Return
to
Contents

How Can We Avoid These Kinds of Problems?

Plan Future Development

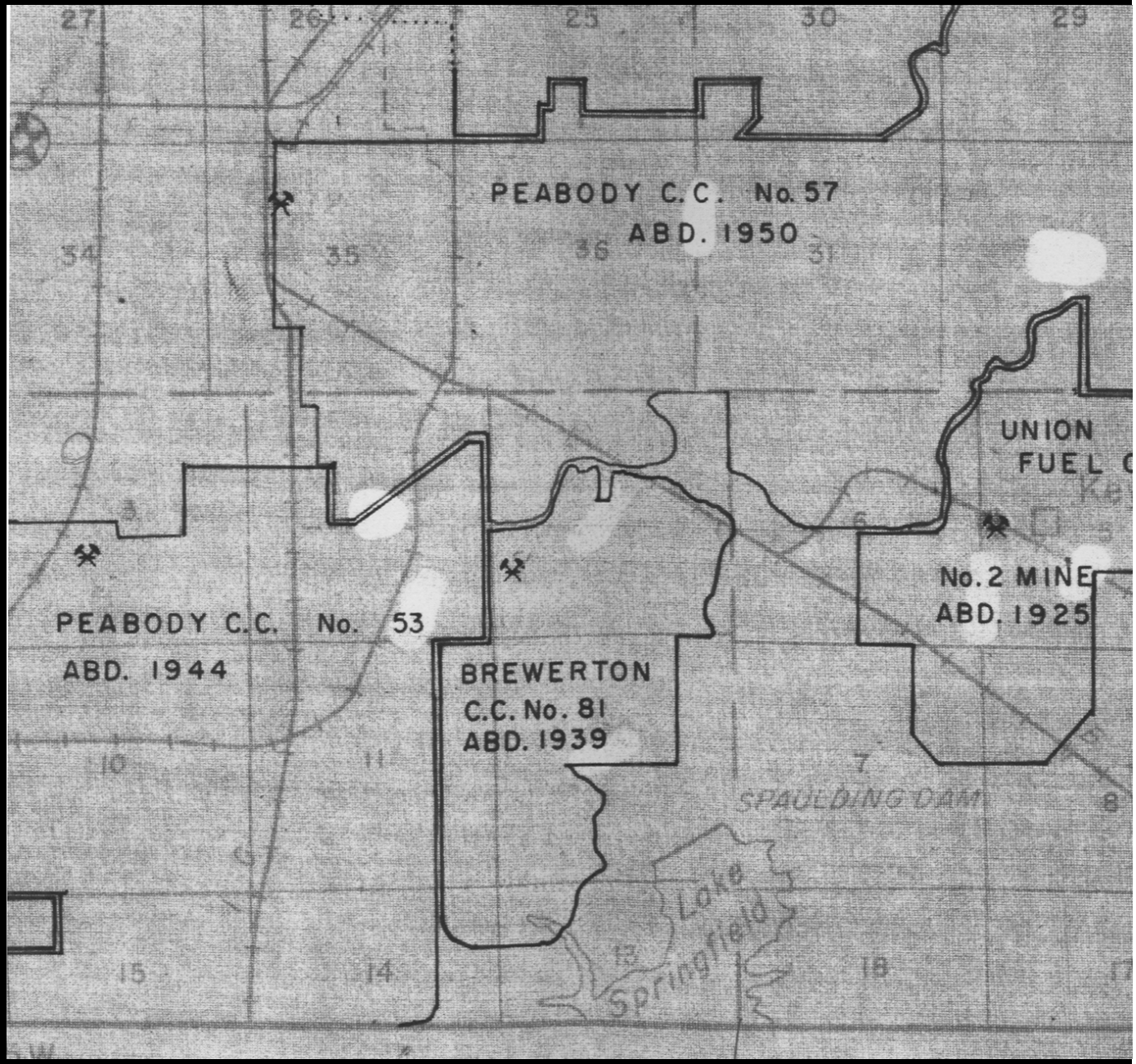
Assuming Mine Maps Are Available, One Solution Is To Avoid Mining Where Possible

Abandoned Mine Map Sources (pre 1980)

- ISGS - MOA's

1976 MOA

Scale 1:62,500



Abandoned Mine Map Sources (pre 1980)

ISGS - MOA's

- Made to show depletion of mineral resource

Abandoned Mine Map Sources (pre 1980)

ISGS - MOA's

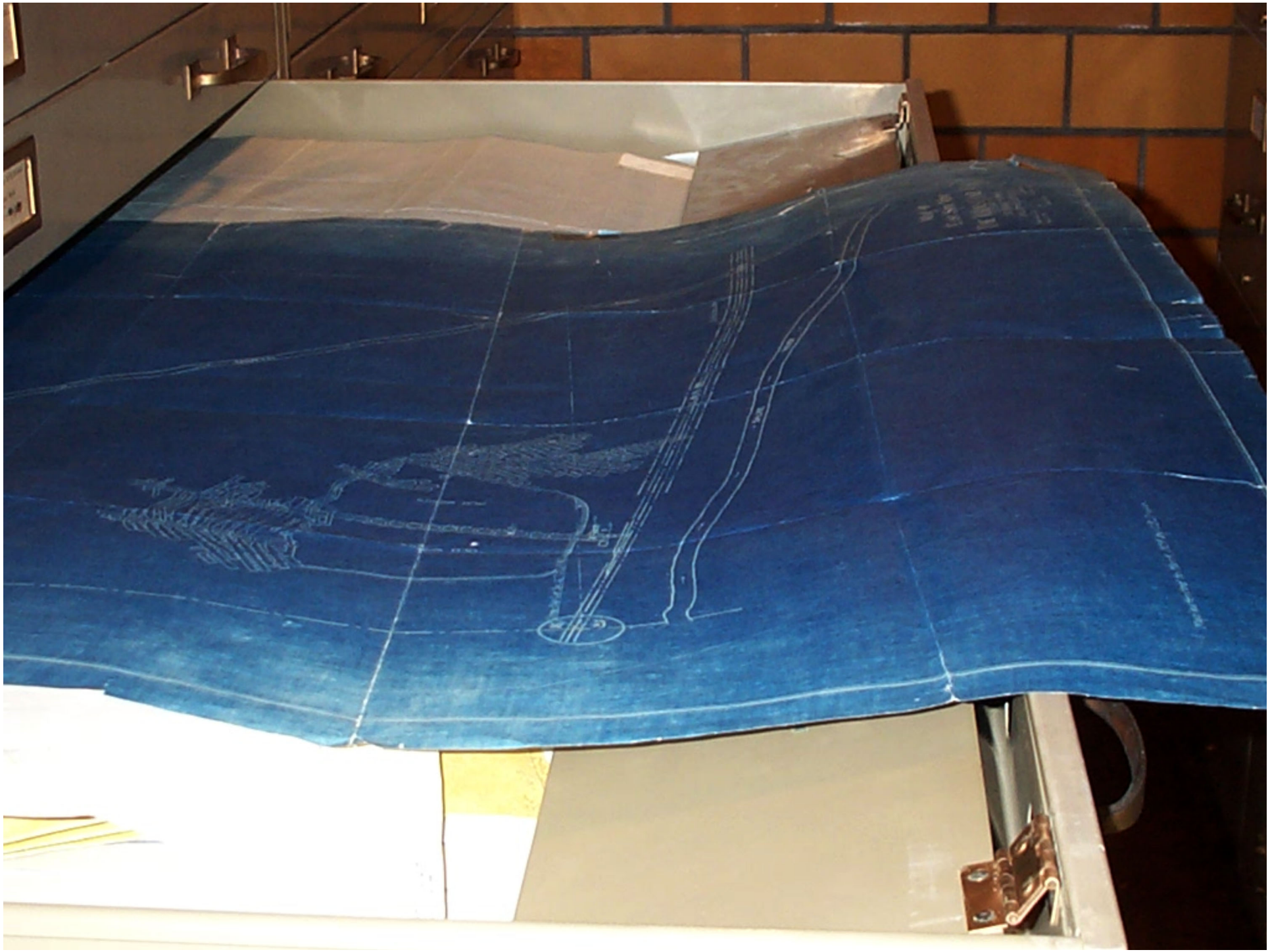
- Made to show depletion of mineral resource
- Intended Use - mineral management.

Abandoned Mine Map Sources (pre 1980)

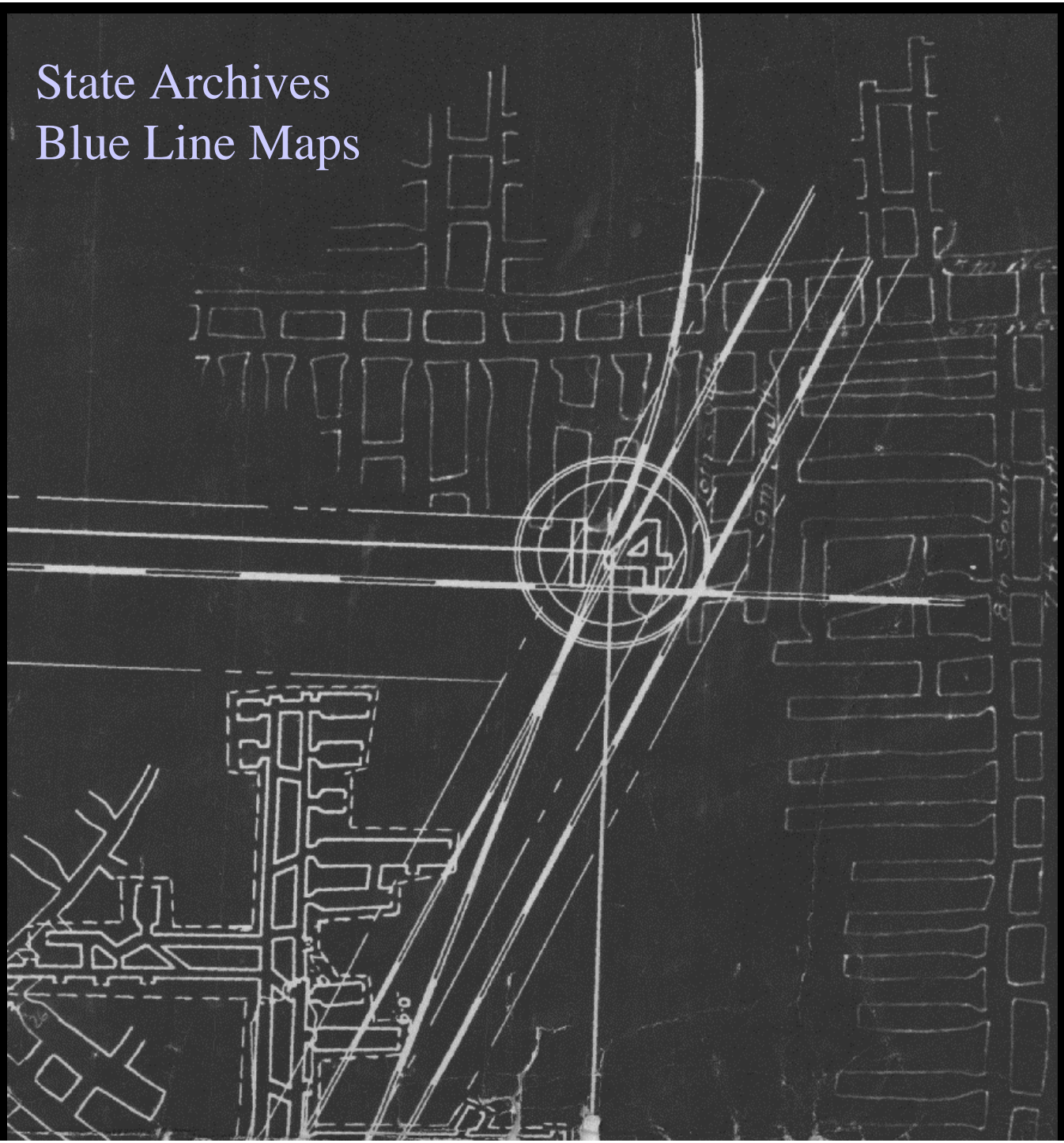
- ISGS - MOA's
- IDMM - Map Archives

State Archive Building
Springfield, Illinois

LEVEL 10
BAY 98



State Archives
Blue Line Maps



Abandoned Mine Map Sources (pre 1980)

IDMM - Map Archives

- Made to show detailed depletion of coal mineral resource relative to coal rights and surface features.

Abandoned Mine Map Sources (pre 1980)

IDMM - Map Archives

- Made to show detailed depletion of coal mineral resource relative to coal rights and surface features.
- Legal Authority and Responsibility for Map Storage (225 ILCS 705).

Abandoned Mine Map Sources (pre 1980)

IDMM - Map Archives

- Made to show detailed depletion of coal mineral resource relative to coal rights and surface features.
- Legal Authority and Responsibility for Map Storage.
- Intended Use - Public Document.

Abandoned Mine Map Sources (pre 1980)

- ISGS - MOA's
- **Department of Mines and Minerals archives**
- **USBOM** - microfiche of IDMM maps

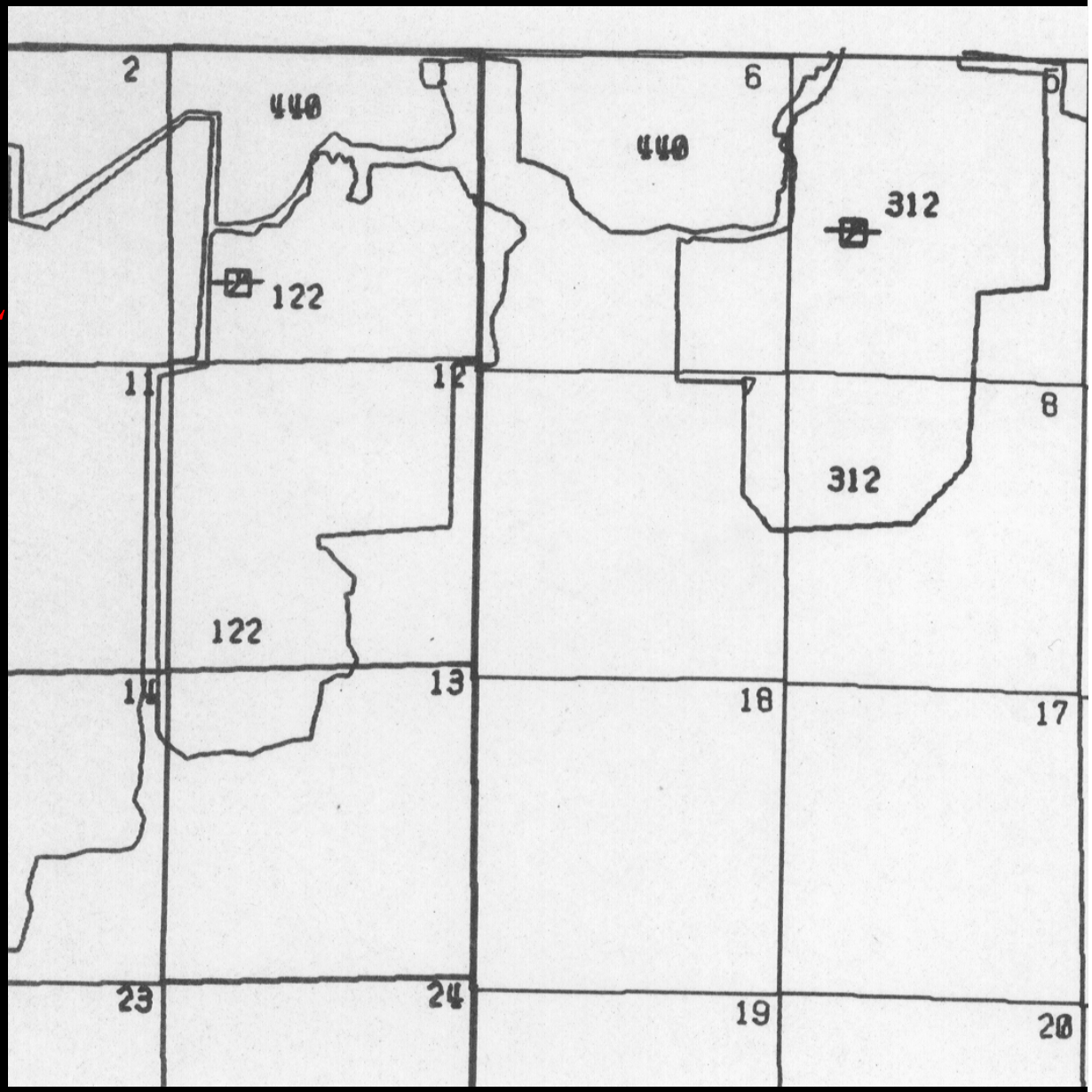
USBOM Microfiche

AMLRC - ISGS Cooperative Agreement

Provide Mined-Out Area Maps
To Each County Seat circa 1981.

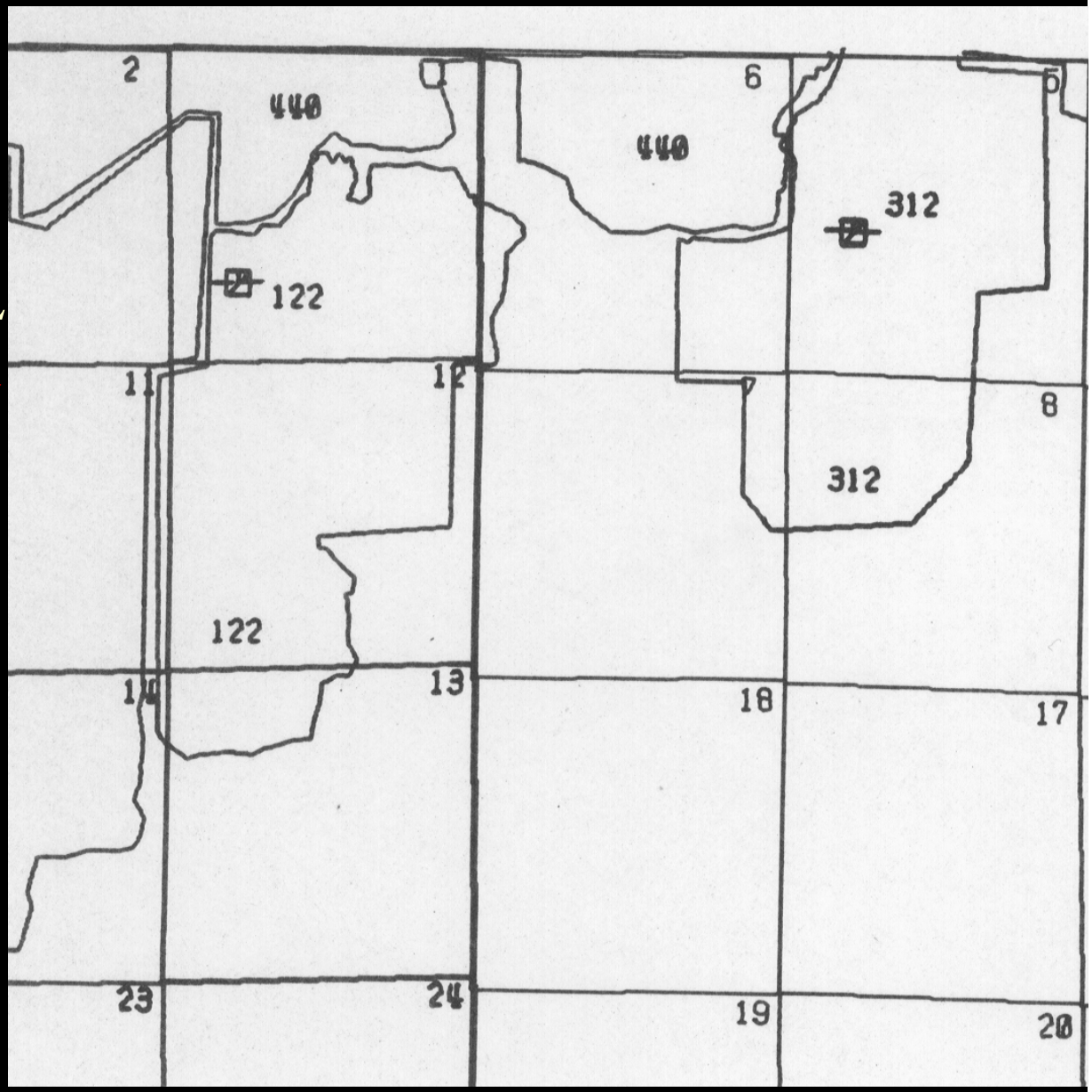
1983 MOA

- Cooperative agreement between ISGS and AML



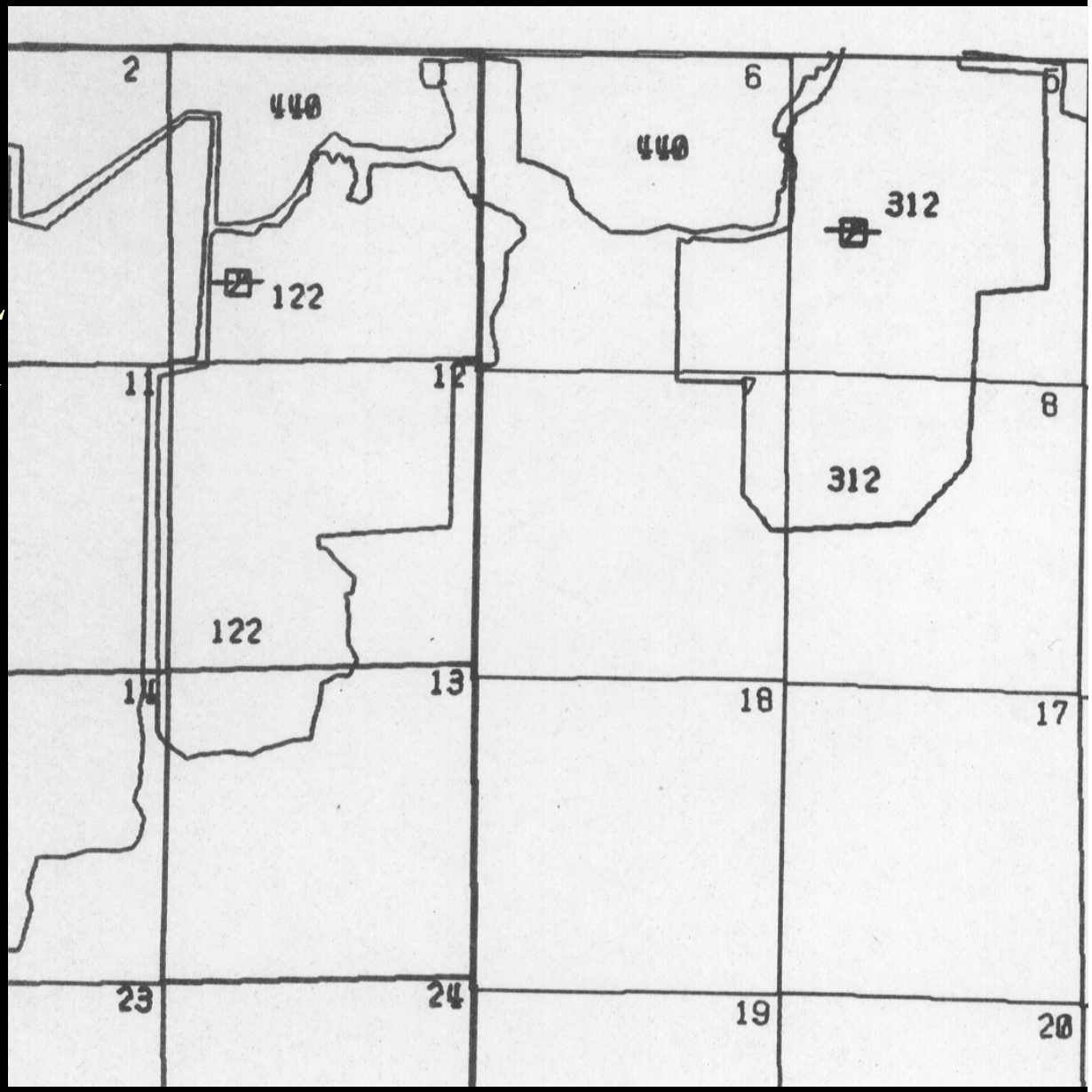
1983 MOA

- Cooperative agreement between ISGS and AML
- First computer generated map.



1983 MOA

- Cooperative agreement between ISGS and AML
- First computer generated map.
- Improved Accuracy of mine location.



1983 MOA

- Cooperative agreement between ISGS and AML
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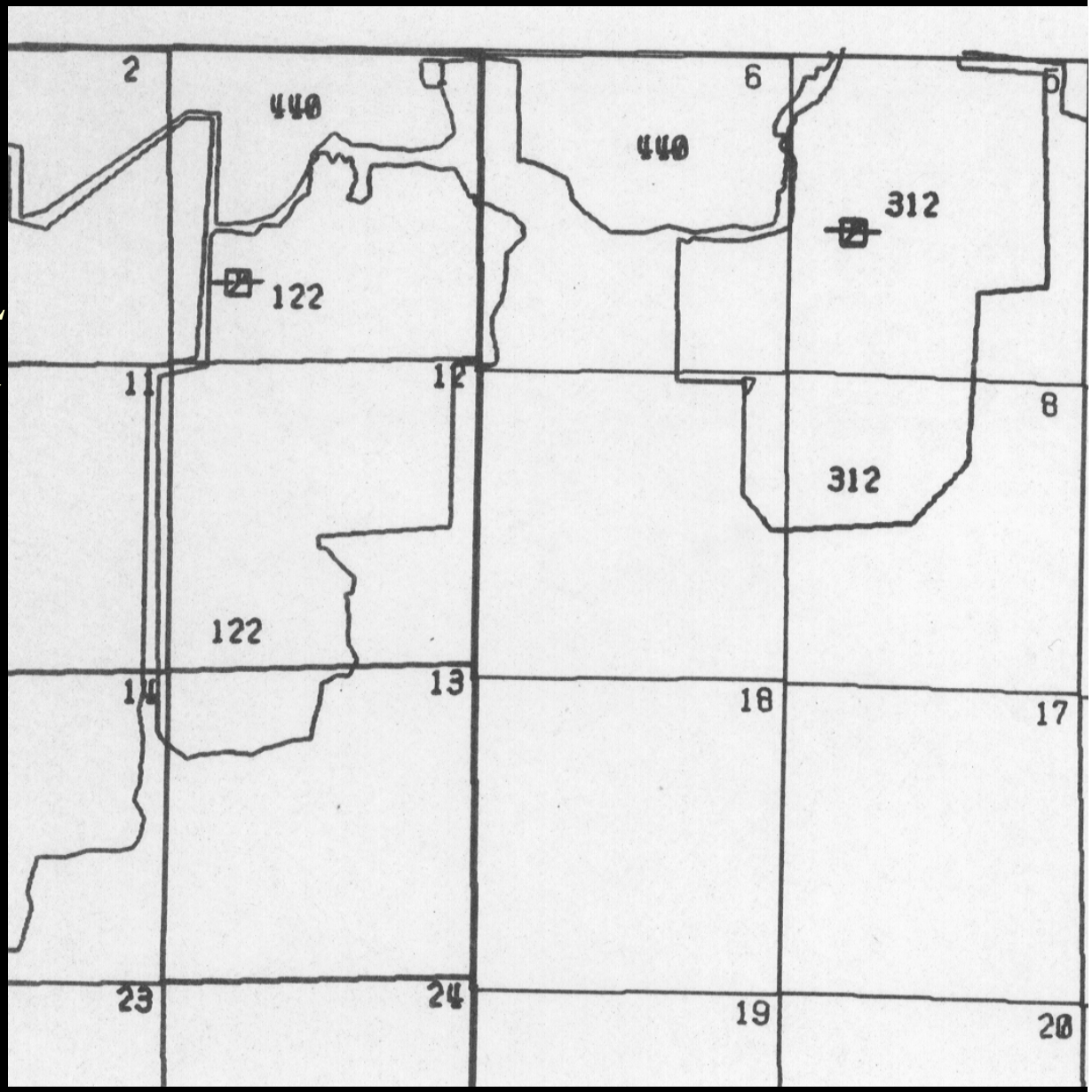
- Improved Accuracy of mine location.
- Scale 1:62,500



1983 Mine Map Directory

Initial Computerized Data Base

DIRECTORY OF ILL. COAL MINES
with
MINE INDEX NUMBERS

Illinois State Ge[illegible] Survey
Septembe[illegible]

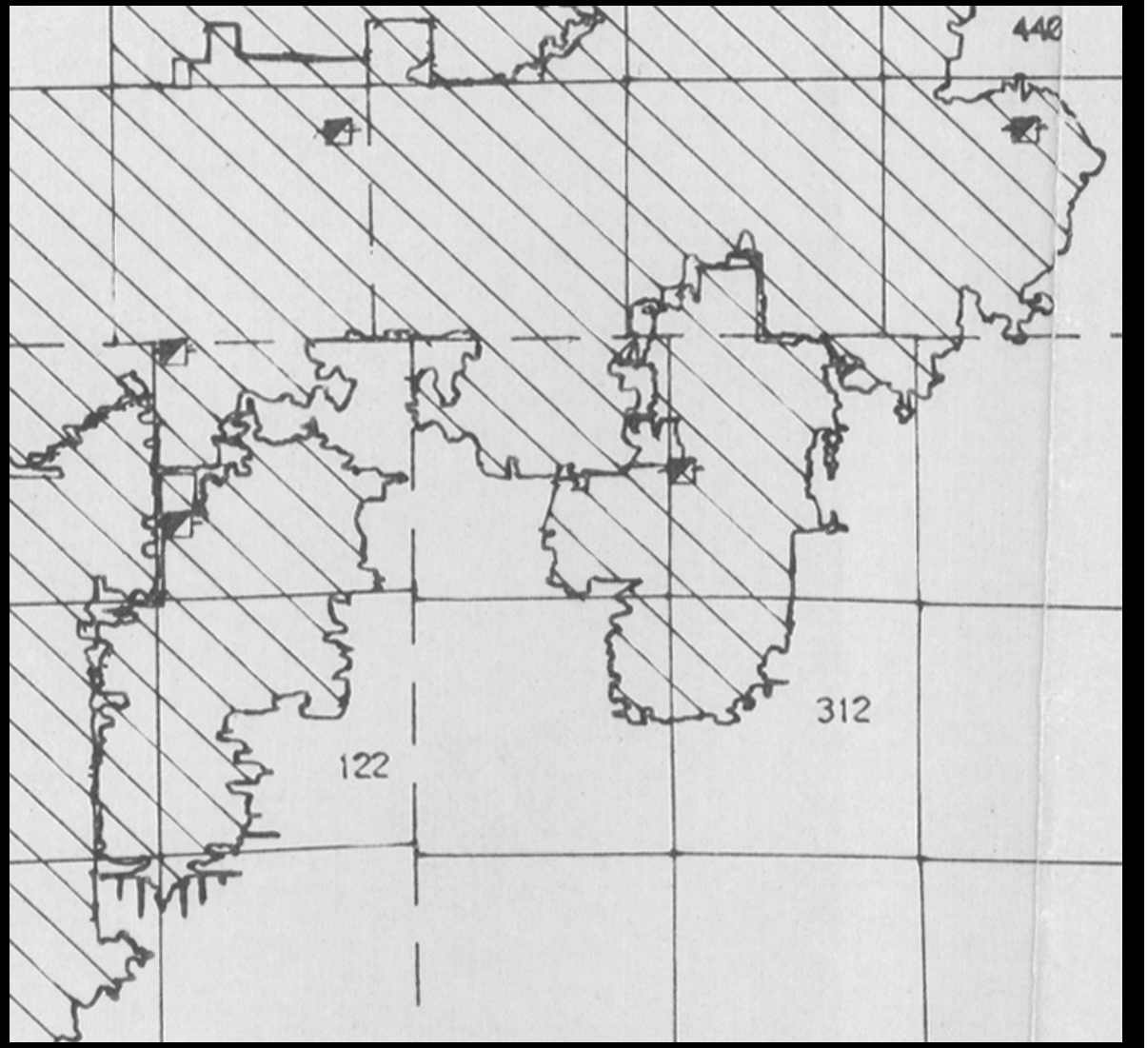
1983 Mine Map Directory

GREENE COUNTY

INDEX NO. ISSS	BM	DMM	CNTY	SEC PT	TWP	RNG	SEAM	COAL COMPANY	MINE NAME	NO	REF +	MINE YRS	*	CONF
2302			GREE					ALLEN,W.L.				4143	1	N
2302	L	16	GREE					HOLLY,CLEAT	HOLLY		SH	3538		N
2302			GREE					PITCHFORD,CLAUDE,OPER ABT 15	PITCHFORD					N
2303			GREE	30 A2	9N	11W		VARBLE,HARRY	VARBLE					N
2304	L	17	GREE	7 B7	10N	10W	2170	WALKER,O S. (SEC. 12 ?)	WALKER		SL	3442		N
2305	L	7	GREE	23 B2	10N	11W	2A180	ADKINS,J T	ADKINS		SD	1442	1	N
2305	L	7	GREE	23 B2	10N	11W	2A180	BOUNS,VERNIE O (SEE BOWNS)	BOUNS	4	SD	4247	2	N
6428			GREE	27 A6	11N	10W		COLLINS, A.Y.			SH	0408	2	N
329			GREE	27 C4	11N	10W	6220	GREENFIELD MNG C IDLE118-19	OLD POLI	749	SL	1721	1	N
329			GREE	27 C4	11N	10W	6220	POLI,A.N.('OLD POLI MINE')	GREENFIELD	749	SL	2323	2	N
347	L	1	GREE	27 C6	11N	10W	6220	GREENE CO C C SEC 28-C27	POLI	347	SH	3737	2	N
347	L	1	GREE	27 C6	11N	10W	6220	GREENFIELD C C	GREENFIELD	347	SH	3739	3	N
347	L	1	GREE	27 C6	11N	10W	6220	POLI,A.N.('NEW POLI MINE')	GREENFIELD	347	SL	2736	1	N
749			GREE	27 B6	11N	10W	6220	KINCAID - MITCHELL OR ARNOLD	KINCAID -		SH	0917	2	N
749			GREE	27 B6	11N	10W	6220	BURROUGHS E E CC			SH	0809	1	N
749			GREE	27 B6	11N	10W		BURROUGHS, E.E.				0809	1	N
6428			GREE	27 A6	11N	10W		SOLOMAN - STURMAN			SH	0304	1	N
6429			GREE	27 B3	11N	10W		COMMUNITY COAL CO.			SH	3639		N
6430			GREE	27 A4	11N	10W		GREENFIELD MNG CO. IDLE 1918			SH	1721		N
6431			GREE	27 B4	11N	10W								N
6432			GREE	27 C6	11N	10W		O'BRIEN, JAMES			SH	2728	2	N
6432			GREE	27 C6	11N	10W		O'BRIEN - MOORE (IDLE 1927)			SH	2627	1	N
6434			GREE	15 A4	12N	10W								N
6435			GREE	15 C8	12N	10W								N
6436			GREE	18 E6	12N	10W								N
6436			GREE	18 E7	12N	10W								N
2306	L	25	GREE	19 F6	12N	10W	2170	FERGUSON,O L	FERGUSON		SL	3540		N
2307	L	44	GREE	E8	12N	11W		TATE C C,SEC 20 OR I1	TATE			3842		N
2308	L	43	GREE	1	12N	11W		WALTZ,E M,OPER ABT 1938	WALTZ		SH			N
2309	L	27	GREE	7 B7	12N	11W	2170	SMITH,HARDIN	SMITH		SL	3744		N
2309	L	29	GREE	7 B7	12N	11W	2170	SMITH,WILLIS	MERHOFF		SL	3744		N
2309	L	29	GREE	7 B7	12N	11W	2170	WHITEHEAD,JOHN H	WHITEHEAD		SL	3744		N
2310	L	33	GREE	12 E4	12N	11W	2170	HOPPER,JESSE	HOPPER		SL	3841		N
2311	L	42	GREE	13 D1	12N	11W		STECKEL,FRED	STECKEL		SH	3943		N
2312	L	49	GREE	19 G6	12N	11W	2170	FERGUSON,O L	FERGUSON	2	SD	3943		N
6433			GREE	19 A6	12N	11W								N
6437			GREE	19 F3	12N	11W								N
2055			GREE	20	12N	11W								N
2313	L	5	GREE	20 F8	12N	11W		TATE,D W	TATE		SH	3538		N
6438			GREE	20 G1	12N	11W		TATE, D.W.	BLACK MINE		SH			N
6438			GREE	21 G8	12N	11W					SM			N
713	L	112	GREE	23 A1	12N	11W	2170	BIRCH CREEK C C	BIRCH CRK		ST	5167	2	N
713			GREE	23 A1	12N	11W	2170	PIPER,DONALD - SON C C	PIPER		ST	5051	1	N
2314	L	6	GREE	23	12N	11W	2170	LAWSON,CHAS.H.	BOUNS 2	2	DR	4040	2	N
2314	L	101	GREE	23	12N	11W	2170	LAWSON,CHAS.H.			DR	4042	1	N
2315	L	48	GREE	23 A2	12N	11W	1083	DOVE,A G C C,OPER ABT 1939	DOVE		SL			N
2316	L	20	GREE	23 B2	12N	11W	2170	BOUNS,JESSE	BOUNS		SD	3437	1	N

