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

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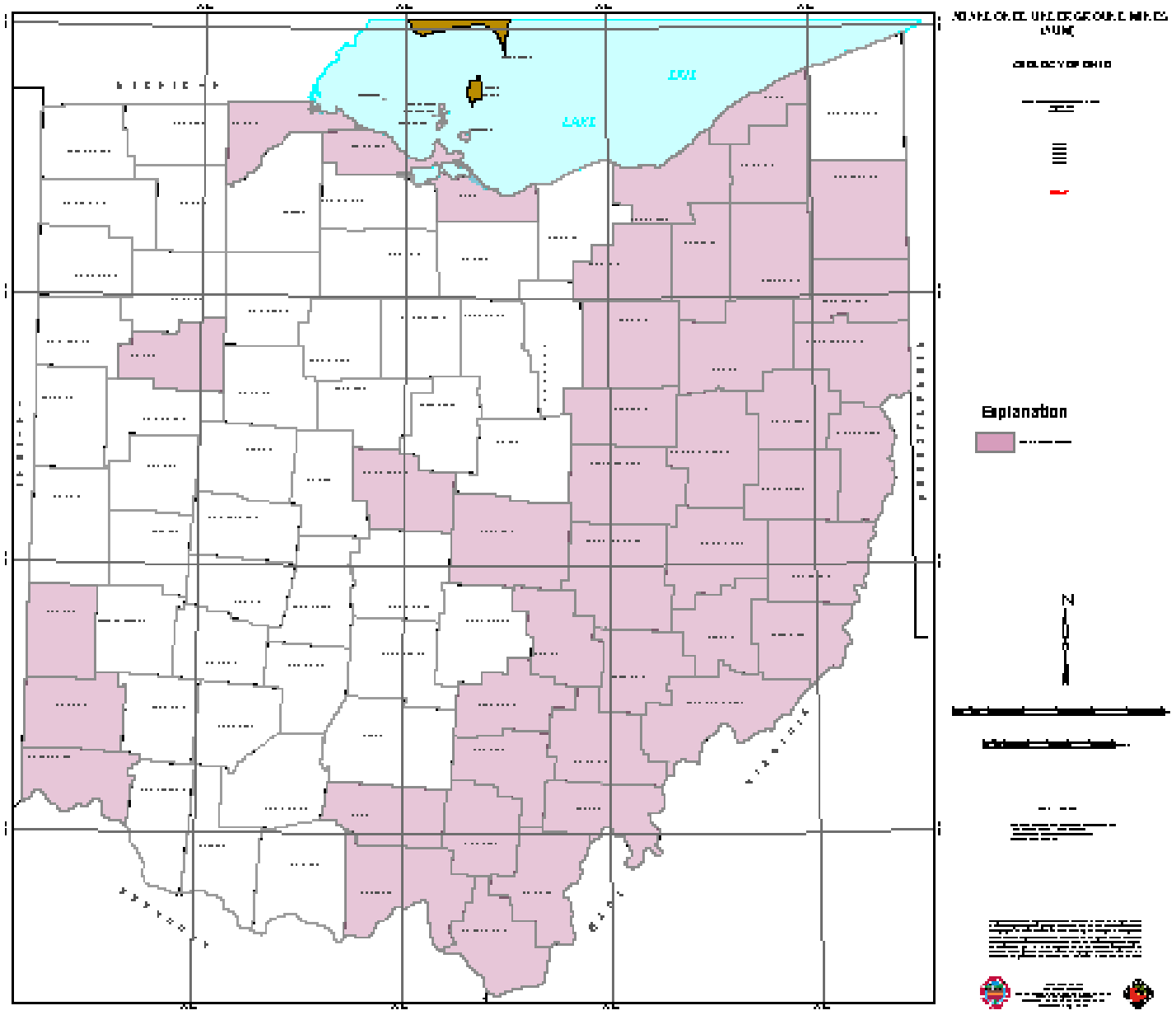
Energy Resources Group

