW
	M. ROSS		
70N REMARKS	12W	6	SW
	OTTUMWA SOUTH 15 QUAD		
70N REMARKS	12W	6	NW NE
	OTTUMWA SOUTH 15 QUAD		
70N REMARKS	12W	7	NE
	OTTUMWA SOUTH 15 QUAD PARTIAL		

70N REMARKS	12W OTTUMWA SOUTH 15 QUAD PARTIAL	8	NW NE
70N REMARKS	12W OTTUMWA SOUTH 15 QUAD PARTIAL	8	SW
70N REMARKS	12W M. ROSS	8	NW
70N REMARKS	12W OTTUMWA SOUTH 15 QUAD	9	NW
70N REMARKS	12W OTTUMWA SOUTH 15 QUAD	17	NE NW
70N REMARKS	12W OTTUMWA SOUTH 15 QUAD	18	SW
70N REMARKS	12W OTTUMWA SOUTH 15 QUAD	18	NW NE
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD	1	SE
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD PARTIAL	5	SE SW
70N REMARKS	13W OTTUMWA SOUTH	6	SE SE
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD PARTIAL	7	NE SE
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD PARTIAL	7	SE NE
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD	8	SW
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD PARTIAL	8	NE NW
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD PARTIAL	8	SW NW
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD PARTIAL	8	NW SW
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD PARTIAL	8	SE NE
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD/M. ROSS PARTIAL MINE EXP.	9	NW
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD TWC MINES	11	NE
70N REMARKS	13W OTTUMWA SOUTH 15 QUAD	12	NW NE

70N	14W	1	NW
REMARKS	OTTUMWA SOUTH 15 QUAD		
70N	14W	1	CENTRAL
REMARKS	OTTUMWA SOUTH 15 QUAD		
70N	14W	2	NE
REMARKS	OTTUMWA SOUTH 15 QUAD		
70N	14W	4	SE
REMARKS	OTTUMWA SOUTH 15 QUAD		

COUNTY : GREENE

TOWNSHIP	RANGE	SECTION	QUARTER
ON	0W	0	
REMARKS	NO STRIP MINES FOUND		

COUNTY : HAMILTON

TOWNSHIP	RANGE	SECTION	QUARTER
ON	0W	0	
REMARKS	NO STRIP MINES FOUND		

COUNTY : JASPER

TOWNSHIP	RANGE	SECTION	QUARTER
79N	19W	9	NW
REMARKS	FQ-ICC-238/NEWTON 7.5 QUAD 22 ACRES		

COUNTY : JEFFERSON

TOWNSHIP	RANGE	SECTION	QUARTER
ON	0W	0	
REMARKS	NO STRIP MINES FOUND		

COUNTY : KECKUK

TOWNSHIP	RANGE	SECTION	QUARTER
76N REMARKS	13W I.G.S. MAP/WHAT CHEER 7.5 QUAD	3	NW 2 ACRES
76N REMARKS	13W I.G.S. MAP/WHAT CHEER 7.5 QUAD	3	NW SE 2 ACRES
76N REMARKS	13W IOWA GEOL SURVEY	4	NW
76N REMARKS	13W IOWA GEOL SURVEY	9	NW
76N REMARKS	13W I.G.S. MAP/WHAT CHEER 7.5 QUAD	14	SW SW 6 ACRES
76N REMARKS	13W I.G.S. MAP/WHAT CHEER 7.5 QUAD	15	SE SE 6 ACRES

COUNTY : LEE

TOWNSHIP	RANGE	SECTION	QUARTER
0N REMARKS	0W NO STRIP MINES FOUND	0	

COUNTY : LUCAS

TOWNSHIP	RANGE	SECTION	QUARTER
72N REMARKS	21W AJG-2P-106	1	SE NW
72N REMARKS	21W AJG-2P-106	9	NE NW
73N REMARKS	20W IOWA GEOL. SURVEY	13	SE NE
73N REMARKS	20W AJG-2P-193	22	SW

73N	20W	32	NE SW
REMARKS	AJG-2P-178		
73N	21W	18	SW
REMARKS	AJG-2P-102		
73N	21W	23	NE
REMARKS	AJG-2P-102		

COUNTY : MAHASKA

TOWNSHIP	RANGE	SECTION	QUARTER
74N	15W	7	W 1/2
REMARKS	EDDYVILLE 7.5 QUAD	69 ACRES	
74N	15W	7	SW SW
REMARKS	MARV ROSS		
74N	15W	7	NW NW
REMARKS	EDDYVILLE 7.5 QUAD	1-2 ACRES	
74N	15W	18	SE SE
REMARKS	KIRKVILLE 7.5 QUAD	13 ACRES	
74N	15W	18	SW
REMARKS	EDDYVILLE 7.5 QUAD	51 ACRES	
74N	15W	18	SE
REMARKS	EDDYVILLE 7.5 QUAD	6 ACRES	
74N	15W	18	SE
REMARKS	MARV ROSS		
74N	15W	18	NW SW
REMARKS	MARV ROSS		
74N	15W	18	W 1/2
REMARKS	EDDYVILLE 7.5 QUAD	113 ACRES	
74N	15W	19	NE SE
REMARKS	KIRKVILLE 7.5 QUAD	24 ACRES	
74N	15W	20	SW
REMARKS	KIRKVILLE 7.5 QUAD	PARTIAL OF 54 ACRES	
74N	15W	28	NW SW
REMARKS	KIRKVILLE 7.5 QUAD	3 ACRES	
74N	15W	28	SW SW
REMARKS	KIRKVILLE 7.5 QUAD	2 ACRES	
74N	15W	29	SW NE
REMARKS			

