

# Scanning Equipment, Hardware and Software

Issues, Problems, and Solutions

Joe Taranto, Technical Services Supervisor,  
Pennsylvania Department of Environmental Protection

# Introduction

- New Equipment: Blessing or Curse?
- Overview of some of the problems and issues that we've encountered in PA DEP.
- How we are dealing with some of the problems to get the job done.
- Suggestions to help others.

# New Equipment: Blessing or Curse?

- It's great to get the new equipment, but it takes time and patience to get it operational.
- Process is not always a smooth one.
- New equipment and software can have a significant learning curve.

# Example Problem 1

- The scanning workstation had problems with RAID configuration.
- Through multiple contacts with Dell Gold Support, it was found that there were hard drive problems.
- While replacing components, it was found that the cooling fan was never connected to the power from the factory.

# Example Problem 1 (Continued)

- Three motherboards and one hard drive later, the machine is now working properly.
- The key to solving these problems was to actively work with customer support and document all problems that were encountered.
- Gold Technical Support option from Dell was probably worth its weight in gold.

# Example Problem 2

- The new scanner grabs maps too forcefully.
- This can be a problem, especially for older, brittle, and more fragile maps.
- We changed to feed setting on the scanner from automatic feed to the slowest setting on manual feed.

# Example Problem 2 (Continued)

- Solution: Set the map in between two sheets of clear acetate or Mylar.
- We are currently using this method and it is working well.
- Not only does this protect the edges of the map, it also protects the surfaces of the map and keeps dust and dirt out of the scanner.

# Example Problem 3

- After receiving our new HP plotter almost two weeks late, we discovered that it was damaged.
- Even though there was little evidence of damage to the outside of the container, it was obvious when the container was opened.

hp designjet 5500 s  
hp designjet imprim  
hp designjet impres



NOV 8 2004



NOV 8 2004



NOV 6 2004



NOV 8 2004



NOV 8 2004



NOV 8 2004

# Example Problem 3 (Continued)

- Numerous contacts with the vendor were required to rectify the situation.
- Two visits from the vendor were required to assess the damage, replace the damaged parts, and test the unit thoroughly.
- The unit is currently operating without any problems and the incident has been noted in case future problems arise.

# Ongoing Problems

- Another new workstation is having performance problems and is displaying error messages.
- One of our new scanners is prompting us to run calibration and maintenance wizard several times a day.
- This same scanner is also displaying “heap overflow errors,” etc.
- Some good features in old scanning software are not included in the new scanning software.

# Suggestions to help you

- Factor installation and training into the cost of equipment.
- “Gold Support” and service can prove to be invaluable.
- Know your service contract and warranty information.
- Document all problems and issues thoroughly.
- Try to fix it sooner rather than later.

# Conclusion

- New equipment can be both a blessing and a curse.
- Try to be proactive and handle problems as they occur.
- Document all problems and issues thoroughly.
- Don't forget installation, training, service contract, and extended warranty when budgeting for new equipment.

# Questions?

Thank You

Joe Taranto, Technical Services Supervisor,  
Pennsylvania Department of Environmental  
Protection (DEP)

# ***Utilizing GIS to Maintain and Manage Mine Maps and Mine Map Database***

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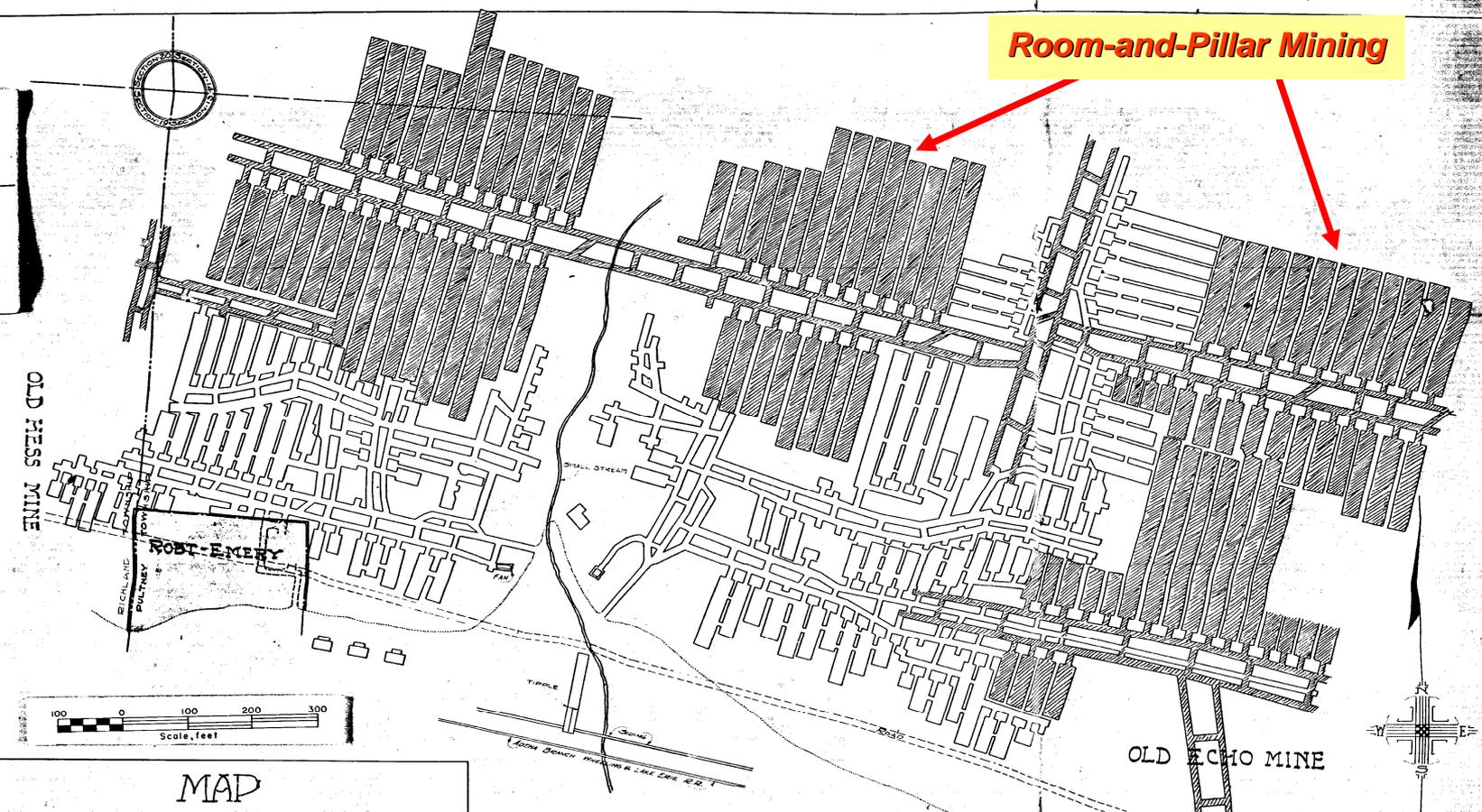
**Joseph Wells, Charles Banks, & Larry Wickstrom  
Energy Resources Group  
Ohio Division of Geological Survey**





# Scanned Image of Abandoned Underground Detailed Mine Map

Room-and-Pillar Mining



MAP  
OF  
ABANDONED MINE No. 7  
THE MAHER COLLIERIES CO  
LOCATED IN  
SECTION 13 TOWNSHIP 6 RANGE 3  
PULTNEY TOWNSHIP BELMONT COUNTY, O.  
SCALE 1"=100'

CERTIFICATE OF ENGINEER  
I THE UNDERSIGNED HEREBY CERTIFY THAT THE ABOVE MAP IS  
TRUE AND CORRECT AND SHOWS ALL THE INFORMATION REQUIRED  
BY SECTION 937 OF THE GENERAL CODE AND COVERS THE  
EXCAVATIONS TO THE DATE OF ABANDONMENT ON APRIL 1-1922.  
SIGNED  
W. H. HARTLAND, ENGINEER.  
ACKNOWLEDGED BEFORE ME A NOTARY PUBLIC THIS 22... DAY  
OF Dec. 1922.  
SIGNED  
Eugene W. Hartland, NOTARY PUBLIC.

NOTE  
ALL WORKINGS OF OLD MINES  
IS SHOWN CROSSHATCHED.

Scanning of Images  
Provided by  
The Office of Surface  
Mining (OSM)

OGS 03041 204 16X 314855

Abandoned Mine BT-005, Pultney Township, Belmont County, Ohio

**Mine Entry**

**Mine Polygon**

**Superimposed Mine Polygons**

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eological  
pographic



# ANNUAL MINE MAP DATA SHEET

OHIO DEPARTMENT OF NATURAL RESOURCES  
Division of Geological Survey

## ANNUAL MINE MAP DATA SHEET

Mine Name: \_\_\_\_\_

Operating Company: \_\_\_\_\_

County: Muskingum

Land Survey: \_\_\_\_\_

Quadrangle: \_\_\_\_\_

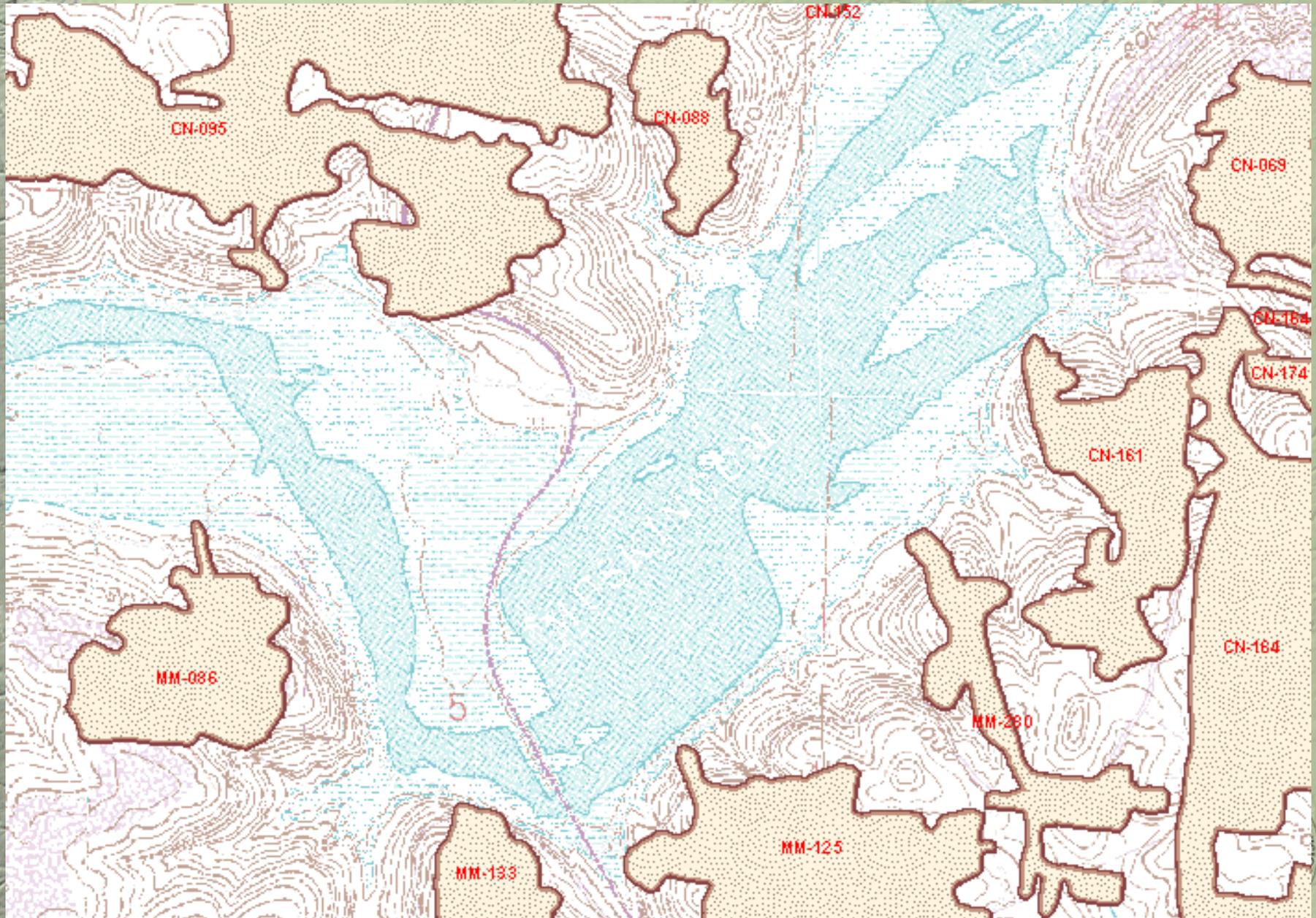
- No annual mine map  
**Annual Mine Map date(s)**  
 Ann. map date ranges from \_\_\_\_\_ to \_\_\_\_\_

- Drift opening  
 Slope opening  
 Shaft opening  
 Hoisting shaft is \_\_\_\_\_ feet deep  
 Elevation \_\_\_\_\_ feet at drift mouth  
 Elevation \_\_\_\_\_ feet at top of shaft/slope  
 Elevation \_\_\_\_\_ feet at base of shaft/slope  
 Several elevations are shown  
 Elevation \_\_\_\_\_ feet at top of air shaft  
 Elevation \_\_\_\_\_ feet at base of air shaft  
 Coal thickness \_\_\_\_\_  
 Coal thickness ranges from \_\_\_\_\_ to \_\_\_\_\_  
 Location of company building(s) is shown  
 Location of company building(s) is shown including mule barn or stable  
 Location of company home(s) is shown  
 Location of underground stable is shown  
 Location of drill hole(s) is shown  
 Location of drill hole(s) including coal depth and/or coal thickness is/are shown  
 Location of oil/gas well(s) is shown  
 Area(s) marked "abandoned," "old works," "worked out," "inaccessible" is/are shown  
 Area(s) marked "caved," "fallen-in," "roof fall," "bad roof," "bad top," "faulty" is/are shown  
 Area(s) marked "holed into old works" is/are shown  
 Area(s) marked "squeeze," "squeezed shut" is/are shown  
 Area(s) marked "pillars drawn," "pillars out," "pillar work," is/are shown  
 Area(s) marked "water," "full of water," "flooded," is/are shown  
 Area(s) marked "fault," "horse-back," "cut-out," is/are shown  
 Location of longwall panel(s) is shown  
 Openings to unmapped mine are shown  
 Shows works to: \_\_\_\_\_  
and \_\_\_\_\_  
and \_\_\_\_\_  
 Other

Get example of  
another data sheet.  
One for points too.



# Digitized Mine Polygons



# AND TO FROM ANNUAL MINE MAP DATA SHEET Database Entry and Retrieval Form

OHIO DEPARTMENT OF NATURAL RESOURCES  
Division of Geological Survey

Microsoft Access - [frmMineOpening : Form]  
File Edit View Insert Format Records Tools Window Help

## 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):

DATA SHEETS TO DATABASES



Find Record Add New Quit

Record: 1 of 2144

Form View NUM 3:32 PM

# Ohio Geological Survey Use of Modified API Primary Key

**12345678901234 – the standard is a 14-digit system broken down as:**

**12-345-6-7890-12-34**

**Where:**

**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 (8 = Coal collection)**

**7-10 – permit number or individual feature ID**

**11-12 – sidetrack number used for O&G wells; subcategory indicator when needed in other collections**

**13-14 – multi-completion number used for O&G wells; used as qualifier for other data types**



# Ohio Geological Survey Use of Modified API Primary Key

## Coal and Underground Mine data

**12-345-6-7890-12-34**

**Where:**

**6 – data type-indicator (8 = Coal data collection)**

**7-10 – individual feature ID**

**11-12    51 – Coal-core and strat holes – NCRDS**

**52 – AUM data**

**13-14**

**01 – mine poly**

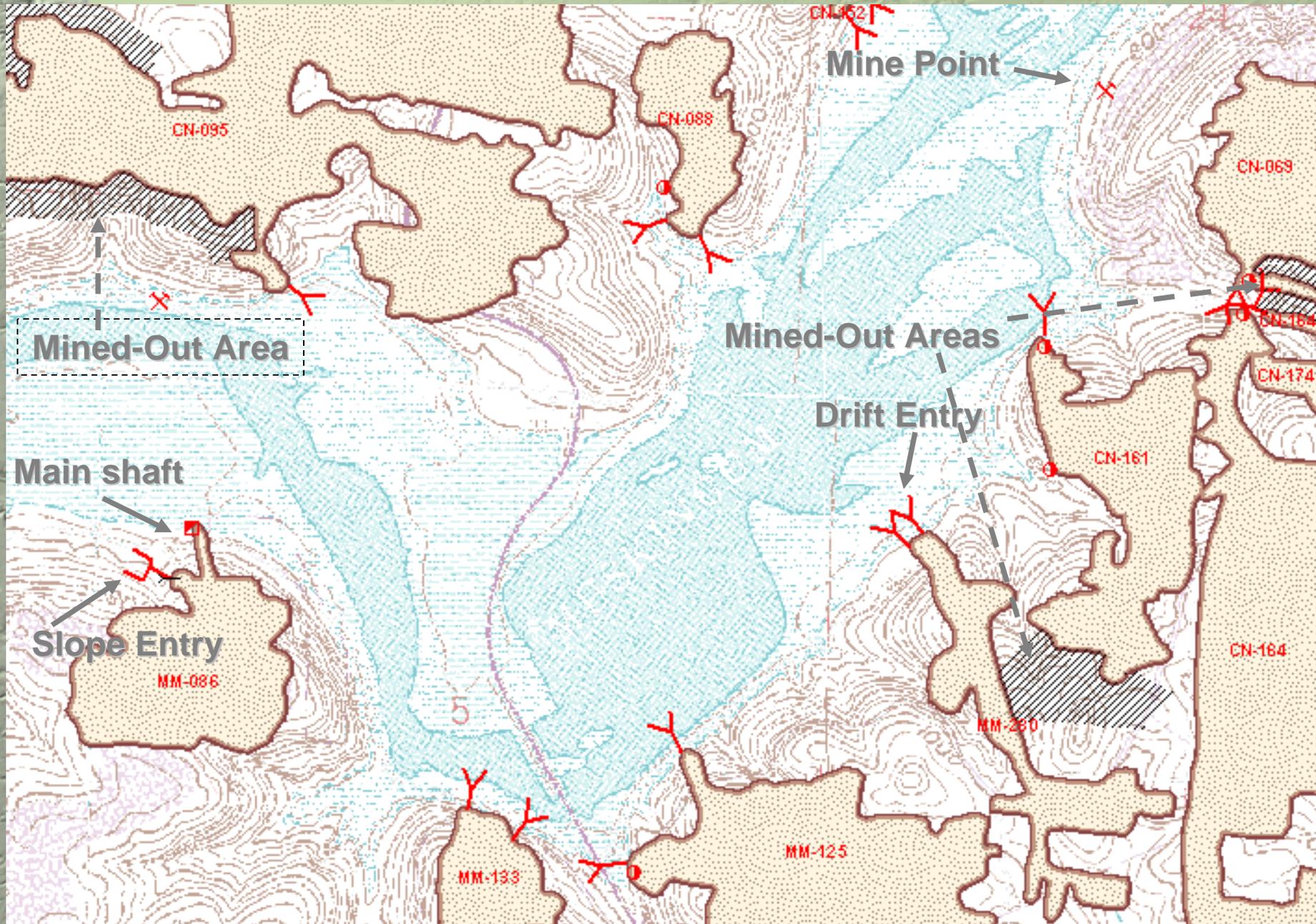
**02 – mine points**

**03 – hachured poly**

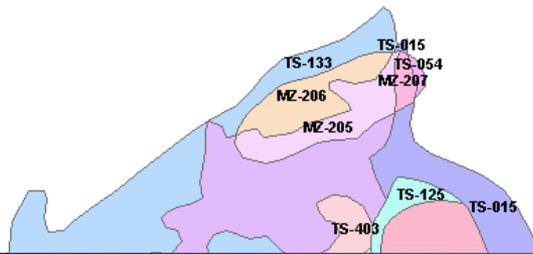
**Example: 340138001235201 = An AUM poly (ID=00123)  
in Belmont Co, Ohio**



# Digitized Mine Polygons, Points, Openings, and Mined-Out Areas



# Issues with Overlapping Mines and Multi-polygon Mines



Attributes of Mine\_temp\_new

FID	Shape*	OBJECTID	MINE_CODE	MULT	MC_2	MC_3	MC_4	DRAIN	Shape_Leng	Shape_Area	MINE_API
0	Polygon	5318	TS-113	1				A	10307.528009	2734091.09605	341578011302
1	Polygon	5320	TS-133	1				A	16754.692306	4735654.50535	341578013302
2	Polygon	5321	TS-403	2	TS-113	TS-403		A	13528.463440	2708229.90325	341578040302
3	Polygon	5322	TS-015	1				A	5737.191397	906893.86735	341578001502
4	Polygon	5323	TS-015	1				A	835.660227	29214.36755	341578001502
5	Polygon	5324	TS-039	1				A	3178.682121	502278.0266	341578003902
6	Polygon	5325	TS-125	1				B	4118.097432	844539.4124	341578012502
7	Polygon	5326	TS-401	2	TS-401	TS-062		A	11685.311356	1929930.00625	341578040102
8	Polygon	5327	TS-062	1				A	14696.417275	4365297.09005	341578006202
9	Polygon	5419	TS-054	2	TS-403	TS-054		A	2201.343978	261912.0351	341578005402

Overlapping Mines

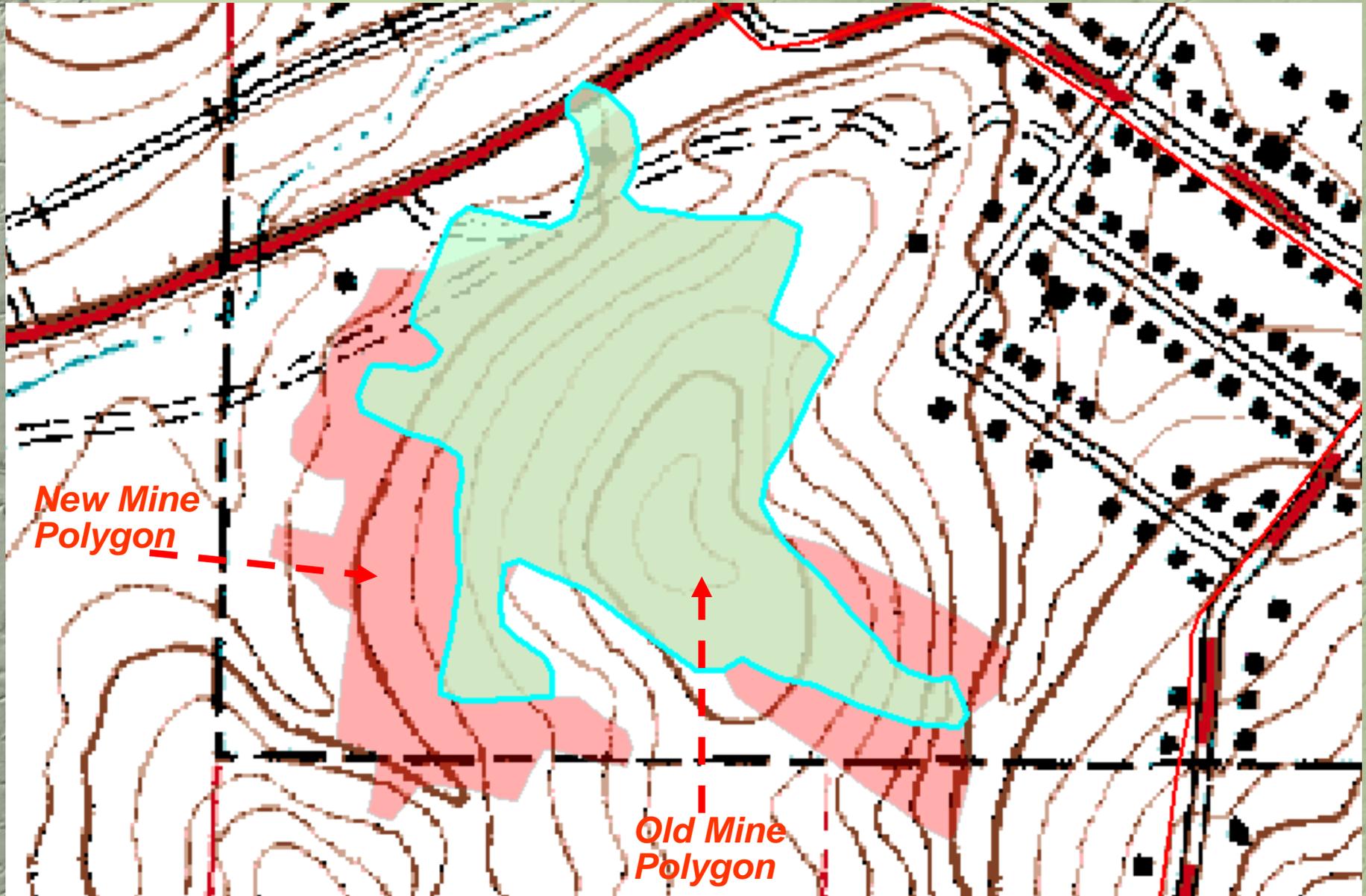
Record: 1 Show: All Selected Records (0 out of 10 Selected.) Options

Start | Inbox - ... | BBC Wo... | WebMail... | Georef... | ArcCatal... | Microsof... | DIGITL... | 2:20 PM



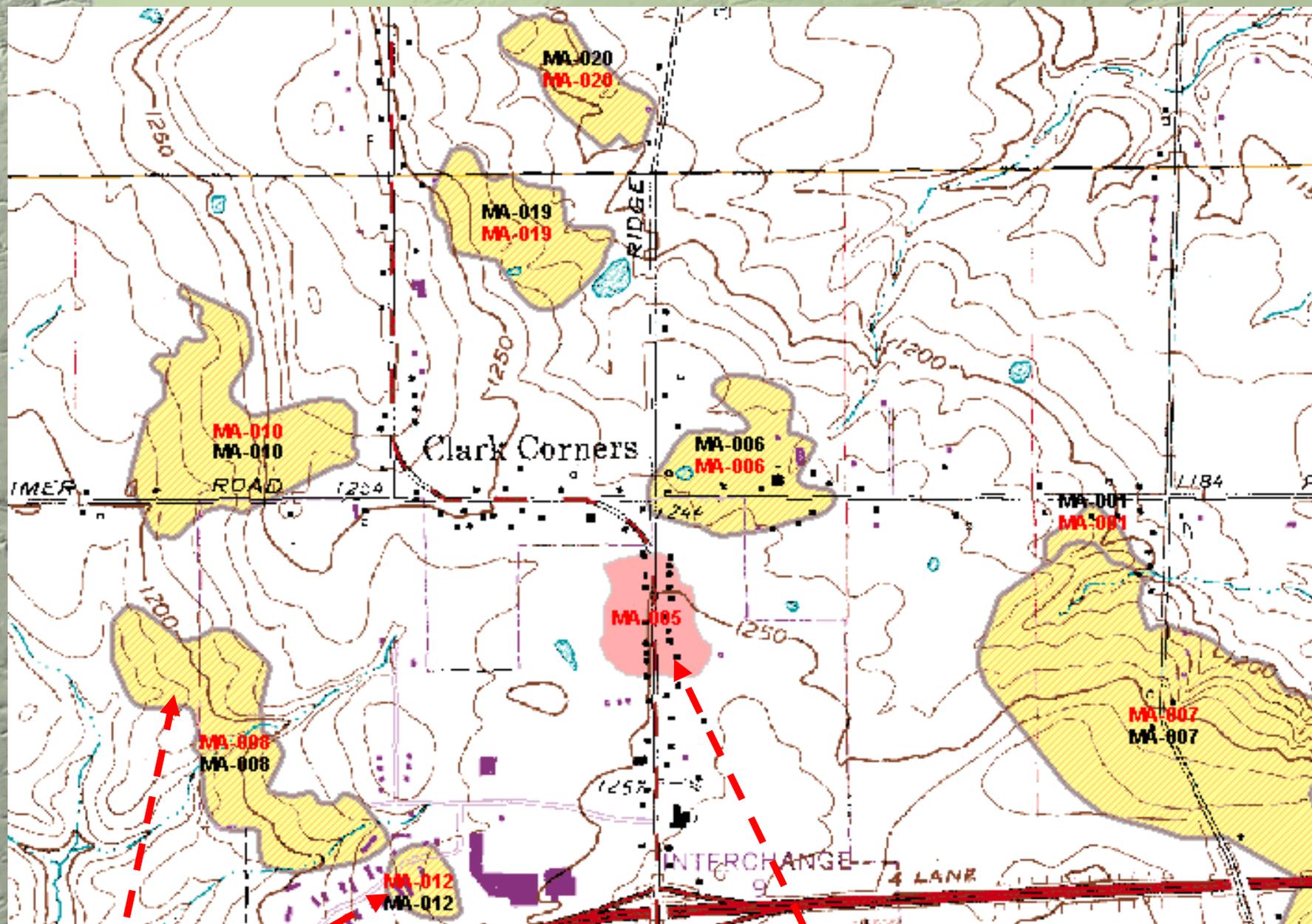


# Re-Digitizing Mine Polygons



HN-002, Bowerston Quadrangle, Ohio

# Addition of Mine Polygons



Original Mine Polygons

Added Mine Polygon

**The New  
AUM Feature Classes,  
Geodatabase,  
and  
Data Storage**



# AUM Points Symbology and Feature Class Attribute Table

The screenshot displays the ArcMap interface with the 'Attributes of AUM\_PTS' table open. The table contains the following data:

OBJECTID*	Shape*	MN_NO	ENTRY_CD	TYPE_CDE	MINE_API*	PNT_API*	ANGLE
917	Point	CL-041	DR	DR	<Null>	34019802040	355
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

The TOC on the left shows the 'AUM\_PTS' layer selected, with symbology for 'Air Shaft or Pumping Shaft' (green circle) and 'Adopted Mine Color' (red square). A red box highlights these symbology options. A red arrow points from the title to the table, and another red arrow points from the title to the TOC.

