

APPLICATION FOR A PERMIT (Form 1)
 OHIO DEPARTMENT OF NATURAL RESOURCES
 DIVISION OF OIL AND GAS RESOURCES MANAGEMENT
 2045 Morse Road, Building H-3
 COLUMBUS, OHIO 43229-6693
 (614) 265-6633

#1158
 \$1,000.00

OHIO 0000910

SEE INSTRUCTIONS ON PAGE 2 (BACK)

1. I, We (applicant) <u>Hard Rock Drilling & Producing LLC</u>		2. Owner #: <u>8837</u>	
(address) <u>7646 Cedar Valley Road, West Salem, Ohio 44287</u>		Phone #: <u>419-846-3850</u>	
hereby apply this date <u>21-Mar</u> , 20 <u>12</u> for a permit to:			
<input type="checkbox"/> Reissue (check appropriate blank)	<input type="checkbox"/> Revised Location	<input type="checkbox"/> Convert	
<input checked="" type="checkbox"/> Drill New Well	<input type="checkbox"/> Plug Back	<input type="checkbox"/> Deepen	
<input type="checkbox"/> Drill Directionally	<input type="checkbox"/> Plug and Abandon	<input type="checkbox"/> Reopen	
<input type="checkbox"/> Drill Horizontally	<input type="checkbox"/> Orphan Well Program	<input type="checkbox"/> Temporary Inactive	
3. TYPE OF WELL:			
<input type="checkbox"/> Oil & Gas	<input type="checkbox"/> Annular Disposal	<input checked="" type="checkbox"/> Saltwater Injection	
<input type="checkbox"/> Stratigraphic Test	<input type="checkbox"/> Gas Storage	<input type="checkbox"/> Other (explain): _____	
<input type="checkbox"/> Solution Mining*	<input type="checkbox"/> Enhanced Recovery* (* if checked, select appropriate box below)		
<input type="checkbox"/> Input/Injection	<input type="checkbox"/> Water Supply	<input type="checkbox"/> Observation	<input type="checkbox"/> Production/Extraction
4. MAIL PERMIT TO: Hard Rock Drilling & Producing LLC, 7646 Cedar Valley Road, West Salem, Ohio 44287		20. TYPE OF TOOLS:	
		<input type="checkbox"/> Cable	<input type="checkbox"/> Air Rotary
		<input type="checkbox"/> Cable / Air Rotary	<input checked="" type="checkbox"/> Air / Fluid Rotary
		<input type="checkbox"/> Cable / Fluid Rotary	<input type="checkbox"/> Fluid Rotary
		<input type="checkbox"/> Cable / Air / Fluid Rotary	<input type="checkbox"/> Service Rig
5. COUNTY: <u>Portage</u>		21. PROPOSED CASING PROGRAM:	
6. CIVIL TOWNSHIP: <u>Windham</u>		16" Conductor cement to surface, 11 3/4 surface to 350' cement to surface, 8 5/8 surface to 4200' 5 1/2 tubing set on packer within 100' of top of perf approximately 4000'. 600' AA 2600' AA	
7. SECTION: _____ 8. LOT: <u>90</u>			
9. FRACTION: _____ 10. QTR TWP: _____			
11. TRACT / ALLOT: _____			
12. WELL #: <u>31</u>			
13. LEASE NAME: <u>Soinski</u>		22. FIRE AND MEDICAL DEPARTMENT TELEPHONE NUMBERS: (closest to well site)	
14. PROPOSED TOTAL DEPTH: <u>4200</u>		Fire: <u>911</u>	
15. PROPOSED GEOLOGICAL FORMATION: <u>Newburg</u>		Medical: <u>911</u>	
16. DRILLING UNIT IN ACRES (must be same as acres indicated on plat): <u>484.73</u>		23. MEANS OF INGRESS & EGRESS:	
17. IF PERMITTED PREVIOUSLY:		Township Road: _____	
API #: _____		County Road: _____	
OWNER: _____		Municipal Road: _____	
WELL #: _____		State Highway: <u>St. Rt. 82</u>	
LEASE NAME: _____		24. IS THE WELL LOCATION OR PRODUCTION FACILITIES WITHIN AN URBANIZED AREA AS DEFINED BY 1509.01(Y) ?	
TOTAL DEPTH: _____		<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No	
GEOLOGICAL FORMATION: _____			
18. IF SURFACE RIGHTS ARE OWNED BY THE OHIO DEPARTMENT OF NATURAL RESOURCES			
Division Name: _____			
Division Phone: _____			
19. LANDOWNER ROYALTY INTEREST:			
Is There An Attached List? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No			
Name: <u>Dale Soinski</u>			
Address: <u>10218 Silica Sand Road, Garrettsville, Ohio 44231</u>			
Name: _____			
Address: _____			
Name: _____			
Address: _____			

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I, the undersigned, being first duly sworn, depose and state under penalties of law, that I am authorized to make this application, that this application was prepared by me or under my supervision and direction, and that the facts stated herein are true, correct, and complete, to the best of my knowledge.

I, the undersigned, further depose and state that I am the person who has the right to drill on the tract or drilling unit and to drill into and produce from a pool and to appropriate the oil or gas that I produce therefrom either for myself or others as described in this application. And furthermore, I the undersigned, being duly sworn, depose and state at this time that I am not liable for any final nonappealable order of a court for damage to streets, roads, highways, bridges, culverts, or drainage ways pursuant to Section 5577.12 of the Ohio Revised Code (ORC). I, the undersigned, further depose and state that all notices required by 1509.06 (A) (9) ORC for this application have been duly provided by me. If applying for a permit to plug and abandon a well, I hereby certify that the written notices, as required in Section 1509.13, ORC, have been given.

That I hereby agree to conform with all provisions of Chapter 1509., ORC, and Chapter 1501., OAC, and all orders and conditions issued by the Chief, Division of Oil and Gas Resources Management.

Signature of Owner/Authorized Agent [Signature]
 Name (Type or Print) Charles J. Cutler Title PRES

If signed by Authorized Agent, a certificate of appointment of agent must be on file.

Sworn to and subscribed before me this the 28 day of March, 20 12



KRISTIN L. CUTLER
 Notary Public, State of Ohio
 My Commission Expires:
 April 1, 2012

[Signature]
 (Notary Public)

April 1, 2012
 (Date Commission Expires)

Before this application can be processed, an Authority and Organization Form (Form 9), indicating the exact owner name on this form, and proof of compliance with the surety and insurance requirements of Chapter 1509.07, Ohio Revised Code, must be on file with the Division of Oil and Gas Resources Management. The signature of owner/authorized agent must correspond with the signature(s) listed on the Form 9 on file with the Division.

All information requested on this form must be provided unless exempted by the instructions below. Incomplete applications may be returned to the applicant. An application for a permit requires the following:

1. Drill, Reopen, Deepen and Plug Back an Oil and Gas Well (non-urban valid for 24 months; urban valid for 12 months)

- a. Original and two (2) copies of Application for a Permit (Form 1);
- b. Original and four (4) copies of an Ohio registered surveyor's plat;
- c. Original and one (1) copy of the Restoration Plan (Form 4);
- d. Reopen, deepen, plug back and convert will require three (3) copies of the Well Completion Record (Form 8);
- e. \$500.00 check or money order payable to the Division of Oil and Gas Resources Management and;
- f. If requesting an expedited review, an additional \$250 fee is required; and an Oil & Gas Affidavit (if the proposed well location is in a coal-bearing township).
- g. For an **urbanized area** new well drilling permit, the fee is as follows: \$500 for a township with a population up to 9,999; \$750 for a township with a population of 10,000 to 14,999; \$1,000 for a township with a population exceeding 15,000; and \$1,000 for all municipal corporations regardless of population.
- h. For **mandatory pooling**, an additional \$5,000.

2. Reissue or Revised Location

- a. Same as above: 1(a), (b), (c), (d), (f);
- b. \$250 check or money order payable to the Division of Oil and Gas Resources Management.

3. Plug and Abandon (valid for 24 months)

- a. Original copy of Application for a Permit (Form 1);
- b. Two (2) copies of the Ohio registered surveyor's plat originally filed, or modified, if available;
- c. Three (3) copies of the Well Completion Record (Form 8) if available; if there is no Well Completion Record on file with the Division, provide any drilling information that is available;
- d. \$250 check or money order payable to the Division of Oil and Gas Resources Management;
- e. If requesting an expedited review, an additional \$500 fee is required.

4. Drill, Reissue, Reopen, Deepen, Plug Back or Convert a Well to Saltwater Injection

- a. Same as above: 1(a), (b), (c), (d); and
- b. \$1,000 check or money order payable to the Division of Oil and Gas Resources Management.

5. Temporary Inactive (valid for 12 months)

- a. Original and one (1) copy of Application for a Permit (Form 1);
- b. A map, on a scale not smaller than four hundred feet to the inch, that shows the location of the well and the tank battery, that includes the latitude and longitude of the well;
- c. A written statement that the well is of future utility, and that there is a viable plan to use the well within a reasonable period of time and the well poses no threat to the health or safety of persons, property or the environment;
- d. For first application, \$100 check or money order payable to the Division of Oil and Gas Resources Management;
- e. For first renewal, \$250 check or money order payable to the Division of Oil and Gas Resources Management;
- f. For subsequent renewals, \$500 check or money order payable to the Division of Oil and Gas Resources Management; additional bonding may be required.

Item 1. Permit holder's name - as it appears on Form 9. Indicate the type of or combination of activities to be permitted.

Item 2. Indicate owner number, if the owner number is not known, please contact the Division.

Item 3. Indicate the type of well for which the application is being submitted.

Item 4. Provide name, address, city, state and zip code where the permit is to be mailed.

Items 5-11. Indicate drilling location.

Items 12-16. Provide requested information.

Item 17. Complete when application is for a permit to reopen, deepen, reissue, plug back, convert, or plug and abandon. If the well was never permitted, list "NONE" under permit #; all other wells require the permit number.

Item 18. Complete if surface rights are owned by the Ohio Department of Natural Resources.

Item 19. List names and addresses of all landowner royalty interest holders. Names must coincide with those shown on the designated unit or subject tract on the surveyor's plat or an explanation must be included. Additional sheets may be attached (overriding royalty and working interests are not required).

Item 20. Indicate type of tools that may be used.

Item 21. Indicate size and amount of casing to be used, and/or formations to be cased off.

Item 22. Indicate fire and medical department emergency telephone numbers closest to the well site.

Item 23. List all county, township, and/or municipal roads, streets and highways by name or number that applicant anticipates to use as means of ingress and egress to and from the well site.

Item 24. An "urbanized area" is a municipal corporation or a township that has an unincorporated population of more than five thousand, as defined under Section 1509.01 (Y) of the Ohio Revised Code. Notice must be provided by regular mail to the owner of each parcel of real property that is located within five hundred feet of the surface location of the well, and to either the executive authority of the municipal corporation or the board of township trustees (see 1509.06 (A) (9)).

**SUPPLEMENT TO APPLICATION
PERMIT FOR AN ENHANCED RECOVERY PROJECT (Form 203)**

Ohio Department of Natural Resources, Division of Oil and Gas Resources Management
2045 Morse Road, Bldg H3
Columbus, OH 43229-6693

AREA OF REVIEW. An application for an Enhanced Recovery Project (ERP) will be evaluated on the basis of an "area of review" surrounding the proposed input wells for the project. The area of review for projects in which injection of greater than two hundred barrels per day per well is proposed shall be the area circumscribed by a circle with one center point at the location of each input well and a radius of one-half mile. The area of review for projects in which a maximum injection of two hundred barrels per day per well or less is proposed shall be the area circumscribed by a circle with the center point at the location of each input well and a radius of one-quarter mile. Projects in which gas is the proposed injection fluid will have an area of review consisting of an area circumscribed by a circle with the center point at the location of each input well and a radius of one-quarter mile.

31. **PROPOSED INJECTION ZONE**

Geological Formation: _____ Newburg
Injection Interval: From: 4050 ⁴⁰⁰⁰ feet to 4200
Geologic description of injection zone: _____ Dolomite

32. **WELL CONSTRUCTION AND OPERATION**

- A. Description of the proposed casing and cement program for new wells, or of the casing, cementing or sealing with prepared clay for existing wells to be converted:
11 3/4 casing surface to 600', 8 5/8 casing surface to 4000' open hole with 1500' of cement fill up.
5 1/2 tubing set on a packer at approx. 3900'. Well will be bond longed to show cement top.
- B. Proposed method for testing the casing:
Pressure test to be done after cementing of longstring. A bond log to show integrity and cement top.
Pressure up on longstring after cementing before open hole.
- C. Description of the proposed method for completion and operation of the injection well:
5 1/2 tubing set on a packer at approx. 3900'
- D. Description of the proposed unloading, surface storage, and spill containment facilities:
The unloading area will be concrete with a concrete vault to hold any spillage. The water will be stored in 210 or 400 BBL tanks which will be placed on a concrete pad with concrete walls. This dike will be of sufficient size to contain all water in case of tank failure.
Trucks will unload through a strainer/ filter into the tanke. Water will be filtered to the injection pump.

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33. **PROPOSED INJECTION VOLUMES**

- A. Indicate the estimated amount of saltwater to be injected into the proposed injection well per day:
 AVERAGE: _____ 800 _____ MAXIMUM: _____ 1600 _____
- B. Indicate the method to be used to measure the actual amount of saltwater injected into the well:
Paperwork turned in by drivers. Electronics on unload station to monitor trucks & amount of water with flowmeter

34. **PROPOSED INJECTION PRESSURES**

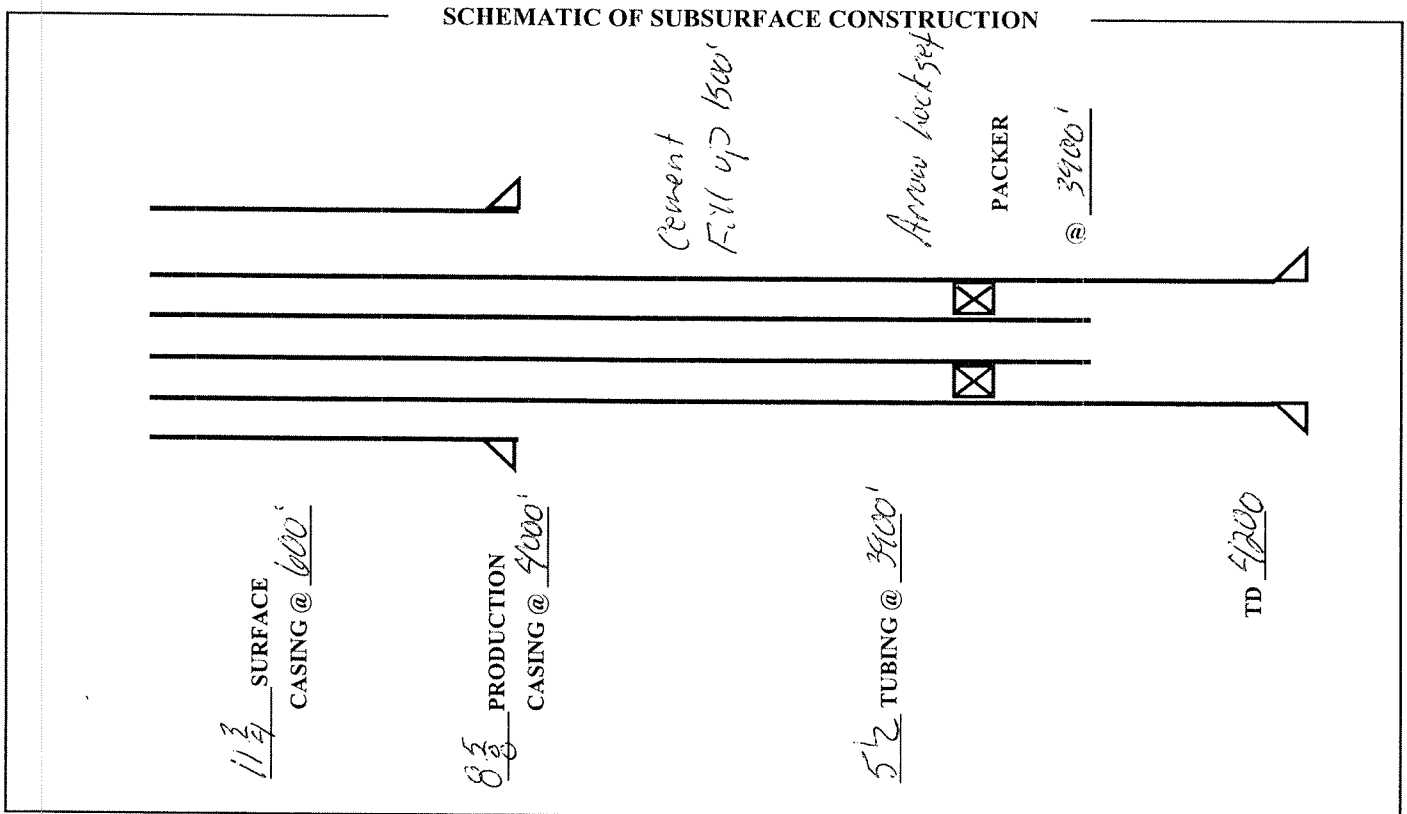
- A. Indicate the estimated pressure to be used for injection of saltwater into the proposed injection well:
 AVERAGE: _____ 800 _____ MAXIMUM: _____ 1000 920 PSI gmbz
- B. Indicate the method to be used to measure the actual daily injection pressure:
Guages on wellhead recorded be well tender and electronics on the well with transducers

35. **PROPOSED CORRECTIVE ACTION**

Explain any corrective action proposed for wells penetrating the proposed injection formation or zone within the area of review.