74N	15W	29	NE NW
REMARKS	KIRKVILLE 7.5 QUAD	PARTIAL	
74N	15W	29	SW NE
REMARKS	KIRKVILLE 7.5 QUAD	PARTIAL	
74N	15W	29	N 1/2
REMARKS	MARV ROSS		
74N	15W	30	SE SE
REMARKS	EDDYVILLE 7.5 QUAD	15 ACRES	
74N	15W	32	NW NW
REMARKS	MARV ROSS		
74N	15W	32	NE
REMARKS	KIRKVILLE 7.5 QUAD	22 ACRES	
74N	15W	33	
REMARKS	KIRKVILLE 7.5 QUAD	166 ACRES	
74N	15W	34	SW
REMARKS	KIRKVILLE 7.5 QUAD	PARTIAL	
74N	16W	1	N 1/2
REMARKS	EDDYVILLE 7.5 QUAD	38 ACRES	
74N	16W	3	NE NW
REMARKS	EDDYVILLE 7.5 QUAD	19 ACRES	
74N	16W	3	NW NW
REMARKS	EDDYVILLE 7.5 QUAD	03 ACRES	
74N	16W	3	E 1/2
REMARKS	EDDYVILLE 7.5 QUAD	137 ACRES	
74N	16W	3	W 1/2 NW 1/4
REMARKS	MARV ROSS		
74N	16W	4	NE
REMARKS	EDDYVILLE 7.5 QUAD	31 ACRES	
74N	16W	10	NW
REMARKS	EDDYVILLE 7.5 QUAD	32 ACRES	
74N	16W	10	NE NW
REMARKS	MARV ROSS		
74N	16W	10	SW SE
REMARKS	EDDYVILLE 7.5 QUAD	16 ACRES	
74N	16W	12	SE NE
REMARKS	MARV ROSS		
74N	16W	12	N 1/2
REMARKS	EDDYVILLE 7.5 QUAD	20 ACRES	
74N	16W	12	SE
REMARKS	EDDYVILLE 7.5 QUAD	68 ACRES	

74N	16W	13	NE
REMARKS	EDDYVILLE 7.5 QUAD	41 ACRES	
74N	16W	19	SW
REMARKS	MARV ROSS PARTIAL		
74N	16W	19	SW
REMARKS	BKG-2DD-168 PARTIAL		
74N	16W	23	SE SE
REMARKS	EDDYVILLE 7.5 QUAD	3 ACRES	
74N	16W	24	NWSW
REMARKS	EDDYVILLE 7.5 QUAD	3 ACRES	
74N	16W	29	NW
REMARKS	EDDYVILLE 7.5 QUAD	50 ACRES	
74N	16W	30	W 1/2 NE 1/4
REMARKS	MARV ROSS		
74N	16W	30	NE NW
REMARKS	MARV ROSS PARTIAL		
74N	16W	30	NW NW
REMARKS	MARV ROSS PARTIAL		
74N	16W	30	NE
REMARKS	EDDYVILLE 7.5 QUAD		
74N	17W	6	NW
REMARKS	BKG-2DD-226		
74N	17W	8	NW NW
REMARKS	MARV ROSS		
74N	17W	10	E 1/2
REMARKS	MARV ROSS		
74N	17W	10	SE
REMARKS	MARV ROSS		
74N	17W	11	NW NW
REMARKS	MARV ROSS		
74N	17W	13	SW SE
REMARKS	MARV ROSS		
74N	17W	13	SW SW
REMARKS	M.ROSS		
74N	17W	14	SW
REMARKS	M.ROSS		
74N	17W	14	SE
REMARKS	BKG-2DD-170		
74N	17W	14	SE
REMARKS	BKG-2DD-16		