# 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
tblTwp	Personal Geodatabase Table
tblTownship	Personal Geodatabase Table

**Coverages  
Shapefiles  
Raster Dataset  
and  
dBase Tables**

A Single Data Repository !!!

# The AUM Maps

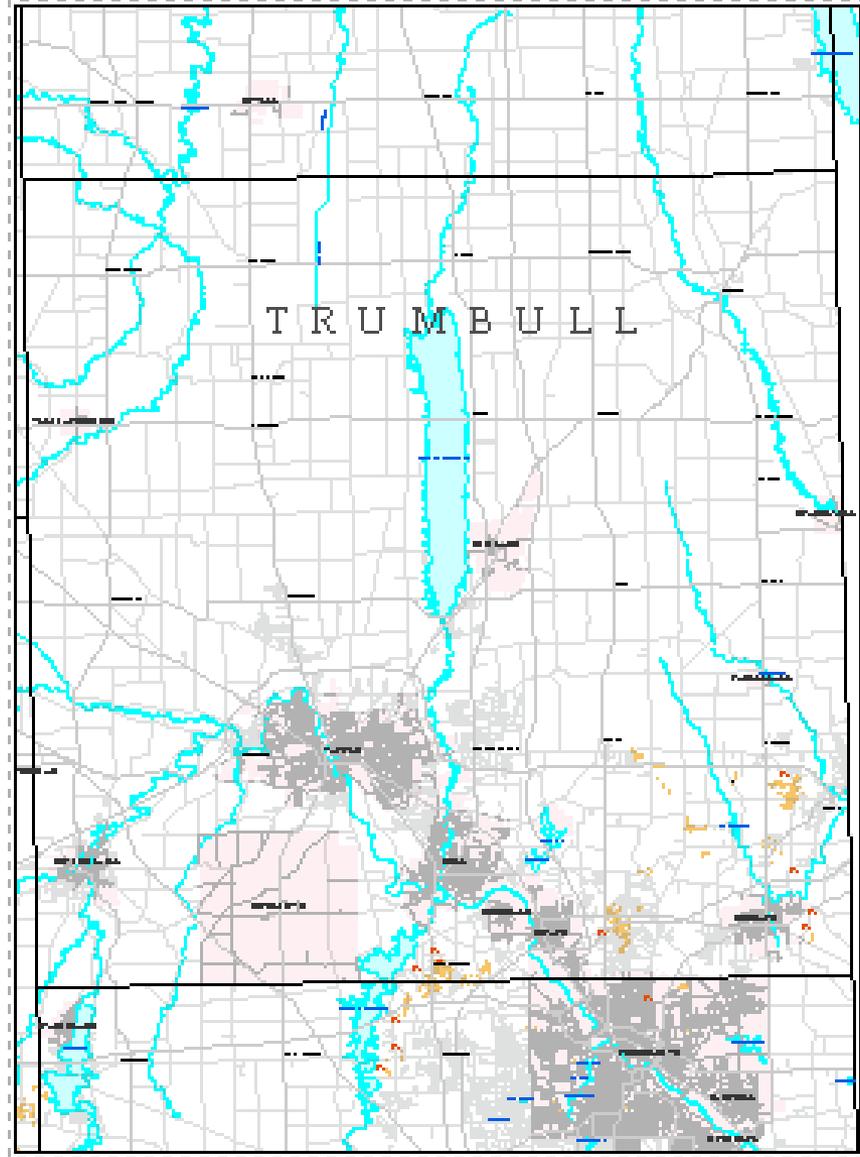
1: 24000

cales

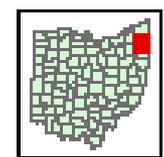
ent	
ad	1: 62,500
ad	Portrait
de" County	and
ll" County	Landscape
ional (quarters of state)	
tewide	



AS AND OTHER UNDERGROUND AND SURFACE WATER OF TRUMBULL COUNTY, OHIO



- Explanation
- Well Location
  - State Road
  - Municipal Road
  - Local Road
  - High Pressure Area
  - AUM
  - OMA



# AUM Statistics

- Number of mapped AUM Polygons = 4,327
- Mined-Out Areas = 889
- Mine Point Locations = 1,945
- Air/Pumping Shaft entry points = 2,878
- Main Shaft entry points = 585
- Drift entry points = 9,475
- Slope entry points = 564
- Geo-referenced mine maps (mosaics) = 2,644
- Number of known underground mines = 7,120  
(based on mapped AUM's and mine points)



# Future Work

- **AUM Geodatabase:** Migration from that of a personal geodatabase to that of a multi-user geodatabase in ArcSDE running on a SQL Server DBMS.
- **Continued Multi-agency Cooperative projects:**
  - Field mapping and data collection (GPS data) of mine subsidence-incidence information. Predictive modeling.
  - Geo-referencing and rectification of all AUM map images (TIFF images). Make readily available to all.
  - Continue efforts to collect information on all mines – mapped or unknown.
- **Upgrade quality of data on known mines.**
  - Associate NCRDS points with mines. Additional control from O&G wells.
  - Use coal maps to augment mine info.
- **Keep interactive website relevant and up-to-date.**





tblLocational

***NCRDS AND COAL AVAILABILITY***

QA / QC

Process date: 1/1/1990

POINT\_ID: D0004-12

QUAD and SERIES: MC ARTHUR (7.5') SURFACE ELEV: 990

STATE: OHIO ELVPREC: [dropdown]

COUNTY: VINTON DESCRIPTION LOG: DRILL HOLE [dropdown]

PROVINCE: EASTERN WEATHERING: FRESH [dropdown]

REGION: APPALACHIAN OWNER: OHGS

FIELD: 0 CONFID: N

GEOLOGIST: OHGS-AXON A G SEC - LOT: 16

SOURCE: ODNR-DIV OF RECLAMA COMMENT: CLINTON TWP

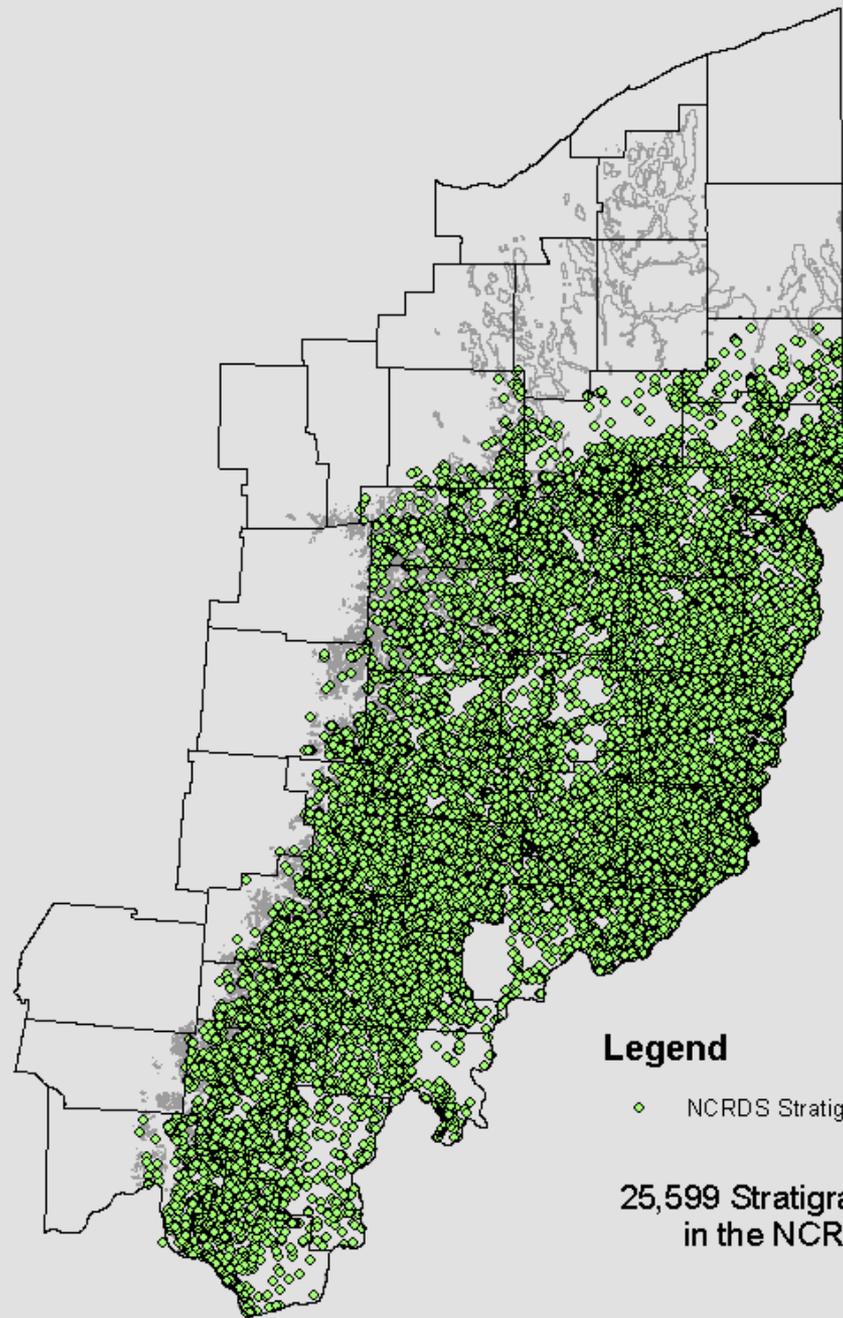
Stratigraphy: TOWNSHIP: CLINTON

	Unit	Unit Qualifier	Thickness	Formation	Bed	Primary Lithology	Lith
▶	01		2.33	ALLEGHENY G		NR	
	02		39	ALLEGHENY G		SS	
	03	EA	2.58	ALLEGHENY G	MDL KITTANNING	COAL	
	04		2	ALLEGHENY G		FCLY	
	05		24	ALLEGHENY G		SH	
	06	EA	2.33	ALLEGHENY G	LOWER KITTANNIN	COAL	
	07		2	ALLEGHENY G		FCLY	
	08		34	ALLEGHENY G		SH	

jw

Record: 8 of 25600





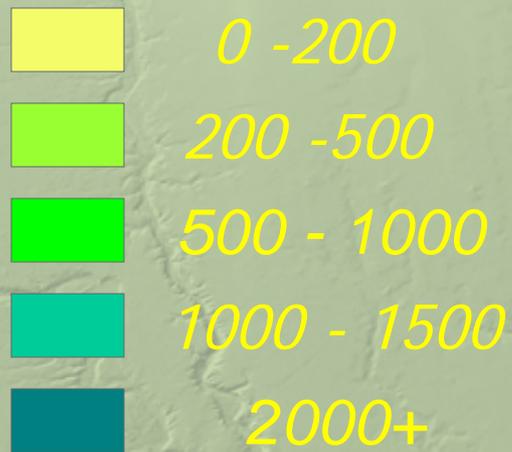
**Legend**

◆ NCRDS Stratigraphic Points

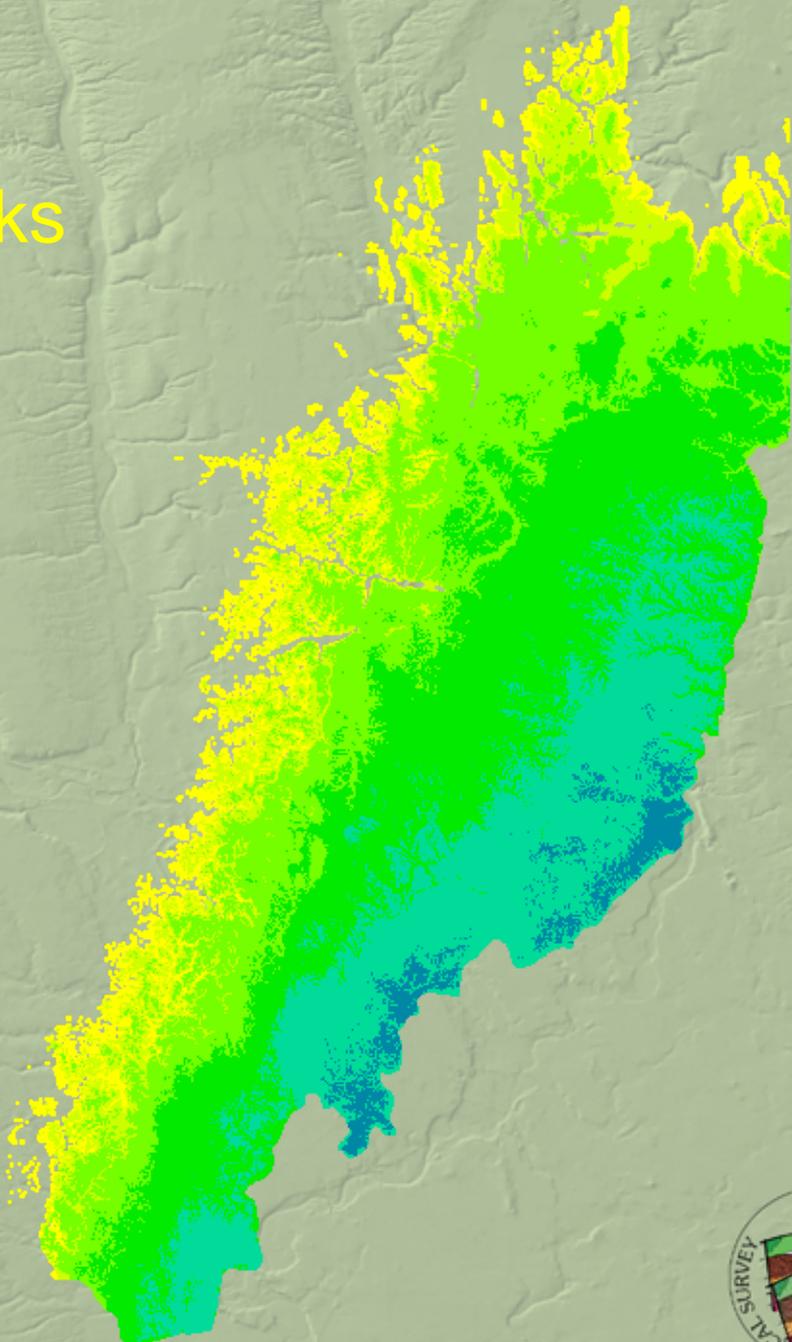
**25,599 Stratigraphic Descriptions  
in the NCRDS Database**

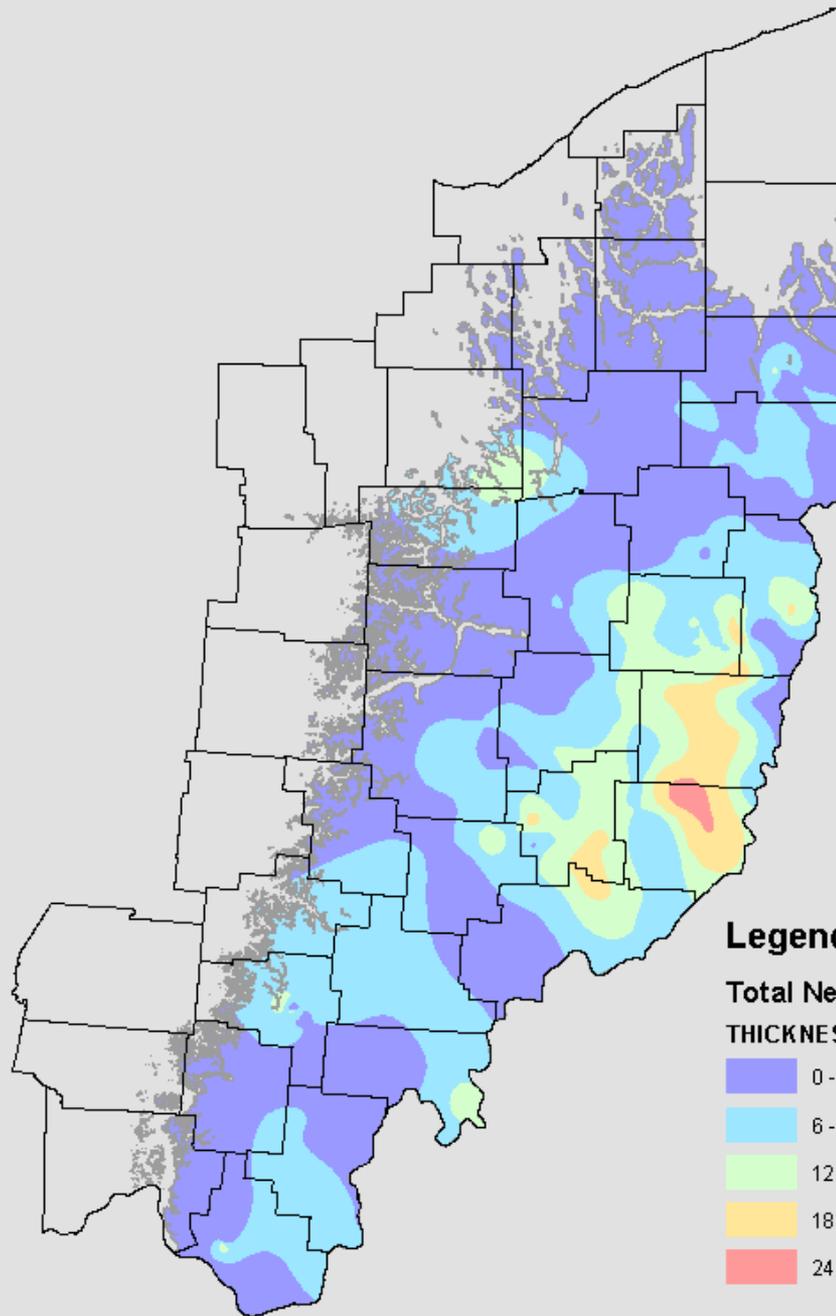


# Depth of coal bearing rocks



In feet





**Legend**

**Total Net Coal  
THICKNESS**

- 0 - 6 feet
- 6 - 12 feet
- 12 - 18 feet
- 18 - 24 feet
- 24 - 27 feet



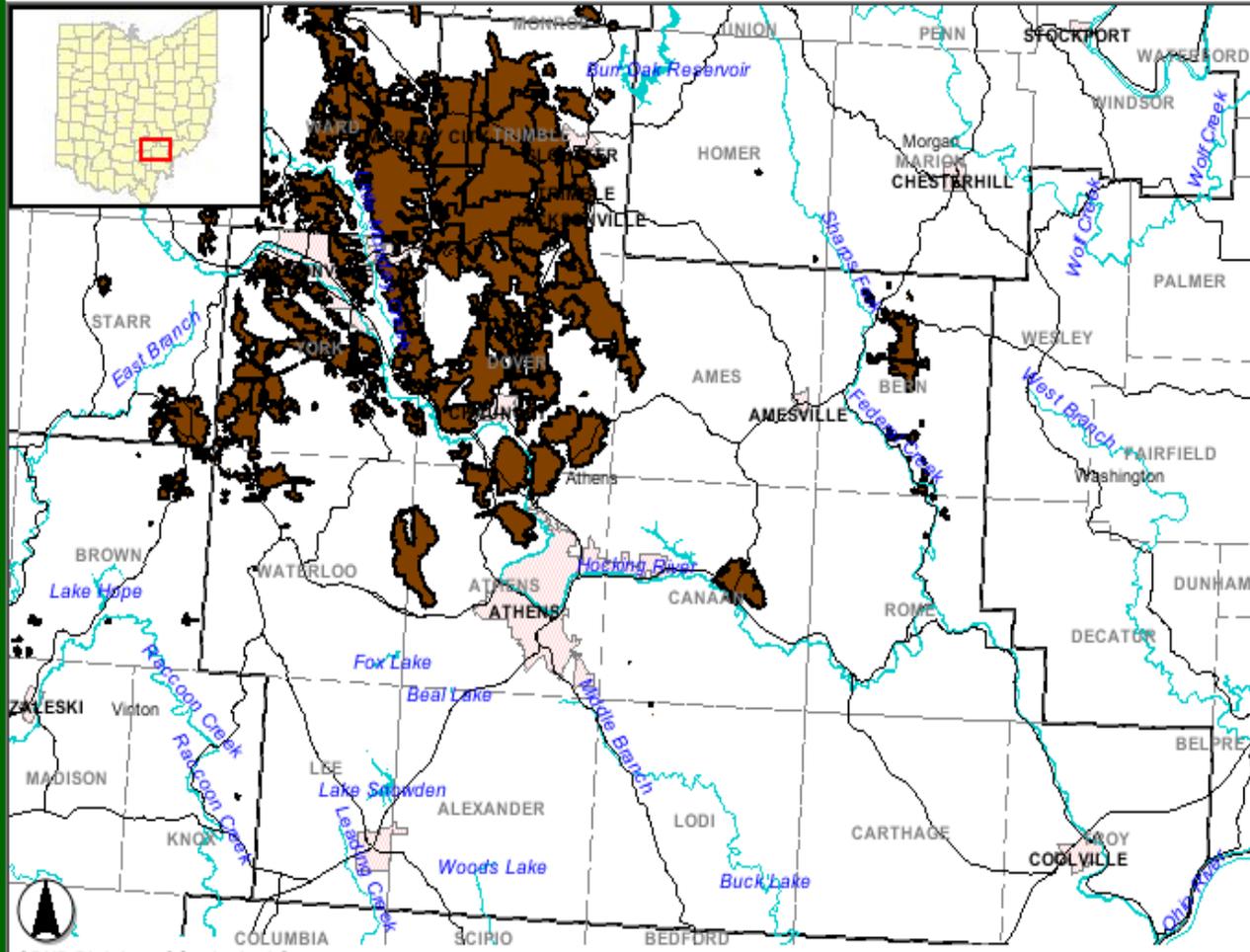


# State of Ohio - Abandoned Underground Mine Locator

- Overview
- In
- Out
- Last
- Pan
- Full
- Measure
- Identify
- Query
- Clear
- Print Map
- Help

Locate Address

Refresh Map



- Visible Active
- State Routes [Info](#)
  - Interstate Hwy [Info](#)
  - Underground Mines [Info](#)
  - Underground Mine Extent Partially Unknown [Info](#)
  - Rivers [Info](#)
  - Lakes [Info](#)
  - Cities [Info](#)
  - Quad 24K [Info](#)
  - Townships [Info](#)
  - Counties [Info](#)

ODNR Division of Geological Survey

0 4mi

New Interactive Map Available at GeoSurvey Website: <http://www.ohiodnr.com/geosurvey/>  
 Then go to "Interactive Maps"

# State of Ohio - Abandoned Underground Mine Locator

**Overview** **In** **Out** **Last** **Pan** **Full** **Measure** **Identify** **Query** **Clear** **Print Map** **Help**

**Locate Address**

**Refresh Map**

Visible Active

- Municipal Routes **Info**
- Local Routes **Info**
- State Routes **Info**
- Interstate Hwy **Info**

**Mine Openings**

- Air Shaft **Info**
- Drift Entry **Info**
- Mine Shaft **Info**
- Slope Entry **Info**

- Underground Mines **Info**
- Underground Mine Extent Partially Unknown **Info**
- Underground Mine Extent Unknown **Info**

- Rivers **Info**
- Lakes **Info**
- Cities **Info**
- Quad 24K **Info**

ODNR Division of Geological Survey

0 2491.29ft

<http://www.ohiodnr.com/geosurvey/> Then go to “Interactive Maps”

