A GIS application to collect in-house geologic information for evaluating mine subsidence

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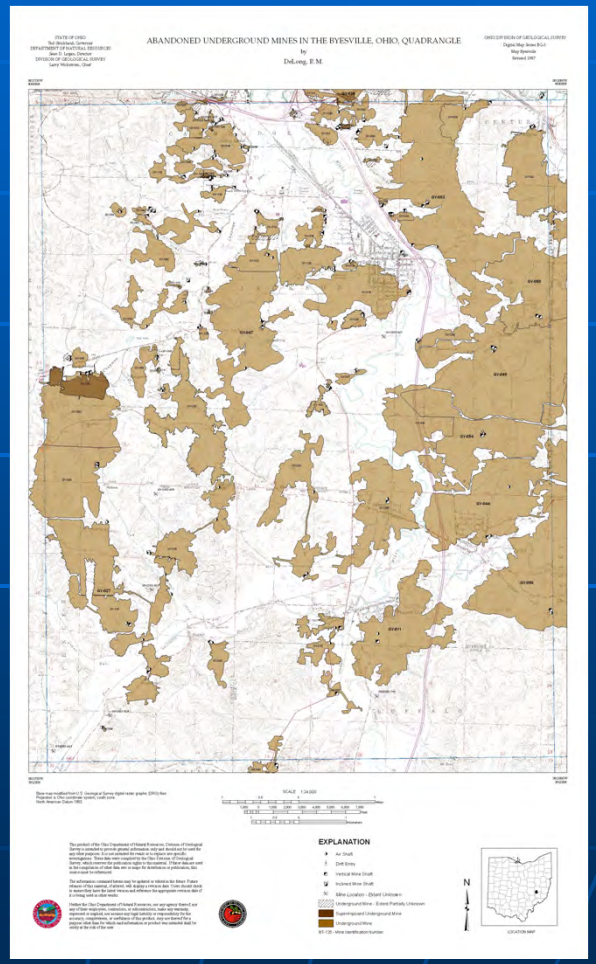
Outline

- Mapping of Abandoned Underground Mines (AUM) - Review
- New Geologic Datasets
- OMSIUA (MSI) Application
- Example site evaluation

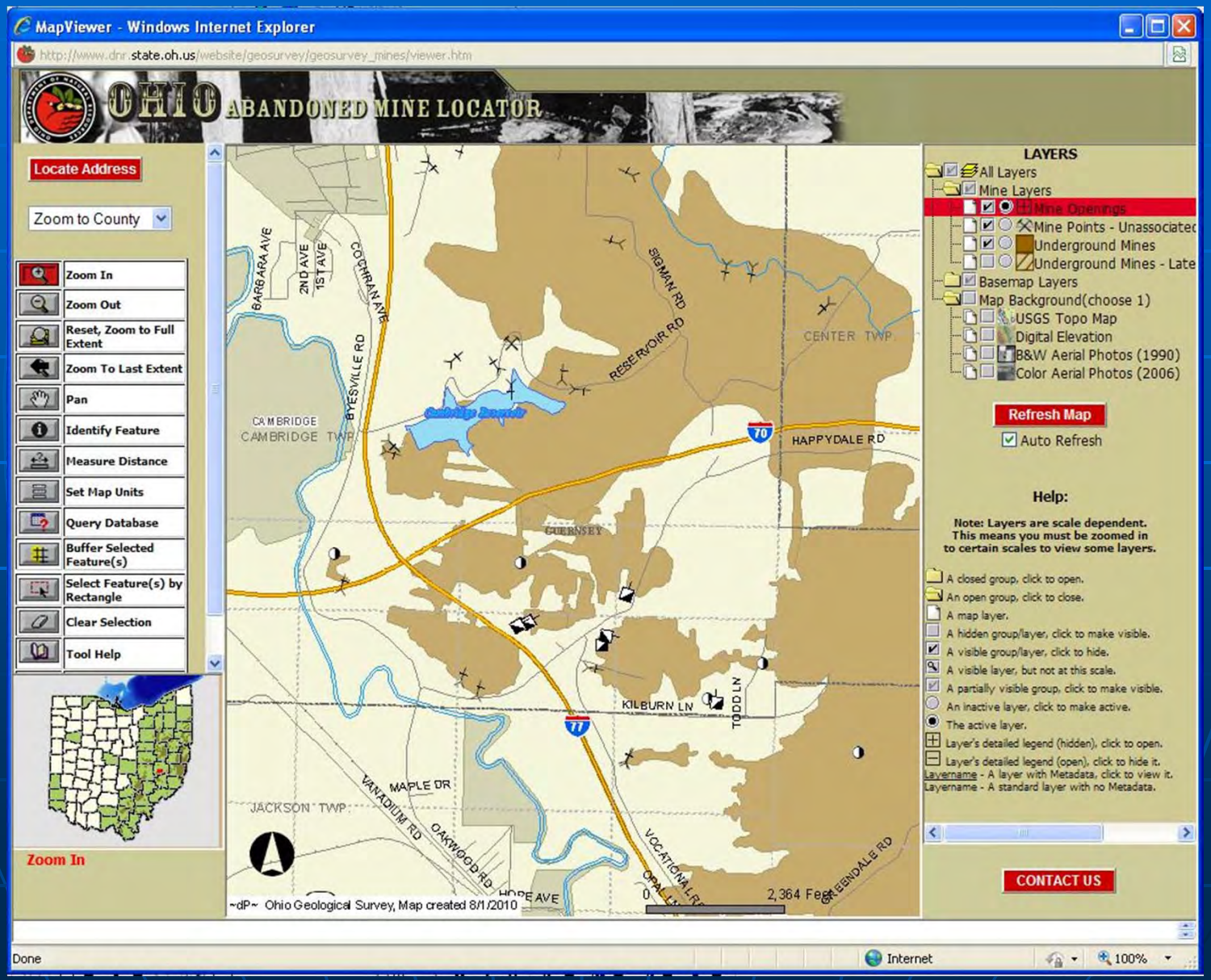
Mapping AUM

- Mapping began in 1969
  - Planimetric maps 1:62,500 scale
- Mapping at 1:24,000 scale
  - Started in 1977
  - 7.5-minute quadrangles
  - GIS Data Creation – 1995
- Internet Map Service – 2004

AUM Maps (1:24,000)



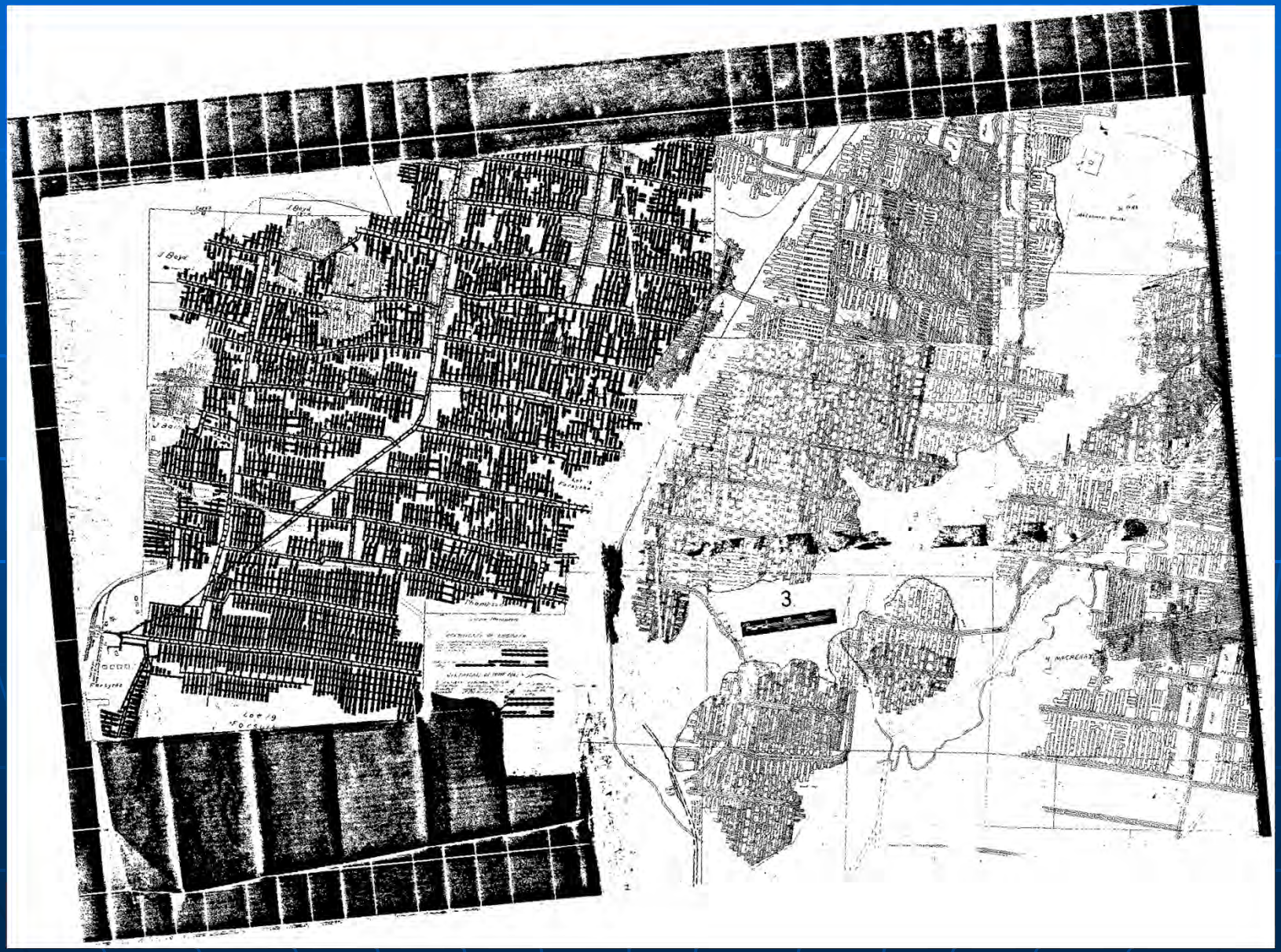
AUM Internet Map Service



New AUM Developments

- Low Resolution mine maps
  - Scanned at 72 dpi
  - Served out on the Internet Map Service – 2004
  - Georeferenced – 2009
- High Resolution Mine Maps
  - Scanning Completed – 400 dpi
  - Serving of maps on the Internet Map Service – July 2010
  - Beginning of georeferencing
- GIS Maintenance
  - Adding AUMs
  - Edits to Existing AUMs
- MSI Application