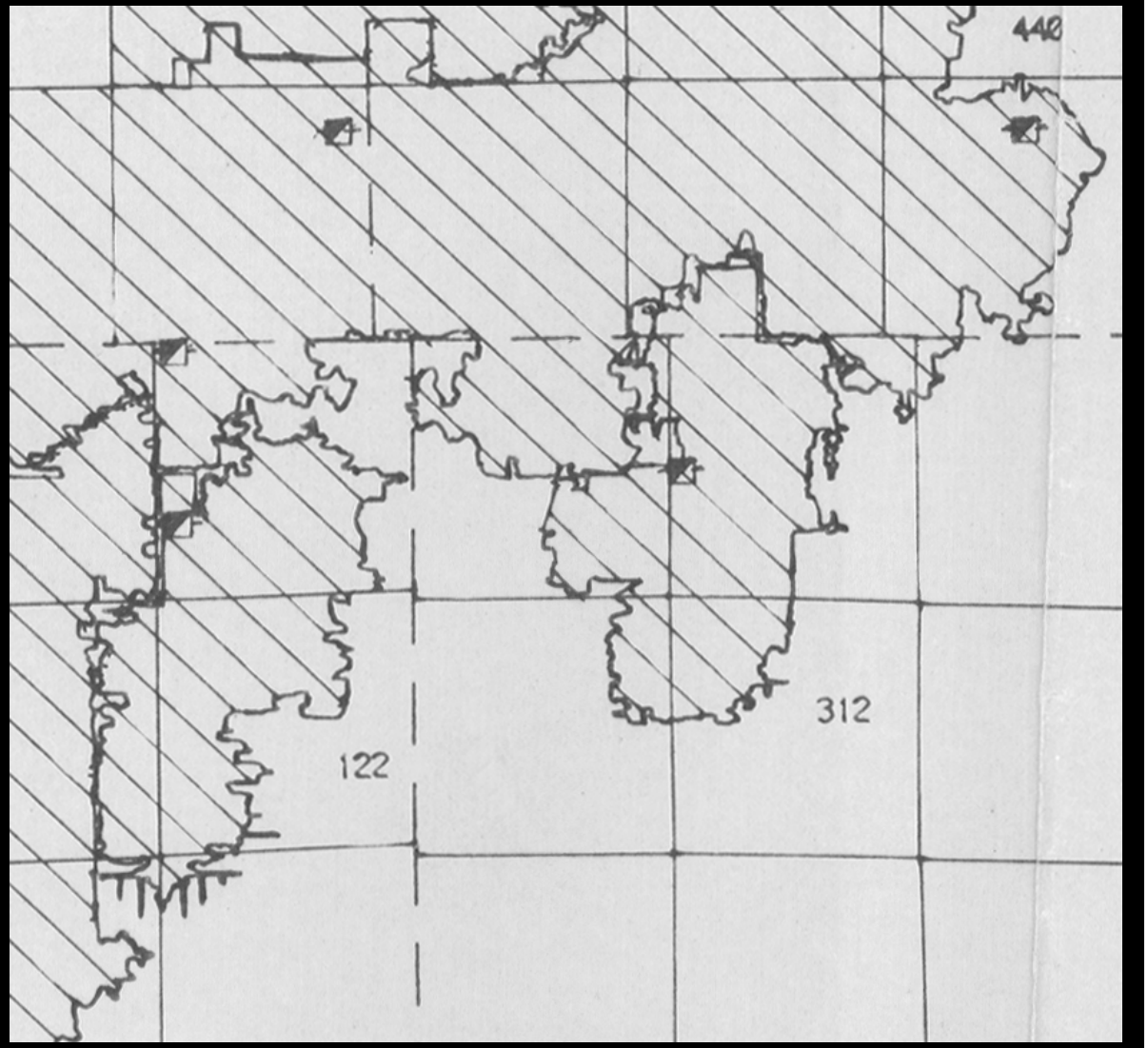
1989 MOA

- Detailed Boundaries



1989 MOA

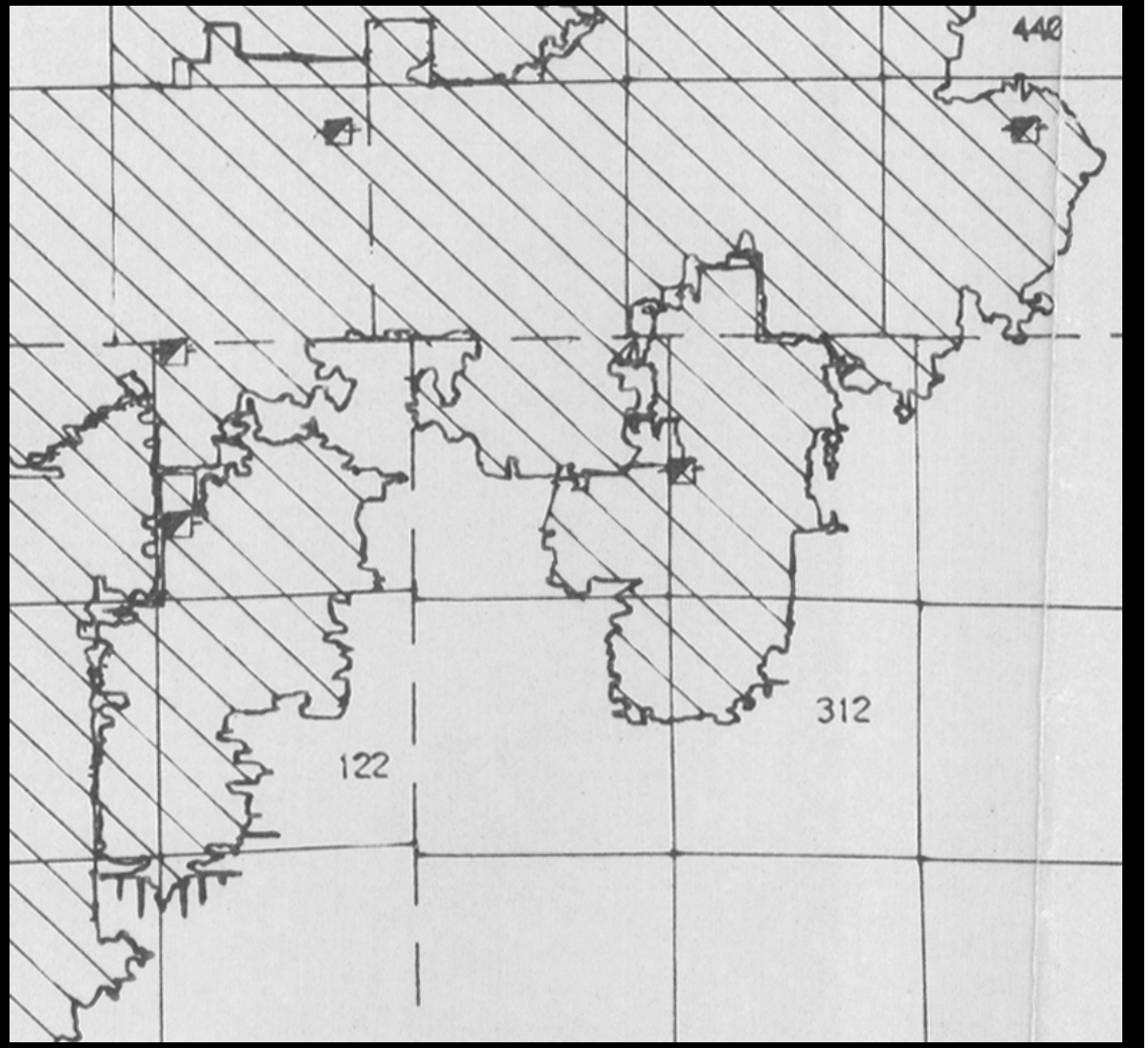
- Detailed Boundaries
- More Mine Features



1989 MOA

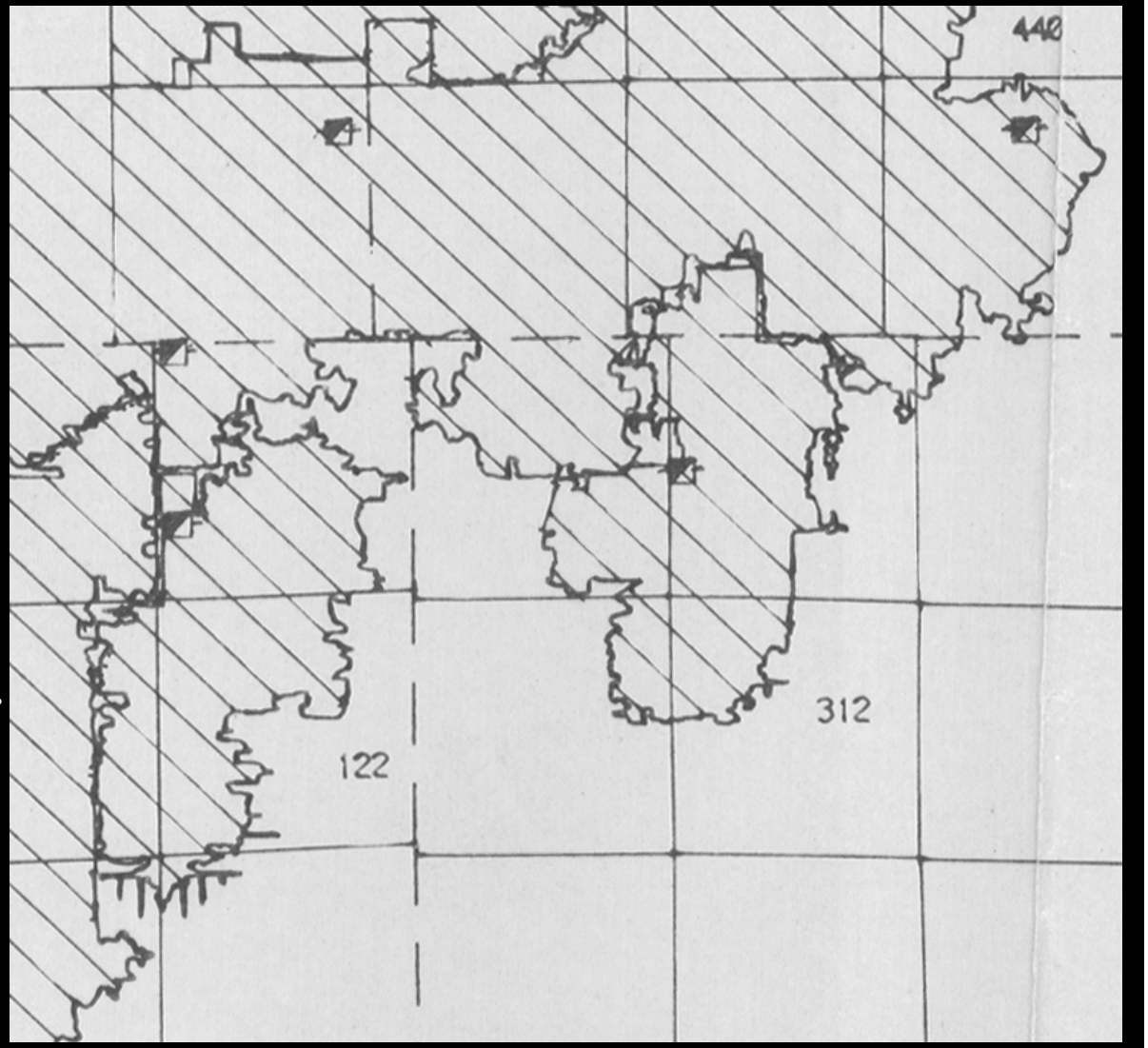
- Detailed Boundaries
- More Mine Features
- Includes:

  Underground Mines
  Surface Mines,
  Active Mines and
  Abandoned Mines.



1989 MOA

- Detailed Boundaries
- More Mine Features
- Includes:
  Underground Mines
  Surface Mines,
  Active Mines
  and Abandoned Mines.
- **Scale 1:100,000**



1991 Mine Directory

- County Specific

DIRECTORY OF COAL MINES IN ILLINOIS

Sangamon County

This directory accompanies the Illinois Coal Mines map or maps for this county (January 1991 edition).

Illinois Department of Energy and Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY

January 1991

1991 Mine Directory

- County Specific
- **Companion to 1:100,000 MO□□A's**

DIRECTORY OF COAL MINES IN ILLINOIS

Sangamon County

This directory accompanies the Illinois Coal Mines map or maps for this county (January 1991 edition).

Illinois Department of Energy and Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY

January 1991

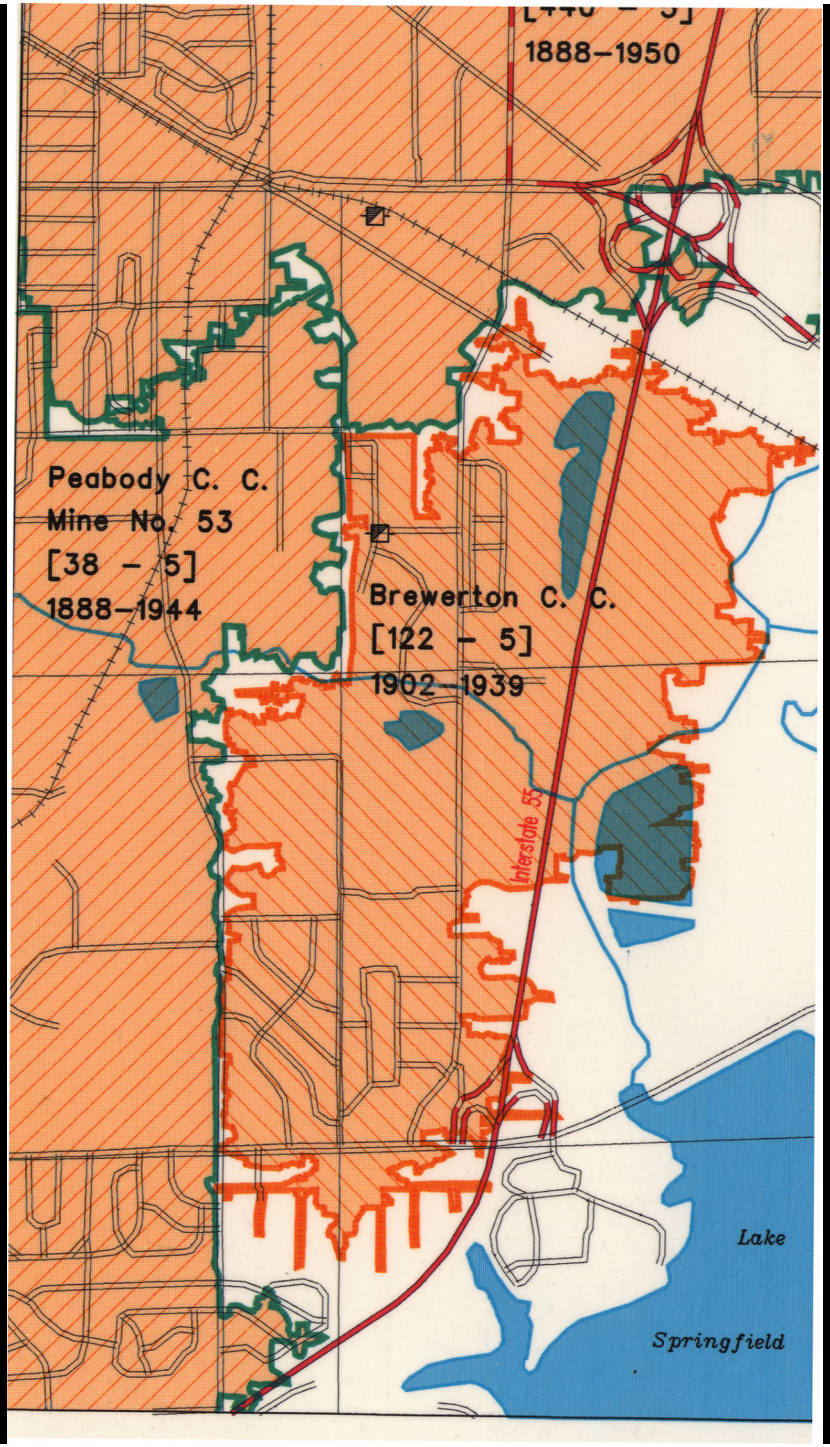
1991 Mine Directory

Table 3. Directory of coal mines sorted by location.

ISGS INDEX	COMPANY NAME (* = ACTIVE)	MINE NAME	MINE NUMBER	MINE TYPE	METHOD	YEARS OPERATED	COAL SEAM	COUNTY	LOCATION: TWP	RGE	SEC
3363	DAVIS & DABNEY			SHAFT		1918-23	SPRINGFIELD	SANGAMON	17N	6W	32
3363	BRANDT,H C C C	BRANDT		SHAFT		1912-15	SPRINGFIELD	SANGAMON	17N	6W	32
3363	CRONISTER & DAVIS	CRONISTER		SHAFT		1906-12	SPRINGFIELD	SANGAMON	17N	6W	32
3363	DABNEY & JACKSON	D & J		SHAFT		1915-17	SPRINGFIELD	SANGAMON	17N	6W	32
3363	DAVIS,SCOTT & CO	DAVIS		SHAFT		1927-34	SPRINGFIELD	SANGAMON	17N	6W	32
3362	ENDERS,TONY	ENDERS		SHAFT		1927-34	SPRINGFIELD	SANGAMON	17N	6W	32
3363	JONES & MEREDITH	J & M		SHAFT		1926-27	SPRINGFIELD	SANGAMON	17N	6W	32
3362	LINCOLN TRAIL C C	LINCOLN TRAIL		SHAFT		1940-48	SPRINGFIELD	SANGAMON	17N	6W	32
3363	SPRINGFIELD SALISBURY C C	S S		SHAFT		1934-41	SPRINGFIELD	SANGAMON	17N	6W	32
3363	SALISBURY C C	SALISBURY		SHAFT		1923-24	SPRINGFIELD	SANGAMON	17N	6W	32
3363	DITMER & HOLMBERG	SALISBURY		SHAFT		1924-25	SPRINGFIELD	SANGAMON	17N	6W	32
3363	SALISBURY COAL CO	SALISBURY		SHAFT		1941-44	SPRINGFIELD	SANGAMON	17N	6W	32
3363	SPRINGFIELD SALISBURY C C	SALISBURY		SHAFT		1944-48	SPRINGFIELD	SANGAMON	17N	6W	32
3363	WATKINS & DABNEY	W & D		SHAFT		1917-17	SPRINGFIELD	SANGAMON	17N	6W	32
4862					RPB			SANGAMON	17N	7W	25
3364	HARRIS,R	HARRIS				1860-75	SPRINGFIELD	SANGAMON	17N	7W	29
3365	SPRINGFIELD & PLEASANT PLAIN	S & P P		SHAFT		1888-01	SPRINGFIELD	SANGAMON	17N	7W	31
3365	TRUTTER C C	TRUTTER		SHAFT		1901-07	SPRINGFIELD	SANGAMON	17N	7W	31
4861	CITIZENS COAL CO			SHAFT		1900-26		SANGAMON	17N	7W	32
4861	KLINGBEIL COAL CO.					1926-29		SANGAMON	17N	7W	32
3366	GARDNER MINE	GARDNER				1875-95	SPRINGFIELD	SANGAMON	17N	7W	32
3367	HAPPY HOLLOW MNG CO	HAPPY HOLLOW		SHAFT	RPP	1939-40	SPRINGFIELD	SANGAMON	17N	7W	35
3367	HAPPY HOLLOW MNG CO	HAPPY HOLLOW		SHAFT		1942-49	SPRINGFIELD	SANGAMON	17N	7W	35
3367	MILLER,FRANK	MILLER		SHAFT		1941-41	SPRINGFIELD	SANGAMON	17N	7W	35
624	BETHEL C C	BETHEL		SHAFT	RP	1933-40	SPRINGFIELD	SANGAMON	17N	8W	25
624	LAWLESS & MILLER	L & M		SHAFT		1940-43	SPRINGFIELD	SANGAMON	17N	8W	25

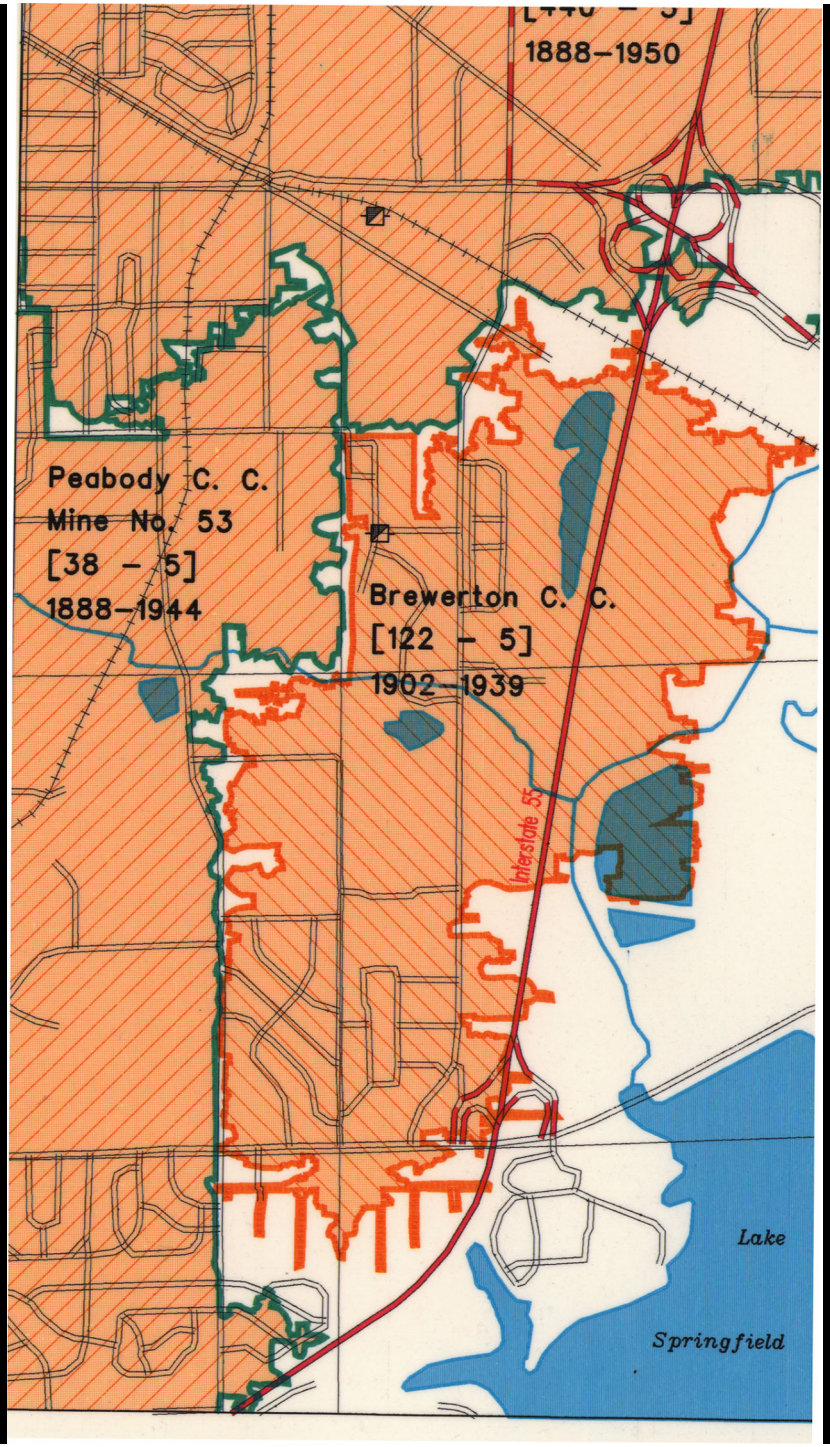
1992 ISGS MOA

- Topographic Sheet Based 1:24,000



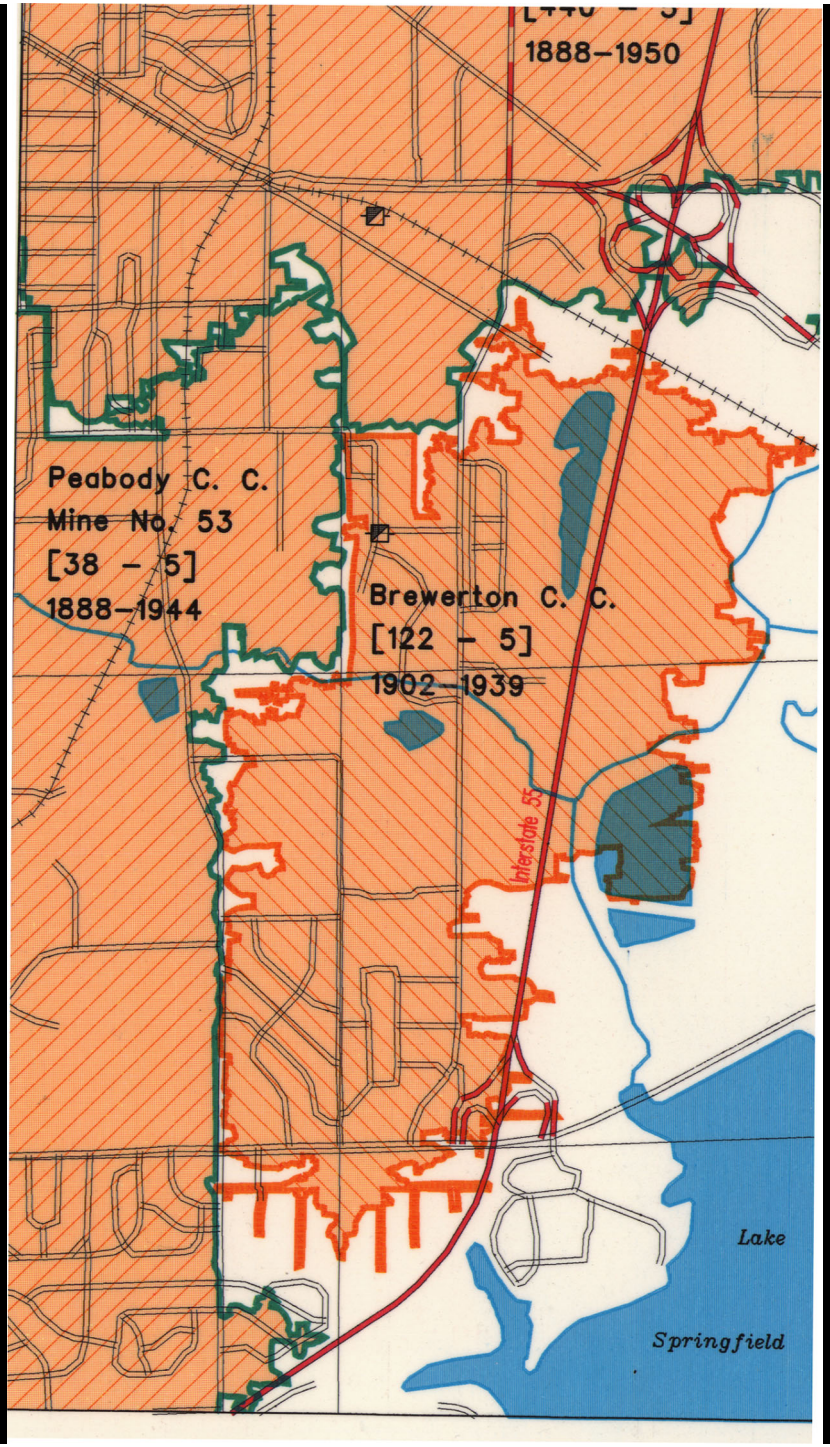
1992 ISGS MOA

- Topographic Sheet Based 1:24,000
- **Mining Method Information**



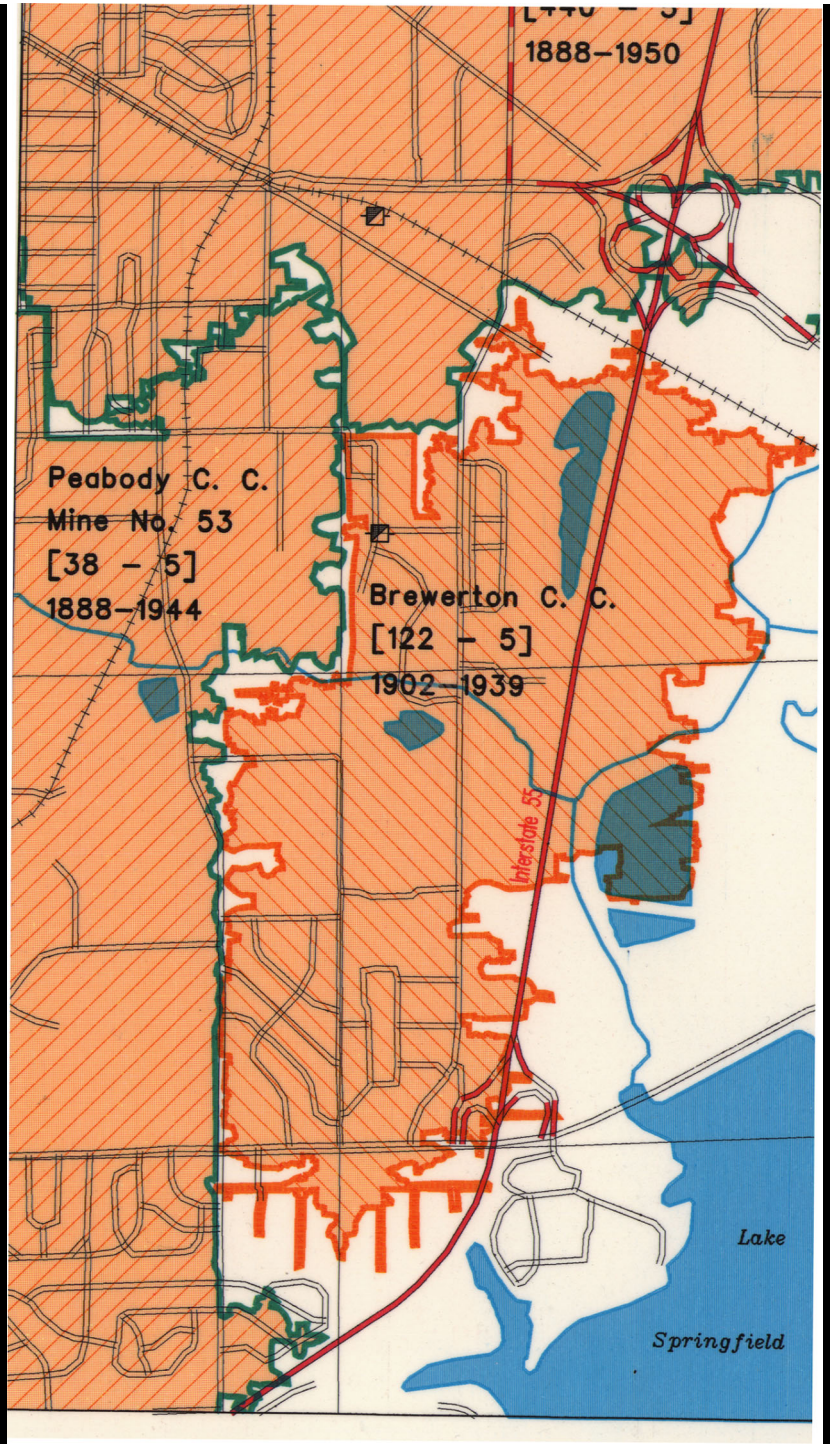
1992 ISGS MOA

- Topographic Sheet Based 1:24,000
- Mining Method Information
- **Detailed Surface Information**



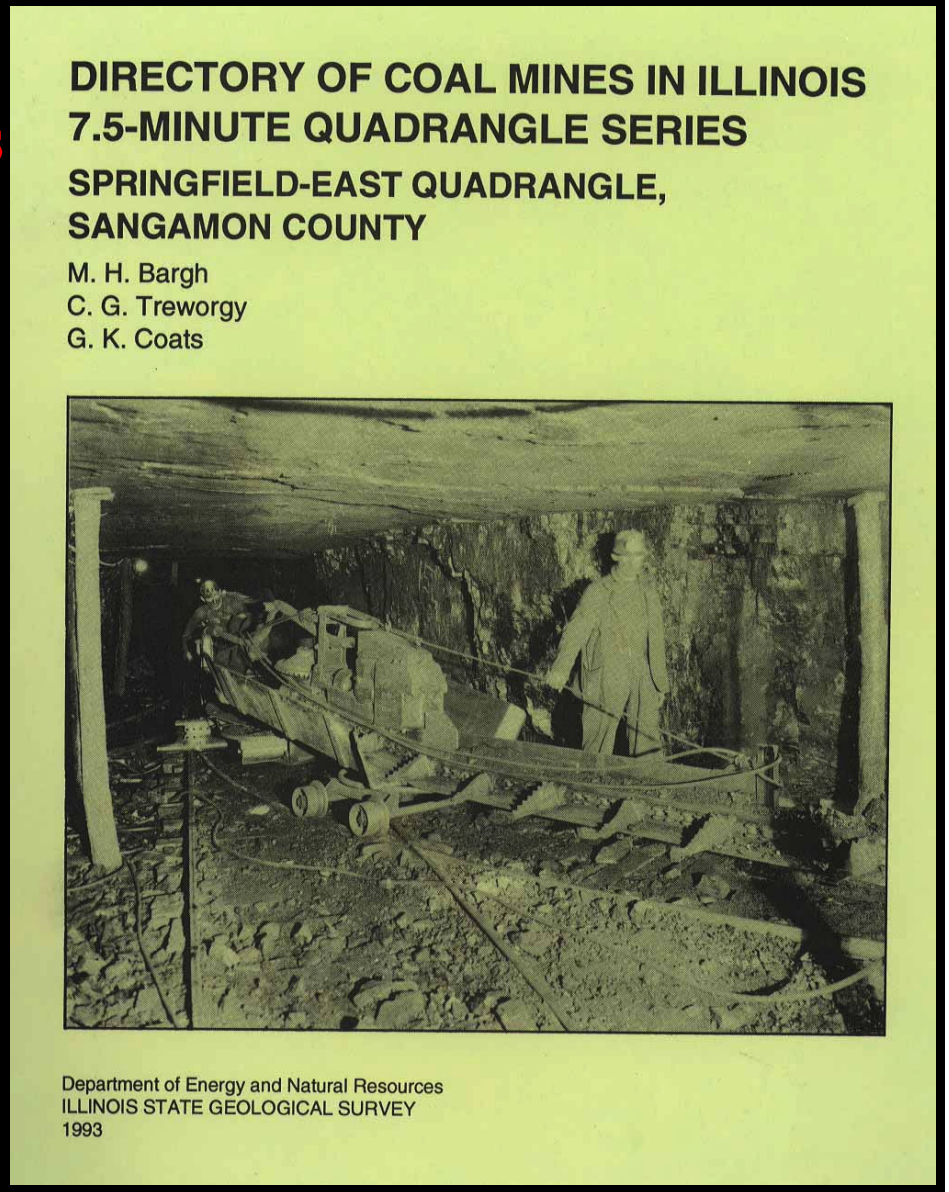
1992 ISGS MOA

- Topographic Sheet Based 1:24,000
- Shows Mining Method Information
- Detailed Surface Information
- **Easy Map Interpretation**



1993 ISGS Mine Directory

- Companion with 1:24,000 MOA's



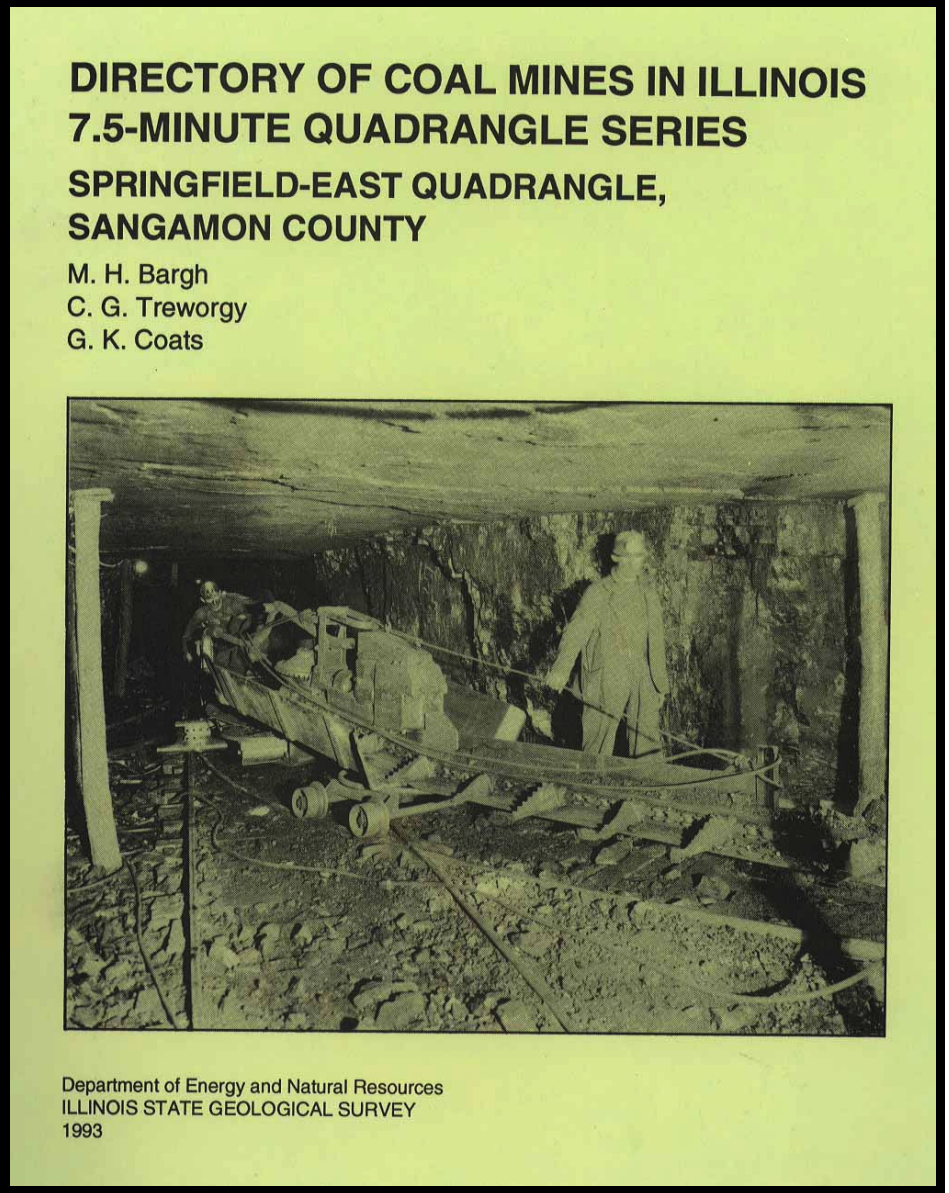
DIRECTORY OF COAL MINES IN ILLINOIS
7.5-MINUTE QUADRANGLE SERIES
SPRINGFIELD-EAST QUADRANGLE,
SANGAMON COUNTY

M. H. Bargh
C. G. Treworgy
G. K. Coats

Department of Energy and Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
1993

1993 ISGS Mine Directory

- Companion with 1:24,000 MOA's
- **Includes History of Mining**



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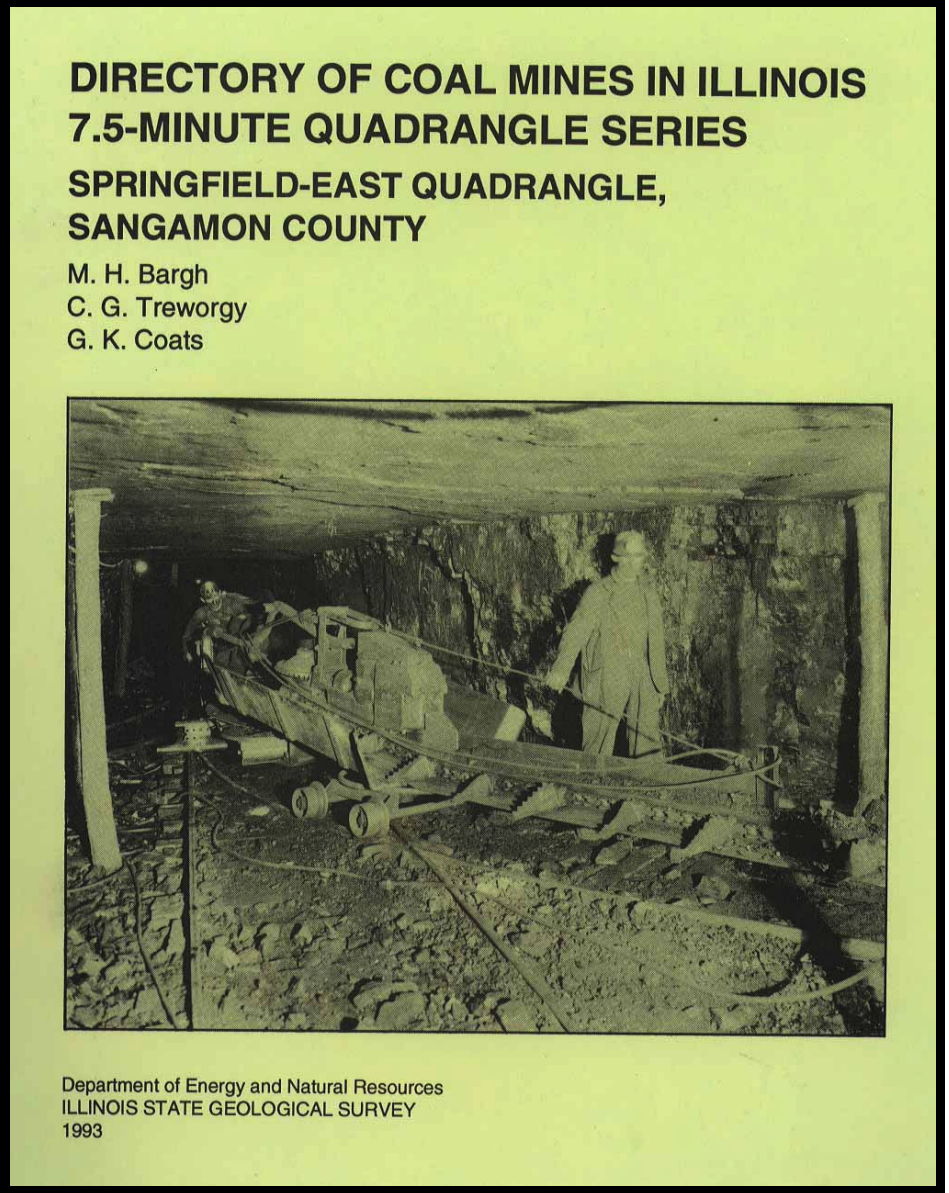
ILLINOIS STATE GEOLOGICAL SURVEY
1993

1993 ISGS Mine Directory

- Companion with 1:24,000 MOA's
- Includes History of Mining
- **Map Interpretation Instructions**



DIRECTORY OF COAL MINES IN ILLINOIS
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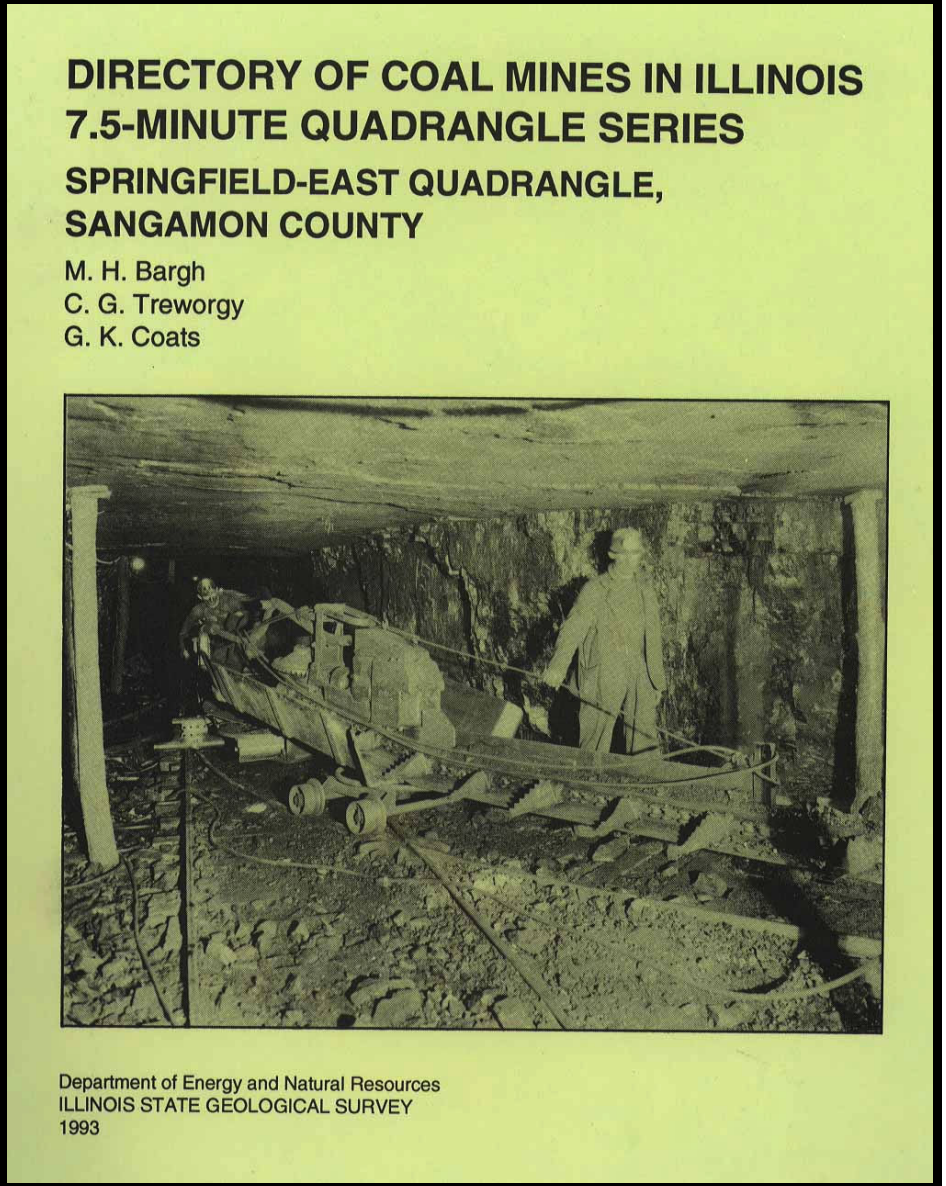
ILLINOIS STATE GEOLOGICAL SURVEY
1993

1993 ISGS Mine Directory

- Companion with 1:24,000 MOA's
- Includes History of Mining
- Map Interpretation Instructions.
- **Detail Mine information:**
  - **Shaft Information**
  - **Geology**
  - **Production History**
  - **Source of Data**



DIRECTORY OF COAL MINES IN ILLINOIS
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SPRINGFIELD-EAST QUADRANGLE,
SANGAMON COUNTY

M. H. Bargh
C. G. Treworgy
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Department of Energy and Natural Resources
ILLINOIS STATE GEOLOGICAL SURVEY
1993

From 1993 ISGS Mine Directory

INTRODUCTION

Coal has been mined in 73 counties of Illinois (appendix A). More than 4,500 coal mines have operated since commercial mining began in Illinois about 1810; fewer than 50 are still active. To detail the extent and location of coal mining in Illinois, the Illinois State Geological Survey (ISGS) has compiled maps and directories of known coal mines. The ISGS offers maps at a scale of 1:100,000 and accompanying directories for each county in which coal mining is known to have occurred. Maps at a scale of 1:24,000 and accompanying directories such as this are available for selected quadrangles. Contact the ISGS for a list of these quadrangles.