# Contact Information

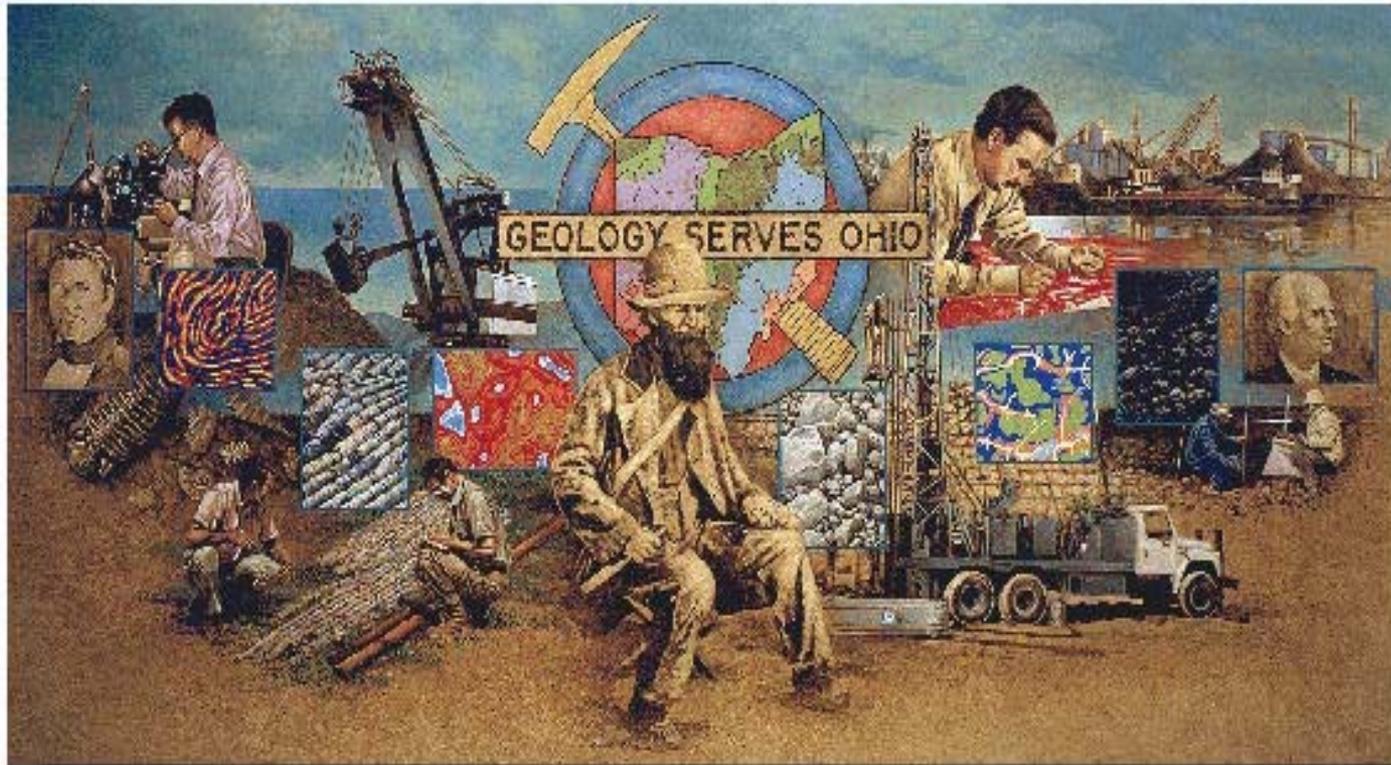
For database details:

Joe Wells  
GIMS Database Administrator  
Ohio Division of Geological Survey  
2045 Morse Rd., Columbus, Oh 43229  
614-265-1030  
joseph.wells@dnr.state.oh.us

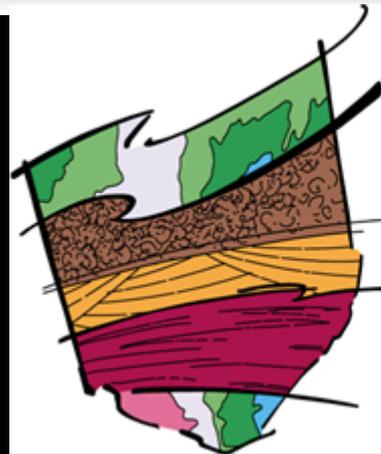
For Program Information:

Larry Wickstrom  
Supervisor, Energy Resources Group  
(Address as above)  
614-265-6598  
larry.wickstrom@dnr.state.oh.us





**Thank You!**



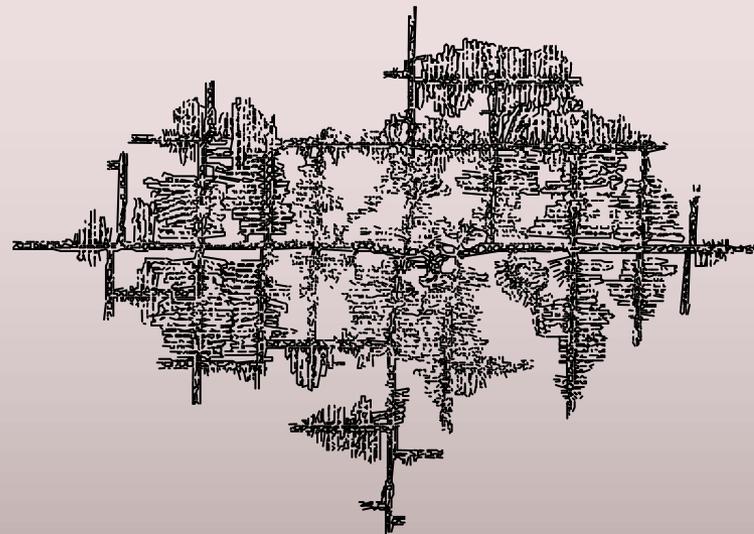
**DIVISION OF  
GEOLOGICAL  
SURVEY**

**OHIO DEPARTMENT OF  
NATURAL RESOURCES**



# CMIS

Indiana Coal Mine  
Information System



## MINE MAP HANDLING, PREPARATION, & SCANNING TECHNOLOGIES

used in Indiana's mapping program



*Presented by Licia Weber  
Pittsburgh - June, 2005*



# Mine Map Acquisition

## Sources of Underground Coal Mine Maps

- Approximately 3,300 underground mine maps from the late 1800's to present
- 90% of the maps are "blueline" maps

### -Indiana Bureau of Mines and Mining

- Historic and current underground mine maps (represents main source of maps)

### -Indiana Geological Survey Files

- Misc. Coal Company Maps
- Coal Related Publications showing mine maps

# Before Map Scanning Can Begin...

**Condition of individual maps has to be accessed.**

**Steps taken in the handling of maps:**

- **Humidify**
- **Flatten**
- **Repair** (if necessary)
- **Protect paper maps:**

Encapsulate to preserve integrity (if necessary)  
UV filters for lights

# Humidifying & Unfolding Maps



-- Two plastic tubs (large, w/ lid & small, no lid)

Deionized water

Weights for small tub (bricks)



# Flattening Maps...

**(Do not iron!)**

- **3/8" to 1/2" Plexiglas to weight map**
- **Acid-free blotter paper to control moisture (not shown)**



# Repairs to map prior to scanning

- Pure Wheat Starch: *Museum Quality*
- Methyl Cellulose: *Acid Free Archival Quality*
- Art Brushes
- Repair Tissue – Japanese kozo fiber papers



# Protection of maps:

**Encapsulation in film envelope**

**UV covers for lights**

- encapsulate in polyester film envelope (when necessary)
- Acid-free tissue paper between maps when storing
- store flat
- Protect from UV light when maps are out of storage



# Scanning...

## 54" Colortrac Scanner

- 400 dpi
- Grayscale (except when map has colors)
- Saved as TIF & JPG images – unedited & edited for legibility



# Storage of Historic Maps

Temporary storage at IGS



## 5) Archiving/Storage of paper documents

**Indiana University archives facility**



# Considerations...

Final products – Indiana’s objective has been to map the locations of abandoned mines as accurately as possible and serve the map information to the public. Computer mapping technology (GIS) advancements have made this task easier.

Starting with high resolution, legible map data is critical to this process.

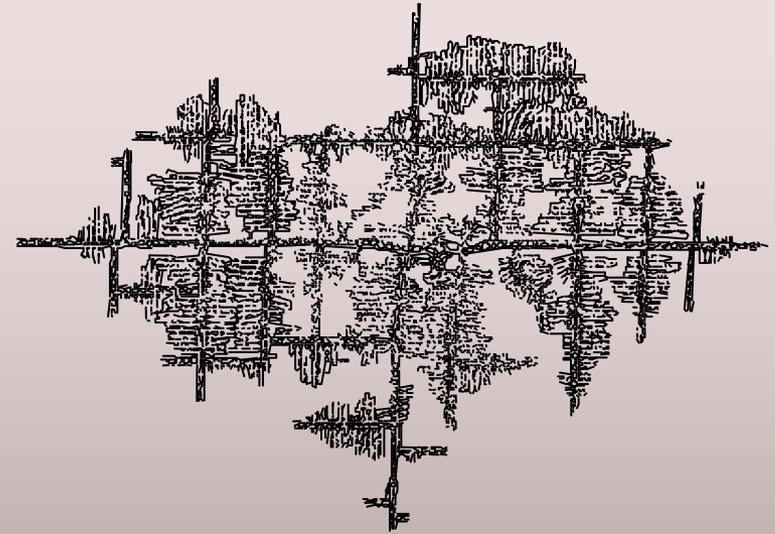
**Scanning is usually a one time option due to map availability, condition, and funding limitations (Anyway, why would you want to do it again?)**

- Resolution of digital image should be as high as possible to preserve map details for future reference
- archive unedited, full scale digital image as a future resource
- Take the time now to “do it right” – the maps are a diminishing resource
- Digital images edited for legibility are easier to georeference and serve to the public



# CMIS

Indiana Coal Mine  
Information System



# EDITING DIGITAL MINE IMAGES

## Using Adobe Photoshop



*Presented by Licia Weber*  
*Pittsburgh - June, 2005*



# WHY EDIT?

## - Legibility

Serving mine maps to the public

Clearer image for georeferencing

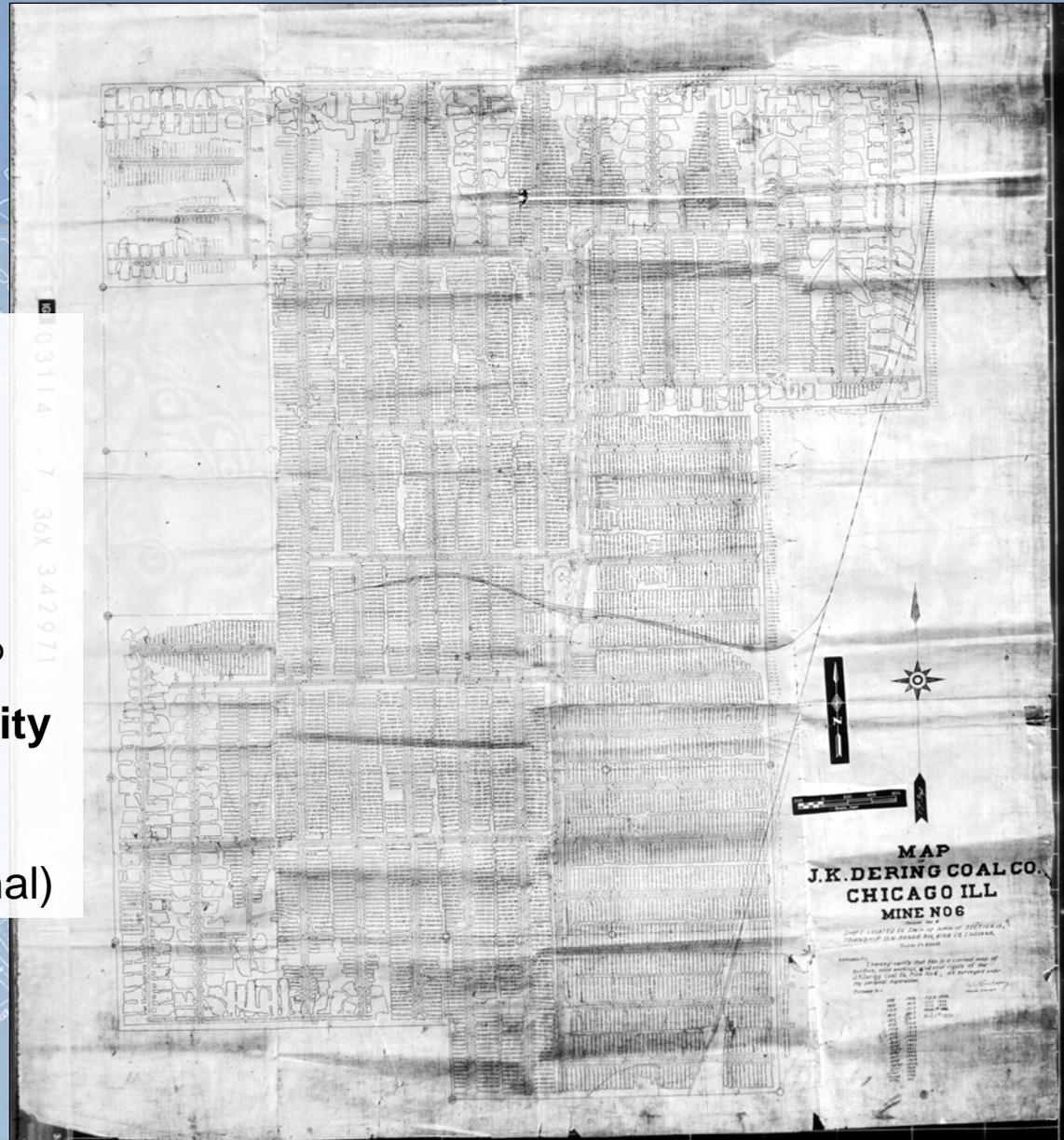
## - Readability

Drilling data and other info on map

## - Consistency in image quality

## - Preservation of map info

## - Prep for vectorizing (optional)



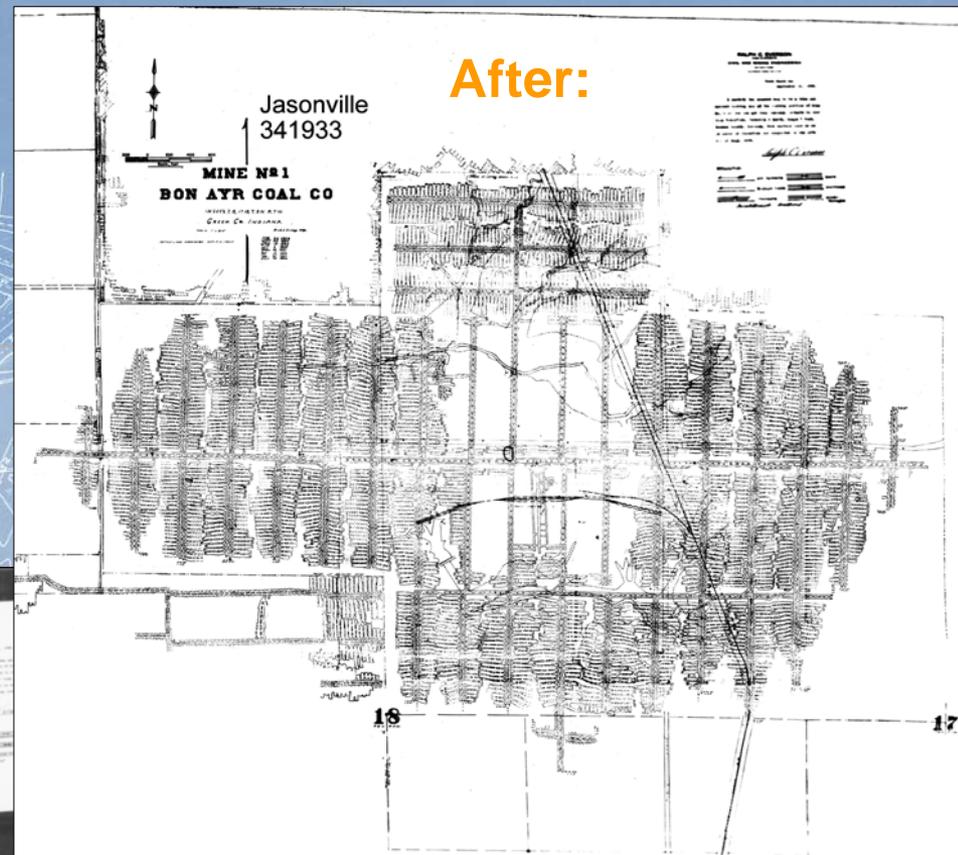
The process of editing is more of an art than a science.

Procedures can be established for editing, but each map has it's own unique issues.

**Before:**



**After:**



It takes a certain eye for detail and someone who 'cares' to do the task.

The main objective is to make sure all the information on the map is preserved and legible.

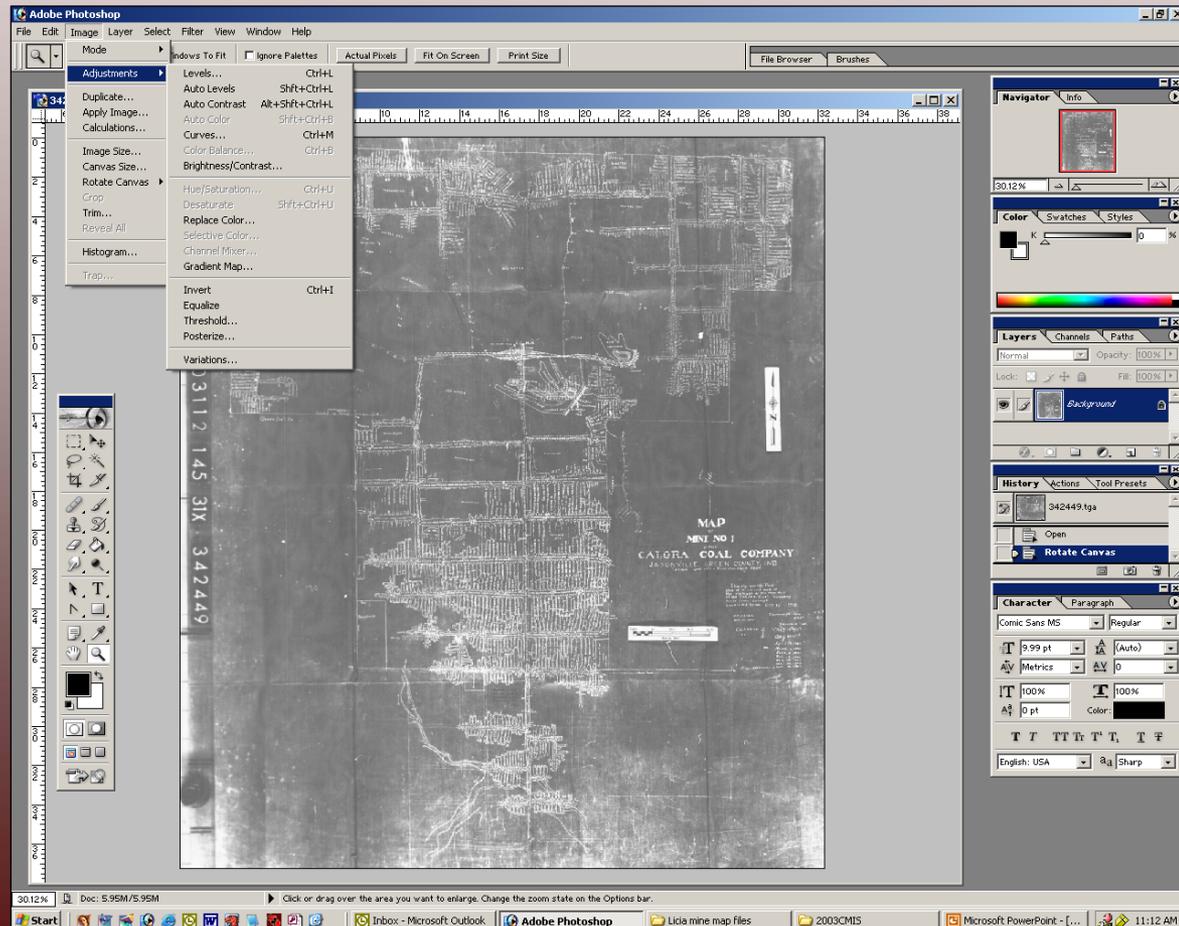
# Using Adobe Photoshop

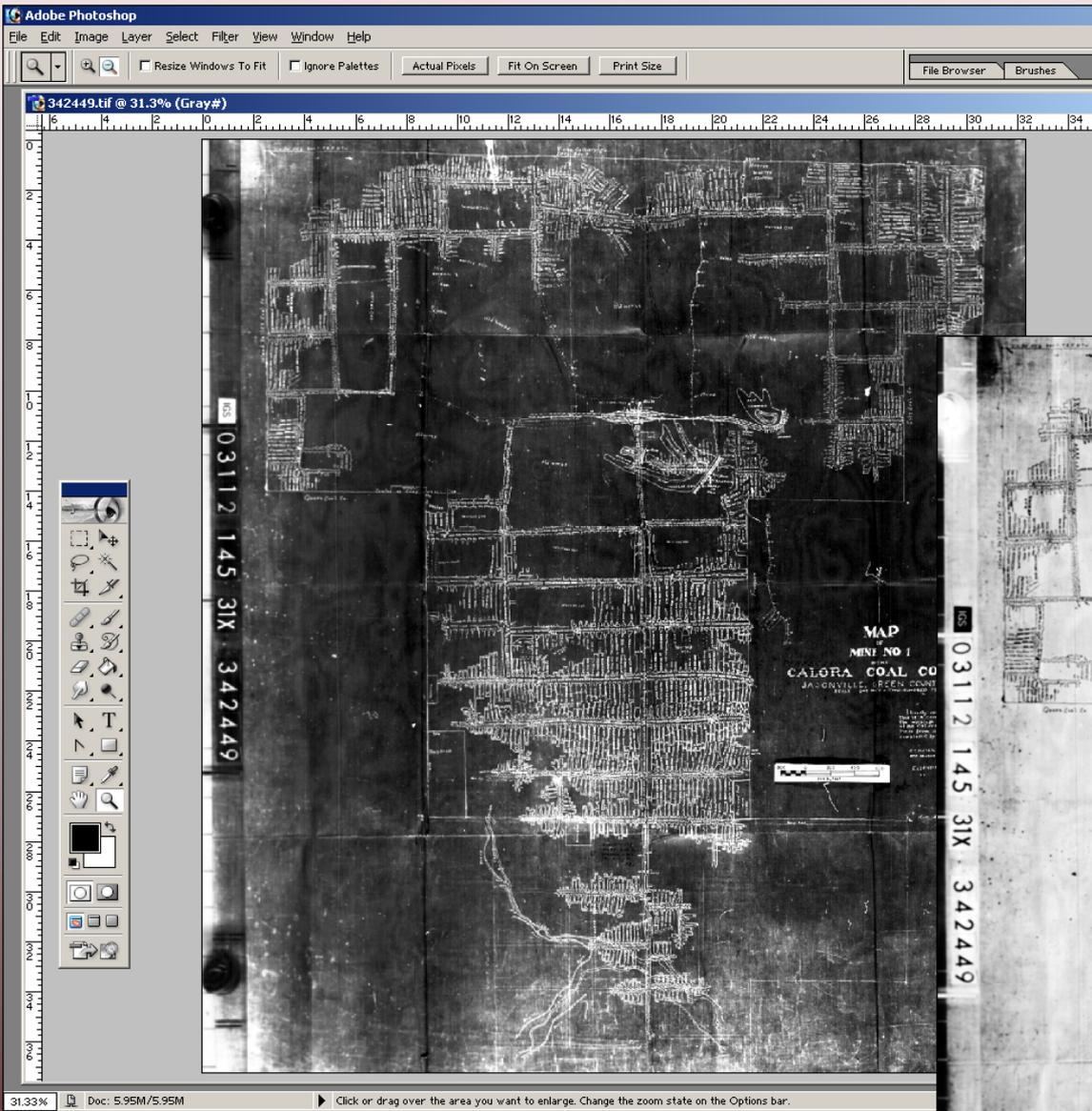
## Editing map images for legibility

Many of the functions that will be used for editing mine map images are found under:

**Image**>  
**Adjustments**>  
**Levels**  
**Brightness/Contrast**  
**Invert**  
**Variations**

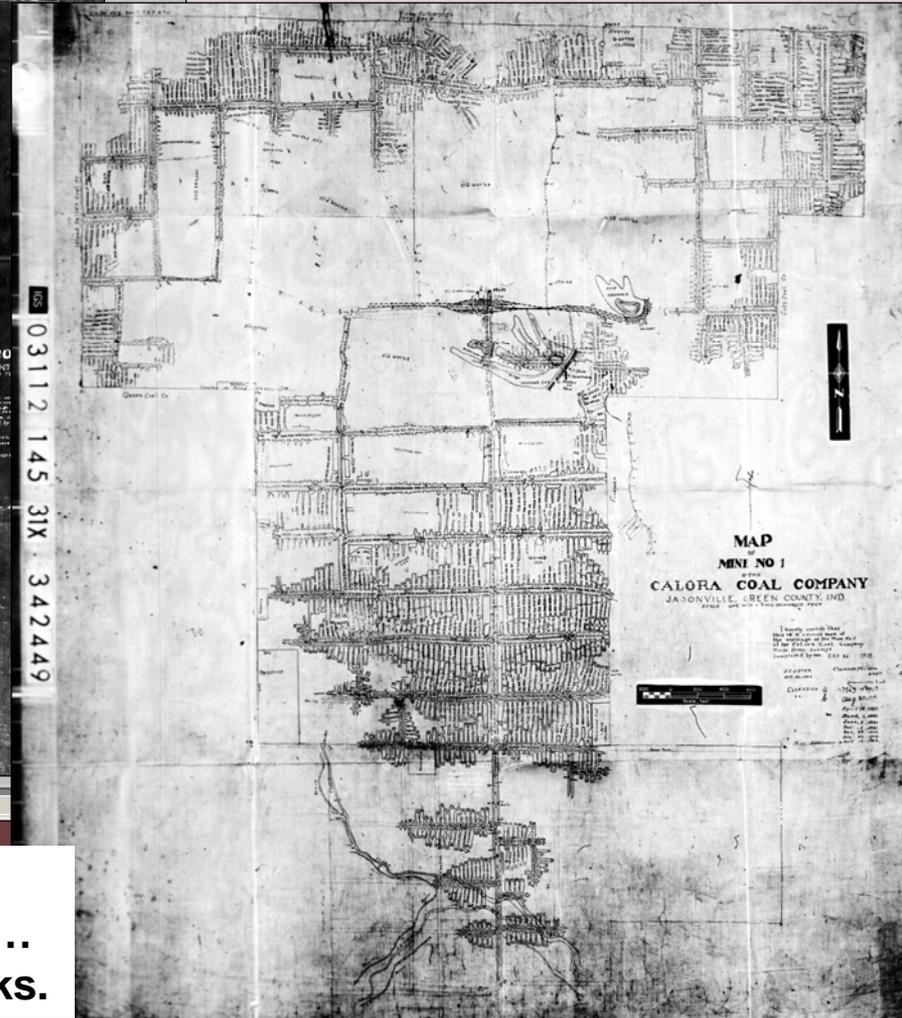
Other preliminary functions such as **Rotate** and **Image Size** are also found in the **Image** menu