There is no wells within the are of review.

36. **MAP.** Each application for a permit shall be accompanied by a map or maps showing and containing the following information:
- A. The subject area trace or tracts of land and their owners upon which the proposed enhanced recovery operations are to be conducted;
 - B. The location and designation of all input, withdrawal, or observation wells on the tract or tracts to be utilized in the enhanced recovery project.
 - C. The geographic location of all wells, penetrating the formation proposed for injection regardless of status, within the area of review;
 - D. All holders of the land owner's royalty interest of record, or holders of the severed oil and gas mineral estates of record in the subject area.
 - E. All owners or operators of wells producing from or injecting into the same formation proposed as the injection formation.
37. **SCHEMATIC DRAWING OF SUBSURFACE CONSTRUCTION.** Label the schematic drawing below indicating size and setting depth of surface casing, intermediate (if any) and production casings; amount of cement used, measured or calculated tops of cement; size and setting depth of tubing; type and setting depth of packer; geologic name of injection zone showing top and bottom of injection interval. If the proposed input well design is substantially different from the schematic below, attach on a separate sheet a schematic of your proposal labeled with the above information.



38. Public notice of an application for an enhanced recovery project is required by law. In addition, the applicant must submit, on an attached sheet, a list of the names and address of those persons required to receive personal notice in accordance with Rule 1501:9-5-05(E)(1), of the Ohio Administrative Code.

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After submitting the application, and after a determination by the Division that it is complete as required by the rules of the Division, a legal notice must be published by the applicant in a newspaper of general circulation in the area of review. The legal notice must contain the information described in Rule 1501:9-5-05(E)(1) of the Ohio Administrative Code. A copy of the notice must be delivered to all owners or operators of wells within the area of review producing from or injecting into the same formation proposed as the injection formation. Proof of publication, publication date, and an oath as to the delivery to those entitled to receive personal notice under this method must be filed with the Division within thirty days after the Division determines that the application is complete.

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In addition, notice of all applications for enhanced recovery projects will be published in the Division's Weekly Circular.

The undersigned hereby agrees to comply with all provisions for an enhanced recovery project as required by Chapter 1501:9-5 of the Ohio Administrative Code. In addition, the undersigned deposed and says that he shall conform to all provisions of Section 1509.072 of the Ohio Revised Code, and to all orders and rules issued by the Chief, Division of Oil and Gas Resources Management.

Owner/Authorized Agent (Type or Print): Charles J. Coffer
 Signature of Owner/Authorized Agent: [Signature] Title: Pres
 Permanent Address of Home Office: 7046 Cedar Valley Rd W. Salem, OH 44267

If signed by Authorized Agent, a certified copy of appointment of agent must be on file with the Division.

SWORN to and subscribed before me this 28 day of March, 2012.



KRISTIN L. CUTLER
 Notary Public, State of Ohio
 Commission Expires
 April 1, 2012

[Signature]
 Notary Public
April 1, 2012
 Date Commission Expires

aAMY0000910

Class II Injection Well Permit Review Package

- Disclaimer
- Contents
- Overview
- References
- Basic Permit Review
 - Bedrock Topography Layer
 - Water Well Layer
 - Underground Coal Mine Layer
 - Surface Water Layer
 - Surface Topography layer
 - Quaternary Geology Layer
 - Oil and gas Layer
 - Groundwater-Source Water Protection Layer
 - Groundwater-Pollution Potential Layer
 - Coal Layer
- Extended Class II Injection Permit Review
 - Gravity Bouguer Anomaly
 - Gravity Free Air
 - Magnetic First Derivative
 - Magnetic Second Derivative
 - Magnetic Reduce Dipole
 - Precambrian Structure from PG-23
 - Knox Structure
 - Trenton Structure
 - EGSP Onondaga Structure
 - MRCSP Onondaga Structure
 - EGSP Berea Structure
 - Mississippian/Pennsylvanian Unconformity Surface
 - Middle Kittanning Coal Structure
 - Upper Freeport Coal Structure
 - Pittsburgh Coal Structure
 - Bedrock Geology
 - Bedrock Topography
 - EGSP Aerial Photo Lineament
 - EGSP LANDSAT Lineament
 - Mason Lineament
 - Oil and gas fields

Disclaimer

The products of the Ohio Department of Natural Resources, Division of Geological Survey, both digital maps and printed maps and any other associated documents are intended to provide general geologic information only and should not be used for any other purpose. It is not intended for resale or to replace site-specific investigations. These data were compiled by the Ohio Division of Geological Survey, which reserves the publication rights to this material. If these data are used in the compilation of other data sets or maps for distribution or publication, this source must be referenced.

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Geologic Review for Class II Wells

Application No. aAmy0000910

Portage County, Windham Twp.

SWIW: (Salt Water Injection Well)

Proposed Well Depth: 4,200 feet

Proposed Injection Zone: "Newburg"

Study area investigated ~ 15 mile radius centered on the proposed well location for all maps except the gravity and magnetic maps, which used 30 mile radius.

Gravity Bouguer Anomaly

- Nothing of note.

Gravity Free Air

- Nothing of note.

Magnetic First Derivative

- There is a northeast-southwest trend located about 24 miles to the northwest of the permit application.

Magnetic Second Derivative

- There is a northeast-southwest trend located about 24 miles to the northwest of the permit application.

Magnetic Reduce Dipole

- There is a northeast-southwest trend located about 24 miles to the northwest of the permit application.

Precambrian Structure from PG-23

- There are no known structural features near the permit application.
- The northeast-southwest trending Akron Magnetic boundary is approximately 20 miles to the northwest of the permit application.

Knox Structure

- There are no known structural features in the study area.

Trenton Structure

- There are no known structural features in the study area.

EGSP Onondaga Structure

- There are no known structural features in the study area.

MRCSP Onondaga Structure

- There are no known structural features near the permit application.

EGSP Berea Structure

- The permit application is located on the flank of a northeast-southwest trending high.

Mississippian/Pennsylvanian Unconformity Surface

- Nothing of note.

Middle Kittanning Coal Structure

- Unit not present.

Upper Freeport Coal Structure

- Unit not present.

Pittsburgh Coal Structure

- Unit not present.

Bedrock Geology

- The top of bedrock for the permit application is near the boundary of the Upper Pennsylvanian Allegheny and Pottsville undivided and Mississippian Logan and Cuyahoga Formations undivided.

Bedrock Topography

- The bedrock topography map indicates an east-west trending channel approximately 2 miles to the northwest.

EGSP Aerial Photo Lineament

- Numerous lineaments generally less than 1 mile in length have been interpreted from aerial photos by Gray and others (1982) over and in the immediate vicinity of the permit application with 2 dominant directions oriented northwest-southeast and northeast-southwest.

EGSP LANDSAT Lineament

- A northwest-southeast trending lineament less than 1 mile in length is present about ½ mile to the northwest of the permit application.

Mason Lineament

- An east west trending lineament is present approximately 1 1/2 miles to the north of the permit. Another northeast-southwest trending lineament is present approximately 4 miles to the south.

Oil and gas fields

- Production in the study area is in the "Clinton," Berea, and Knox. The permit application is located within the Aurora gas field that produces from the "Clinton."

Earthquakes

- There has been 1 earthquake in 1988 within the 30-mile study area. The epicenter is approximately 4 miles northwest of the salt water injection permit and had a magnitude of 2.8.

Injection Wells

- There are 17 active salt water disposal (SWD), 1 injection for enhanced oil recovery (EOR), 1 producing for enhanced oil recovery (IEOR), and 16 inactive salt water disposal (ISWD) wells within the 30-mile study area. They are injecting into the "Clinton/Medina" and Lockport ("Newburg"). The nearest injection well is less than 1 mile to the south.

To summarize, this proposed injection well in the "Newburg" is of no major concern. It is not located within close proximity to any known faults. There has been 1 documented earthquake with a magnitude of 2.8 within the 30-mile study area, which was 4 miles to the northwest of the permit application. Injection well records indicate there are currently 17 SWD wells, 1 EOR, 1 IEOR, and 16 ISWD wells in the 30-mile study area. The nearest oil and gas producing field is the Aurora field that produces from the "Clinton" sandstone.

References

- Baranoski, M.T., 2002, Structure contour map on the Precambrian unconformity surface in Ohio and related basement features: Ohio Division of Geological Survey Map PG-23, scale 1:500,000, and 18-p. text.
- Gray, J.D., and others, 1982, An integrated study of the Devonian-age black shales in eastern Ohio: Ohio Division of Geological Survey, final report for U.S. Department of Energy Eastern Gas Shales Project: U.S. Department of Energy Report No. DOE/ET/12131-1399.
- Hansen, M.C., 2002, Earthquake epicenters in Ohio and adjacent areas: Ohio Division of Geological Survey Map EG-2, scale 1:500,000.
- Hildenbrand, T.G., Gravity anomaly maps of Ohio, U.S. Geological Survey Geophysical Investigations Map GP-963, scale 1:1,000,000.
- Hildenbrand, T.G. and Kucks, R.P., 1984a, Residual total intensity magnetic map of Ohio: U.S. Geological Survey Geophysical Investigations Map GP-961, scale 1:500,000.
- Hildenbrand, T.G. and Kucks, R.P., 1984b, Complete Bouguer gravity anomaly map of Ohio: U.S. Geological Survey Geophysical Investigations Map GP-962, scale 1:500,000.
- Mason, Greg, 1999, Structurally related migration of hydrocarbons in the central Appalachian basin of eastern Ohio: Ohio Geological Society, Proceedings of the sixth annual fall symposium, p. 20-33.
- Ohio Division of Geological Survey, 2003, Shaded bedrock-topography map of Ohio: Ohio Department of Natural Resources, Division of Geological Survey Map BG-3, available as 1:500,000-scale and digital (GIS) format.
- Ohio Division of Geological Survey, 2003, Structure map of the Lower Freeport coal, unpublished digital (GIS) map.
- Ohio Division of Geological Survey, 2003, Structure map of the Lower Kittanning coal, unpublished digital (GIS) map.
- Ohio Division of Geological Survey, 2003, Structure map of the Middle Kittanning coal, unpublished digital (GIS) map.
- Ohio Division of Geological Survey, 2003, Structure map of the Mississippian-Pennsylvanian unconformity, unpublished digital (GIS) map.
- Ohio Division of Geological Survey, 2003, Structure map of the Pittsburgh coal, unpublished digital (GIS) map.

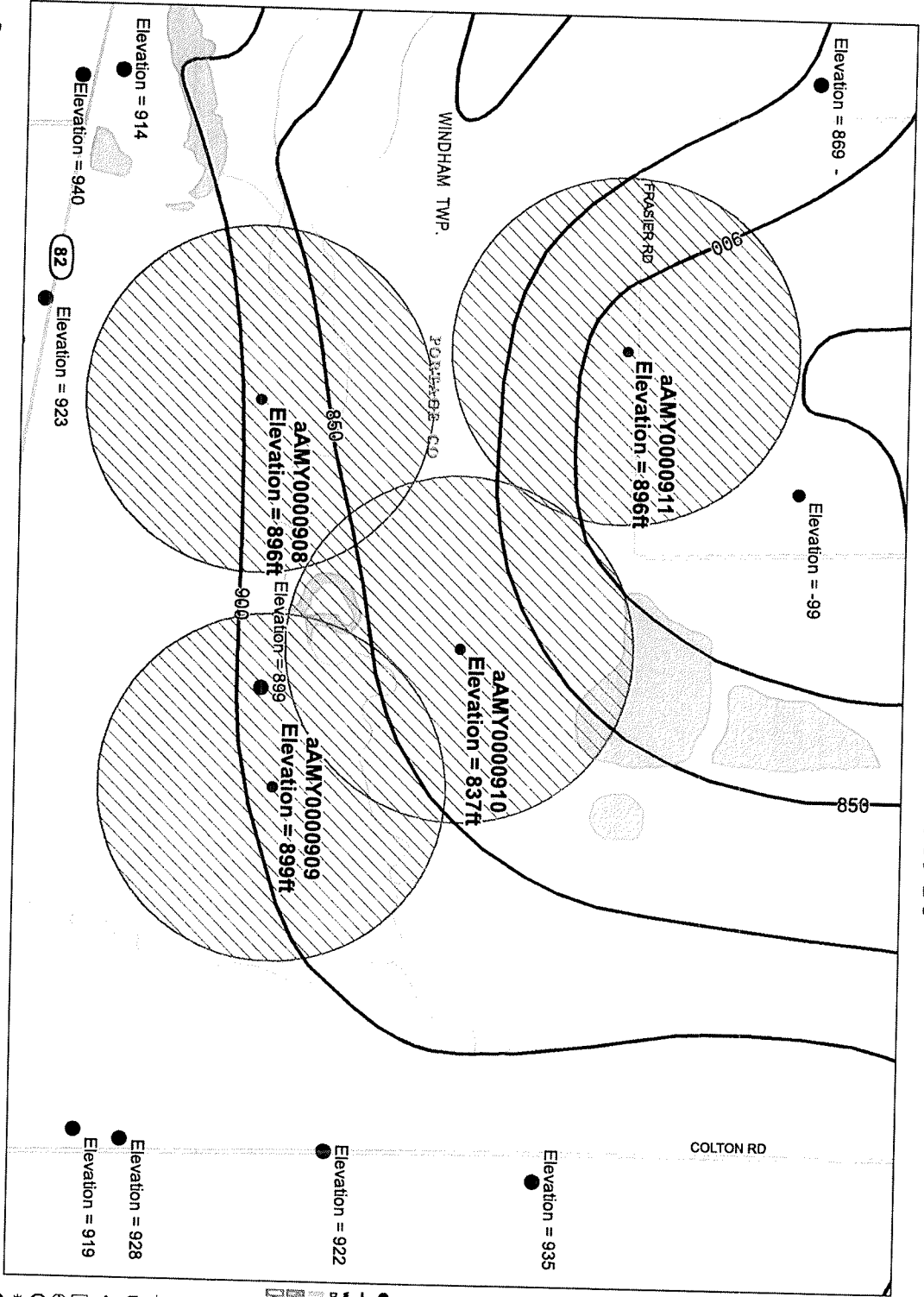
Ohio Division of Geological Survey, 2003, Structure map of the Upper Freeport coal, unpublished digital (GIS) map.

Patchen, D.G., Hickman, J.B., Harris, D.C., Drahovzal, J.A., Lake, P.D., Smith, L.B., Nyahay, Richard, Schulze, Rose, Riley, R.A., Baranoski, M.T., Wickstrom, L.H., Laughrey, C.D., Kostelnik, Jaime, Harper, J.A., Avary, K.L., Bocan, John, Hohn, M.E., and McDowell, Ronald, 2006, A Geologic Play Book for Trenton-Black River Appalachian Basin Exploration: Final report prepared for U.S. Department of Energy, contract no. DE-FC26-03NT41856, 601 p.

Slucher, E. R., compiler, Swinford, E. M., Larsen, G. E., Schumacher, G. A., Shrake, D. L., Rice, C. L., Caudill, M. R., and Rea, R. G., 2006, Bedrock geologic map of Ohio: Ohio Division of Geological Survey Map BG-1, scale 1:500,000.