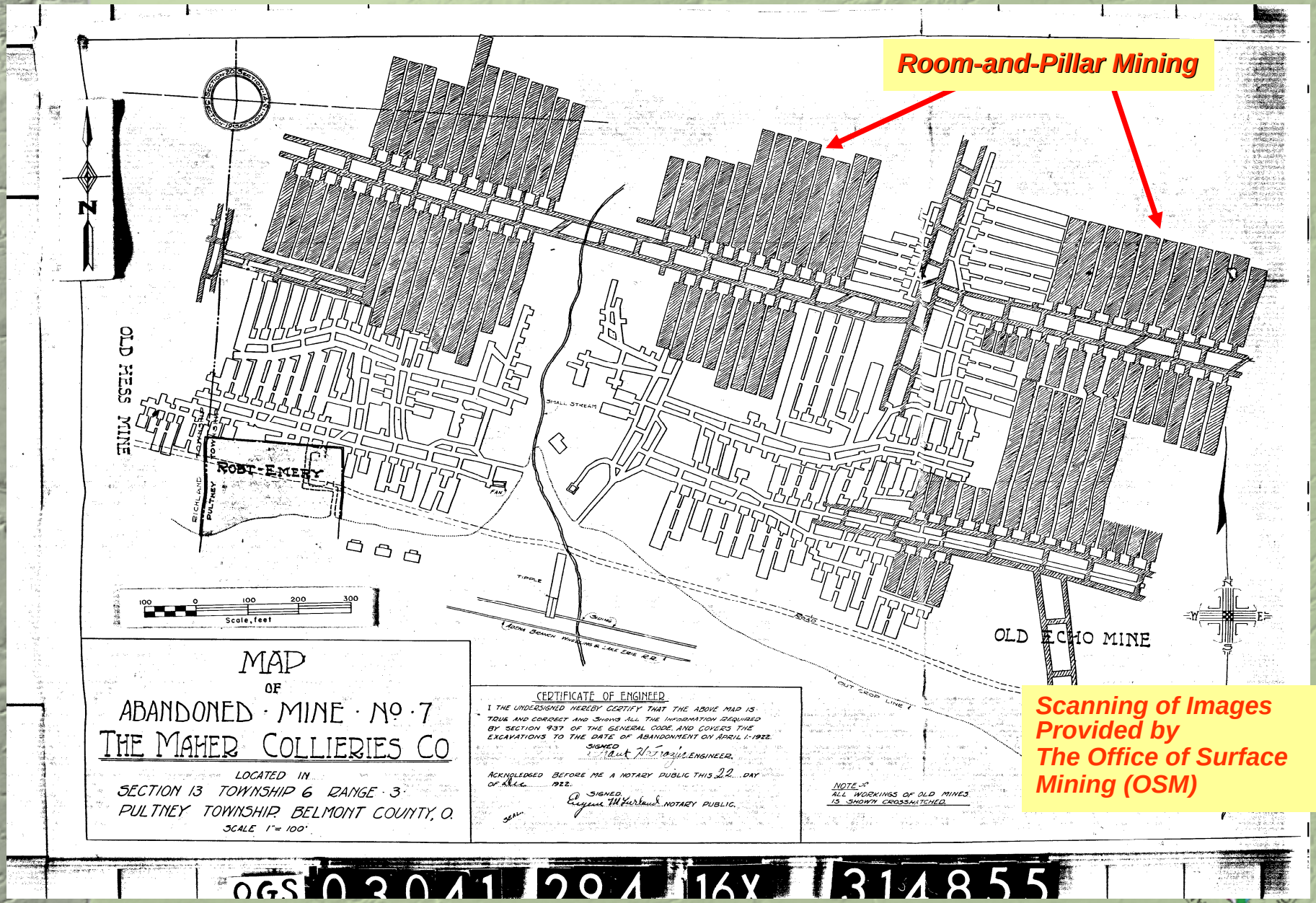
Ohio Division of Geological Survey

State of Ohio Counties with known AUM's



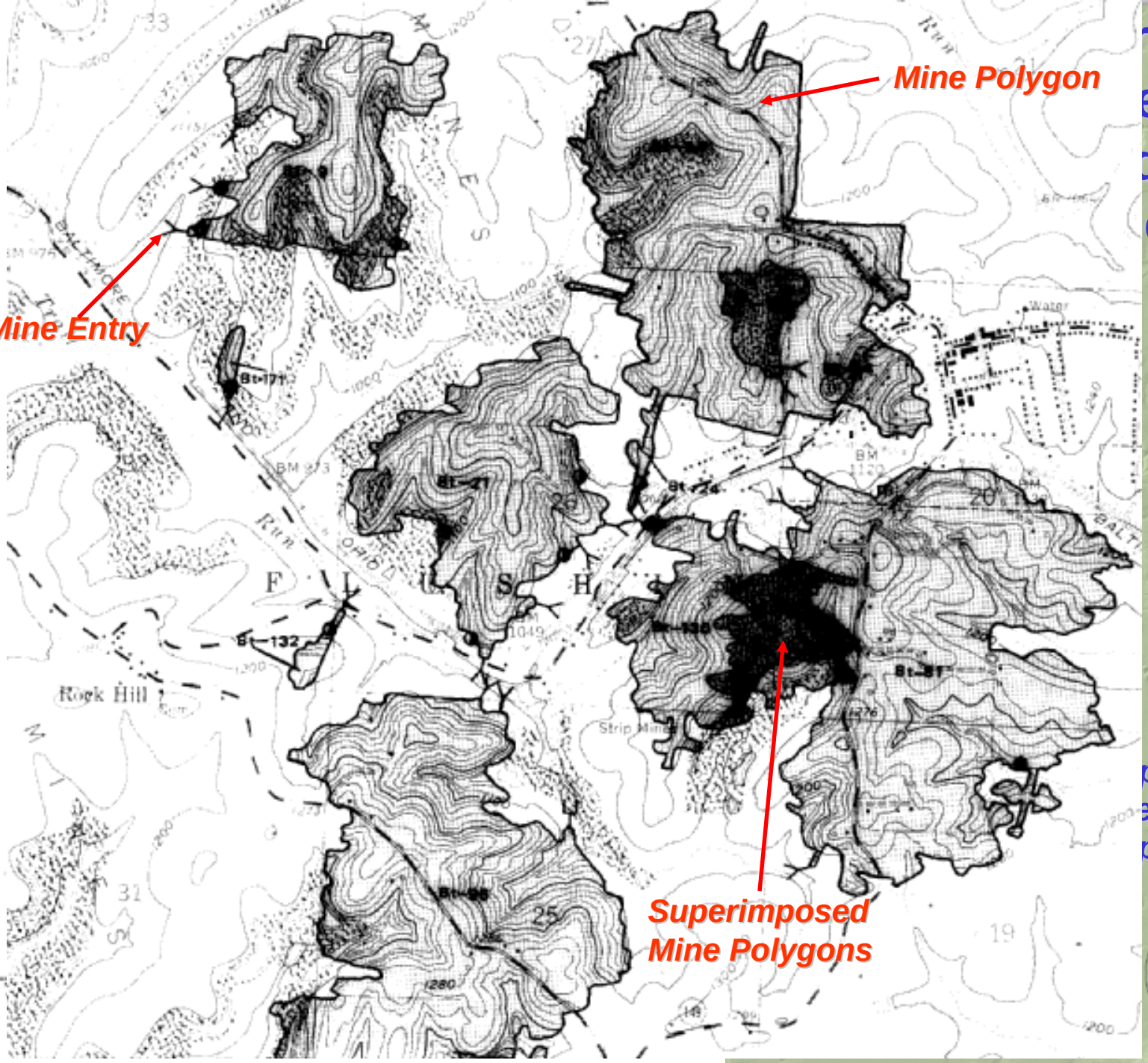
43 Counties with AUM's

Scanned Image of Abandoned Underground Detailed Mine Map



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

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



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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

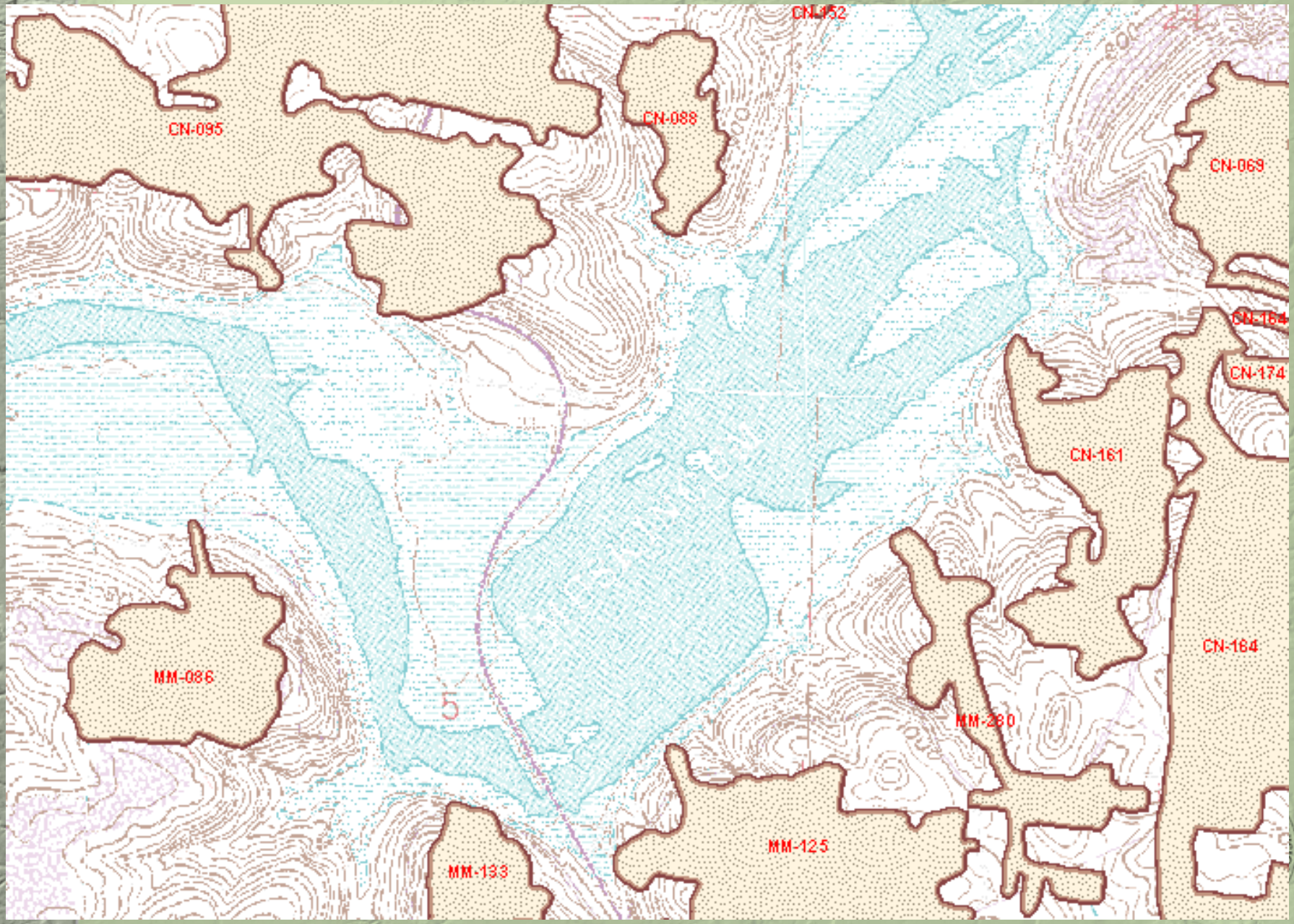
Annual Mine Map date(s)

☐ 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



ANNUAL MINE MAP DATA SHEET

AND TO

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AUM Opening 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

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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

DATA SHEETS TO DATABASES

Record: 1 of 2144

Form View

NUM

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☐ Other

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)