Low Resolution AUM Maps

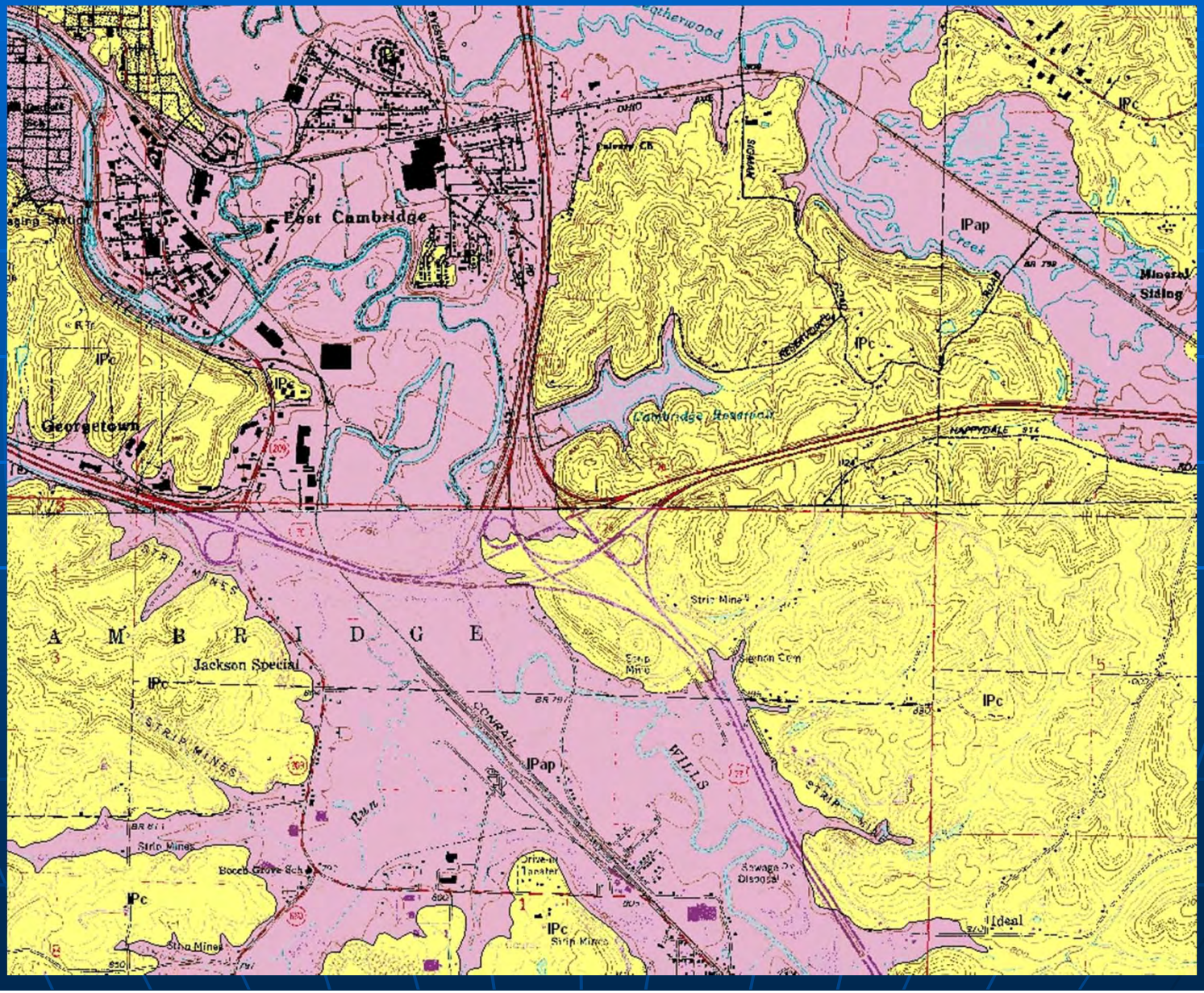


High Resolution AUM Maps

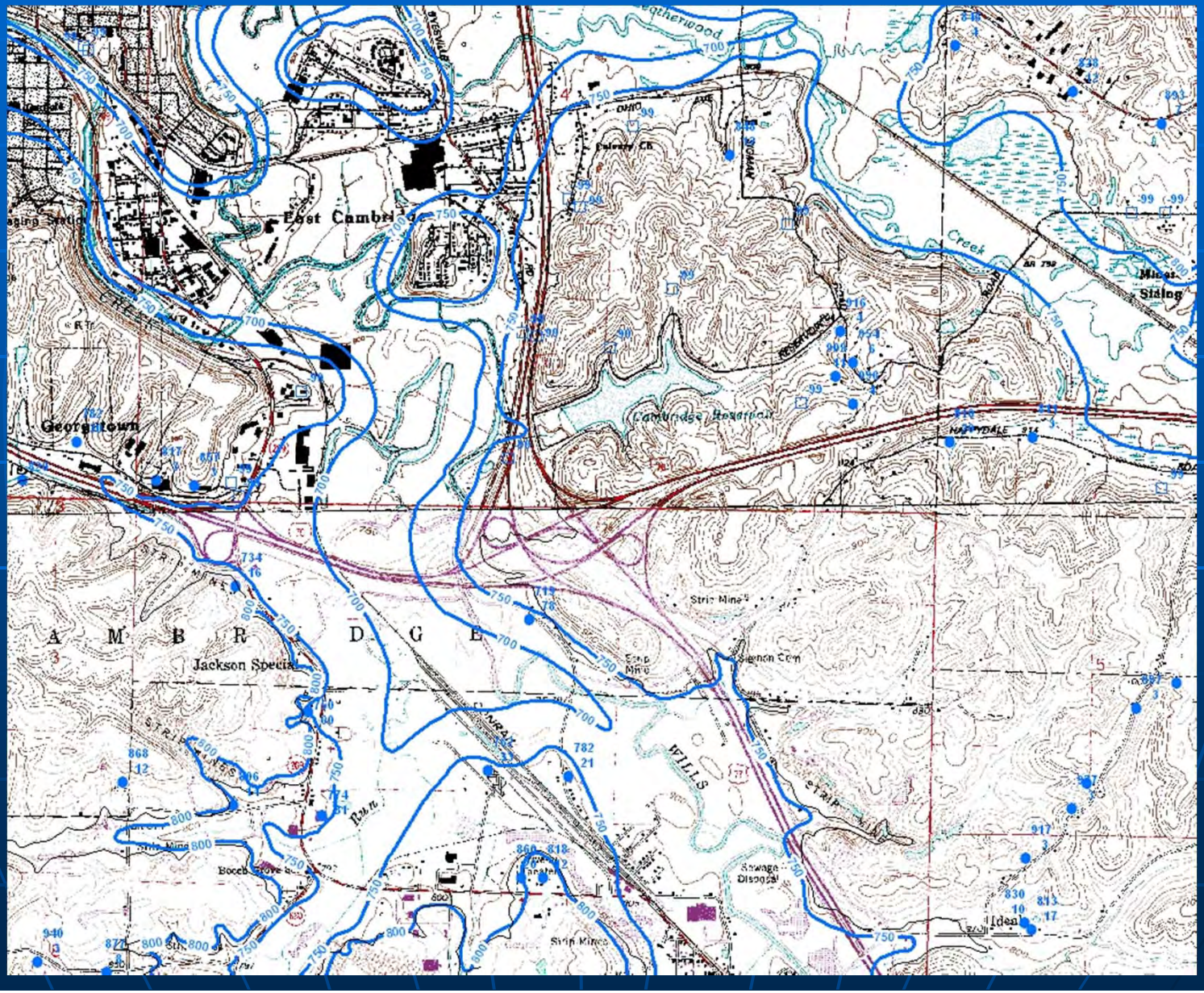
New Geologic Datasets

- Bedrock Geology: 1:24,000 and 1:500,000 scales
- Bedrock Topography: 1:24,000 and 1:500,000 scales
- Bedrock Structure Contour Maps: 1:24,000 scale
- Other Datasets: Drift Thickness, Karst, Glacial Geology, Surficial Geology in 3D, etc.
- Scanning of Paper Documents and Publications