Bedrock Topography Layers

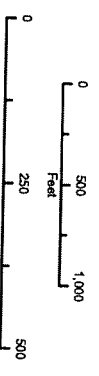
Well APPNO - aAMY0000910



Basemaps

Railroad
 Local Road
 State Route
 U.S. Highway
 Interstate

Hydrography Line
 Hydrography Polygon
 Hydrography
 City
 Township
 County



Date Created: 4/4/2012
Data Source: Bedrock Topography Layers, Division of Geological Survey (DGS)



Legend

- Data Point Value
- Dashed Line
- Hatched Area
- Well Feature Type
- Well Feature
- Well Feature Bound
- Well Feature Bound
- Well Feature Bound
- Well Feature Bound
- Well Feature Bound

BT Data Points

- POINT_TYPE
- △
- X
-

Other Features

- Well Feature Bound
- Well Feature Bound
- Well Feature Bound
- Well Feature Bound
- Well Feature Bound

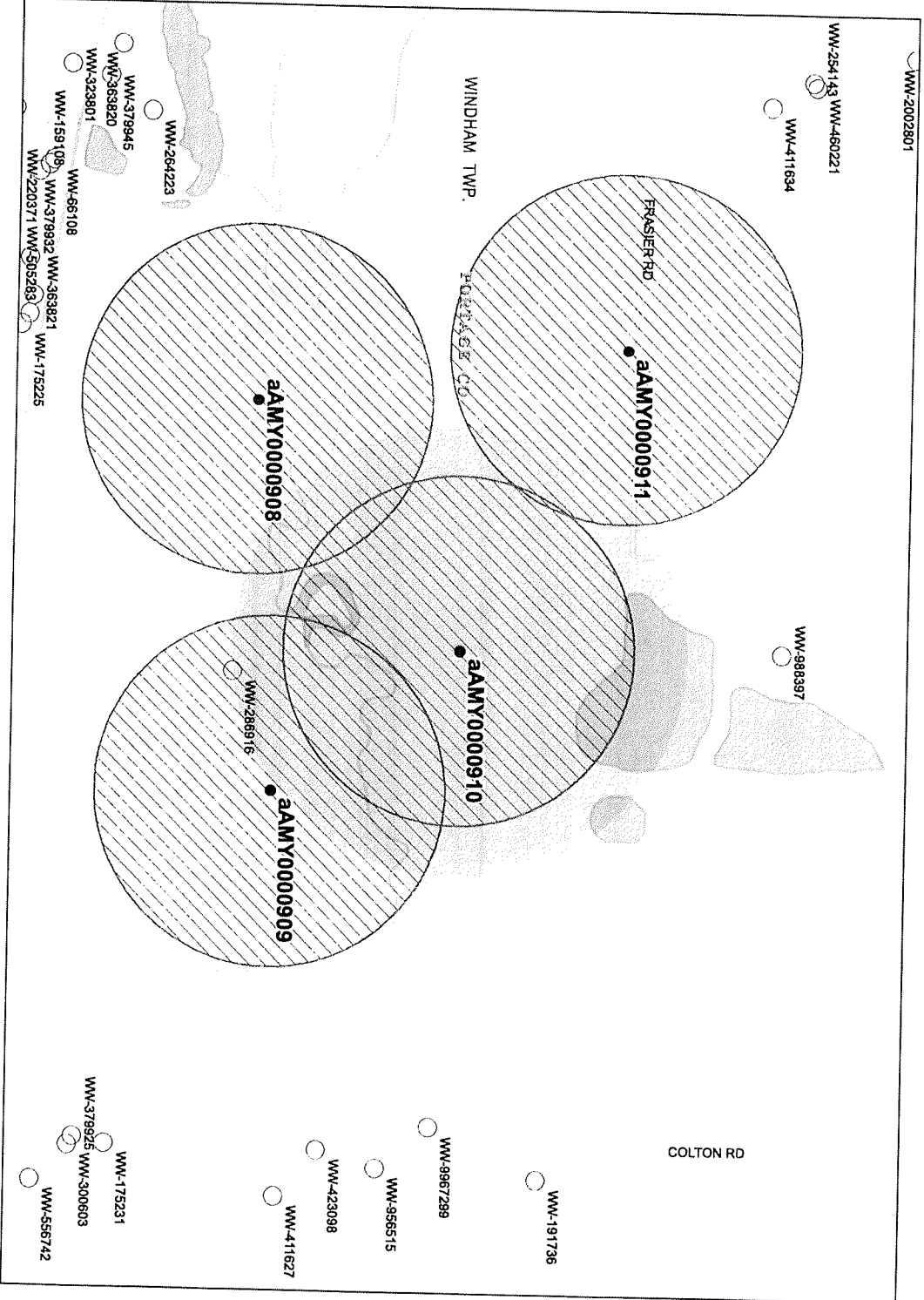
US Geological Survey report well
 Well used data from the Division of Natural Resources
 Well Color
 Well Type
 Well Diameter
 Well Depth
 Well Status
 Well Comment

Bedrock Topography 500K

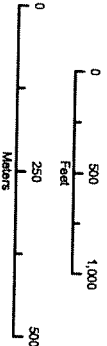
Scale: 1:100

Water Well Layer

Well APPNO - aAMY0000910



- Basemap**
- Railroad
 - Local Road
 - State Road
 - U.S. Highway
 - Interstate
 - Hydrography Line
 - Hydrography Polygon
 - Hydrography Intersect
 - City
 - Township
 - County

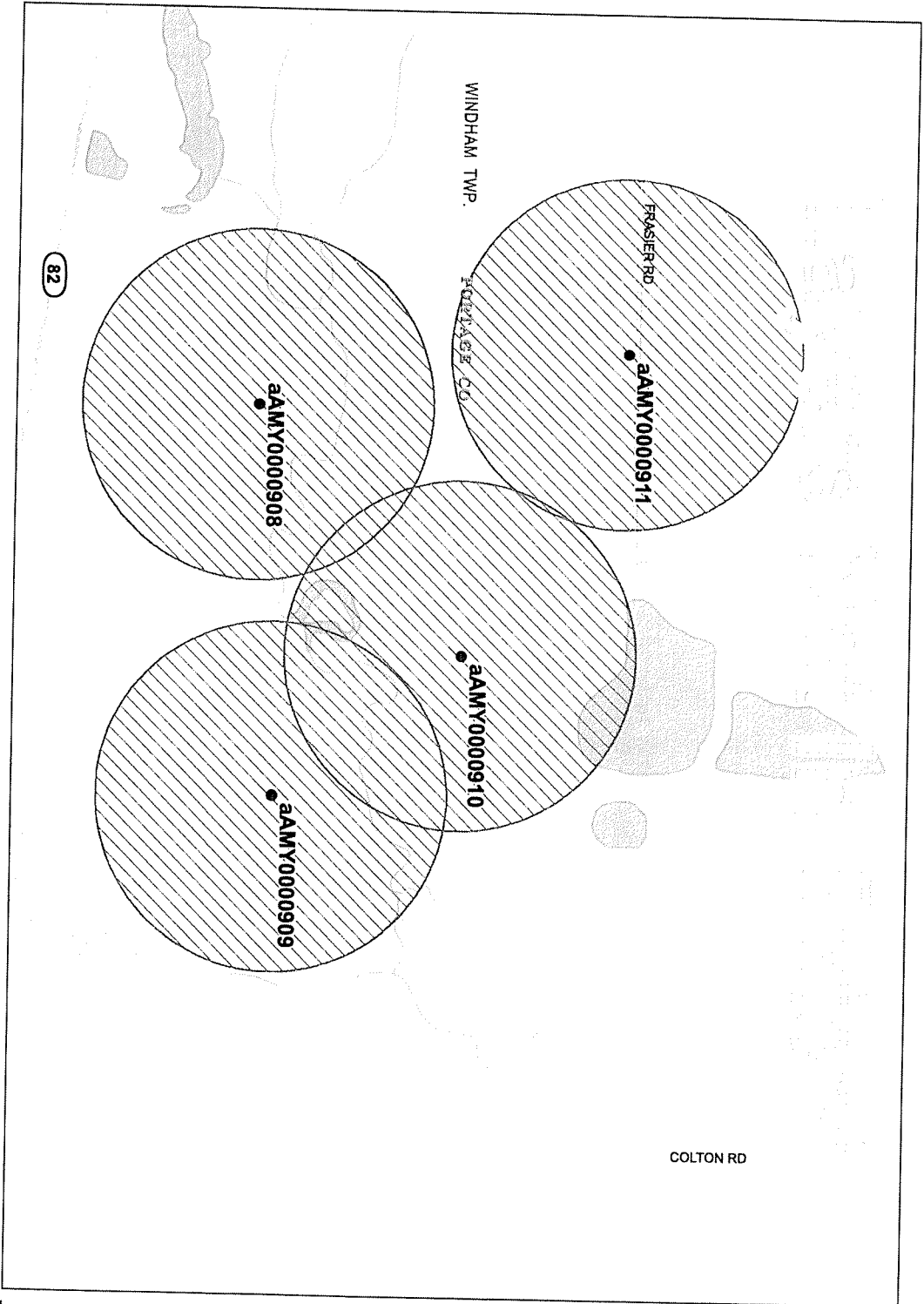


Date Created: 4/4/2012
Data Source: Water Well Layer, Division of Soil and Water Resources (DSWR)



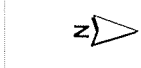
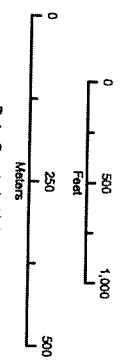
- Checkered Line
- Well Station Type
- Checkered Polygon
- Checkered Intersect
- Well Station Checked
- Well Station

Underground Coal Mine Layers Well APPNO - aAMY0000910



82

- Basemaps**
- Railroad
 - Local Road
 - State Route
 - U.S. Highway
 - Interstate
 - Hydrography Line
 - Hydrography Polygon
 - Hydrography Intersect
 - City
 - Township
 - County

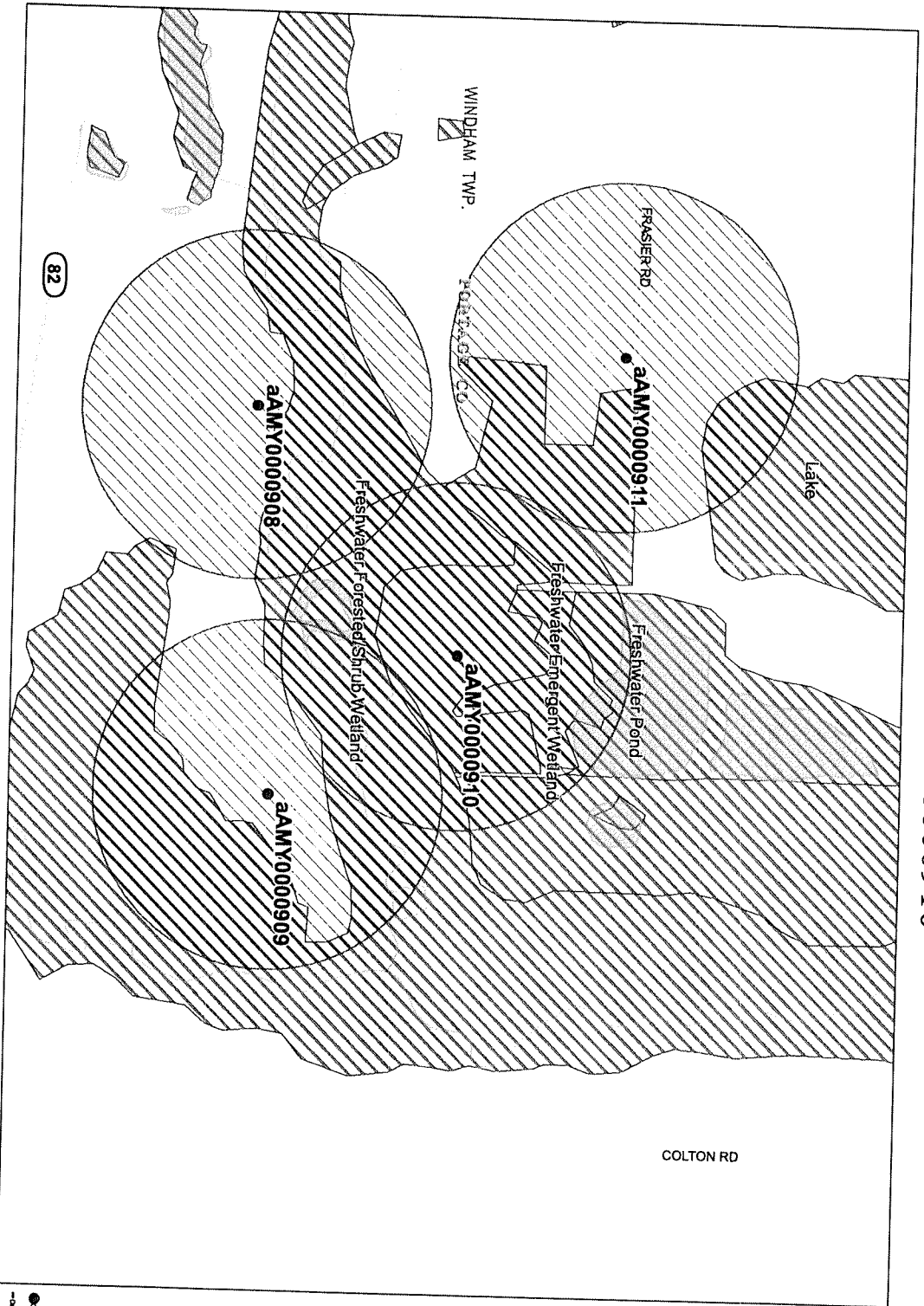


- Well Point Well
 - Abandoned Layer
 - Well Status Type
 - DR
 - Operative Ground
 - Other Mine Ground
 - Non Operative Ground
 - Block
 - Active - 2009 at Report
 - Active Opening
 - Entry Code
 - Well Status
 - Well Point Well
 - Well Point Well
 - Well Point Well
 - Well Point Well
- Abandoned Operating**
- Entry Code
 - Well Status
 - Well Point Well
 - Well Point Well
- TYPE CODE**
- Well Point Well
 - Well Point Well
 - Well Point Well
 - Well Point Well

Produced Under
West Virginia
Department of Environmental Protection
Division of Geological Survey
April 1999, 11/14/1999, 10/1999

Surface Water Layers

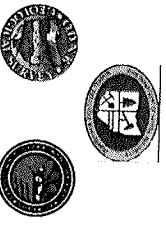
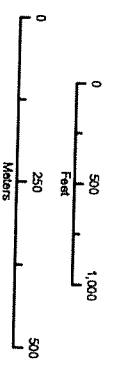
Well APPNO - aAMY0000910



- Basemaps**
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 - ◆ U.S. Highway
 - ◆ Interstate
 - ◆ Hydrography Use
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 - ◆ City
 - ◆ Township
 - ◆ County



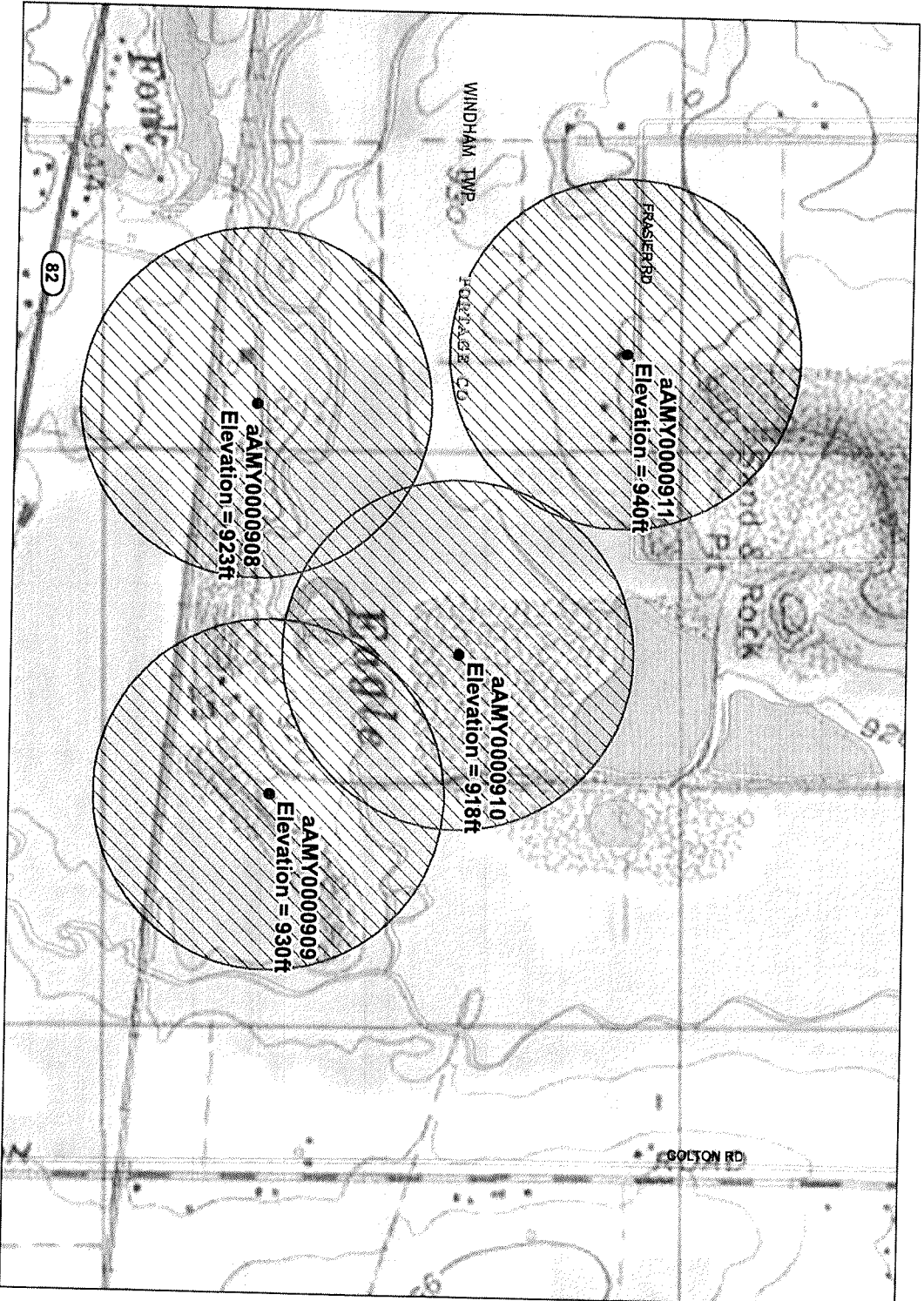
Data Sources: Surface Water Layers, Federal Emergency Management Agency (FEMA), and Division of Watercraft (DWC)