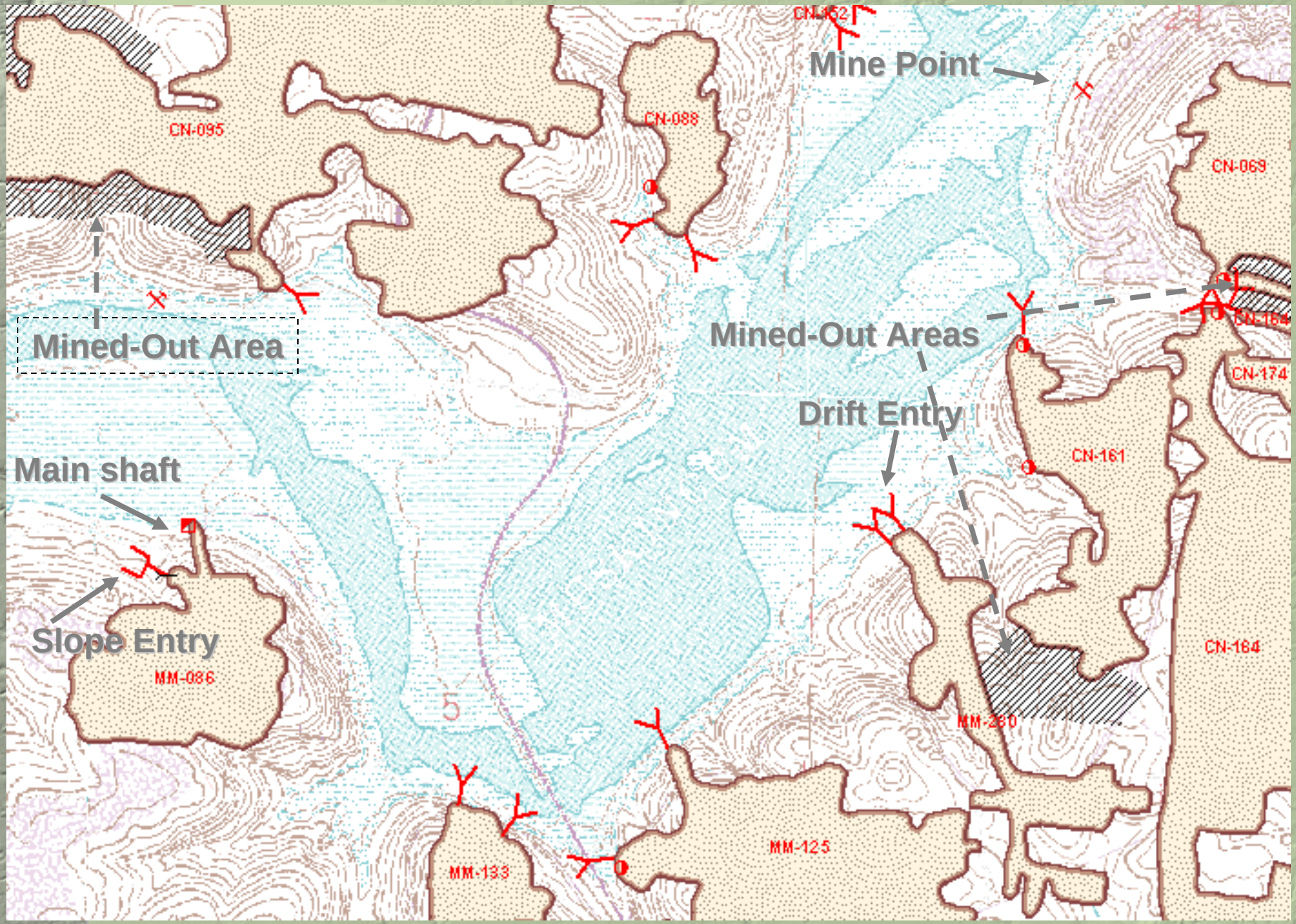
7-10 – individual feature ID

11-12 51 – Coal-core and strat holes – NCRDS
52 – AUM data

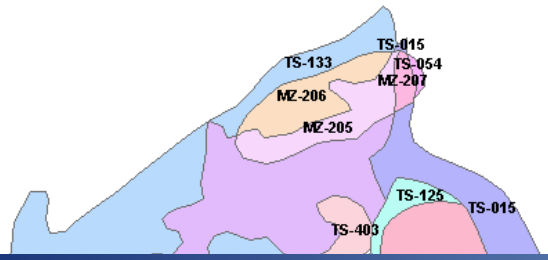
13-14 01 – mine poly
02 – mine points
03 – hachured poly

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

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



Issues with Over-lapping 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

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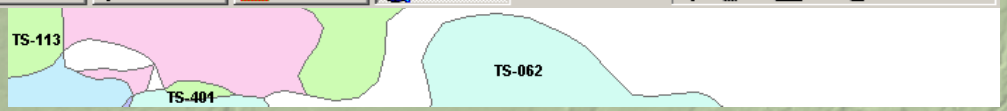
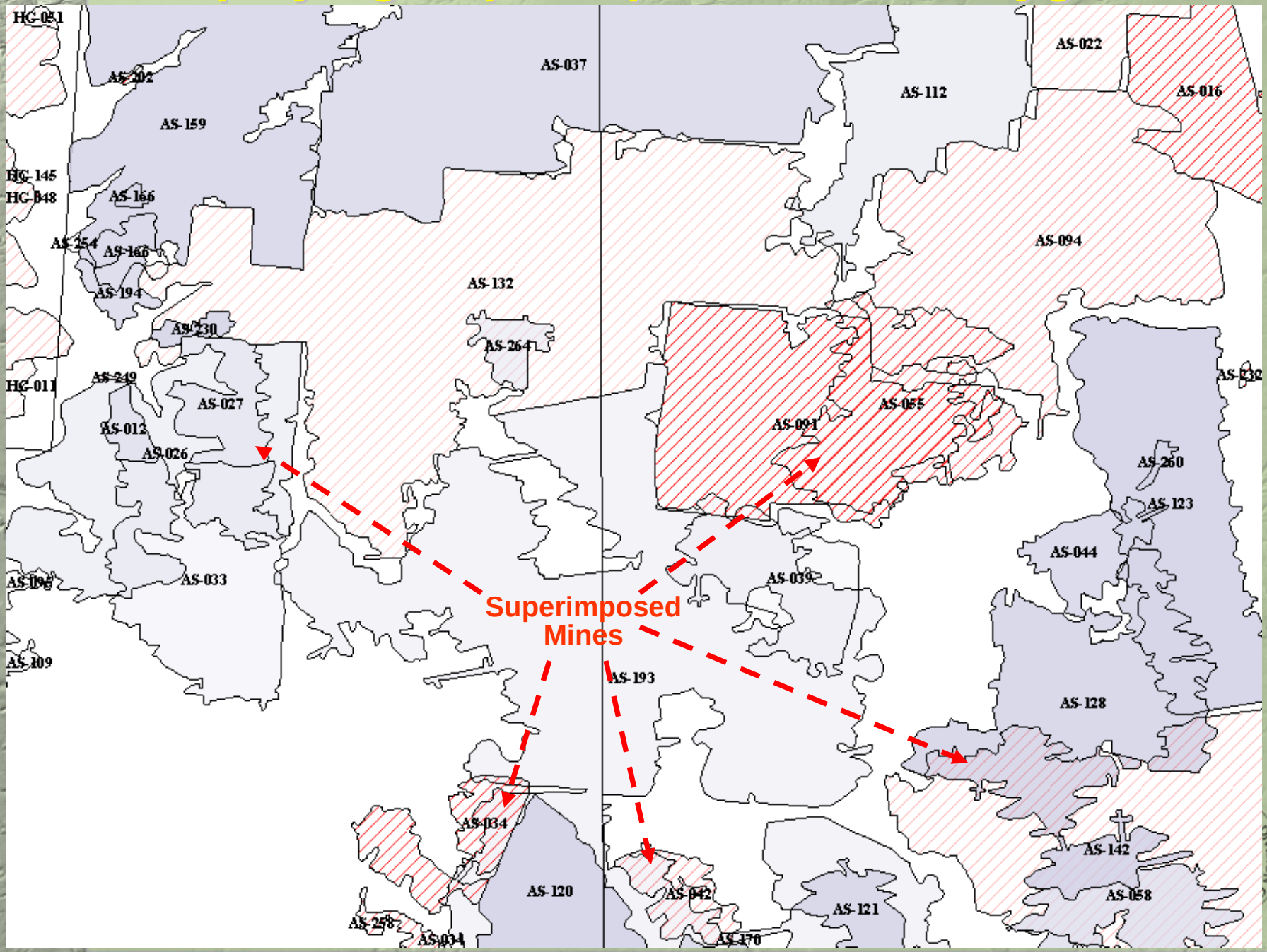
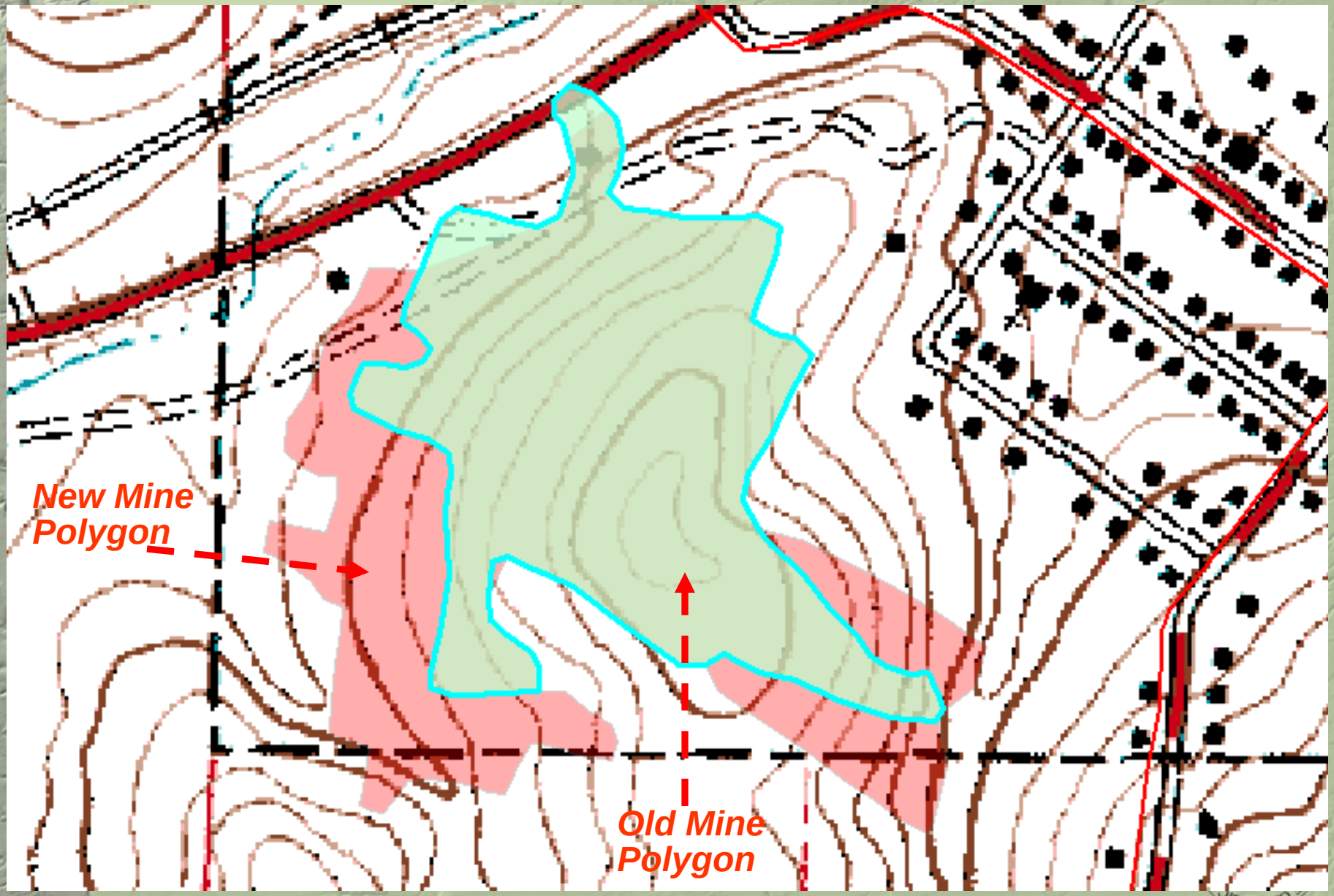