74N	17W	22	
REMARKS	MARV ROSS PARTIAL		
74N	17W	22	
REMARKS	MARV ROSS		
74N	17W	22	W 1/2
REMARKS	BKG-2DD-215		
74N	17W	24	E 1/2
REMARKS	IOWA GEOL. SURVEY		
74N	17W	24	CENTRAL
REMARKS	BKG-2DD-168		
74N	17W	24	
REMARKS	MARV ROSS		
74N	17W	24	SE
REMARKS	BKG-2DD-168 PARTIAL		
74N	17W	26	
REMARKS	MARV ROSS PARTIAL		
74N	17W	27	
REMARKS	MARV ROSS PARTIAL		
74N	17W	28	SW SE
REMARKS	BKG-2DD-215		
74N	17W	35	SW NE
REMARKS	MARV FOSS PARTIAL		
74N	17W	35	SE NE
REMARKS	MARV ROSS PARTIAL		
74N	17W	36	SW NW
REMARKS	MARV ROSS PARTIAL		
75N	14W	6	NW NW
REMARKS	UNIVERSITY PARK QUAD 15 ACRES		
75N	14W	20	W 1/2
REMARKS	MARV ROSS		
75N	15W	4	NE SE
REMARKS	MARV ROSS		
75N	15W	8	SW NE
REMARKS	UNIVERSITY PARK 7.5 QUAD 37 ACRES		
75N	15W	9	NE
REMARKS	UNIVERSITY PARK 7.5 QUAD 120 ACRES		
75N	15W	9	S 1/2
REMARKS	UNIVERSITY PARK 7.5 QUAD 139 ACRES		
75N	15W	9	NW
REMARKS	UNIVERSITY PARK 7.5 QUAD 57 ACRES		

75N REMARKS	15W IOWA GEOL SURVEY	9	SW
75N REMARKS	15W MARV ROSS	9	NW
75N REMARKS	15W UNIVERSITY PARK 7.5 QUAD	10 160 ACRES	
75N REMARKS	15W UNIVERSITY PARK 7.5 QUAD	11 156 ACRES	NW
75N REMARKS	15W UNIVERSITY PARK 7.5 QUAD	11 56 ACRES	NW
75N REMARKS	15W UNIVERSITY PARK 7.5 QUAD	17 19	SW NE
75N REMARKS	15W OSKALOOSA 7.5 QUAD/IGS	30 PARTIAL OF 84 ACRES	SW
75N REMARKS	15W OSKALOOSA 7.5 QUAD/IGS	31 PARTIAL OF 84 ACRES	NW
75N REMARKS	15W EDDYVILLE 7.5 QUAD	31 6 ACRES	SW SW
75N REMARKS	15W OSKALOOSA 7.5 QUAD	31 5 ACRES	SW NE
75N REMARKS	15W OSKALOOSA 7.5 QUAD/IGS	31 PARTIAL OF 84 ACRES	NW NE
75N REMARKS	15W UNIVERSITY PARK 7.5 QUAD	32 41	NW SW
75N REMARKS	15W IOWA GEOL SURVEY	32	W 1/2
75N REMARKS	16W OSKALOOSA 7.5 QUAD	5 16 ACRES	SW NW
75N REMARKS	16W OSKALOOSA 7.5 QUAD	5 15 ACRES	NW SW
75N REMARKS	16W OSKALOOSA 7.5 QUAD/BKG+2DD-153	7 PART OF 22 ACRES	SW
75N REMARKS	16W OSKALOOSA 7.5 QUAD	8 PARTIAL OF 125 ACRES	SW
75N REMARKS	16W OSKALOOSA 7.5 QUAD	17 PARTIAL OF 125 ACRES	NE
75N REMARKS	16W BKG-2DD-153	18 PARTIAL	S 1/2
75N REMARKS	16W OSKALOOSA 7.5 QUAD/BKG-2DD-153	18 PART OF 22 ACRES	NW

75N REMARKS	16W BKG-200-153	19	N 1/2 PARTIAL
75N REMARKS	16W OSKALOOSA 7.5 QUAD	19	NW PARTIAL OF 67 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	19	SW PARTIAL OF 67 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	19	NE 35 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	19	SE PARTIAL OF 201 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	20	SW PARTIAL OF 201 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	21	SE PARTIAL OF 38 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	21	SE SW PARTIAL OF 38 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	22	NE 6 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	22	SE 20 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD/IGS	25	SE SE PARTIAL OF 84 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	27	NW PARTIAL OF 87 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	28	NE PARTIAL OF 87 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	28	SW 30 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	29	NW NW PARTIAL OF 201 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	30	NE PARTIAL OF 201 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	30	NW PARTIAL OF 201 ACRES
75N REMARKS	16W OSKALOOSA 7.5 QUAD	35	SE SW 12 ACRES
75N REMARKS	16W EDDYVILLE 7.5	35	SE 8 ACRES
75N REMARKS	16W EDDYVILLE & OSKALOOSA 7.5 QUADS	35	SW 12 ACRES

75N	16W	35	SE NW
REMARKS	OSKALCOOSA 7.5 QUAD		
75N	16W	36	NE SW
REMARKS	OSKALCOOSA 7.5 QUAD	12 ACRES	
75N	17W	1	SW
REMARKS	BKG-2DD-178	THREE MINES	
75N	17W	12	SE
REMARKS	BKG-2DD-153	PARTIAL	
75N	17W	13	NE
REMARKS	BKG-2DD-153	PARTIAL	
75N	17W	26	NE
REMARKS	BKG-2DD-174		