These larger scale maps show the approximate positions of mines in relation to surface features such as roads and water bodies, and indicate the mining method used and the accuracy of the mine boundaries. The maps are useful for locating mine boundaries relative to specific properties and for assessing the potential for subsidence in an area. Mine boundaries compiled from final mine surveys are generally shown within 200 feet of their true position. As a result of poor cartographic quality and inaccuracies in the original mine surveys, boundaries of some older mines may be mislocated on the map by 500 feet or more. Original mine maps should be consulted in situations that require precise delineation of mine boundaries or internal workings of mined areas.

The directory serves as a key to the accompanying mine map and provides basic information on the coal mines. The directory is composed of two parts. Part I explains the symbols and patterns used on the accompanying map and the summary data presented for each mine. Part II alphabetically lists the mines in the quadrangle and summarizes the geology and production history of each mine.

MINING IN SPRINGFIELD-EAST QUADRANGLE

The Springfield-East Quadrangle covers the east half of the city. The Springfield Coal (formerly referred to as the No. 5 Coal) is the only seam known to have been mined in this quadrangle. Mining began in this quadrangle in 1881 and, by the turn of the century, nine mines were operating. Fourteen mines, all underground, have operated in the Springfield East-Quadrangle. Most mines closed prior to 1940; the last was abandoned in 1964. The nearest active mine today is east of Elkhart in Logan County, about 10 miles north of the quadrangle.

The Springfield Coal is 200 to 260 feet deep and about 6 feet thick in this quadrangle. No major mining problems were reported in the mines, although clay dikes may have been abundant. Several companies avoided mining below the Sangamon River valley, an area that could have unstable roof conditions and water seepage.

From 1993
ISGS Mine Directory

Mine Index 310
Spaulding Coal Company

Type: Underground
Total mined-out acreage shown: 433

Shaft, Slope, Drift, or Tipple Locations

Type	County	Twp	Section	Footage	
Main shaft	Sangamon	16N 4W	4	475 NL	555 EL

Geology

Seam(s) mined	Depth (ft)	Thickness (ft) Min	Max	Ave	Mining method
Springfield	238			6.1	RP

Geologic problems reported:

Production History

Company	Mine name	Years	Production (tons)
Riverton Coal Co.	Riverton	1884-1885	4,100
Sangamon Coal & Mng. Co.		1885-1887	44,650
Illinois Fuel Co.		1887-1894	599,723
Phoenix Coal Co.	Spaulding	1894-1895	83,793
Rutledge, William	Spaulding	1896-1897	32,100
Spaulding Coal Co.	Spaulding No. 1	1897-1906	767,853
Standard Washed Coal Co.	Spaulding No. 1	1906-1911	394,344
Idle		1911-1912	
Spaulding Coal Co.	Spaulding No. 1	1912-1914	25,214
			1,951,759

Last reported production: February 1913

Sources of Data

Source map	Date	Original scale	Digitized scale	Map type
Microfilm reel 03134	5-20-1932	1:2400	1:4800	Incomplete

The main entries of this mine are shown on the map for Peabody No. 52. The mine appears to be connected to the Peabody mine. No rooms or panels are shown. The digitized outline is based on the main entries and possible extent of rooms and panels not shown. This outline is considered incomplete though it is large enough to account for all of the reported production.

Annotated Bibliography (data source, brief description of information)

Annual reports of the Illinois Department of Mines and Minerals - Production

Directory of Illinois Coal Mines (Sangamon) - Mine names, years of operation, mine index

ENR Document 85/01 - Mining method

Microfilm map of Peabody No. 52 (mine index 36) - Shaft location, mine outline

Mine notes (Sangamon County) - Mine type, thickness, depth, seam, shaft location

IDNR-ISGS

Provides Online Mined-Out Area Maps

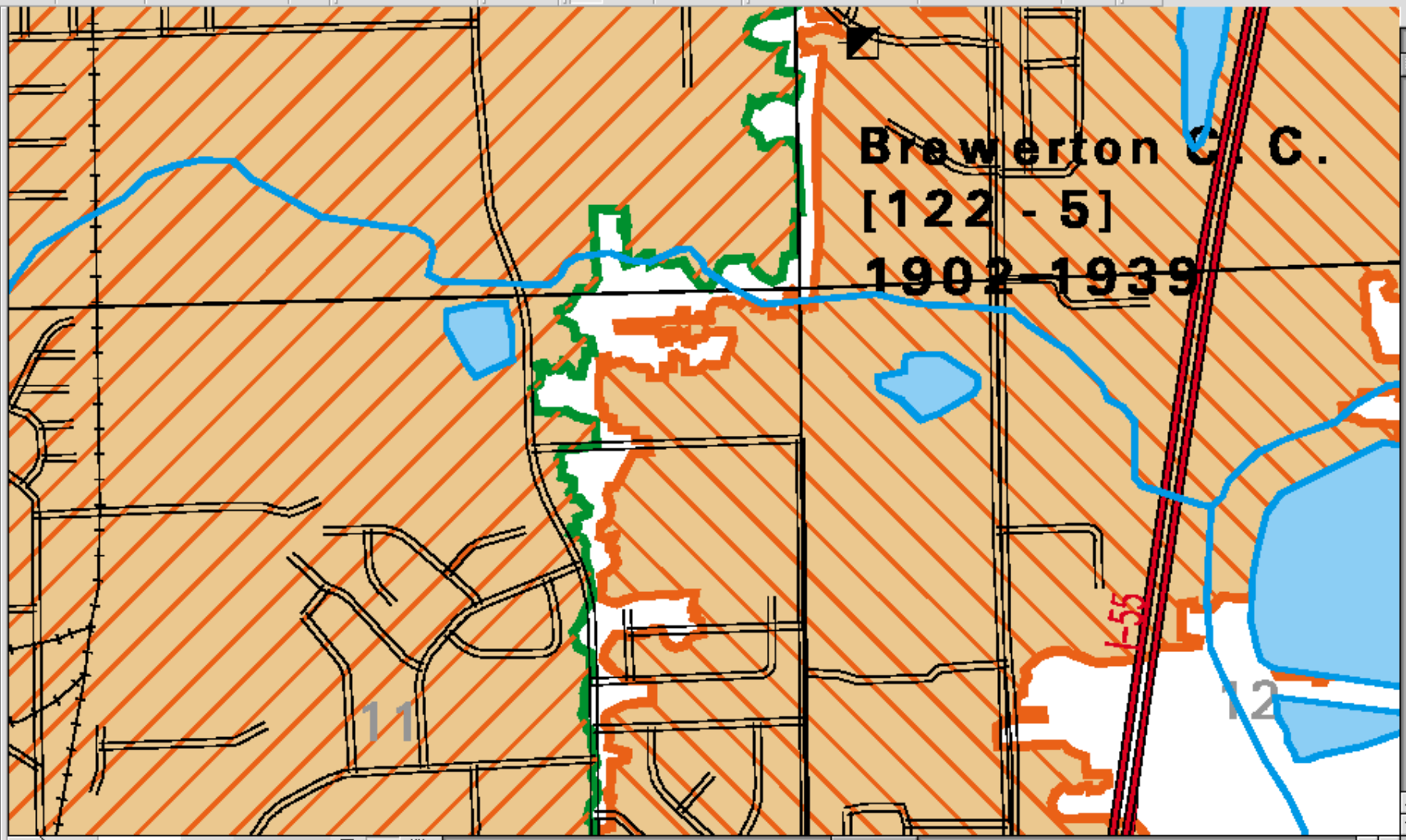
springfield-mines.pdf

Back Forward Stop Refresh Home AutoFill Print Mail

Address: http://www.isgs.uiuc.edu/servs/pubs/pdf-pubs/springfield-mines.pdf go

Favorites Bookmarks History Thumbnails Search Scrapbook Page Holder

300%



1 of 51 8.5 x 11 in

Internet zone

3 Key Advances in MOA Development

1) Enhanced MOA availability.

3 Key Advances in MOA Development

1) Enhanced MOA availability.

2) Make MOA's more complete and accurate.

3 Key Advances in MOA Development

1) Enhanced MOA availability.
2) Make MOA's more complete and accurate.
3) Make MOA's easier to understand and interpret.

What If Mining Can’t Be Avoided?

Then ….

- MOA’s are not adequate.

Then ….

- MOA’s are not adequate.
- Detailed Mine Maps Are Necessary

Detailed Mine Map Advantages

- **Contain Valuable Information**
  - coal thickness and depth
  - mine problems such as falls, squeezes and water.

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  - estimate cost /benefit of backfilling.
  - selection of area to minimize backfill volume.

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- **Facilitate Coal Companies.**
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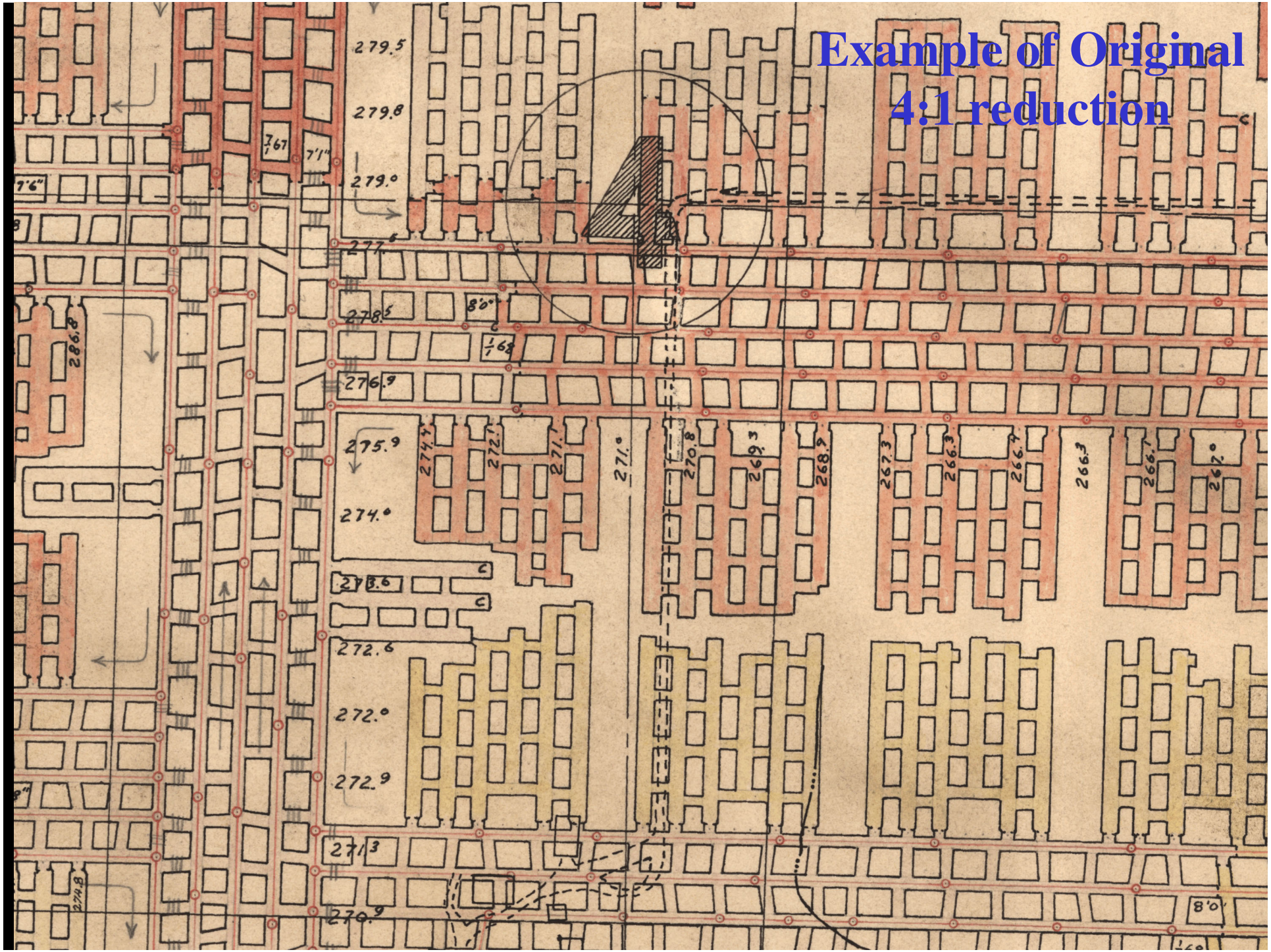
- Facilitate Coal Companies.
  - 'one stop shopping' to accurately locate abandoned mines.
- **Avoid dangerous gas accumulations venting through**
  - **boreholes**
  - **shafts**

Map Making Background

- Original Mine Map


Example of Original
4:1 reduction
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266.3
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266.1
262.0
8'0"
7'6"
7'1"

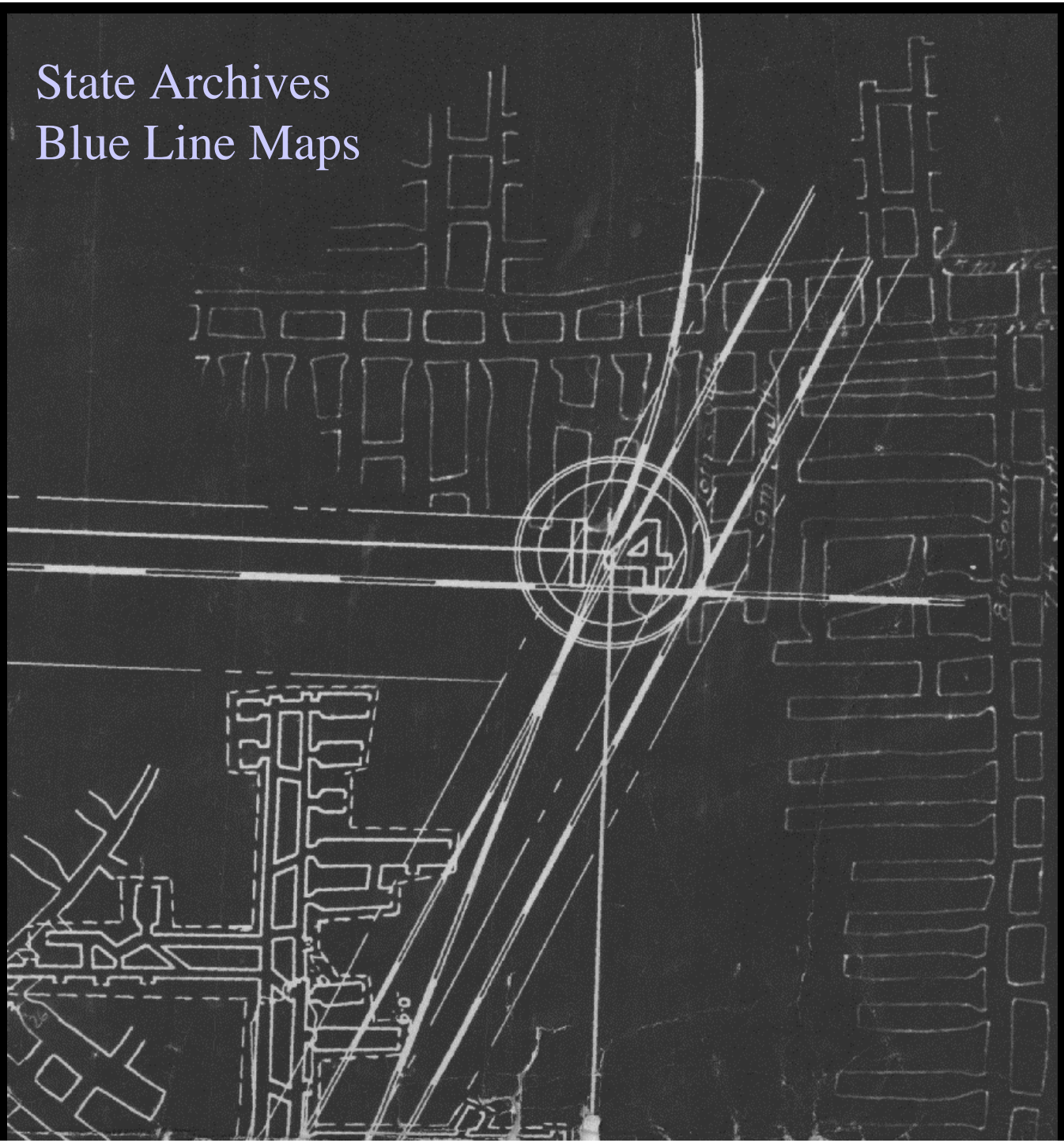
Map Making Background

- Original Mine Map
- Acetate photographic proofs used to make ‘blue-line copies.

Making Background

- Original Mine Map
- Acetate photographic proofs used to make ‘blue-line copies.
- ‘Blue-line copy used by Department. Copy stored in State Archives when mine closed.

State Archives
Blue Line Maps



Map Making Background

- Original Mine Map
- Acetate photographic proofs used to make ‘blue-line copies.
- ‘Blue-line copy used by Department. Copy stored in State Archives when mine
- 1970’s and 1980’s. USBOM photographed State’s blue-line copies and converted to Microfiche.

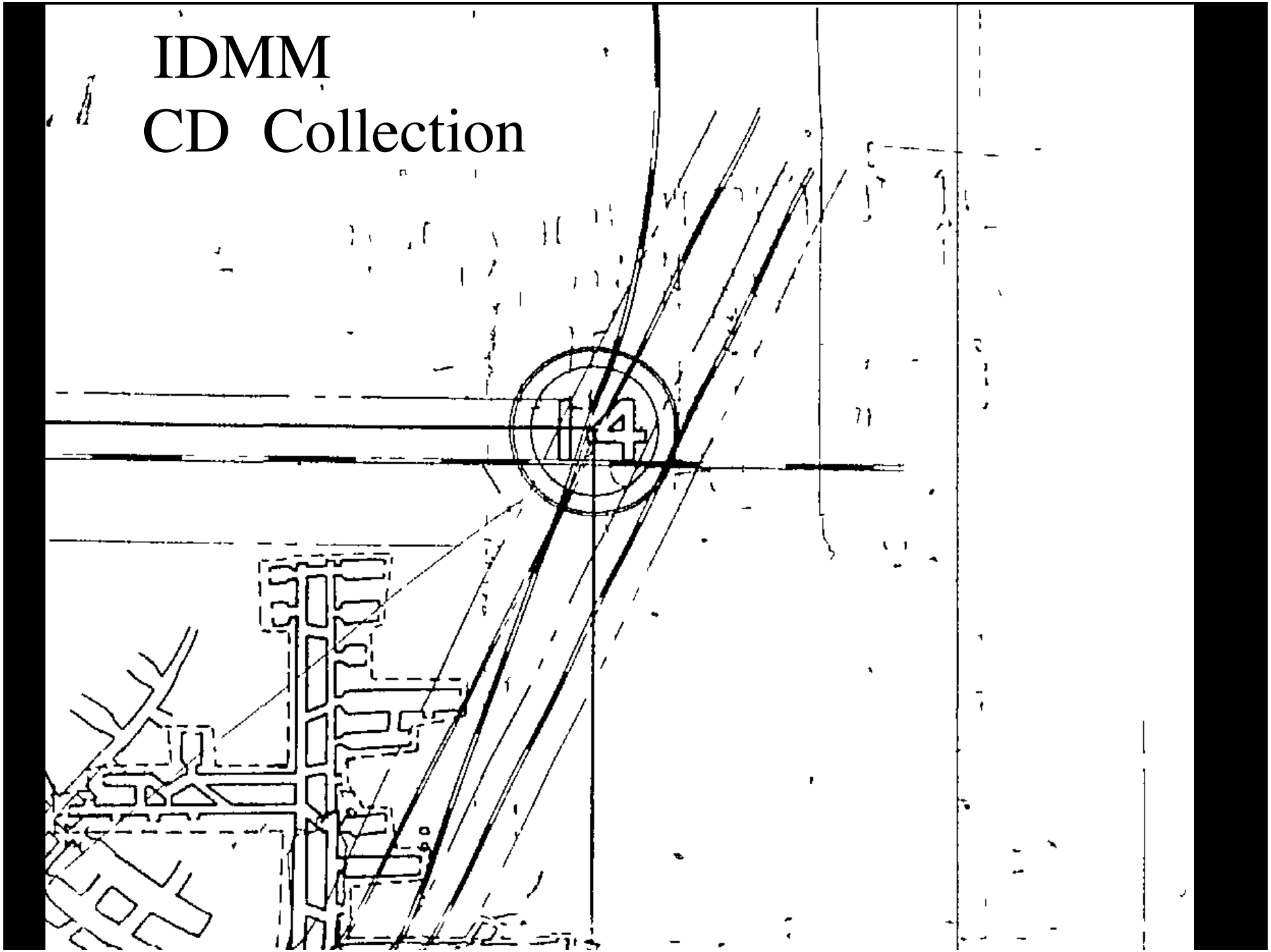
USBOM Microfiche

Map Making Background

- During the 1990's technology allows the creation of digital images.

Map Making Background

- During the 1990's technology allows the creation of digital images.
- Microfiche images are scanned and Raster images are stored on CD's.


IDMM
CD Collection
I-4

Map Making Background

- In general, each successive generation of mine map imaging enhances map availability and facilitates reproduction. However, degradation of image also increases with each generation.

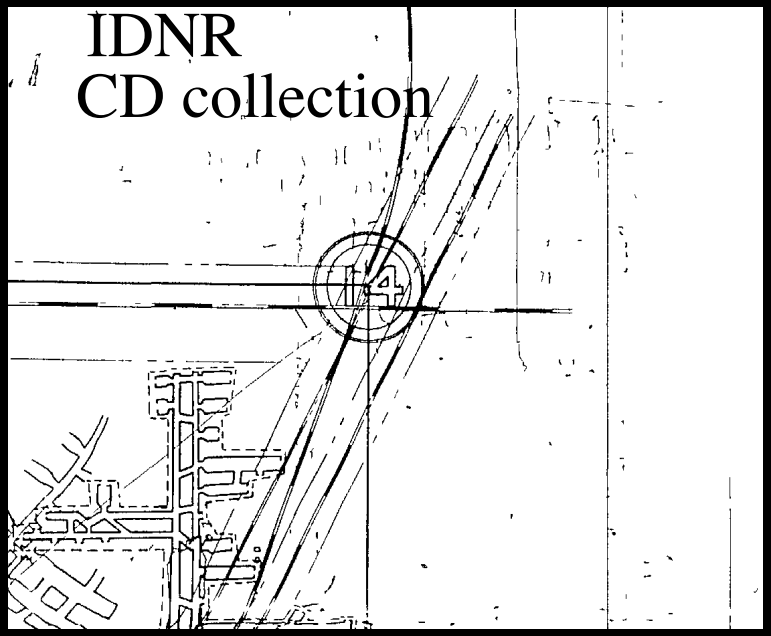
1

Scanned Blue Line

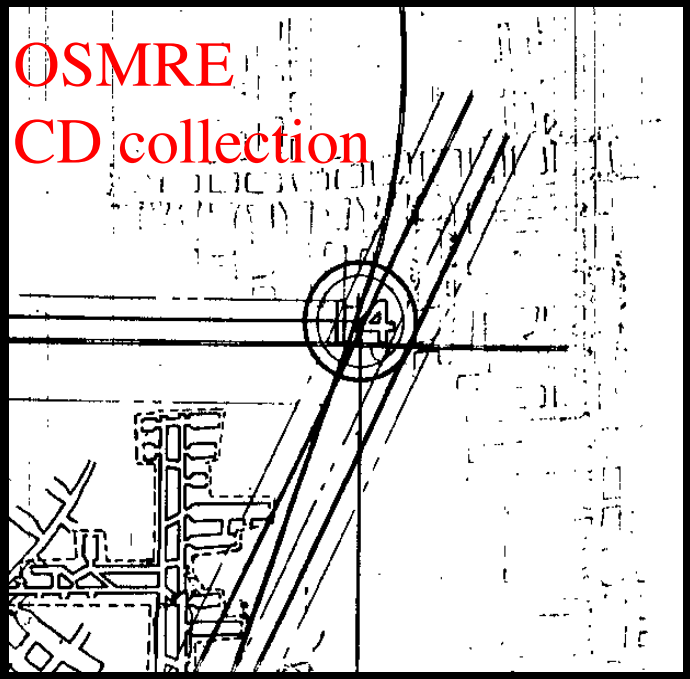
2

Original
Microfiche

3


IDNR
CD collection

4


OSMRE
CD collection

IDMM		OSMRE
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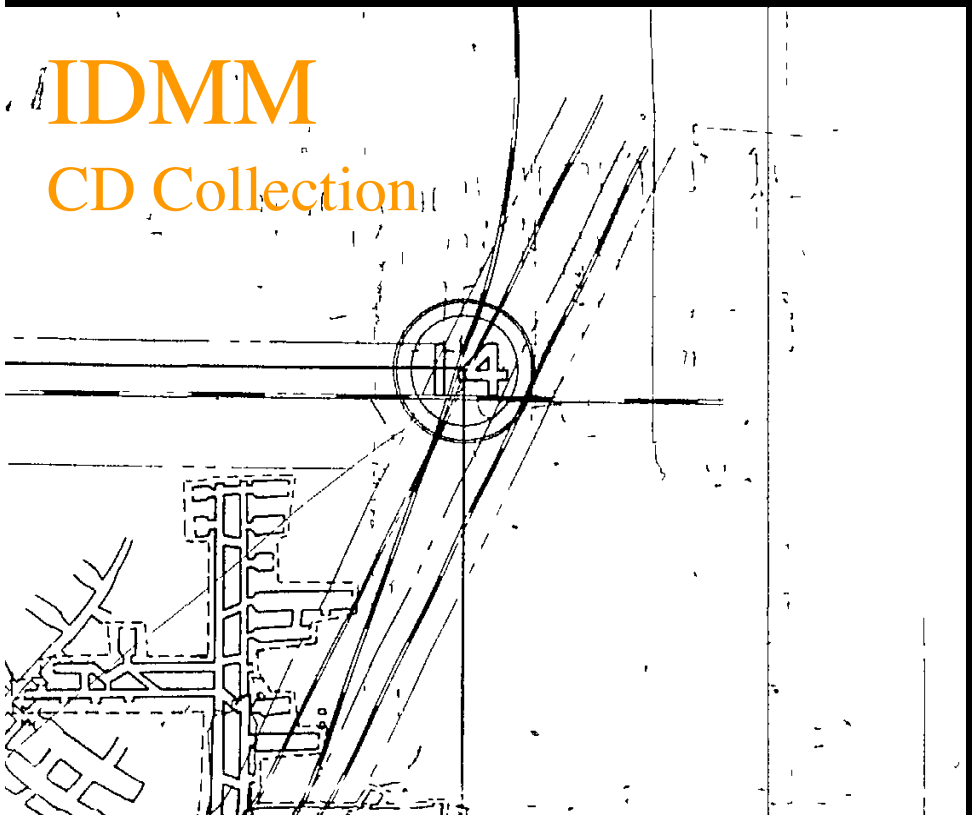
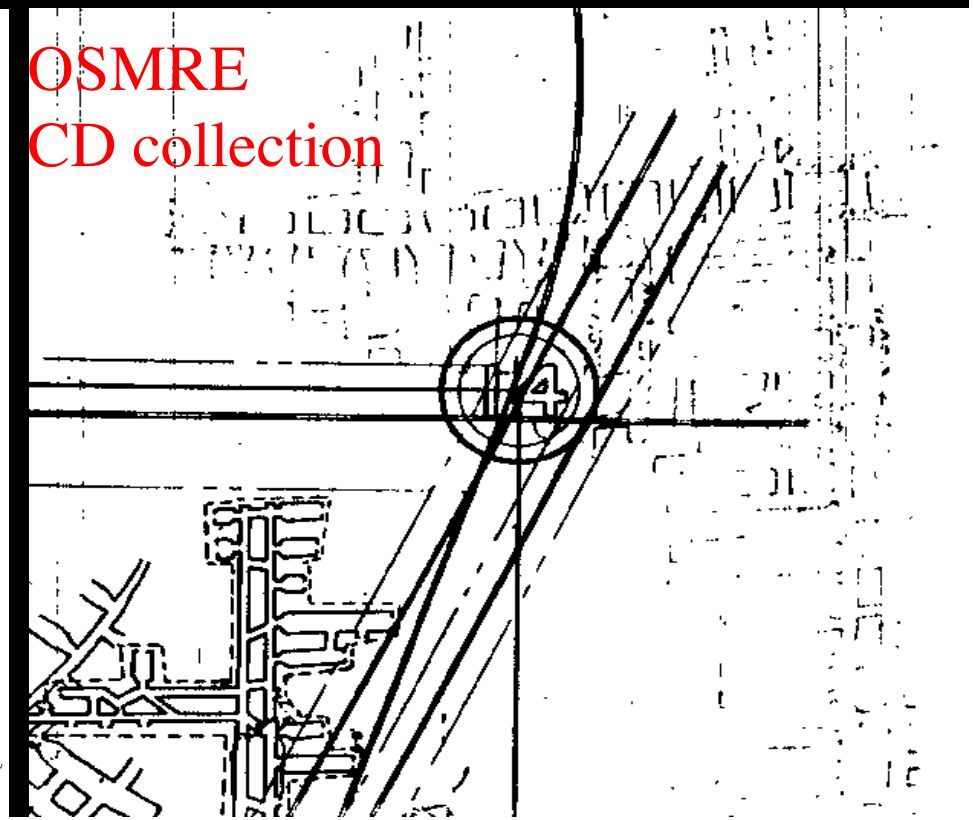
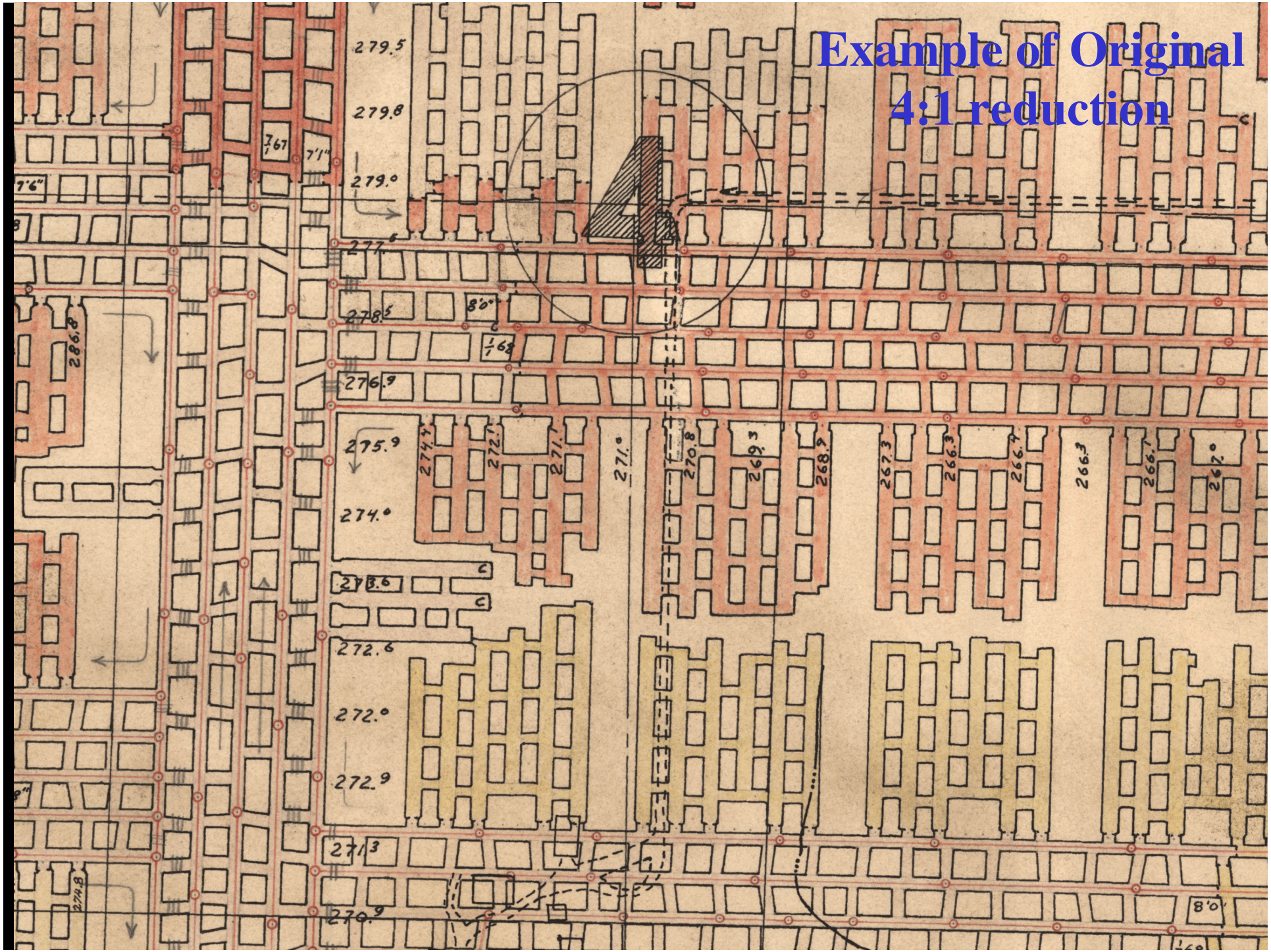
200 x 200 ppi	Resolution:	400 x 400 ppi
B/W 1bit	Color:	B/W 1bit
5.5 MB	Memory:	1.9 MB
1:1	Compression:	1:1
‘X’ of microfiche	Generation:	1 of microfiche





Mine Map Preservation Project

- Create high resolution scanned images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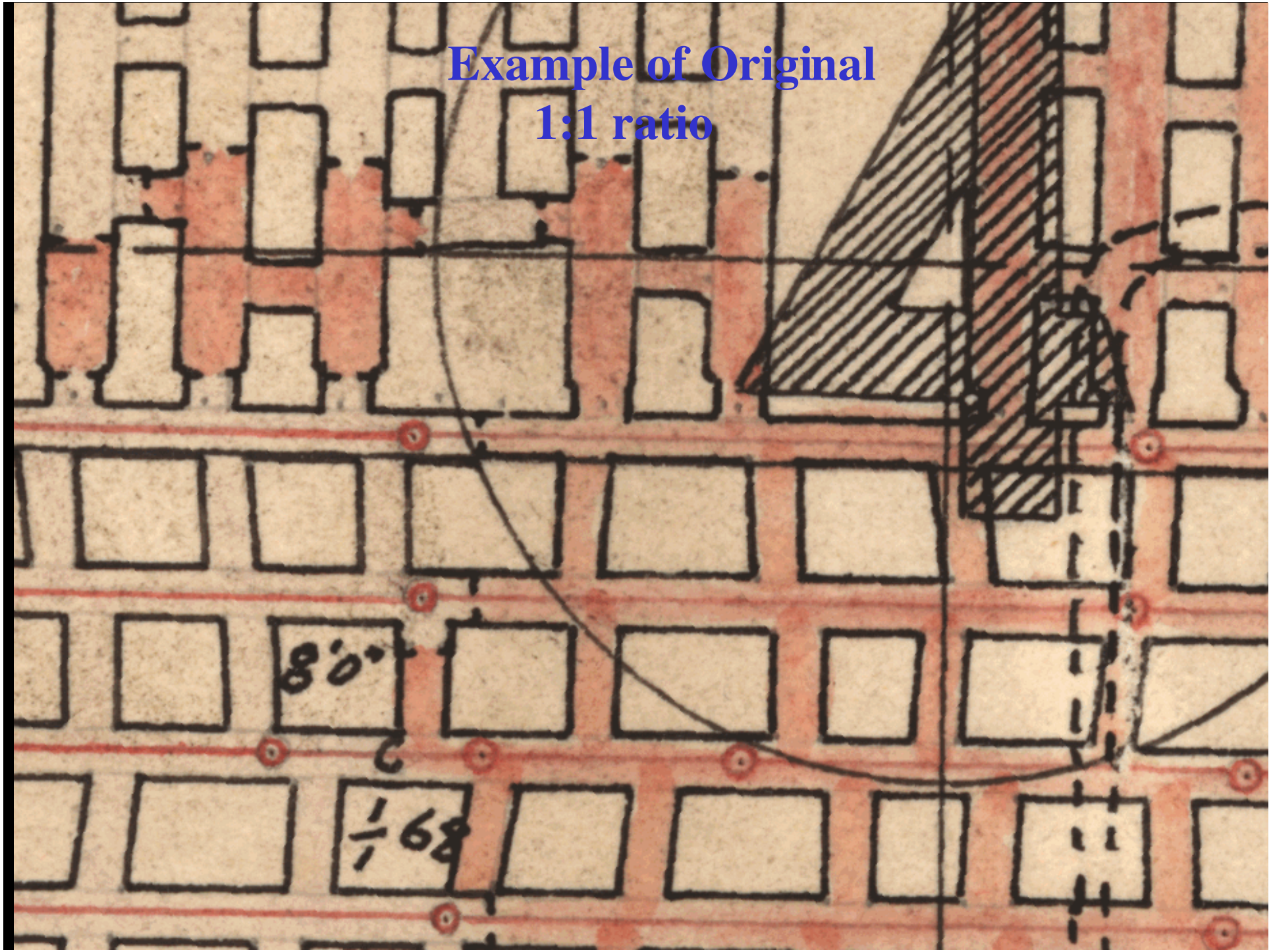

Example of Original
1:1 ratio
80'
1/1 68

Map Preservation

- Create high resolution scanned images
- **Attach reference information to scanned image.**

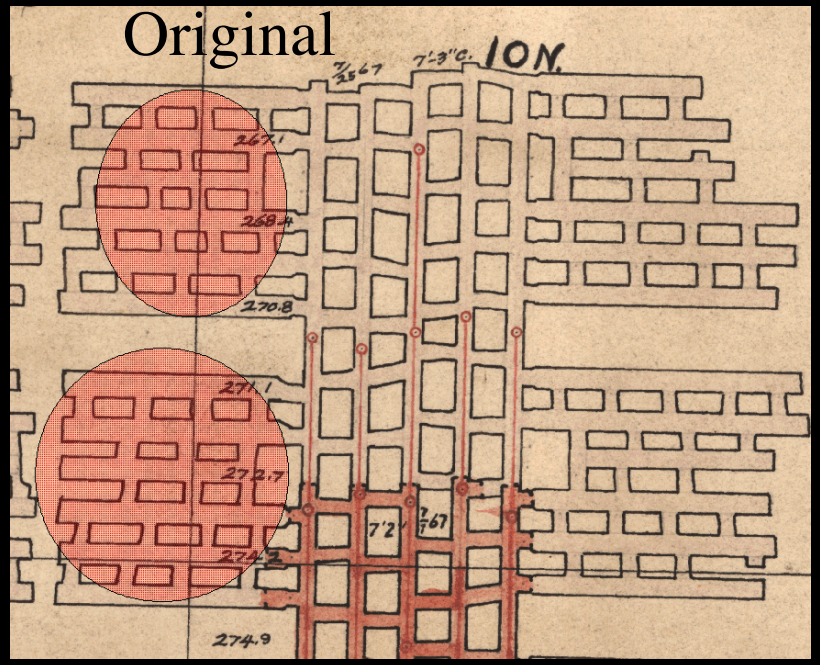
Mine Map Preservation Project

- Create high resolution scanned images
- Attach reference information to scanned image.
- Convert Raster image to Vector image.