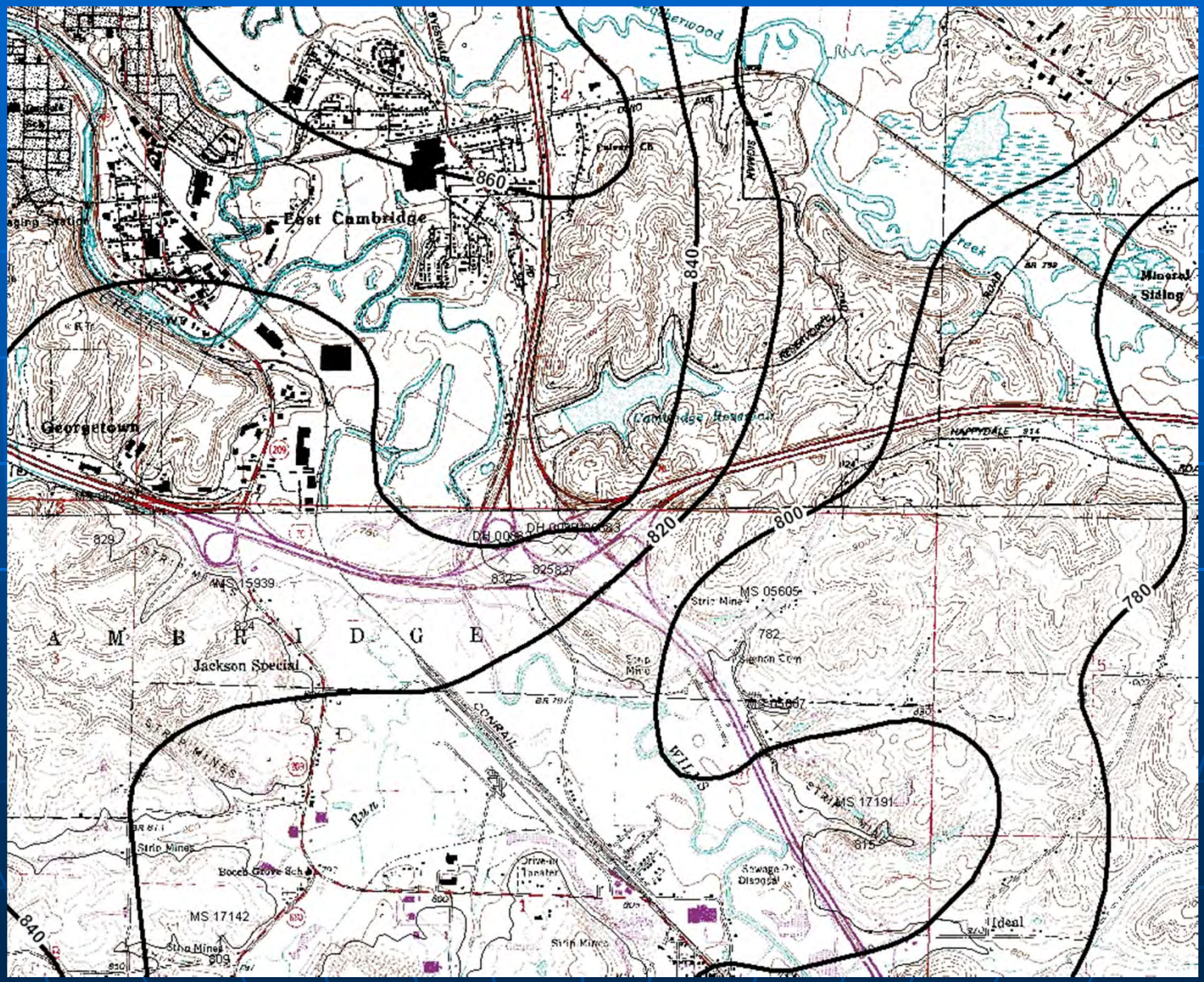
Bedrock Geology (1:24,000)



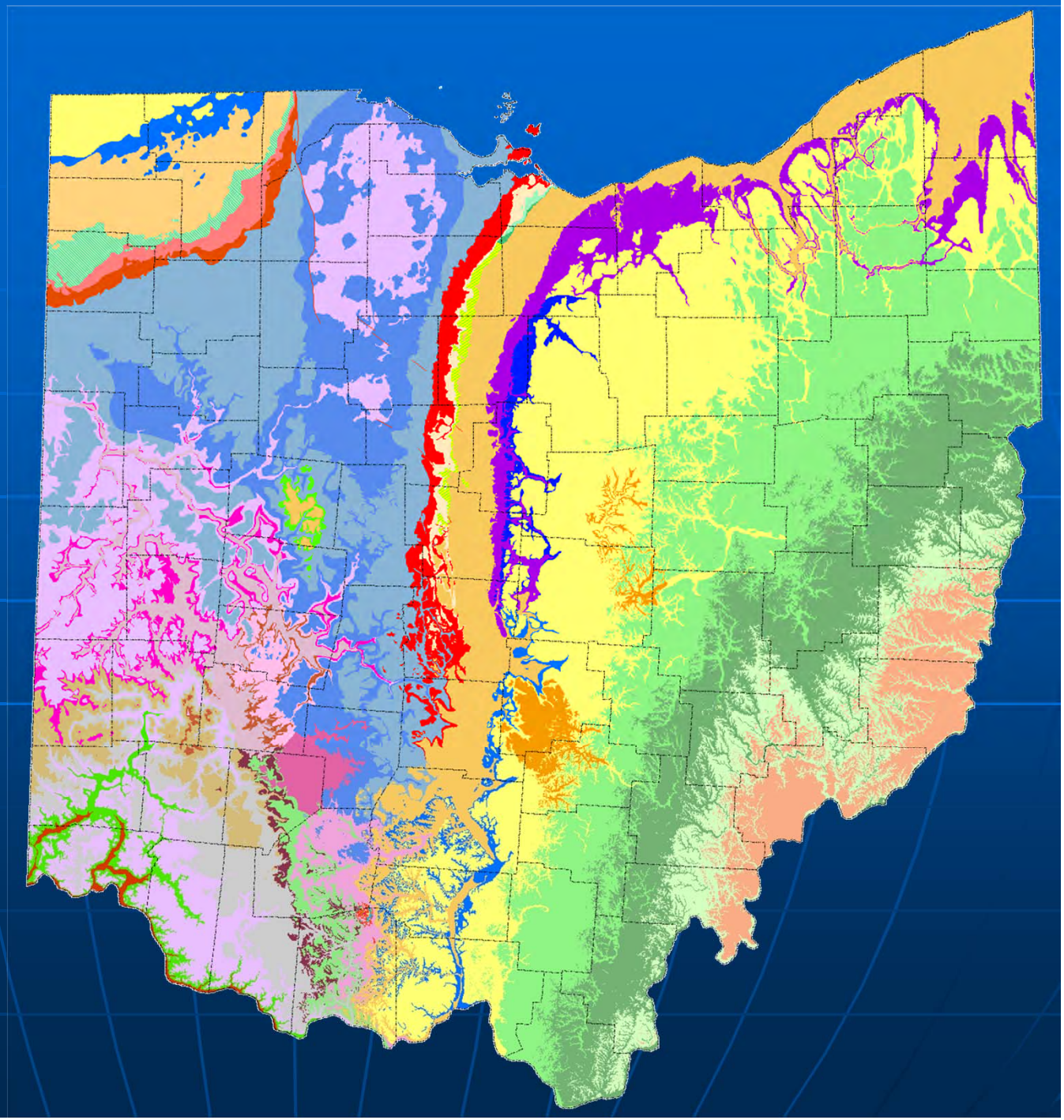
Bedrock Topography (1;24,000)



Structural Geology (1:24,000)



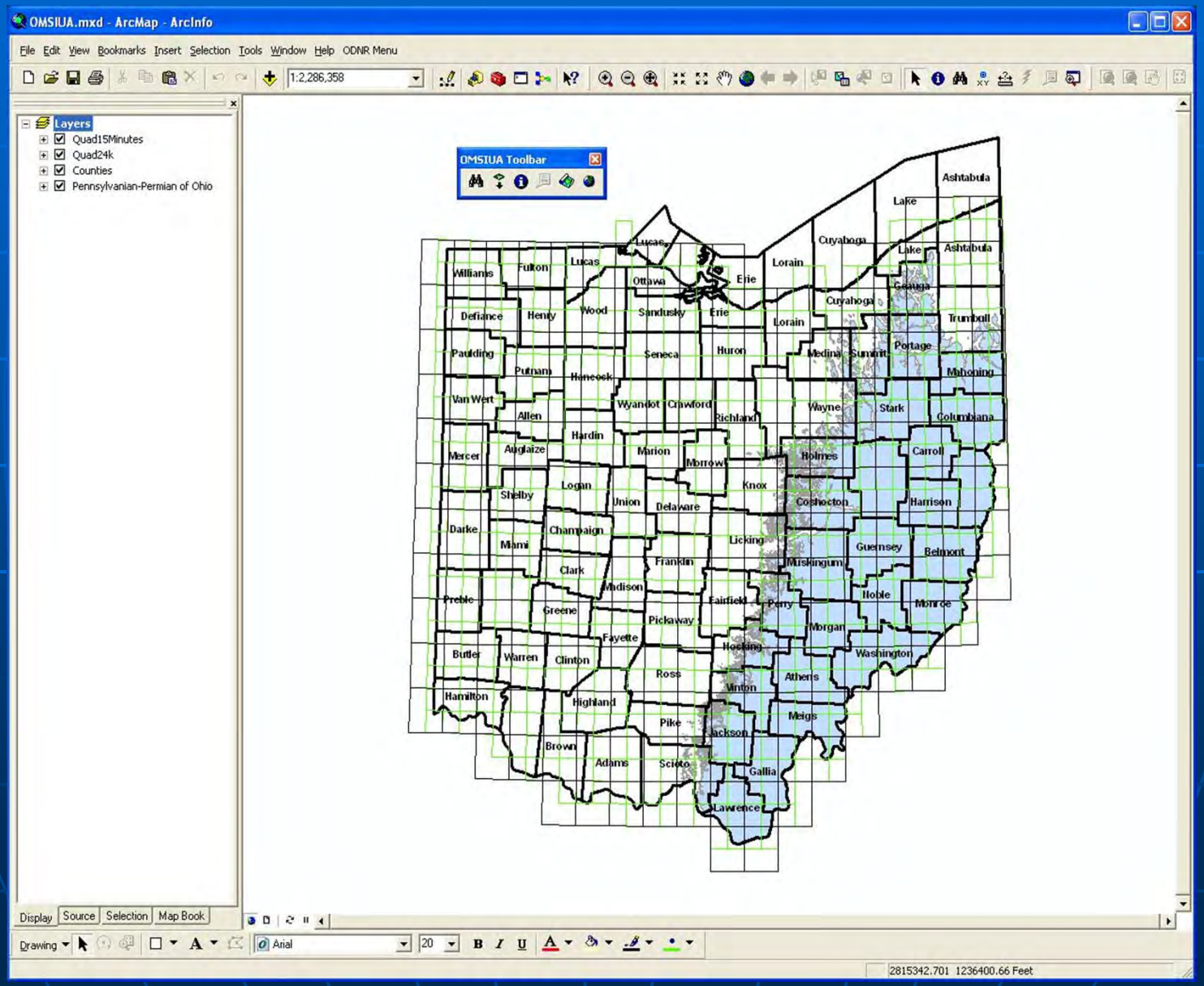
Ohio's New 1:500,000-Scale Bedrock Geology Map & GIS