COUNTY : MAHASKA 7

TOWNSHIP	RANGE	SECTION	QUARTER
45N	56W	95	W E
REMARKS	EDDYVILLE 7.5 QUAD	44 ACRES	

COUNTY : MARION

TOWNSHIP	RANGE	SECTION	QUARTER
74N	18W	4	S 1/2
REMARKS	BKH 1955/USDA PARTIAL, MINE EXPANSION		
74N	18W	5	
REMARKS	BKH 1955/USDA PARTIAL, MINE EXPANSION		
74N	18W	6	NE SE
REMARKS	BKH 1955/USDA PARTIAL, MINE EXPANSION		
74N	18W	6	W/2 SE/4
REMARKS	BKH 1955/USDA		
74N	18W	7	SW
REMARKS	BKH 1955/USDA		
74N	18W	8	N 1/2
REMARKS	BKH 1955/USDA PARTIAL, MINE EXPANSION		
74N	18W	9	N 1/2
REMARKS	BKH 1955/USDA PARTIAL, MINE EXPANSION		

74N	18W	9	E 1/2
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	9	W 1/2
REMARKS	BKH 1955/USDA		
74N	18W	10	NW
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	11	SW
REMARKS	BKH 1955/USDA	TWO MINES	
74N	18W	14	NW
REMARKS	BKH 1955/USDA	TWO MINES	
74N	18W	14	SE SW
REMARKS	BKH 1955/USDA		
74N	18W	14	SW SW
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	15	SE SE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	16	S 1/2
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	16	SW
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	17	SE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	17	N 1/2
REMARKS	BKH 1955/USDA		
74N	18W	18	NE SW
REMARKS	BKH 1955/USDA		
74N	18W	18	NW
REMARKS	BKH 1955/USDA		
74N	18W	19	SE SE
REMARKS	BKH 1955/USDA		
74N	18W	20	
REMARKS	BKH 1955/USDA		
74N	18W	20	SE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	20	NE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	20	SW NE
REMARKS	M. ROSS		
74N	18W	21	W 1/2
REMARKS	BKH 1955/USDA		

74N	18W	21	NW NE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	22	NE NE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	22	E 1/2
REMARKS	BKH 1955/USDA		
74N	18W	22	SW SE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	22	SE SW
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	23	NW NE
REMARKS	BKH 1955/USDA		
74N	18W	23	NW NW
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	27	
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	29	NE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	30	SW
REMARKS	BKH 1955/USDA		
74N	18W	31	NW
REMARKS	BKH 1955/USDA		
74N	18W	31	W 1/2
REMARKS	BKH 1955/USDA	PARTIAL	
74N	18W	33	E 1/2
REMARKS	BKH 1955/USDA	PARTIAL	
74N	19W	1	SE SE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	19W	12	SE SE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	19W	12	NE NE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	19W	13	NE NE
REMARKS	BKH 1955/USDA	PARTIAL	
74N	19W	13	E/2 SW/4
REMARKS	BKH 1955 /USDA	PARTIAL	
74N	19W	14	SW
REMARKS	BKH 1955/USDA	MINE EXPANSIGN	
74N	19W	24	N 1/2
REMARKS	BKH 1955 /USDA	PARTIAL	

74N	19W	25	SW
REMARKS	EKH 1955/USDA		
74N	19W	25	CENTRAL
REMARKS	EKH 1955/USDA		
74N	19W	27	
REMARKS	EKH 1955/USDA	TWO MINES	
74N	19W	36	SW SW
REMARKS	M. ROSS		
74N	19W	36	
REMARKS	M. ROSS		
75N	18W	4	NW NW
REMARKS	EKH 1955/USDA		
75N	18W	7	NW
REMARKS	BKH 1955/USDA	TWO MINES PARTIAL	
75N	18W	8	
REMARKS	I.G.S.		
75N	18W	9	SE
REMARKS	EKH 1955/USDA		
75N	18W	10	SW
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	14	SE
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	14	NW SE SW
REMARKS	EKH 1955/USDA		
75N	18W	15	N 1/2
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	16	SE SW
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	17	S 1/2
REMARKS	EKH 1955/USDA	TWO MINES PARTIAL	
75N	18W	20	NE
REMARKS	EKH 1955/USDA		
75N	18W	20	SE
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	20	SE
REMARKS	I.G.S. MINE EXPANSION		
75N	18W	20	SW
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	21	SW SW
REMARKS	EKH 1955/USDA	PARTIAL	

75N	18W	21	N 1/2
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	23	NE
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	28	W/2 NW/4
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	29	N3/4 E/2
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	29	N/2 NW/4
REMARKS	EKH 1955/USDA		
75N	18W	30	SE SE SE
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	31	NE NE NE
REMARKS	EKH 1955/USDA	PARTIAL	
75N	18W	32	NW
REMARKS	EKH 1955/USDA	PARTIAL	
75N	19W	2	NE
REMARKS	KNOXVILLE 7.5 QUAD	18 ACRES	
75N	19W	2	SE SW
REMARKS	USDA PARTIAL OF 130 ACRES,	MINE EXPANSION	
75N	19W	2	SE
REMARKS	USDA PARTIAL OF 130 ACRES,	MINE EXPANSION	
75N	19W	3	NE
REMARKS	KNOXVILLE 7.5 QUAD	50 ACRES	
75N	19W	3	SE
REMARKS	KNOXVILLE 7.5 QUAD	10 ACRES	
75N	19W	4	N/2 NW/4
REMARKS	M. ROSS		
75N	19W	8	NW
REMARKS	KNOXVILLE 7.5 QUAD	11 ACRES	
75N	19W	9	NE SW
REMARKS	USDA		
75N	19W	9	NE SE
REMARKS	KNOXVILLE 7.5 QUAD	4 ACRES	
75N	19W	11	NE
REMARKS	USDA PARTIAL OF 130 ACRES,	MINE EXPANSION	
75N	19W	11	NW
REMARKS	USDA PARTIAL OF 130 ACRES,	MINE EXPANSION	
75N	19W	11	NE
REMARKS	KNOXVILLE 7.5 QUAD PARTIAL OF	113 ACRES	