Mine Map Preservation Project

- Create high resolution scanned images
- Attach reference information to scanned image.
- Convert Raster image to Vector image
- Develop Web Site ?

1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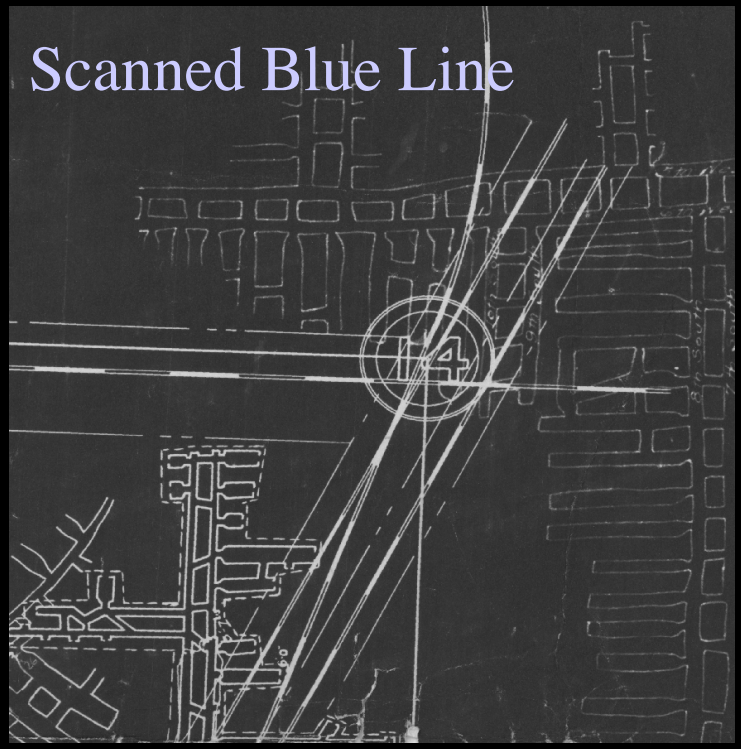

Scanned Blue Line

3

Microfiche

4

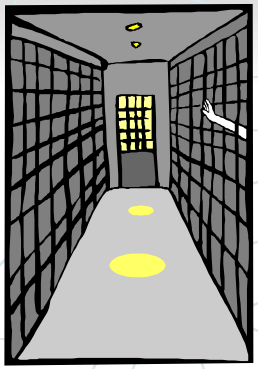
CD collection

Return
to
Contents

Kentucky's Mine Map Information System

Martin County Coal Slurry Spill -October 11, 2000

Quecreek Mine Inundation -July 24, 2002



Who Holds and Maintains Kentucky Mine Map Information?

Kentucky Department of Mines and Minerals

Kentucky Department of Surface Mining and Reclamation Enforcement

Kentucky Revenue Cabinet

Office of Surface Mining

MSHA

Kentucky Geological Survey

Kentucky Department of Mines and Minerals

Most complete collection of large-scale underground mine maps

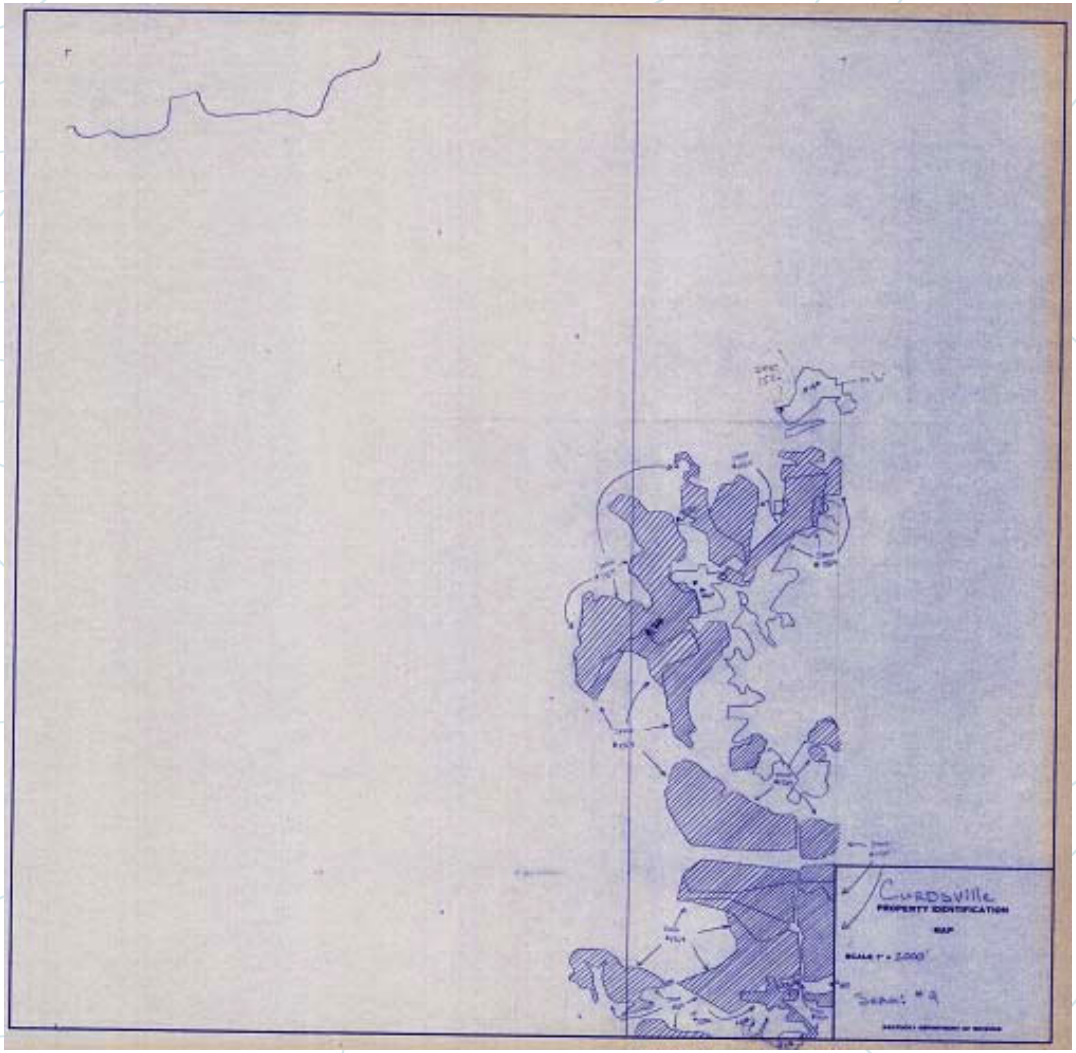
Over 30,000 distinct mines
Each with annual maps

Identified by unique State File Number

Kentucky Department of Mines and Minerals

1:24,000 Mine Outline
Mylar Overlays

Original base for
Revenue Cabinet
GIS



Kentucky Department of Mines and Minerals

Mine Map Database

Seagate ActiveX Viewer - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Back Search Favorites Media

Address http://minemaps.ky.gov/Minereports/SimpleADOMSSQL.ASP?FileNum=18438 Go Links

200% 1 of 1

Preview

Mines and Minerals Annu

MINE NAME	COMPANY NAME	ADDRESS	CITY	STATE	ZIP
STATE FILE NO	18438				
COUNTY: PIKE					
NO 1					
SLEEPY HOLLOW	MISTY MOUNTAIN MINING IN	P O BOX 100	JONANCY	KY	4153
1	SISTER BEAR MINING INC	P O BOX 100	JONANCY	KY	4153
SLEEPY HOLLOW	MISTY MOUNTAIN MINING IN	P O BOX 100	JONANCY	KY	4153
	GRACE MINING INC	P O BOX 520	VIRGIE	KY	4157

Annual Report_TTX.AD_CITY (String)

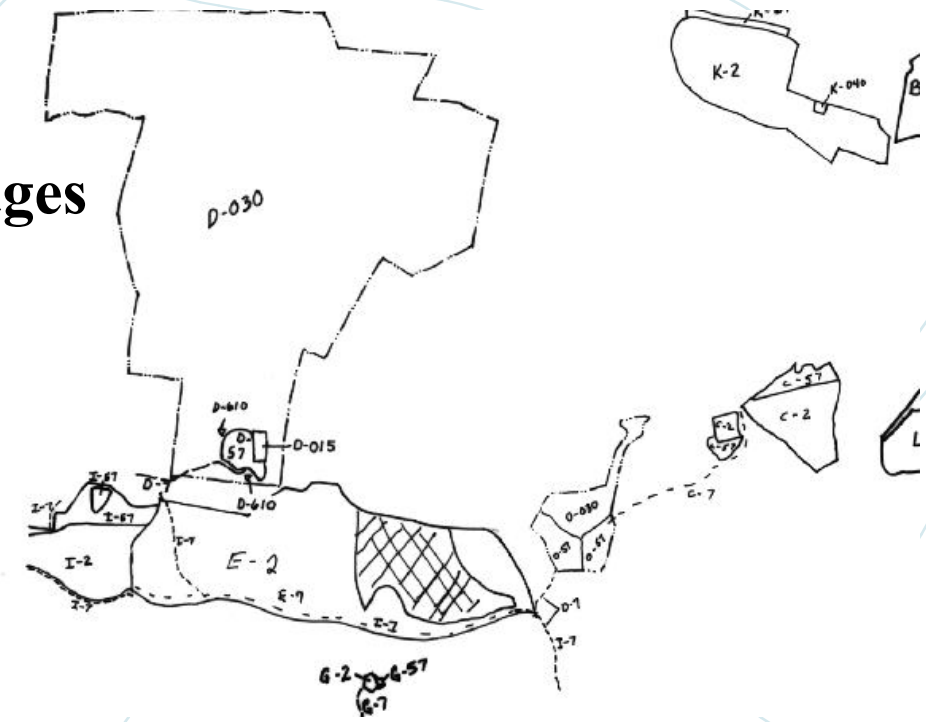
Done Internet

Kentucky Department for Surface Mining and Reclamation Enforcement DSMRE

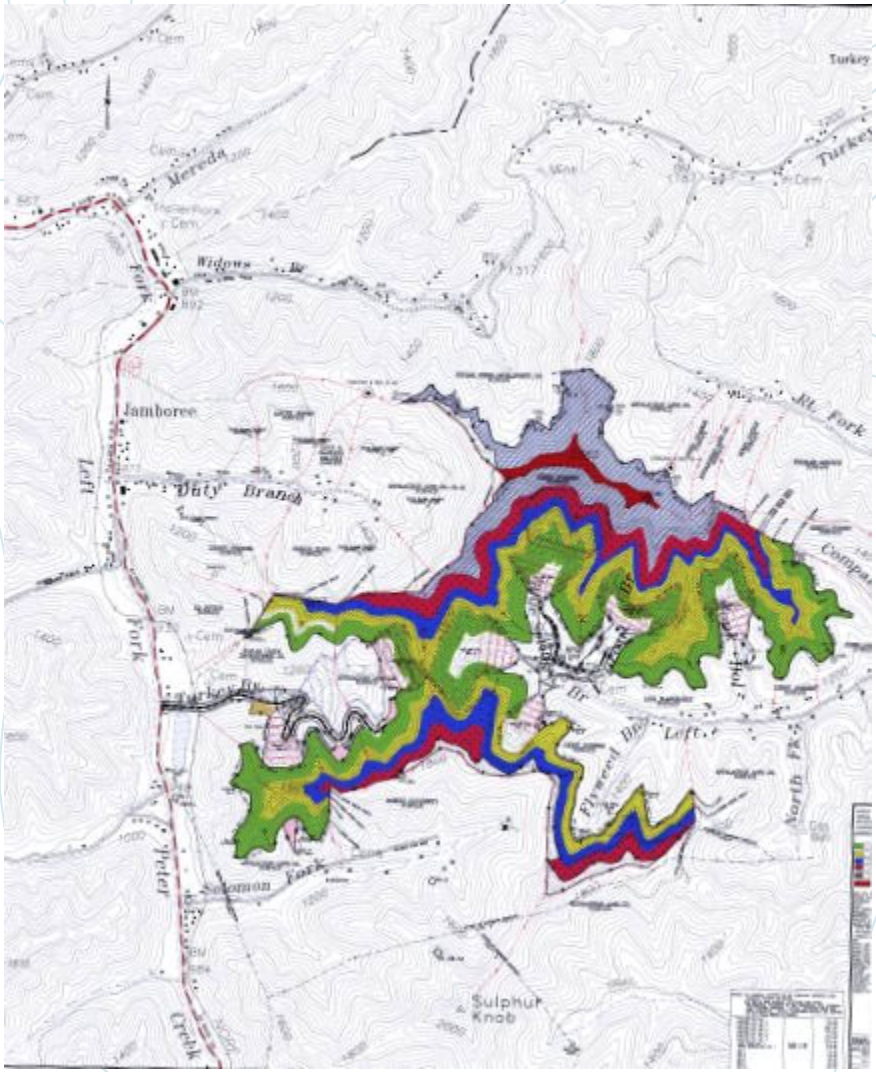
1:24,000 Permit Boundary Overlays

2000 quadrangle sheets

Scanned, georeferenced images



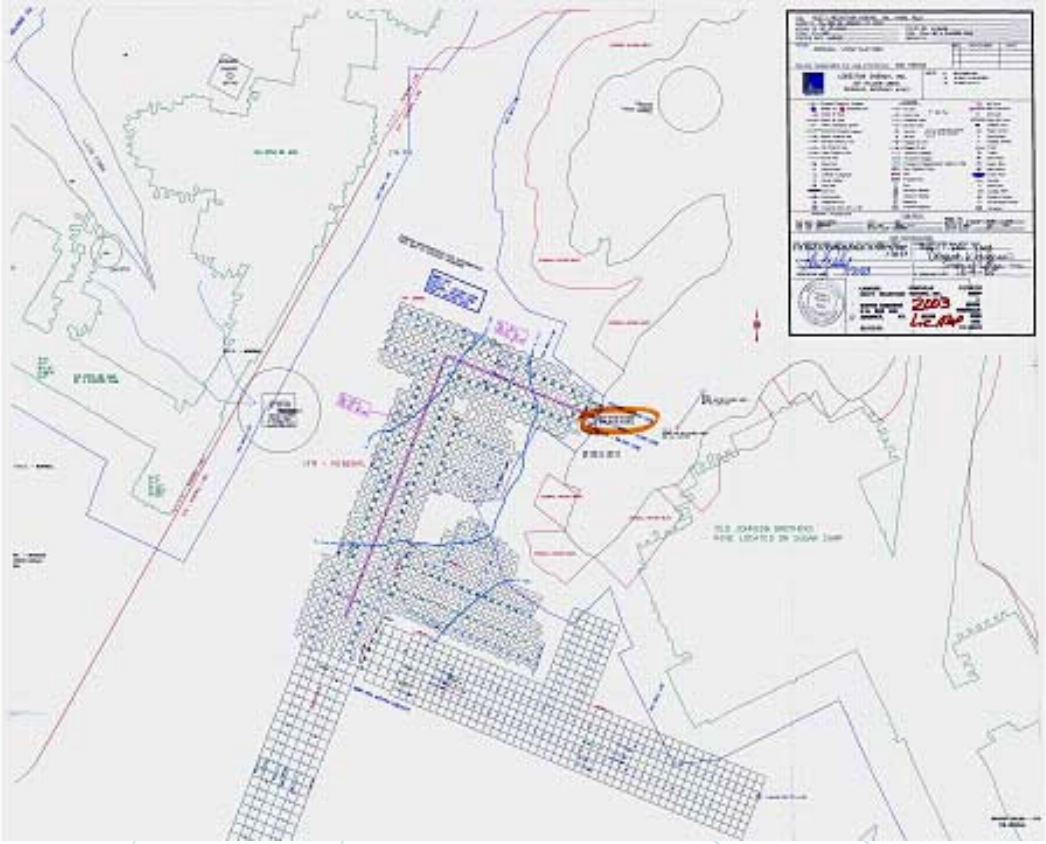
Kentucky Department of Surface Mining and Reclamation Enforcement



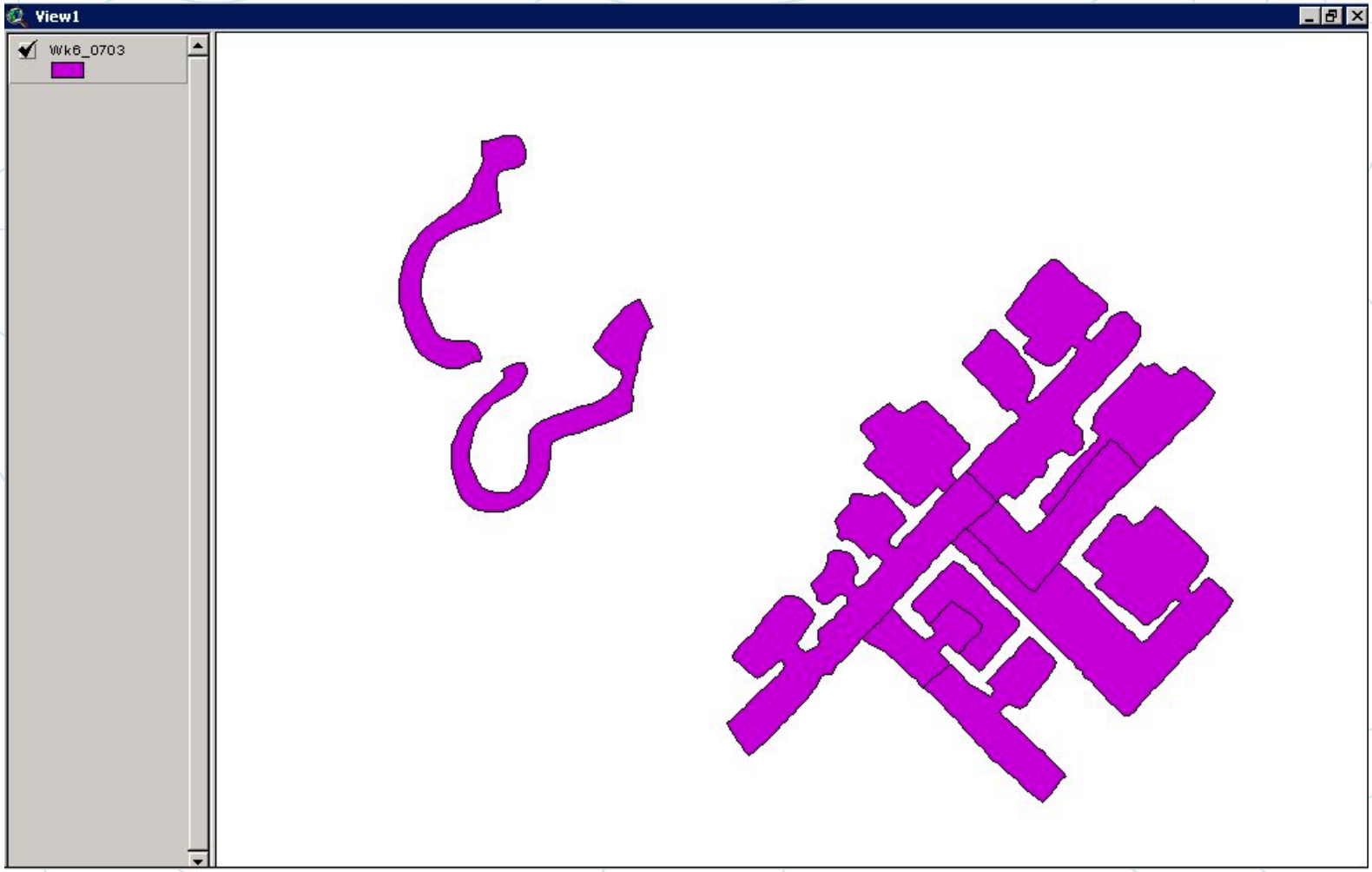
Mining and Reclamation Plan (MRP) maps are required to be submitted with any permit application for a coal mining operation in KY. These maps indicate where mining will occur.

Kentucky Department of Surface Mining and Reclamation Enforcement

Annual underground maps required since 1998

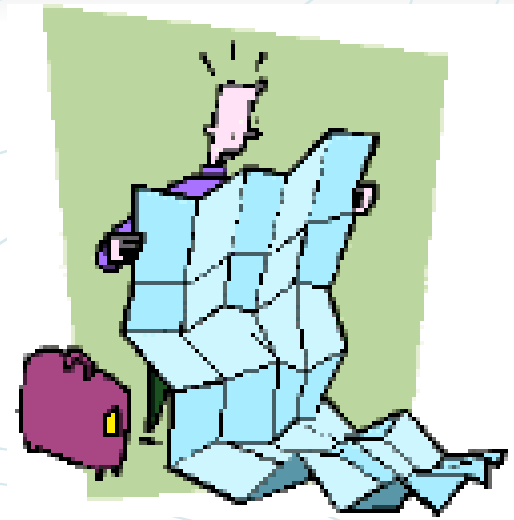


Kentucky Revenue Cabinet



Digital GIS of mine polygons
Over 60 layers by coal bed

Year 2001 Obstacles

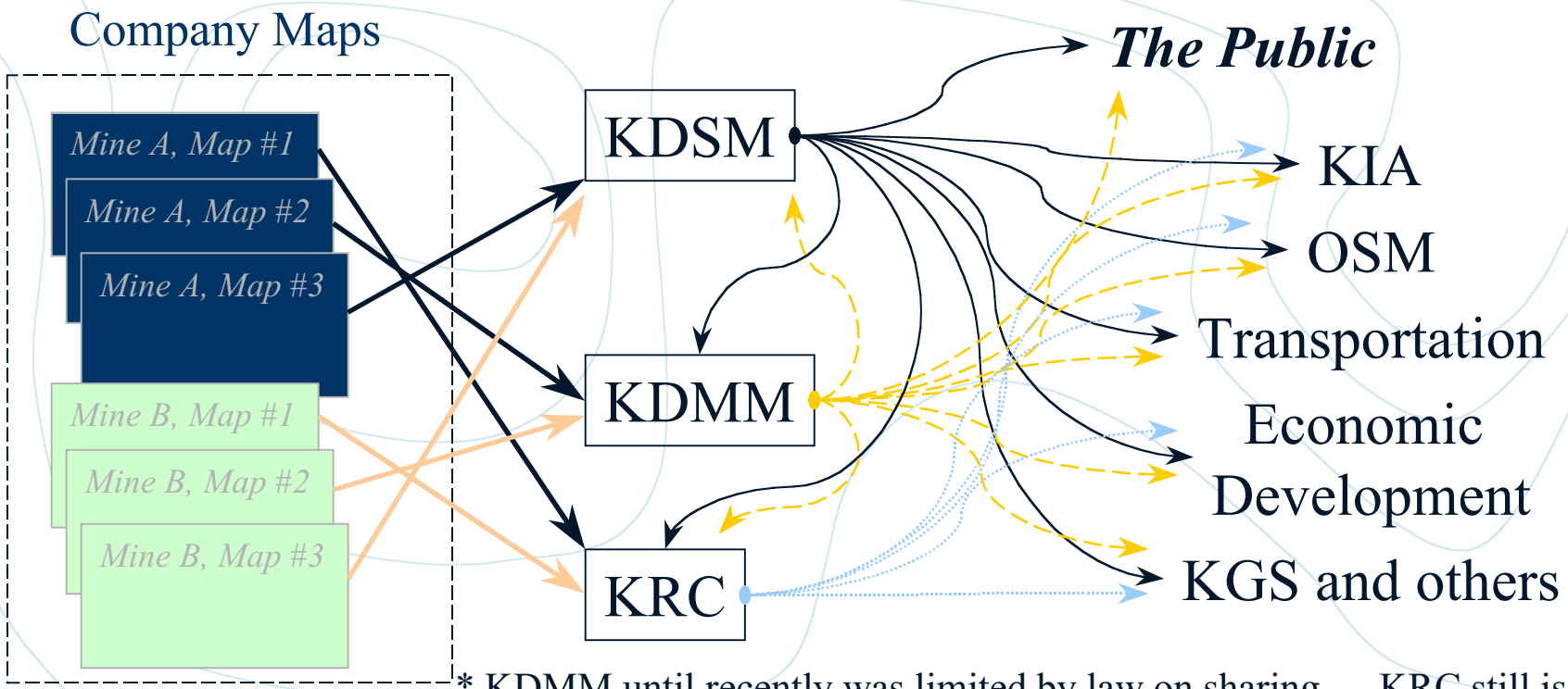


- Maps and data are not entirely in digital format

- Legal restrictions-
  - Mines and Minerals active maps [KRS 352.480]
  - KRC confidentiality restrictions [KRS 131.190 and KRS 131.081(15), KRS 131.355]

Current Information Flow

Companies must file separate maps. Agencies' needs are similar, but companies may not be reporting the same information to all agencies and agencies are currently limited in information sharing.



* KDMM until recently was limited by law on sharing…. KRC still is.

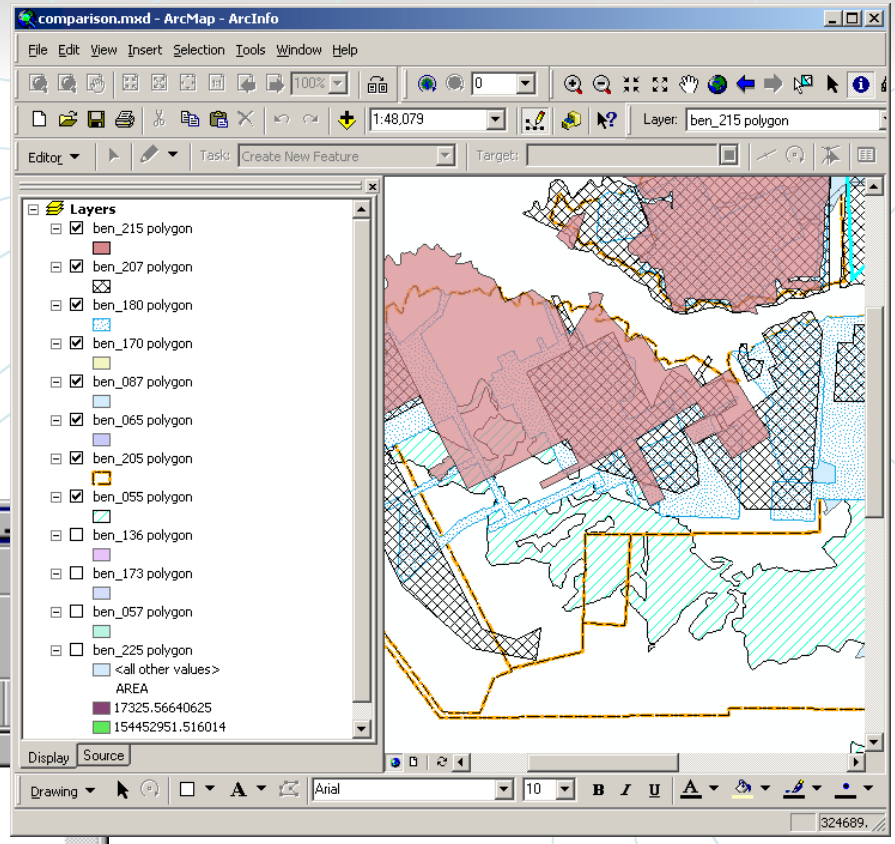
Kentucky Mine Map Initiative

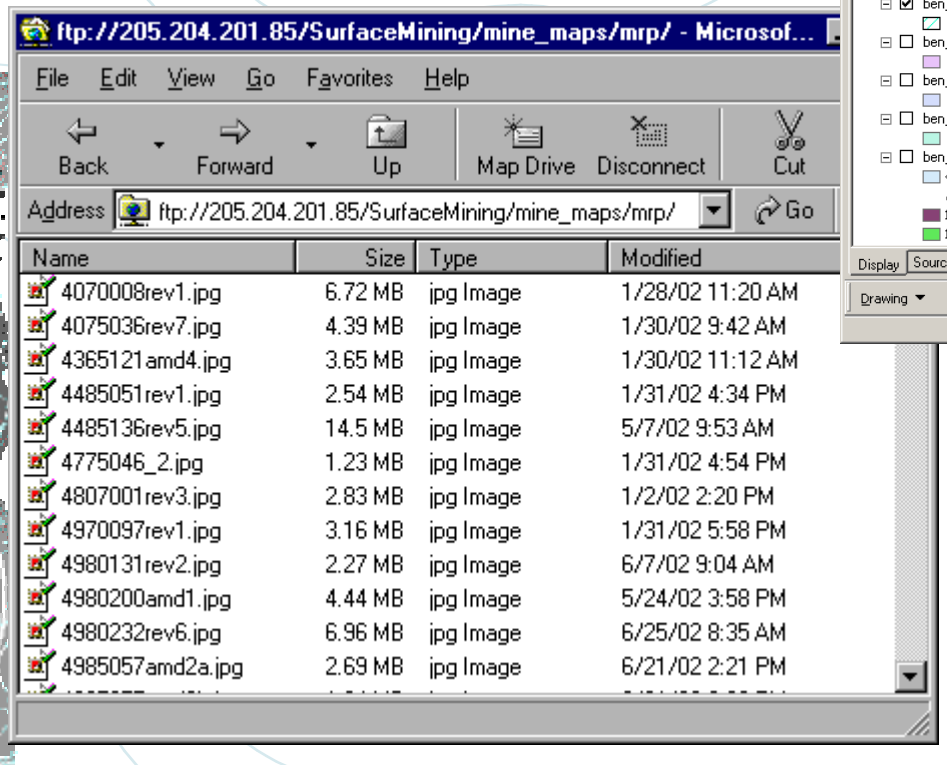
- State and Federal Agencies originally met in September 2001
- Legal and Technical teams were established
- Initial emphasis placed on legal impediments
- Technical development by regular meetings overseen by

Cabinet for Natural Resources

Proposed System

- Develop an ArcIMS web site to display available coal mine related data



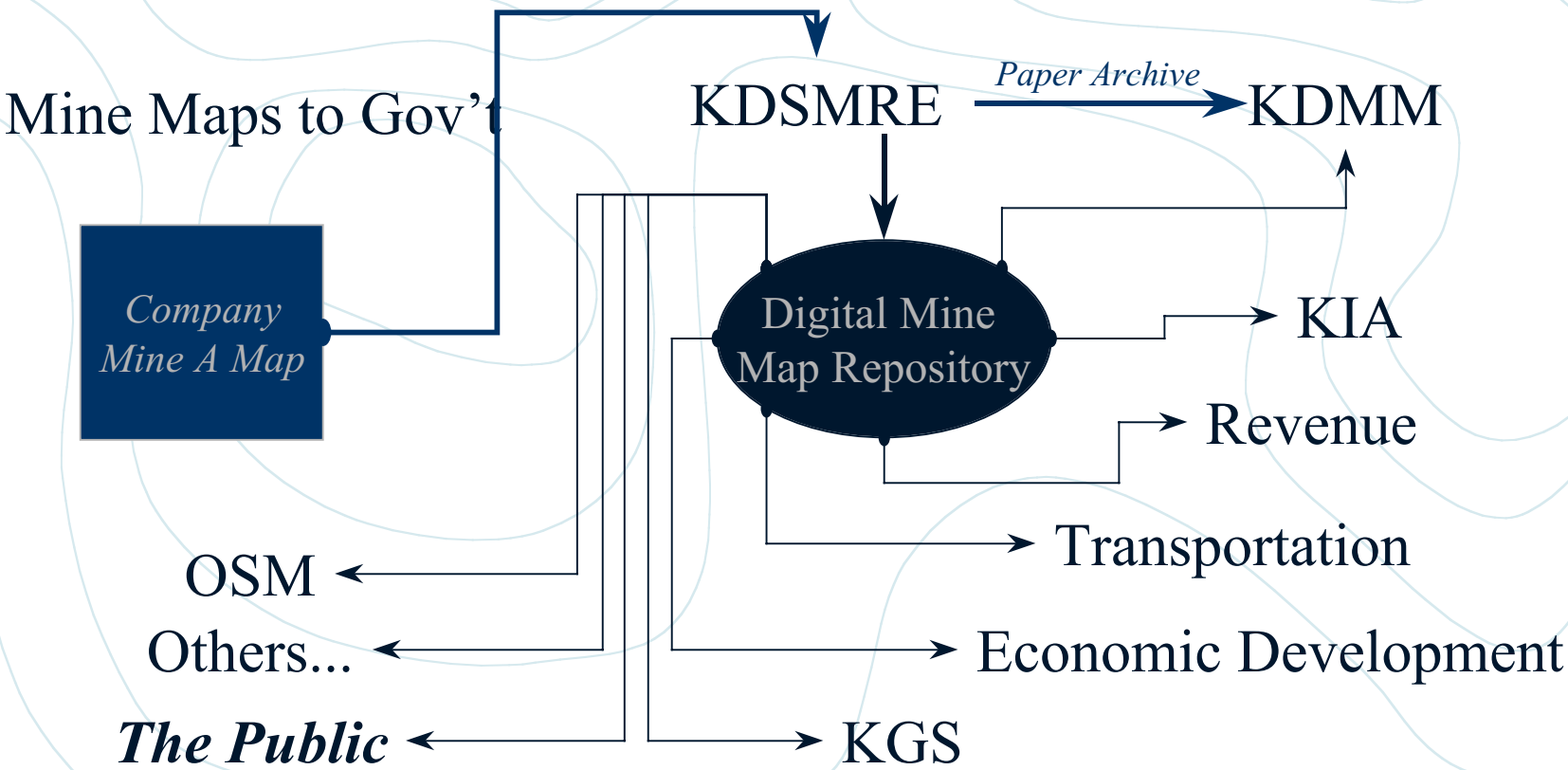


- Establish an FTP site for downloading electronic coal mine related data

Future Information Flow

Companies will file *one* map shared by all agencies. This will...

- Reduce reporting workload on companies
- Ensure agencies share common understanding about mine location/extent.
- Quicken access needed mine information.



Phased Development

- **Phase 1:** Prototype online ArcIMS with mine outlines and 2002 active mine scans
- **Phase 2:** ArcIMS customization and enhanced database connectivity
- **Phase 3-n:** Complete scanning and add links to related information

Successes!

- Technical and Legal teams have accomplished their tasks
- SB 165 passed allowing maps to be released
- MOAs allow Revenue Cabinet to share data with other agencies
- KRC, KDMM, and KDSMRE are scanning and verifying maps
- Phase I ArcIMS ready to announce

www.minemaps.ky.gov

Search KY: ? Options

KY Mine Mapping Information System

Home

Benefits

History

Project Team

Our Customers

Feedback/Links

Click here to access the internet mine map and FTP applications

Welcome to the Kentucky Mine Mapping Information System Home Page

Purpose

This web site was developed by a collaboration of Commonwealth and Federal agencies to provide online access to maps showing locations of coal mines in Kentucky.

Information Available

This Website provides Internet access to view and download (1) all known mined out areas (polygons) digitized by the Kentucky Revenue Cabinet (2) individual Mine reports from the Mines and Minerals database, and (3) Scanned images of Engineering drawings (mine maps) for year-end 2002 (2003 reporting year) active mines.

On-Line Internet mapping

There are two ways to access this information (1) an on-line Internet map for viewing and download and (2) a directly accessible FTP download site.

You have a choice of two on-line map services. The first map service is restricted to polygons derived from 2002 active mining and each of these polygons has a scanned image of the engineering drawings submitted for reporting year 2003 in addition to the mine report. The second map service shows known mined out extents and is organized by coal seam. You can access mine reports from many of these polygons.

Kentucky Mine Mapping Information System

Internet Mine Map Application
(Search Page)

Home	Benefits	History	Project Team	Our Customers	Feedback / Links

Important Note: The mined out area polygons were derived from mine engineering drawings/maps, submitted to the Kentucky Revenue Cabinet and the Kentucky Department for Mines and Minerals. These polygons were digitized from varying source materials at differing scales and stored at 1:24,000 scale . The accuracy of the source maps has not been verified. These data therefore would not exceed the current National Map Standard for 1:24,000 scale maps which states that they are accurate to within +/- 40 feet horizontally (from a well defined location). These data should not be considered complete and should not be used as the sole basis for any determination. These data do not constitute all coal mining voids nor does it show naturally occurring voids or other underground mining voids (e.g. stone quarries). These data are being made available as a reference and as a first resource in determining mine voids in Kentucky and any determination made from this data should be confirmed or denied by either examining the archive maps at the Kentucky Department for Mines and Minerals or by doing local geotechnical investigations.