- Contour Interval
- Contour Line
- Well Number Type
- ◆ DW
- ◆ Delineation District
- ◆ District Status District
- ◆ Post Delineation District
- ◆ District Name
- ◆ Marine Waters Inventory Point
- ◆ Boundary
- ◆ Point Name (Start Channel)

Surface Topography Layers

Well APPNO - aAMY0000910



Basemaps

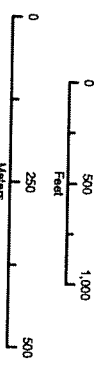
- Retained
- Local Road
- State Route
- U.S. Highway
- Interstate
- Hydrography Line
- Hydrography Polygon
- Hydrography Polygon
- Hydrography Polygon
- City
- Township
- County

Overview



Data Source: Surface Topography Layers, Division of Geological Survey (DGS) and Environmental Science Research Institute (ERSI)

Date Created: 4/4/2012

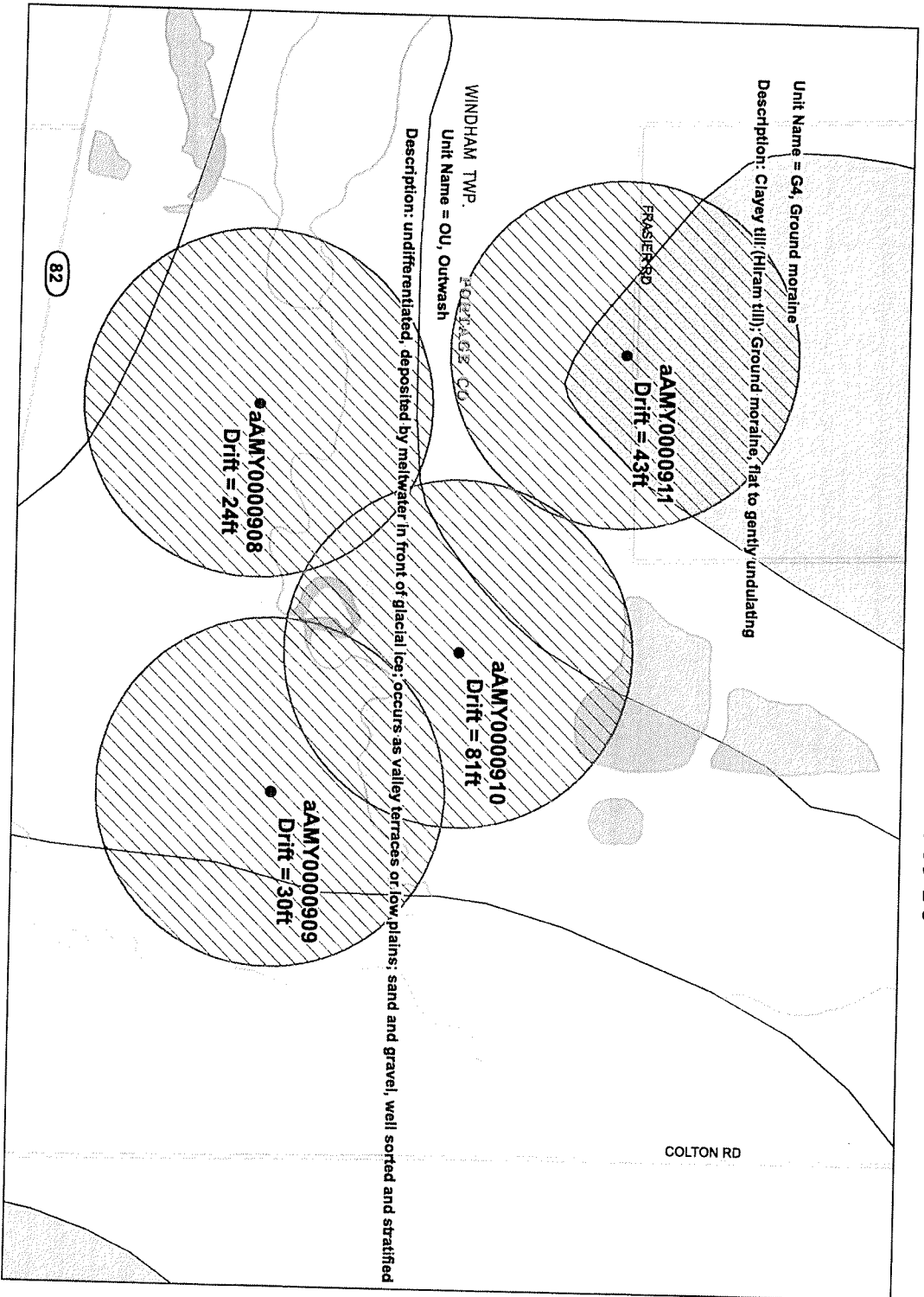


Well Point Data

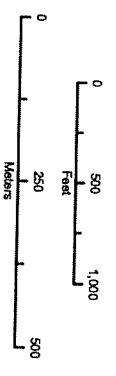
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- Installation Date
- Point Name
- Point Name

Quaternary Geology Layers

Well APPNO - aAMY0000910

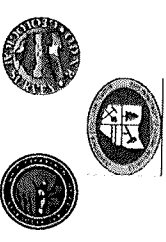


- Basemaps**
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 - Local Road
 - State Route
 - U.S. Highway
 - Interstate
 - Hydrography Line
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 - Hydrography Polygon
 - City
 - Township
 - County



Data Source: Quaternary Geology Layers, Division of Geological Survey (DGS)

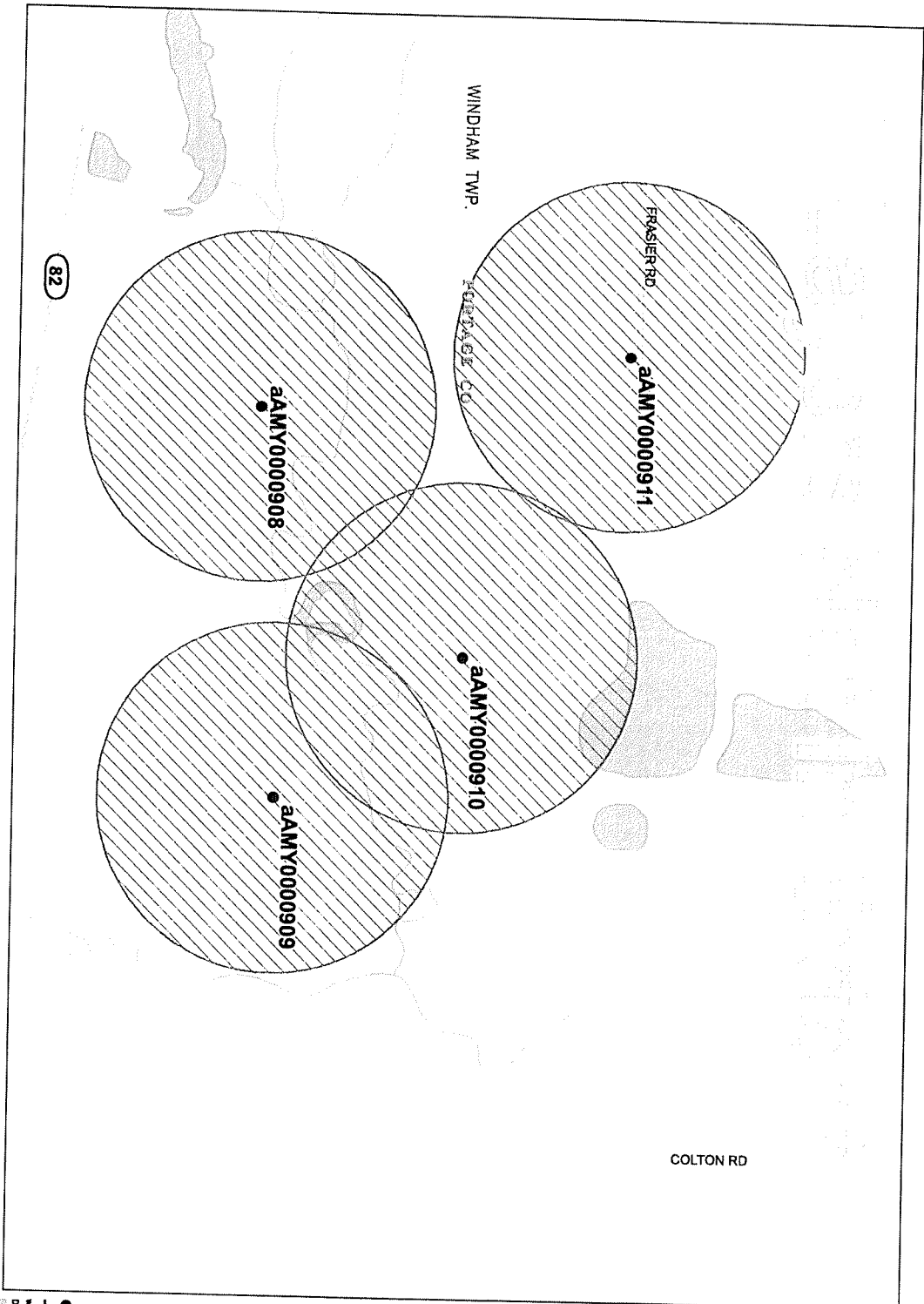
Date Created: 4/4/2012



- Well Symbol
- Drift Type
- Drift Type
- Drift Type

Groundwater - Source Water Protection Area Layers

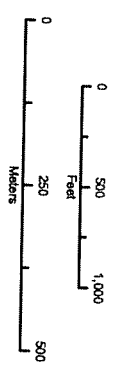
Well APPNO - aAMY0000910



- Basemaps**
- Railroad
 - Local Road
 - State Route
 - U.S. Highway
 - Interstate
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 - Hydrography Polygon Feature
 - City
 - Township
 - County



Data Source: Groundwater - Source Water Protection Areas Layers, Ohio Environmental Protection Agency (OEPA)

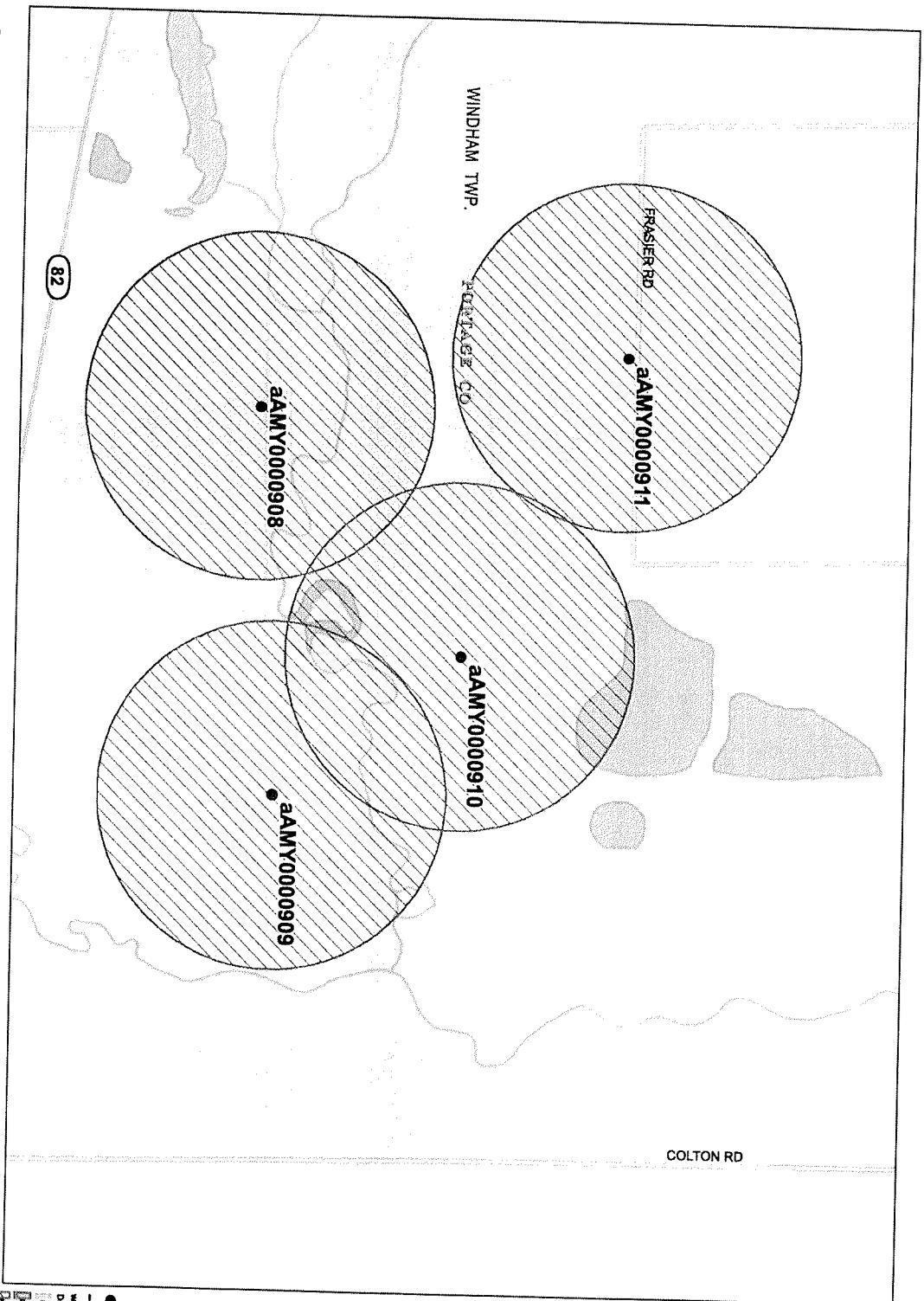


- Well Name
- Decision Line
- Well Feature Type
- DW
- Closed Area Ground
- Open Area Ground
- Unconsolidated Well Aquifer
- Open Well Aquifer
- SWHA TYPE**
- Well Management Zone (1-year flow of base)
- Source Water Protection Area - 5 Year TDT

Printer: 14, 100, 100

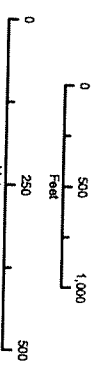
Groundwater - Pollution Potential Layers

Well APPNO - aAMY0000910

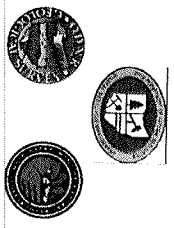


Basemaps

- Railroad
- Local Road
- State Route
- U.S. Highway
- Interstate
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- Hydrography Intersect
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- Township
- County