75N REMARKS	19W KNOXVILLE 7.5 QUAD	11 PARTIAL OF 113 ACRES	SE
75N REMARKS	19W KNOXVILLE 7.5 QUAD	11 15 ACRES	NW SE
75N REMARKS	19W KNOXVILLE 7.5 QUAD	11 PARTIAL OF 61 ACRES	
75N REMARKS	19W KNOXVILLE 7.5 QUAD	12 PARTIAL OF 113 ACRES	NW
75N REMARKS	19W USDA PARTIAL	12	NE
75N REMARKS	19W KNOXVILLE 7.5 QUAD	14 PARTIAL OF 61 ACRES	NE
75N REMARKS	19W KNOXVILLE 7.5 QUAD	14 PARTIAL OF 22 ACRES	NW
75N REMARKS	19W KNOXVILLE 7.5 QUAD	14 9 ACRES	NW
75N REMARKS	19W KNOXVILLE 7.5 QUAD	14 53 ACRES	CENTRAL
75N REMARKS	19W KNOXVILLE 7.5 QUAD	14 PART OF 227 ACRES, MINE EXP	SW
75N REMARKS	19W KNOXVILLE 7.5 QUAD	15 PARTIAL OF 22 ACRES	NE
75N REMARKS	19W KNOXVILLE 7.5 QUAD	15 PARTIAL OF 85 ACRES MINE EXP	SW
75N REMARKS	19W USDA MINE EXPANSION	15	W/2 NW/4
75N REMARKS	19W IGS	15	NE
75N REMARKS	19W M. ROSS	15	NW SW
75N REMARKS	19W M. ROSS	16	SE NW
75N REMARKS	19W USDA MINE EXPANSION	16	NE
75N REMARKS	19W KNOXVILLE 7.5 QUAD	16 PARTIAL OF 85 ACRES MINE EXP	SE
75N REMARKS	19W KNOXVILLE 7.5 QUAD	16 14 ACRES	SE
75N REMARKS	19W KNOXVILLE 7.5 QUAD	16 9 ACRES	NE

75N REMARKS	19W KNOXVILLE 7.5 QUAD	18 13 ACRES	SW SE
75N REMARKS	19W KNOXVILLE 7.5 QUAD	19 PARTIAL OF 9 ACRES	SE SW
75N REMARKS	19W KNOXVILLE 7.5 QUAD	20 16 ACRES	SW
75N REMARKS	19W KNOXVILLE 7.5 QUAD	20 19 ACRES	NE NW
75N REMARKS	19W KNOXVILLE 7.5 QUAD	21 PARTIAL OF 85 ACRES	NE MINE EXP
75N REMARKS	19W KNOXVILLE 7.5 QUAD	22 PARTIAL OF 85 ACRES	NW MINE EXP
75N REMARKS	19W KNOXVILLE 7.5 QUAD	22 10 ACRES	NE
75N REMARKS	19W KNOXVILLE 7.5 QUAD	23 28 ACRES	NW
75N REMARKS	19W KNOXVILLE 7.5 QUAD	23 PART OF 227 ACRES,	SW MINE EXP
75N REMARKS	19W KNOXVILLE 7.5 QUAD	23 PART OF 227 ACRES,	NW MINE EXP
75N REMARKS	19W USDA MINE EXPANSION	26	NW NW
75N REMARKS	19W KNOXVILLE 7.5 QUAD	30 PARTIAL OF 9 ACRES	NE NW
75N REMARKS	20W KNOXVILLE SW 7.5 QUAD	5 9 ACRES	NW NE
75N REMARKS	20W KNOXVILLE SW 7.5 QUAD	7 5 ACRES	SW SE
75N REMARKS	21W IGS /KNOXVILLE SW 7.5 QUAD,	25 MINE EXPANSION	E/2
76N REMARKS	18W BKH 1955/USDA	23 PELLA MINE AREA	
76N REMARKS	18W BKH 1955/USDA	34 PARTIAL	NE SE
76N REMARKS	18W BKH 1955/USDA	35 PARTIAL	NW SW
76N REMARKS	19W KNOXVILLE 7.5 QUAD	21 PARTIAL OF 194 ACRES	
76N REMARKS	19W KNOXVILLE 7.5 QUAD	22 PARTIAL OF 140 ACRES	SE