Displaying Superimposed Mine Polygons

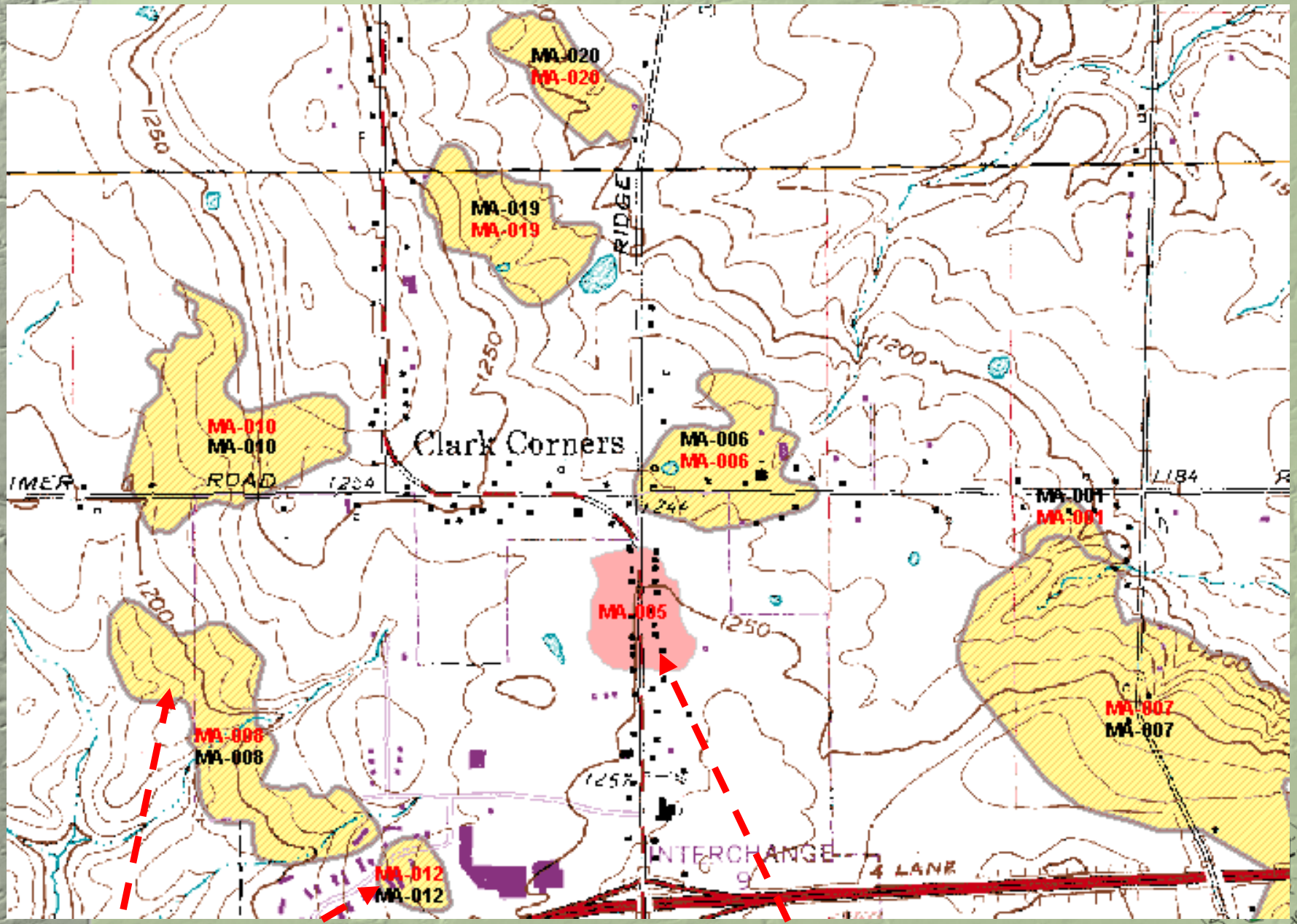


Re-Digitizing Mine Polygons



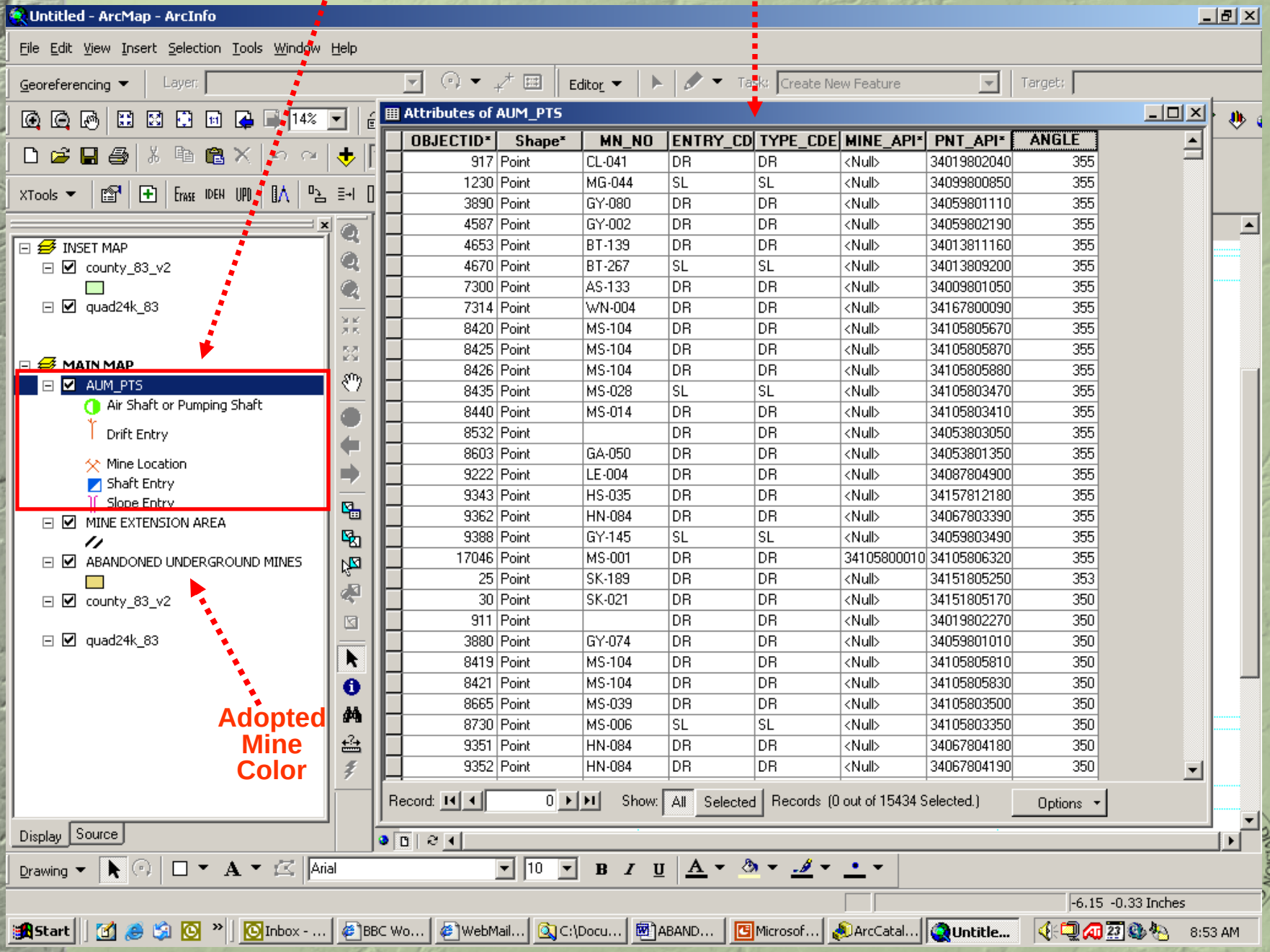
HN-002, Bowerston Quadrangle, Ohio

Addition of Mine Polygons



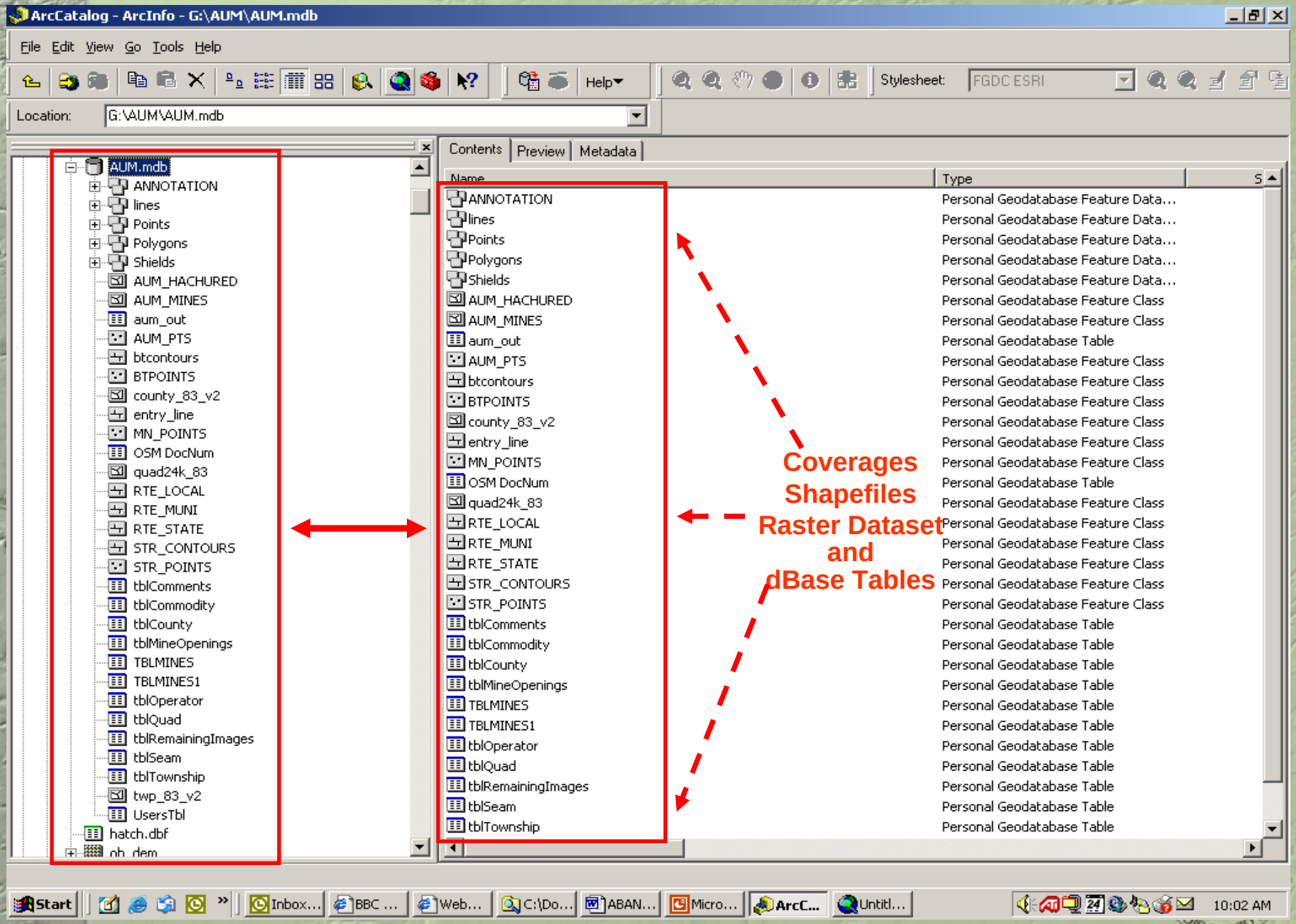
The New
AUM Feature Classes,
Geodatabase,
and
Data Storage

AUM Points Symbology and Feature Class Attribute Table