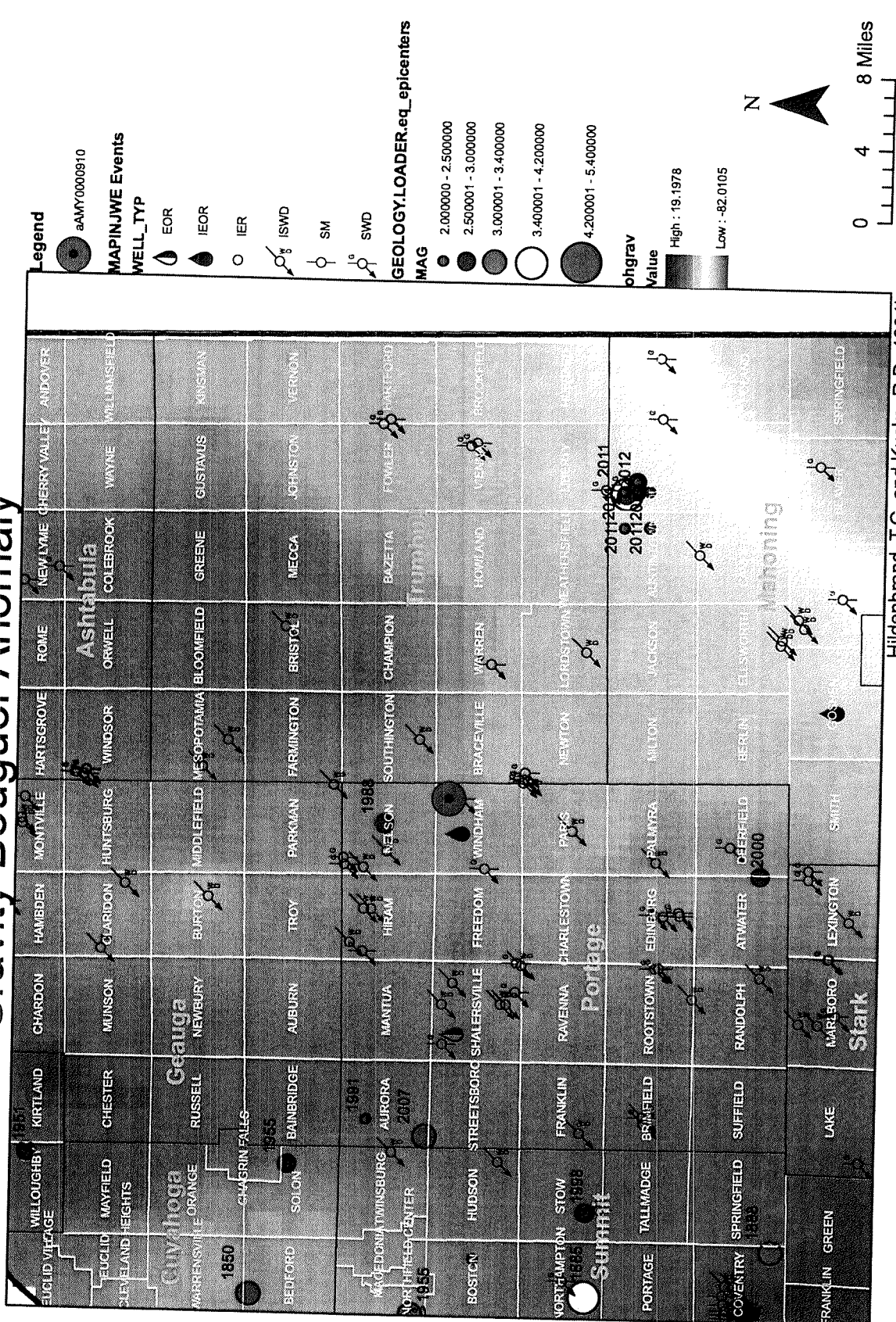


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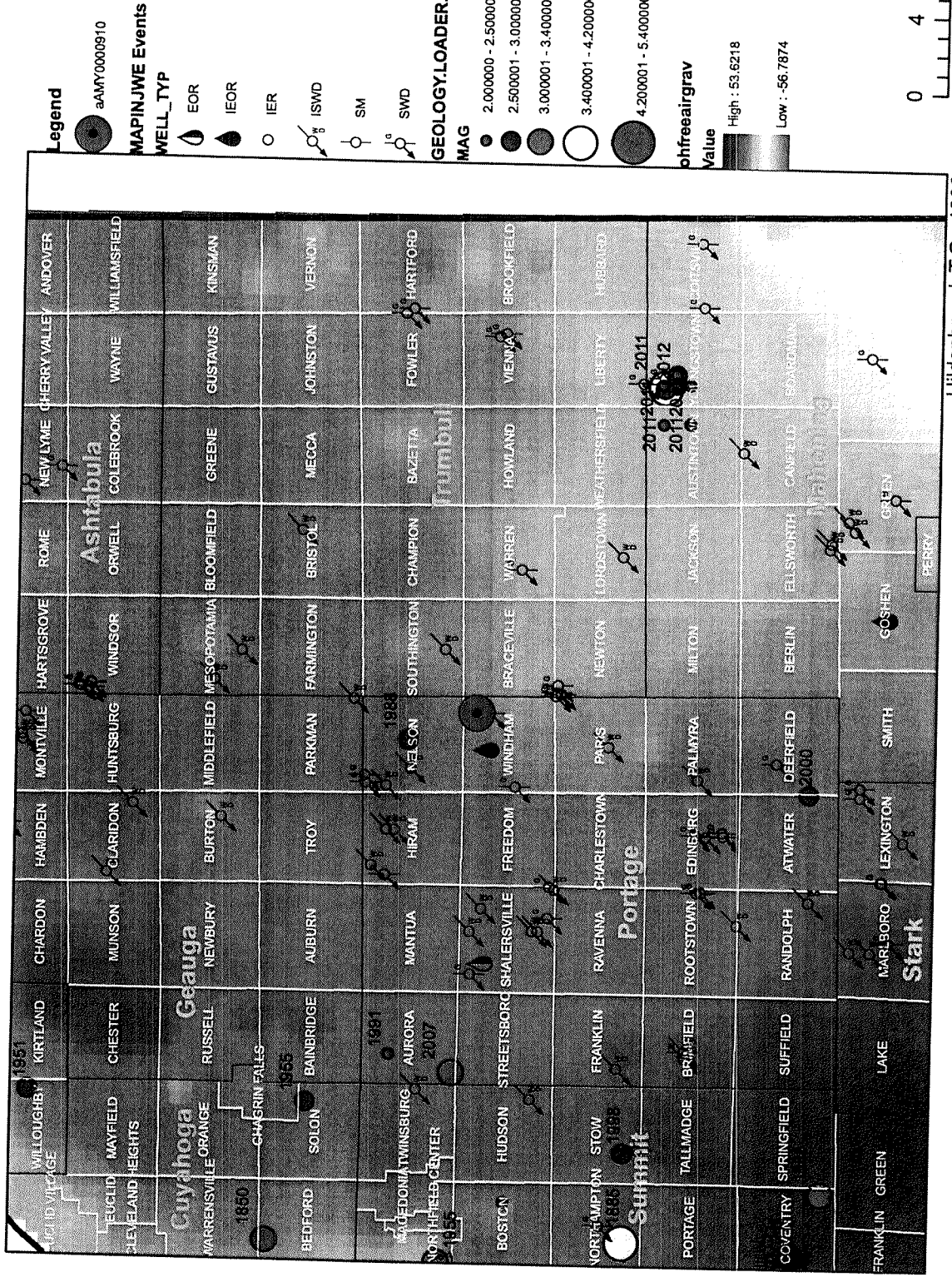
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Gravity Bouguer Anomaly

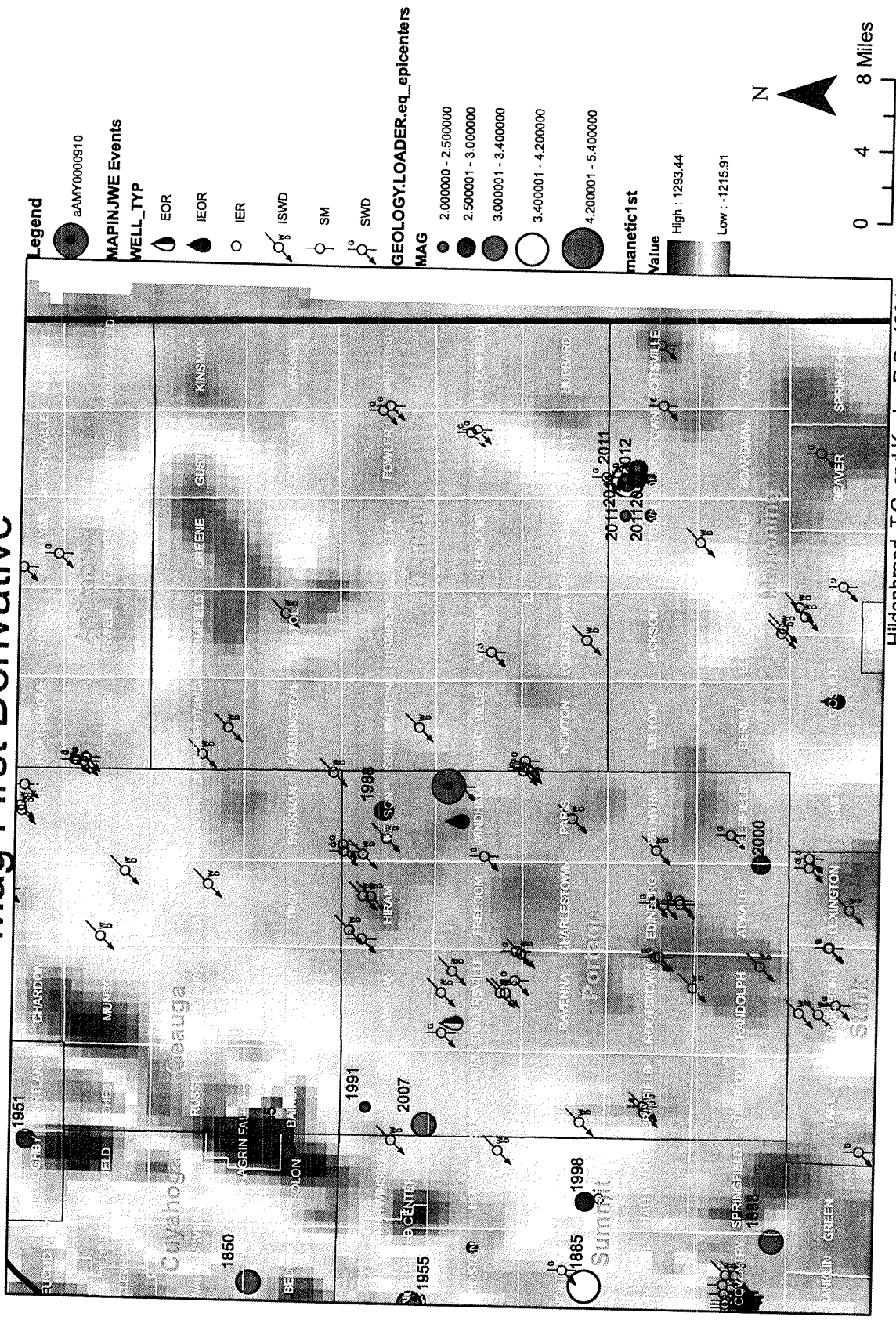


Hildenbrand, T.G. and Kucks, R.P., 1984b

Gravity Free Air

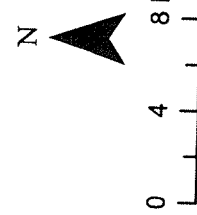


Mag First Derivative

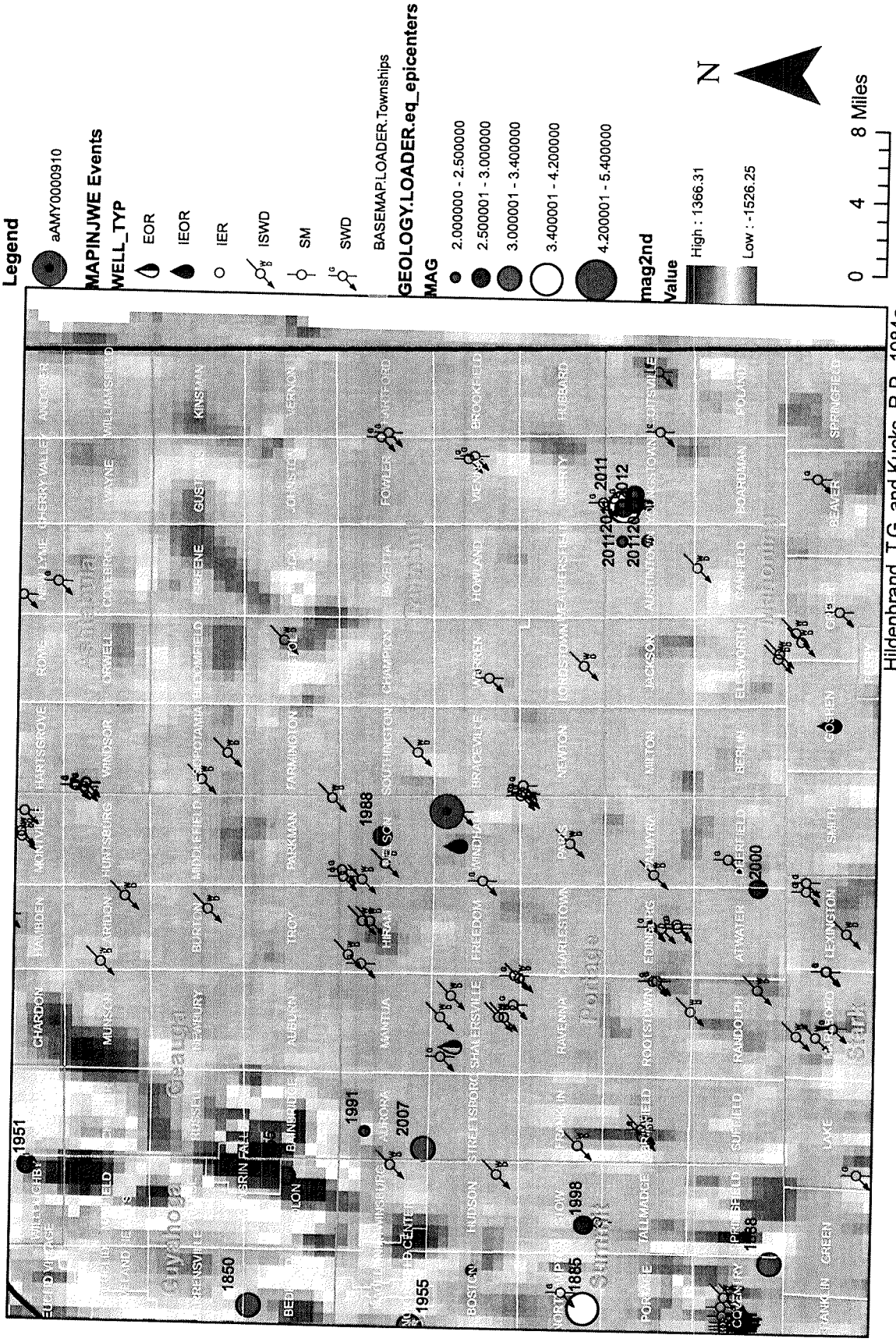


Hildenbrand, T.G. and Kucks, R.P., 1984a

Legend
 aAMY0000910
MAPINJWE Events
WELL_TYP
 EOR
 IEOR
 IER
 ISWD
 SM
 SWD
GEOLOGY.LOADER.eq_epicenters
MAG
 2.000000 - 2.500000
 2.500001 - 3.000000
 3.000001 - 3.400000
 3.400001 - 4.200000
 4.200001 - 5.400000
manetic1st
 Value
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 Low : -1215.91

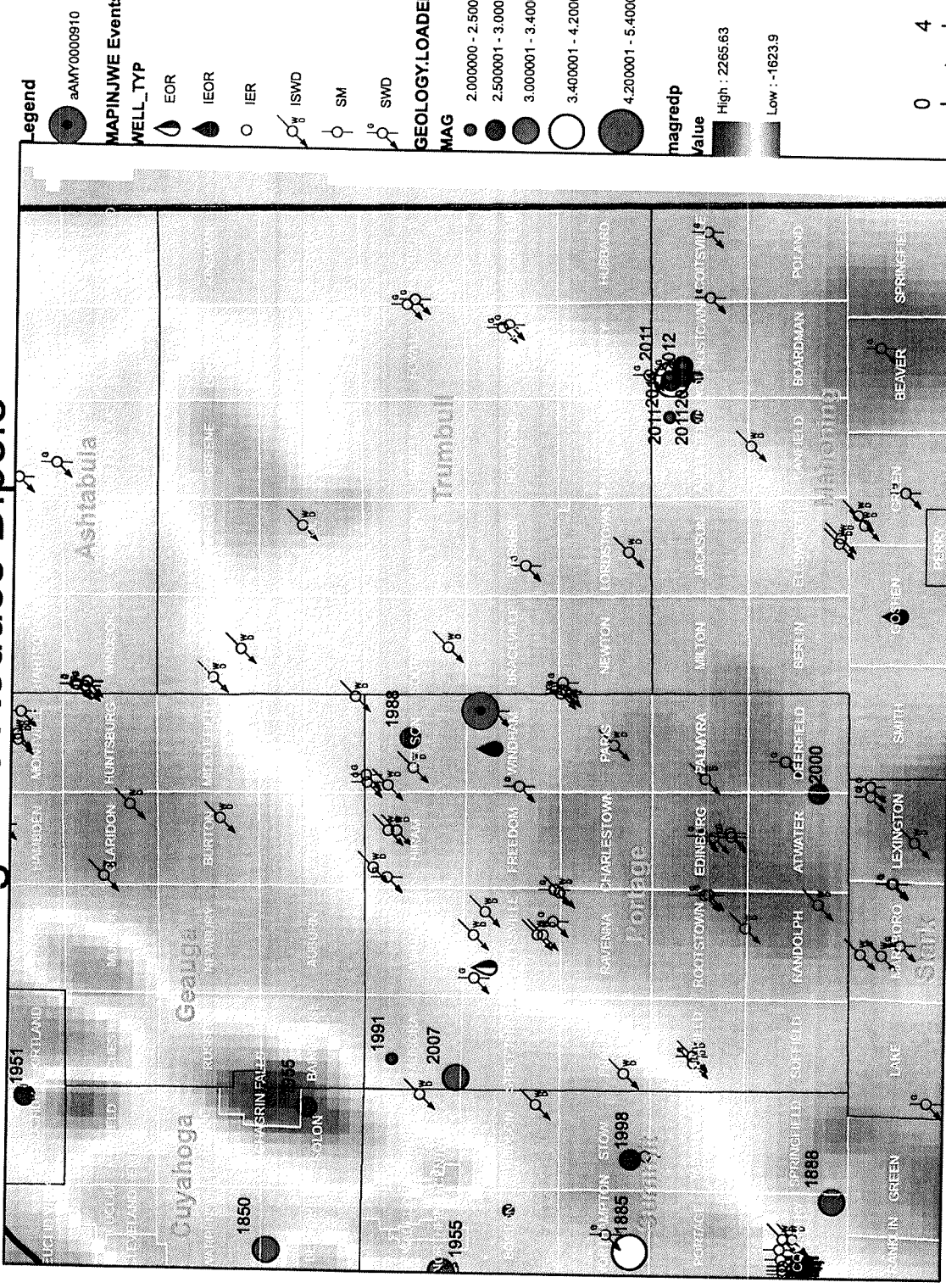


Magnetic Second Derivative



Hildenbrand, T.G. and Kucks, R.P., 1984a

Magnetic Reduce Dipole



Legend

- aAMY0000910**
- MAPINJWE Events**
- WELL_TYP**
 - EOR
 - I EOR
 - I ER
 - ISWD
 - SM
 - SWD
- GEOLOGY.LOADER.eq_epicenters**
- MAG**
 - 2.000000 - 2.500000
 - 2.500001 - 3.000000
 - 3.000001 - 3.400000
 - 3.400001 - 4.200000
 - 4.200001 - 5.400000
- magredp**
- Value**
 - High : 2265.63
 - Low : -1623.9