76N	19W	22	NE
REMARKS	KNOXVILLE 7.5 QUAD	PARTIAL CF 140	ACRES
76N	19W	23	NW SE
REMARKS	USDA		
76N	19W	23	NW
REMARKS	CTLEY 7.5 QUAD	PARTIAL	
76N	19W	23	NW
REMARKS	KNOXVILLE 7.5 QUAD	PARTIAL FD 140	ACRES
76N	19W	24	SE SE
REMARKS	USDA MINE EXPANSION		
76N	19W	26	NW
REMARKS	USDA MINE EXPANSION		
76N	19W	26	S/2
REMARKS	USDA MINE EXPANSION		
76N	19W	26	NW NW
REMARKS	M. RCSS		
76N	19W	26	SW
REMARKS	KNOXVILLE 7.5 QUAD	25 ACRES	
76N	19W	26	SW
REMARKS	KNOXVILLE 7.5 QUAD	PARTIAL CF 49	ACRES
76N	19W	26	NW
REMARKS	KNOXVILLE 7.5 QUAD	/USDA 66	ACRES
76N	19W	28	NW
REMARKS	KNOXVILLE 7.5 QUAD	PARTIAL CF 194	ACRES
76N	19W	28	NE
REMARKS	KNOXVILLE 7.5 QUAD	PARTIAL CF 194	ACRES
76N	19W	29	NE
REMARKS	KNOXVILLE 7.5 QUAD	67 ACRES	
76N	19W	29	NE
REMARKS	IGS		
76N	19W	33	
REMARKS	KNOXVILLE 7.5 QUAD	66	ACRES
76N	19W	34	NE SE
REMARKS	KNOXVILLE 7.5 QUAD	3	ACRES
76N	19W	34	SE SE
REMARKS	USDA MINE EXPANSION		
76N	19W	34	SE NE
REMARKS	M. RCSS		
76N	19W	35	NE
REMARKS	KNOXVILLE 7.5 QUAD	PARTIAL CF 49	ACRES

76N REMARKS	19W KNCXVILLE 7.5 QUAD	35 PARTIAL OF 49 ACRES	NW
76N REMARKS	19W USDA MINE EXPANSION	35	NE
76N REMARKS	20W KNCXVILLE SW 7.5 QUAD	29 PARTIAL OF 131 ACRES	SW
76N REMARKS	20W IGS MINE EXPANSION	32	NE
76N REMARKS	20W KNCXVILLE SW 7.5 QUAD	32 PARTIAL OF 131 ACRES	NE
77N REMARKS	19W OTLEY 7.5 QUAD	17 14 ACRES	W/2 NE/4
77N REMARKS	19W OTLEY 7.5 QUAD	21 2 ACRES	SE SE
77N REMARKS	19W OTLEY 7.5 QUAD	21 PARTIAL OF 91 ACRES	SW
77N REMARKS	19W OTLEY 7.5 QUAD	21 PARTIAL OF 91 ACRES	SE
77N REMARKS	19W IGS	21	SE
77N REMARKS	19W M. RCSS	21	NW SE
77N REMARKS	19W OTLEY 7.5 QUAD	22 77 ACRES	SW
77N REMARKS	19W OTLEY 7.5 QUAD	27 30 ACRES	SE
77N REMARKS	19W OTLEY 7.5 QUAD	28 3 ACRES	NE NE
77N REMARKS	19W OTLEY 7.5 QUAD	28 PARTIAL OF 91 ACRES	NW
77N REMARKS	19W IGS MINE EXPANSION	28	
77N REMARKS	19W OTLEY 7.5 QUAD	35 19 ACRES	NW NW
77N REMARKS	20W USDA	13	SE
77N REMARKS	20W USDA	13	NE NW
77N REMARKS	20W USDA	13	W/2

77N	20W	26	SE NE
REMARKS	USDA		
77N	20W	26	NW
REMARKS	KNOXVILLE NW 7.5 QUAD/USDA		MINE EXPANSION
77N	20W	26	SW
REMARKS	KNOXVILLE NW 7.5 QUAD		PARTIAL, MINE EXPANSION
77N	20W	26	NW
REMARKS	KNOXVILLE NW 7.5 QUAD		66 ACRES MINE EXPANSION
77N	20W	27	SW
REMARKS	KNOXVILLE NW 7.5 QUAD		8 ACRES MINE EXPANSION
77N	20W	27	NW
REMARKS	KNOXVILLE NW 7.5 QUAD		2 ACRES, MINE EXPANSION
77N	20W	28	NE
REMARKS	KNOXVILLE NW 7.5 QUAD		5 ACRES, MINE EXPANSION
77N	21W	4	SW SW
REMARKS	PLEASANTVILLE 7.5 QUAD		2ACRES
77N	21W	5	SW
REMARKS	PLEASANTVILLE 7.5 QUAD/		USDA