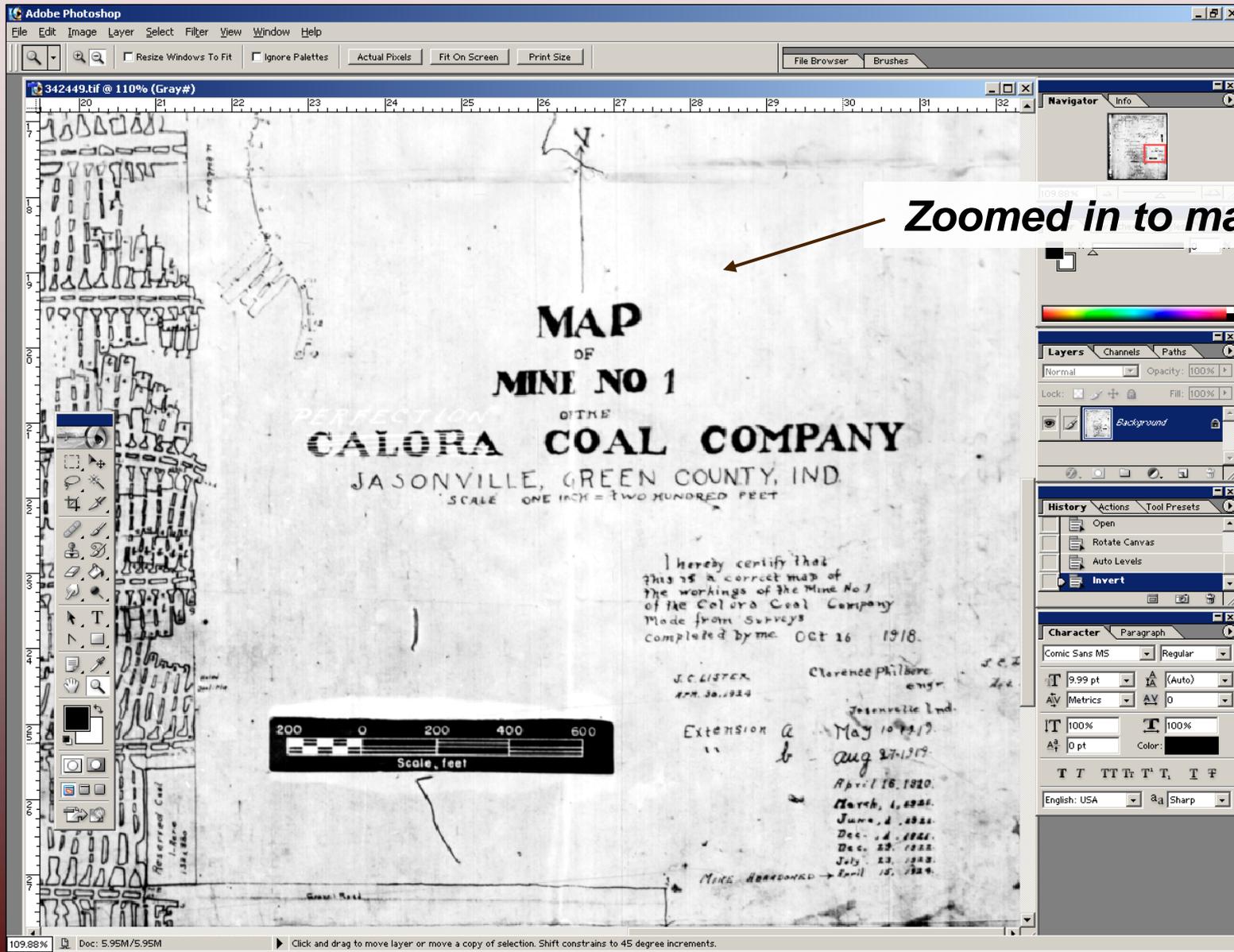
**Convert the image to black on white background:**

**Image>  
Adjustments>  
Invert**



**Sometimes the Auto Levels or Auto Contrast functions are used before inverting the image... It depends on the users preferred order of tasks.**

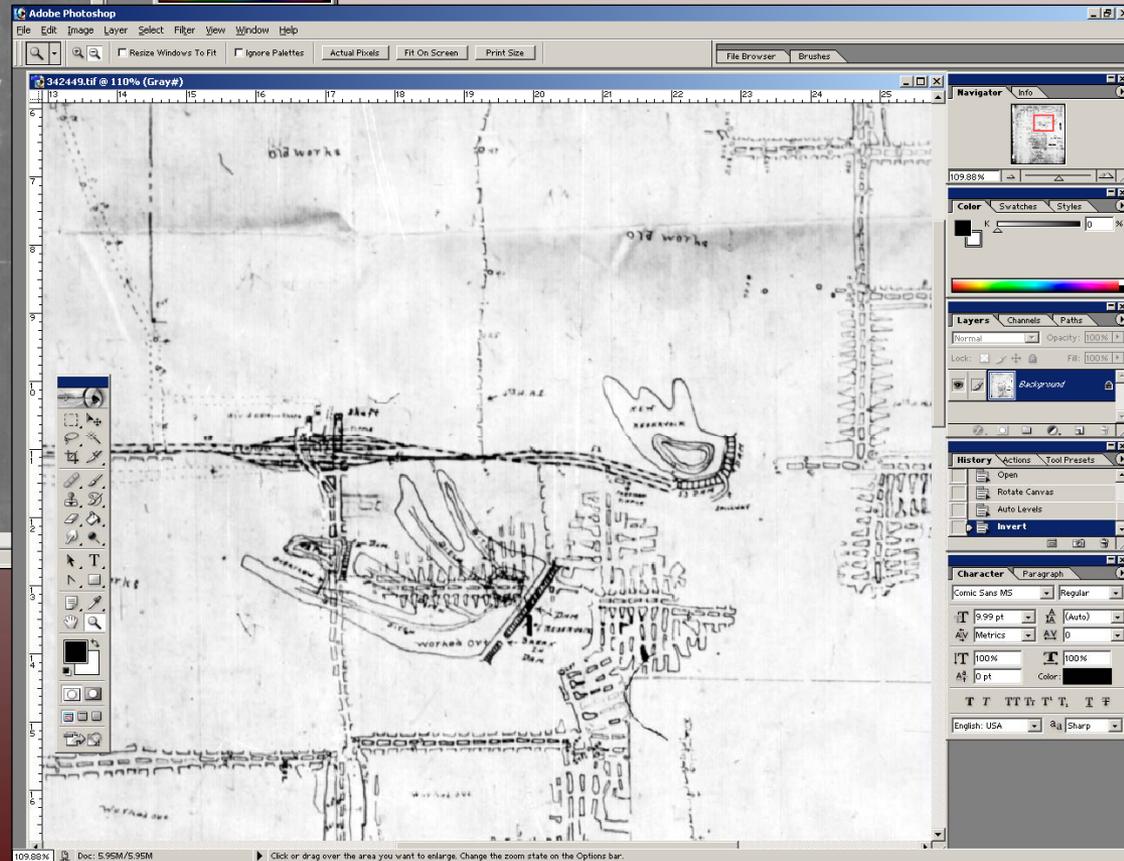
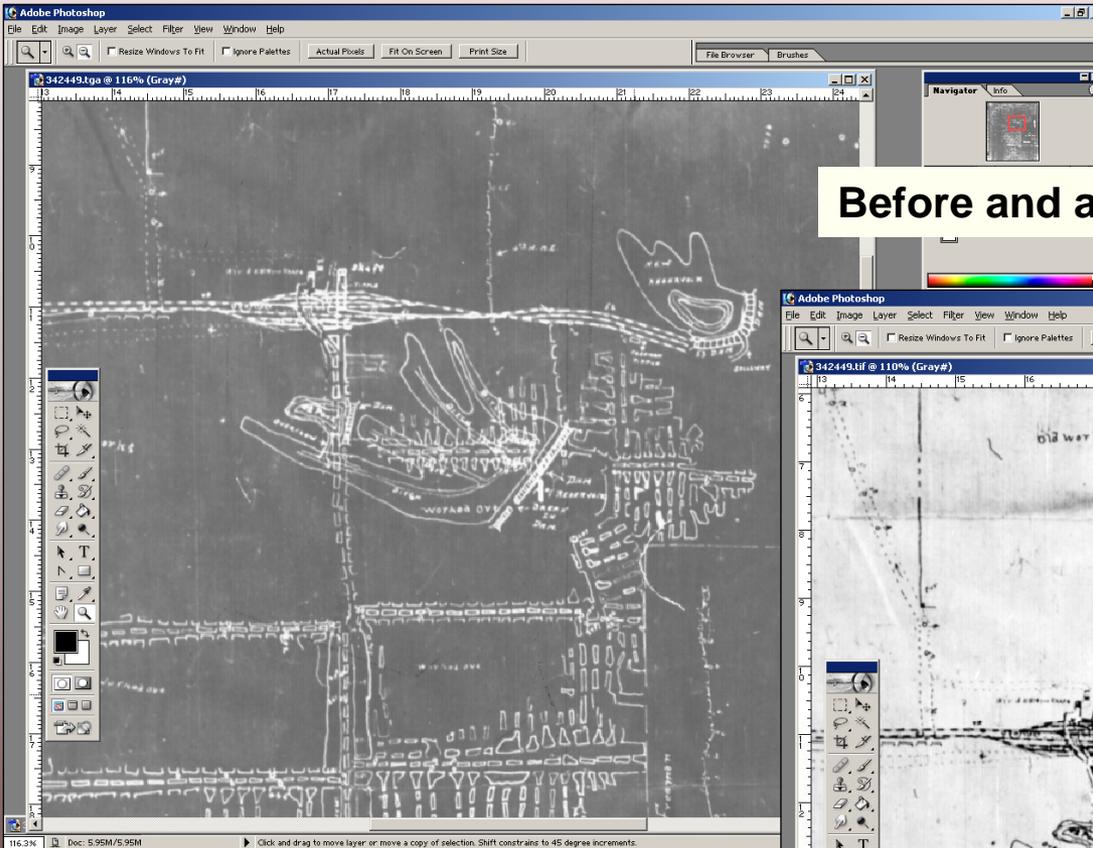
# Check map details... Are they still legible?



Zoomed in to map legend

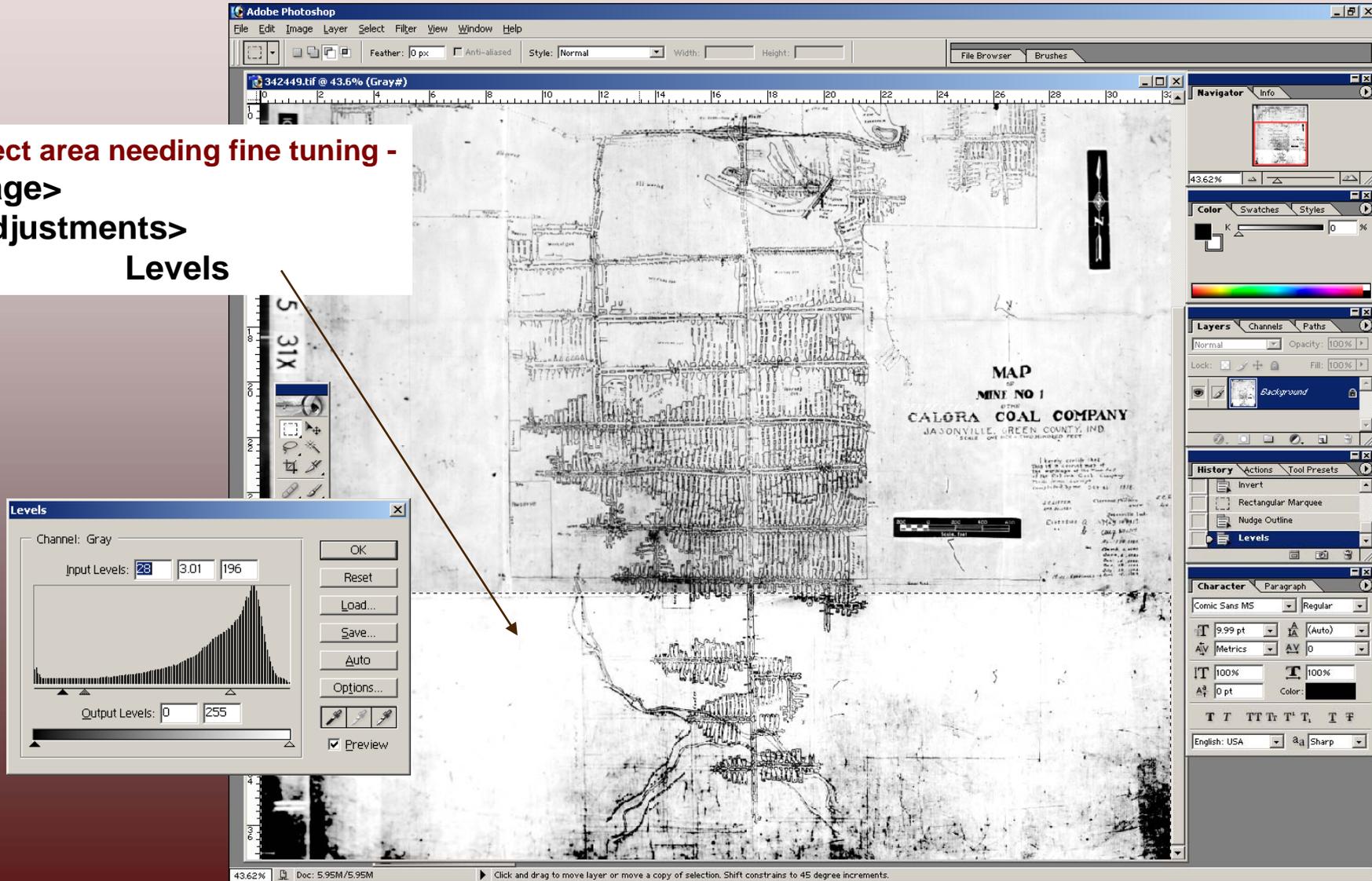
# Continue to check for map detail legibility...

Before and after editing - comparing map details

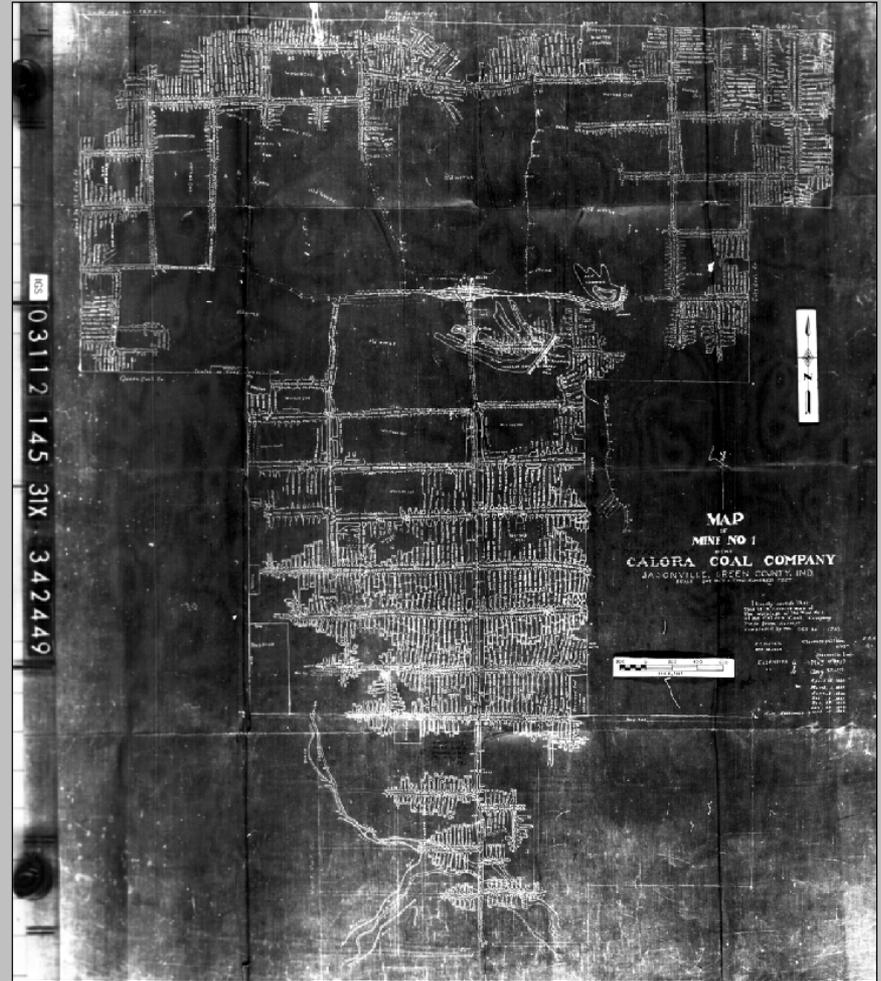
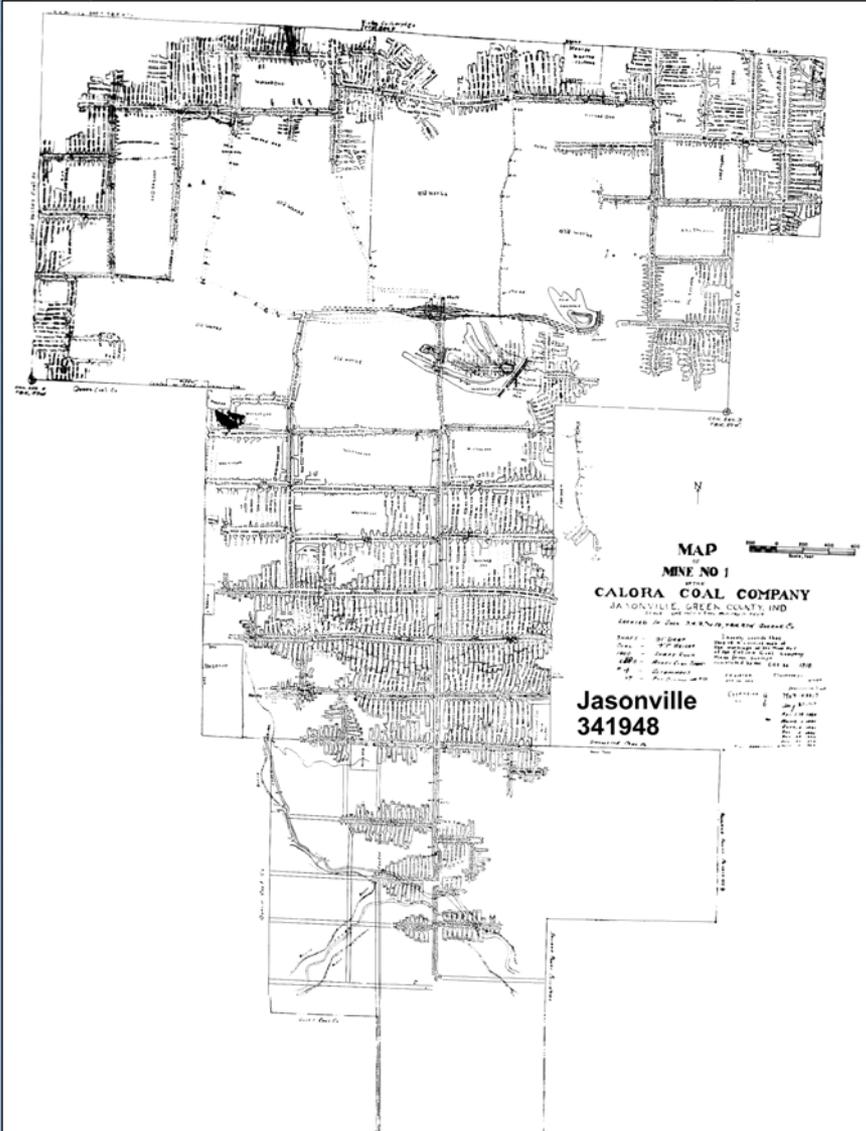


# Fine tuning... work on areas where background may be dark (or lines are too light)

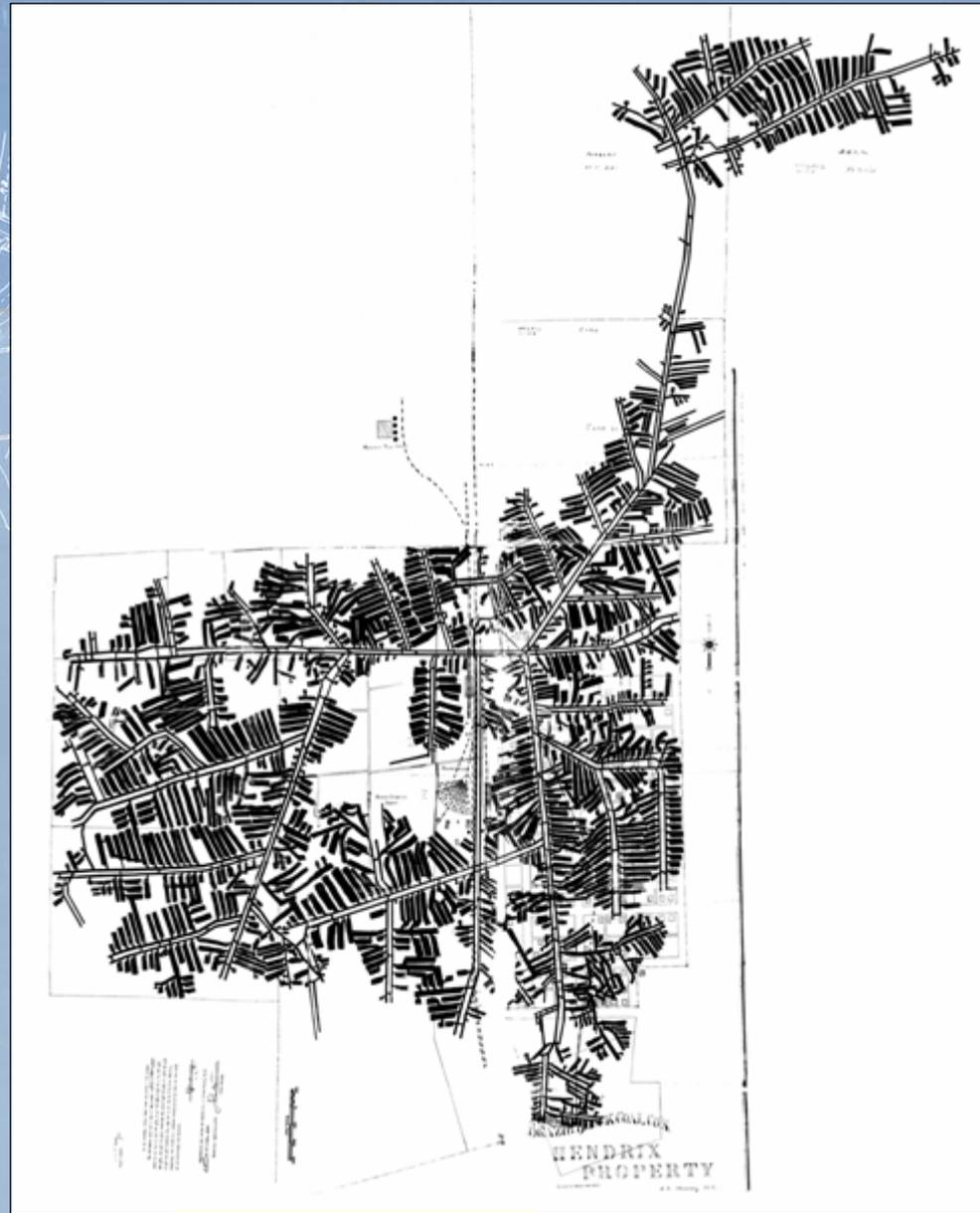
Select area needing fine tuning -  
Image>  
Adjustments>  
Levels