Hildenbrand, T.G. and Kucks, R.P., 1984a

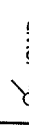
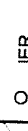
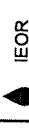
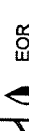
Precambrian Structure Contours from PG-23 (C.I. = 100 feet)

Legend



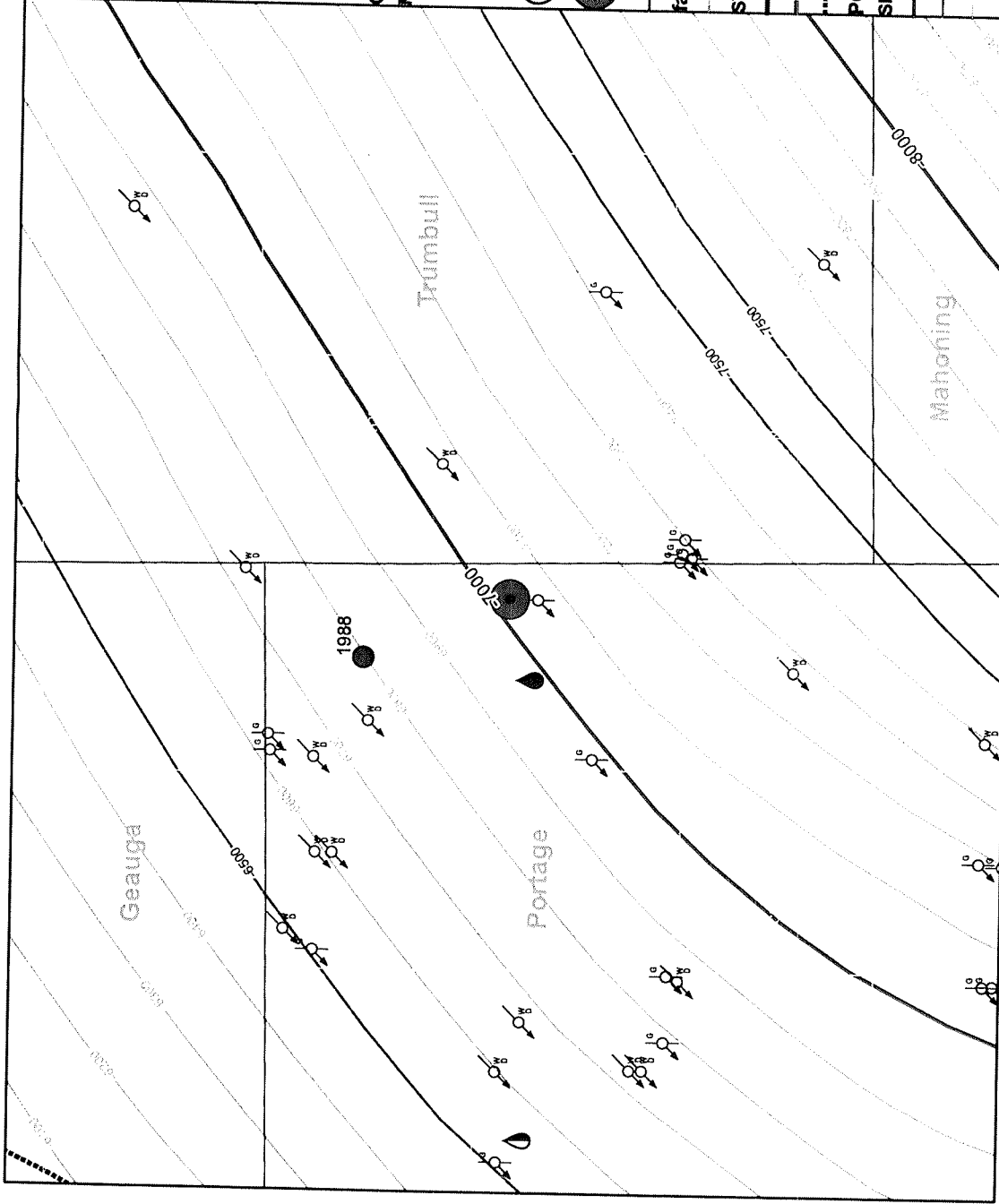
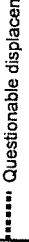
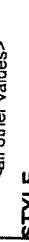
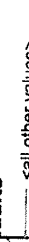
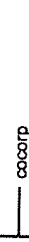
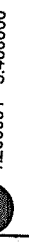
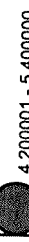
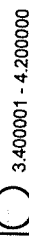
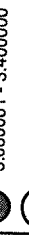
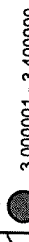
MAPINJWE Events

WELL_TYP



GEOLOGY.LOADER.eq_epicenters

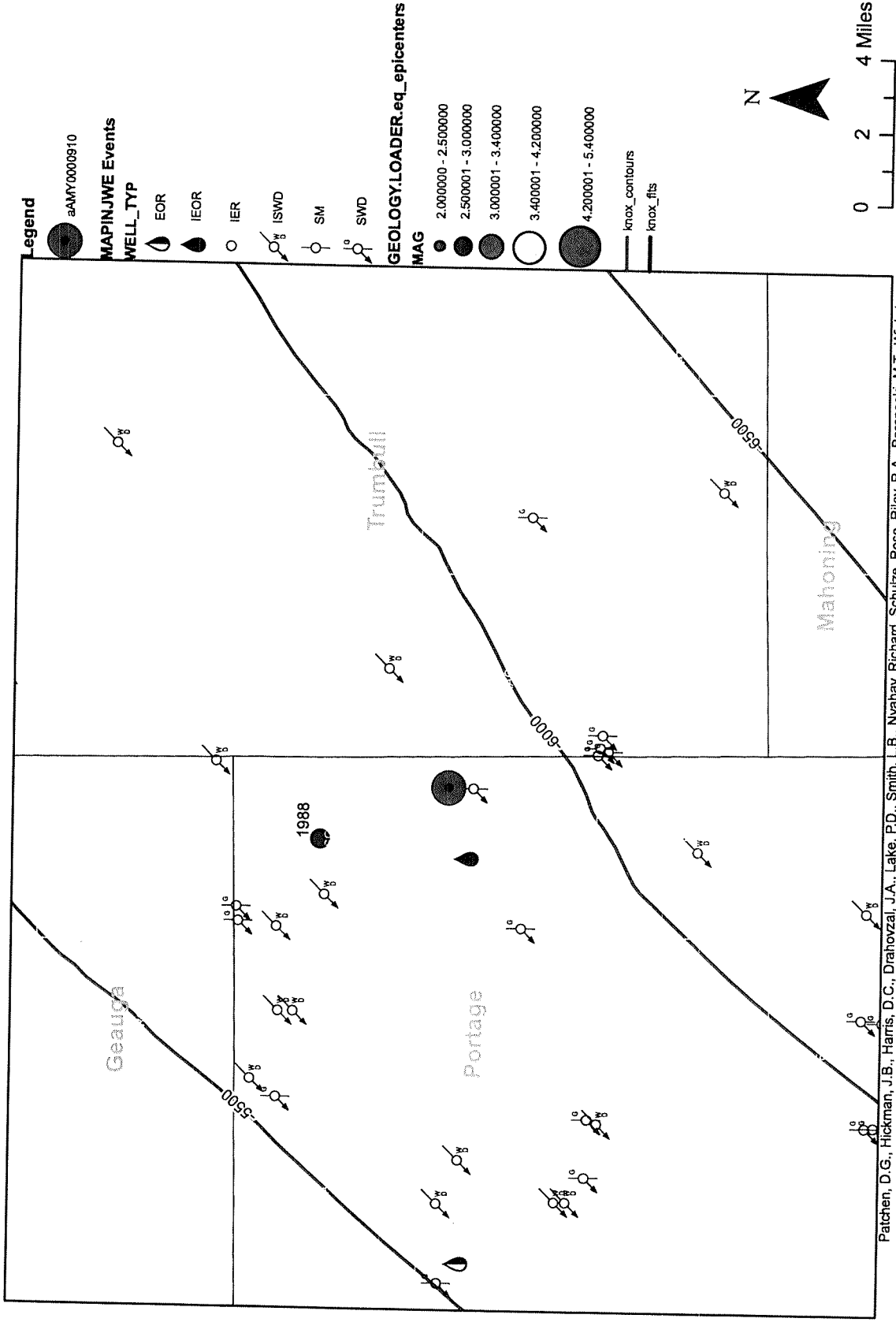
MAG



Baranoski, M.T., 2002

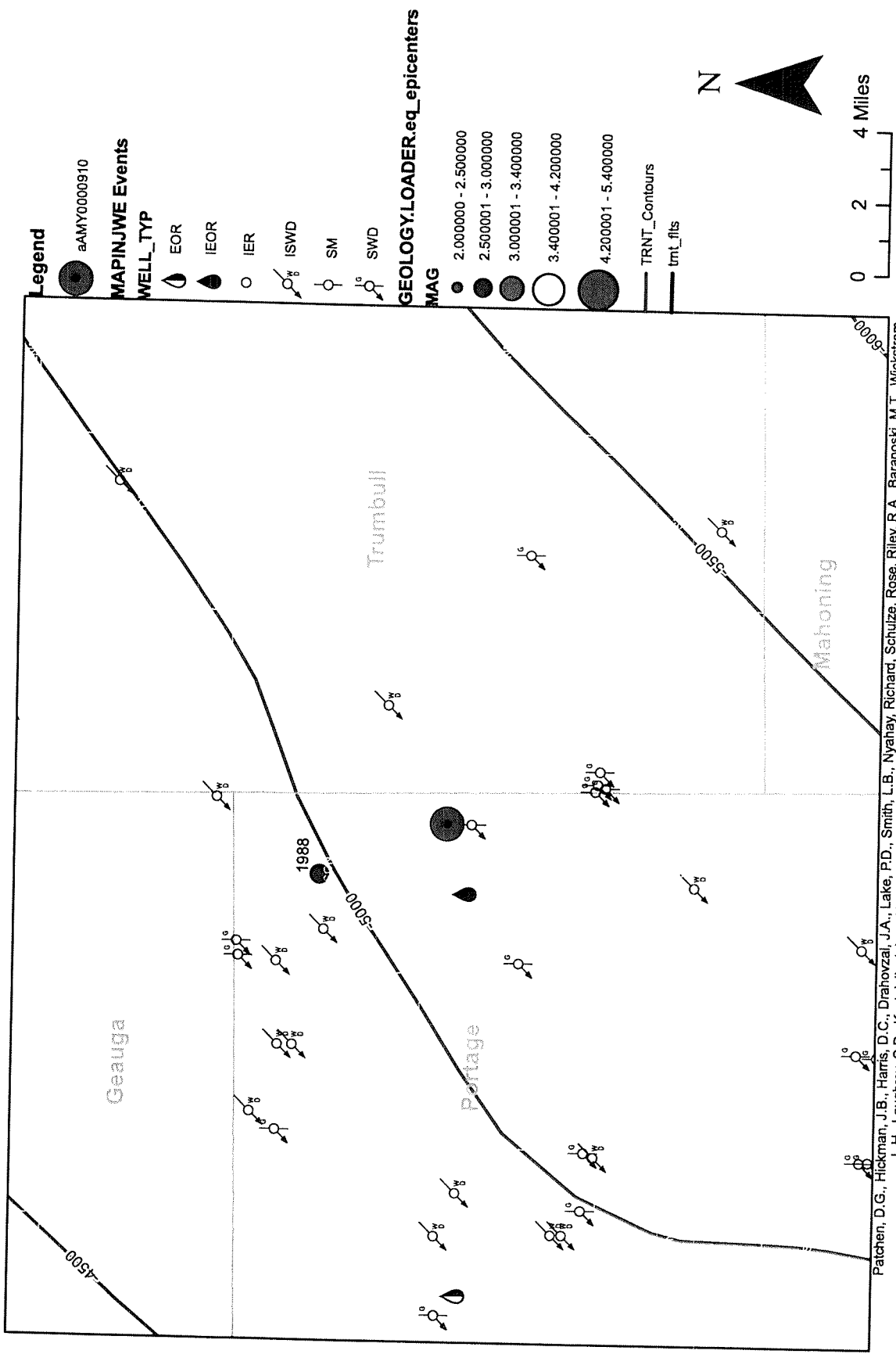


Knox Structure (C.I. = 500 feet)



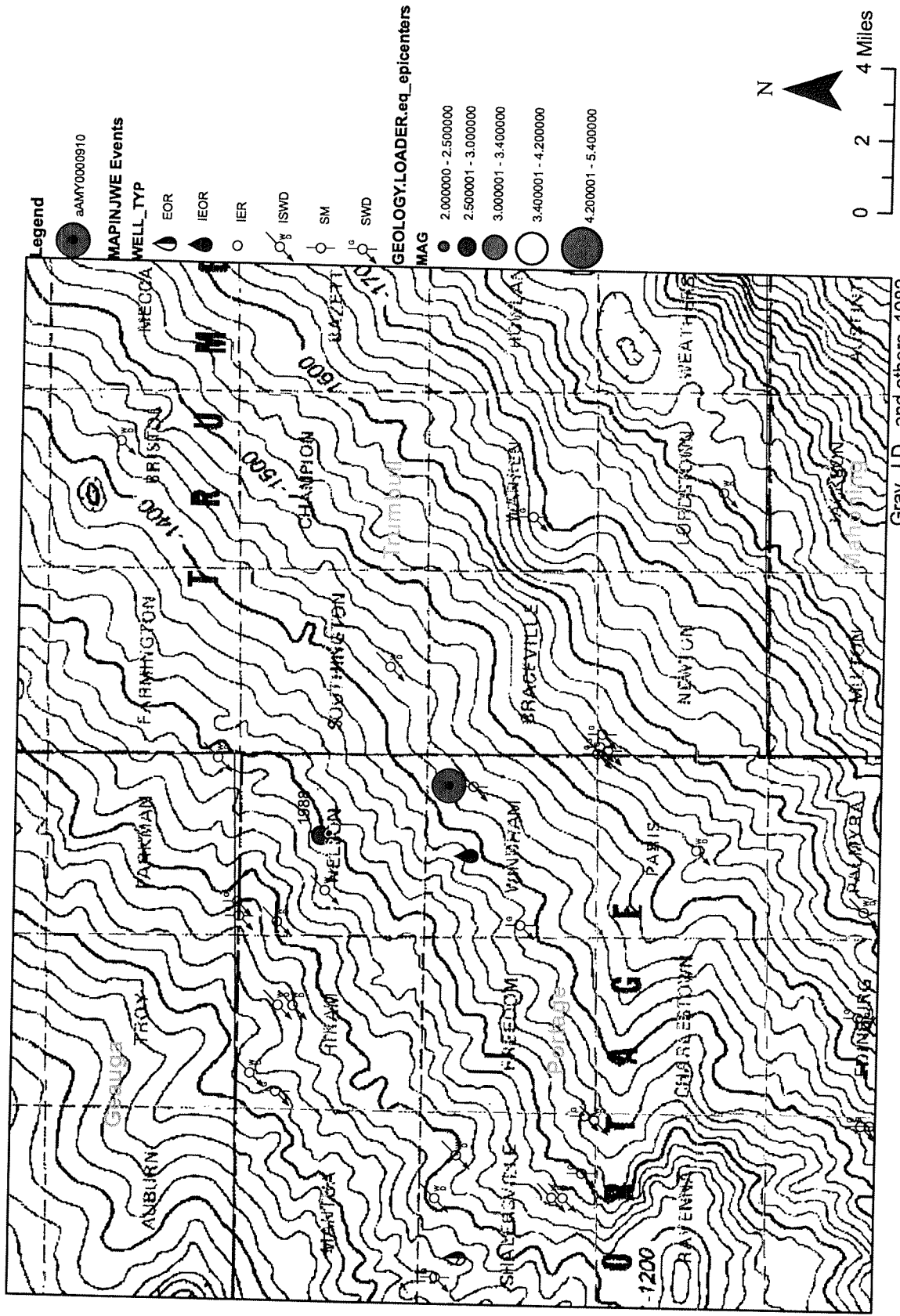
Patchen, D.G., Hickman, J.B., Harris, D.C., Drahozal, J.A., Lake, P.D., Smith, L.B., Nyahay, Richard, Schulze, Rose, Riley, R.A., Baranowski, M.T., Wickstrom, L.H., Laughrey, C.D., Kostelnik, Jaime, Harper, J.A., Avary, K.L., Bocan, John, Hohn, M.E., and McDowell, Ronald, 2006

Trenton Structure Contours (C.I. = 500 feet)