COUNTY : MARSHALL

TOWNSHIP	RANGE	SECTION	QUARTER
ON	0W	0	
REMARKS	NO STRIP MINES FOUND		

COUNTY : MCNROE

TOWNSHIP	RANGE	SECTION	QUARTER
71N	17W	2	
REMARKS	AJF-ICC-43		
71N	17W	9	NW NW
REMARKS	AJF-ICC-43		
72N	16W	10	NW
REMARKS	AVERY 7.5 QUAD		19 ACRES---TWO MINES
72N	16W	10	E 1/2
REMARKS	AVERY 7.5 QUAD		04 ACRES

72N	16W	13	NW
REMARKS	AVERY 7.5 QUAD	16 ACRES	
72N	16W	14	N1/2
REMARKS	AVERY 7.5 QUAD	50 ACRES	
72N	16W	23	NE
REMARKS	AVERY 7.5 QUAD	PARTIAL CF 50 ACRES	
72N	16W	23	NW
REMARKS	AVERY 7.5 QUAD	12 ACRES	
72N	16W	24	NW
REMARKS	AVERY 7.5 QUAD	PARTIAL CF 33 ACRES	
72N	17W	34	SW SE
REMARKS	AJF-ICC-43		
72N	18W	2	
REMARKS	AJF-2CC-10		
72N	19W	8	SE NW
REMARKS	MARV RCSS		
73N	16W	15	SW
REMARKS	AVERY 7.5 QUAD	08 ACRES	
73N	16W	25	SE
REMARKS	AVERY 7.5 QUAD	3 ACRES	
73N	16W	30	SW NE
REMARKS	AVERY 7.5 QUAD	2 ACRES	
73N	17W	5	SE
REMARKS	AJF-ICC-55		
73N	17W	5	NW
REMARKS	MARV RCSS		
73N	17W	8	SW NE
REMARKS	AJF-2CC-255		
73N	17W	12	SE NE
REMARKS	MARV RCSS		
73N	17W	13	W1/2 SW NE
REMARKS	IGWA GECL SURVEY		
73N	17W	17	NW
REMARKS	AJF-2CC-253/I.G.S.		
73N	18W	5	SW
REMARKS	AJF-2CC-96/I.G.S. PARTIAL		
73N	18W	6	SE
REMARKS	AJF-2CC-96/I.G.S. PARTIAL		
73N	18W	6	NW NW
REMARKS	AJF-2CC-96		

73N	18W	7	NE
REMARKS	AJF-2CC-96/I.G.S. PARTIAL		
73N	18W	8	NW
REMARKS	AJF-2CC-96/I.G.S. PARTIAL		
73N	18W	13	SE NF
REMARKS	ICWA GEOL SURVEY		
73N	18W	18	NW
REMARKS	AJF-2CC-96 PARTIAL		
73N	19W	12	SW
REMARKS	AJF-2CC-179		
73N	19W	13	NE
REMARKS	AJF-2CC-96 PARTIAL		
73N	19W	14	
REMARKS	ICWA GEOL SURVEY		

COUNTY : POLK

TOWNSHIP	RANGE	SECTION	QUARTER
78N	22W	33	NW SW
REMARKS	RISING SUN 7.5 QUAD		APPROX 3 ACRES
78N	23W	20	SW
REMARKS	DES MOINES SE 7.5 QUAD		
78N	24W	14	NW NE
REMARKS	DES MOINES SE 7.5 QUAD		
78N	24W	14	SW NE
REMARKS	DES MOINES SE 7.5 QUAD		
78N	25W	3	NE
REMARKS	DES MOINESS SW 7.5 QUAD		
79N	23W	20	NE
REMARKS	DES MOINES NE 7.5 QUAD		
79N	24W	21	E 1/2 SE
REMARKS	DES MOINES NW 7.5 QUAD		2 MINES
79N	24W	22	SW NW
REMARKS	DES MOINES NW 7.5 QUAD		
79N	24W	27	SW SW
REMARKS	DES MOINES SW 7.5 QUAD		
80N	25W	23	CENTRAL
REMARKS	DES MOINES NW 7.5 QUAD		

COUNTY : POWESHIEK

TOWNSHIP	RANGE	SECTION	QUARTER
ON REMARKS	0W	0	
	NO STRIP MINES FOUND		

COUNTY : STORY

TOWNSHIP	RANGE	SECTION	QUARTER
ON REMARKS	0W	0	
	NO STRIP MINES FOUND		

COUNTY : VAN BUREN

TOWNSHIP	RANGE	SECTION	QUARTER
67N REMARKS	8W	10	SW
	ANSON 7.5 QUAD		
69N REMARKS	8W	16	SW
	TI-4R-165		
69N REMARKS	8W	20	NE NW
	TI-4R-165 PARTIAL		
69N REMARKS	8W	20	NW NE
	TI-4R-165 PARTIAL		
69N REMARKS	8W	20	NE
	TI-4R-165		
69N REMARKS	8W	20	SW
	TI-4R-165 2 MINES		
69N REMARKS	8W	20	SE
	TI-4R-165 2 MINES		
69N REMARKS	8W	29	NW
	TI-4R-165 2 MINES		
69N REMARKS	9W	10	E 1/2
	TI-4R-109		