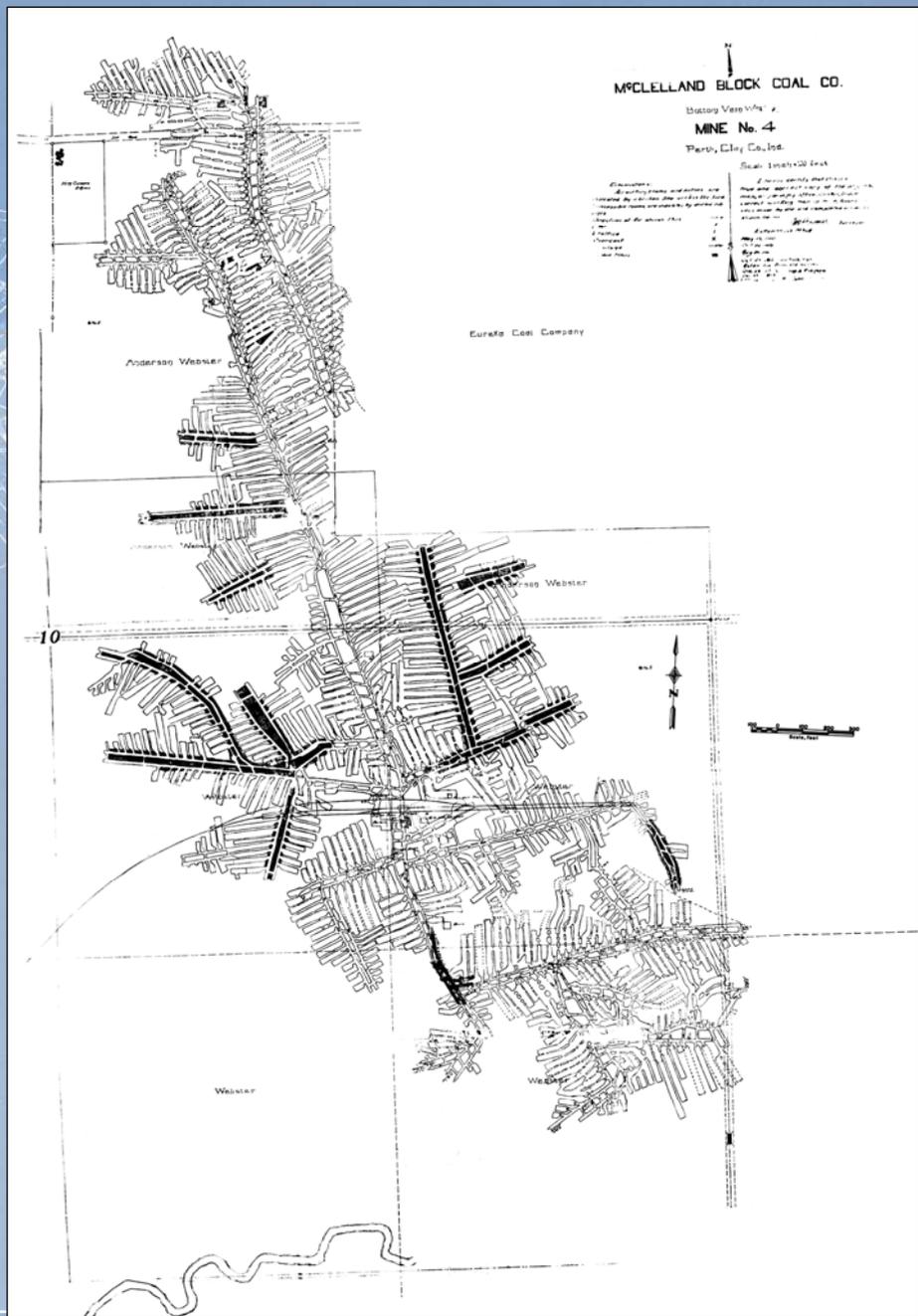
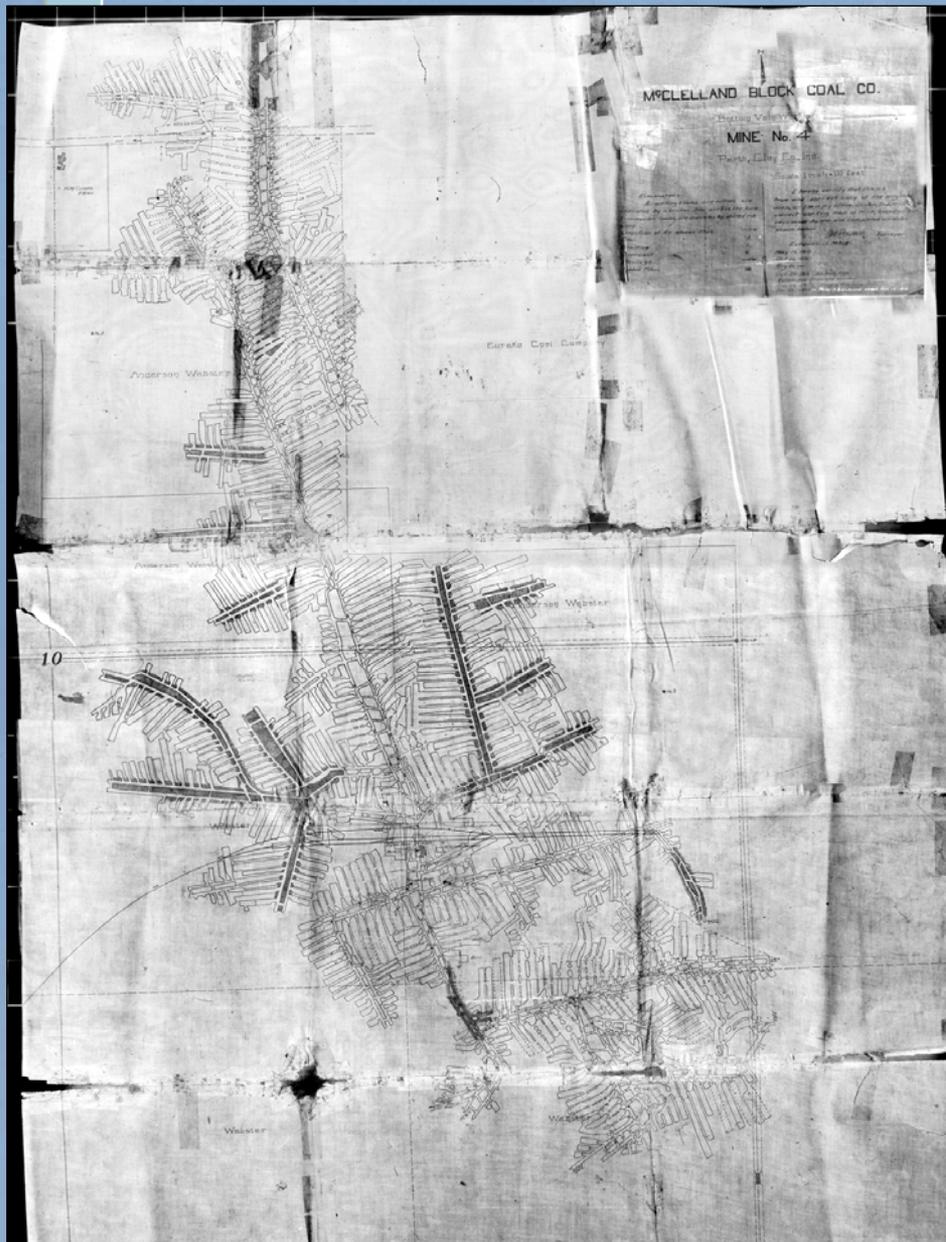
# Finished image...



**BEFORE**



**AFTER**



# Contact Info:



**Licia Weber**

**Indiana University - Indiana Geological Survey**

**611 N. Walnut Grove**

**Bloomington, IN 47405**

**812-855-1364**

**weber@indiana.edu**

# THE UNDERGROUND MINE MAPPING WORKSHOP

## Underground Mine Map Submittals: A Perspective From The National Council of Coal Lessors

June 1-2, 2005

Pittsburgh, Pennsylvania



Marco M. Rajkovich, Jr.  
250 West Main Street, Suite 1600  
Lexington, Kentucky 40507  
859-233-2012



# NATIONAL COUNCIL OF COAL LESSORS, INC.

- Land Holding Companies Owning U.S. Coal Reserves
- Supports Archiving Underground Mine Maps.
- Concern for Dissemination of Accurate Information.

# Five (5) Categories of Maps

- 
- Maps Prepared and Certified In-House
  - Outdated In-House Maps Without Verification
  - Uncertified In-House Maps
  - Certified Third-Party Maps
  - Uncertified Third-Party Maps.

# Map Certification

- 
- NSPE Model Code of Ethics, Rules of Practice, II(2)(b)
  - “Engineers shall not affix their signatures to any plans or documents dealing with subject matter in which they lack competence, nor to any plan or document *not prepared under their direction and control*”



# Maps Prepared And Certified In-House

- Company Stands By Its Own Mapping Accuracy
- Concern Is Use For Another Purpose or Release of Proprietary Information



# Outdated In-House Maps Without Verification

- Not Prepared Under The Engineer's Direction Or Control
- No Way For Physical Verification

A vertical strip on the left side of the slide shows a portion of a topographic map. It features contour lines, a road, and a yellow line. A white circle with a crosshair is positioned on the map, with two white arrows pointing to the right towards the text.

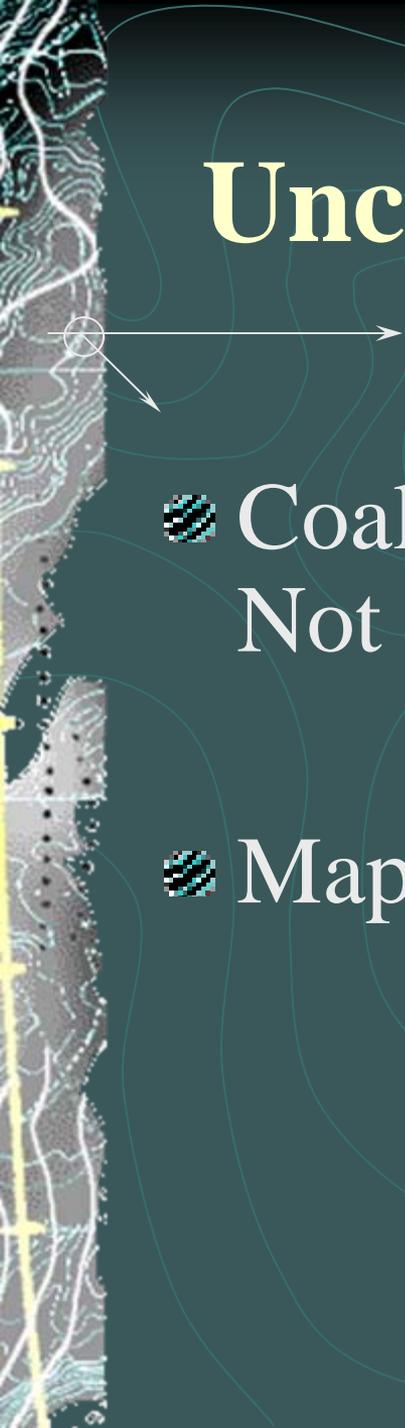
# Uncertified In-House Maps

- Likely Not Intended For Regulatory Submission
- May Not Be Prepared To Minimum Standards

# Certified Third-Party Maps

- 
- May Not Be Verified By The Coal Lessor
  - Coal Lessor Could Incur Liability

# Uncertified Third-Party Maps

- 
- Coal Lessor Releases A Map It Did Not Prepare
  - Map Preparer Did Not Certify

# Goal

- 
- The Public Needs Information
  - The Public Needs Reliability
  - No Innocent Provider Should Be Punished

# Accomplishing Goal

- 
- Statement Of Notice On Reliability
  - Provide Immunity To Map Provider

# Immunity



▣ Sovereign Immunity

▣ You Cannot Sue The King

▣ Extend Sovereign Immunity To Map  
Provider

# Notice of Reliability

- 
- Disclaimers To Stamp On Maps
  - Public Is Given Notice As To Degree Of Reliability



# Disclaimer: Maps Prepared And Certified In-House

## Limited Certification

*This map has been certified, as shown, by an agent of [company name] and such certification is limited to the statement made by the certifying licensed professional engineer as shown hereon, as agent of [company name].*



# Disclaimer: Outdated In-House Maps Without Verification

Unverified [Company Name] Map --- For  
Informational Purposes Only

*While this map has been certified, as shown, THIS MAP MAY CONTAIN OUTDATED INFORMATION AND NO RESEARCH OR VERIFICATION HAS BEEN UNDERTAKEN REGARDING THE ACCURACY OR COMPLETENESS OF THIS MAP. It is distributed "AS-IS". Any determination made from this information should be confirmed by the user's*



# Disclaimer: Outdated In-House Maps Without Verification (Cont'd)

Unverified [Company Name] Map --- For  
Informational Purposes Only (Cont'd)

*own geotechnical and surface investigations since information obtained from a detailed investigation and historical research of documents relating the areas depicted on this map may differ from the information shown on this map. [company name] bears no responsibility to inform user of any future changes to the information shown on this map.*



# Disclaimer: Uncertified In- House Maps

Uncertified Map --- For Informational Purposes Only

*This map has not been certified by [company name] nor any agent of [company name] and is distributed “AS-IS”. [company name] affirmatively states that nothing herein shall constitute a “land survey”, that such information contained herein may not conform to any minimum standards for map preparation and [company name] does not represent or warrant the accuracy or completeness of this map. [company name] **DISCLAIMS ALL REPRESENTATIONS AND/OR WARRANTIES***



# Disclaimer: Uncertified In-House Maps (cont'd)

Uncertified Map --- For Informational Purposes Only (cont'd)

*whether expressed, implied or statutory, including but not limited to, warranties of title, merchantability, and fitness for a particular purpose of use. [company name] makes no representation as to any property rights and further disclaims liability for any and all damages that may arise from the use of this map by anyone. [company name] specifically disclaims all liability for the consequences of decisions made by anyone on the basis of the information contained herein. This map is made available as a reference and resource in locating mine voids in [state].*



# Disclaimer: Uncertified In- House Maps (cont'd)

Uncertified Map --- For Informational Purposes Only (cont'd)

*It is the user's responsibility to review this map and understand the limitations of the information herein. Any determinations made from this information should be confirmed by the user's own geotechnical and surface investigations since information obtained from a detailed investigation and historical research of documents relating to the areas depicted on this map may differ from the information shown on this map. [company name] bears no responsibility to inform user of any future changes to the information shown on this map.*

# Disclaimer: Certified Third-Party Maps

Unverified Third-Party Map - For Informational Purposes Only

*This map was purportedly prepared and certified by a third-party unaffiliated with [company name] and is distributed “AS-IS”. [company name] affirmatively states that it has not verified and does not represent or warrant the accuracy or completeness of this map. [company name] **DISCLAIMS ALL REPRESENTATIONS AND/OR WARRANTIES** whether express, implied or statutory including but not limited to, warranties of title, merchantability and fitness for a particular purpose or use. [company name] makes no representation as to any property rights and further disclaims all liability for any and all damages, that may arise from the use of this map by anyone.*



# Disclaimer: Certified Third-Party Maps (Cont'd)

Unverified Third-Party Map --- For Informational Purposes Only (cont'd)

*specifically disclaims all liability for the consequences of decisions made by anyone on the basis of the information contained herein. This map is made available as a reference and resource in locating mine voids in [state]. It is the user's responsibility to review this map and understand the limitations of the information herein. Any determination made from this information should be confirmed by the user's own geotechnical*



# Disclaimer: Certified Third-Party Maps (Cont'd)

Unverified Third-Party Map --- For Informational Purposes Only (cont'd)

*and surface investigations since information obtained from detailed investigation and historical research of documents relating to the areas depicted on this map may differ from the information shown on this map. [company name] bears no responsibility to inform user of future changes to the information shown on this map.*

# Disclaimer: Uncertified Third-Party Maps

Unverified, Uncertified Third-Party Map - For Informational Purposes Only

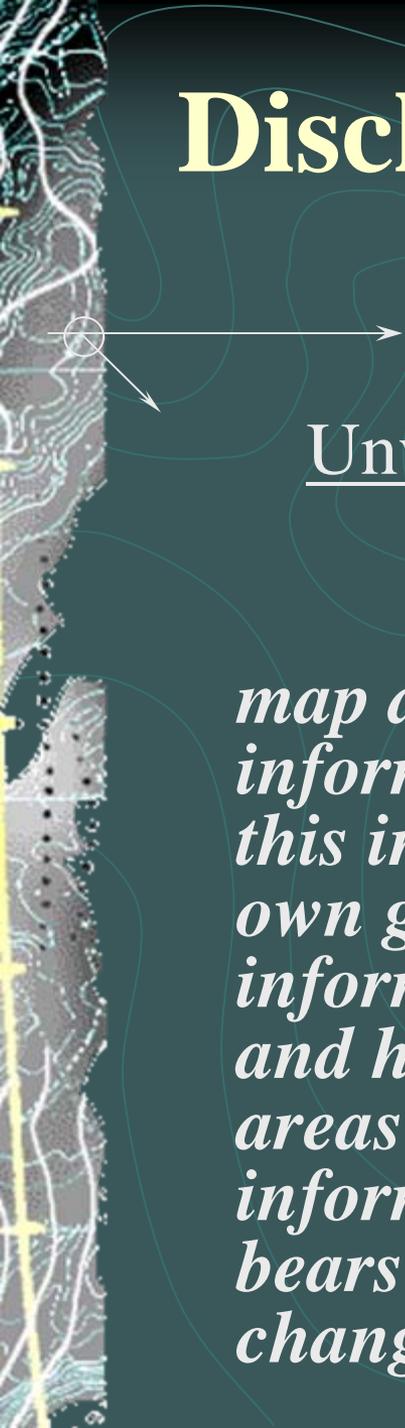
*This map was purportedly prepared by a third-party and bears no certification and is distributed “AS-IS”. [company name] affirmatively states that it has not verified and does not represent or warrant the accuracy or completeness of this map. [company name] **DISCLAIMS ALL REPRESENTATIONS AND/OR WARRANTIES** whether express, implied or statutory including but not limited to, warranties of title, merchantability and fitness for a particular purpose or use. [company name] makes no*



# Disclaimer: Uncertified Third-Party Maps (Cont'd)

Unverified, Uncertified Third-Party Map - For Informational Purposes Only (Cont'd)

*makes no representation as to any property rights and further disclaims all liability for any and all damages, that may arise from the use of this map by anyone. [company name] specifically disclaims all liability for the consequences of decisions made by anyone on the basis of the information contained herein. This map is made available as a reference and resource in locating mine voids in [state]. It is the user's responsibility to review this*



# Disclaimer: Uncertified Third-Party Maps (Cont'd)

Unverified, Uncertified Third-Party Map - For Informational Purposes Only (Cont'd)

*map and understand the limitations of the information herein. Any determination made from this information should be confirmed by the user's own geotechnical and surface investigations since information obtained from detailed investigation and historical research of documents relating to the areas depicted on this map may differ from the information shown on this map. [company name] bears no responsibility to inform user of future changes to the information shown on this map.*

# Maps Submitted For Redaction

- 
- All Title Blocks, Proprietary Information And Originator's Name And Information Is Redacted.

# State Regulatory Agency Disclaimer

Unverified Map --- For Informational Purposes Only

*This map has been furnished to [state agency] and is distributed “AS-IS”. [state agency] does not represent or warrant that this map is accurate, complete or current. Likewise, the party that furnished the map (hereinafter the “Supplier”) affirmatively states that it has not verified and does not represent or warrant the accuracy, or completeness of this map, unless the*

# State Regulatory Agency Disclaimer (Cont'd)

Unverified Map --- For Informational Purposes  
Only (Cont'd)

*Supplier or its agent certified this map, in which case such representation is limited by any disclaimers placed on the map by the Supplier or its agent. Both [state agency] and the Supplier **DISCLAIM ALL REPRESENTATIONS AND/OR WARRANTIES**, whether express, implied, or statutory, including but not limited to, warranties of title, merchantability and fitness for particular purpose or use. Both [state agency] and Supplier make no representations as*

# State Regulatory Agency Disclaimer (Cont'd)

Unverified Map --- For Informational Purposes Only  
(Cont'd)

*to property rights and further disclaim liability for any and all damages that may arise from the use of this map by anyone. Both [state agency] and Supplier specifically disclaim all liability for the consequences of decisions made by anyone on the basis of the information contained herein. This map is made available as a reference and resource in locating mine voids in [state]. It is the*

# State Regulatory Agency Disclaimer (Cont'd)



*user's responsibility to review this map and understand the limitations of the information herein. Any determination made from this information should be confirmed by the user's own geotechnical and surface investigations since information obtained from a detailed investigation and historical research of documents relating to areas depicted on this map may differ from the information shown on this map. Neither [state agency] nor Supplier bear any responsibility to inform user of any future changes to the information on this map.*

A vertical strip on the left side of the slide shows a portion of a topographic map with contour lines, a road, and a river. A white circle with a crosshair is positioned on the map, with two white arrows pointing to the right towards the text.

# Standard Form Submittal Letter

- Identify The Category Of Maps Submitted
- Request That The Map Be Released With The Disclaimer
- Request The State Agency Obtain A Release Consent

# Standard Form Submittal Letter



● *[state agency, address]*

*Dear [state agency official]:*

*At your request, [company name] has searched its map files and is transmitting the following categories of maps to you for informational purposes [INCLUDE ONLY THE FOLLOWING THAT APPLY]:*

# Standard Form Submittal Letter (Cont'd)



*[Maps prepared and certified by employees or agents of [company name] containing date-specific information and certified as specifically indicated thereon.*

*Maps drafted and uncertified by employees or agents of [company name] containing date-specific information*

*Unverified maps neither prepared nor certified by [company name] for which no verification has been undertaken.]*

# Standard Form Submittal Letter (Cont'd)



*These maps are furnished to you, at your request, and only for what assistance they can give and for no other purposes. It is our further understanding that [state agency] will release the maps herewith furnished to requesters specifically directing the requester to take note of any disclaimers contained on these maps and admonishing the requester that such maps may contain outdated information for which no reasonable*

# Standard Form Submittal Letter (Cont'd)



*verification could be undertaken. [INSERT THE FOLLOWING FOR ANY THIRD PARTY COMPANIES CURRENTLY IN EXISTENCE - It is our understanding that your agency will be contacting the following companies for consent to release their maps that we have furnished to you pursuant to your request: (LIST THIRD-PARTY COMPANY NAMES)].*

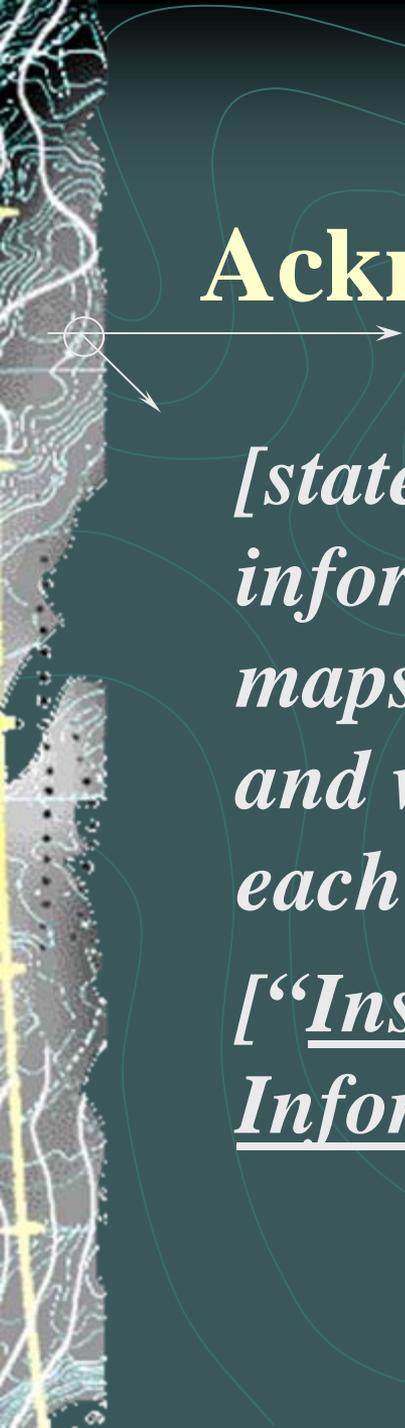
*Very truly yours,  
[company official]*

# Standard Form Agency Acknowledgment Letter

*[state agency letterhead and address]*

*Dear [company name]:*

*[state agency] acknowledges receipt of mine maps and/or scanned images of mine maps provided by your company. We understand that the maps are for representational use only and do not imply any claim as to the accuracy as to the mine works shown on the maps. We also realize that the information is date specific and may be reinterpreted as new information becomes available.*



# Standard Form Agency Acknowledgment Letter (Cont'd)

*[state agency] intends to make the information contained on your furnished maps available to other interested parties and will attach the following statement to each distribution:*

*["Insert Unverified Map --- For Informational Purposes Only" Disclaimer]*



# Standard Form Agency Acknowledgment Letter (Cont'd)

*Thank you for your contribution to this important project. It is imperative that the records of mining activity in [state] are collected, correlated, kept in a repository, and made available to those with interest in the coal fields of [state].*

*Very truly yours,  
[state agency official]*

# Mutual Ultimate Goal

- 
- Get The Best Possible Information Disseminated.
  - Alert Recipients Of Degree Of Reliability
  - Keep The Innocents Out Of The Courts
  - Work On Legislation To Accomplish The Goal

# THE UNDERGROUND MINE MAPPING WORKSHOP

## Underground Mine Map Submittals: A Perspective From The National Council of Coal Lessors

June 1-2, 2005

Pittsburgh, Pennsylvania



Marco M. Rajkovich, Jr.  
250 West Main Street, Suite 1600  
Lexington, Kentucky 40507  
859-233-2012

# Abandoned Coal Mines in Iowa

## Map Preservation and Archiving

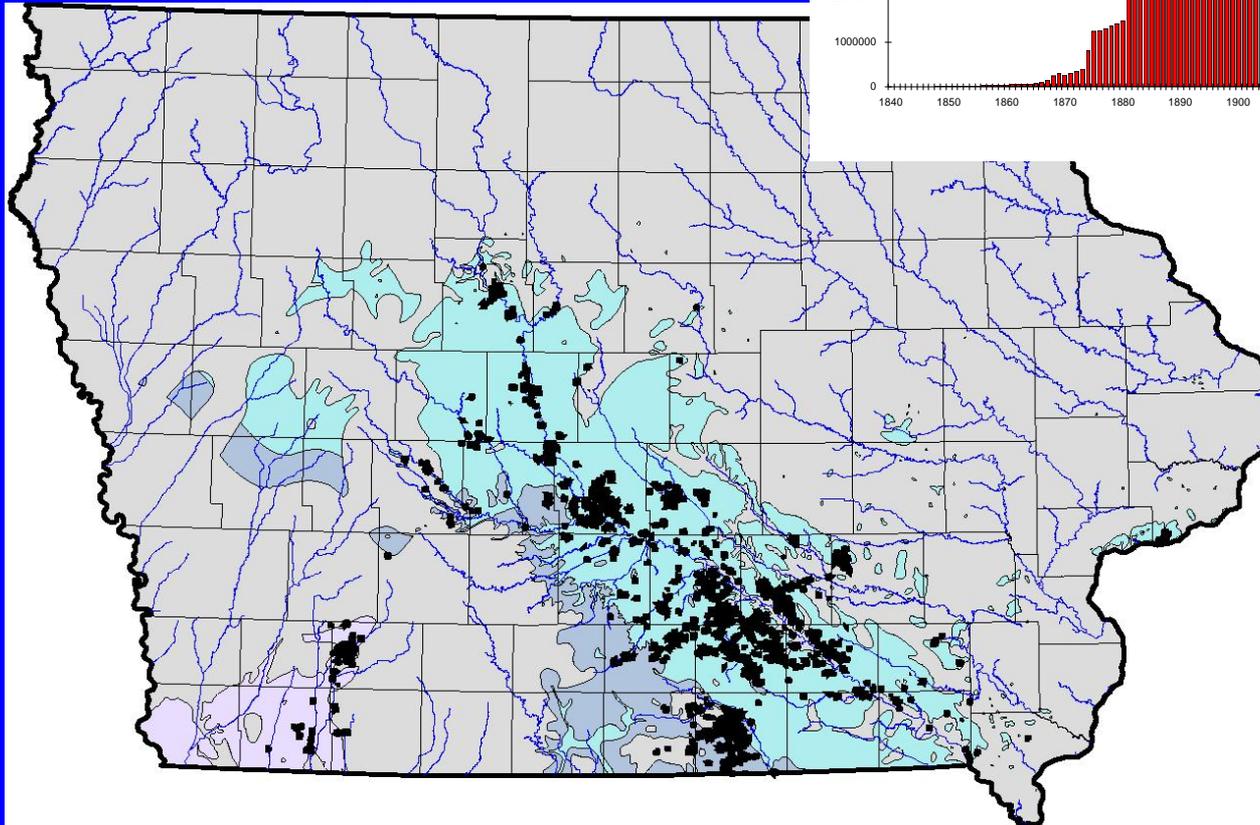
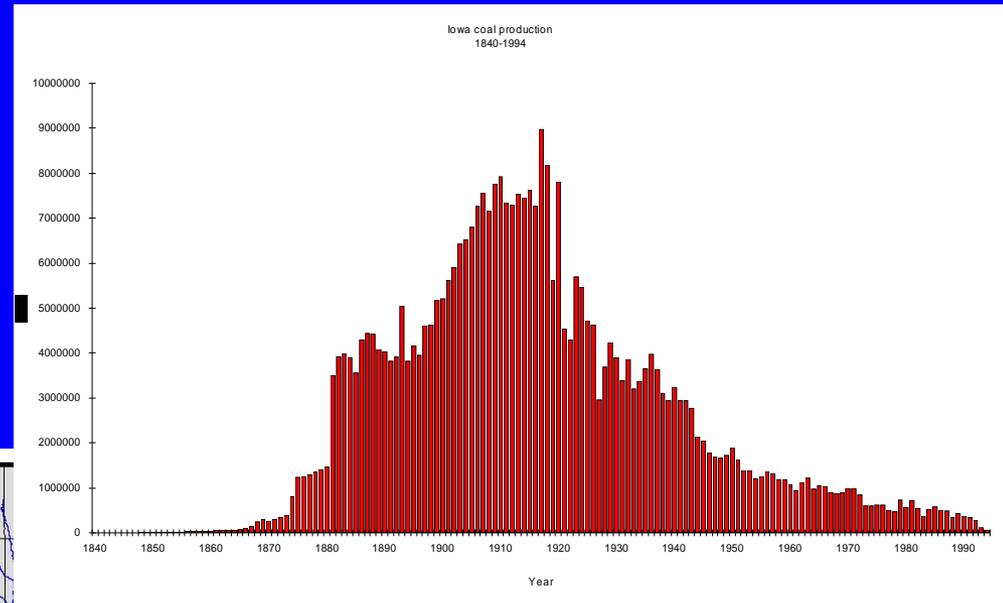


*lithograph from State Historical Society of Iowa*

**Mary R. Howes**  
**Research Geologist**  
**Iowa Geological Survey**

## Coal production by year

Greatest production was from late 1890's to late 1920's –the majority of maps are also from this period - 80 to 110 years old.