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 New AUM Personal Geodatabase



A Single Data Repository !!!

The AUM Maps

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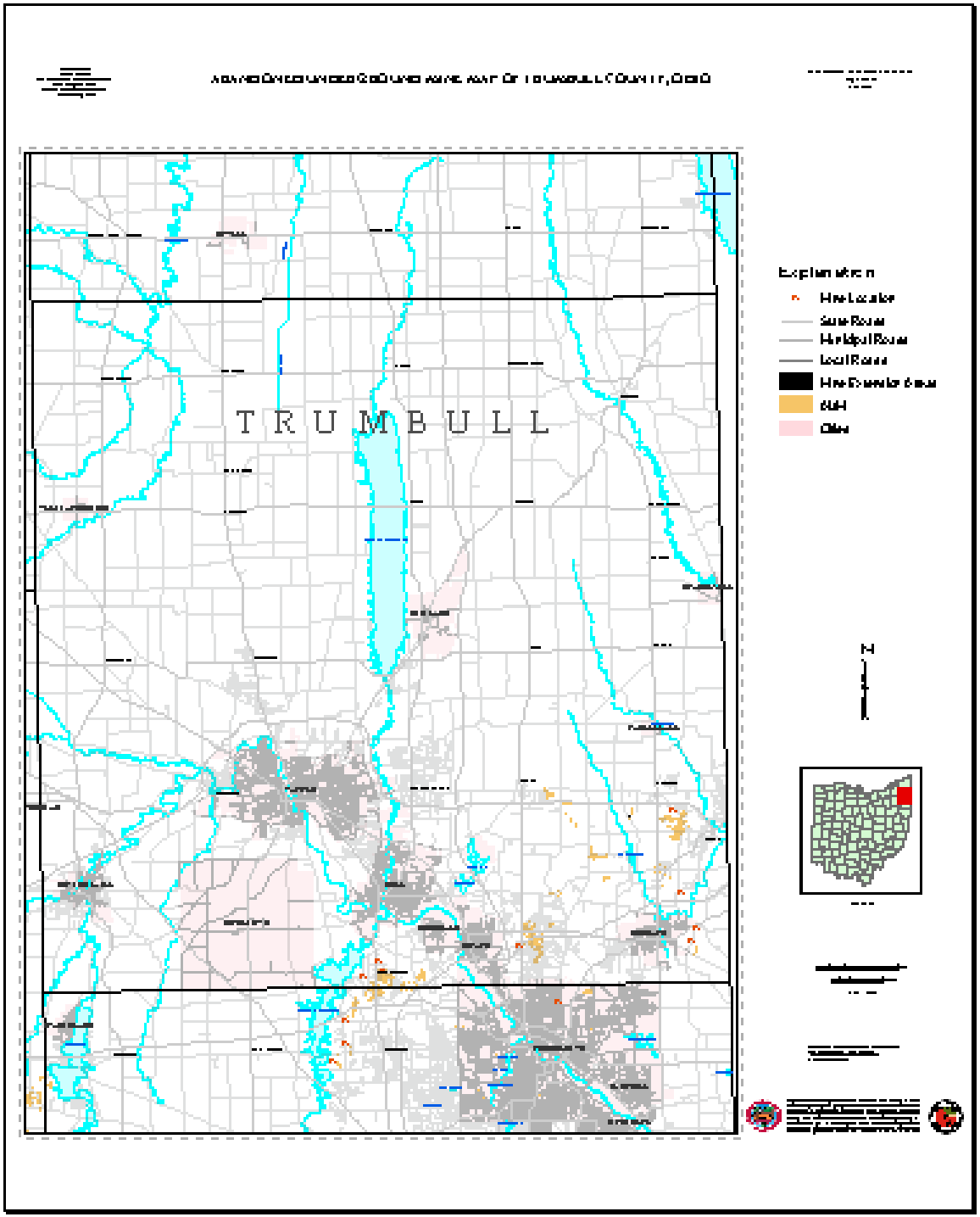

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and
Landscape

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.