The following Search options are available to assist you in finding your area of interest:

Active Coal Mine Areas

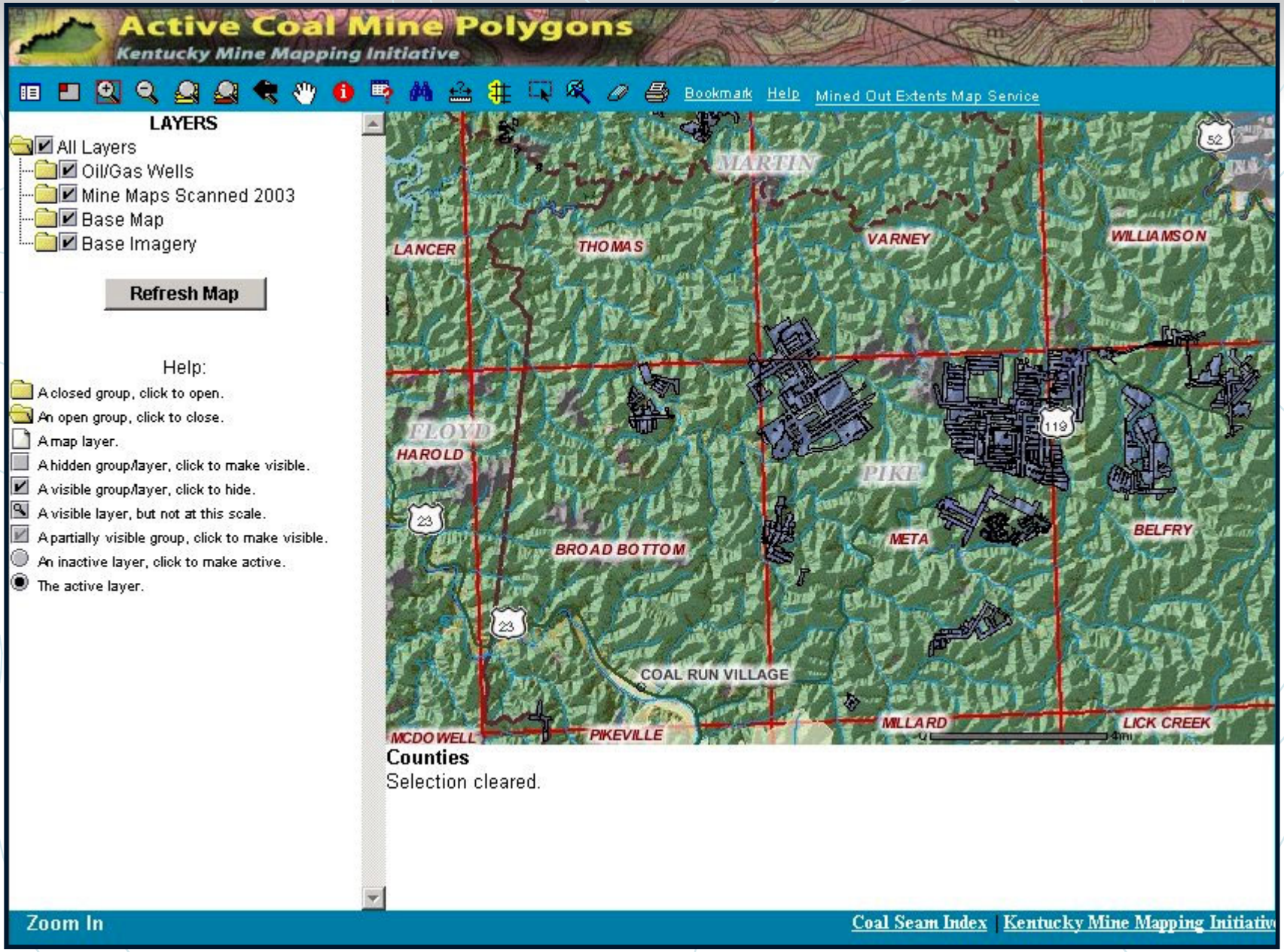
For access to an on-line map of currently active mining, as of reporting year 2003, choose one of the following search methods.
Note: Each of these polygons is linked to a corresponding Mine report and scanned image of the engineering drawings (map) for the mine.

Search by Map	Search by County (Eastern Coal Field)	Search by County (Western Coal Field)	Search by 7.5 ' Quadrangle
Choose an area...	Choose a County...	Choose a County...	Choose a 7.5' Quad...

Known Mined Out Areas by Coal Seam

For access to an on-line map of all historic known mined out areas, organized by coal seam, choose one of the following search methods. Note: a mine report for the Mines and Minerals database is available for approximately 12,000 of the 43,000 polygons.

Search by Map	Search by County (Eastern Coal Field)	Search by County (Western Coal Field)	Search by 7.5 ' Quadrangle


Active Coal Mine Polygons
Kentucky Mine Mapping Initiative
Bookmark
Help
Mined Out Extents Map Service
LAYERS
All Layers
Oil/Gas Wells
Mine Maps Scanned 2003
Base Map
Base Imagery
Refresh Map
Help:
A closed group, click to open.
An open group, click to close.
A map layer.
A hidden group/layer, click to make visible.
A visible group/layer, click to hide.
A visible layer, but not at this scale.
A partially visible group, click to make visible.
An inactive layer, click to make active.
The active layer.
MARTIN
LANCER
THOMAS
VARNEY
WILLIAMSON
FLOYD
HAROLD
PIKE
BROAD BOTTOM
META
BELFRY
COAL RUN VILLAGE
MCDOWELL
PIKEVILLE
MILLARD
LICK CREEK
52
119
23
Counties
Selection cleared.
Zoom In
Coal Seam Index
Kentucky Mine Mapping Initiativ

Known Mined Out Extents by Coal Seam

Kentucky Mine Mapping Initiative

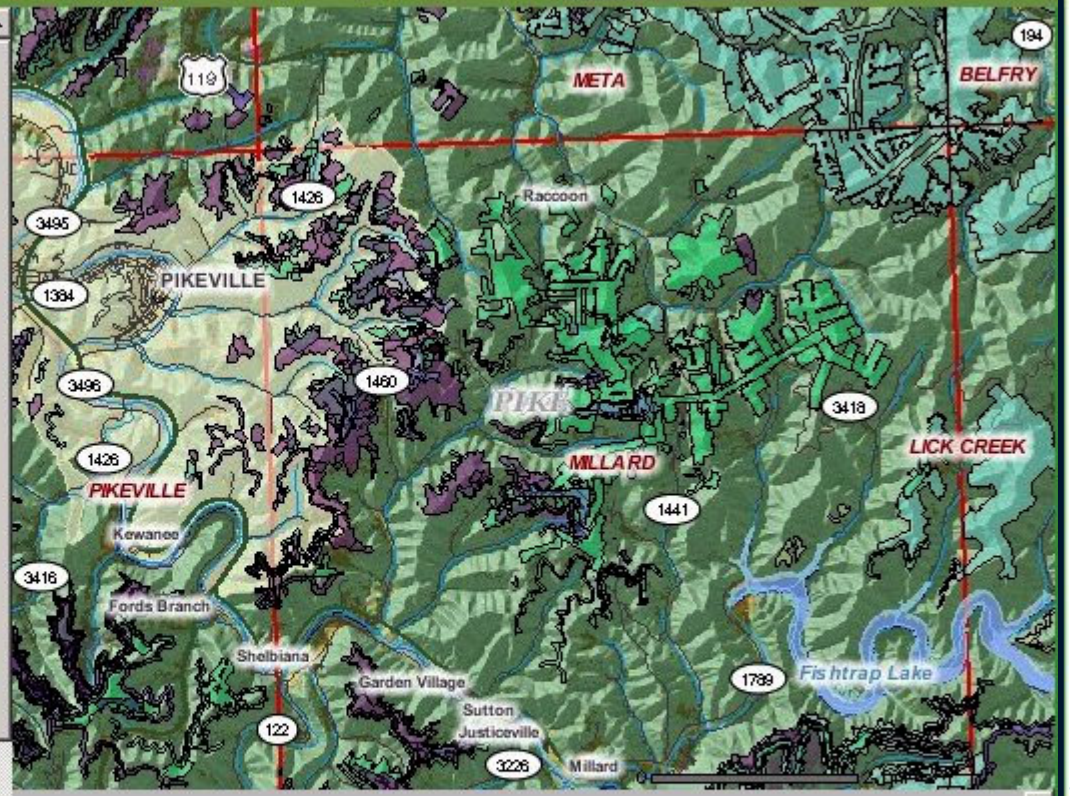
Bookmark Help Active Coal Mine Map Service

LAYERS

- All Layers
  - Oil/Gas Wells
  - Eastern Coal seams
  - Western Coal seams
  - Base Map
    - Incorporated Cities
    - Populated Places (GNI
    - Major Roads
    - State Roads
    - Local Roads
    - Time Zone Boundary
    - NHD (100k)
    - NHD (24k)
    - Ohio River
    - Lakes/Reservoirs
    - City Boundaries
    - Quad Boundaries
    - Counties
  - Base Imagery
    - Shaded Relief
    - LANDCOVER
    - SPOT 10 Meter
    - KRGs
    - Ortholmagery

Refresh Map

Help:



seam210

Rec	AREA	PERIMETER	SEAM210_	SEAM210_ID	QUAD	SEAM	MFLAG	REPORTED	MINE_TYPI
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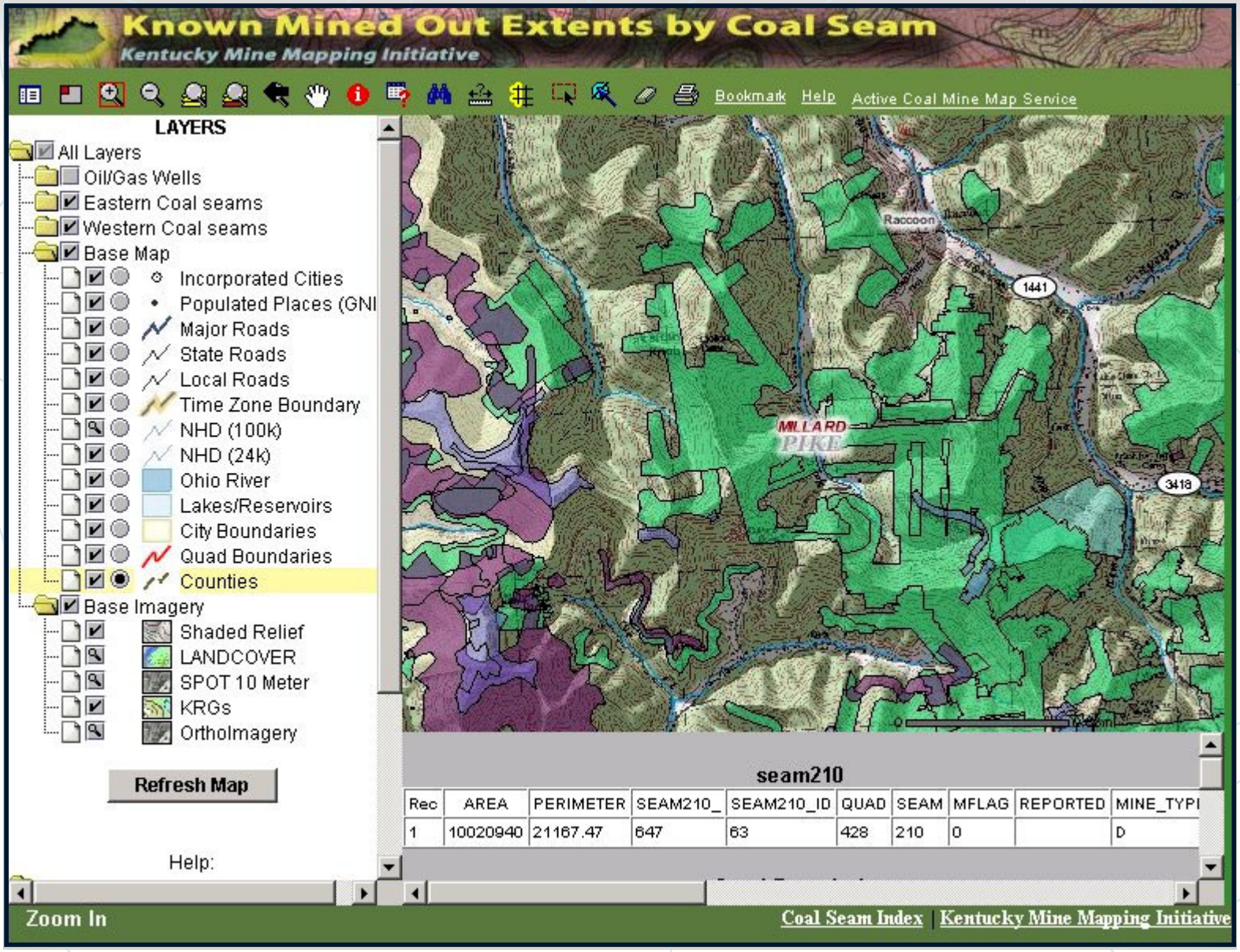
ID Visible Features

Coal Seam Index | Kentucky Mine Mapping Initiativ


Known Mined Out Extents by Coal Seam
Kentucky Mine Mapping Initiative
Bookmark
Help
Active Coal Mine Map Service
LAYERS
All Layers
Oil/Gas Wells
Eastern Coal seams
Western Coal seams
Base Map
Incorporated Cities
Populated Places (GNI
Major Roads
State Roads
Local Roads
Time Zone Boundary
NHD (100k)
NHD (24k)
Ohio River
Lakes/Reservoirs
City Boundaries
Quad Boundaries
Counties
Base Imagery
Shaded Relief
LANDCOVER
SPOT 10 Meter
KRGs
OrthoImagery
Refresh Map
Help:
Raccoon
1441
MILLARD
PIKE
3418
seam210
Rec | AREA | PERIMETER | SEAM210_ | SEAM210_ID | QUAD | SEAM | MFLAG | REPORTED | MINE_TYPI
1 | 10020940 | 21167.47 | 647 | 63 | 428 | 210 | 0 | | D
Zoom In
Coal Seam Index | Kentucky Mine Mapping Initiative

Available Documents

You have "identified" the polygon for Kentucky State File number 18083.
The State File Number is a unique number assigned by the Department of Mines and Minerals to all coal mines licensed by KDMM in Kentucky.

Detailed mine reports are available for most, but not all file numbers. If a report is available you may view it by clicking on the link provided below. You may print a copy of the report locally by using the print button provided (not the browser print feature).

Detailed scanned images of engineering mine drawings are available for mines active during 2002. These maps are those submitted to Kentucky Department of Mines and Minerals for the 2003 reporting year. The maps are incorporated into "Zip" files and include an associated "world" file, which provides geographic reference. Some "Zip" containers include multiple maps for the same File Number. If maps are available for this File number you may access them by clicking on the link provided below.

Data Reporting for this State File Number is currently unavailable.

"Click" to View Mine Image

Version 1.4.3 September 23, 2003

Kentucky Mine Mapping Information System - FTP Download Page - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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Address http://www.minemaps.ky.gov/ftpdownload.htm Go Links

Kentucky Mine Mapping Information System

FTP Download Page

Home	Benefits	History	Project Team	Our Customers	Feedback / Links

For direct access to the FTP site to download East and West coalfield polygons and scanned Engineering Drawings (Mine Maps) choose one of the following. Note that you will need to know the State File Number to download the correct Engineering Drawings.

Eastern Coal Field Seams (Zipped Shapefiles - 25.5mb)	Western Coal Field Seams (Zipped Shapefiles - 3.25mb)	2003 Scanned Mine Maps (.tif images with world files)	

Internet

Next Phases

- Continue Scanning Final and Last Maps
- Link All Mine Outlines to Image Files and Database
- Customise ArcIMS Functionality
- Secure Ongoing Funding for Development and Maintenance

Estimated Development Time and Costs

- **Shared Project Manager** - $100,000 annually
- **ArcIMS Site** – Startup costs $50,000 – paid
  Annual Ongoing costs of operation $35,000
- Annual cost of additional **software development** $50,000
- Cost of annually **scanning** maps and back-file conversion of last map for every mine: $90,000 includes 2 geo-processors
- Est. time for **scanning all paper maps** – 2 years if outsourced
  Cost: $500,000 – 1,000,000 (does not have to be done to provide for a complete mine detail coverage)

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Mine Map Archiving in Utah

IMCC/MSHA Benchmarking Workshop

Louisville, Kentucky

October 15-16, 2003

Wayne Western, Reclamation Specialist

Utah Division of Oil and Gas and Mining

Objectives

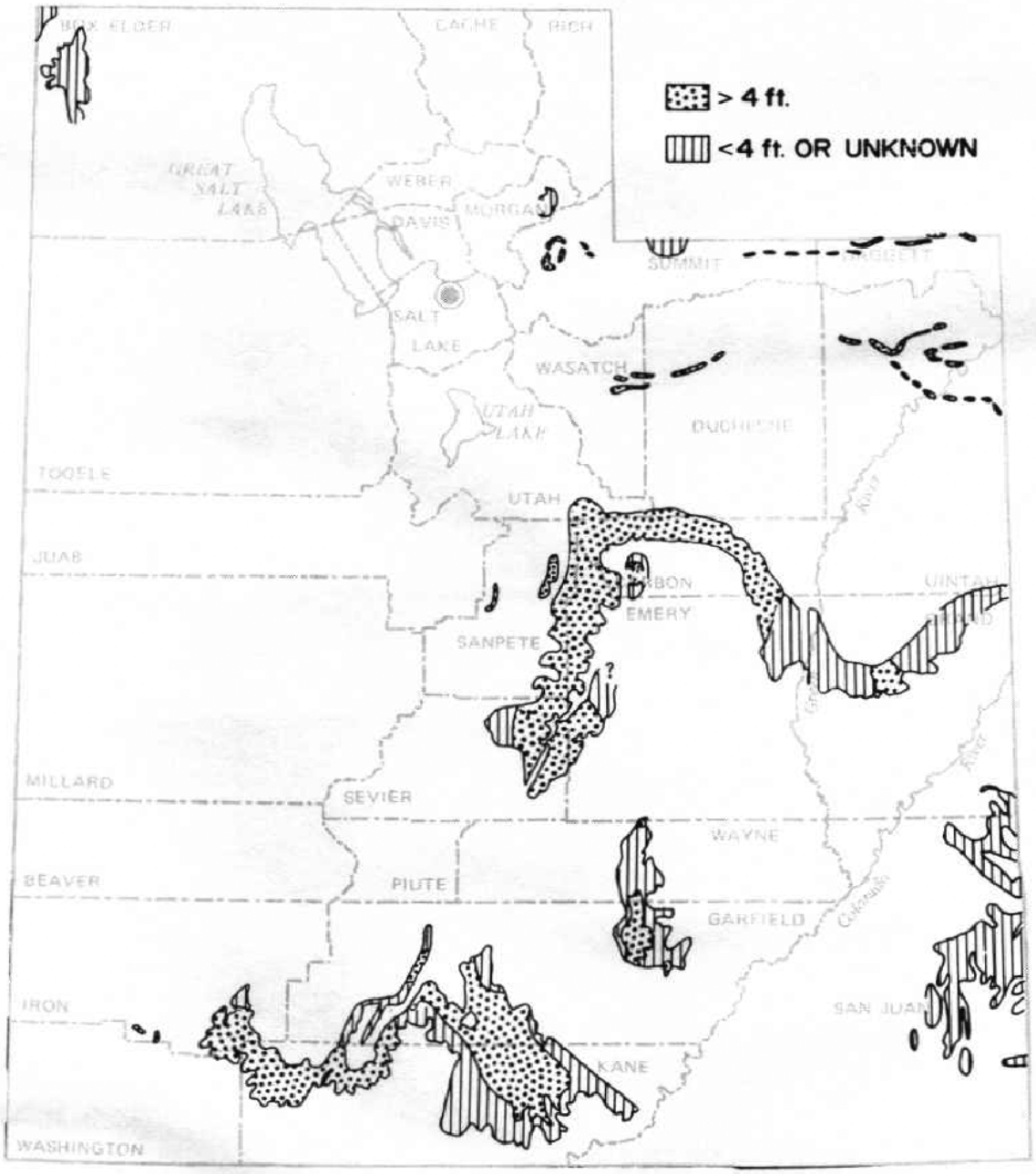
- Understand the history of mine mapping in Utah- accuracy and limitations
- Importance of mine maps
- Gathering, sharing and storing information

To Understand Utah's Program - Must Understand Utah's:

- Coal fields
- Coal mining history
- Coal industry
- Regulatory program

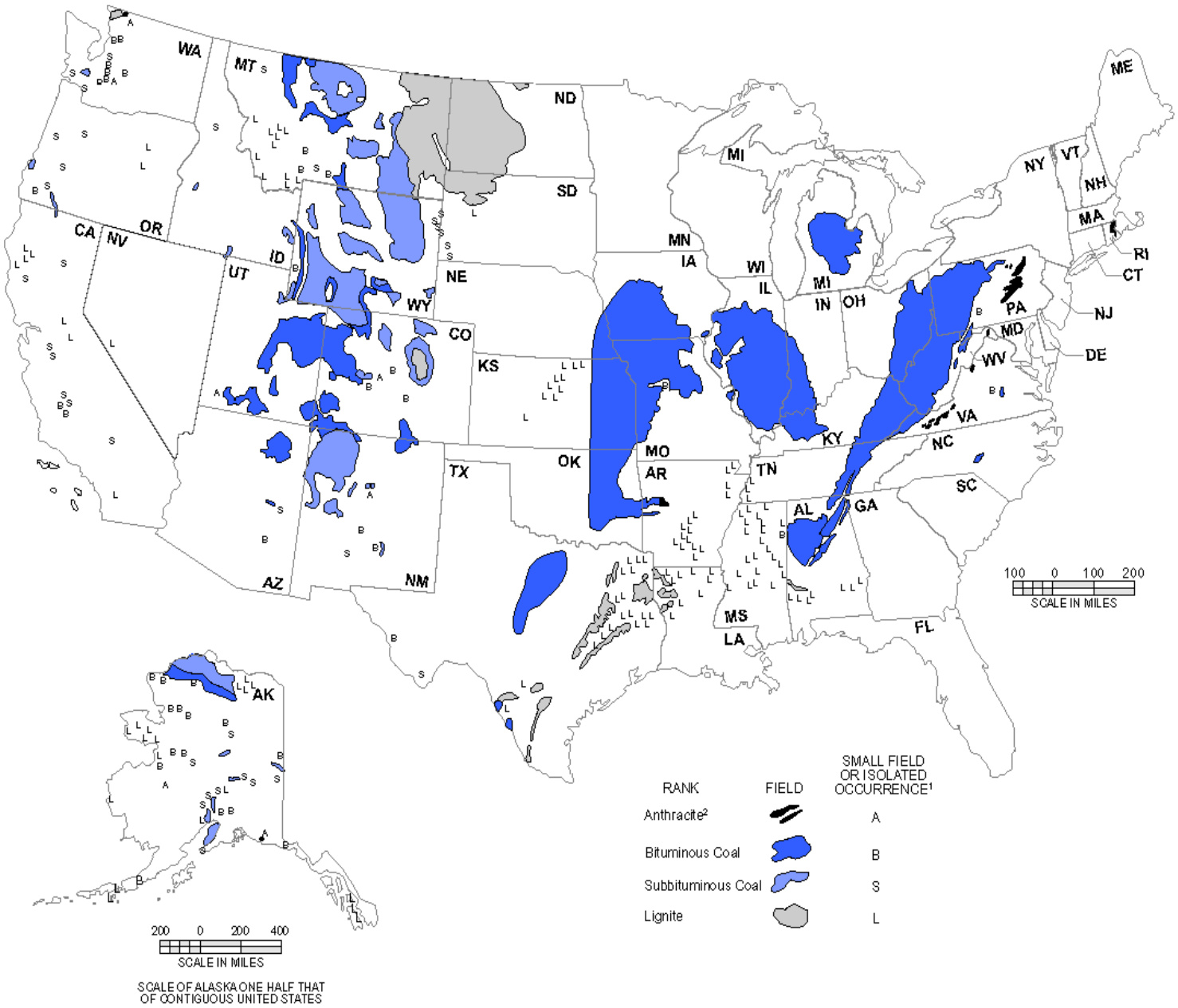
Utah's Coal Reserves

- Economic cut off beds - greater than 4 feet in thickness/ under less than 3,000 feet of cover
- 4% of the State is underlain with coal reserves
- 80% of recoverable coal in three coalfields
- Wasatch and Book Cliffs fields developed
- Kaiparowits Plateau undeveloped - transportation problems and environmental concerns



Areas in Utah with coal less than 3,000 feet below the surface.

Figure 1. Coal-Bearing Areas of the United States



Coalfields of West Compared to Utah

- 1/3 of nation's coal produced in Wyoming
- 2.4% of nation's coal produced in Utah
- Surface mines produce most western coal
- All active mines in Utah - underground
- 24% of the nation's coal reserves - Montana
- 1% of nation's coal reserves - Utah

Western State's Coal Production 2001 in Million Tons

Rank	State	Production	% of U.S. Total
1	Wyoming	368.8	32.8%
6	Montana	39.1	3.5%
9	Colorado	33.3	3.0%
12	New Mexico	29.6	2.6%
13	Utah	27.0	2.4%
16	Arizona	13.4	1.2%

Coal Production by Method Million Short Tons 2001

State	Surface	Underground	Total
Arizona	12.961	0	12.961
Colorado	9.431	22.958	32.389
Montana	32.298	0	32.298
New Mexico	17.409	1.200	18.609
Utah	0.019	25.490	26.148
Wyoming	350.780	1.024	351.805

Western Coal Reserves in Million Short Tons

Rank	State	Underground	Surface	Total	% of U.S.
1	Montana	70,958	48,465	119,423	23.91%
3	Wyoming	42,501	23,257	65,758	13.17%
8	Colorado	11,721	4,771	16,493	3.30%
10	New Mexico	6,202	6,085	12,287	2.46%
15	Utah	5,317	268	5,585	1.12%
28	Arizona	102	0	102	.02%
31	Idaho	4	0	4	.00%

Utah Coal Mining 1847-1905

- 1847 - Settlers arrive in Utah Territory
- 1852-1853 - Coal discovered near Cedar City used in iron industry
- 1854 - Reward for discovery of coal with in 40 mile of Salt Lake City
- Early 1860's - Coalville field developed
- 1869 - Union Pacific monopolizes coal
- 1870's - Settlers develop coal for local markets
- 1881- D&RG enters Utah develops Wasatch and Book Cliff fields
- By1900 total production was 1 million tons

Utah Coal Mining 1906 -1941

- Trust busting between 1906 and 1912 -coal companies independent of railroads
- Midsize independent coal mines
- WWI spurs coal development
- Production plateaus in 1920's
- Depression cause fall in production/gradual recovery

Utah Coal Mining 1942-1969

- WWII spurs increase in production
- Coal market stable during 1950's
- Production falls in 1957 due to competition from natural gas and diesel
- Projected reserves - 200 years

Utah Coal Mining 1970's

- Environmental regulations and groups stop mining in the Kaiparowits Plateau
- SMCRA
- Small mining operations cease
- Coal production increases

History of Coal Mining 1980-Present

- 1980 first unsuitable lands for mining
- Coal production increase in 1980's then hits a plateau in the 1990's,
- Wasatch and Book Cliff fields mature
- Grand Staircase-Escalante
- Mines become interdependent
- Dugout Canyon incident

Dugout Canyon Mine – Mid 1950's- 1998

- Knight-Ideal Mine operated mid 1950's to late 1960's
- 1995 Canyon Fuel begins exploration program
- Acquired mine map dated November 25, 1965 supposedly showed all workings
- Searched state and federal records no new maps
- Contacted previous employees of Knight-Ideal
- Permit granted 1998

Dugout Canyon Mine Incident July 29, 2002

- December 2001 rock slope from Rock Canyon to Gilson Seam began
- April 2002 mining begins in Gilson Seam
- No mining within 200 feet of abandoned works
- Water seeped from coal as mining progressed westward at first no concern
- Somorset, Pennsylvania

Dugout Canyon Mine Incident - July 30, 2002

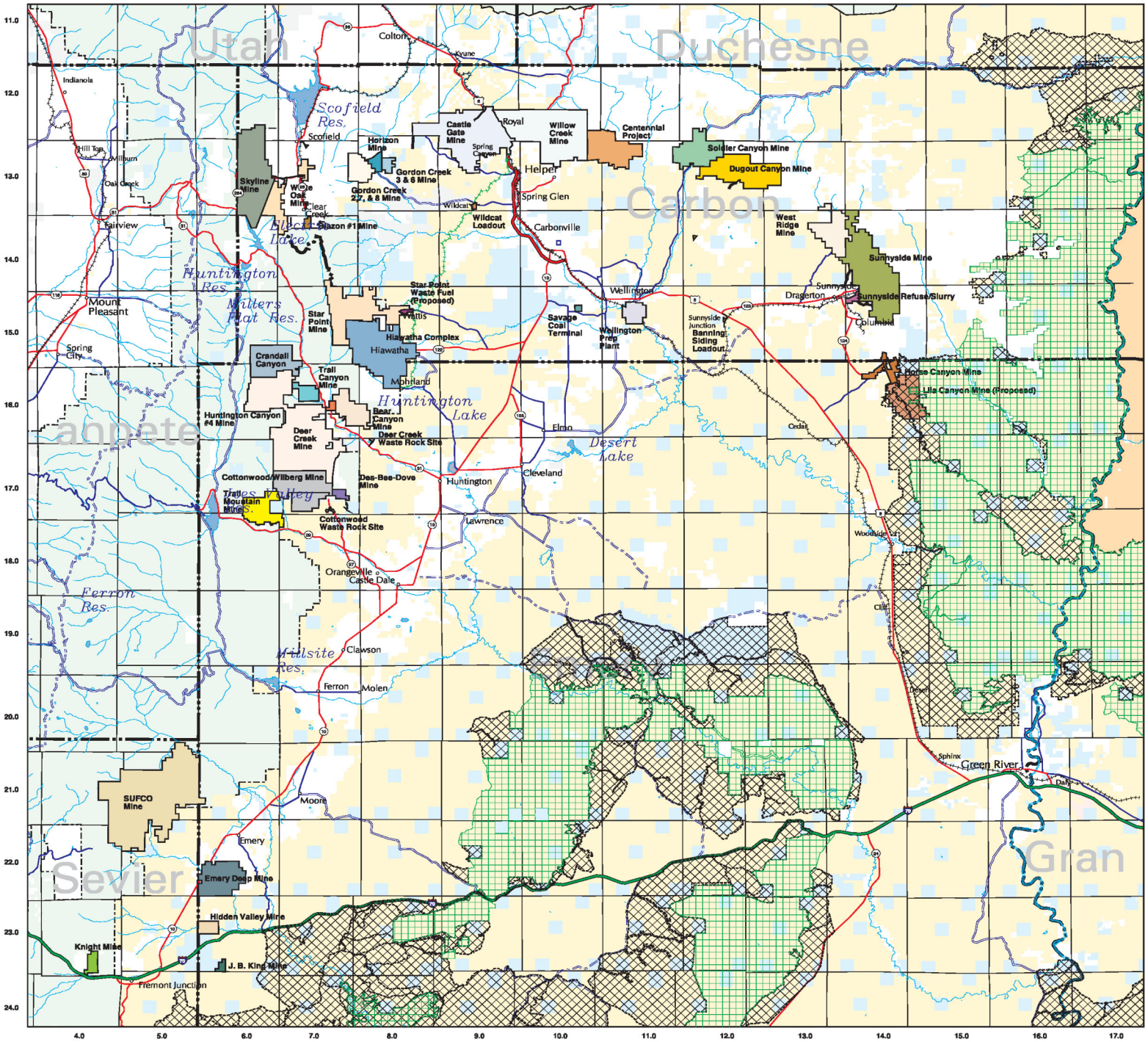
- Mine Mgr. contacts surveyor of Knight-Ideal mine - thought map was accurate
- Mine Mgr. visits BLM to recheck maps
- BLM staff finds another map tube
- Active workings within 20 feet of flooded mine works!!!!!
- 3:45 pm mine evacuation begins

Dugout Mine Incident – August 2002

- Emergency drilling program to drain old works
- Workers saved
- $3,000,000 in equipment saved
- $700,000 in development saved

Future of Mining in Utah

- New mines begin where old mines ended
- Need for mine maps increases
- Mine disaster could have major impacts on Utah economy


Utah
Duchesne
Carbon
Sevier
Gran
Colton
Kyune
Indianola
Scofield Res.
Scofield
Hill Top
Wilburn
Oak Creek
Fairview
Skyline Mine
Wide Oak Mine
Clear Creek
Horizon Mine
Gordon Creek 3 & 6 Mine
Gordon Creek 2,7, & 8 Mine
Spring Canyon
Castle Gate Mine
Royal
Willow Creek Mine
Centennial Project
Soldier Canyon Mine
Dugout Canyon Mine
Helper
Spring Glen
Wildcat
Wildcat Loadout
Carbonville
Spazon #1 Mine
Huntington Res.
Millers Flat Res.
Mount Pleasant
Spring City
Star Point Waste Fuel (Proposed)
Star Point Mine
Wattis
Hiawatha Complex
Hiawatha
Crandall Canyon
Trail Canyon Mine
Mohrland
Huntington Canyon #4 Mine
Deer Creek Mine
Bear Canyon Mine
Deer Creek Waste Rock Site
Huntington Lake
Cottonwood/Wilberg Mine
Des-Bee-Dove Mine
Trail Mountain Mine
Cottonwood Waste Rock Site
Huntington
Lawrence
Orangeville
Castle Dale
Ferron Res.
Millsite Res.
Clawson
Ferron
Molen
Moore
Emery
SUFCO Mine
Emery Deep Mine
Hidden Valley Mine
Knight Mine
J. B. King Mine
Fremont Junction
Wellington
Savage Coal Terminal
Wellington Prep Plant
Sunnyside Junction Banning Siding Loadout
West Ridge Mine
Sunnyside Mine
Sunnyside
Dragerton
Sunnyside Refuse/Slurry
Columbia
Horse Canyon Mine
Lila Canyon Mine (Proposed)
Elmo
Cedar
Desert Lake
Cleveland
Woodside
Cliff
Sphinx
Green River
Dalton
11.0
12.0
13.0
14.0
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16.0
17.0

Operator - Mine Maps

- Before 1869 coal mines were small, no maps
- Between 1870-1906 large railroad controlled mines that were mapped or small mines with no maps.
- 1906-mid 1970's Large company and independents mines have maps
- Late 1970's-Present all mines required to submit mine maps annually to DOGM

History of Regulations 1891-1975

- 1891- Congress passes mine safety for territories (Utah included)
- 1910 - Bureau of Mine (BOM) Established
- 1941-BOM begins inspections
- 1973 - MESA
- 1975 Utah Abandoned mines program

History of Regulations 1976-Present

- 1970's – 2000 Utah Industrial Commission
- 1977 SMCRA and MSHA
- 1979 Utah Coal Mining and Reclamation
- 1981 Utah Primacy
- 1980's AML begins inventorying state for coal mines

Regulatory Agencies – Mine Maps

- Before 1941 no maps
- 1941-1970's Bureau of Mines – OSM
- 1970's – Present State and Federal Agencies will have mine maps

Other Sources of Mine Maps

- Museums and historical groups collect maps
- BLM collects maps
- Utah Geologic Survey collect maps 1970's-1980's
- Companies, Employees, Consultants

Map Archive Status

- No agency has responsibility to archive mine
- No agency has authority to get maps
- UGS has maps indexed by township, range and section
- DOGM is starting informal program to collect maps.

Future of Archiving

- Scan maps from all agencies
- Develop long term storage and retrieval system
- Have miners review maps

Limitation

- Final mine map?
- Map accuracy
- Covering up mistakes
- Robbing Coal

Conclusions

- Accurate maps from closed mines have prevented mine disasters in Utah.
- Need for old mine maps will increase.
- Limited resources, lack of any agency having direct responsibility or authority to get old maps requires government agencies and industry to find and preserve old maps.

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Managing Underground Coal Mining Information in Iowa

Mary R. Howes
Iowa Department of Natural Resources
Iowa Geological Survey

**Intergovernmental Benchmarking Workshop on
Underground Mine Mapping, Louisville, Kentucky
October 15-16, 2003**

History of coal mining and information development

The earliest known coal production in Iowa occurred in the 1840s in southeastern Iowa along the Des Moines River. There was little recorded coal production until the 1880's when four railroads began laying track westward across the state toward Council Bluffs. After that time, coal production increased steadily to supply the railroads until it reached a peak in 1910. Thirty-four counties across southern and central Iowa have had at least some coal mining, although most of the activity was concentrated in a few counties, figure 1.

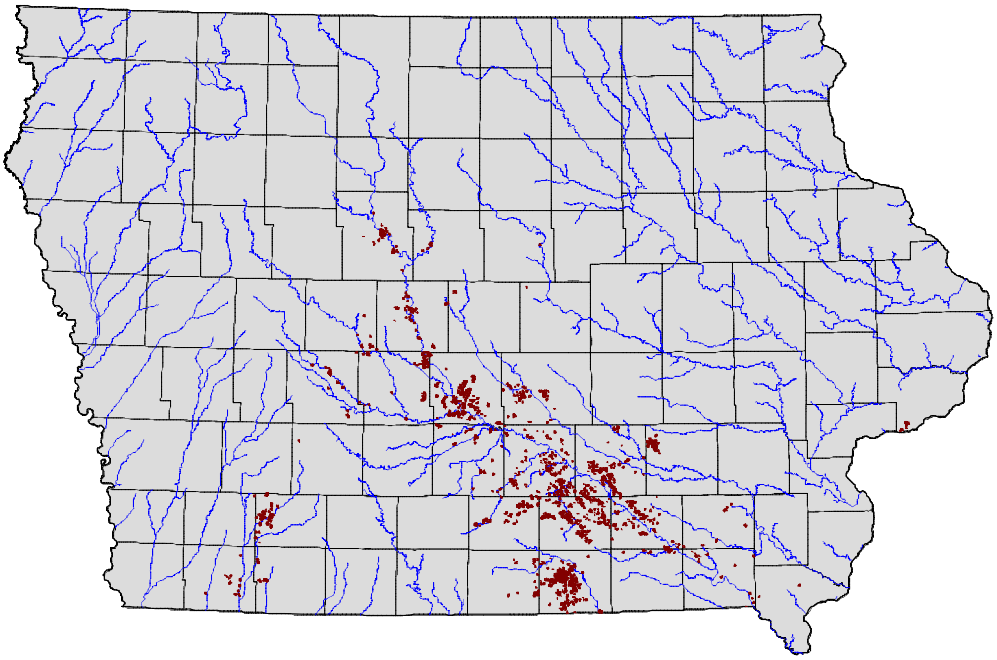

Figure 1. Distribution of coal mining in Iowa. (Size of mined areas has been exaggerated to create this map.)

Official record keeping began with the establishment of the Iowa State Mine Inspectors' Office in 1884. Its primary goal was overseeing the health and safety of the coal miners, however, in the process a great deal of information that described the mines was accumulated. The mine operators in Iowa were required to submit updated maps of the mine workings every two years for operating mines that regularly employed more than four miners. Statistics related to coal production were compiled along with detailed information about fatalities and serious injuries. The production statistics provide a general picture of the distribution of the coal industry across the state and its evolution over time. As coal production diminished the role of the State Mine Inspectors Office changed and the type of information collected changed as well. In the 1960's the

State Mine Inspector compiled recorded locations and extents of documented mines on paper maps and file cards. In 1973, the State Mine Inspectors' Office was closed and the maps and files were turned over to the Iowa Geological Survey (IGS) for use in the coal resources program underway at the time. At that point, there were approximately 1,550 mine maps in the collection. Most were detailed maps of mine works, although a few were regional maps, maps of surface facilities, or exploration maps. It was known that there were single maps for many mines and other mines were represented by multiple maps, however, it wasn't know how many of the documented abandoned mines were shown on any map.