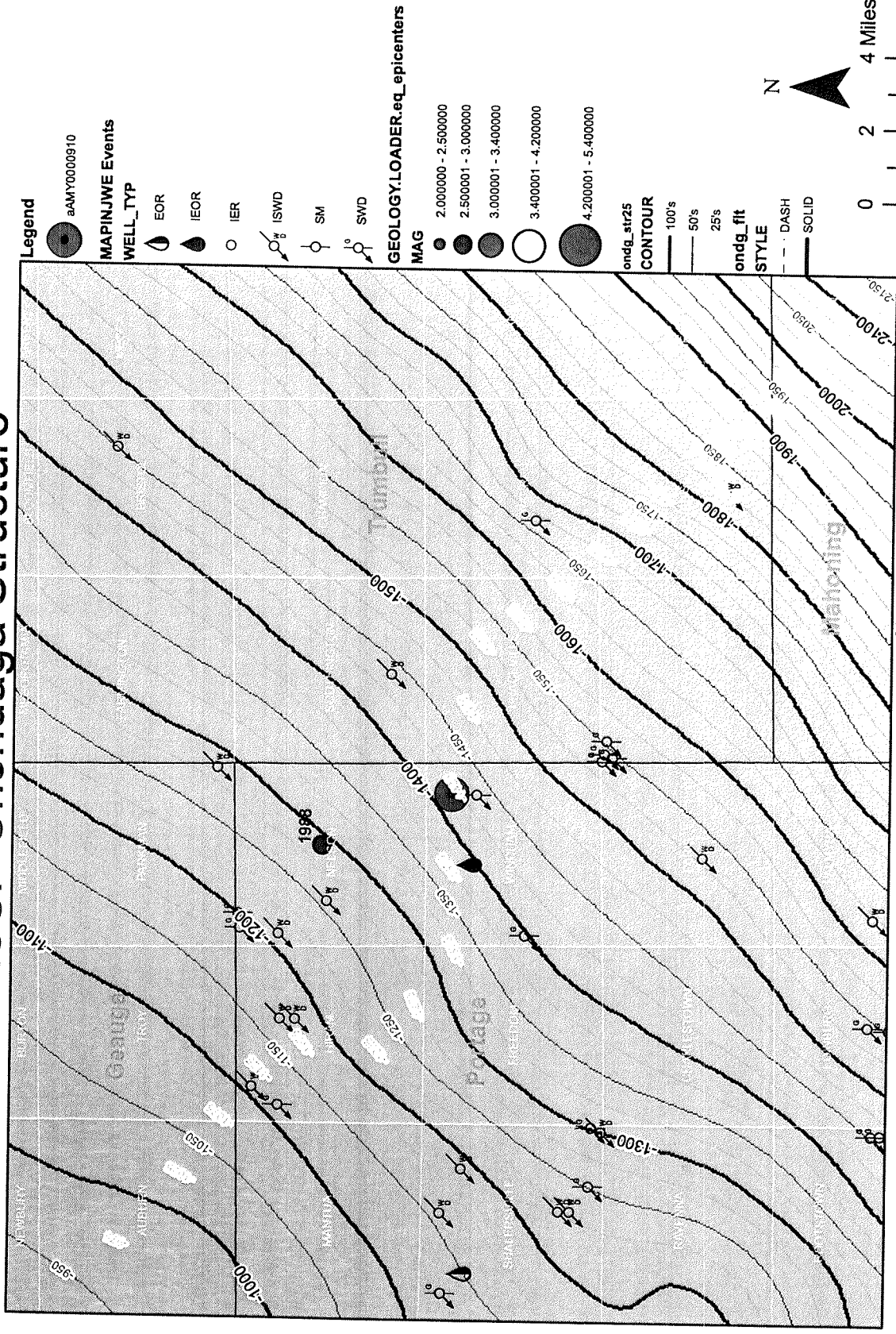
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EGSP Onondaga Structure



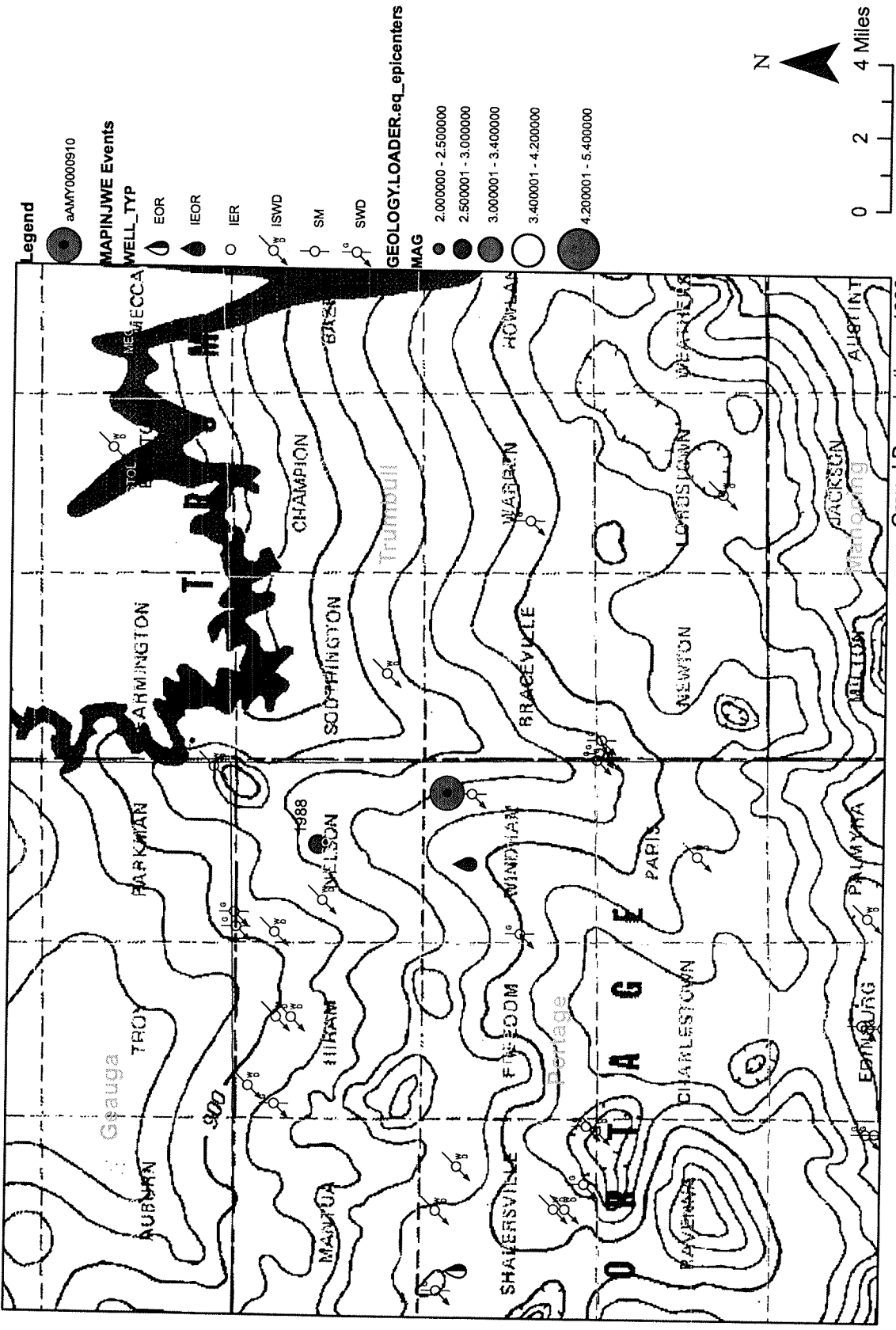
Gray, J.D., and others, 1982

MRCSP Onondaga Structure

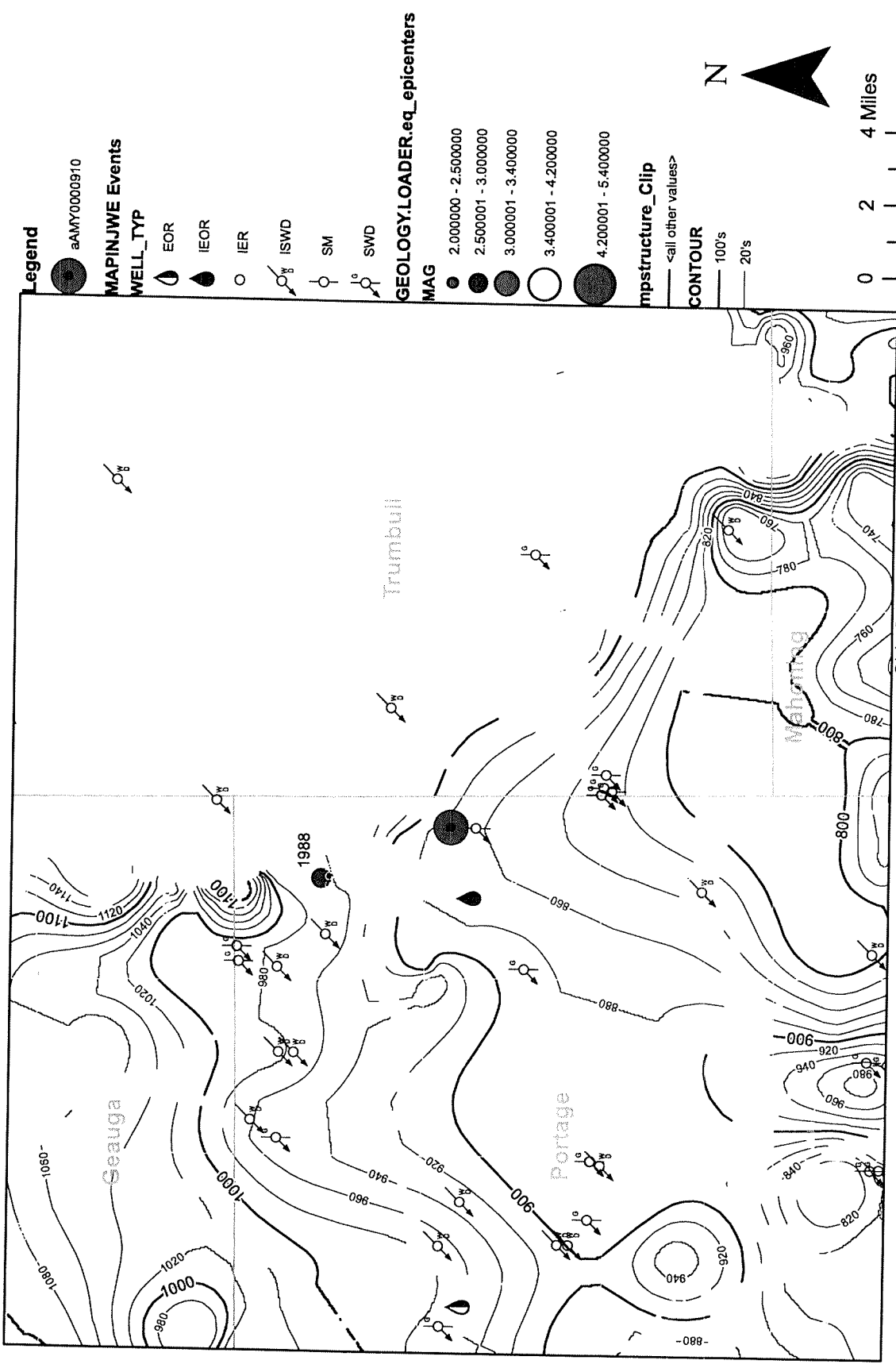


Ohio Division of Geological Survey, 2011

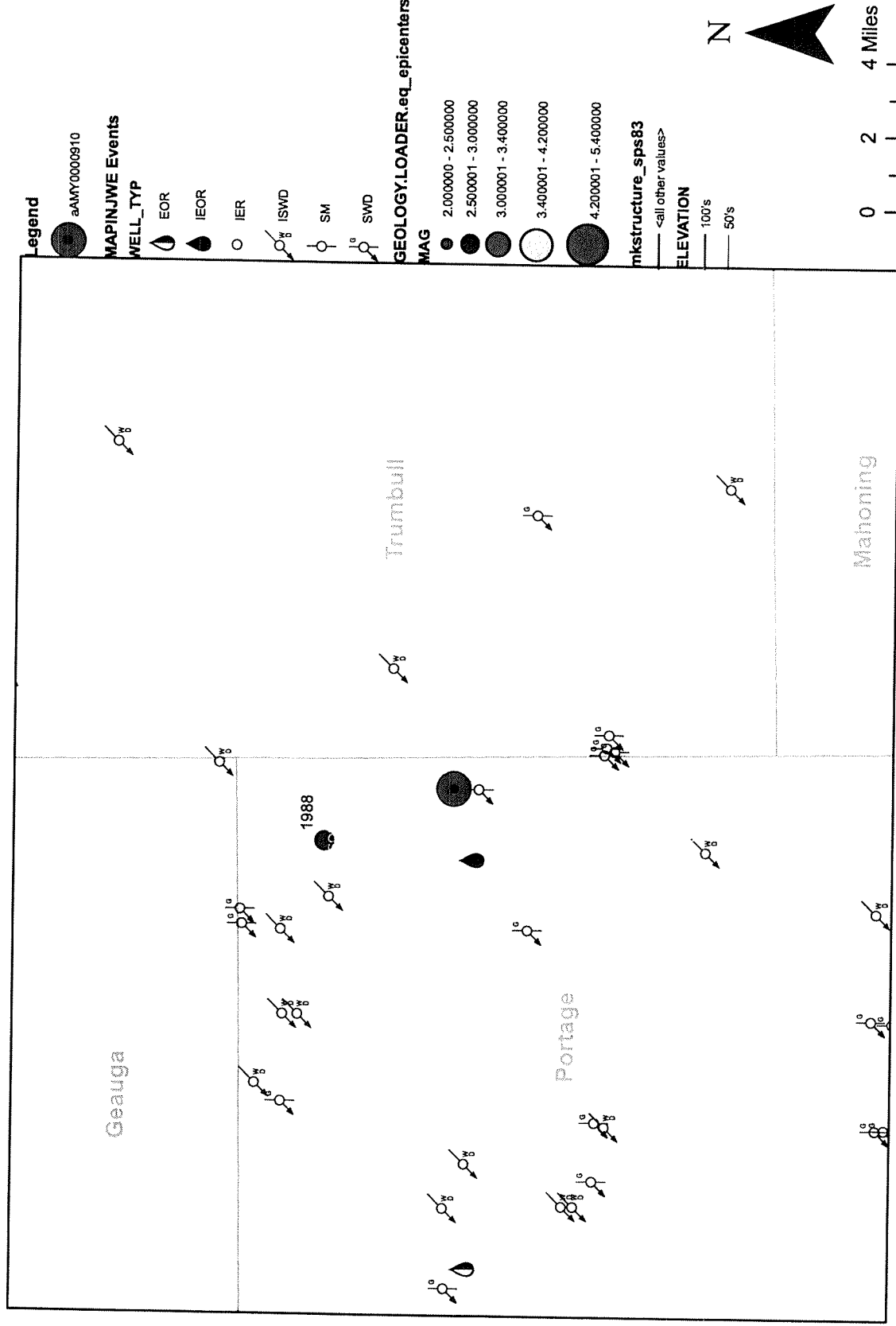
EGSP Berea Structure



Mississippian/Pennsylvanian Unconformity Surface Countours (C.I. = 20 feet)

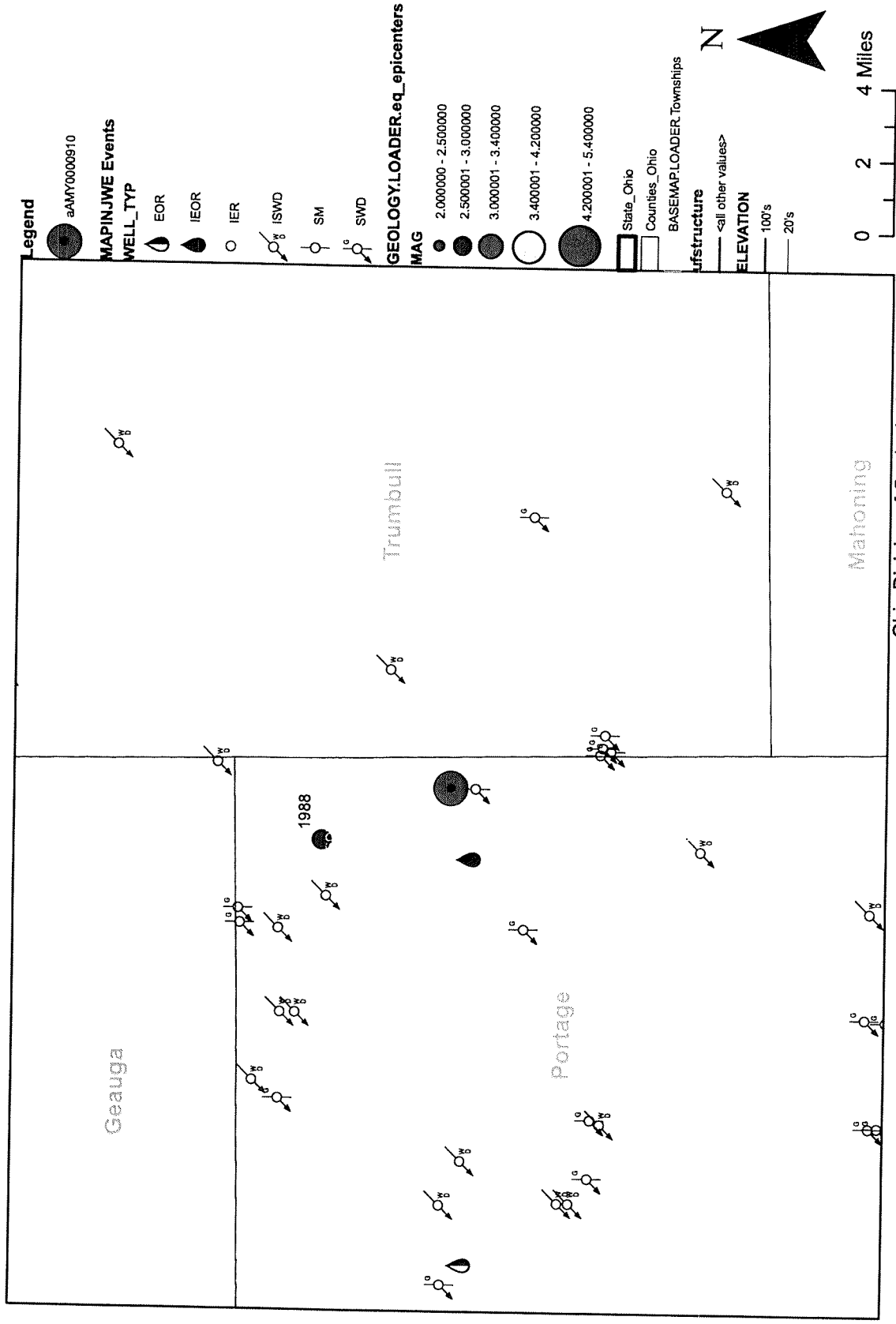


Middle Kittanning Coal Structure (C.I. = 50 feet)