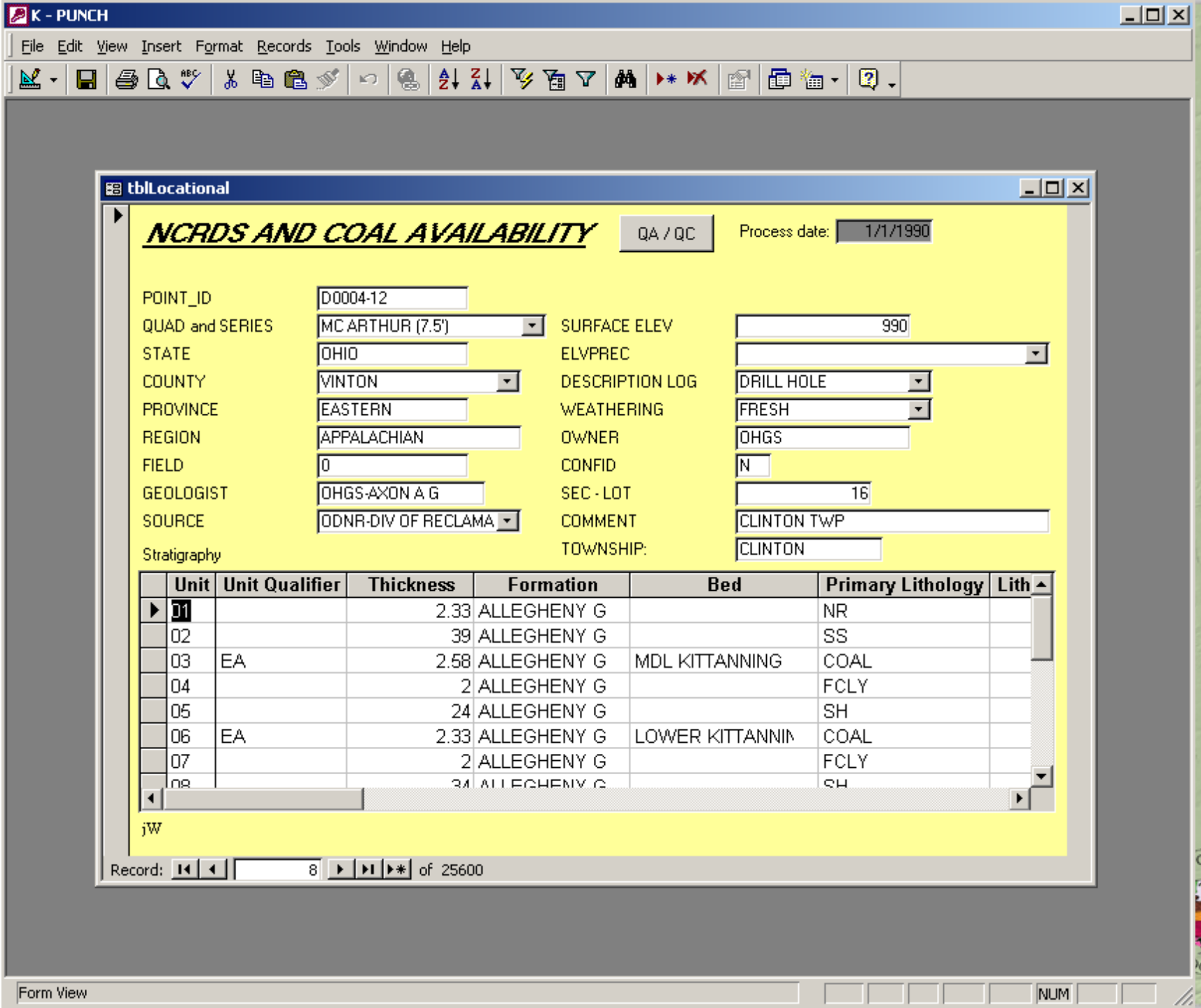
- **Continued Multi-agency Cooperative projects**:
  - Field mapping and data collection (GPS data) of mine subsidence-incidence information. Predictive modeling.

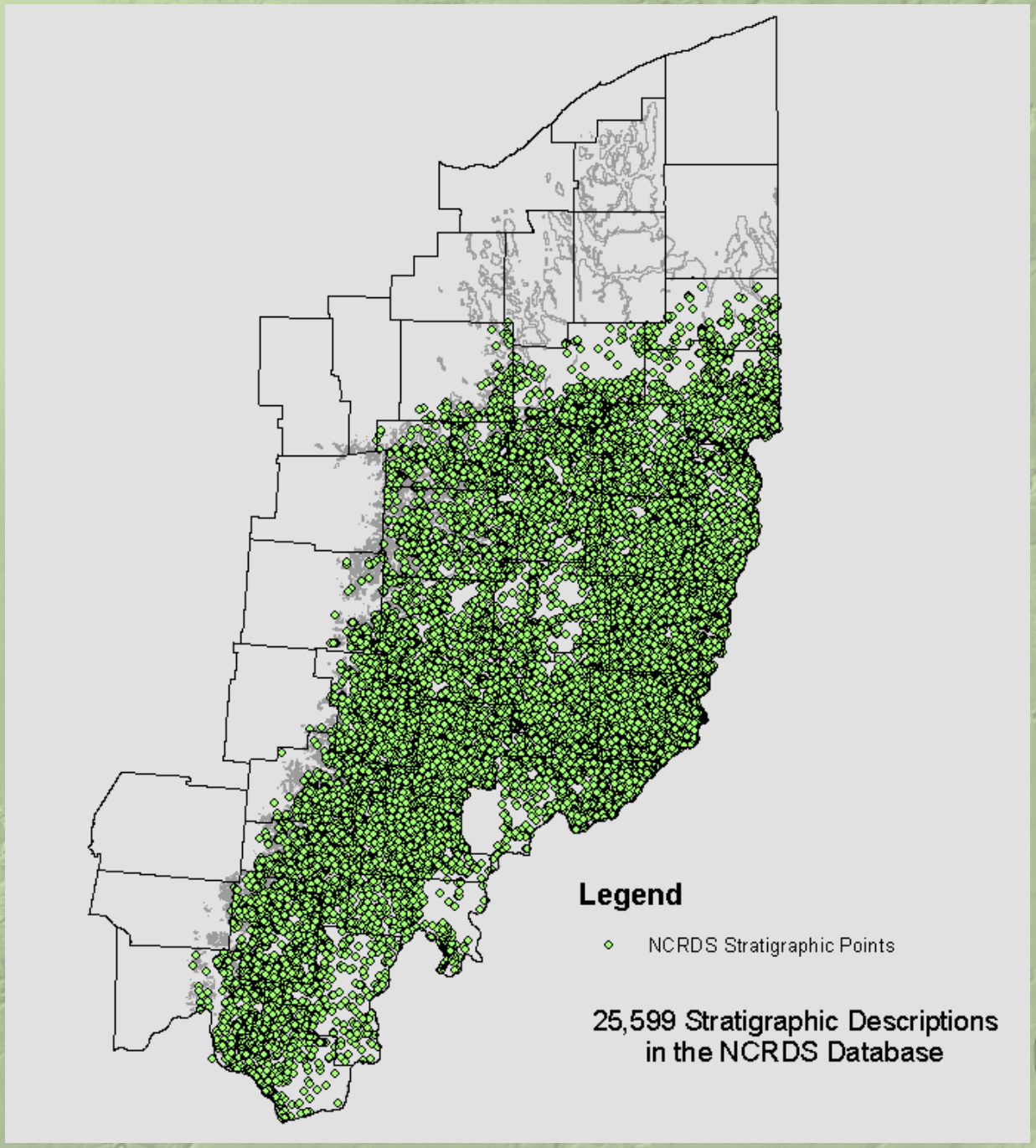
  - Geo-referencing and rectification of all AUM map images (TIFF images). Make readily available to all.

  - Continue efforts to collect information on all mines – mapped or unknown.

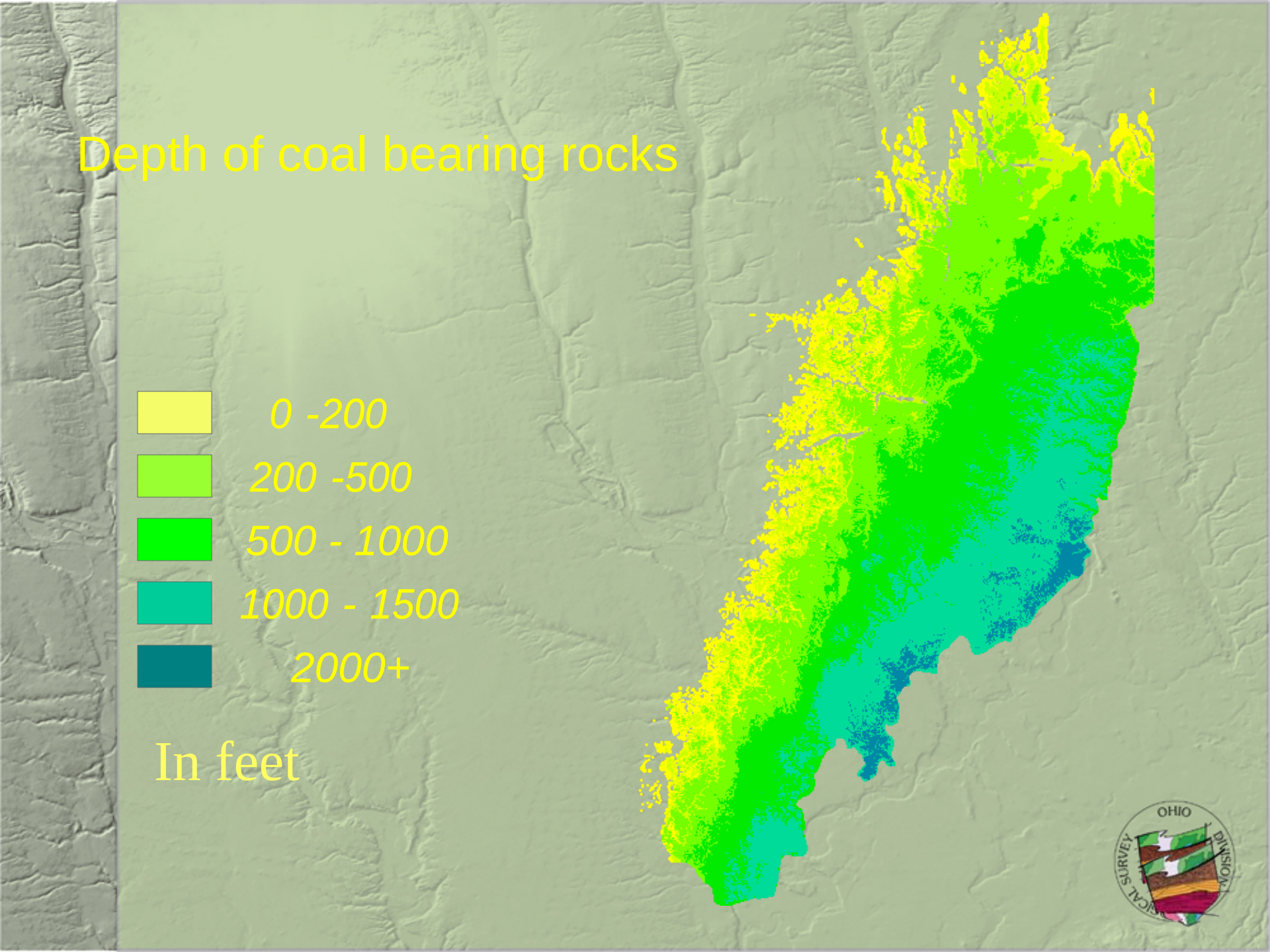
- **Upgrade quality of data on known mines.**
  - Associate NCRDS points with mines. Additional control from O&G wells.
  - Use coal maps to augment mine info.