Early coal mine data compilations

Coal mine data was compiled and outlines plotted on maps that were subsequently published in several documents before digital databases and GIS technology was available. A regional compilation prepared in 1977 by Iowa State University titled "Coal Mine Maps for Eight Iowa Counties" consists of township maps with mines plotted and a summary of the available data in a series of coded lists. In the late 1970's, coal mine-related subsidence in Des Moines, Iowa, prompted a detailed compilation of mine data for the Des Moines area that included plotting generalized outlines of the known mines on a 7.5' topographic map base. A similar compilation was created for What Cheer in 1984 in response to concerns about mine-subsidence related problems the small southeastern Iowa community was experiencing. In 1986, mine data was compiled and a map created for the extensively undermined area in and around Centerville in south central Iowa. The mapping for the Des Moines area was updated using digitized coal mine extents and shaft locations in 1989.

Coal mine database

IGS began development of a coal mine database with the primary purpose of cataloging the mine maps and other site information to allow a user to determine whether a specific site might be undermined and then to identify and locate any available maps. The work began in 1987 with funding provided by the Mines and Minerals Bureau of the Iowa Department of Agriculture. The initial database was a simple tabular file developed from a variety of sources including the mine map collection, maps and file information collected by the Office of State Mine Inspectors, published information, and IGS files. Data items that provided a physical description of the mine included location, depth, coal thickness, and probable coal seam identification, and years of operation of the mine. Bibliographical information was collected as well as descriptive information about the maps themselves. As the data were being compiled efforts were made to preserve the maps. Much of the work was accomplished by the Iowa State Historical Society (ISHS) with funding through a contract with IGS. ISHS used a combination of techniques to clean and preserve the maps depending on the material they were drawn on and then further protect them from damage in handling and storage by enclosing them in sealed polyester film envelopes. Special cabinets were designed and built to allow the maps to be stored flat. During the preservation process the maps were photographed using a camera that produced an 8-1/2 x 11 in. negative on high contrast, very fine grained black and white film to capture as much detail as possible. The collection of photographs is now used to respond to most inquiries for detailed information about a mine. Other maps were located that were in the possession of individuals or local historical preservation groups. Whenever it was possible, these were borrowed and photographed and the information on them was added the database.

The State Mine Inspectors' records indicate about 270 additional mines may have operated in Iowa with no more detailed locational information than a post office. Information about these mines was simply compiled as a list of names and post offices.

Developing the geographic information system component

The availability of the mine map photographs and the coal mine database allowed coal mines to be an early addition to the IGS Natural Resource Geographic Information System. The photographs of the maps were used to develop the geographic information system component of the database by digitizing the mined out areas, mine entrances, and other features for georeferencing the digitized outlines of the most recent revision of the map. Computer aided design software was used for this process. In most cases, the last revision of the map or most extensive map was digitized if multiple maps existed in the collection. Georeferencing the digitized mine outline was often complicated by the lack of reference points and scaling information on the maps.

Other known mine sites that were not mapped were digitized from 7.5' topographic maps prepared for coal resources studies. These included underground mines with known locations, but approximate extents from the State Mine Inspectors maps, mine locations available as points only from several sources, and surface mines. As the majority of information requests about past mining activity received by IGS are location-based, the GIS database has been an extremely valuable resource to quickly provide information about past coal mining activity.

Assessing the impact of historic coal mining activity

Development of the coal mine database allowed an evaluation of the impact of coal mining on Iowa that had not been possible in the past. About 3,100 mine sites were located during development of the database. Approximately 2,740 of these are underground mines. Location and mined extent is well documented for about 830 underground mine sites from mine maps. About 80 of the mapped mine sites lack reference points, although they have a location accurate to at least one section noted on the map. This group of mine sites was added to the GIS database with an attribute describing them as "mapped mines with poor locations". The two classes of mapped mines together comprise about 60,000 acres. An additional 370 underground mine sites have known locations, but only approximate extents. These mines add another 13,500 acres to the total area known to be affected by underground mining. Nearly half of the mine sites were documented as point locations only. The locational accuracy varies among the sites, however, a split into two classes emerged as the data was compiled. One group was found to be accurate to one section and the second to one quarter section or less. The area impacted by these last two classes of data is unknown.

The GIS component of the database also allows simple analysis of temporal changes and the mined areas' relationships to other geographic features. One significant change that emerged from a comparison of mine sites that were at least partially within an incorporated area in 1990 (377 mine sites) and 2000 (422 mine sites) suggests that urban areas are encroaching on land underlain by abandoned coal mines. Figure 2 illustrates an area in Iowa where urban development is spreading into an area with relatively shallow coal mines and possible subsidence problems have occurred.

Knowledge of local geology is key information in assessing impacts of coal mining. Coal resource-related geologic data compiled by IGS is used to estimate mining depths and coal thicknesses. In Iowa, where coal-bearing strata are relatively flat-lying, the mine shaft depth provides

a fairly reliable estimate of the elevation of the coal seam.. Shaft depths were recorded for 825 mines, but only 314 mine shafts can be located accurately. The known mine shaft depths range from twelve to 410 feet with an average depth of 119 ft.

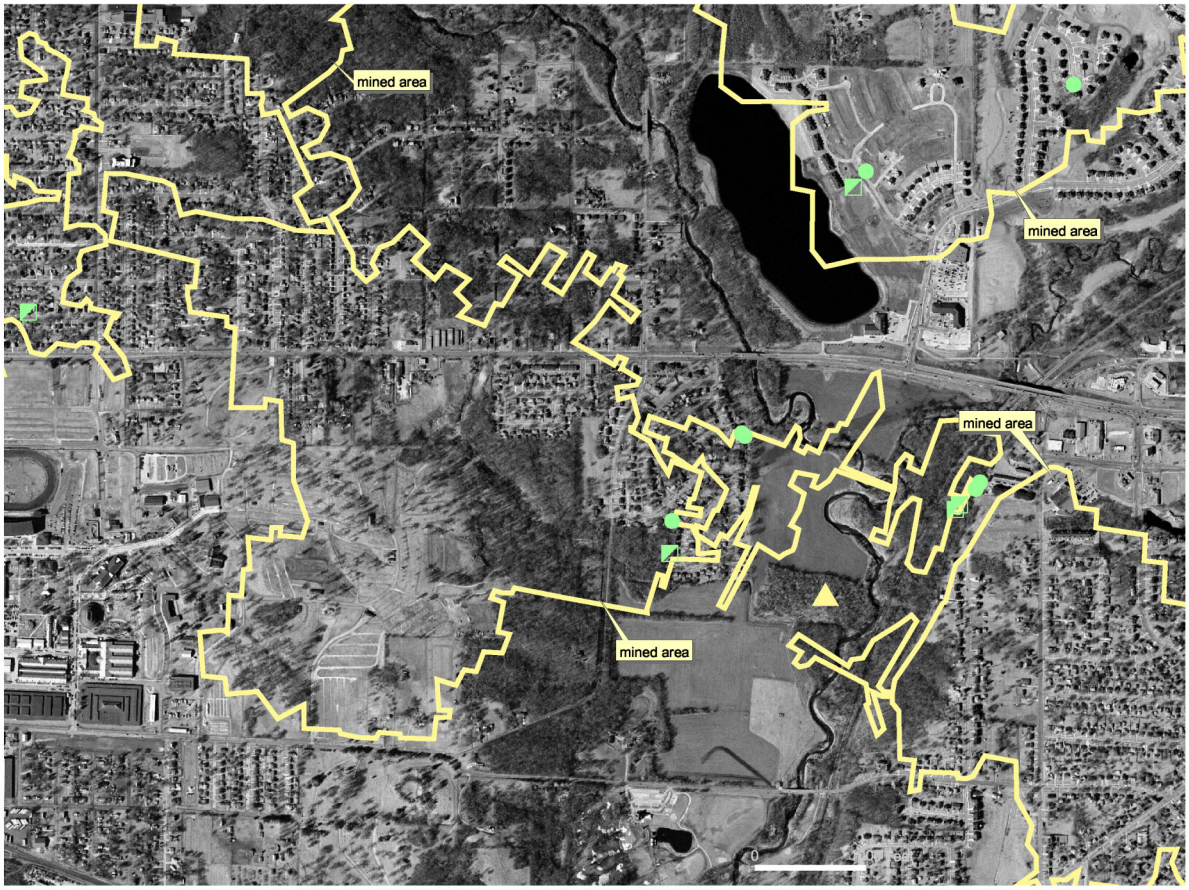

Figure 2. Extensive coal mining in an area undergoing rapid growth on the east side of Des Moines, Iowa. The light-colored outlines show mined areas. The triangle (right and below center) indicates a mine documented as a point location only with the location described to one quarter section or more. The mine entrances are also indicated on this map. The base map is a 2002 digital orthophoto.

Future developments

Inquiries about possible mining activity and land subsidence problems in undermined areas that prompted compilation of the coal mine database continue to arise on a frequent basis. Changes in technology make enhancements to the existing data both possible and desirable. Scanning the mine maps or the photos of the mine maps into image files is a logical next step. Acquiring image files of the mine maps is preferable but may be prohibited by the methods used to preserve the maps. The scanned images could be used to improve the accuracy of the mined-out areas in the GIS database. Image registration software would be used to georeference the image allowing a more accurate digitized area than the original technique that relied on transformations from CAD drawing files. Improving the availability of the coal mine data by publishing the GIS component on an interactive mapping web site is an enhancement that would get the information to a wider audience. Ideally, a web-accessible application would allow location-based searches and access to downloadable mine map images to be performed by anyone with internet access.

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Old ‘hard rock’ mines in North Carolina

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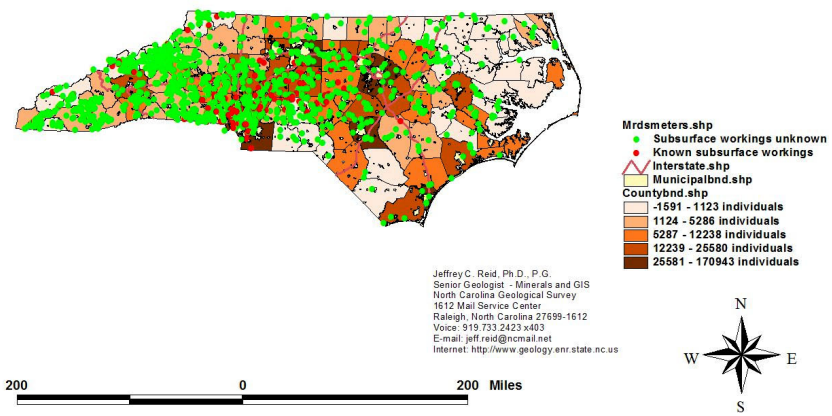
E-mail: jeff.reid@ncmail.net
Internet: www.geology.enr.state.nc.us

Old ‘hard rock’ mines in North Carolina

- Urbanization in high population growth areas encroach on historic old mines
- Old mines predate the NC Mining Act
- Increased incidents involving mine surface breaches and ‘close encounters’
- Many mines (hundreds) with known subsurface workings as deep as 900 feet

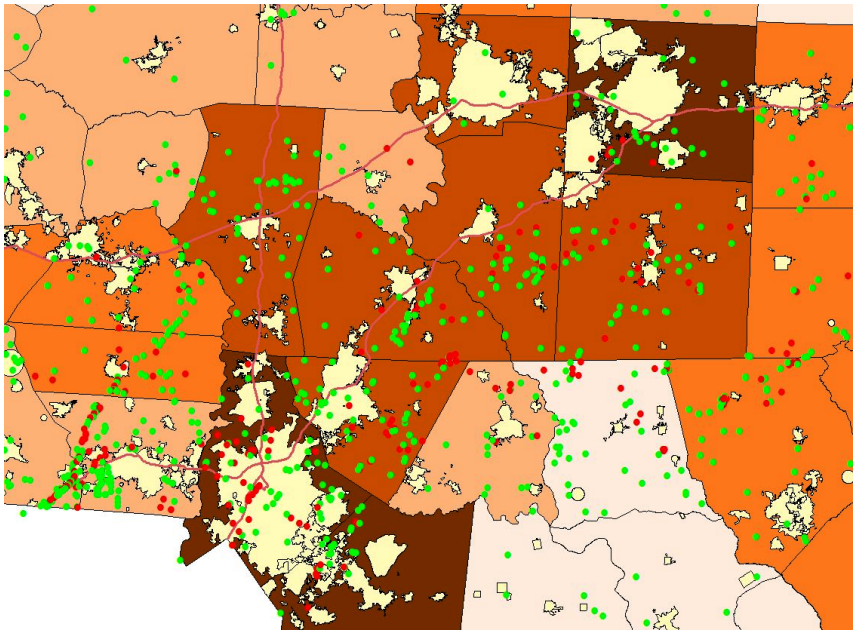
Old mines with known and unknown subsurface workings, with population growth (projected) to 2010

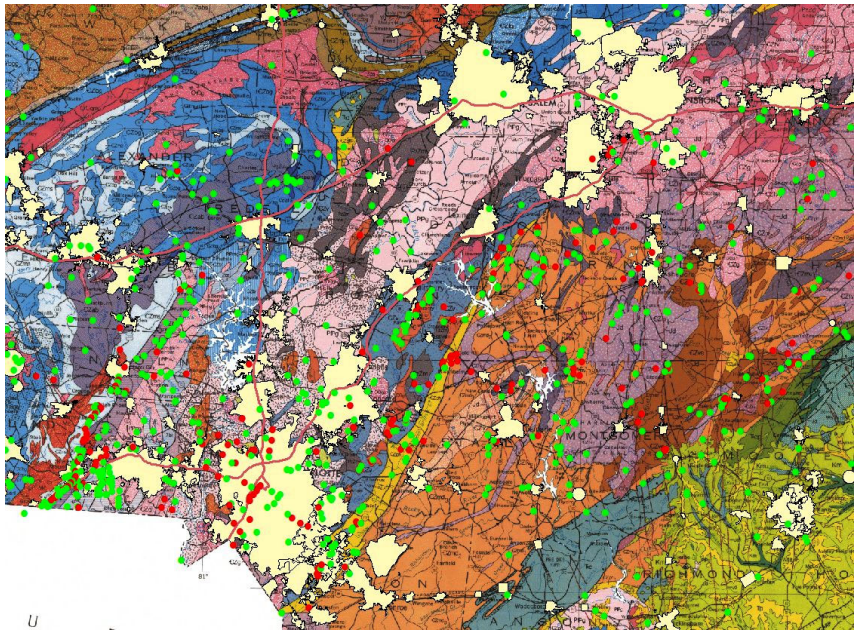


Mines with known subsurface workings

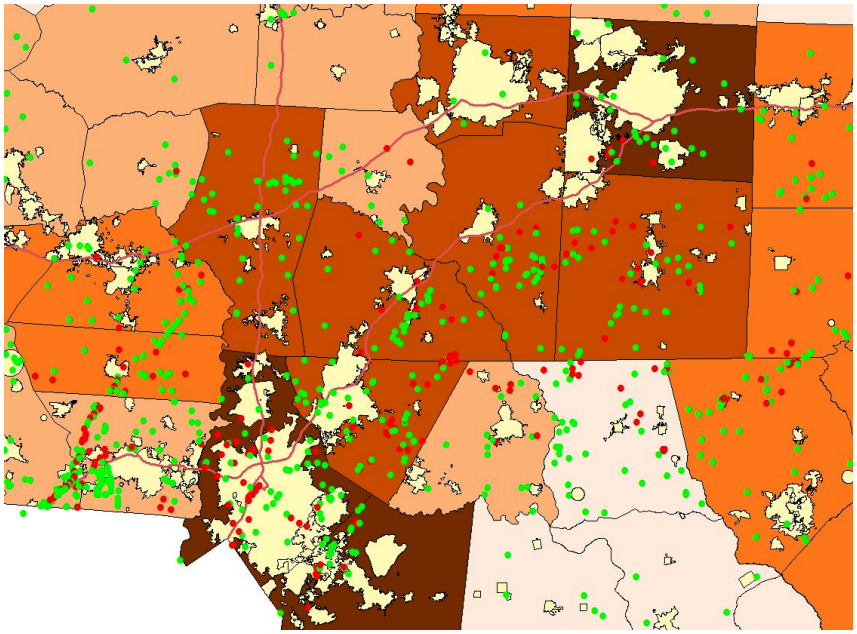
- Piedmont
  - Gold (hundreds)
  - Tin (tens)
  - Tungsten (one)
  - Coal (limited workings)
- Mountains
  - Mica (hundreds, or more?)
  - Feldspar (hundreds?)
  - Other industrial minerals ?

Old ‘hard rock’ mines in rapid growth areas – North Carolina



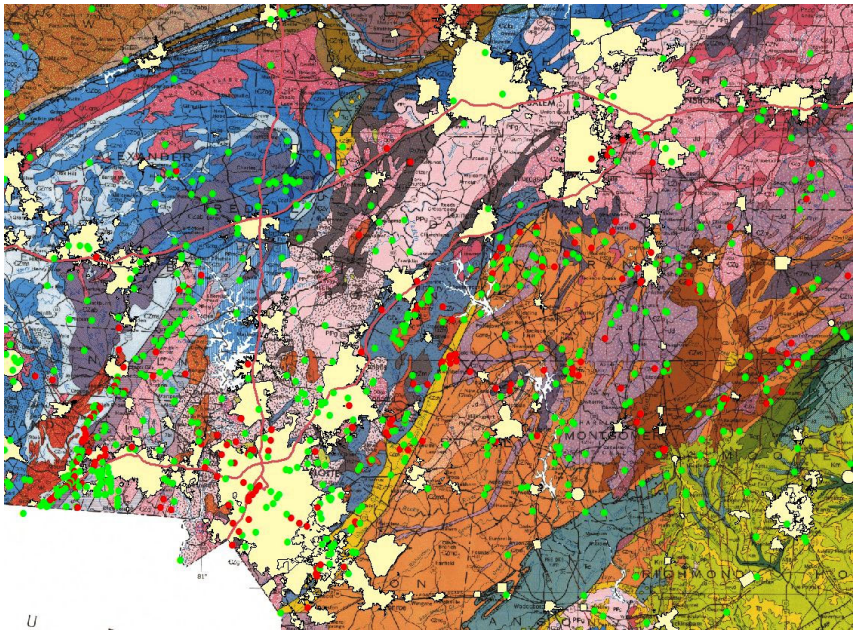


Recent examples – North Carolina



- February 18, 2000 – Phoenix gold mine breached surface
- Golf course home development built over abandoned gold mine
- Result: “19th” hole

Recent examples – North Carolina



- Spring 2003
  - Concord (Cabarrus Co.) – likely gold mine ventilation shaft breaches back yard following heavy rain
  - Union County – citizen reports he fell into shallow depression between workings; his probing with iron rod suggested deeper workings (high growth area just east of Charlotte).
  - Concurrent issue – high arsenic in groundwater

Some future challenges

- High population growth counties in Piedmont “crescent”
  - Urbanization encroaching on old ‘hard rock’ areas
  - Likely high speed rail route from Washington, D.C. to Charlotte
- Highway construction (e.g., Tin – Lincoln Co.)
- Asheville area as retirement destination

Assets and challenges

- Highly developed state ‘corporate’ GIS & orthoimage database
- Capable trained staff
- Solid hardware and ArcGIS 8.x GIS software asset base – computers, large format scanners &, plotters, OFR reports, etc.
- Serving data and scanned geologic maps on *via* Internet and ArcIMS,
- National database experience (NGMDB)

- Cash strapped (salaries and operations)
- Limited staff available (temporary staff needed to make substantial advances – nearby university student ‘pool’)
- Holder of many paper maps (e.g., mica and feldspar), gold, etc., dating from 1896
- Limited current staff time
- Server approaching limits
- LISTSERVE ? to facilitate communication

Assets and challenges, cont'd

- Field verification of database locations needed
- Field investigation of selected Piedmont sites with known subsurface workings needed
- Resources needed to support field work and confirm locations
- Ground penetrating radar (GPR) equipment needed
- Other subsurface investigation tools needed

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Mining and Mine Mapping in Kansas

James R.McCauley and Janice H. Sorensen Kansas has a 150 year history of underground mining for 5 different commodities: coal, lead and zinc, salt, gypsum and limestone. The earliest period of intense underground mining was in southeastern Kansas in what would become the Tfi-State lead and zinc mining district which extends into southwestern Missouri and northeastern Oklahoma. A short distance to the north and a few years later in time, underground mining of coal ~began in the coal fields of southeastern Kansas. In later years, underground mining of salt, gypsum, and limestone followed.

Lead and Zinc Lead and zinc mining is restricted to the extreme southeast corner of Kansas. Underground mining of lead and zinc began in the 1870's and continued until 1970 when the last mine shut down. The ores were taken ffom Mississippian-age limestones in mines that reached depths of 480 feet. A 1983 study funded by the U. S. Bureau of Mines mapped the extent of underground lead and zinc mining in Kansas from existing maps and inventoried mine-related hazards such ~s open and collapsed shafts and mine caveins, which were numerous throughout the mined areas. A total of 589 hazardous open shafts were found, of which 541 were collapsed. In addition, 307 surface collapses were mapped. Similar concurrent studies were conducted in the adjoining states of Missouri and Oklahoma. The total mined area in Kansas is 2220 acres. In subsequent years, much reclamation and remediation has occurred in parts of the Tri-State district, but mine collapse continues to be a hazard. Contaminated water that has flooded these mines is an environmental threat to surface and groUndwater supplies

Coal Eastern Kansas is located in the Western Interior Coal Basin and contains numerous coals of Pennsylvanian Age. Shallow underground mining of coal began as early as 1850 in the area near Fort Leavenworth, in northeastern Kansas. In 1874, underground mining of coal began in the more productive coal fields of southeastern Kansas. The original mines were shallow and near the outcrops of the coal beds. With time, mining followed the coal down dip to deeper levels of up to 150 feet. Underground mining of coal continued until 1960. A total of 52,500 acres overlie abandoned coal mines. Collapsing coal mines continue to be a geologic hazard, especially in the area of shallow mining, which includes part of Pittsburg, Kansas, the largest city in the region (population 19,243). Another smaller area of underground mining occurs in Osage County in east-central Kansas. Deep coal mines of 700 feet and 1000 feet once operated in the Leavenworth and Atchison areas, respectively In addition, small, abandoned lignite mines occur in north central Kansas in the Dakota Formation of'Cretaceous age. These mines are generally shallow with horizontal surface openings and are in undeveloped areas and are not considered a major geologic hazard.

Salt

Salt mining began in central Kansas in the city of Hutchinson in l 888, in what would become known as the Hutchinson Salt member of the Permian-age Wellington Formation. Salt mining is of two types, solUtion mining and conventional underground, room-and-pillar mining. The first mine in Hutchinson was a solution mine. In 1891 conventional mines opened in Lyons and Kanopolis in central Kansas and Kingman in south-central Kansas. Over the years, additional mines of both types operated in this same area of central and south-central Kansas and many have since been abandoned. Today, 5 solution mines and three conventional mines extract salt ffom beneath Kansas. Mine depths range from 650 to 1,100 feet. Solution mines have collapsed in Hutchinson on mine owned property. A salt mine near Kanapolis was the site of a shaft collapse in 1972. A mine collapse in 2000 on the edge of Kanapolis occurred beneath a waste pile at a brick plant. The compressed air in the mine caused an ensuing "eruption" of broken brick into the air causing e?ctensive property damage but miraculously, no serious injuries.

Gypsum

Gypsum mining in Kansas began in the 1 880's near Medicine Lodge in south-central Kansas. The gypsum bed mined is the Medicine Lodge Member of the Blaine Formation and occurs in Permian-age red beds. Mining later moved northwest of Medicine Lodge to an area near the small town of Sun City where it continues today. Gypsum is mined at this site by both open pit and underground methods. The underground mines are generally shallow, less than 150 feet and underlie undeveloped land. Gypsum mining began at a later date in northeast Kansas, north of the town of Blue Rapids. The gypsum mined is in the Easly Creek Shale, also Permian in age but older than the gypsum mined at Sun City. This mine is generally less than 200 feet deep and also underlies an **undeveloped area.**

Limestone Mines

Outside of one small abandoned limestone mine in Mississippian-age rocks of extreme southeastern Kansas, limestone mining is restricted to Pennsylvanian-age limestones in the northeastern part of the state The Kansas City metropolitan area is home to a number of limestone mines in two separate geologic units, the Argentine Member of the Wyandotte Limestone and the older Bethany Falls Member of the Swope Limestone. A number of limestone mines have been converted to usable underground space with multiple uses, including cold and cool storage, manufacturing, warehousing, offces, document and record storage, and even a college library. Kansas City leads the nation in the amount of usable underground space, totaling several square miles. These **mines are** located on both sides of the Missouri-Kansas state line. All these mines are accessible ffom the surface by roads or ramps and even railroads in some instances. Depths are generally less than 200 feet. In Kansas, some abandoned mines have collapsed causing property damage, especially

in Kansas City, Kansas. Additional limestone mines nre found in Leavenworth and the Atchison area north of Kansas City in younger Pennsylvanian limestones. These mines are also generally less than 200 feet deep at the most and some have collapsed in and close to the two cities.
There is no central collection of mine maps for older abandoned coal mines. Maps of lead and zinc mines and other records are in a collection in the library of Missouri Southern State University in Joplin, Missouri, however this is not a complete collection of mine maps. Maps of other small abandoned mines may not exist.

The State Geologist of Kansas, mandated by state statute (K.S.A. 49-201), holds the responsibility for collecting and archiving maps of active underground mines in the State of Kansas. This responsibility was transferred to the State Geologist in July 2000 from the Secretary of Human Resources. All maps collected prior to 2000 were transferred to the KGS These include active and inactive mines. The older maps date from the late 1960's. There are 150 to 175 maps for limestone, gypsum, or salt mines in the state. The maps are in paper format with the exception of 2 that are on mylar. The maps vary in size. The smallest maps are approximately 11" x 17". Larger oversized sheets measure approximately 36" x 46". None of the maps have been digitized.

Nine companies currently operate limestone, gypsum or salt underground mines in Kansas. Mine owners are notified each year that a current map is to be on file at the Kansas Geological Survey by July 10. When maps are received they are dated, inventoried, and filed under company name and housed in the KGS library and archives unit. Maps are available at the KGS for prompt and easy access. If needed, paper copies can be reproduced.

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MISSOURI

Missouri has a long history of underground mining of coal, lead, zinc, iron, clay, industrial sand, sandstone and limestone. Over 9000 abandoned underground mines are estimated to exist in the state, ranging from drifts less than 100 feet in early mines to hundreds of miles in more recent mines. The Missouri Geological Survey and Resource Assessment Division (GSRAD) has maps for approximately 10% of coal mines. GSRAD has less than 50% representation of maps for noncoal commodities; the majority of these are in the Tri-State District.

Maps are currently filed in drawers by general area. A very rough, incomplete inventory is the only catalog. Less than 10% of the maps are original paper/linens, with the rest reproductions on various media. These reproductions are also commonly the only known remaining copies of these maps. About 10% have been electronically scanned, and only a few percent of these are georeferenced.

The map files sometimes receive extensive use by individuals and companies doing planning or construction projects or addressing geologic hazards such as new collapses in mined regions.

Currently only one GSRAD staff member is familiar with the locations of maps in the files.

Submitted by: Cheryl M. Seeger, R.G., PhD Geologist Geologic Survey Program Geologic Survey and Resource Assessment Division PO Box 250 Rolla, MO 65402 ph: 573.368.2184 fax: 573.368.2111 nrseegc@mail.dnr.state.mo.us

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Mine maps at the NMBG&MR

Over the years mine maps have been acquired through donations from individuals and companies and through the Abandoned Mine Lands progTam. The INM Bureau of Geology was a major participant in the AML project. Collecting data relating to historical mining in New Mexico is part of the Bureau's mission to conduct studies and disseminate information on geology, mineral and energy resources, geologic hazards, and environmental problems.

Coal program (Gretchen Hoffman)

As a result of the AML program the Bureau published Bulletin 111, Coal Mining in the San Juan Basin, a compilation of the data on individual mines and the mining history for the northwest corner of the state. Data ffom the AML is available for other areas of the state but has not been published.

An Access database has been developed including the data acquired by the AML studies and additional information has been added ffom other sources. Over 560 mines from 14 counties are documented in this database with varying degrees of information. These mines are classified by county, quadrangle, and geologic unit. Lf?cation data (T, R, sec, latitude, longitude) production, ownership, and geologic information are included in the database. Available coal mine maps (approximately 90) are listed in the Geographic Information Center database and some maps reside in the coal database library. None of these maps have been digitized or scanned.

More recent underground mines are included in mine plans required by the Mining and Minerals division who are the regulatory agency.

Uranium program (Virginia McLemore)

Over200 mines in 18 counties inNewMexico yielded 164,575 tonsofU3Osffom 1948 to 2000, which is nearly 40°/~ of the total uranium production ffom the United States. A compilation of these mines and prospects and data on the location, production reserves, geology, development, ownership, type of deposit, geochemistry, and sources of other information was developed by McLemore (1983) and summarized by McLemore and Chenoweth (1989) and is now available in computerized database (McLemore et al., 2001). NMBGMR has numerous mine maps of uranium mines and we may also be obtaining additional maps ffom BHP-Billiton of the former Kerr McGee mines. CurTently there is no uranium mining in the state.

Metal/nonmetal mines (Virginia McLemore, Robert Eveleth)

The NMBGMR has collected published and unpublished data, including mine maps on the districts, mines, deposits, occurTences, and mills since it was created in 1927 and is slowly converting historical data into a relational database, the New Mexico Mines Database. The purposes of this database are to provide computerized data that will aid in identifying and evaluating resource potential, resource development and management, production, and possible environmental concerns, such as physical hazards (i.e. hazardous mine openings), indoor radon, regional exposure to radiation ffom the mines, and point-sources of possible contamination in areas of known mineral deposits. One of the f ture components of the New Mexico Mines Database is to tie the data in the database to electronic copies of mine maps. Many mine maps have been published in various NMBGMR and USGS publications and theses.

Summary

Although many people over the years have accessed the mine maps, there is a real need to catalog the maps we have and make the maps available digitally. The NM Bureau of Geology does not have a dedicated person assigned to this task, nor is the money available to hire someone. Some areas are lacking data; whether maps exist or not is questionable. Although there is only one underground coal mine operating in the San Juan Basin and none in the Raton Basin, some areas of past underground coal mines are becoming more populated or have become areas of interest for coalbed methane development. In both cases, knowing where the underground workings are located could be significant to development.

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Virginia's Approach

Roundtable Discussion 1

Acquiring and Preserving Map Images

Intergovernmental Benchmarking Workshop on Underground Mine Mapping

October 15 & 16, 2003

Louisville, Kentucky

Virginia Department of Mines Minerals and Energy

Acquiring Mine Maps

- Campaign launched through various media outlets requesting mine maps
- Maps & mine locations acquired through permitting process
- Private party donations
- Company archives
- Initiated communication with suspected map sources
- Accepted burden of acquiring maps & provided results to contributors

Virginia Department of Mines Minerals and Energy

Preserving Map Images

- Images are stored on a central server & can be accessed by all personnel
- Digitization of mine boundaries
- Use of GIS software for access
- Scanned image file formats

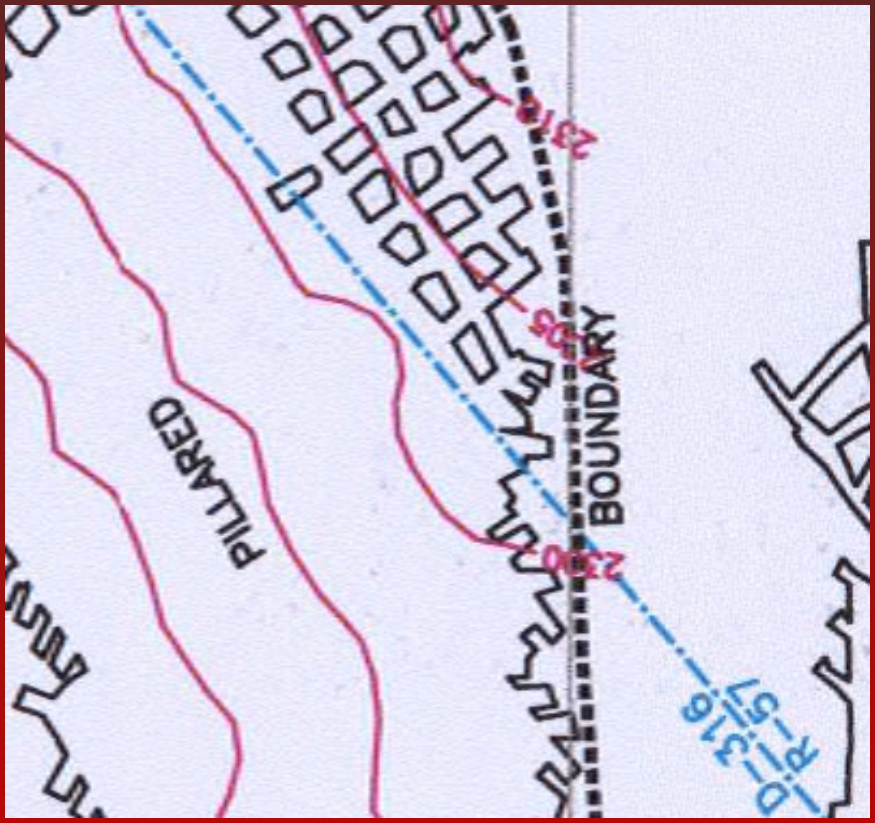

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Image File Format

- Standard format is tagged image file (.tif)
- Compatibility with multiple software packages and image viewing applications
- Upon request, images can be compressed into a Mr. SID file format
- Images compressed with Mr.SID can be used with a free downloadable viewer and is becoming more compatible with various software applications

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Scanning Solutions

- Portability of scanners are essential for on-site scanning of company mine map archives
- Large format decreases need to fold maps to scan = reduced image editing to merge images
- Associated scanner software allows manipulation of image files for increased image quality
- ColorTrac 5480 scanner will accept materials up to 12mm in thickness
- Ultimately the goal is to obtain the best scan possible at a file size that is manageable

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Large Format Scanners

Vidar – TruScan Titan

Action Imaging Solutions – ColorTrac 5480

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Cataloging

- Information derived from mine maps are put into a Microsoft sql database
- Creation of Index of map archive
- Data, images and vectorized outline are used to generate numerous products

MineMaps - Microsoft Internet Explorer

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Map Information Data Tables

Maps		
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	CollName	varchar(50)
	CollID	int
	MapID	varchar(12)
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	Scale	int
	Company	varchar(50)
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	SM	bit
	OM	bit
	Auger	bit
	Thick	bit
	Elev	bit
	Corehole	bit
	Gas_Well	bit
	VVH	bit
	Portals	bit
	H2O_Hzd	bit
	Roof_Fall	bit
	Drains	bit
	SP_Coor	bit
	LL_Coor	bit
	Co_Coor	bit
	SP_Northing	numeric(18,0)
	SP_Easting	numeric(18,0)
	LL_Lat_Deg	smallint
	LL_Lat_Min	smallint
	LL_Lat_Sec	numeric(5,2)
	LL_Long_Deg	smallint
	LL_Long_Min	smallint
	LL_Long_Sec	numeric(5,2)
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	DD_Lon	numeric(16,8)
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	Entry_Who	varchar(50)
	Georef_Method	varchar(50)
	Map_Quality	varchar(4)
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	HasGeoRef	bit
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	Date_Unknown	bit

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	TblCnName	varchar(14)

Maps_Mines		
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I1	DMMEID	varchar(10)
I2	MineID	varchar(7)

Maps_Places		
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I1	DMMEID	varchar(10)
	PlacesID	int
	Feature_Name	varchar(50)

Maps_Quadrangles		
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	TblQuDesc	varchar(20)

Maps_StandardCoals		
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	Std_Unit_Name	varchar(30)

Scans	
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Scan_Date	datetime
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Scan_Fmt	varchar(50)
Scan_Path	text
DMMEID	varchar(7)

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Mine Information Data Tables

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	PrevID	varchar(7)
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	Mine_Name	varchar(50)
	Operator	varchar(50)
	Company	varchar(50)
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	Unknown_License	**bit**
	License_Possible	**bit**
	Mine_Size	varchar(6)
	Lessor	varchar(50)
	Mining_Method	varchar(24)
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Mines_Counties		
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Reference Tables

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	FirstName	varchar(50)
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AliasUnitsTbl		
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	Alias_Unit_Name	nvarchar(50)

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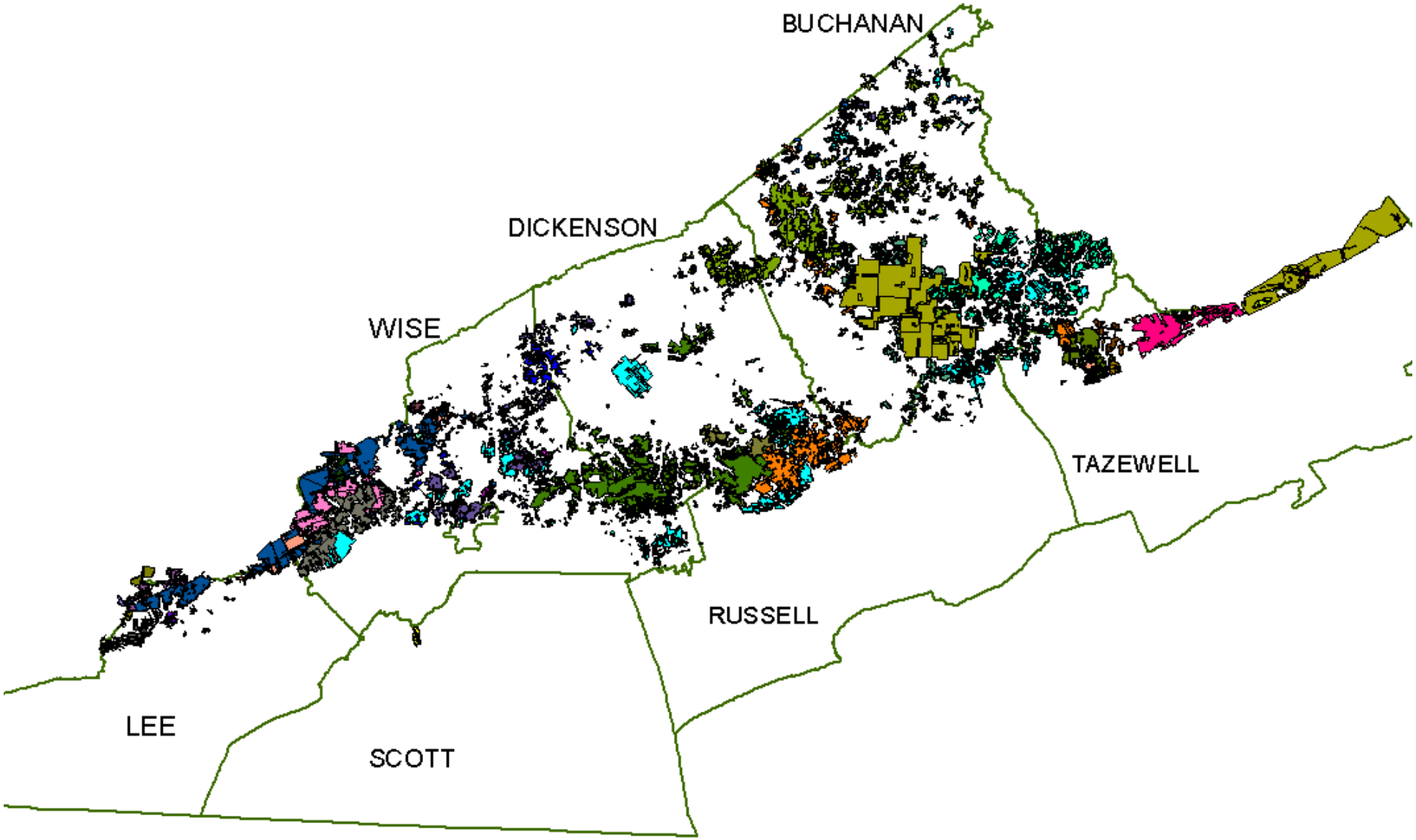
Done Local intranet

Geo-referencing

- Defining in real world coordinates how an area represented on the map fits on the earth's surface
- Maps geo-referenced into Virginia State Plane Coordinate System
- Information shown on the map such as coordinate grids, identifiable surface features, coal outcrop configuration, land tracts, etc., are used to place maps.
- Maps are geo-referenced using AutoDesk's AutoCAD Map