## Location of coal mines

Mine extents are exaggerated so that distribution can be seen at this scale.

# Significant events in coal mining information management

- 1840's - Earliest known coal mining near Ft. Des Moines and along the Des Moines River in southeast Iowa. Little information remains.
- 1865 - Council Bluffs named as the eastern terminus of the Union Pacific Railroad. Four railroad companies begin laying track across Iowa.
- 1880's - Iowa coal industry undergoes rapid expansion in response to demand for coal for the railroads.
- 1884 - Office of State Mine Inspectors was created. Surveyed maps of all underground coal mines that employed more than four people were to be filed on a biennial schedule.
- 1917 - Peak year of coal production in Iowa.
- 1973 - State Mine Inspectors' files, maps, and surveyed maps were transferred to the Iowa Geological Survey.
- 1978, 79 etc. - IGS assisted with investigating episodes of suspected coal mine subsidence in Des Moines and other areas.
- 1979 - Coal mines for the Des Moines area were plotted on 7.5' topographic maps.
- 1984 - Coal mine map restoration and database project begins.
- 1988 - Coal mine geographic information system database is developed.
- 1989 - IGS published *Abandoned Underground Coal Mines of Des Moines, Iowa, and Vicinity*.
- 1994 - Last operating coal mine in Iowa closed.
- Recent - scanning and georeferencing photographs as needed, updates to databases.



## Mine map storage before restoration



# Blueprint map in poor condition



# Goals of Mine Map Restoration Project

- Map restoration and preservation
  - IGS recognized the need to preserve the maps and the information on them.
  - Investigated methods of map restoration and preservation
  - Museum-quality archiving was beyond financial reach
  - Iowa State Historical Department proposed a document conservation method that was within the available budget
  - Customized storage was designed and built.
- Improved access to information contained on mine maps
  - Photographed the maps with a document copy camera that produced an 8-1/2 x 11 in. archival negative. Two prints were made from each negative. The photo collection provides for all routine access to the map collection.
  - Developed a catalog database and searching applications to locate maps by location, name, etc.

# Highlights of Mine Map Collection

- About 1,550 maps are in the collection. Approx. 50 additional maps are represented by photographs from maps that were loaned to IGS.
- 1,480 are surveyed mine maps that can be located
- 765 mine sites are represented by one or more maps
- Many maps represent revisions of earlier maps
- Surveyed mine maps are on a variety of materials. Blue prints make up the majority. There are also blue lines, ink on linen, canvas, and paper.
- Condition of the maps ranged from very good to very poor.
- “Readability” ranges from good to poor and may not be related to condition.
- Smallest map is 9” x 11”, the largest 57” x 108”.



## “Dry-cleaning” map surface



# Preparing map for washing – positioning on backing sheet





## Positioning map in drying rack



## Preparing map for washing – removing creases



# Removing tape from maps using heat and solvents



# Patching maps that are torn or have been cut into sections



## Enclosing in polyester film



Smoothing to remove air bubbles

Welding the envelope closed with ultrasonic welder



Site ID	77029		
Site name	American Coal Mining Co.		
Sequence No.	1		
No. of Site Records	3		
Quadrangle	des moines sw		
Central location	sw sw ne se 29 t079n r24w		
Area location #1	se 29 t079n r24w		
Area location #2	sw sw nw 28 t079n r24w		
Area location #3	nw sw 28 t079n r24w		
Area location #4	sw sw 29 t079n r24w		
Map name	american coal mining company		
Map ID	0893		
Last revision date	03/31/1919		
Map storage location	b2l		
Map size	40 in. x	46 in.	
Map scale	1 in. =	100 ft.	
Microfilm map	Yes		
Owner/superintendent	isaac evans		
Opening date	1912		
Ending date	1919		
Mining method	room and pillar		
Mine entrance type	shaft		
Surface elevation	0 ft.		
Shaft depth	0 ft.		
Coal seam	Blackoak		
Coal seam elevation	0 ft.		
Data type	Surveyed map		
Add'l notes	The "3rd Vein" was mined at this site. It is assigned to the currently accepted name Blackoak Coal. The name of the Blount & Evans Coal Co. appears on the back of one of the maps for this mine suggesting that the mines may		

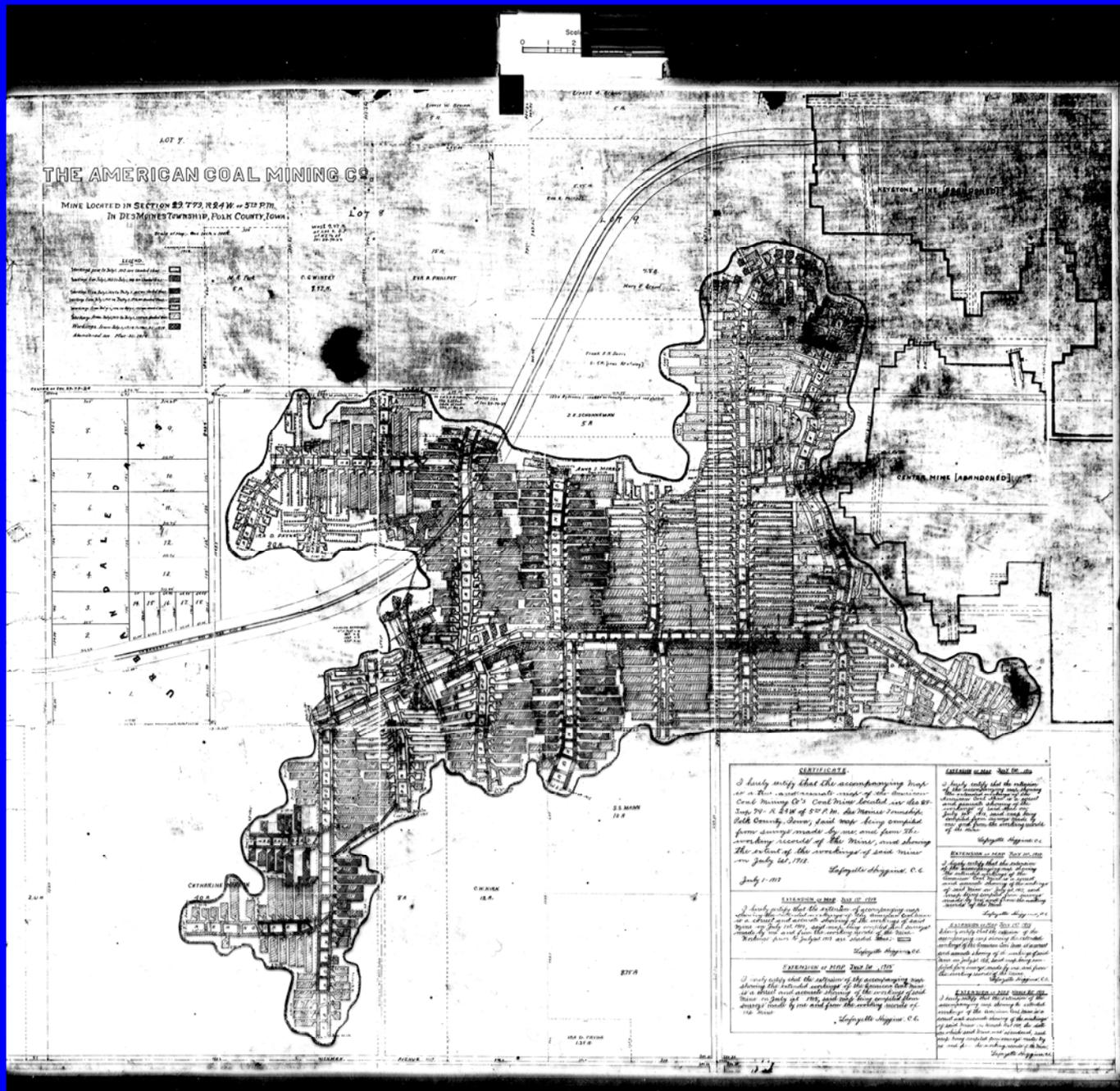
## Coal mine database

- Database was developed to serve as a catalog for the maps. A simple application allowed searches by name, location, or id.
- Typical data elements for mines with surveyed mine maps are shown at left
- Data available from a linked Access application (Arcview 3.2)

# Map photography

Following the restoration process, the maps were photographed using a document copy camera that produced an 8-1/2 x 11 inch archival quality negative. Prints from these negatives were used to develop the GIS database. The negatives continue to be used to make copies of the maps for a variety of purposes.

Scanned image of a negative from a blueprint map



# Map storage following restoration



Large custom-made storage cabinet holds maps up to 57" x 108"

Mine maps are sorted by size and stored in cardboard boxes in cabinets



# Coal mine geographic information system databases, part 1

Mine sites were classified into seven categories based on the geographic information available

- Surface
- Underground
  - Surveyed mine map with good location references-known location and extent
  - Surveyed mine map with poor location references-known extent, approx. location
  - State Mine Inspectors' township-known location and approx. extent
  - State Mine Inspectors' files, IGS publications, etc.-unknown extent, location approx. to 1/4 section or smaller
  - State Mine Inspectors' files, IGS publications, etc.-unknown extent, location approx. to one section
  - State Mine Inspectors' files, IGS publications, etc. - unknown extent, unknown location

# Coal mine geographic information system databases, part 2

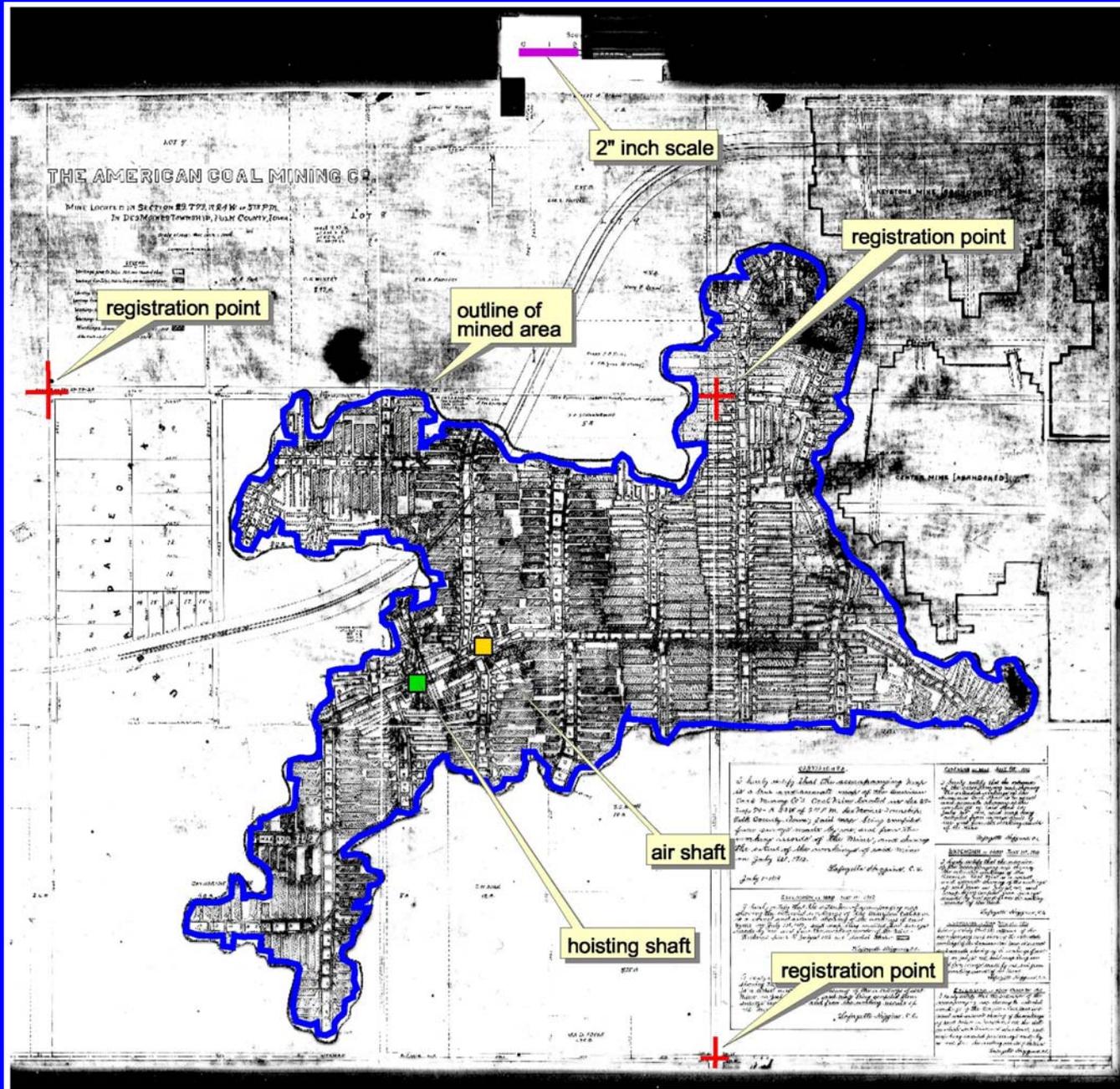
- This process was streamlined by the earlier development of the Coalmine database which had already identified the mine sites and all associated maps and other data, as well as the most recent map for the site.
- Mine outlines, shaft locations, and registration marks were digitized with Autocad from the photographs taken as part of the mine map restoration project. Generally the map with the latest revision was selected unless the condition of the map was such that it could not be digitized.
- Coordinate conversion was performed with Autocad using 7.5' topographic maps by selecting points on the quadrangle that corresponded to the registration marks digitized with the mine data.
- Data was exported from Autocad files and imported into pcArcInfo as a polygon coverage (mine outlines) and a point coverage (shaft locations)
- Identifiers linking the outline to the Coal mine database were added to the attribute tables
- Attributes were added from the Coal mine database

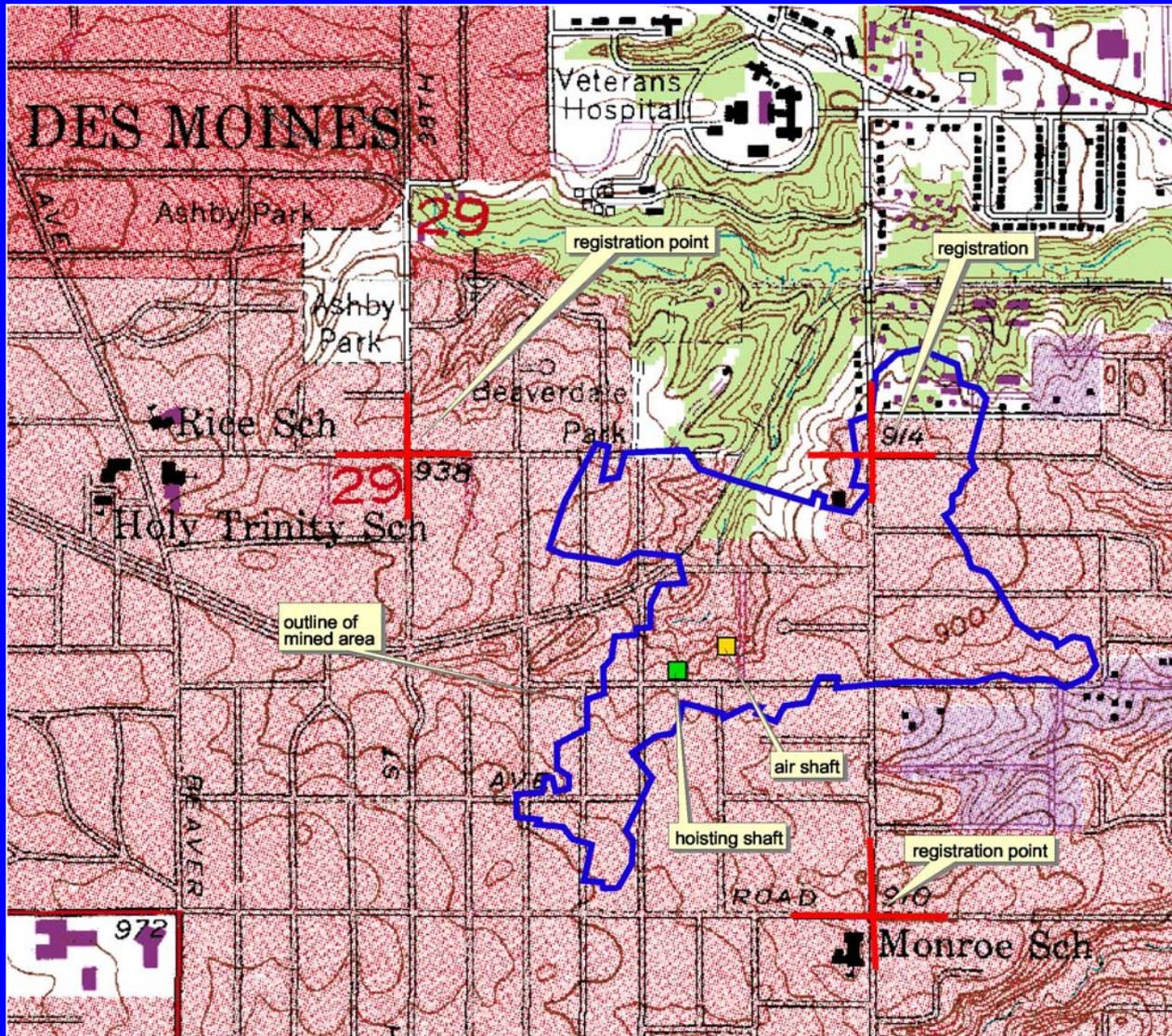
# GIS development, 1988

Photo prints of mine maps were used as the source for digitizing in AutoCad

Features of mine maps that were digitized:

- outline of mined-out area
- two or more registration points and the scale
- or-
- one registration point, a directional feature, and the scale
- mine entrances

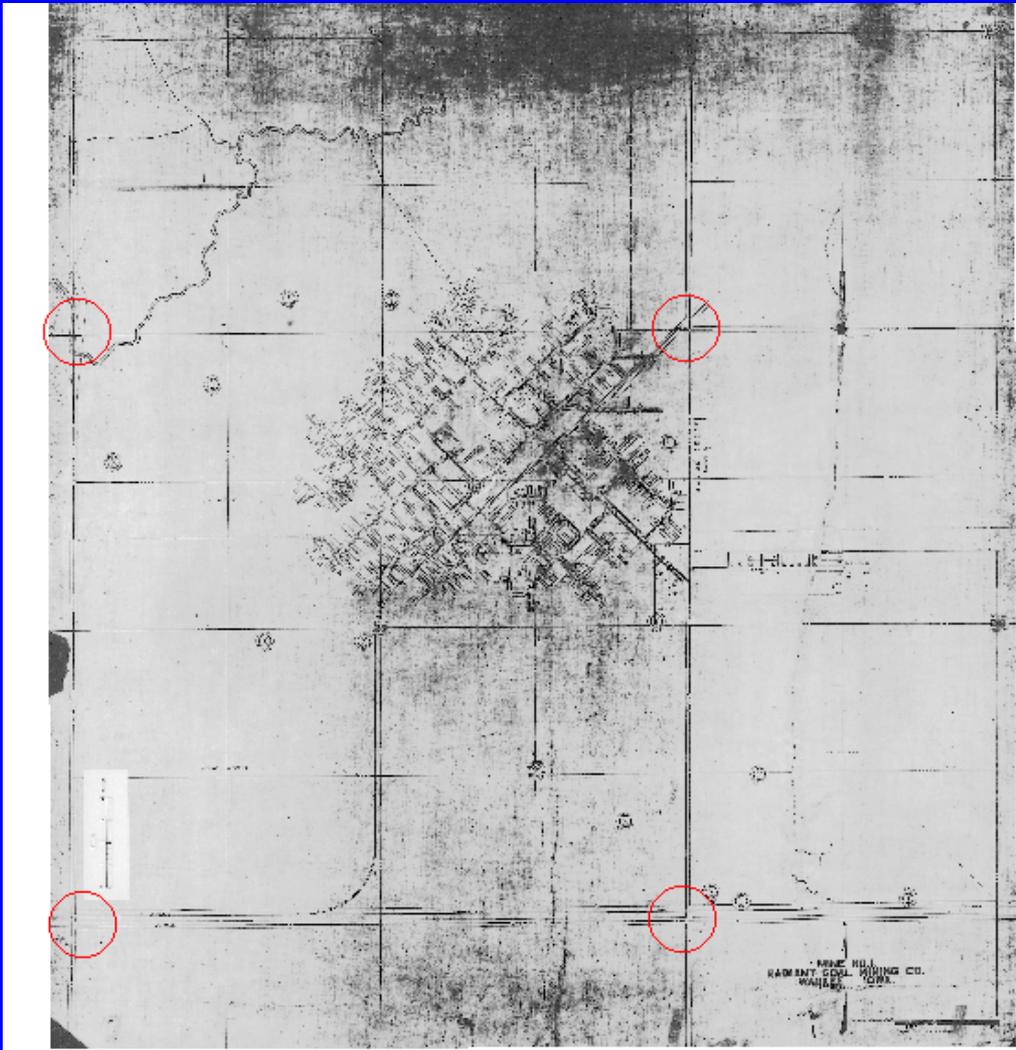




## GIS development, 1988, cont.

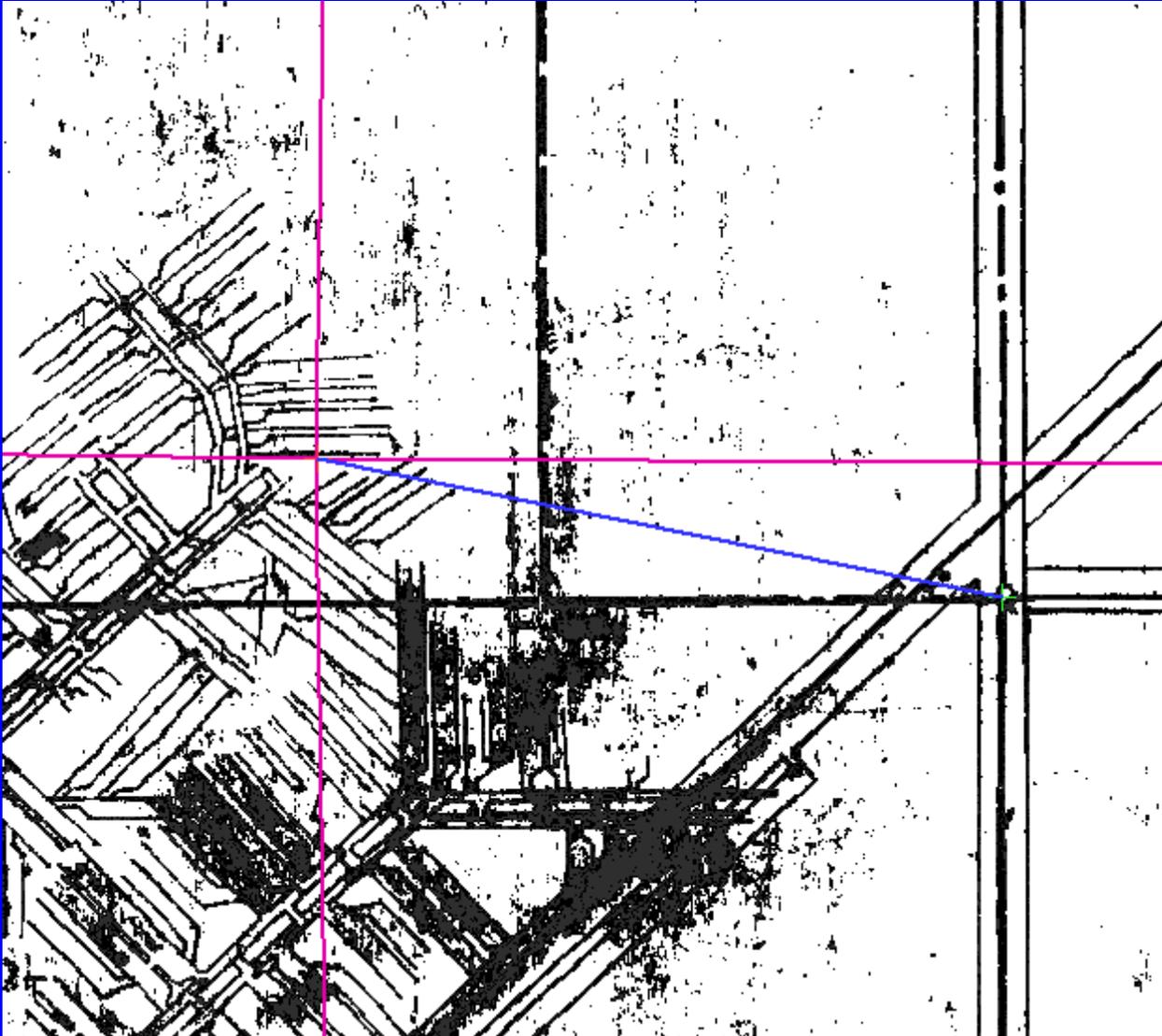
Registration step - digitized registration points are located and “transformed” to the equivalent points on a georeferenced 7.5’ topographic quadrangle. The digitized mine outline and entrance locations are transformed with the reference points.