MSI Application

- Load All Geologic Information
  - Vector GIS Datasets
  - Load Historical Project Maps
  - Access All Scanned Documents
- Provide an User Interface to Query the AUM Database
- Copy All Scanned Documents and Reports
- Automate Map Production

MSI Application



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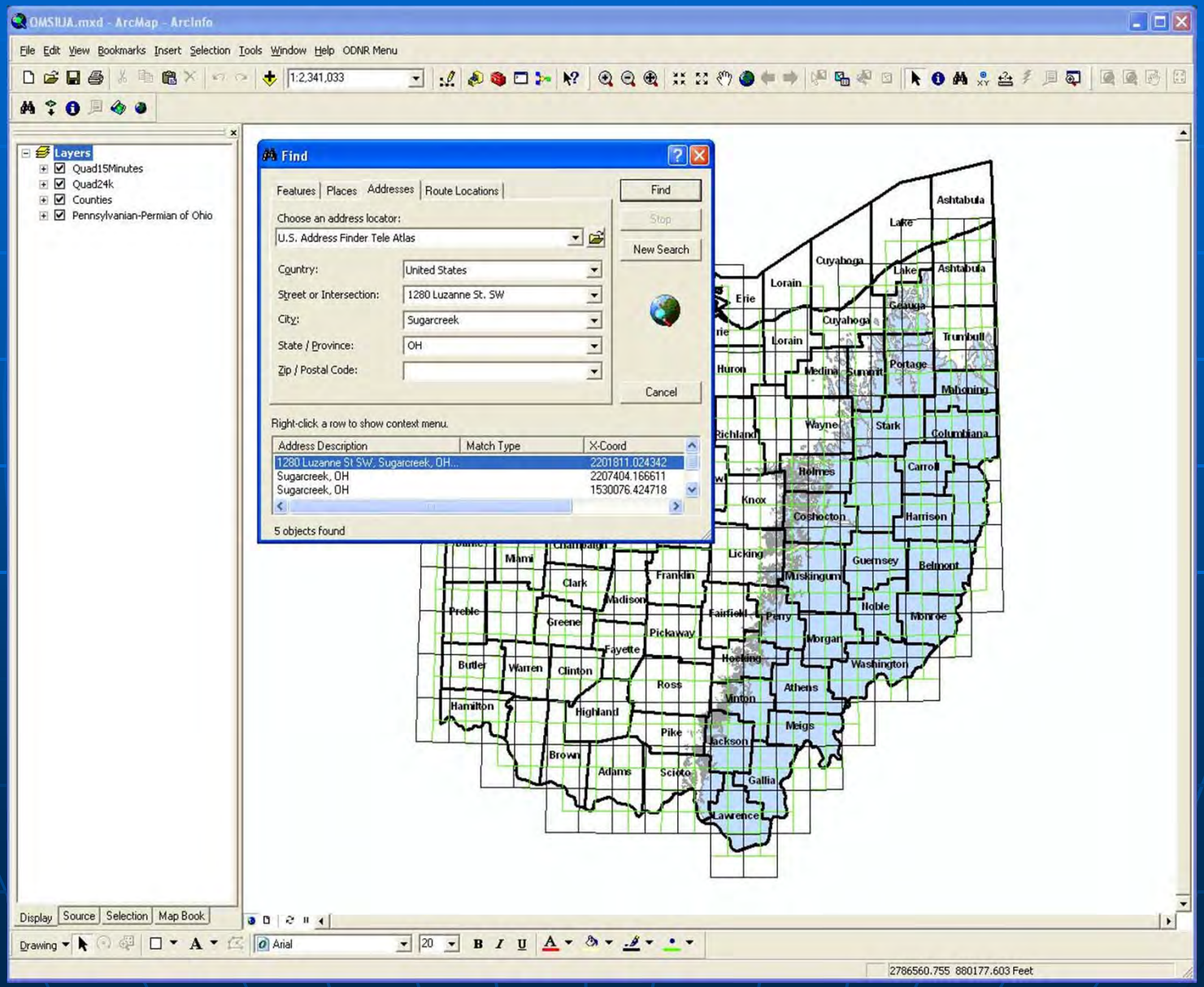

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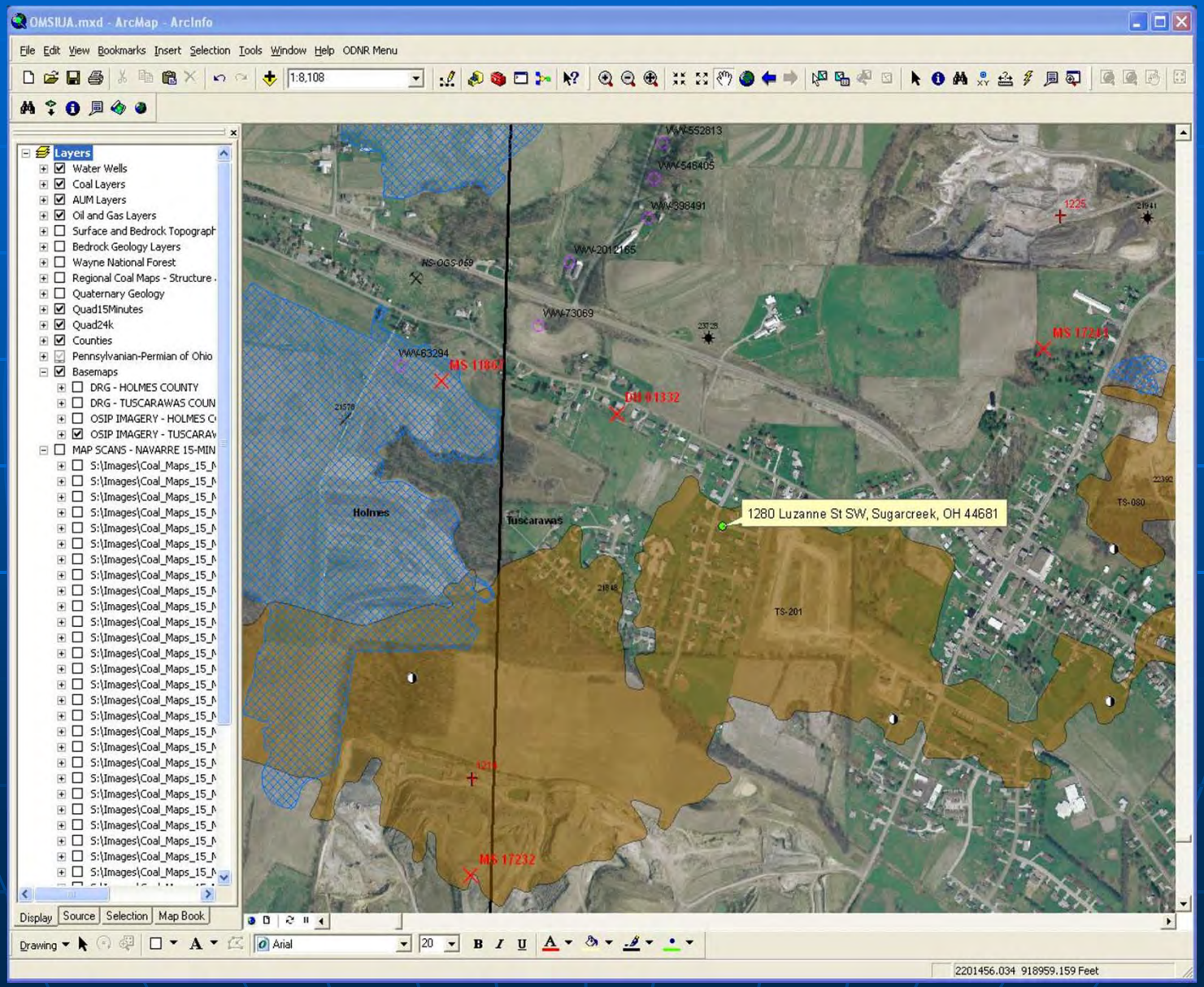