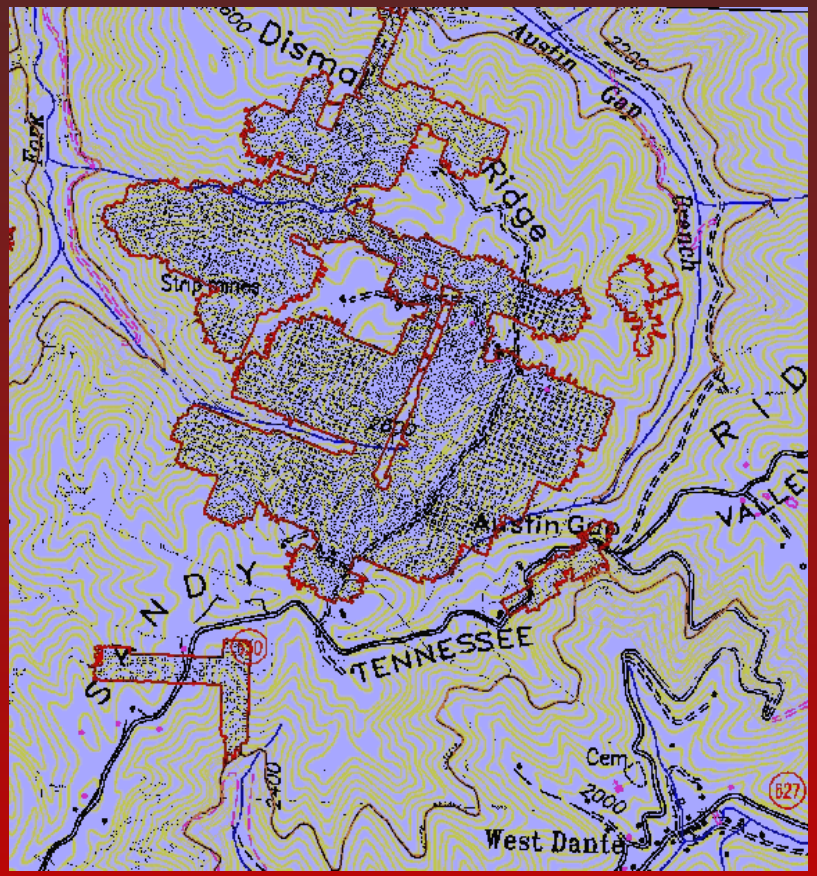
Virginia Department of Mines Minerals and Energy

Digitization

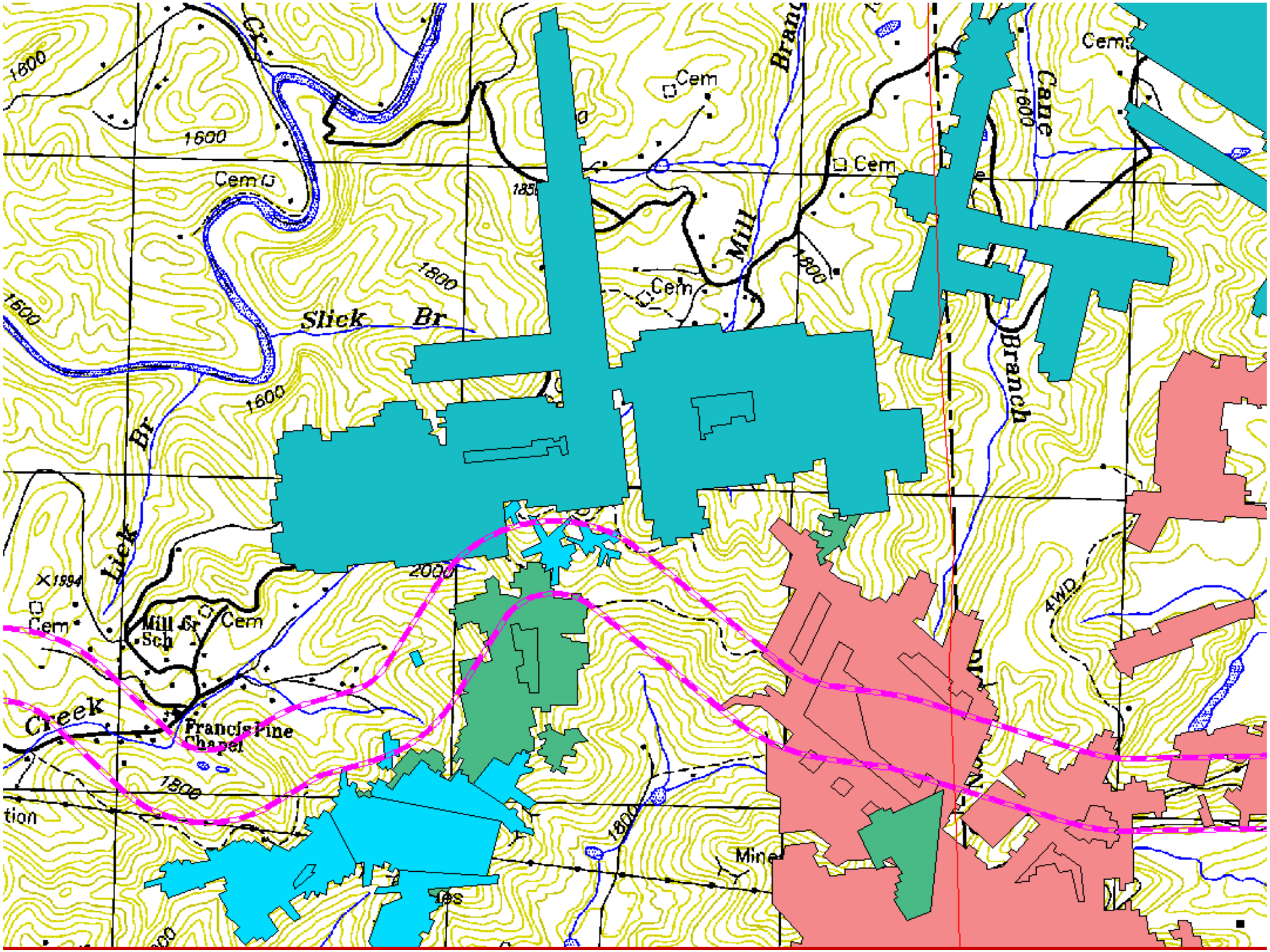


Raster to Vector

- Image geo-referenced to Virginia State Plane Coordinate System
- Heads-up onscreen digitization
- Mine boundary linked to scanned image through index
- Mine boundaries are used with other DMME spatial data in GIS



Virginia Department of Mines Minerals and Energy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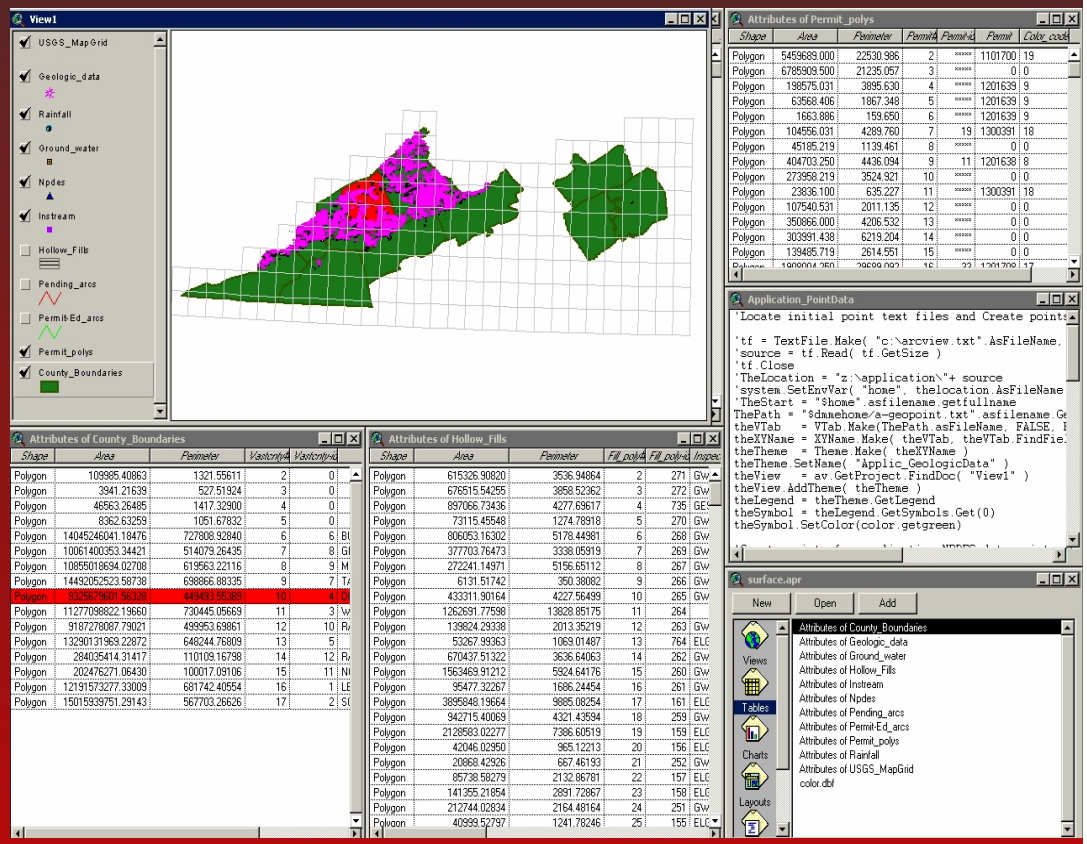
Mine

Spatial Data

- Regulatory Data
  - Water Monitoring
  - Permit Boundaries
  - Geologic Samples
  - Hollow Fills
  - PMU
- Basemap Elements
  - USGS Quad Index
  - Political Boundaries
- Easily Incorporated Features
  - Coalbed Mapping
  - Quad Maps
  - Orthophotography
  - Satellite Imagery



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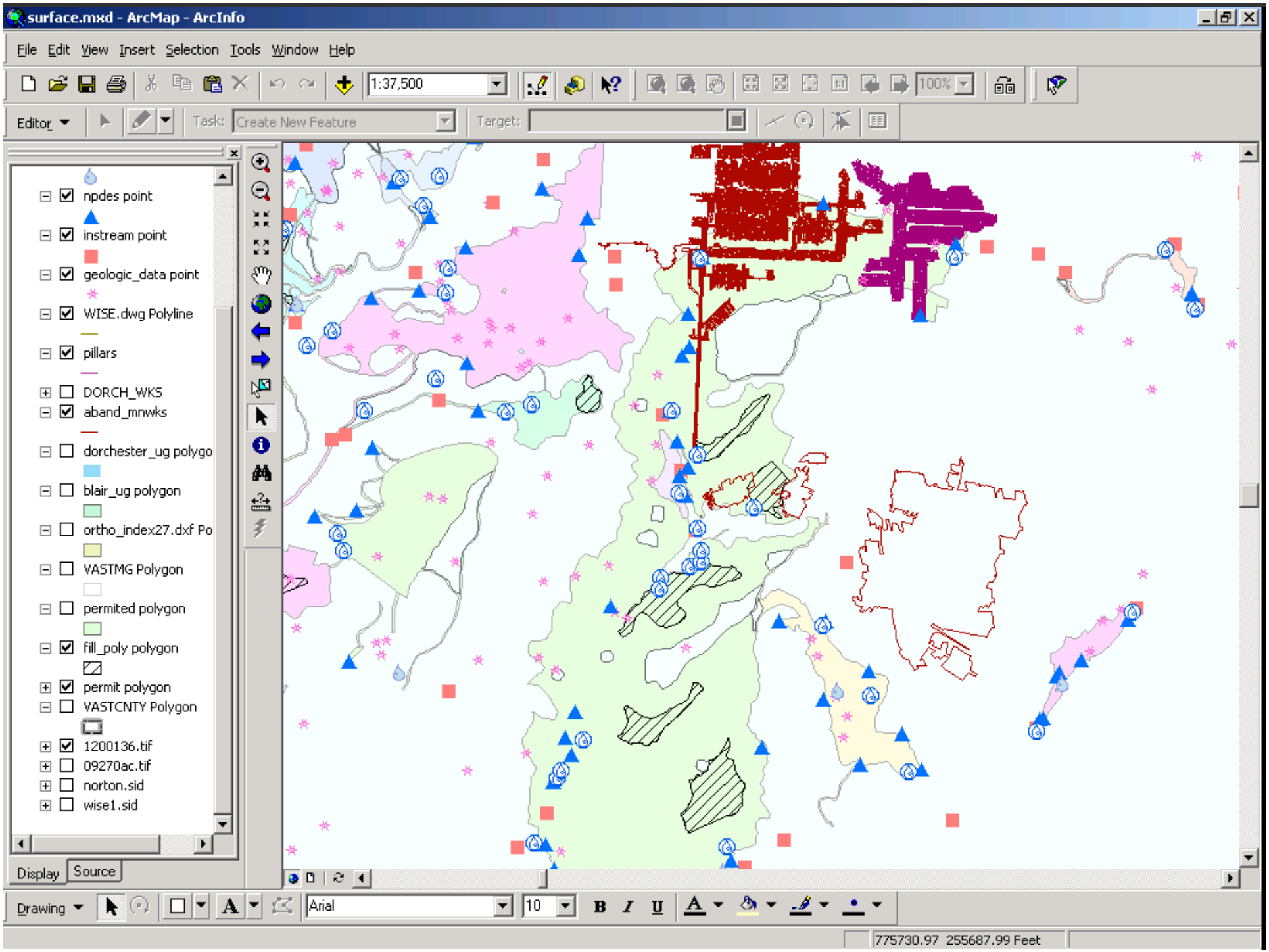
surface.mxd - ArcMap - ArcInfo
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pillars
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aband_mnwks
dorchester_ug polygo
blair_ug polygon
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permited polygon
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permit polygon
VASTCNTY Polygon
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09270ac.tif
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wise1.sid
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Summary

- Proactive approach to obtaining mine maps
- Obtain the best scan possible at a file size that is manageable
- Have a system in place for indexing and cataloging
- Use images to create a usable digital product
- Use industry standard software, hardware and file formats for compatibility
- Implement methods & procedures for disseminating the data to the end user

Virginia Department of Mines Minerals and Energy

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Moving Maps to GIS

Pennsylvania Department of Environmental Protection,

District Mining Operations, California District Office

Overview

- Georeferencing*
- Digitizing
- Capturing and Attributing Information

Georeferencing

- Find surface control points on detailed mine maps that correspond to points on 7.5” USGS Topographic maps
  - Road intersections,
  - Bridges and stream intersections, etc
- This is easy for index maps that are drawn on USGS Topo maps, but more difficult for detailed maps.

Georeferencing (Continued)

- Use at least four control points to Register and Rectify the image using ArcInfo.
  - In the past we used ArcInfo workstation and ArcView 3.2a for georeferencing.
  - ArcInfo Desktop 8.3 has a much simpler interface with the Georeferencing Toolbar.
- When rectifying an image, our goal is to get an RMS error of less than 10.
  - This has proven effective for our purposes.

Georeferencing (Continued)

- Georeferencing Tips:
  - A low RMS value does not necessarily yield a more accurately georeferenced map.
  - Start by georeferencing the map with the best control points and build from that map.
  - Localize the area that you georeference if you do not have mining data on the whole map.

Digitizing

- Done by our Mining Specialists
- We also use interns to digitize
  - Only a few, well-trained interns.
  - Under close supervision
  - Mining Specialists always Quality Control the data
- Usually digitizing several themes, such as:
  - Permit Boundary
  - “Mined Out” Areas
  - Longwall Panels (Active Mining)

Capturing and Attributing Information

- Done by our Mining Specialists
- Usually attribute information is input as a mine is digitized.

- All mines:
  - Mine Name
  - Operator
  - Coal Seam
  - County
  - Permit Number

- Active longwall mines:
  - Panel Identification
  - Status (active/complete)
  - Date of Completion (month/year)

Capturing and Attributing Information (Continued)

- One of our most important themes is our Mine Subsidence Insurance (MSI) Claims theme.
- This theme contains information such as:
  - General Claim info (Claimant, Claim #, etc)
  - Status of Claim (Open, Supported, Denied, etc)
  - Investigation Info (Investigator, Date, etc)
  - Mining Info (Mine Name, Mapping Source, Cover, etc)
- This theme is updated every time we open or close a claim (almost daily).

Conclusion

- Georeferencing is more of an art than a science.
- Digitizing the data makes it easier to use and more efficient.
- Attribute information is one of the main reasons to use a GIS to store, edit, and view data.

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Betty Carver, Commissioner of Commerce
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Mountain State Feature Articles Coming Soon!

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West Virginia Links
Software Links Coming Soon!

ims.wvgs.wvnet.edu/coalims.htm

*Ship

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Mont Chateau Research Center
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Page last revised: Tuesday, April 08, 2003 08:45:10

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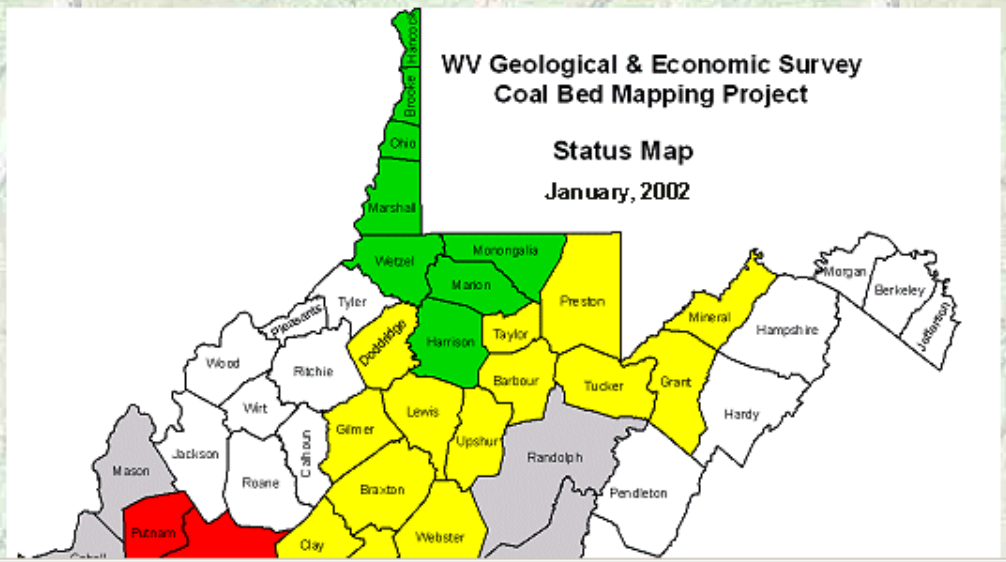
[Mine Map Archives]

Mapping Progress

Project geologists are mapping coal beds in a county or group of counties at a time. When completed, the statewide extent of each mapped coal bed will be available. At this time, coal beds in the counties shown in green have been mapped.

Click on one of the GREEN counties to view the coal bed maps currently available.



IMPORTANT: To view the Interactive Maps, it is recommended to use Nescape version 4.7, or Internet Explorer version 5 (Later versions are not yet compatible with the interactive maps). [Click here for more information.]

Please view the [Interactive Map Help Guide] before using the maps!

Document: Done

Interactive Coal Bed Mapping Project(CBMP) Northern Coals - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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Address http://ims.wvgs.wvnet.edu/coalimsframen.htm Go Links

WVGES

Interactive Coal Maps

WVGES Welcome | CBMP Welcome | Coverage Explanations

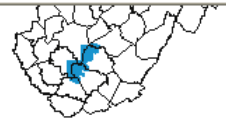
Select Fm./Gp. from Menu

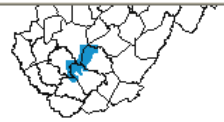
Then Press Go Go

Allegheny Fm. (SW)

KANAWHA FM.

- *Kanawha Black Flint*
- Stockton Rider
- Stockton
- Coalburg
- Little Coalburg
- Upper Winifrede
- Winifrede
- Lower Winifrede
- Chilton A
- *Winifrede Shale*
- Chilton Rider
- Chilton
- Little Chilton
- Fire Clay Rider
- Fire Clay
- Fire Clay Lower Split 1
- Little Fire Clay
- Cedar Grove
- *Dingess Shale Member*
- Williamson Rider
- Williamson
- *Campbell Creek marine zone*
- Peerless
- No. 2 Gas
- Powellton A
- Powellton
- Lower Powellton
- *Crummies Member*
- Eagle A
- Eagle
- Little Eagle
- Cedar
- *Betsie Shale Member*
- Matewan
- Middle War Eagle
- Bens Creek
- Little Middle War Eagle
- *Bolt Mountain Member*


Williamson


Peerless

No. 2 Gas

Powellton

Lower Powellton

Eagle A

Eagle

Little Eagle

Internet

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Number 2 Gas - Microsoft Internet Explorer

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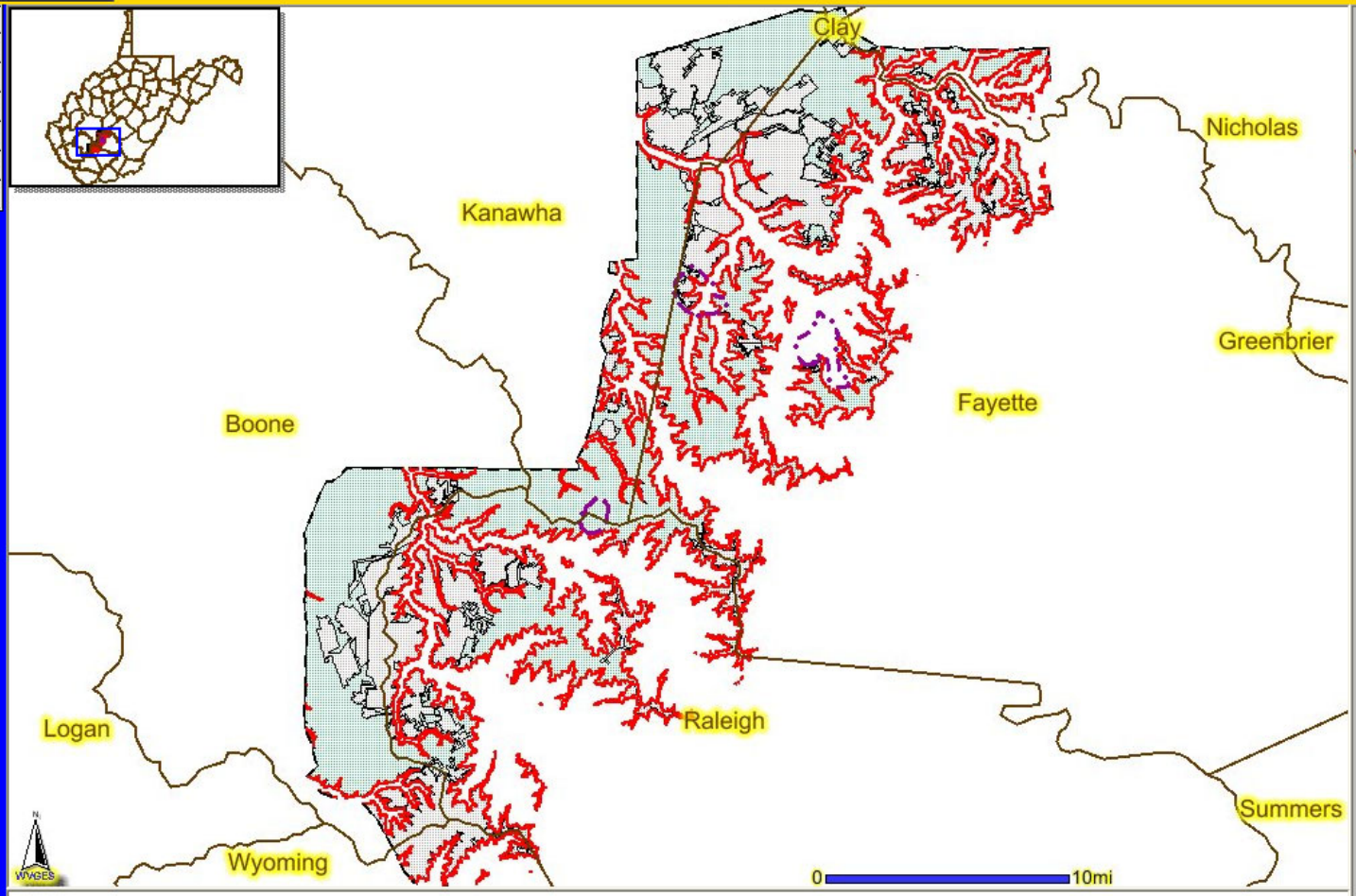
Address http://ims.wvgs.wvnet.edu/n2g/viewer.htm?Title=Number%202%20Gas Go Links

Number 2 Gas Coal

WVGES

W V G E S Home Page | C B M P Home Page | Return to Coal Formation | Coverage Explanations | Interactive Map Help



Refresh Map Click Button to Redraw Map

Layers

Visible Active

- [x] WV Counties
- [ ] WV Quadrangles
- [ ] Elevation Control Points
- [ ] Thickness Control Points
- [ ] Structural Contours
- [ ] Geological Discontinuities
- [ ] Mining Extent Unknown
- [ ] Aperture Card Labels
- [x] Coal Seam Split/Merge
- [x] Coal Map Boundaries
- [x] Mined and Remaining Coal
- [ ] Net Coal Thickness
- [ ] Percent Partings
- [ ] Total Bed Thickness
- [ ] Fayette and Raleigh County Topographic Map Mosaic

Internet

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Bob Wise, Governor

Doug Conaway, Director
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Revised Surface Mine Foreman Guide now available

West Virginia Mine Permits Listings

The West Virginia Office of Miners' Health, Safety and Training is responsible for the enforcement of the West Virginia Mine Safety Laws and Regulations (Chapter 22A Code of WV). Learn more about our agency from our Informational page or from our (Agency Mission Statement) page.

Document: Done

Microsoft Access

File Edit View Insert Format Records Tools Window Help

Type a question for help

wvapcd : Database (Access 2000 file format)

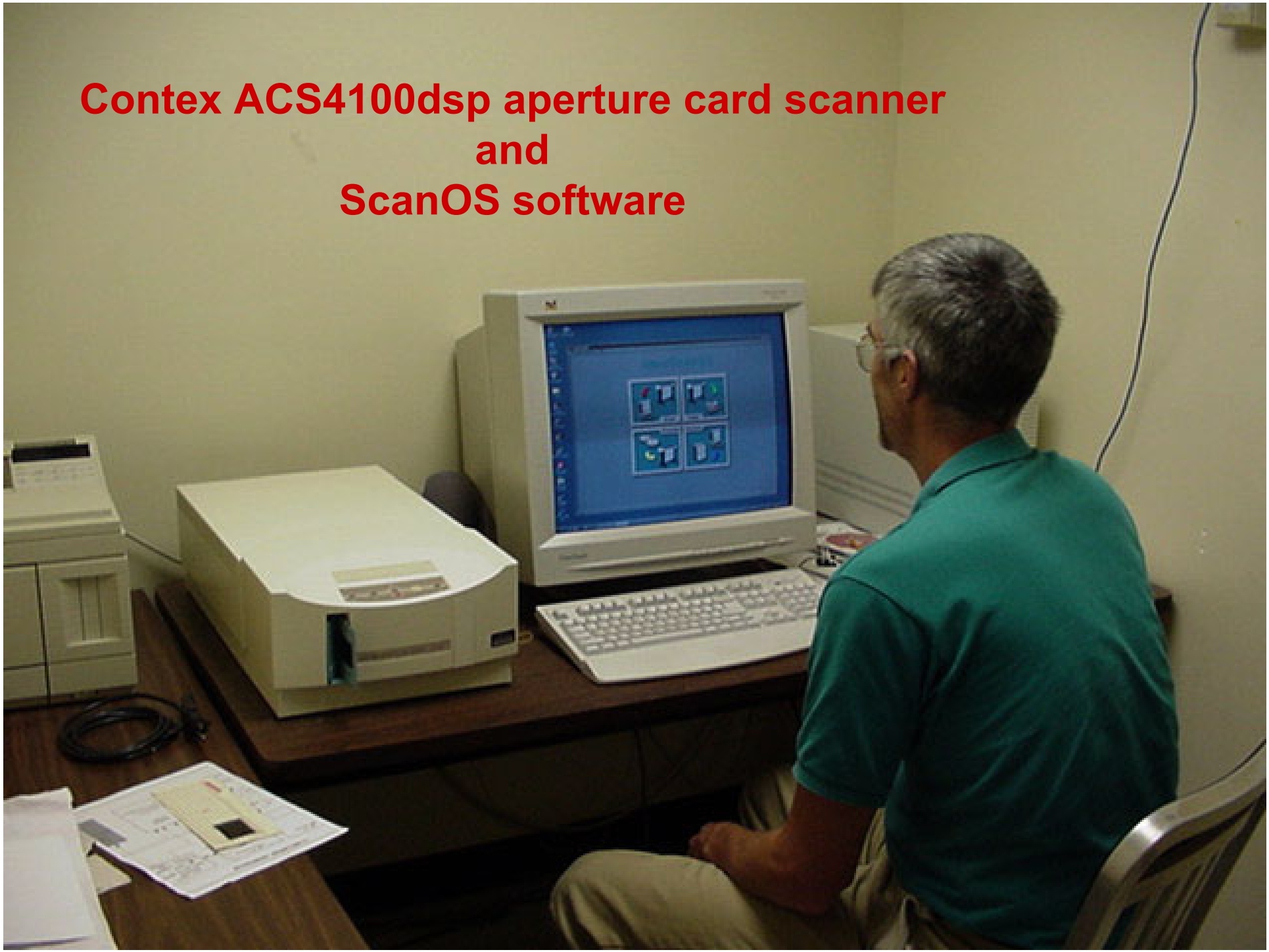
Mine/comp : Table

MINECOMP	APCARD	MINE NAME	COMPANY NAME	POLYGC	PERMIT	WVGES COMMENTS	MINE	MODIFIED DAT
41782	373195	ACE	ROBINSON PHILLIPS COAL	*			U	1/1/1996
46158	379663	ACE	ROBINSON PHILLIPS COAL	*			U	1/1/1996
4423	308196	ACE HIGH NO 1	ACE HIGH COAL	*			U	1/1/1996
45762	378842	ACE MINING NO 1	ACE MINING	*			U	1/1/1996
5064	312790	ACE MINING NO 1	ACE MINING	*		projections only	U	1/1/1996
4067	307900	ACE MINING NO 1	ACE MINING	*			?	1/1/1996
29862	344409	ACE MINING NO 5-BBC-10	ACE MINING	*	9436		U	1/1/1996
43472	374954	ACE MINING NO 5-BCC-10	ACE MINING	*			U	1/1/1996
37349	368646	ACE NO 64	BLACK HORSE CREEK MININ(	*			U	1/1/1996
43728	375551	ACE NO 64	ROBINSON PHILLIPS COAL	*			U	1/1/1996
41807	373217	ACE PROPOSAL	ROBINSON PHILLIPS COAL	*			C	1/1/1996
47174	383618	ACKLEY HOUSTON NO 4	ACKLEY HOUSTON	*	3042-89	SEE 382104,953034; SA		
47191	383635	ACKLEY HOUSTON PROSPI	ACKLEY HOUSTON	*		OLD LIMITS SHOWN		
17342	332219	ACME	UNKNOWN	*		TRUAX-TRAER #4,'55	?	1/1/1996
17413	332267	ACME	TRUAX-TRAER COAL	*			U	1/1/1996
17414	332268	ACME	TRUAX-TRAER COAL	*			U	1/1/1996
17415	332269	ACME	TRUAX-TRAER COAL	*		?	U	1/1/1996
48109	953069	ACME	UNKNOWN	J				
8588	322004	ACME	SANDERSON COAL	*			U	1/1/1996
1252	304436	ACME	ACME COAL	*		(2 COPIES)	U	1/1/1996
1253	304436	ACME	MARION GAS COAL	A		SEE ALSO 953069J	U	1/1/1996
30418	349952	ACME AUGER	TRUAX-TRAER COAL	*			C	1/1/1996
39053	370416	ACME CONST STRIP	ACME CONSTRUCTION	*			S	1/1/1996
39049	370412	ACME CONST STRIP	ACME CONSTRUCTION	*			S	1/1/1996
32466	358782	ACME FIRE CLAY	ACME FIRE CLAY	B		BEST VIEW OF ACME M	U	8/15/2000
41626	373048	ACME FIRE CLAY	ACME FIRE CLAY	A		SEE 358782 FOR BEST	U	8/7/2000
20942	335359	ACME FUEL	ACME FUEL	*			?	1/1/1996
47547	384210	ACME LEASING NO 1	ACME LEASING	*				
38491	369789	ACME LIMESTONE	ACME LIMESTONE	*			S	1/1/1996
4078	307907	ACME LIMESTONE NO 4	ACME LIMESTONE	*			U	1/1/1996
45498	377911	ACME LIMESTONE NO 6 & 7	ACME LIMESTONE	*			U	1/1/1996
39684	371062	ACME LIMESTONE QUARRY	ACME LIMESTONE	*			S	1/1/1996
38845	370138	ACME LIMESTONE STRIP	ACME LIMESTONE	*			S	1/1/1996
17423	332275	ACME NO 2	TRUAX-TRAER COAL	*			U	1/1/1996

Record: 1 of 49297

Datasheet View

start | Microsoft Power... | wvapcd : Datab... | Mine/comp : Table | 12:50 PM


Contex ACS4100dsp aperture card scanner
and
ScanOS software

Ideal FSS8300dsp 36” wide scanner
and ScanOS software

Kip Starprint 4000
36” wide format printer

Planned Improvements

- Make georeferenced mine map images available with GIS data and via the web
- Make all mine map images available via the web
  - MHST & OSM already have them

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Accessing / Sharing Information

GIS Database Content

and

Data Delivery

AUM Opening Database Entry and Retrieval Form

AND

TO

FR

ANNUAL MINE MAP DATA SHEET

OHIO DEPARTMENT OF NATURAL RESOURCES

Division of Geological Survey

Microsoft Access - [frmMineOpening : Form]

File Edit View Insert Format Records Tools Window Help

Tahoma 12

Abandoned Underground Mine Map Openings

Mine Opening ID:

Opening Type: Source: Date of Rec:

County: Township:

Commodity: Quadrangle:

Operator: Mine Name:

Seam Name: Elev: ft. Thickness: in.

Comment(s):

Find Record Add New Quit

O.D.N.R. GEOLOGICAL SURVEY

Record: 1 of 2144

Form View

NUM

Start Inbox... BBC ... Thesa... Image... ArcCa... AUM_... ABAN... AUM_... frmMi... 3:32 PM

Start frmMai... 3:59 PM

Other

DATA SHEETS TO DATABASES

Original AUM Feature Class Attribute Tables

Untitled - ArcMap - ArcInfo

File Edit View Insert Selection T

Georeferencing Layer:

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Layers
- D:\UNDERGROUND MI
  - mines_poly
  - entry_pts
  - entry_line
  - shafts_pts
  - mine_pts
  - TBLMINES

Attributes of mine_pts

OBJECTID*	Shape*
1	Point
2	Point
3	Point

Record: 1

Display Source

Drawing

Attributes o...