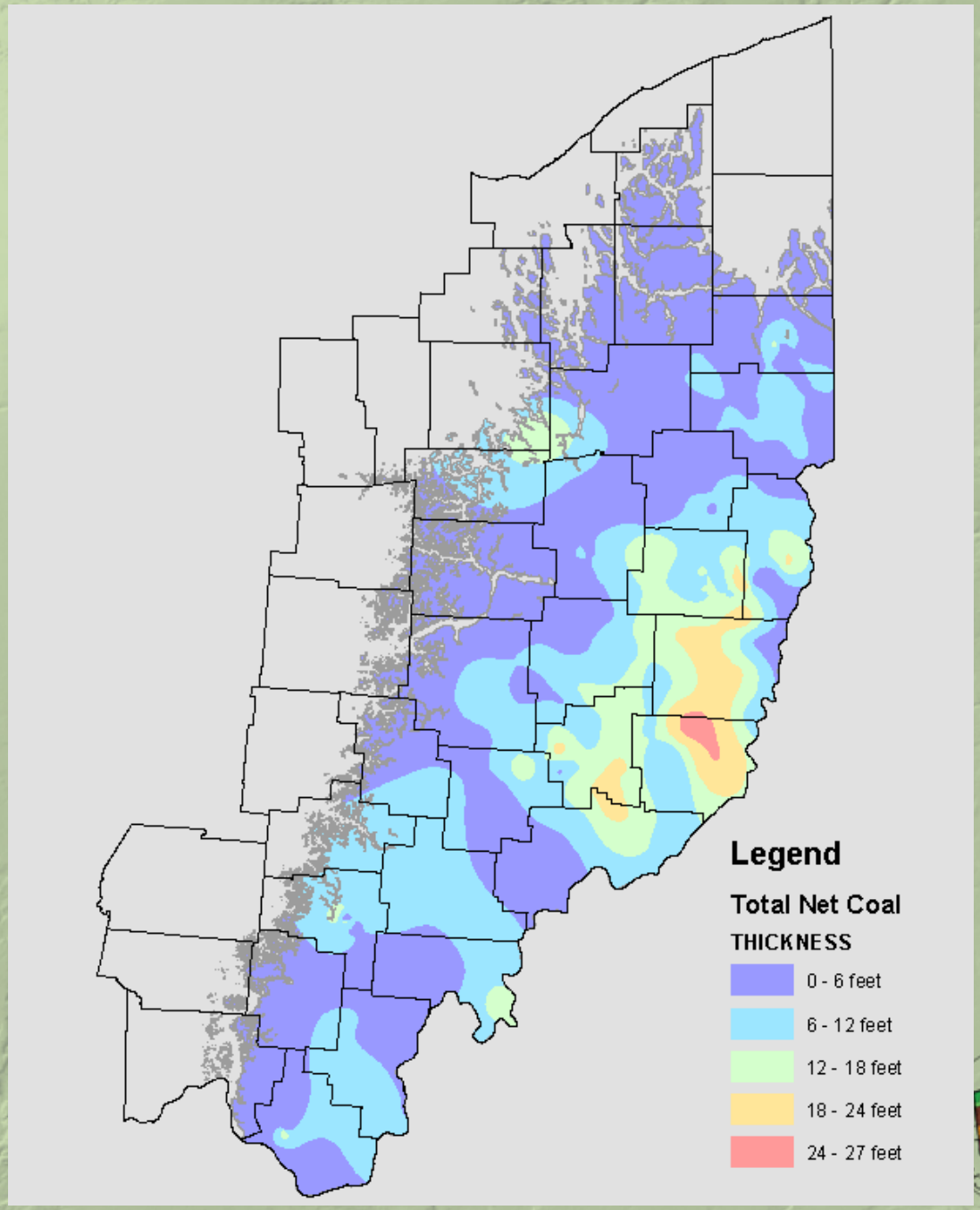
- **Keep interactive website relevant and up-to-date.**


K - PUNCH
File Edit View Insert Format Records Tools Window Help
tblLocational
NCRDS AND COAL AVAILABILITY
QA / QC
Process date: 1/1/1990
POINT_ID D0004-12
QUAD and SERIES MC ARTHUR (7.5')
STATE OHIO
COUNTY VINTON
PROVINCE EASTERN
REGION APPALACHIAN
FIELD 0
GEOLOGIST OHGS-AXON A G
SOURCE ODNR-DIV OF RECLAMA
SURFACE ELEV 990
ELVPREC
DESCRIPTION LOG DRILL HOLE
WEATHERING FRESH
OWNER OHGS
CONFID N
SEC - LOT 16
COMMENT CLINTON TWP
TOWNSHIP: CLINTON
Stratigraphy
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
jW
Record: 8 of 25600
Form View
NUM

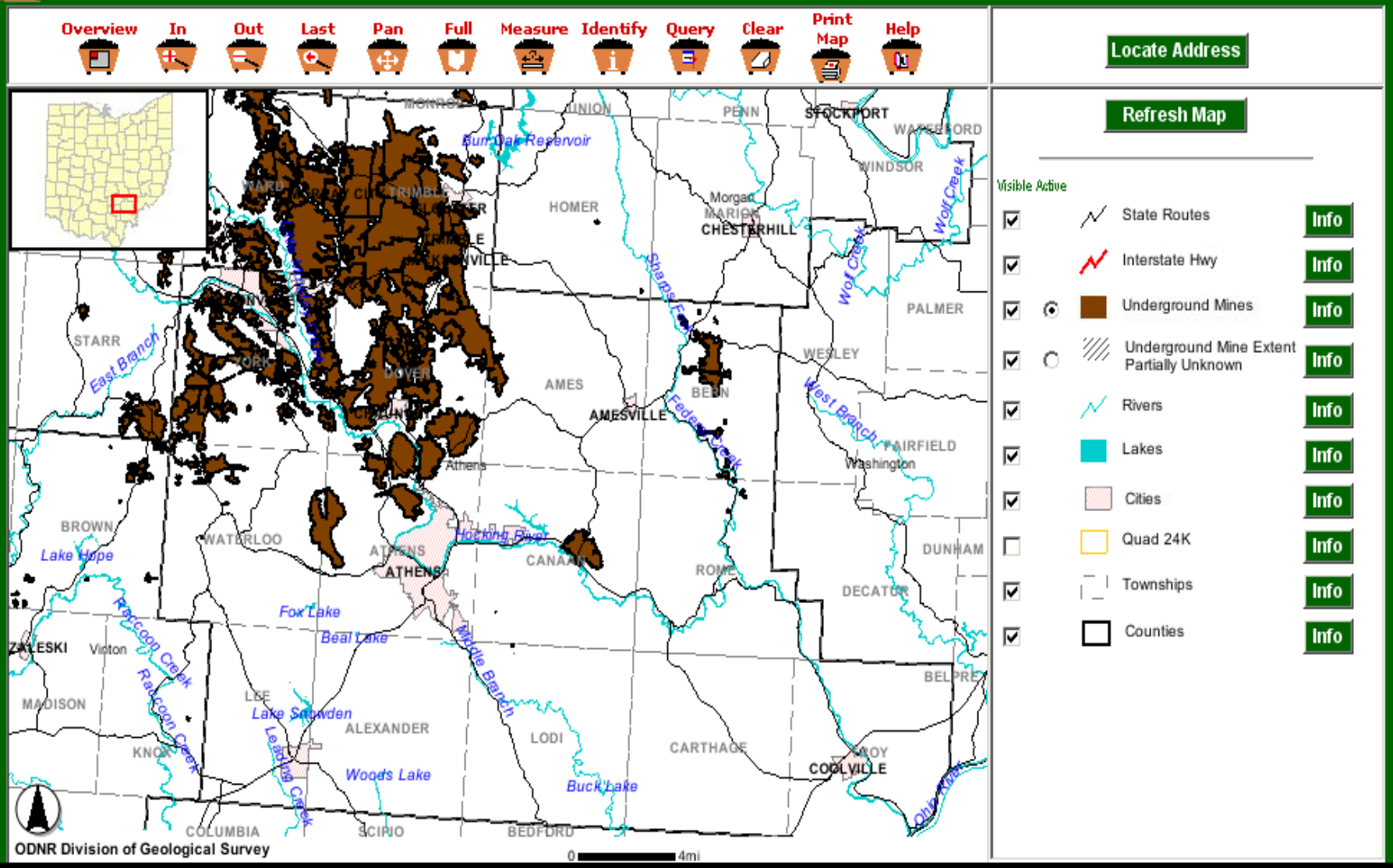

Legend
NCRDS Stratigraphic Points
25,599 Stratigraphic Descriptions
in the NCRDS Database