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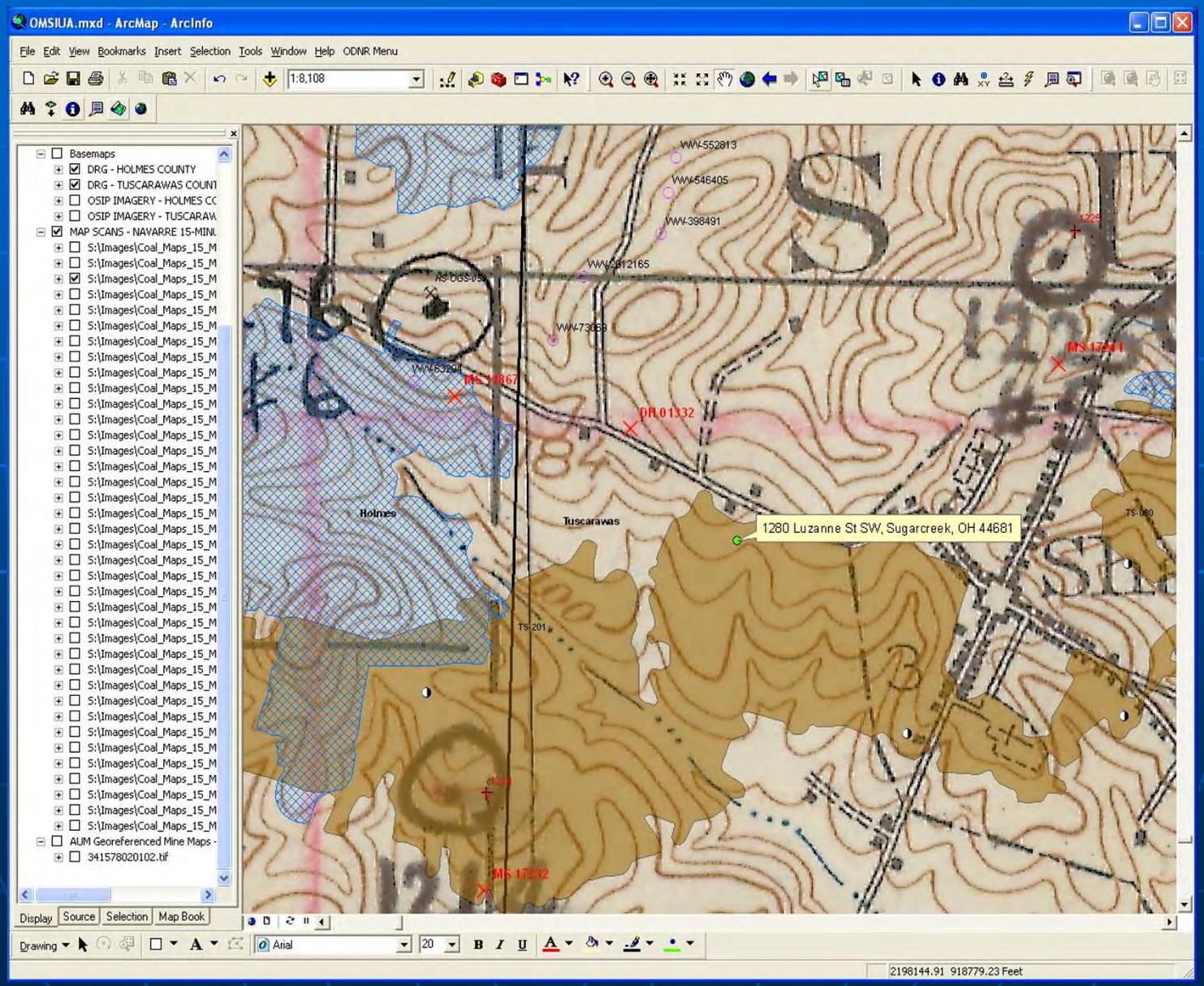

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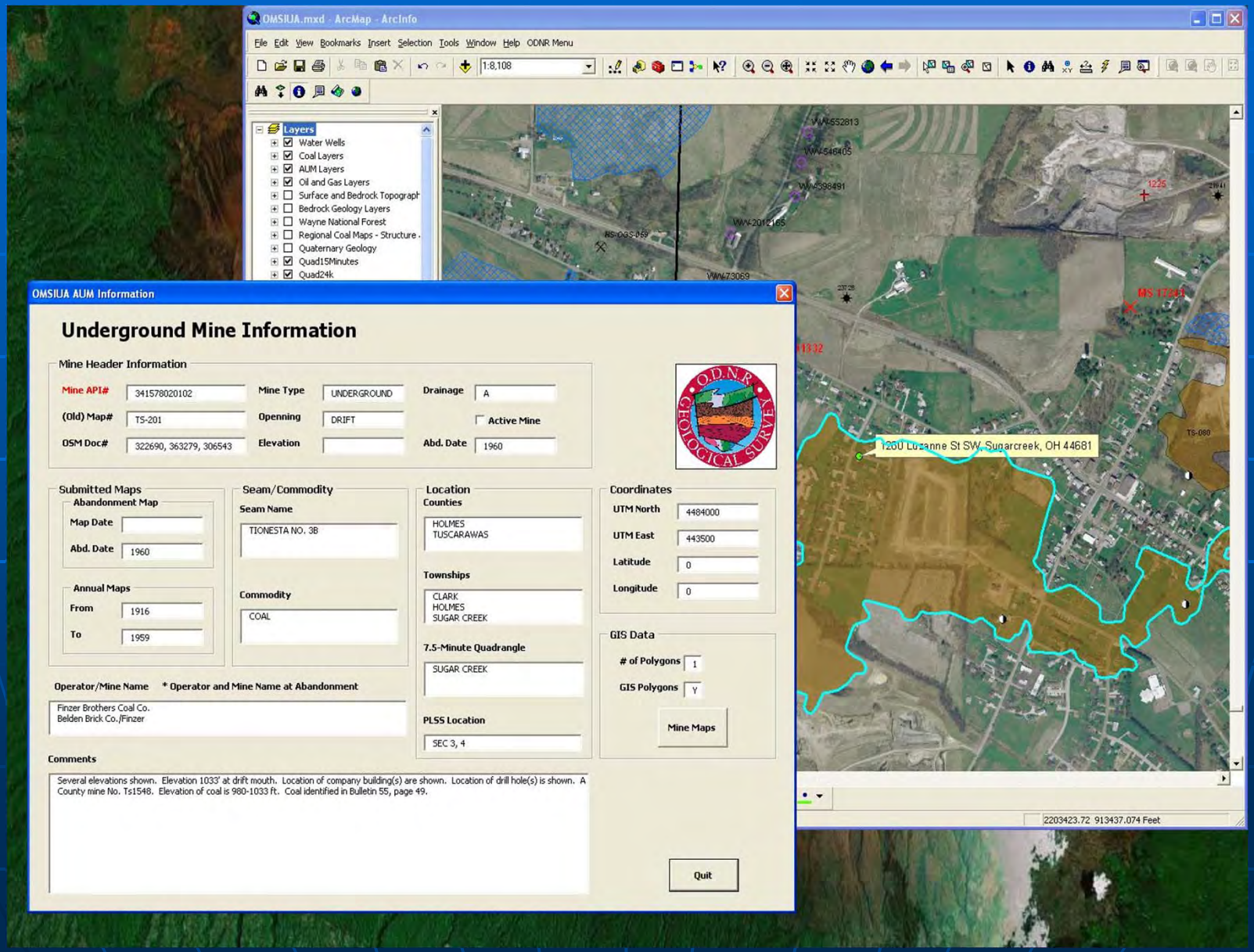