70N	11W	10	NE NE
REMARKS	MARV ROSS		
70N	11W	10	NW
REMARKS	LIBERTYVILLE 7.5 QUAD	19 ACRES	
70N	11W	10	NW
REMARKS	LIBERTYVILLE 7.5 QUAD	PARTIAL OF 81 ACRES	
70N	11W	10	S1/2
REMARKS	DOUDS 7.5QUAD	PARTIAL OF 81 ACRES	
70N	11W	14	NW
REMARKS	DOUDS 7.5 QUAD	23 ACRES	
70N	11W	14	NW SE
REMARKS	DOUDS 7.5 QUAD	03 ACRES	
70N	11W	23	NE NE
REMARKS	DOUDS 7.5 QUAD	18 ACRES	

COUNTY : WAPELLO

TOWNSHIP	RANGE	SECTION	QUARTER
71N	12W	31	NE
REMARKS	AGENCY 7.5 QUAD	2 MINES 23 AND 10	ACRES
71N	15W	12	NE
REMARKS	BLAKESBURG NE 7.5 QUAD	3 ACRES	
72N	14W	2	NE SW
REMARKS	OTTUMWA NORTH 15' QUAD		
72N	14W	2	NW NW
REMARKS	OTTUMWA NORTH 15' QUAD		
72N	14W	3	NW NW
REMARKS	OTTUMWA NORTH 15' QUAD		
72N	14W	7	SE
REMARKS	CHILLICOTHE 7.5 QUAD	PARTIAL OF 50	ACRES
72N	14W	11	SE
REMARKS	OTTUMWA NORTH 15' QUAD		
72N	14W	13	NE NE
REMARKS	OTTUMWA NORTH 15' QUAD		
72N	14W	18	NE
REMARKS	CHILLICOTHE 7.5 QUAD	PARTIAL OF 50	ACRES
72N	14W	18	SW
REMARKS	CHILLICOTHE 7.5 QUAD	18 ACRES	

72N	15W	9	
REMARKS	MARV ROSS		
72N	15W	20	SW
REMARKS	CHILLICOTHE 7.5° QUAD	13 ACRES	
72N	15W	29	NW NE
REMARKS	CHILLICOTHE 7.5° QUAD	22 ACRES	
73N	14W	8	NE SW
REMARKS	KIRKVILLE 7.5° QUAD	02 ACRES	
73N	14W	17	NW
REMARKS	KIRKVILLE 7.5° QUAD	PARTIAL OF 56 ACRES	
73N	14W	18	NE
REMARKS	KIRKVILLE 7.5° QUAD	PARTIAL OF 56 ACRES	
73N	14W	19	NE
REMARKS	CHILLICOTHE 7.5 QUAD	PARTIAL OF 10 ACRES	
73N	14W	19	NE
REMARKS	CHILLICOTHE 7.5 QUAD	26 ACRES	
73N	14W	20	NW
REMARKS	CHILLICOTHE 7.5 QUAD	PARTIAL OF 10 ACRES	
73N	15W	3	NW
REMARKS	KIRKVILLE 7.5° QUAD	PARTIAL OF 57 ACRES	
73N	15W	3	S1/2
REMARKS	KIRKVILLE 7.5° QUAD	34 ACRES	
73N	15W	13	NW
REMARKS	KIRKVILLE 7.5° QUAD	PARTIAL OF 56 ACRES	
73N	15W	13	SE
REMARKS	CHILLICOTHE 7.5° QUAD	52 ACRES	
73N	15W	13	NE
REMARKS	KIRKVILLE 7.5° QUAD	PARTIAL OF 56 ACRES	
73N	15W	24	NW SE
REMARKS	MARV ROSS		
73N	15W	24	W1/2 NE
REMARKS	MARV ROSS		

COUNTY : WARREN

TOWNSHIP	RANGE	SECTION	QUARTER
77N	22W	8	SE SW
REMARKS	HARTFORD 7.5 QUAD	1 ACRE	

77N	22W	17	NE
REMARKS	HARTFORD 7.5 QUAD	28 ACRES	
77N	23W	4	
REMARKS	DES MOINES SE 7.5 QUAD		
77N	23W	8	NW SE
REMARKS	SCOTCH RIDGE 7.5 QUAD	6 ACRES	
77N	23W	30	S/2
REMARKS	SCOTCH RIDGE 7.5 QUAD	133 ACRES	'BANNER MINE'

COUNTY : WAYNE

TOWNSHIP	RANGE	SECTION	QUARTER
ON	OW	0	
REMARKS	NO STRIP MINES FOUND		

COUNTY : WEBSTER

TOWNSHIP	RANGE	SECTION	QUARTER
87N	27W	25	NW
REMARKS	CAC-IV-4		
88N	28W	4	NE
REMARKS	EVANSTON 7.5 QUAD	89ACRES	
89N	29W	9	SE
REMARKS	CAC-2V-169		
89N	29W	33	
REMARKS	CAC-2V-107/MOORLAND 7.5 QUAD	PARTIAL OF 50	
89N	29W	34	
REMARKS	CAC-2V-107/MOORLAND 7.5 QUAD	PARTIAL OF 50	