Depth of coal bearing rocks



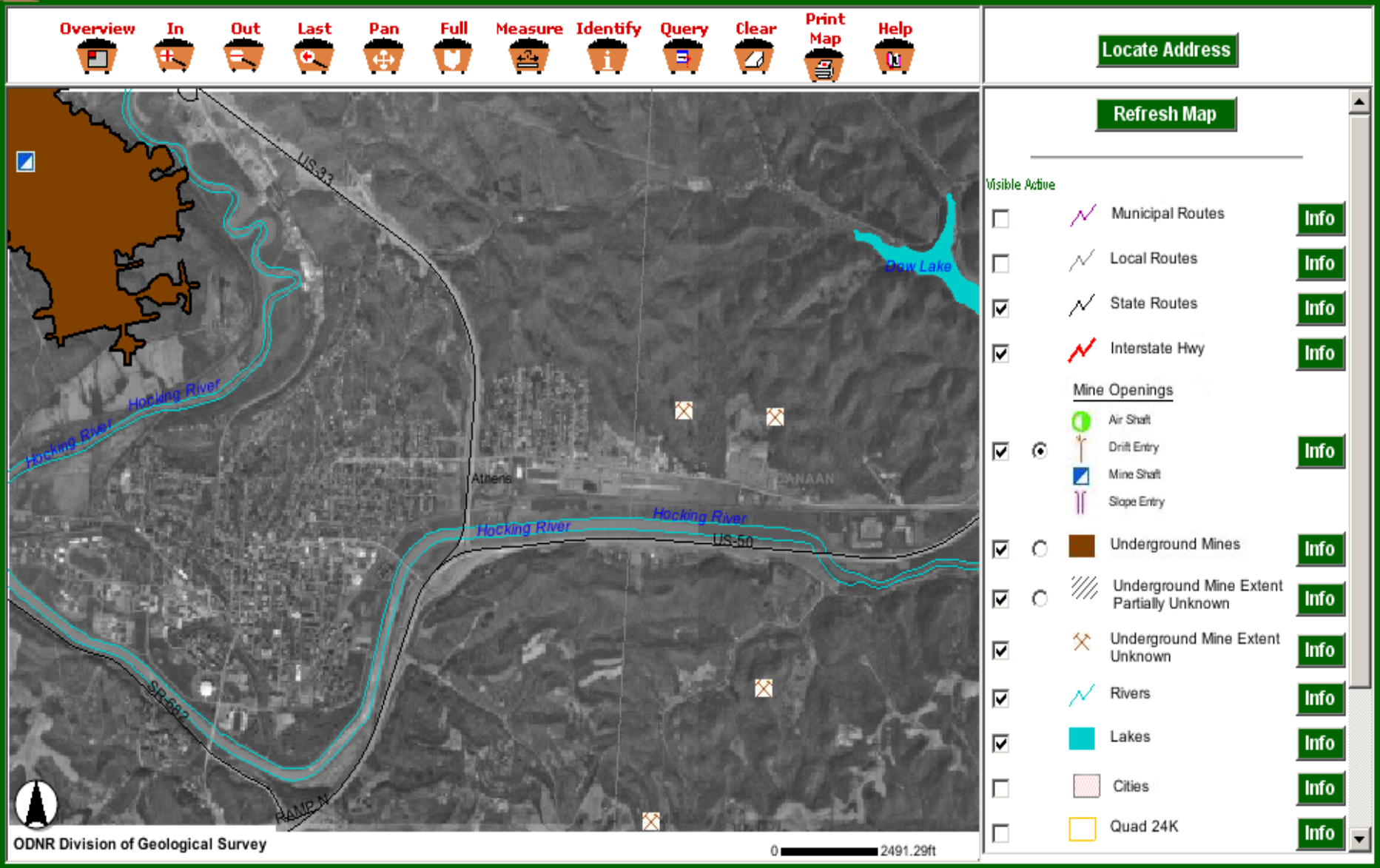

Legend
Total Net Coal
THICKNESS
0 - 6 feet
6 - 12 feet
12 - 18 feet
18 - 24 feet
24 - 27 feet

State of Ohio - Abandoned Underground Mine Locator



New Interactive Map Available at GeoSurvey Website: http://www.ohiodnr.com/geosurvey/
Then go to “Interactive Maps”

State of Ohio - Abandoned Underground Mine Locator



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

Contact Information

For database details:

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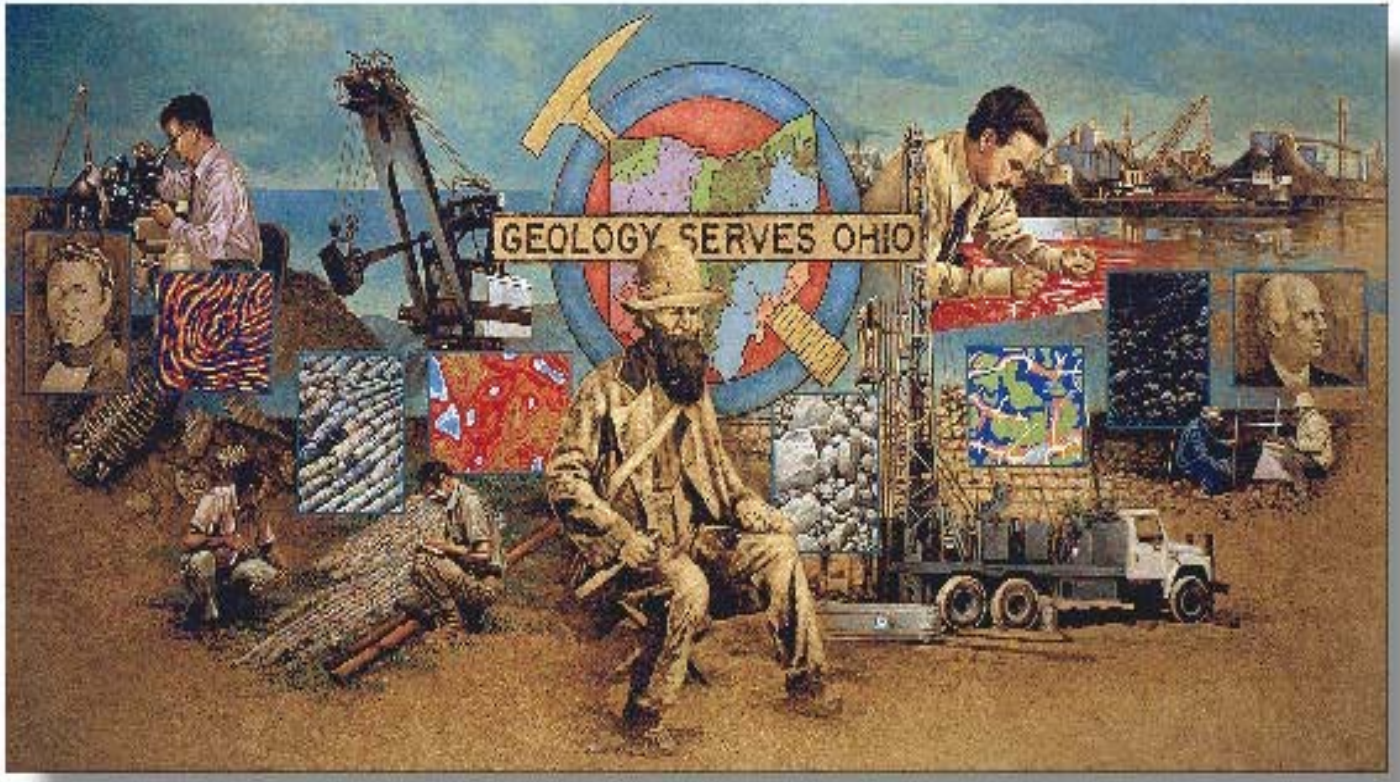
Ohio Division of Geological Survey
2045 Morse Rd., Columbus, Oh 43229
614-265-1030
joseph.wells@dnr.state.oh.us

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