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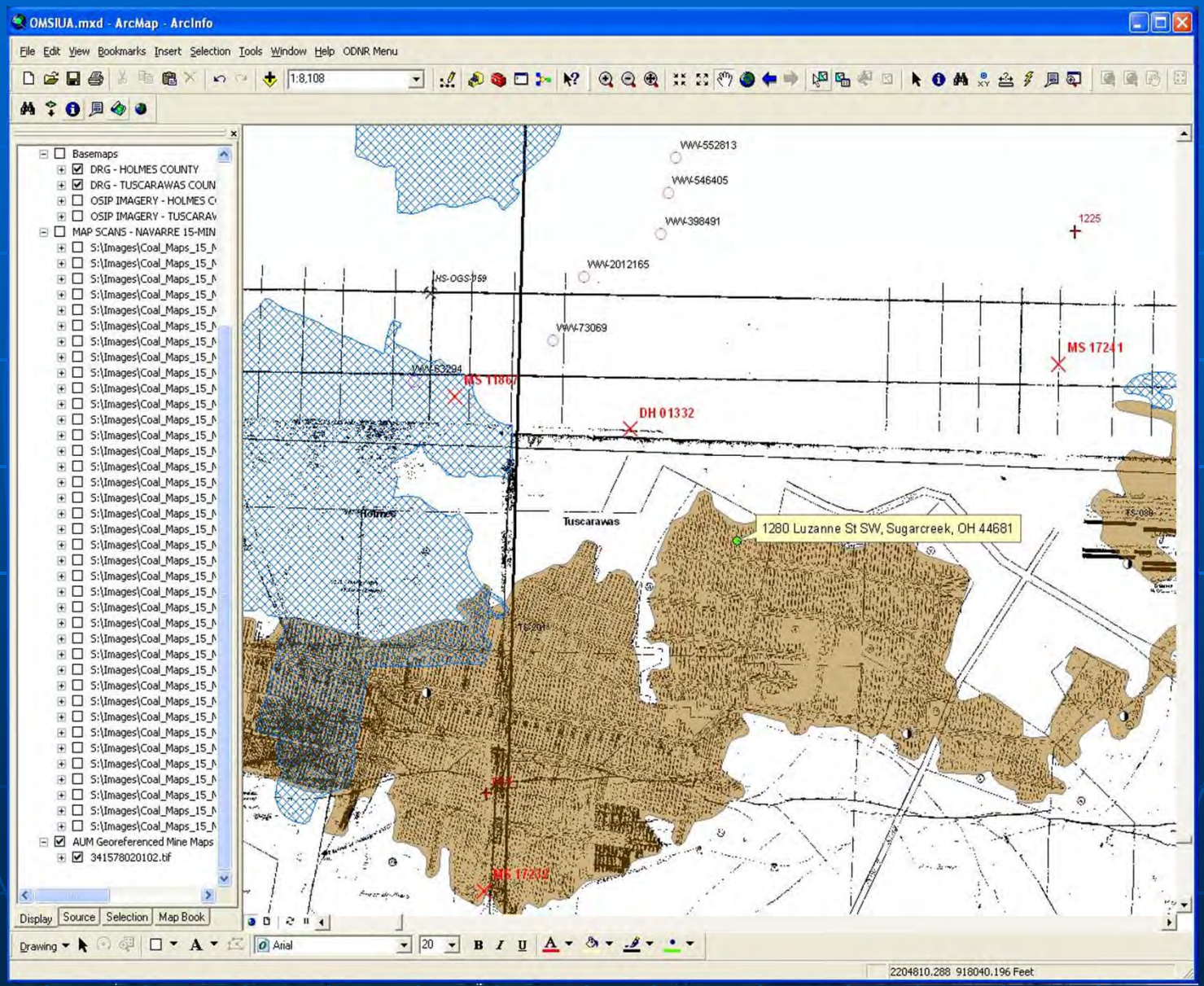

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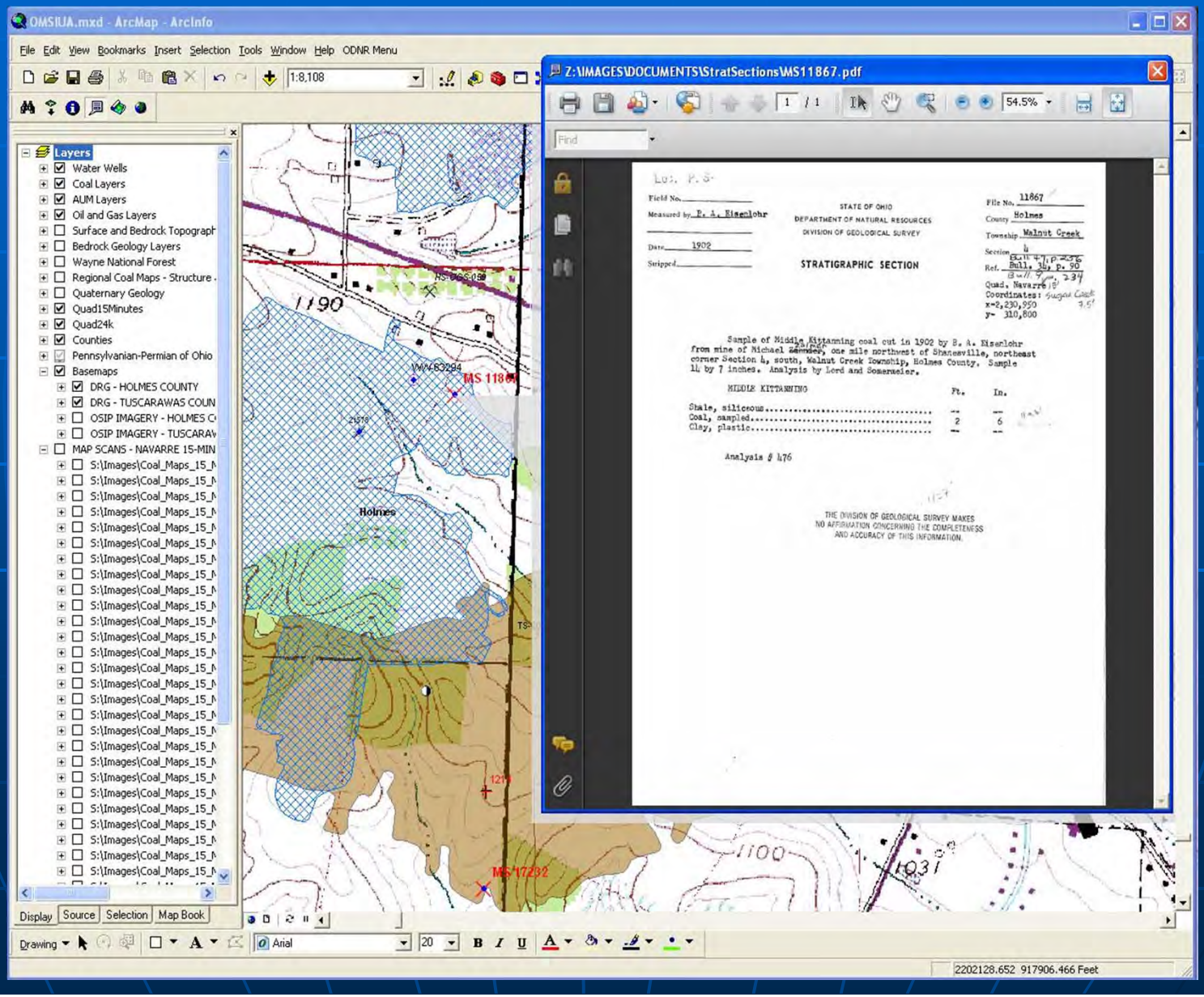

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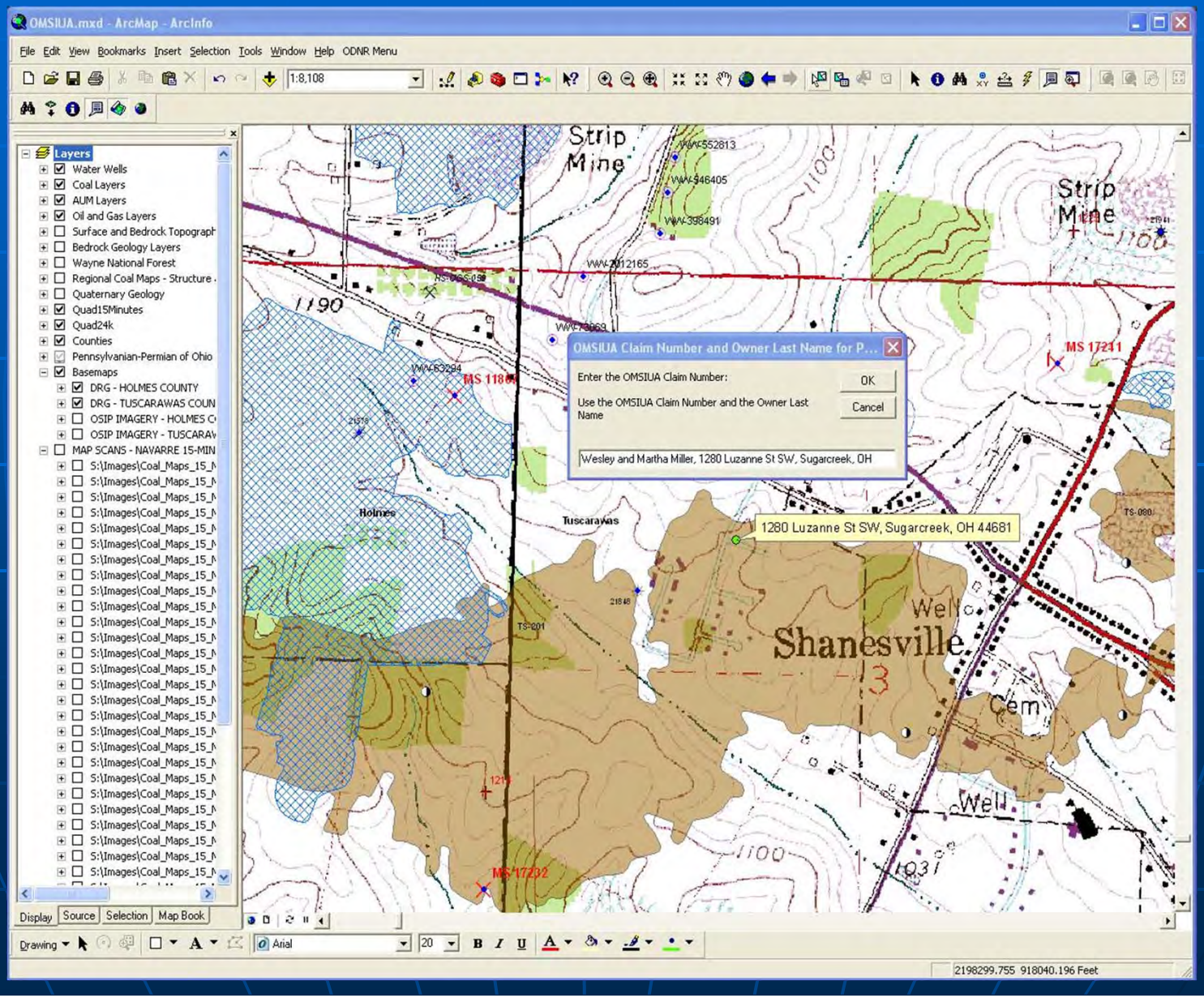