## Georeferencing mine map images, 2005, step 1



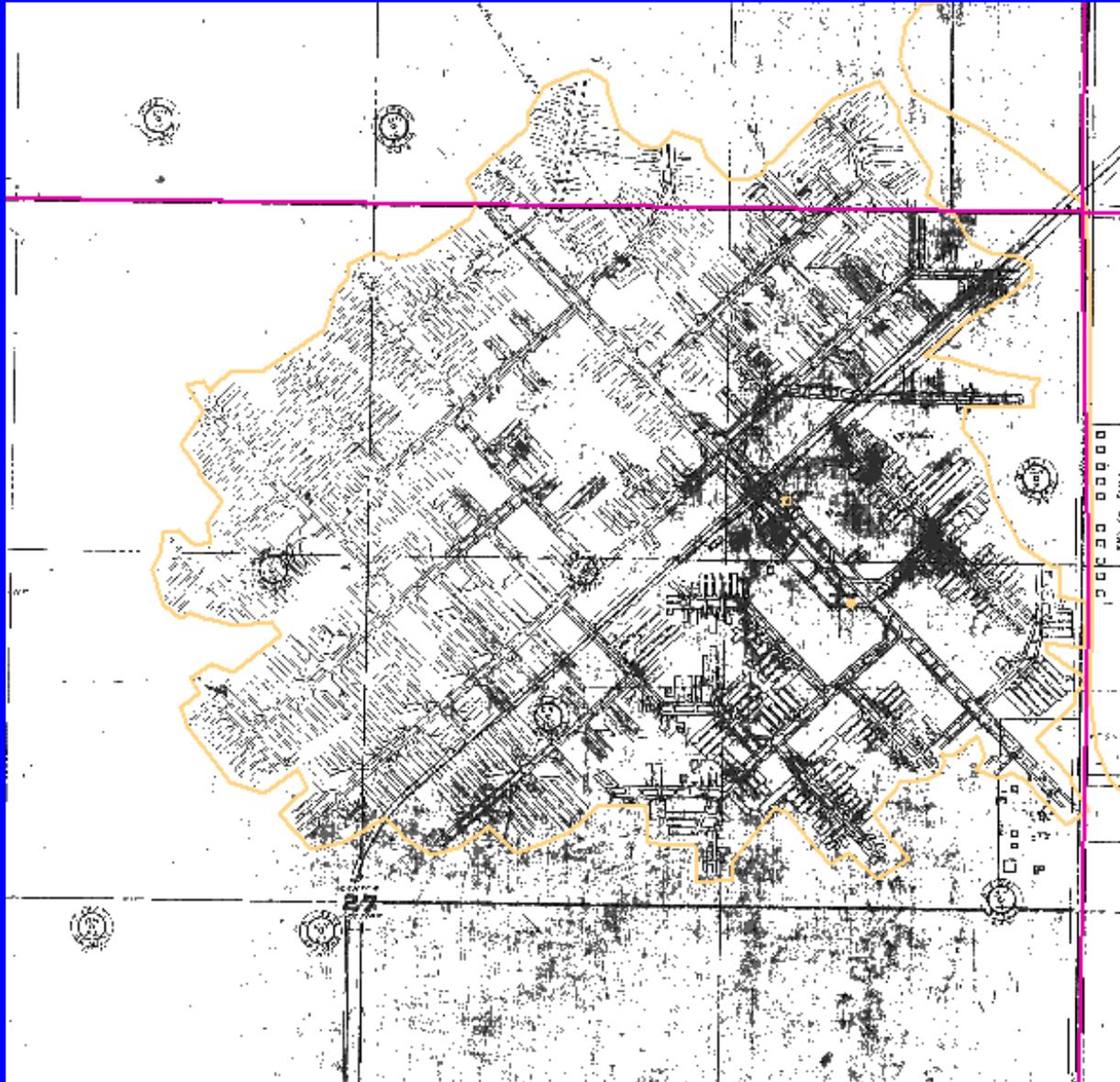
- Negative is scanned at 600 dpi, saved as .tif image
- Minor cropping and cleanup
- Identify reference points. In this example, four section corners have been located and circled in red.
- Load layers for georeferencing and the mine map image into Arcmap 9 with the Georeferencing extension. Zoom to the approximate location of the map. Select the map image as the layer to georeference and fit it to the data view

## Georeferencing mine map images, 2005, step 2



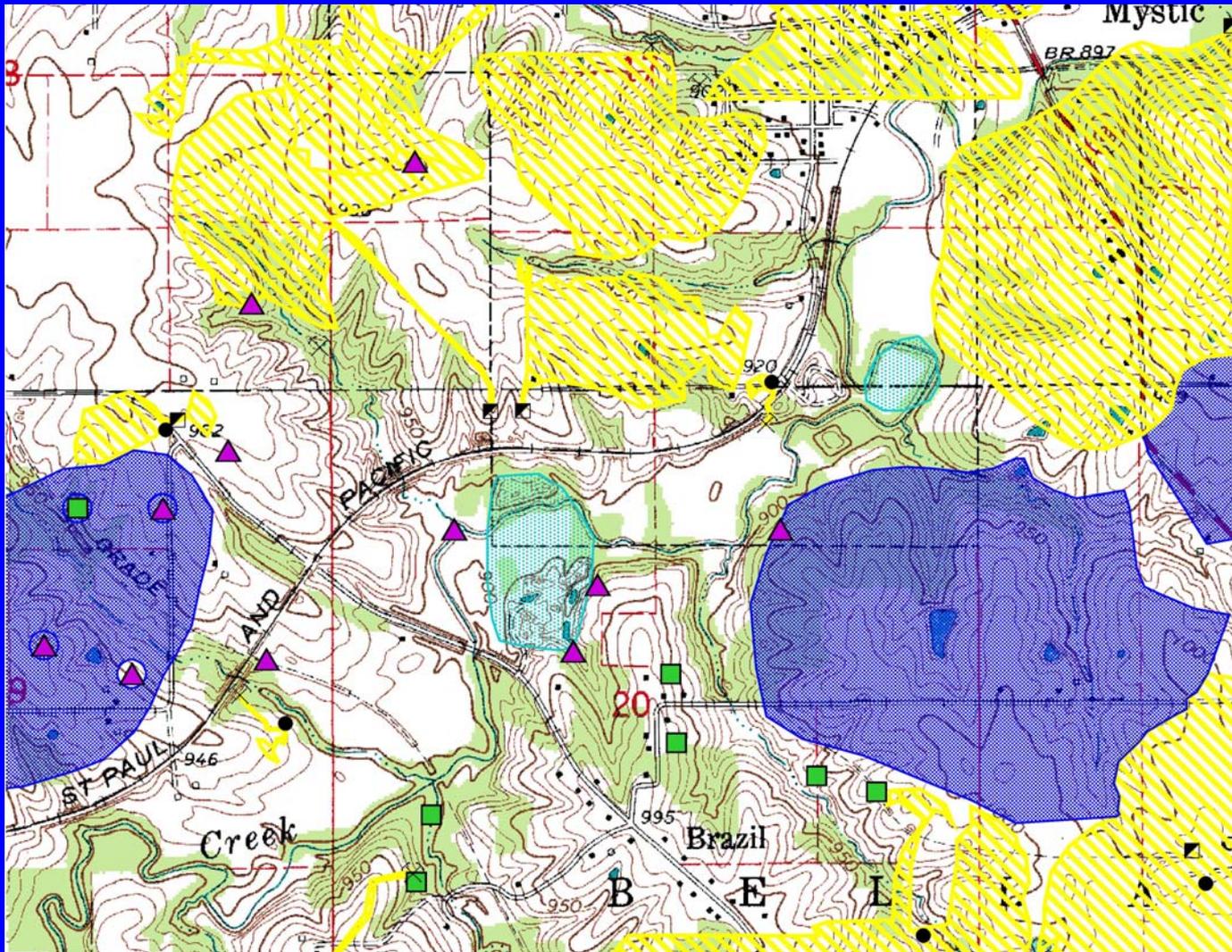
- Reference points on the map image are linked to matching reference points on the data view. The northeast section corners are linked (blue line) in this screen capture. Two widely spaced points are adequate for “scale-and-rotate” georeferencing.
- Arcmap will write/update the world file for the image.
- It may be helpful to classify the legend for the image to remove the mid-gray tones—this doesn’t alter the image, only the way it appears on the screen.

# Digitizing/Updating GIS database features, 2005



- Outline showing the mine extent is digitized/updated into the coal mine GIS database (gold line).
- Mine opening are digitized/updated into the mine entrance GIS database (gold markers).
- Attributes are updated, including information about georeferencing and location of scanned, georeferenced image.

# Area of extensive underground mining

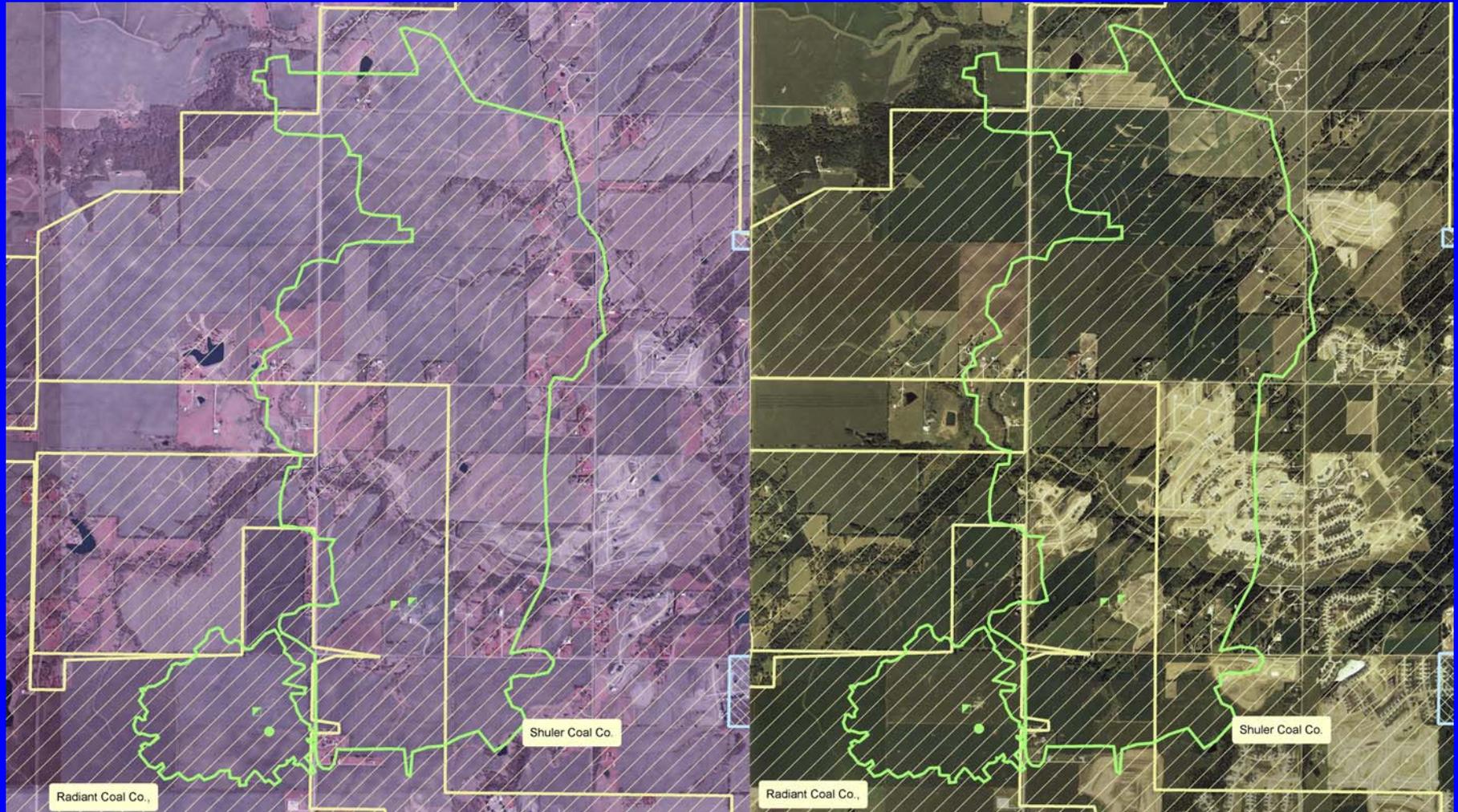


Five categories of abandoned mine data are shown. The “point location” mines are stored as one-acre round polygons to maintain compatibility with other coal mine data. The one acres areas are not included in acreage totals. On this view, the “point mines” have been converted to marker symbols for display purposes.

## Summary of coal mine GIS database

- About 5,800 mines can be documented in Iowa
- 3,062 mines can be located within at least one square mile
- 765 mines have a surveyed map that can be located
- 1,480 mines are located as points only
- 2,766 mines have only a post office as a location (not located in GIS database)
- About 345 surface mines exist

# Comparison of 2002 and 2004 land use and historic coal mining



2002 aerial photo (false color IR)

2004 aerial photo (true color)

# How GIS is Used to Meet OMB Circular A-16 Requirements

John Reitsma – BLM Land & Resources Project Office

---

SWUG Conference

Oct 21, 2004

# The Purpose of A-16

- Many governmental agencies are funded by the OMB for mapping efforts...



# OMB Circular A-16

[http://www.whitehouse.gov/omb/circulars/a016/print/a016\\_rev.html](http://www.whitehouse.gov/omb/circulars/a016/print/a016_rev.html)

- The purpose of the Circular was **"to ensure that surveying and mapping activities may be directed toward meeting the needs of federal and state agencies and the general public, and will be performed expeditiously, without duplication of effort."**

# A-16 History

- Originally issued by the President's Office of Management & Budget (OMB) in **1953** to coordinate topographic mapping activities, National Atlas, Geodetic Control Surveys and International Boundaries.
- A 1967 revision placed responsibility for coordination of mapmaking and surveying to the Dept. of Interior, Dept. of Commerce, and Dept. of State.
- A 1990 revision included “geographically referenced **digital** data”.
- August 19, 2002 revision incorporated Executive Order 12906 to recognize the implementation of the National Spatial Data Infrastructure (**NSDI**) and the authority of the Federal Geographic Data Committee (**FGDC**) for NSDI coordination.

# A-16 Outlines the Provisions of the National Spatial Data Infrastructure



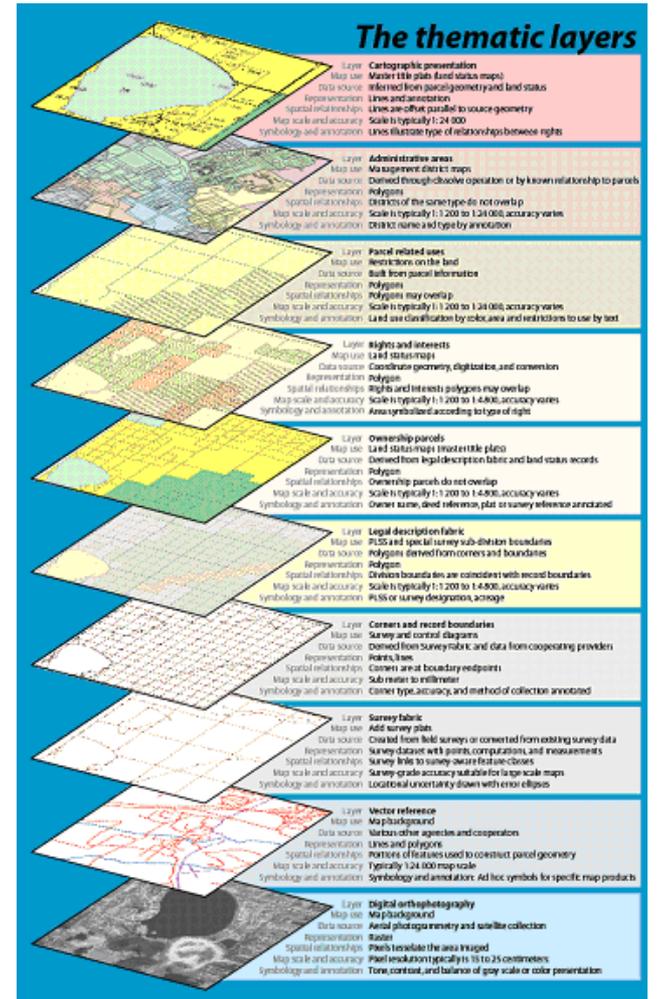
- Data Themes
- Metadata
- National Spatial Data Clearinghouse
- Standards
- Partnerships

# Questions People Have Regarding Federally Produced Spatial Data

- Who is the data steward for a particular spatial data theme.
- What data layers are available from the government to the public?
- Where does one go to find Spatial Data?
- When (and how) was the data collected?
- How can I view and use the data?

# A-16 Describes Specific Framework Data Layers and Assigns Agency Responsibility

- Geodetic Control
- Cadastral
- Governmental Units
- Transportation
- Elevation and Bathymetry
- Hydrography
- Orthoimagery
- Plus 27 others...

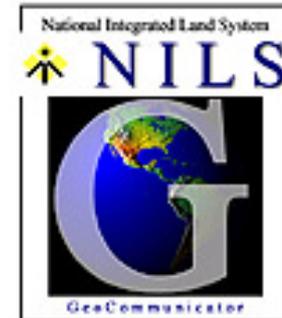


# Meeting A-16 Requirements

- Take **responsibility** for your assigned data layer.
- Work with your **partners** to move toward **standardization & interoperability**.
- Document with **METADATA!**
- Make your data **accessible** through a spatial data clearinghouse.

# Demonstration

- The National Integrated Land System (NILS) is serving the Bureau of Land Management's assigned spatial data layers in compliance with OMB A-16 Requirements.



<http://www.geocommunicator.gov>

# NILS Spatial Data Layers

- Land Survey Information
- Federal Land Stewardship
- Land & Mineral Use Records

Serving National Spatial Data Layers for the BLM as directed by OMB Circular A-16

[http://www.whitehouse.gov/omb/circulars/a016/a016\\_rev.html](http://www.whitehouse.gov/omb/circulars/a016/a016_rev.html)

# GeoCommunicator: The Portal to NILS Spatial Data

GeoCommunicator - Microsoft Internet Explorer

File Edit View Favorites Tools Help

 **GeoCommunicator**  
www.geocommunicator.gov

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About  
**Land & Mineral Use Records**  
**Federal Land Stewardship**  
**Land Survey Information**  
Reference  
Search Geodata.gov  
Contact Us

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- **Reference** documents and information for the cadastral, land records, and parcel management communities.
- **Link to Geodata.gov** portal for searching, locating, and accessing U.S. maps and data.



GeoCommunicator is an official United States Government web site. GeoCommunicator is provided by the **Bureau of Land Management** & the **U.S. Forest Service**. This is a U.S. Government Computer System. Before continuing, please read GeoCommunicator's **Privacy/Security Policy**. Please use the **Contact Form** with any questions relating to accessibility of documents.

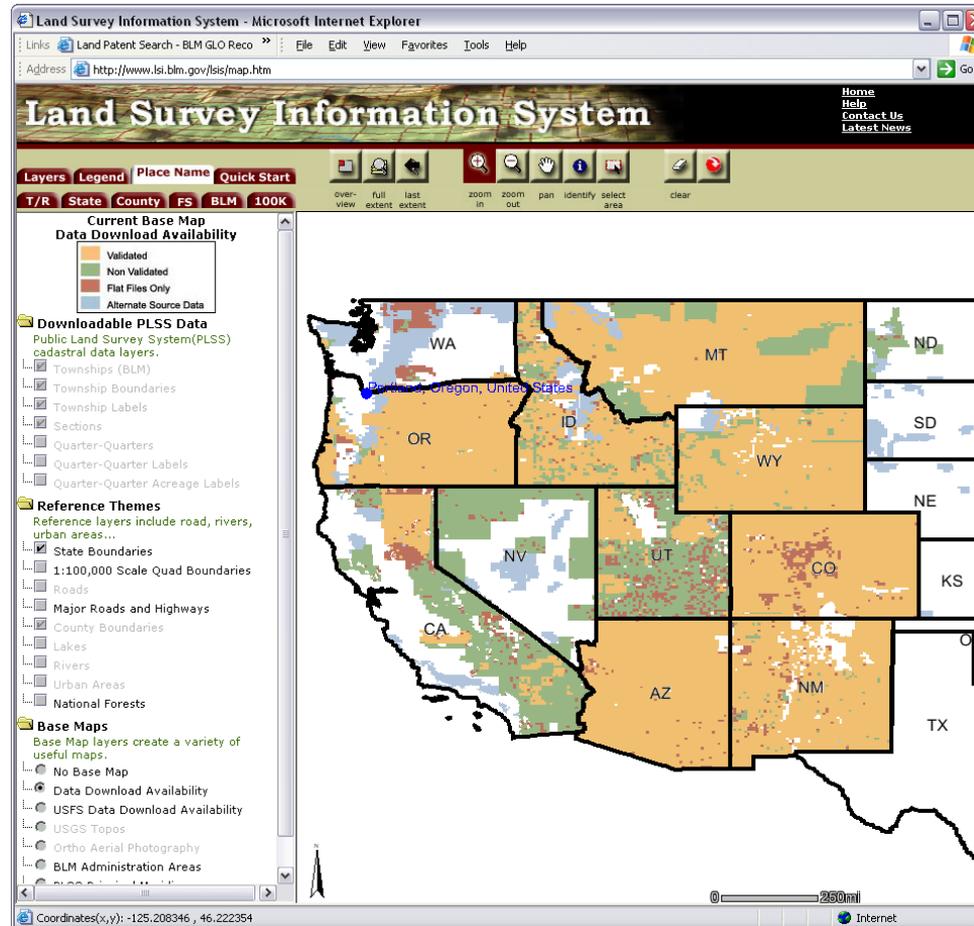
 

This site uses **cookies** .

Local intranet

# Land Survey Information

- A Seamless Multi-Purpose Cadastre

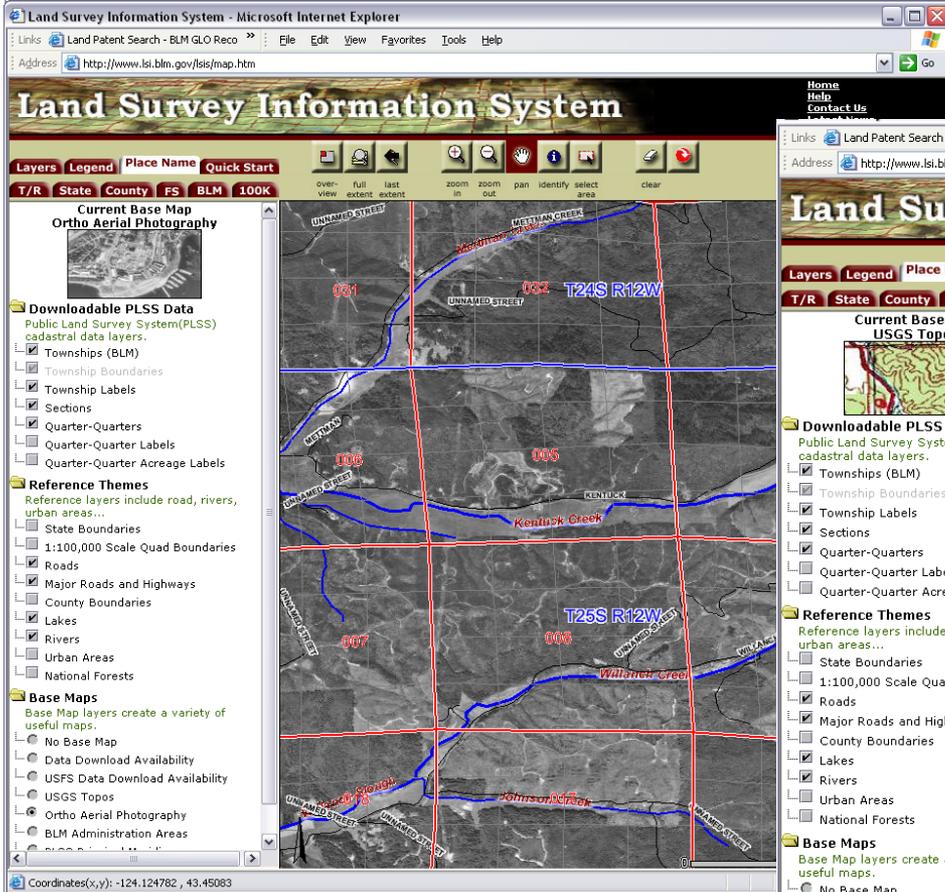


# Data is delivered 3 ways...

The screenshot displays the Land Survey Information System (Lsis) web application running in Microsoft Internet Explorer. The browser's address bar shows the URL <http://www.lsi.blm.gov/lsis/map.htm>. The application header includes the title "Land Survey Information System" and navigation links for Home, Help, Contact Us, and Latest News. Below the header is a toolbar with icons for over-view, full extent, last extent, zoom in, zoom out, pan, identify, select area, and clear. A secondary toolbar contains tabs for T/R, State, County, FS, BLM, and 100K. The main content area is divided into a left sidebar and a central map. The sidebar contains several sections: "Current Base Map Data Download Availability" with a legend for Validated (orange), Non Validated (green), Flat Files Only (red), and Alternate Source Data (blue); "Downloadable PLSS Data" listing Public Land Survey System (PLSS) cadastral data layers and Township boundaries; "Reference Themes" listing various reference layers like roads, rivers, and urban areas; and "Base Maps" listing map types such as No Base Map, Data Download Availability, USFS Data Download Availability, USGS Topos, Ortho Aerial Photography, BLM Administration Areas, PLSS Principal Meridians, and Shaded Relief. The central map shows a grid of township and range coordinates (e.g., T205 R10W, T205 R11W) overlaid on a topographic map. The map area is labeled with "Curry", "Douglas", and "Josephine". At the bottom of the map, coordinates (x,y) are shown as -124.716093, 43.416306. The browser's status bar at the bottom indicates "Internet".

1

- Viewable from the web interface



# 2

- Downloadable as Shapefiles

**Selected Townships**  
Custom Selection

To download data, select the desired Provider and Format, and press button.

- BLM (GIS Shapefile format)
- BLM (GCDB Flat File format [Info...](#))
- USFS and other Sources (GIS Shapefile format)

**Download Now**

Total Records: 2		Data Availab Status	
Township	Updated	BLM	USFS And Sour
1 OR 33 T024S R012W	28 Oct 2002	Yes	-
2 OR 33 T025S R012W	28 Oct 2002	Yes	-

**Close**

**FME Download - Microsoft Internet Explorer**

**SpatialDirect**  
WEB-BASED DATA DELIVERY

Dynamically download all Townships currently displayed on the map. A variety of Data formats and projections are supported by this feature.