Attributes of mines_poly

MINE_CODE	MULT	MC_2	MC_3	MC_4	DRAIN	TYPE	Shape_Length	Shape_Area	
LS-015	1				B	LPGAS	1861.521144	118712.206122	<Null>
CYA-030	1				B	SALT	78810.339586	89995920.570085	<Null>

Microsoft Access - [TBLMINES : Table]

File Edit View Insert Format Records Tools Window Help

ANN_MAPS	RNG_FRM	RNG_TO	OPEN_TYPE	ELEV	AB_DT	MAP_DT	OSM_DOC_NO	DEM_ELEV
1	11/1920	2/1923	DRIFT	0	2/1933		313492	0
1	3/28/1907	5/1914	DRIFT	757	1915		313493	0
1	5/31/1909	12/1914	DRIFT	0	1916		313494	0
1	6/10/1897	5/1912	DRIFT	0	1913		313495	0
1	1874		DRIFT	0	1916		313496	0
0			DRIFT	784	1919		313497	0
0			DRIFT	0			NoMap	0
1	12/1916	5/1921	DRIFT	0	1918		313498	0
0			SHAFT	681	1913		313500	0
1	1/1918		DRIFT	0	1920		313499	0
0			DRIFT	0	1923		313501	0
1	1/1911	12/1920	DRIFT	0	1922		313502	0
1	6/4/1895	2/1916	DRIFT	684	1923		313503	0
1	1/1903	3/1927	SLOPE	674	1928		313504	0
1	8/1920	8/1922	DRIFT	763	1923		313505	0
0			DRIFT	0	1922		313506	0
1	6/1904	5/1923	SLOPE	550	1919		313507	0
1	4/1914	10/1922	SHAFT	689	1923		313508	0
1	10/1921		DRIFT	0	1922		313509	0
1	4/9/1907	12/1920	DRIFT	700	1923		313510	0
0			DRIFT	0	1925		313511	0
1	7/19/1918	5/1923	DRIFT	0	1924		313512	0
1	10/1914	4/1924	SLOPE	0	1925		313513	0
0			DRIFT	0			313514	0
1	7/1902		DRIFT	0	1925		313515	0
1	12/1918	12/1922	SHAFT	618	1923		313516	0
1	1/13/1905	11/2/1925	DRIFT	0	1926		313517	0
1	12/23/1907	1/2/1912	DRIFT	747	1916		313518	0
0			DRIFT	0	1923		313519	0
1	3/21/1908	1/1925	SHAFT	0	1927		313520	0
1	9/30/1904	1/1924	SLOPE	0	1925		313521	0
0			SHAFT	653	1930		313522	0
1	12/7/1903	1/5/1929	SHAFT	618	1929		313523	0
1	12/1917	10/11/1929	DRIFT	755	1929		313524	0

Record: 1 of 4210

Datasheet View

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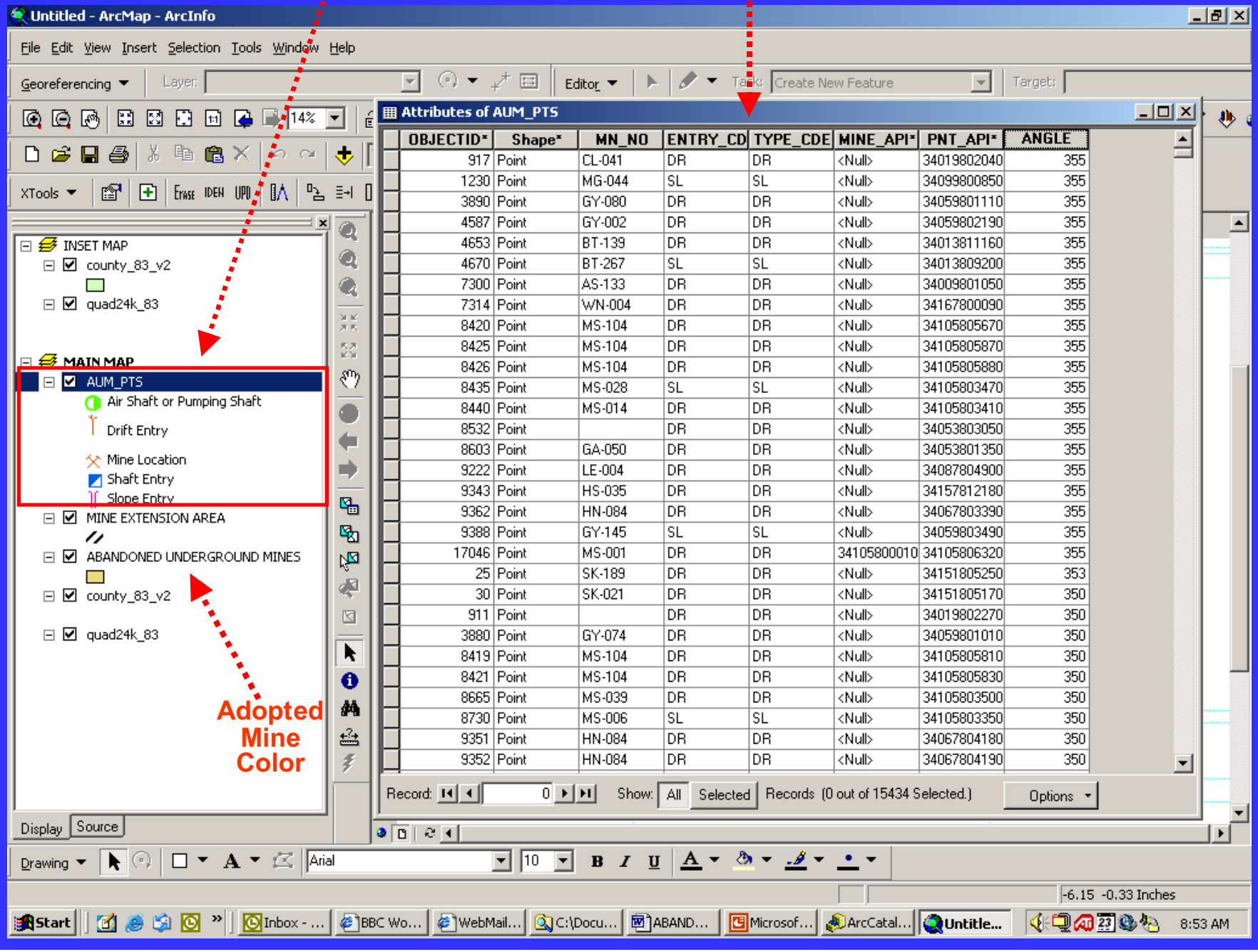
AUM Points Symbology and Feature Class Attribute Table



OBJECTID*	Shape*	MN_NO	ENTRY_CD	TYPE_CDE	MINE_API*	PNT_API*	ANGLE
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1230	Point	MG-044	SL	SL	<Null>	34099800850	355
3890	Point	GY-080	DR	DR	<Null>	34059801110	355
4587	Point	GY-002	DR	DR	<Null>	34059802190	355
4653	Point	BT-139	DR	DR	<Null>	34013811160	355
4670	Point	BT-267	SL	SL	<Null>	34013809200	355
7300	Point	AS-133	DR	DR	<Null>	34009801050	355
7314	Point	WN-004	DR	DR	<Null>	34167800090	355
8420	Point	MS-104	DR	DR	<Null>	34105805670	355
8425	Point	MS-104	DR	DR	<Null>	34105805870	355
8426	Point	MS-104	DR	DR	<Null>	34105805880	355
8435	Point	MS-028	SL	SL	<Null>	34105803470	355
8440	Point	MS-014	DR	DR	<Null>	34105803410	355
8532	Point		DR	DR	<Null>	34053803050	355
8603	Point	GA-050	DR	DR	<Null>	34053801350	355
9222	Point	LE-004	DR	DR	<Null>	34087804900	355
9343	Point	HS-035	DR	DR	<Null>	34157812180	355
9362	Point	HN-084	DR	DR	<Null>	34067803390	355
9388	Point	GY-145	SL	SL	<Null>	34059803490	355
17046	Point	MS-001	DR	DR	34105800010	34105806320	355
25	Point	SK-189	DR	DR	<Null>	34151805250	353
30	Point	SK-021	DR	DR	<Null>	34151805170	350
911	Point		DR	DR	<Null>	34019802270	350
3880	Point	GY-074	DR	DR	<Null>	34059801010	350
8419	Point	MS-104	DR	DR	<Null>	34105805810	350
8421	Point	MS-104	DR	DR	<Null>	34105805830	350
8665	Point	MS-039	DR	DR	<Null>	34105803500	350
8730	Point	MS-006	SL	SL	<Null>	34105803350	350
9351	Point	HN-084	DR	DR	<Null>	34067804180	350
9352	Point	HN-084	DR	DR	<Null>	34067804190	350

New AUM Mines, Points and Mined-Out Areas Feature Class Attribute Tables

Attributes of AUM_HACHURED

OBJECTID*	SHAPE*	MINE_COD	OGSCODE	QUAD_NA	COMMENT	SHAPE_Le	SHAPE_Are	HACH_API*	MINE_API*
284	Polygon	AS-130	B3D2	NELSONVILL	<Null>	5236.167073	1393931.142	340098000103	340098013002
746	Polygon	AS-131	B3D3	UNION_FUR	<Null>	3231.417805	437236.2400	340098000203	340098013102
282	Polygon	AS-013A	B3D2	NELSONVILL	<Null>	5342.636503	1036615.095	340098000303	340098028102
517	Polygon	AS-140	B2C8	STEWART	<Null>	2200.174673	208527.6621	340098000403	340098014002
518	Polygon	AS-140	B2C8	STEWART	<Null>	2377.951392	335775.9027	340098000503	340098014002
559	Polygon	AS-165	B3D3	UNION_FUR	<Null>	2230.933628	258826.7368	340098000603	340098016502
24	Polygon	AS-179	B2D8	AMESVILLE	<Null>	2602.654994	341854.4815	340098000703	340098017902
23	Polygon	AS-002	B2D8	AMESVILLE	<Null>	898.708456	54209.57255	340098000803	340098000202
558	Polygon	AS-247	B3D3	UNION_FUR	<Null>	3371.083599	541629.0486	340098000903	340098024702
274	Polygon	AS-247	B3D2	NELSONVILL	<Null>	959.135226	61221.25040	340098001003	340098024702
275	Polygon	AS-247	B3D2	NELSONVILL	<Null>	4084.532647	704969.4141	340098001103	340098024702
285	Polygon	AS-248	B3D2	NELSONVILL	<Null>	2051.074717	250260.2570	340098001203	340098024802
749	Polygon	AS-256	B3D3	UNION_FUR	<Null>	1876.278267	234198.8828	340098001303	340098025602
747	Polygon	AS-270	B3D3	UNION_FUR	<Null>	1490.179141	84777.70785	340098001403	340098027002
443	Polygon	AS-276	B3D2	NELSONVILL	<Null>	3403.570072	244330.8067	340098001503	340098027602
442	Polygon	AS-276	B3D2	NELSONVILL	<Null>	2012.254941	178106.4590	340098001603	340098027602
272	Polygon	AS-003	B3D2	NELSONVILL	<Null>	5125.264752	907979.0382	340098001703	340098000302
441	Polygon	AS-003	B3D2	NELSONVILL	<Null>	1853.321261	182738.6988	340098001803	340098000302
748	Polygon	AS-005	B3D3	UNION_FUR	<Null>	5789.606646	1108422.755	340098001903	340098000502
283	Polygon	AS-056	B3D2	NELSONVILL	<Null>	2355.366628	279873.6806	340098002003	340098005602
280	Polygon	AS-077	B3D2	NELSONVILL	<Null>	5191.195042	911902.7930	340098002103	340098007702
276	Polygon	AS-077	B3D2	NELSONVILL	<Null>	1646.080199	136003.1917	340098002203	340098007702
281	Polygon	AS-077	B3D2	NELSONVILL	<Null>	9497.166250	1453051.761	340098002303	340098007702
279	Polygon	AS-077	B3D2	NELSONVILL	<Null>	4574.216321	590111.0798	340098002403	340098007702
278	Polygon	AS-077	B3D2	NELSONVILL	<Null>	1068.588866	65104.00295	340098002503	340098007702
277	Polygon	AS-077	B3D2	NELSONVILL	<Null>	3272.265526	373804.3786	340098002603	340098007702
95	Polygon	AS-087	B3E1	CORNING	<Null>	3005.850976	360489.1728	340098002703	340098008702
94	Polygon	AS-087	B3E1	CORNING	<Null>	1230.007225	75228.44475	340098002803	340098008702
271	Polygon	AS-088	B3D2	NELSONVILL	<Null>	5326.216522	524268.8589	340098002903	340098008802
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1607	Polygon	AS-248	B3D2	NELSONVILL	<Null>	622.012136	19114.35215	340098003103	<Null>
217	Polygon	BT-104	C1A7	LANSING	<Null>	4434.944507	836639.4597	340138000103	340138010402
653	Polygon	BT-012	C1A6	WHEELING	<Null>	4975.124443	1624405.976	340138000203	340138001202
651	Polygon	BT-012	C1A6	WHEELING/	MERGED AR	4452.544112	1046995.298	340138000303	340138001202
220	Polygon	BT-012	C1A7	LANSING	<Null>	1491.547370	143523.8901	340138000403	340138001202
652	Polygon	BT-012	C1A6	WHEELING	<Null>	3829.721945	896619.2175	340138000503	340138001202
213	Polygon	BT-141	C1A7	LANSING	<Null>	1965.872445	258986.5823	340138000603	340138014102
178	Polygon	BT-148	C1B8	HARRISVILL	<Null>	5578.590661	1256260.185	340138000703	340138014802
646	Polygon	BT-151	C1A6	WHEELING	<Null>	3892.083344	556750.8400	340138000803	340138015102

Record: 1 Show: All Selected Records (0 out of 883 Selected.) Options

Start Inbox - ... BBC Wo... WebMai... C:\Docu... ABAND... Microso... ArcCata... Untitle... 9:16 AM

AUM_Hachured Areas (Mined-Out Areas) Polygon Attribute Table

Attributes of AUM_HACHURED

OBJECTID*	SHAPE*	MINE_COD	OGSCODE	QUAD_NA	COMMENT	SHAPE_Length	SHAPE_Are	HACH_API*	MINE_API*
284	Polygon	AS-130	B3D2	NELSONVILL	<Null>	5236.167073	1393931.142	34009800010	340098013002
746	Polygon	AS-131	B3D3	UNION_FUR	<Null>	3231.417805	437236.2400	34009800020	340098013102
282	Polygon	AS-013A	B3D2	NELSONVILL	<Null>	5342.636503	1036615.095	34009800030	340098028102
517	Polygon	AS-140	B2C8	STEWART	<Null>	2200.174673	208527.6621	34009800040	340098014002
518	Polygon	AS-140	B2C8	STEWART	<Null>	2377.951392	335775.9027	34009800050	340098014002
559	Polygon	AS-165	B3D3	UNION_FUR	<Null>	2230.933628	258826.7368	34009800060	340098016502
24	Polygon	AS-179	B2D8	AMESVILLE	<Null>	2602.654994	341854.4815	34009800070	340098017902
23	Polygon	AS-002	B2D8	AMESVILLE	<Null>	898.708456	54209.57255	34009800080	340098000202
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747	Polygon	AS-270	B3D3	UNION_FUR	<Null>	1490.179141	84777.70785	34009800140	340098027002
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283	Polygon	AS-056	B3D2	NELSONVILL	<Null>	2355.366628	279873.6806	34009800200	340098005602
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277	Polygon	AS-077	B3D2	NELSONVILL	<Null>	3272.265526	373804.3786	34009800260	340098007702
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94	Polygon	AS-087	B3E1	CORNING	<Null>	1230.007225	75228.44475	34009800280	340098008702
271	Polygon	AS-088	B3D2	NELSONVILL	<Null>	5326.216522	524268.8589	34009800290	340098008802
270	Polygon	AS-088	B3D2	NELSONVILL	<Null>	2265.409914	234958.0704	34009800300	340098008802
1607	Polygon	AS-248	B3D2	NELSONVILL	<Null>	622.012136	19114.35215	34009800310	<Null>
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653	Polygon	BT-012	C1A6	WHEELING	<Null>	4975.124443	1624405.976	34013800020	340138001202
651	Polygon	BT-012	C1A6	WHEELING/	MERGED AR	4452.544112	1046995.298	34013800030	340138001202
220	Polygon	BT-012	C1A7	LANSING	<Null>	1491.547370	143523.8901	34013800040	340138001202
652	Polygon	BT-012	C1A6	WHEELING	<Null>	3829.721945	896619.2175	34013800050	340138001202
213	Polygon	BT-141	C1A7	LANSING	<Null>	1965.872445	258986.5823	34013800060	340138014102
178	Polygon	BT-148	C1B8	HARRISVILL	<Null>	5578.590661	1256260.185	34013800070	340138014802
646	Polygon	BT-151	C1A6	WHEELING	<Null>	3892.083344	556750.8400	34013800080	340138015102

Record: 1 Show: All Selected Records (0 out of 878 Selected.) Options

Start Inbox ... BBC W... ODNR ... Micros... ABAN... D:\arc... ArcCa... Untitl... 1:11 PM

The AUM Application Toolbar Tools

Populated Blank Attribute Attribute Form Tool Form Button

Show Atts | Select/Zoom | Images

On 1 of 3 Duplicate APIs >>

Choose a Feature

The following features are at the chosen point. Please choose one:

Point - 340818060501 -
Mine - 340818008902 - JFN-089

OK | Cancel

Mine Point Attributes Form

Point API: 340818060501 | Show Atts | Select/Zoom
Associated Mine: | Show Mine | Select/Zoom | Images
(Old) Mine Code: | Associate by Mine Code
Mine Opening ID

Type Code: Drift | County:
Point Source: | Township:
Commodity: | Quadrangle:
Operator: | Elevation:
Mine Name: | Thickness:
Seam Name: | Date Record:
Angle Orientation:

Apply Changes | Close/Cancel

Mines Attribute Form

Mine API: 340138018102 | Show Atts | Select/Zoom | Images
(Old) Mine No: BT-181
OSM Doc No: 314893, 363283

Mine Type: UNDERGROUN
Drain Type: A

Elevation: 810
Map Date: 1958
Abandon Date: 1958

Multiple Mine Codes
Mine Code 2:
Mine Code 3:
Mine Code 4:

Location Information
UTM North: 4442000
UTM East: 523000
Latitude: 0
Longitude: 0

Mine Ownership
NIXON RUN COAL CO. - NIXON RUN
Operator:
Mine Name:
Present:
ADD | REMOVE

Position
County: BELMONT
ADD | REMOVE
Township: PEASE
ADD | REMOVE
All | Lookup
Quad: TILTONSVILLE WHEELING
ADD | REMOVE

Annual Maps
Maps Received
From:
To:

Seam Information
PITTSBURGH NO.8
ADD | REMOVE

Commodities
COAL
ADD | REMOVE

Comments
COUNTY NO.BT-1008; THIS MAP ALSO SHOWS MAP NO.14 AND PART OF MAP NO.87; COAL IDENTIFIED IN OFFICE NO ANNUAL MINE MAP.
OGS FILE NO. 2258. MEASURED SECTION TAKEN BY STOUT AND WHITE IN 1925 AT A LOCAL MINE. THE SEAM TH
ADD | REMOVE

Apply Changes | Close/Cancel

Hachured Areas Attributes Form

Hach API: 340138001303 | Show Atts | Select/Zoom
Associated Mine: 340138020302 | Show Mine | Select/Zoom
(Old) Mine Code: BT-203 | Associate by Mine Code

OGS Quad Code C1B6 | Quadrangle: TILTONSVILLE
Comments:

Apply Changes | Close/Cance

The AUM Images

ArcCatalog - ArcInfo - I:\AUM_Images\jefferson

File Edit View Go Tools Help

Stylesheet: FGDC ESRI Location: I:\AUM_Images\jefferson

AUM_Images
- athens
- belmont
- butler
- carroll
- COLUMBIANA
- coshocton
- cuyhoga
- delaware
- erie
- gallia
- guernsey
- hamilton
- harrison
- hocking
- holmes
- jackson
- jefferson
- lake
- lawrence
- lucas
- mahoning
- medina
- meigs
- monroe
- morgan
- muskingum
- noble
- ottawa
- perry
- portage
- preble
- scioto
- stark
- summit
- trumbull
- tuscarawas

Contents | Preview | Metadata

Name	Type	S
340818012402_02.tif	Raster Dataset	233
340818012402_03.tif	Raster Dataset	269
340818012502.tif	Raster Dataset	136
340818012602.tif	Raster Dataset	149
340818012702.tif	Raster Dataset	237
340818012702_02.tif	Raster Dataset	494
340818012802_01.tif	Raster Dataset	303
340818012802_02.tif	Raster Dataset	326
340818012802_03.tif	Raster Dataset	192
340818012802_04.tif	Raster Dataset	598
340818012802_05.tif	Raster Dataset	491
340818012802_06.tif	Raster Dataset	122
340818012802_07.tif	Raster Dataset	31
340818012802_09.tif	Raster Dataset	499
340818012802_10.tif	Raster Dataset	125
340818012802_11.tif	Raster Dataset	160
340818012802_8.tif	Raster Dataset	388
340818012902_01.tif	Raster Dataset	303
340818012902_02.tif	Raster Dataset	331
340818012902_03.tif	Raster Dataset	266
340818012902_04.tif	Raster Dataset	670
340818012902_05.tif	Raster Dataset	716
340818012902_06.tif	Raster Dataset	578
340818012902_07.tif	Raster Dataset	766
340818012902_08.tif	Raster Dataset	562
340818012902_09.tif	Raster Dataset	515
340818012902_10.tif	Raster Dataset	371
340818012902_11.tif	Raster Dataset	131
340818012902_12.tif	Raster Dataset	133
340818012902_13.tif	Raster Dataset	225
340818012902_14.tif	Raster Dataset	232
340818012902_15.tif	Raster Dataset	190

Arranged by Counties

API Indexing

Start Inb... BB... G:\... Wi... Arc... Sta... AU... AU... Ex... 4:45 PM

API INDEXING

API Assignment for all data at DGS

0-7 is reserved for various types of oil and gas well data

8 will be used for Abandoned Underground Mines (this may change to 9 - miscellaneous)

9 will designate miscellaneous data. Thus, if you see a 9 you will know that it is not oil-and-gas- well data and to look at characters 11 and 12 to define the type of data.

12 = state code, Ohio = 34 (see attached list of all other states)

345 = county code (see attached list for all counties)

6 – data type indicator

7-10 – permit number or individual feature ID

11-12 – sidetrack number used for O&G wells; data type indicator for all other collections

13-14 – multi-completion number used for O&G wells; can be used for qualifier for other types

Data Type Identifier

Digit # 6

1234567890 1234 – the standard is a 14-digit system broken down as:

12-345-6-7890-12-34

Where:

52 – AUM data

this data will also use the 13 and 14 characters to further qualify the data as:

34115900015201 – mine poly

34115900025202 – mine points

34115900455203 – hachured poly

The New AUM Personal Geodatabase

ArcCatalog - ArcInfo - G:\AUM\AUM.mdb

File Edit View Go Tools Help

Location: G:\AUM\AUM.mdb

Contents | Preview | Metadata

Name	Type
ANNOTATION	Personal Geodatabase Feature Data...
lines	Personal Geodatabase Feature Data...
Points	Personal Geodatabase Feature Data...
Polygons	Personal Geodatabase Feature Data...
Shields	Personal Geodatabase Feature Data...
AUM_HACHURED	Personal Geodatabase Feature Class
AUM_MINES	Personal Geodatabase Feature Class
aum_out	Personal Geodatabase Table
AUM_PTS	Personal Geodatabase Feature Class
btcontours	Personal Geodatabase Feature Class
BTPOINTS	Personal Geodatabase Feature Class
county_83_v2	Personal Geodatabase Feature Class
entry_line	Personal Geodatabase Feature Class
MN_POINTS	Personal Geodatabase Feature Class
OSM DocNum	Personal Geodatabase Table
quad24k_83	Personal Geodatabase Feature Class
RTE_LOCAL	Personal Geodatabase Feature Class
RTE_MUNI	Personal Geodatabase Feature Class
RTE_STATE	Personal Geodatabase Feature Class
STR_CONTOURS	Personal Geodatabase Feature Class
STR_POINTS	Personal Geodatabase Feature Class
tblComments	Personal Geodatabase Table
tblCommodity	Personal Geodatabase Table
tblCounty	Personal Geodatabase Table
tblMineOpenings	Personal Geodatabase Table
TBLMINES	Personal Geodatabase Table
TBLMINES1	Personal Geodatabase Table
tblOperator	Personal Geodatabase Table
tblQuad	Personal Geodatabase Table
tblRemainingImages	Personal Geodatabase Table
tblSeam	Personal Geodatabase Table
tblTownship	Personal Geodatabase Table

AUM.mdb
- ANNOTATION
- lines
- Points
- Polygons
- Shields
- AUM_HACHURED
- AUM_MINES
- aum_out
- AUM_PTS
- btcontours
- BTPOINTS
- county_83_v2
- entry_line
- MN_POINTS
- OSM DocNum
- quad24k_83
- RTE_LOCAL
- RTE_MUNI
- RTE_STATE
- STR_CONTOURS
- STR_POINTS
- tblComments
- tblCommodity
- tblCounty
- tblMineOpenings
- TBLMINES
- TBLMINES1
- tblOperator
- tblQuad
- tblRemainingImages
- tblSeam
- tblTownship
- twp_83_v2
- UsersTbl
- hatch.dbf
- oh_dem

Coverages
Shapefiles
Raster Dataset
and
dBase Tables

A Single Data Repository !!!

The AUM Data Storage Folder -- on the NR728Mather Server

ArcCatalog - ArcInfo - G:\

File Edit View Go Tools Help

Location: G:\

E:\
G:\
AUM
AUM POINT SYMBOLOGY
AUM_GEOREF_IMAGES
AUM_IMAGES
DIGITIZER_TICS
DMRM Surface Mines
JAMIE POINT SYMBOLOGY
Sample Problems
TEMPLATES
WayneNF
AUM.mdb
hatch.dbf
oh_dem
OHIO_DEM_earthtones.lyr
Basemap
Cartography
d0a97f50d58101dbca
Export
Geophysics
GRCSales
Images
Landslide
msdownld.tmp
NewberryData
SanduskyData
WUTemp
XML_Dir
H:\
I:\
J:\
J:\UAM
K:\
N:\
Q:\WS_FTP
S:\

Contents | Preview | Metadata

Name	Type	Size
AUM	Folder	
Basemap	Folder	
Cartography	Folder	
d0a97f50d58101dbca	Folder	
Export	Folder	
Geophysics	Folder	
GRCSales	Folder	
Images	Folder	
Landslide	Folder	
msdownld.tmp	Folder	
NewberryData	Folder	
SanduskyData	Folder	
WUTemp	Folder	
XML_Dir	Folder	

Folder Connection selected

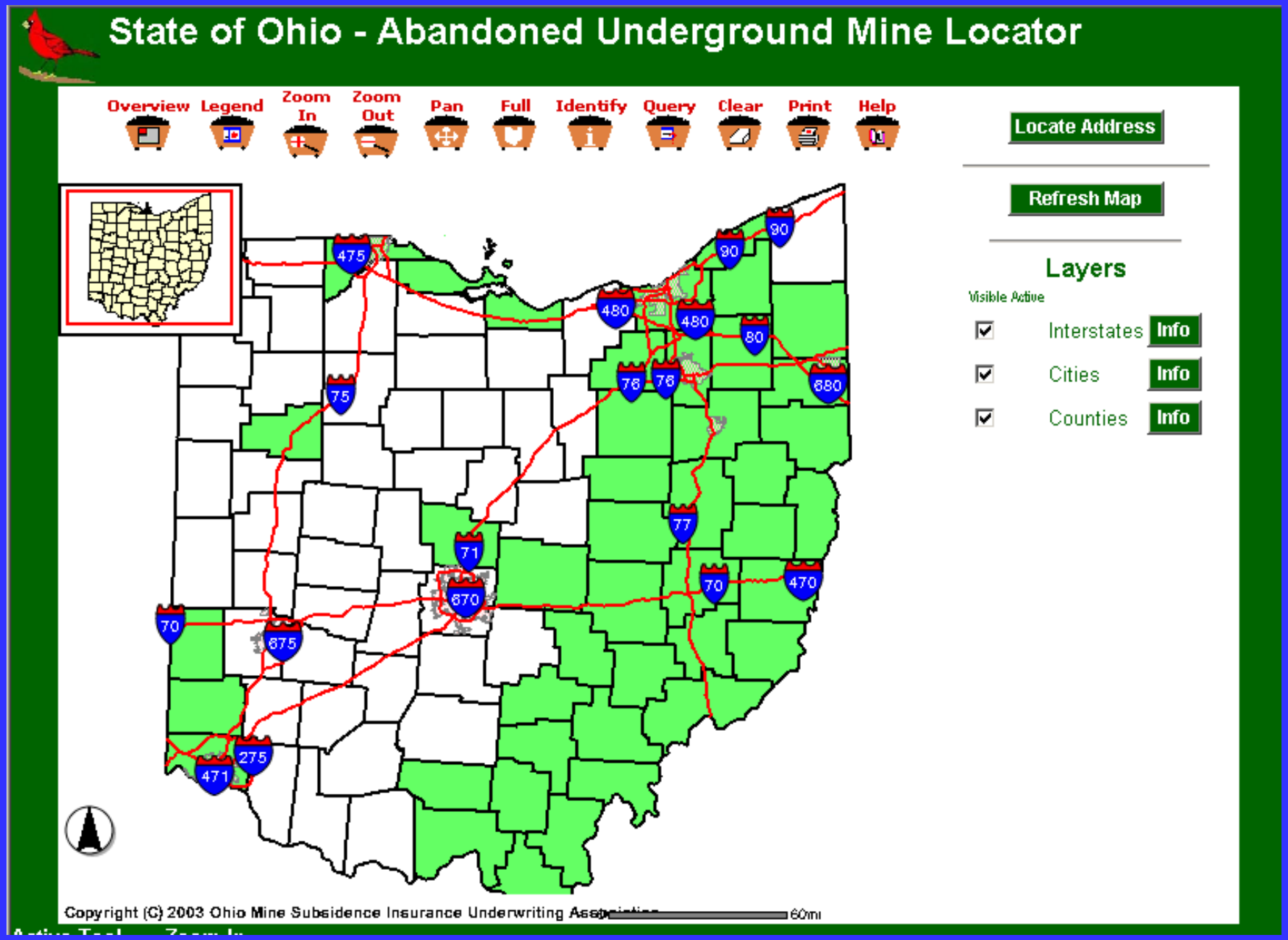
Start | Inbox ... | WebM... | C:\temp | ABAN... | Micros... | ArcCa... | Untitle... | ODNR ... | 1:23 PM

Recent Work…….

- **AUM Geodatabase**:

Migration from a personal geodatabase to a multi-user geodatabase in ArcSDE running on a SQL Server DBMS.

Now Available….. AUM ArcIMS Website



On the Ohio Geological Survey Website --- http://www.dnr.state.oh.us/geosurvey/index.html

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IMCC/MSHA/OSM Benchmarking Workshop on Underground Mine Mapping
October 15 and 16, 2003
The Galt House Hotel
Louisville, KY

NOTE: On Day Two of the Benchmarking Workshop, attendees participated in an interactive discussion of several topics that were introduced by a panel of presenters during four roundtable sessions. The following notes reflect some of the discussions that took place during those sessions.

Roundtable Session I: Acquiring and Preserving Map Images

Presentation by PA Bureau of Deep Mine Safety

They scan at 300 DPI in color and save to TIFF
They use a Vidar Color Scanner
It preserves details on the map
The intention is to preserve and scan the maps as a visual equivalent of the original

Presentation by Virginia Department of Mines, Minerals and Energy

Scans in color at 200 to 300 DPI depending on the level of detail in document
Save as TIFF 6 format for Archive
Compress as Mr. SID for daily use
Anyone can view Mr. SID files with free SID viewer
They have a portable scan station that they can take to remote locations for scanning maps. This is essential to their acquisition of many maps because many people won't let maps off site.
They use a Color Track 5400 scanner that takes maps up to 12mm thick.
Georeference using AutoCAD Map

Presentation by OSM regarding OSM Mine Map Repository

Repository began scanning 5 to 6 years ago
Started at 100 DPI, then 200 and now 400 DPI
Just purchased a new 54 inch scanner and will scan all original maps that come in. Will not abandon the aperture card process.

Several questions were raised by the moderator prior to an extended period of discussion, as follows:

Of the 20 states represented at the workshop:

How many states have capability to scan	Answer. 12
How many states have laws in place that require submission of mine maps	Answer: 10 (coal) 4 (noncoal)

How many states receive signed and certified coal mine maps	Answer 9
How many receive signed and certified non coal maps	Answer 4
How many states require final non-certified coal maps	Answer 2
How many states required to keep and preserve maps	Answer 9
How many states required to keep maps in secure location	Answer 4 or 5
How many accept electronic mine maps	Answer 9

MSHA requires submittal of final coal mine closure map for all mines. Some district offices send these to OSM and others do not.
Some companies go out of business before closure and maps are not submitted.
MSHA has no map submittal requirement for non-coal mines.
While OSM has a mutual agreement with some MSHA district offices to receive closure maps, this is not a requirement of MSHA and not all districts do it.

West Virginia started last fall acquiring mine maps
Effort includes talking to many groups and organizations including:

- Coal associations
- Engineering and survey firms
- Professional Engineering Board
- Survey Board

Effort includes:

- Acquiring maps of old mines
- Editing database and comparing it with the OSM database
- Taking a fresh look at map requirements for active mines, talking to operators about electronic submittal, getting information for all active mines
- Getting final maps of all current mines by providing resources to mine companies such as a checklist of information to be included on final map (georeferencing info required).

MSHA asked how states get companies to release maps.

WV stated that persistence prevails. They have continued to work with operators on issues like liability and confidentiality. Some companies are developing disclaimers to deal with liability.

Virginia has been successful by just persisting. Also, VA gives the company something back by making scanned mine map and database information available to mining companies for new permits and other actions. VA puts a disclaimer on all data released.

Illinois said that they have had great success with some companies and less with others. IL gives electronic copies of all scanned maps back to the mining company. IL suggested that all states send copies of scanned maps to the OSM MMR as an archive or national storehouse. 17 states replied that they would do this if asked by OSM.

North Carolina said that we need a document maintenance plan for electronic data.

IL stated that the national MMR must have a data upgrade plan or data will become obsolete.

It was asked how many states have a quality controlled facility to store and preserve paper maps long term. Seven states responded that they do have one. It was also asked how many states have facilities to store maps properly (i.e. flat and climate controlled). The answer was four.

We learned that OSM MMR does not keep original paper maps. They are microfilmed and/or scanned and returned to sender.

Wyoming uses state archives to store paper maps. IL has a dedicated mine map storage facility. Others states are able to work their state archivists as well. In fact, ten states indicated that they have state archive facilities or agencies that can store maps.

PA stated that the compact disk is not an appropriate long term data storage medium. It was suggested that people use a redundant server for this process.
Illinois stated that we may need Federal requirements for final mine maps on non-coal mines, similar to those for coal mines.

IL also said that we need a MSHA requirement that all district offices send final closure maps to OSM-MMR.

BLM stated that we need a statute requiring submittal of all final mine maps.

OK stated that we should scan every unique map, not just the latest map for a mine. Early maps and operation plan maps may contain a lot of detail that the final map may omit. We especially need to capture surface features.

New Mexico wants a database of all company lineages to find out who has the old maps. New Mexico has not scanned any mine maps yet.

Ohio stated that they would like to see a general list of sites where people would look for mine maps.

MSHA stated that the Library of Congress has a mine map collection. Also has maps by state. This collection is called the Sanborn Collection and is available via the web.

Someone suggested that paper maps are the only acceptable Archive medium right now.

Other issues/topics that were raised during this session included the following:

- Deterioration of maps: how do we protect maps and bring them forward into the future?
- What should we scan – the original or a copy?

- Quality control is critical, especially in terms of protection and storage.
- We need scanning solutions
- Cataloguing and indexing is also critical
- We should focus more resources on georeferencing and rectification
- How do we define what a "final" map is and what we do with it?
- Liability concerns: how do we get companies (both land and mining) to release maps? Issues here include: proprietary information; potential legal liability; use of disclaimers; sharing information back with the companies; and use of the information we receive as a "footprint", not a "hammer".
- Potential use of OSM's national mine map repository for all maps (digital copies)
- Storage of original maps – use of state archivist agencies here.
- Storage – CD (digital) v. original paper copies of maps
- Standards for submittal of maps for active coal and noncoal mines
- Importance of capturing unique map characteristics, usually on oldest available maps.
- Resource for contacting mining companies who mined in the past
- Guidelines for what states are attempting to capture in their mapping efforts.

Roundtable Session II: Moving Maps to GIS

Kentucky – they reprocess the file to best fit 32 colors. It was stated that KY started scanning maps 6 months ago. Started at 200 DPI, 24 bit color, then reprocess to 32 color 8 bit data. They use MS Photoshop with Active X to automatically reprocess image files overnight. Have an ACAD utility they build in-house for semi-automatically georeferencing. They enter 2 points then enter or point and click to set the scale. Then you pick other points with a snap to grid feature.

West Virginia - has a rough set of guidelines for georeferencing. They use the following features, in order, as tie points for maps:

- Standard coordinates
- Geologic features
- Mine features
- Railroads
- Oil and gas wells
- Transmission lines
- Roads
- Property lines
- Streams

WV has other guidelines including:

- Don't do anything that distorts the mine features
- Estimate average positional error at 10 meters
- Use GIS as index to detailed mine maps, but do not actually display the mine maps in the GIS for public.
- Comply with FGDC metadata rules

Illinois made several suggestions. Scan and save all maps as uncompressed TIFF for archive purposes. You can then compress the images for use in GIS or other. Never fold maps during scanning. Cut and splice if necessary. Never rubbersheet maps.

MSHA asked which states have state funding for mine map efforts. Answer: 3
How many rely solely on Fed funds – Answer: 6
How many have no funding specifically earmarked to do anything on mine maps. Answer: 7. Of these, six state are not doing any mapping; one state is doing mapping.

It was also asked how many states require a geo-referenced coordinate system for their mine mapping effort? Answer: 8.

Indiana suggested that map collection efforts be sensitive to user needs and comments.

Illinois asks companies to place permanent markers at all shafts and record the location with the courthouse. This is not by statute but simply by request. IL asked if other states do it. The answer was no.

Someone stated that today's mine maps do not contain the details that old maps had.

Someone suggested national guidance on:

Organizing maps
Indexing maps
Managing maps
Software
Hardware
Data management

Someone suggested we need a coordinated effort to compile a standard model and examples of a GIS.

Someone also suggested that OSM needs to discuss setting up a web site or message board for tech transfer on mine maps, possibly a list server.

Other topics/issues raised during this session included the following:

- Georeferencing is an art form
- Digitizing makes it easier to use data
- Capturing and attributing information
- Image processing – minimize user intervention
- Data validity – source document impact on uncertainty and error
- Importance of funding/resources to make sure of newer technologies for georeferencing and digitizing

- GIS can serve an index to more detailed mine maps
- Database management and indexing: potential data model and/or guidance; mechanism to share this information.

NOTE: At this point in the proceedings, several states who did not make formal presentations on Day One were invited to provide an overview of what is occurring in their respective state regarding mine mapping efforts. Among the presentations were the following:

Kansas -- Ken Nelson with Kansas Geological Survey stated that KS has just started moving mine maps to GIS. Has a scanner available and lots of computing hardware. Uses ArcSDE for other GIS data. He lacks money for staff to do mine map georeferencing.

Missouri -- Cheryl Seeger said Missouri Geological Survey has made no concerted effort to find mine maps or move to GIS. They have a large color scanner but no staff time. The maps that they do have are stored flat.

Iowa -- Mary Howes stated that Iowa has an inventory of 1600 to 1700 mine maps, most are prior to 1940. During the 1980's Iowa used $30,000 from the AML program to have the state Achiever wash the maps to remove acids and seal them in Mylar envelopes. The maps are stored flat. They used AutoCAD to digitize mine boundaries from the maps. Also photographed all maps in 81/2 by 11 inch and use these photos for day-to-day work. Today, Iowa has a GIS with mine data stored in it and maps for 830 mine sites. They know of 2000 mines that may have existed in the state and need to identify and verify the locations of each. Iowa is just in the beginning of creating an ARC IMS site.

New Mexico -- Alysia Leavitt of New Mexico reported that NM has 10,000 to 15,000 abandoned UG mines. They have one room full of mine maps. The only scanning that is done is the Open File maps and this is a minimal number. Their next step is to index the maps they have. At this time, they do not use TIPS for anything related to mine map efforts.

Oklahoma -- Mary Ann Prichard and Mike Sharp reported that the Oklahoma Department of Mines has a vault of underground mine maps. Only a few are scanned. The AML program staff retrieves the ones they need on an as-needed basis. They have 1500 to 2000 coal maps and 500 lead/zinc maps. They report that Missouri Southern College in Joplin, Missouri has the old Bureau of Mines map collection for the Tri-State district. The Missouri maps are on microfich. Oklahoma and Kansas are on paper and linen. They know that there were about 100,000 drill holes in the Tri-State area but they have only about 14,000 drill logs at Missouri Southern.

Overviews were also presented by NY, WY and CO but were not transcribed and are unavailable.

Roundtable Session III: Access/Sharing Information

A key element here is: who is your customer base? It can include the mining industry; insurance companies; landowners; the general public; planners (county, city, etc); state agencies (i.e. the departments of transportation); utilities; consulting firms; lenders; and the news media.
The use of websites is becoming more useful and practical.

Someone suggested the use of a subscriber service.

A key issue is how the information will be used – there are different views and needs

Importance of sharing freely validated data.

Roundtable Session IV: Next Steps – Moving into the Future

This session began with an overview from MSHA and OSM about their respective visions for the future, including potential sources of funding for state mine map initiatives.

MSHA stated that out of the $10 million, no-year money that it received from Congress as a follow-up to the Quecreek incident, $6 million has been earmarked for demonstration projects for detecting underground mine voids. An RFP was issued and responses are due by November 1. Another $4 million has been specifically earmarked for digitizing of mine maps. This money is specifically designated for state grants and grant proposals are open to the entire mapping effort. At this juncture, MSHA is considering distributing the money in three increments over three years: $2 million by 12/1/03; another $1 million by 10/1/04; and the final $1 million by 10/1 05. However, the agency may re-think their position on this and choose to make all $4 million available immediately, depending on the nature of the state grant proposals. States were encouraged to submit their proposals to MSHA no later than November 1. For further information, states were directed to contact Larry Checca with MSHA at checca.elio@dol.gov.

OSM stated that it is hoping to include an amount of money (yet to be determined) in its budget for FY 2005 to enhance its mine map repository but also to develop and enhance "centers of excellence" at the state level that will allow states with advanced experience and information on mine mapping to share their expertise with other states. OSM would also like to see funding available to allow those states with larger workloads related to underground mine mapping to continue their on-going work and to bring all states up to some base level of performance. OSM views their initiative as a multi-year funding effort. It will be primarily focused on coal only, since SMCRA does not address noncoal. As part of its analysis of funding needs, OSM will be looking at hardware, software and training needs. For further information, contact John Craynon of OSM at jcraynon@osmre.gov .

Discussion then ensured regarding the types of next steps that might be appropriate as a follow up to this workshop. Beyond the individual state funding opportunities with MSHA and future state funding opportunities with OSM, it was recommended that several select working groups or committees be formed to refine and explore the following topics:

- Preserving and archiving maps (including storage and protection and a national effort to recover mine maps)
- Digitizing, scanning and ground-truthing maps
- Database management (including data validity; minimizing and quantifying error; cataloguing and indexing)
- Access and sharing information (including resolution of the liability issues)
- Future workshops or intergovernmental discussions (perhaps as a follow-up to the work of the working groups or committees)
- National guidelines (that might address mine map indexing, archiving, moving paper maps to CDs (digitization), etc.)
- Interactive web sites or a national mine map bulletin board
- Hazard prediction
- Coordinating the map acquisition effort, especially between OSM and MSHA
- Speed up the scanning of MMR maps
- Avoiding duplication between agencies, ideally through partnering
- Improve capabilities of all states to use and deliver maps, again through partnering
- Possible new, national regulations or guidelines addressing the preparation and submission of closure maps for all coal and non-coal mines.

Notes prepared by Len Meier of OSM and Greg Conrad, IMCC.

ABANDONED

UNDERGROUND MINES

GIS FOR OHIO

CHARLES E. BANKS --- Ohio Division of Geological Survey, Columbus, Ohio
JAMES MCDONALD --- Ohio Division of Geological Survey, Columbus, Ohio
DOUGLAS L. CROWELL --- Ohio Division of Geological Survey, Columbus, Ohio
LAWRENCE H. WICKSTROM --- Ohio Division of Geological Survey, Columbus, Ohio

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