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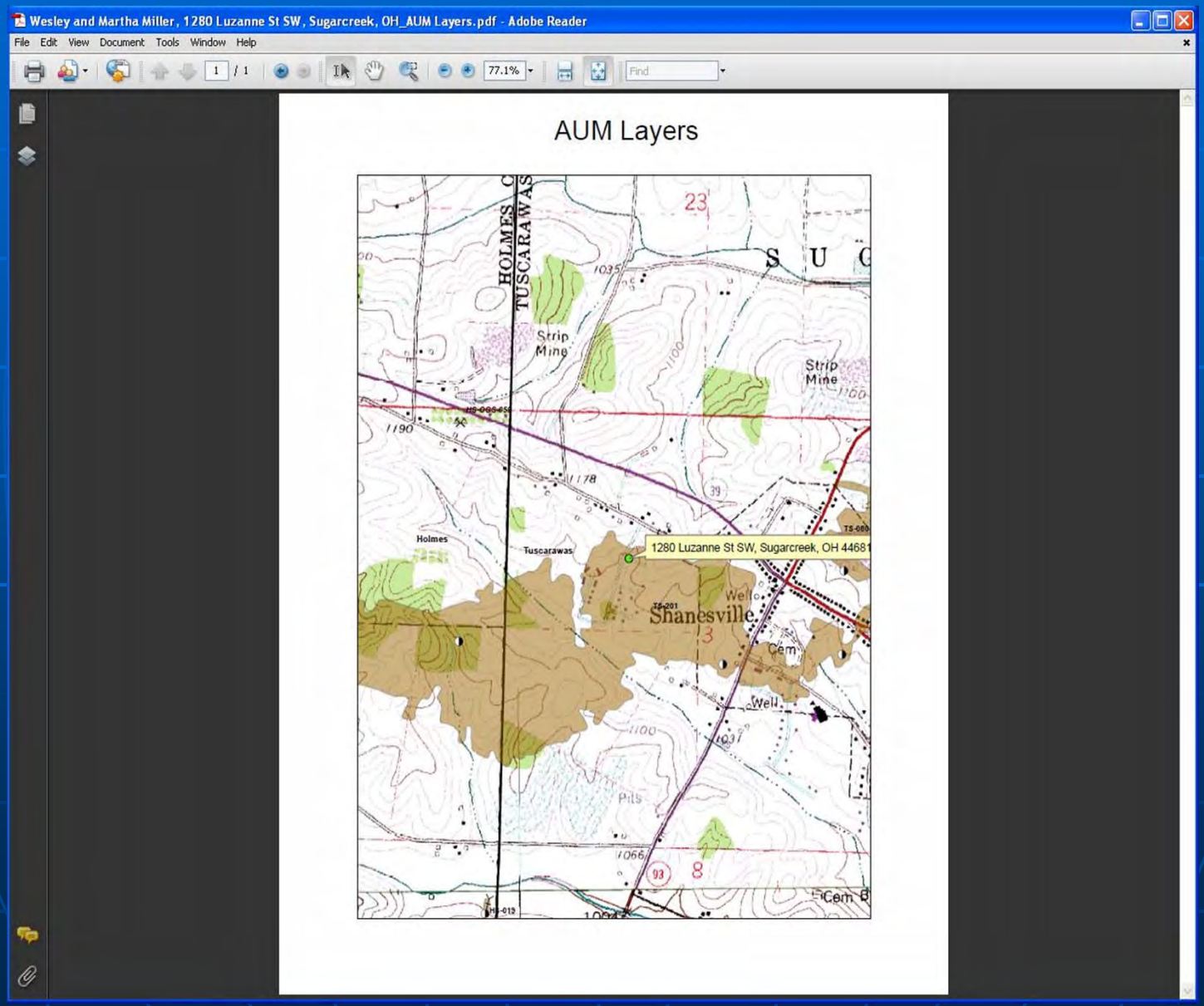