*NOTE: To download large extents like an entire state, you can use the Query tools(ie. State Query) to download pre-packaged zip files. These pre-packaged files are limited to Shapefile format, using Geographic NAD27 coordinate system.*

**Download Format:**  
ESRI Shape  
AutoCAD DWG (R14)  
AutoCAD DWG (R2000)  
AutoCAD DXF (R12)  
AutoCAD DXF (R14)  
AutoCAD DXF (R2000)  
Caris NTX  
EPS (Encapsulated PS)  
IEPS (Illustrator EPS)  
ESRI Arc/Info Coverage  
ESRI Arc/Info Export (E00)  
ESRI Arc/Info Generate  
ESRI GML  
ESRI Shape  
FME Feature Store File  
Geographix CDF  
GML 2 (Safe Schema)  
Landmark 7.MAD

**Coordinates:**  
Lat/Long NAD83

**Layers:**  
Townships  
Sections  
Aliquots

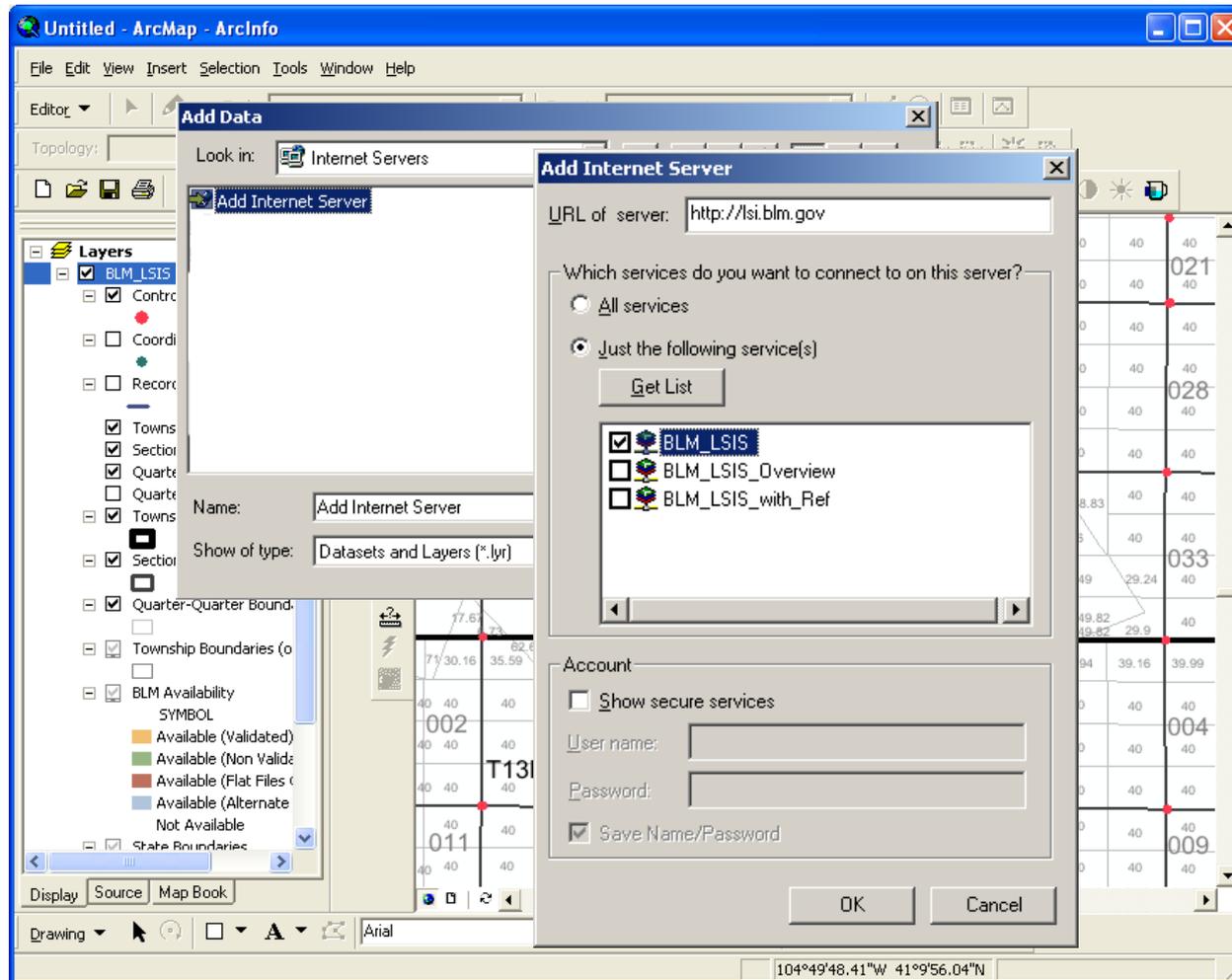
**Translate Data**

and requests. A notification e-mail will be sent to

Internet

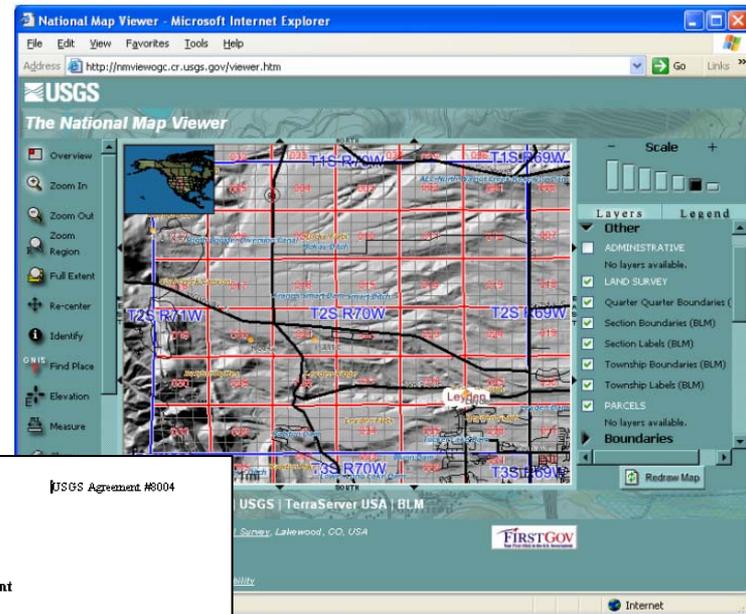
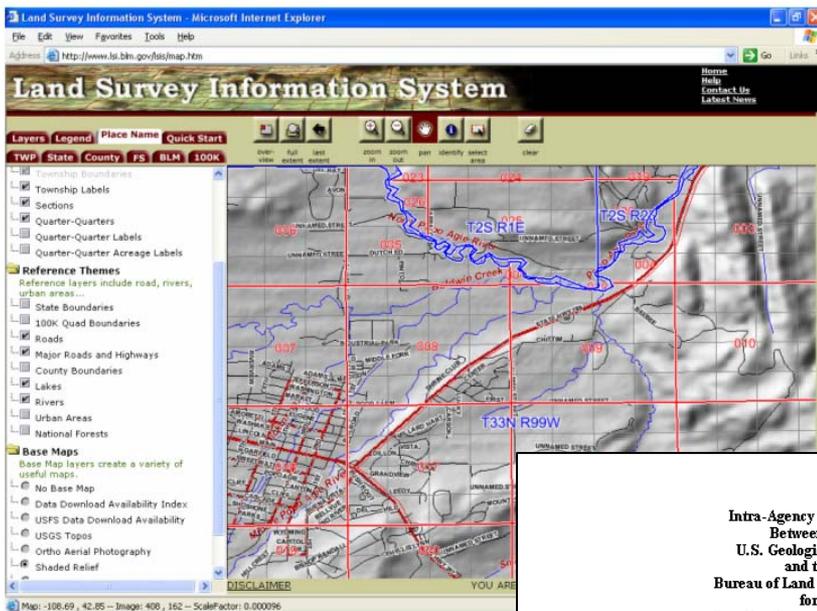
# 3

- Accessible as a streaming ArcIMS layer



# Part of the National Map

- BLM & USGS sharing data resources



**Intra-Agency Agreement  
Between the  
U.S. Geological Survey  
and the  
Bureau of Land Management  
for  
Coordination and Cooperation  
Pertaining to *The National Map*  
and the  
National Integrated Land System**

**I. Purpose**

The purpose of this agreement is to leverage the U.S. Geological Survey (USGS) and Bureau of Land Management (BLM) investments in geospatial data that are contained in *The National Map* and the National Integrated Land System (NILS). This agreement describes key technical considerations that need to be coordinated in order to maintain a mutually beneficial relationship.

# GeoCommunicator: Federal Land Stewardship

GeoCommunicator - Microsoft Internet Explorer

File Edit View Favorites Tools Help

 **GeoCommunicator**  
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This site uses **cookies** .

Local intranet

# Land Manager Viewer

- Displays Surface Land Management Agency

The screenshot shows a web browser window titled "GeoCommunicator LandManager Contact - Microsoft Internet Explorer". The main content area is titled "Land Manager Viewer" and features a navigation menu with "HOME", "CONTACT US", and "HELP" links. Below the menu is a "TEXT SEARCH" field and a toolbar with various navigation icons. The central part of the interface is a map of the southwestern United States, showing various land management areas such as "Craters of the Moon", "Gunnison Gorge NCA", "Grand Staircase-Escalante", "Vermilion Cliffs", "Grand Canyon-Parashant", "Kasha-Katuwe Tent Rocks", "El Malpais NCA", "Sonoran Desert", "Gila Box Riparian NCA", and "Ironwood Forest". Major cities like Salt Lake City, Denver, Phoenix, and Santa Fe are also marked. A "Layers" panel on the left lists various map features, all of which are checked under the "Visible" section. Below the layers panel is a "QUICK START" section with four numbered steps: 1. Locate the land you are interested in by using the Navigation tools above. 2. Click on the Identify tool to activate it. 3. Click on the desired land in the map to display the land manager information. 4. Use Text Search for Querying, Blm District, Forest Service Region, Federal Land. The bottom of the browser window shows the status bar with "Done" and "Local intranet".

GeoCommunicator LandManager Contact - Microsoft Internet Explorer

## Land Manager Viewer

HOME  
CONTACT US  
HELP

TEXT SEARCH

### Layers

Visible

- U.S. States
- Capital Cities
- Major Highways
- Streams
- Major Inland Water Bodies
- BLM National Monument
- BLM National Conservation Area
- Other Federal Lands
- BLM Lands
- National Forests

### QUICK START

1. Locate the land you are interested in by using the Navigation tools above.
2. Click on the Identify tool to activate it.
3. Click on the desired land in the map to display the land manager information.
4. Use Text Search for Querying, Blm District, Forest Service Region, Federal Land.

Map Created by GeoCommunicator

Done Local intranet

# Land Browser Interface

GeoCommunicator LandManager Contact - Microsoft Internet Explorer

## Land Manager Viewer

HOME  
CONTACT US  
HELP

TEXT SEARCH

**Layers**

Visible

- U.S. States
- Capital Cities
- Major Highways
- Streams
- Major Inland Water Bodies
- BLM National Monument
- BLM National Conservation Area
- Other Federal Lands
- BLM Lands
- National Forests

**QUICK START**

1. Locate the land you are interested in by using the Navigation tools above.
2. Click on the Identify tool to activate it.
3. Click on the desired land in the map to display the land manager information.
4. Use Text Search for Querying, BLM District, Forest Service Region, Federal Land.

Map Created by GeoCommunicator

- Zoom, Pan, Search, and Identify

Identify All - Microsoft Internet Explorer

**Forest Service Regions 1 features found**

ADM	STATE	FS_PHONE	FS_URL	FS_NAME
R4	UT	801-625-5605	<a href="http://www.fs.fed.us/r4/">http://www.fs.fed.us/r4/</a>	Intermountain

**BLM Districts 1 features found**

DISTRICT	STATE	PHONE	NAME	URL
FILLMORE	UT	(801) 743-6811	Fillmore Field Office	<a href="http://www.ut.blm.gov">http://www.ut.blm.gov</a>

**National Parks 0 features found**

No features found.

**National Forests 0 features found**

No features found.

**Other Federal Lands 1 features found**

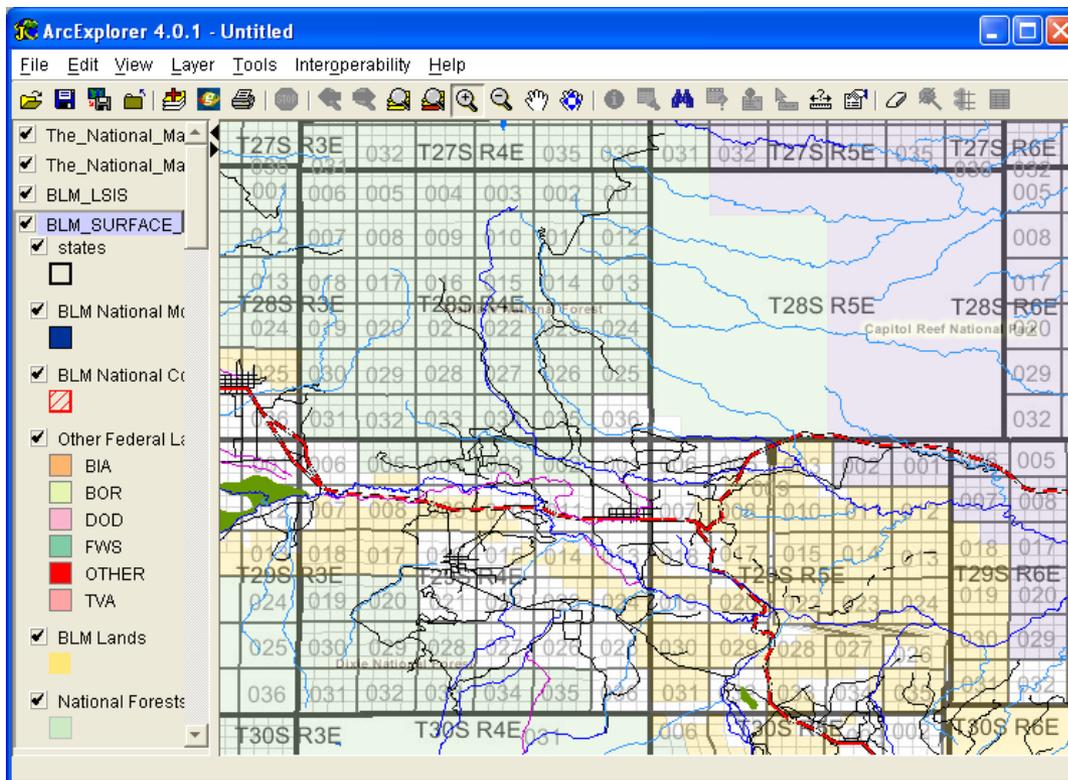
AGENCY	AGENCY_URL	AGENCY_PHO	STATE	DISTRICT	DISTRICT_U	PHONE	FEATURE1
FWS	<a href="http://www.fws.gov/">http://www.fws.gov/</a>	(202) 208-5634	UT				National Wildlife Refuge FWS

Local intranet

# Integrate with other data layers through Desktop or Mobile GIS

- Add data from the internet with the URL:

<http://lsi.blm.gov>



# GeoCommunicator: Land & Mineral Use Records



GeoCommunicator - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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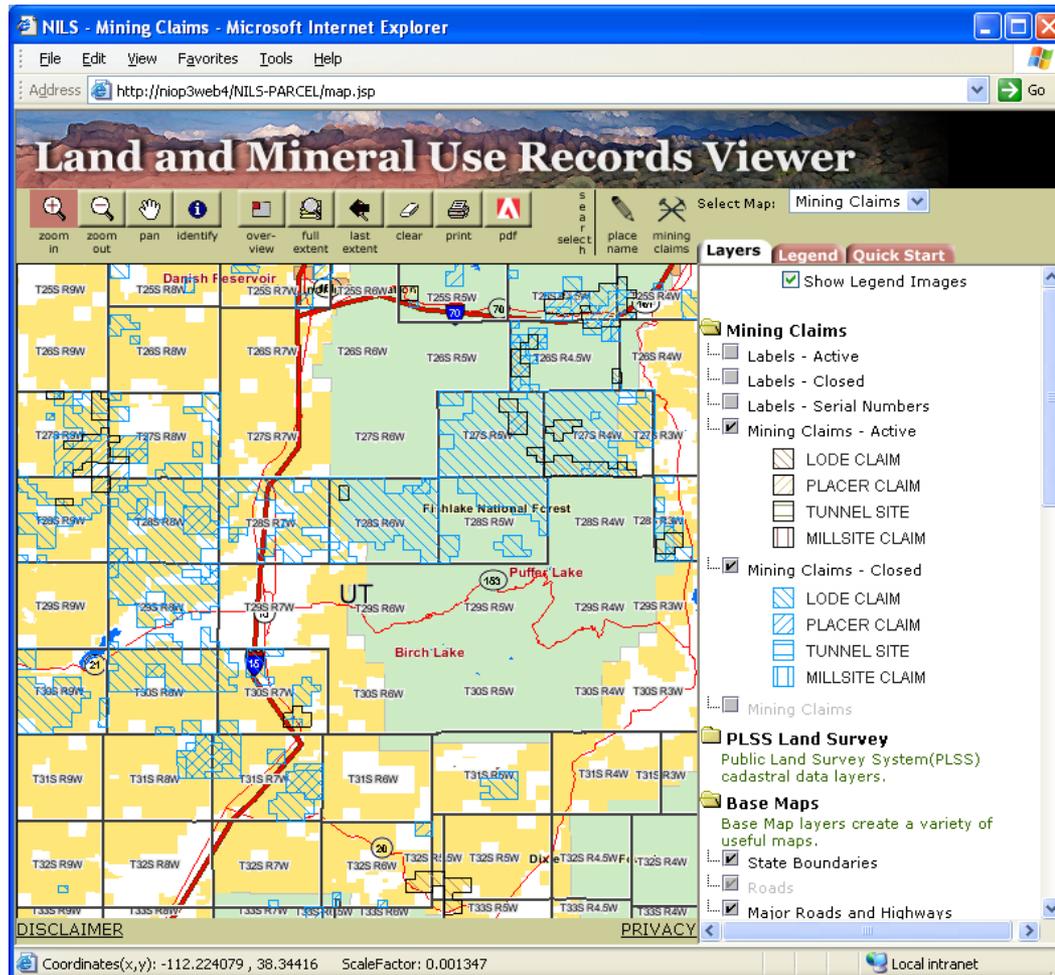
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This site uses **cookies** .

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# Land & Mineral Use Records Viewer

- Mining claims - Oil & Gas leases



# NILS Mining Claims

- Display claims by type
- Display active or closed claims
- Label with claim name or serial number
- Display with reference themes:
  - survey, roads, topographic map, orthophoto
- Links directly to LR2000 reports

# View Land Records in Context with Other Spatial Reference Themes

**Nils - Mining Claims - Microsoft Internet Explorer**

Address: <http://www.geocommunicator.gov/NILS-PARCEL/>

## Land and Mineral Use Records Viewer

Select Map: Mining Claims

Tools: zoom in, zoom out, pan, identify, overview, full extent, last extent, clear, print, pdf, search, place name, mining claims

**Layers** Legend Quick Start

- Shaded Relief
- USGS Topos
- Ortho Aerial Photography
- Surface Management Agency
  - BLM Lands
  - National Forests
  - National Parks
  - BLM National Monument
  - BLM
  - BLA
  - BOR
  - DOD
  - FWS
  - TVA
  - OTHER

DISCLAIMER

Coordinates(x,y): -112.855466 , 38.785298 ScaleFactor: 0.000232

Internet

# Links with LR2000

NILS - Mining Claims - Microsoft Internet Explorer

Address: <http://niop3web4/NILS-PARCEL/map.jsp>

## Land and Mineral Use Records Viewer

Identify Parcels - Microsoft Internet Explorer

Mining Claims 20 features found

Zoom	Select	Reports	Case ID	Serial #	Claim Name	Type	Disposition	Date of Recordation	Date of Location	Commodity
zoom	<input type="checkbox"/>	LR2000 SRP	3239638	UMC200910	PLACID NO. 1	Placer	Closed	11/8/1979	09/20/1979	
zoom	<input type="checkbox"/>	LR2000 SRP	3479130	UMC200912	PLACID NO. 3	Placer	Closed	11/8/1979	09/20/1979	
zoom	<input type="checkbox"/>	LR2000 SRP	3544751							
zoom	<input type="checkbox"/>	LR2000 SRP	3565823							
zoom	<input type="checkbox"/>	LR2000 SRP	3650281							
zoom	<input type="checkbox"/>	LR2000 SRP	3655234							
zoom	<input type="checkbox"/>	LR2000 SRP	3689364							
zoom	<input type="checkbox"/>	LR2000 SRP	3711116							
zoom	<input checked="" type="checkbox"/>	LR2000 SRP	3751296							
zoom	<input type="checkbox"/>	LR2000 SRP	3752137							
zoom	<input type="checkbox"/>	LR2000 SRP	3757407							
zoom	<input type="checkbox"/>	LR2000 SRP	3782455							
zoom	<input type="checkbox"/>	LR2000 SRP	3807021							
zoom	<input type="checkbox"/>	LR2000 SRP	3874850							
zoom	<input type="checkbox"/>	LR2000 SRP	4365854							
zoom	<input type="checkbox"/>	LR2000 SRP	4428582							
zoom	<input type="checkbox"/>	LR2000 SRP	4761254							
zoom	<input type="checkbox"/>	LR2000 SRP	5215059							
zoom	<input type="checkbox"/>	LR2000 SRP	5237652							
zoom	<input type="checkbox"/>	LR2000 SRP	5261951							

Coordinates(x,y): -112.618079 , 38.523747 ScaleFactor: 0.000353

http://nirm0rptdev.corp.blm.gov/ods-nasapi/ods.ods?Method=login&Username=tpuser&Password=tpuser - Microsoft Internet Explorer

Serial Register Page

DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
MINING CLAIMS  
(LIVE) Serial Register Page

RunDate/Time: 07/08/04 03:03 PM

01 05-10-1872-017STAT0091:30USC26,28,34

Case Type 384101: LODE CLAIM

Claim Name: PLACID NO. 9

Commodity :

Case Disposition: CLOSED

Serial Number UMC200918

Name & Address	Int Rel	% Intere
HANSEN SPENST M 130 ELM AVE REXBURG, ID 83440	OWNER	100.0000000

Mer Twp	Rng	Se	Quadrant	District/Resource	County
26	0270S	0080W	012 NW	CEDAR CITY FIELD OFFICE	BEAVER

Act Date	Code	Act:	Action Remarks	Receipt Number
09/20/1979	403	LOCATION DATE		
11/08/1979	395	RECORDATION NOTICE RECD		
09/22/1981	480	EVID OF ASSMT FILED	1981	
08/14/1995	885	CASE DESTROYED		
05/15/1988	631	ABANDONMENT CLAIM VOID	LOCKE	
11/08/1979	500	MAP IN LEAD FILE	UMC200909	
11/08/1979	501	ACCT ADV IN LEAD FILE	UMC200909	
10/19/1979	404	COUNTY RECORDATION	136647:159:254	

Ready Zoom: 115% Internet

# Allows Searching...

NILS - Mining Claims - Microsoft Internet Explorer

Address: http://niop3web4/NILS-PARCEL/map.jsp

## Land and Mineral Use Records Viewer

Tools: zoom in, zoom out, pan, identify, over-view, full extent, last extent, clear, print, pdf, search, select h, place name, **mining claims**, Layers, Legend, Quick Start

Coordinates(x,y): -112.618079 , 38.523747 ScaleFactor: 0.000353

Mining Claim Search - Microsoft Internet Explorer

### MINING CLAIM SEARCH

Claim Name:  Date of Location: (YYYY-MM-DD)

Case ID:  Start Date:

Serial #:  End Date:

Dispositon:  Date of Recordation: (YYYY-MM-DD)

Type:  Start Date:

End Date:

claim\_name LIKE 'LADY%' and date\_of\_location BETWEEN (ts '1986-06-10') and (ts '1987-06-10') Number of features found: 6

Zoom	Select	Reports	Case ID	Serial#	Claim Name	Type
zoom	<input type="checkbox"/>	LR2000 SRP	56966	ORMC91129	LADY SLIPPER 2	Placer
zoom	<input type="checkbox"/>	LR2000 SRP	718899	ORMC91128	LADY SLIPPER 1	Placer
zoom	<input type="checkbox"/>	LR2000 SRP	593471	IMC120445	LADY GAMBLER	Load
zoom	<input type="checkbox"/>	LR2000 SRP	5041805	CAMC186845	LADY FRACTION	Load
zoom	<input type="checkbox"/>	LR2000 SRP	4309214	CAMC189271	LADY DI	Placer
zoom	<input type="checkbox"/>	LR2000 SRP	2954164	AMC269302	LADY BUG	Load

Local intranet

# Direct Link with LR2000



NILS - Mining Claims - Microsoft Internet Explorer

Address: <http://niop3web4/NILS-PARCEL/map.jsp>

## Land and Mineral Use Records Viewer

zoom in zoom out pan identify over-view full extent last extent clear print pdf select place mining claims

Select Map: Mining Claims

Layers Legend Quick Start

Show Legend Images

- Mining Claims
  - Labels - Active
  - Labels - Closed
  - Labels - Serial Numbers
  - Mining Claims - Active
    - LODGE CLAIM
    - PLACER CLAIM
    - TUNNEL SITE
    - MILLSITE CLAIM
  - Mining Claims - Closed
    - LODGE CLAIM
    - PLACER CLAIM
    - TUNNEL SITE
    - MILLSITE CLAIM
- PLSS Land Survey
  - Public Land Survey System (PLSS) cadastral data layers.
- Base Maps
  - Base Map layers create a variety of useful maps.
  - State Boundaries

DISCLAIMER PRIVACY

Coordinates(x,y): -112.618079 , 38.523747 ScaleFactor: 0.000353 Local intranet

http://nirm0nils.corp.blm.gov/ods.nsap/ods.ods?Method=logIn&Username=Internetuser&Password=Int - Microsoft Internet Explorer

Address: <http://nirm0nils.corp.blm.gov/ods.nsap/ods.ods?Method=logIn&Username=Internetuser&Password=Internetuser&HTT>

File View Tools Help

### Serial Register Page

Sections: Main, Serial, Banner

DEPARTMENT OF THE INTERIOR  
BUREAU OF LAND MANAGEMENT  
MINING CLAIMS  
(MASS) Serial Register Page

RunDate/Time: 05/17/04 09:00 AM Page: 1 of 1

01 05-10-18720175TA10091;30USC26,28,34 Serial Number  
Case Type: 38410: LODGE CLAIM CMC112141  
Commodity:  
Claim Name: SPRE  
Case Disposition: CLOSED

Name & Address Int. Pr. & Interest  
MOUNT EMMONS MNG CO PO BOX 579 CRESTED BUTTE, CO 81: OWNER \*\*\*\*\*

County/Stat District  
GUNNISON County, CO MONTROSE

Mer Twp. Rng Sec Subdiv  
06 01305 0860W NW

Act. Dat.	Code	Action	Tex	Action	Remark	Receipt Num
07/05/197	403	LOCATION DATE				
09/20/197	395	RECORDATION NOTICE RECD				
10/14/199	488	EVTD OF ASSMT FILED			1997	
07/17/199	163	CASE SENT TO NARA			DEN-049-95-0096:	
08/31/199	831	ABANDONMENT CLAIM VOID				
12/06/199	170	ADDRESS CHANGE FILED			MOUNT EMMONS MNG CO	
12/12/198	170	ADDRESS CHANGE FILED			MOUNT EMMONS MINING	
09/20/197	501	ACCT ADP IN LEAD FILE			112115-112141	

Line No. Remarks

Ready Zoom: 100% To view reports on full screen