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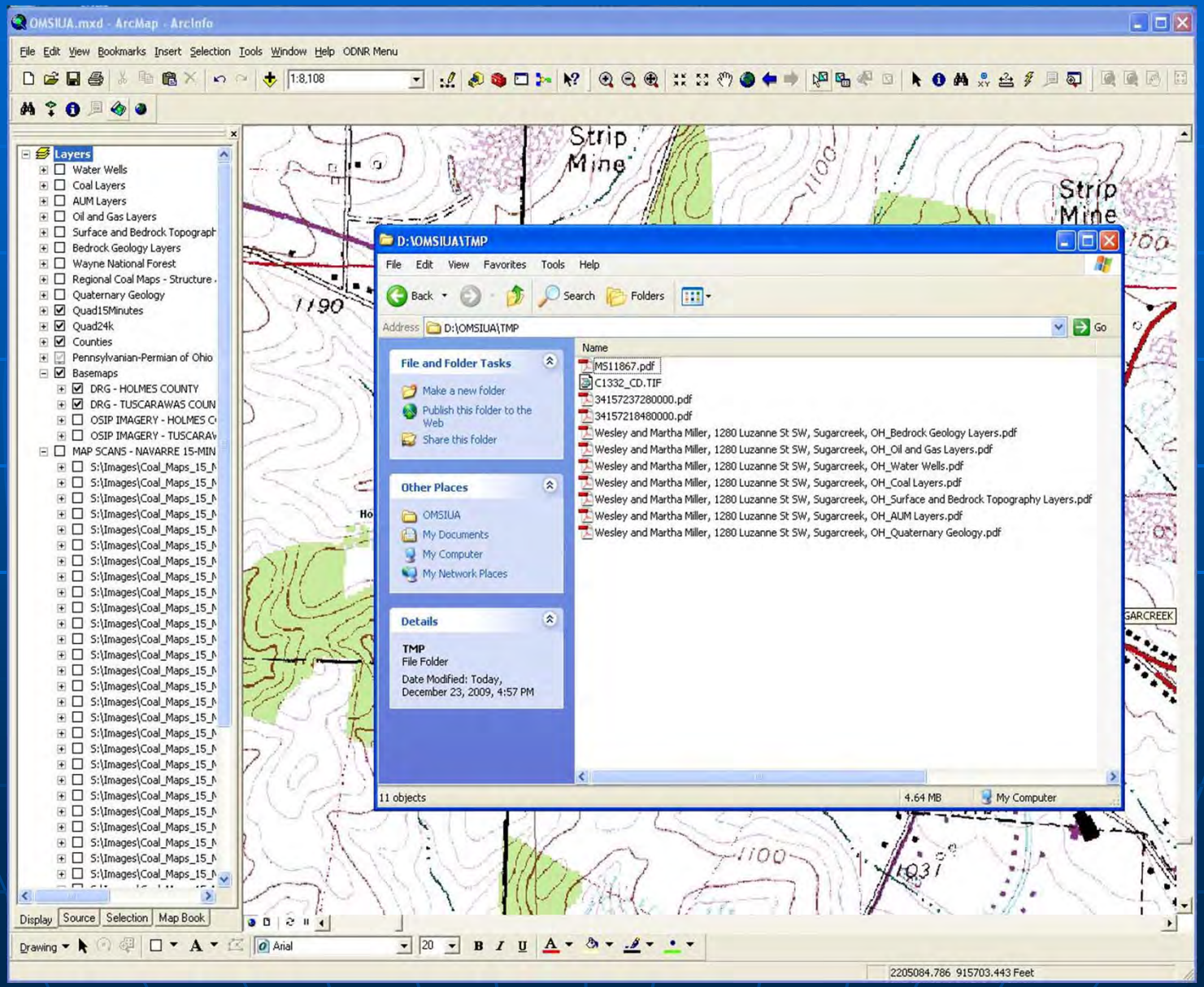
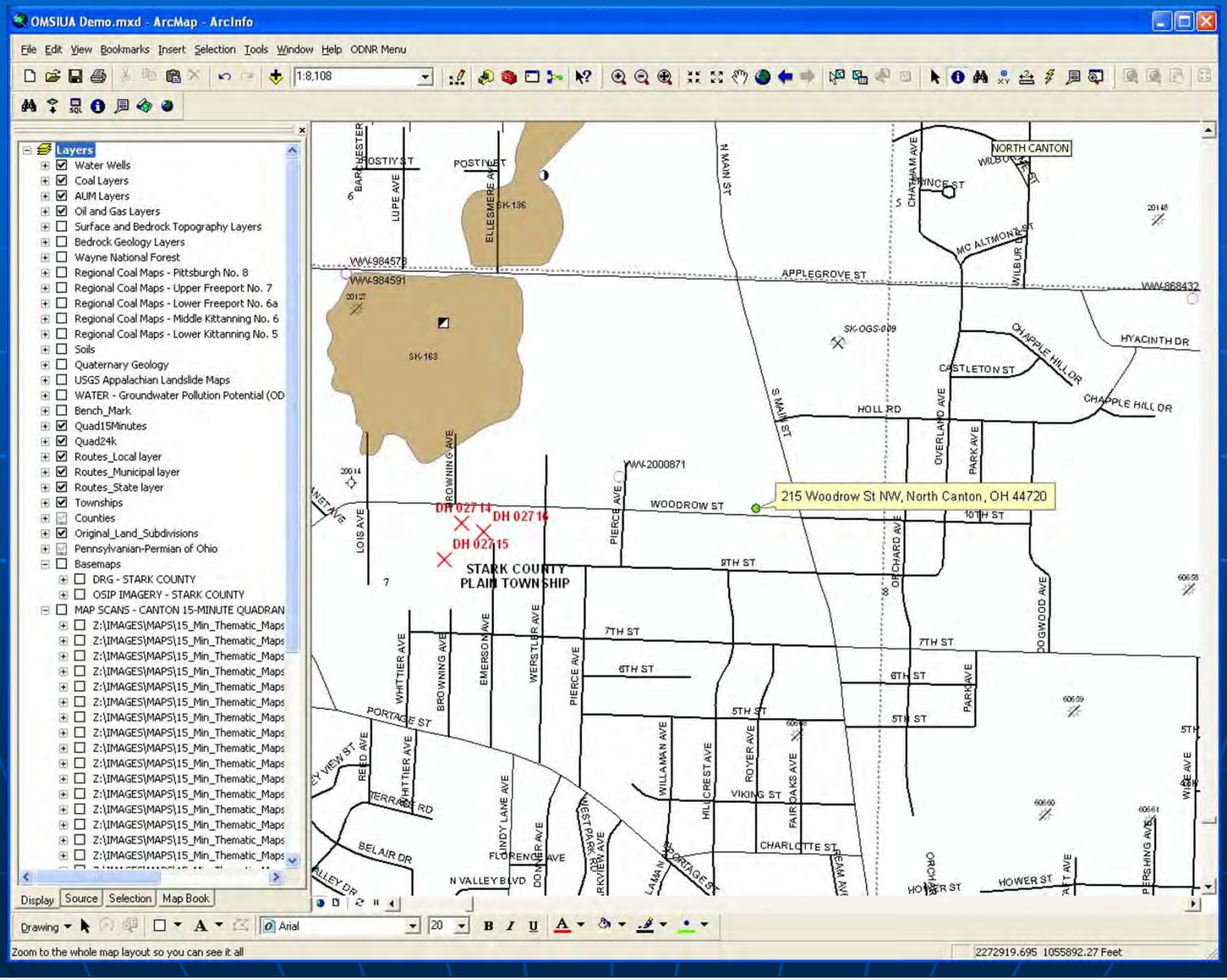
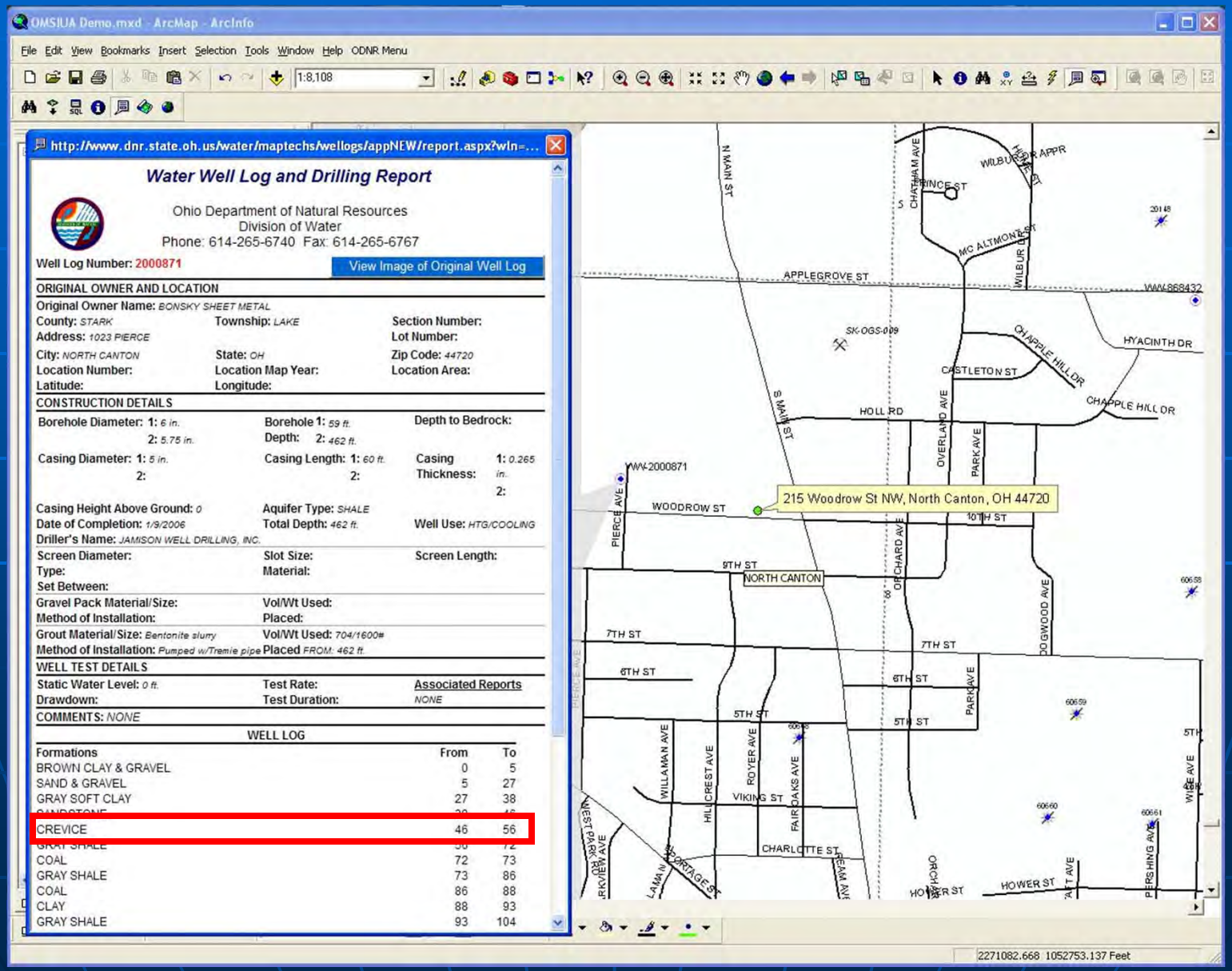


Example Site Evaluation



Example Site Evaluation



Example Site Evaluation

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GEOLOGICAL SURVEY OF OHIO

20127

127

OIL AND GAS WELL LOG

State Ohio

County Stark Township Plain Quadrangle Canton

Lot ..... Quarter ..... Tract ..... Section 7 NW ..... NE ..... SW .....

Measured 1310 Feet From E Line And 314 Feet From N Line Of NW ¼

Land Owner Theo. Myers Well No. 1 Date Started .....

Operator Dr. Chermiller Well No. ..... Date Completed 12-26-38

Elevation Bar. ..... S. L. ..... Total Depth 4515 Plugged Back .....

Formation Drilled To 2nd Clinton Producing Form. ..... Init. Prod. Nat. gas - 0.36

Shot or Acid Record ..... Prod. A. S. or Acid .....

Init. Rock Press. ..... Abandoned 8-9-62

Formation	Top	Bottom	Remarks	Formation	Top	Bottom	Remarks
surface	0	30					
old mine	30	35					
sl.	35	300					
Injun	300	410					
Berea grit	725	775	50				
Big Ls.	2734	4262	sult. 3356-3550				
			Newb. 3980-3990				
			water 4025				
little ls.	3377	4400					
stray ss.	4223	4447					
red ss.	4447	4480					
Clinton ss.	4480	4497					
2nd Clinton	4511	4515					
		4515	T.D.				

Example Site Evaluation

ODNR
DIVISION OF GEOLOGICAL SURVEY

File No. 2715

CORE RECORD

County: Stark
Quadrangle: North Canton
Township: Plain
State Coordinates X: 2,300,240
Zone North
Section or Lot: 7
Y: 446,500
Measured: **Ft. from** **Line, and** **Ft. from** **Line**
Location Remark: Browning St. North Canton
Property owner: Fisher
Core Hole Designation (project): Browning St. No. 2
Purpose of Core: Stratigraphic test, mine subsidence
Driller: D. Nicklaus & D. Collins
Drilling Co.: ODNR, Division of Reclamation
Drilled For: ODNR, Division of Reclamation
Surface Elev: 1159'
Datum for Elev: Mean Sea Leval
Date Started: 10-18-88
Date Completed: 10-18-88
Logged By: G. Larsen
Date Logged: 11-25-88
Core Diameter:
No. of Core Boxes: 1
Total Depth: 35.50'
Direction of Hole: Vertical
Core Disposition: ODNR, Division of Reclamation
Remarks:

TOP FT.	BOTTOM FT.	THICKNESS FT.	DESCRIPTION
0.00	19.50	19.50	Overburden.
19.50	26.50	7.00	Limestone, medium-light-gray to medium-gray; sparse biomicrite; becomes argillaceous downward; from 20.00 to 20.90 ft. vertical fracture; from 20.50 to 20.70 ft. healed fracture; marine fossils, large disseminated crinoid stem fragments common; core badly broken, not full recovery.
26.50	30.70	4.20	Void, coal mine suspected.
30.70	31.10	0.40	Coal, dull, poorly cleated; abundant fusain bands; clarain banded with durain; core badly broken.
31.10	33.00	1.9	Seatrock, medium-gray to medium-dark-gray; clayey to silty, micaceous, hard, rooted; rapid gradational lower contact.
33.00	35.50	2.50	Sandstone, very-light-gray to dark-gray; fine to medium grained, micaceous, coal spars, carbonaceous; vertical fracture from 33.70 to 34.00 ft.; rooted, rooting decreases downward.

Summary

- Brings Together All Geological Information
- Speeds Evaluation Process
- Used for Preliminary Mine Subsidence Insurance Evaluations
- Potential for Transportation Planning and Remediation