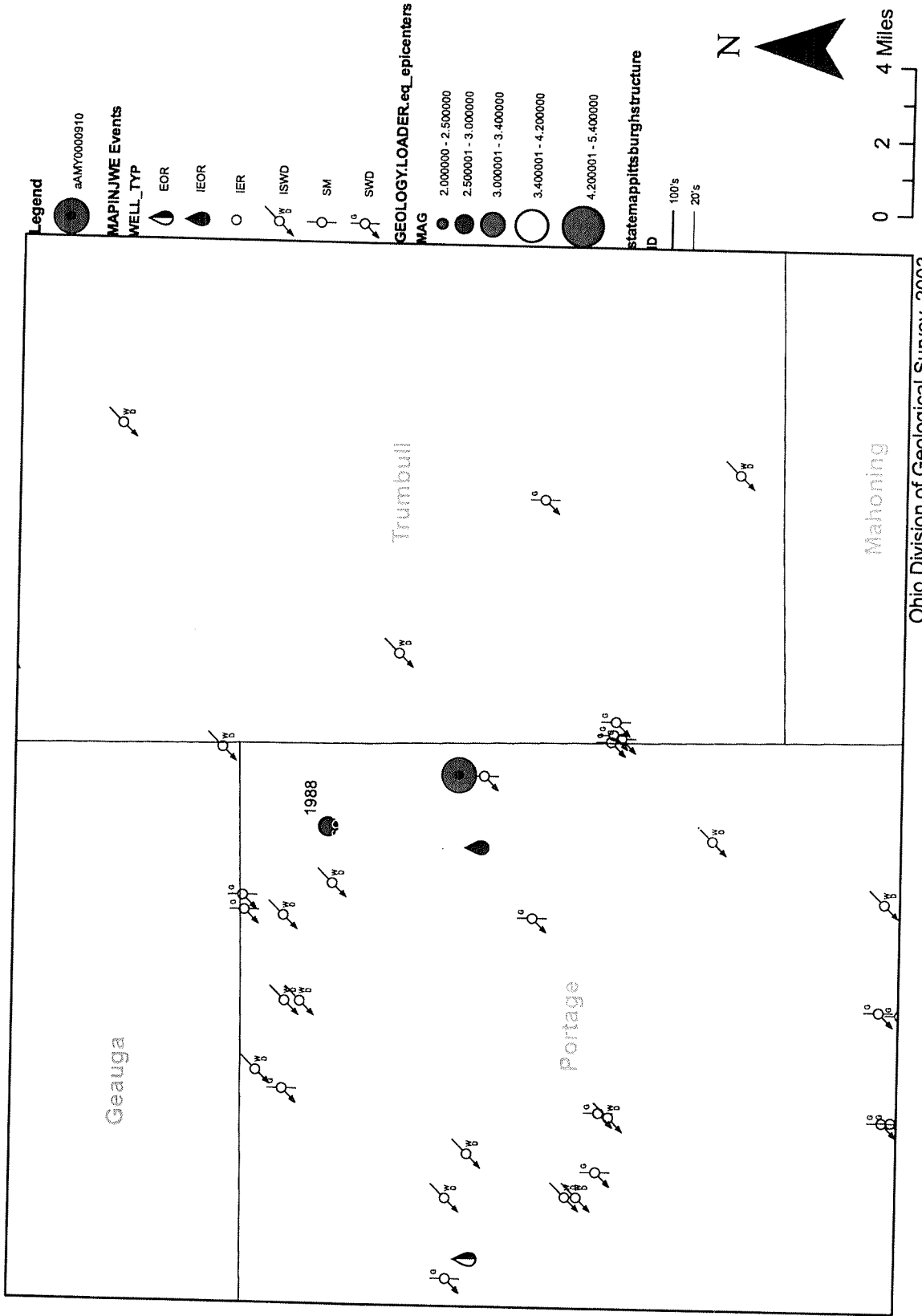
Ohio Division of Geological Survey, 2003

Upper Freeport Coal Structure (C.I. = 20 feet)



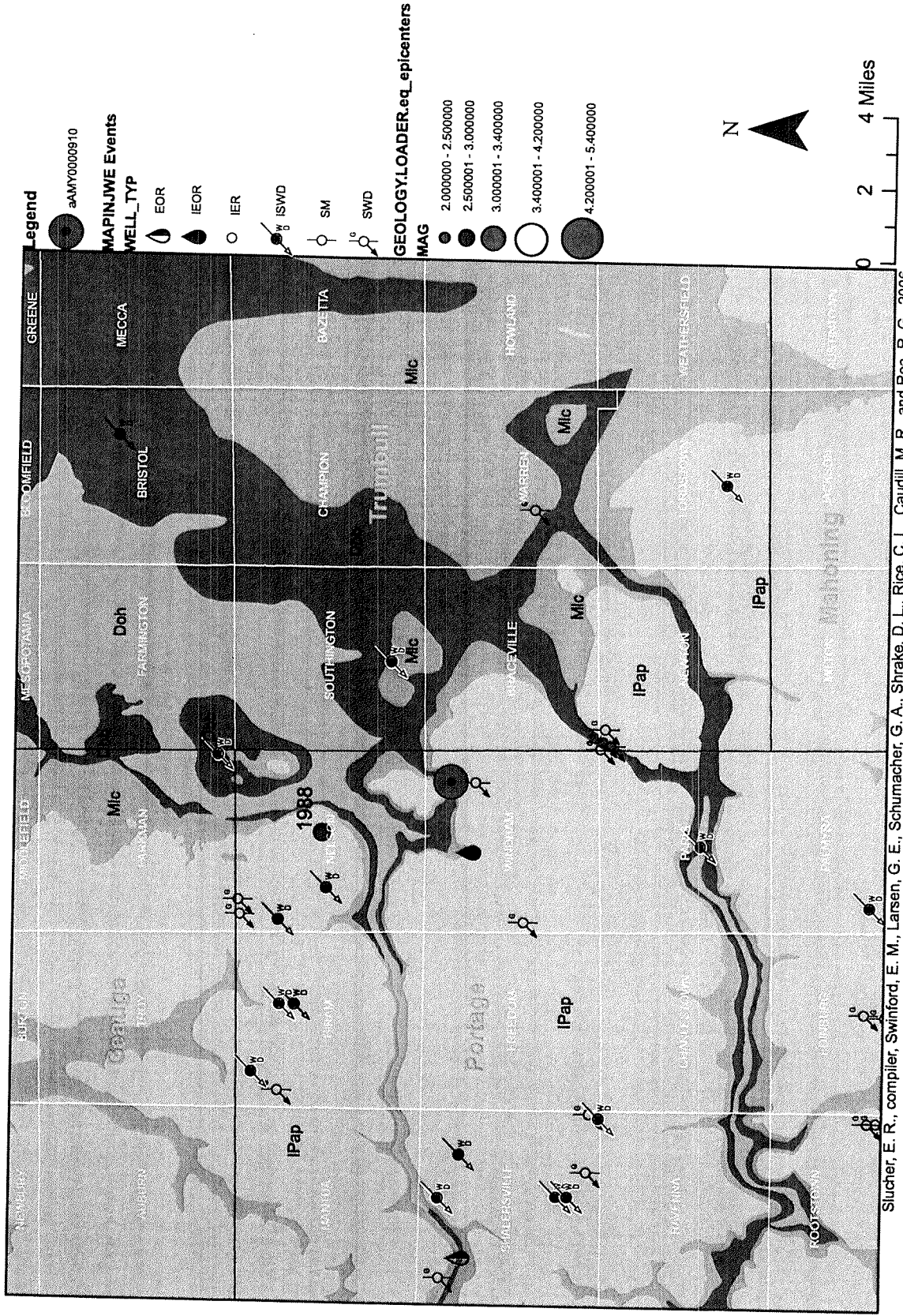
Ohio Division of Geological Survey, 2003

Pittsburgh Coal Structure Contours (C.I. = 20 feet)



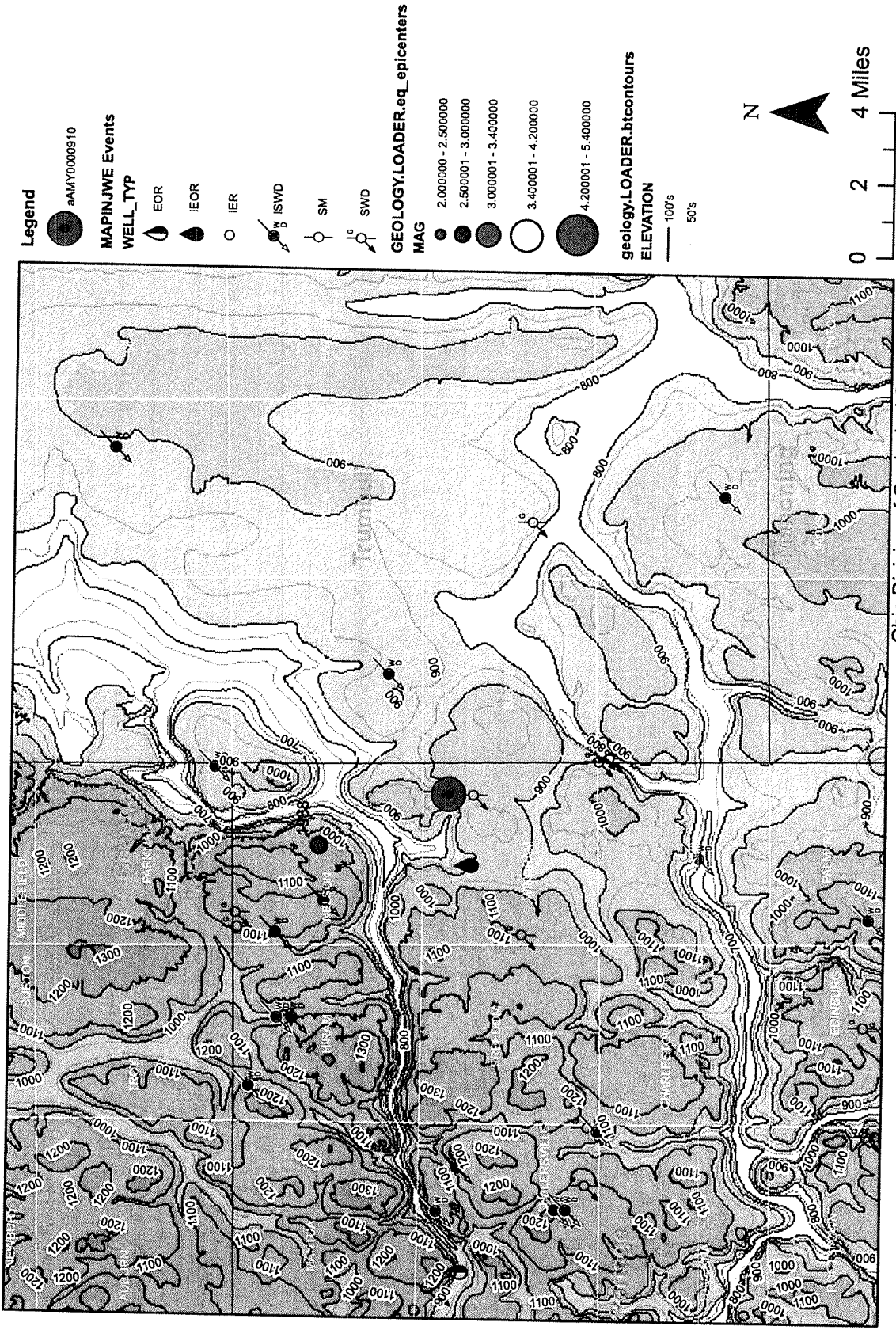
Ohio Division of Geological Survey, 2003

Bedrock Geology

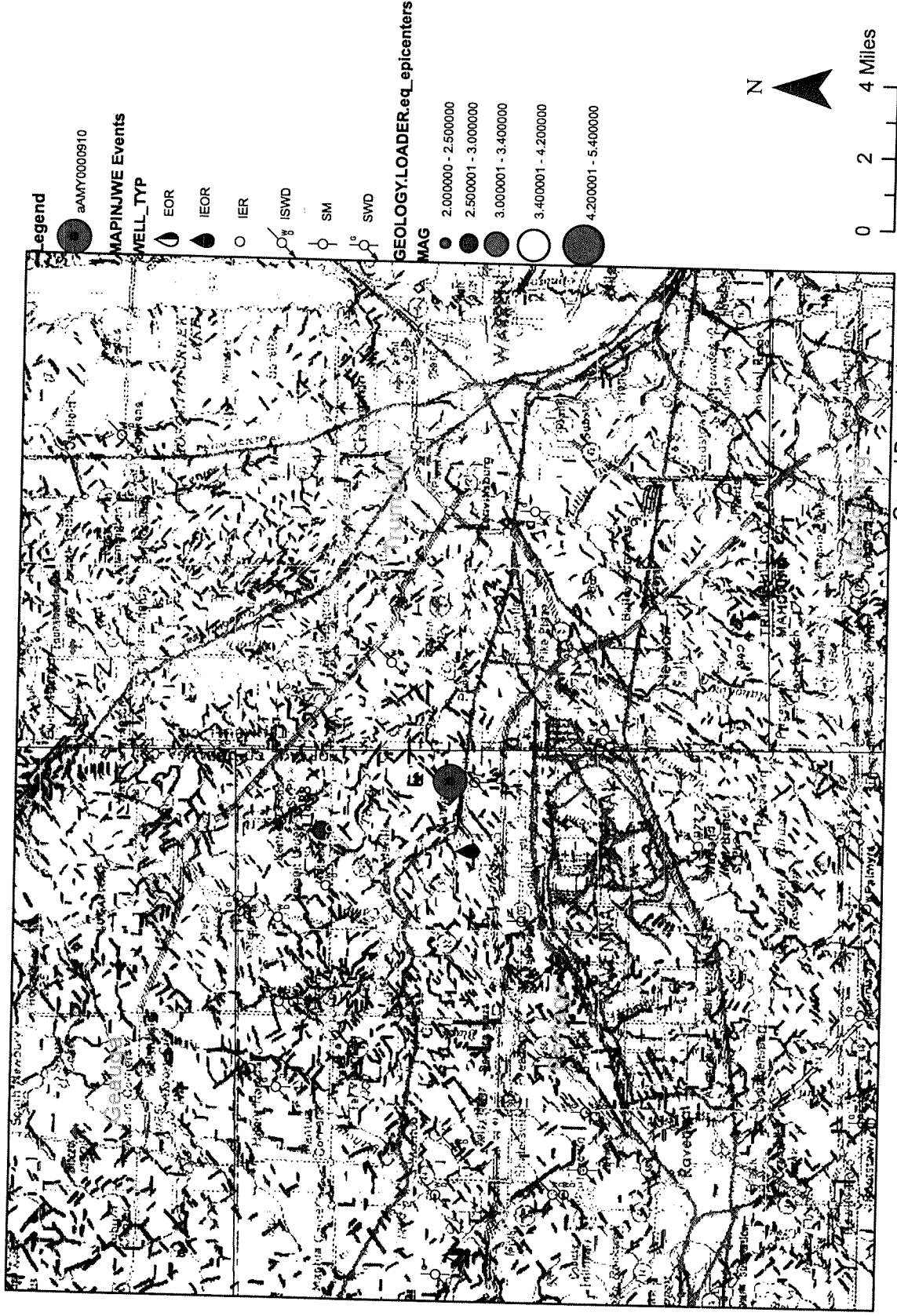


Slucher, E. R., compiler, Swinford, E. M., Larsen, G. E., Schumacher, G. A., Shirake, D. L., Rice, C. L., Caudill, M. R., and Rea, R. G., 2006

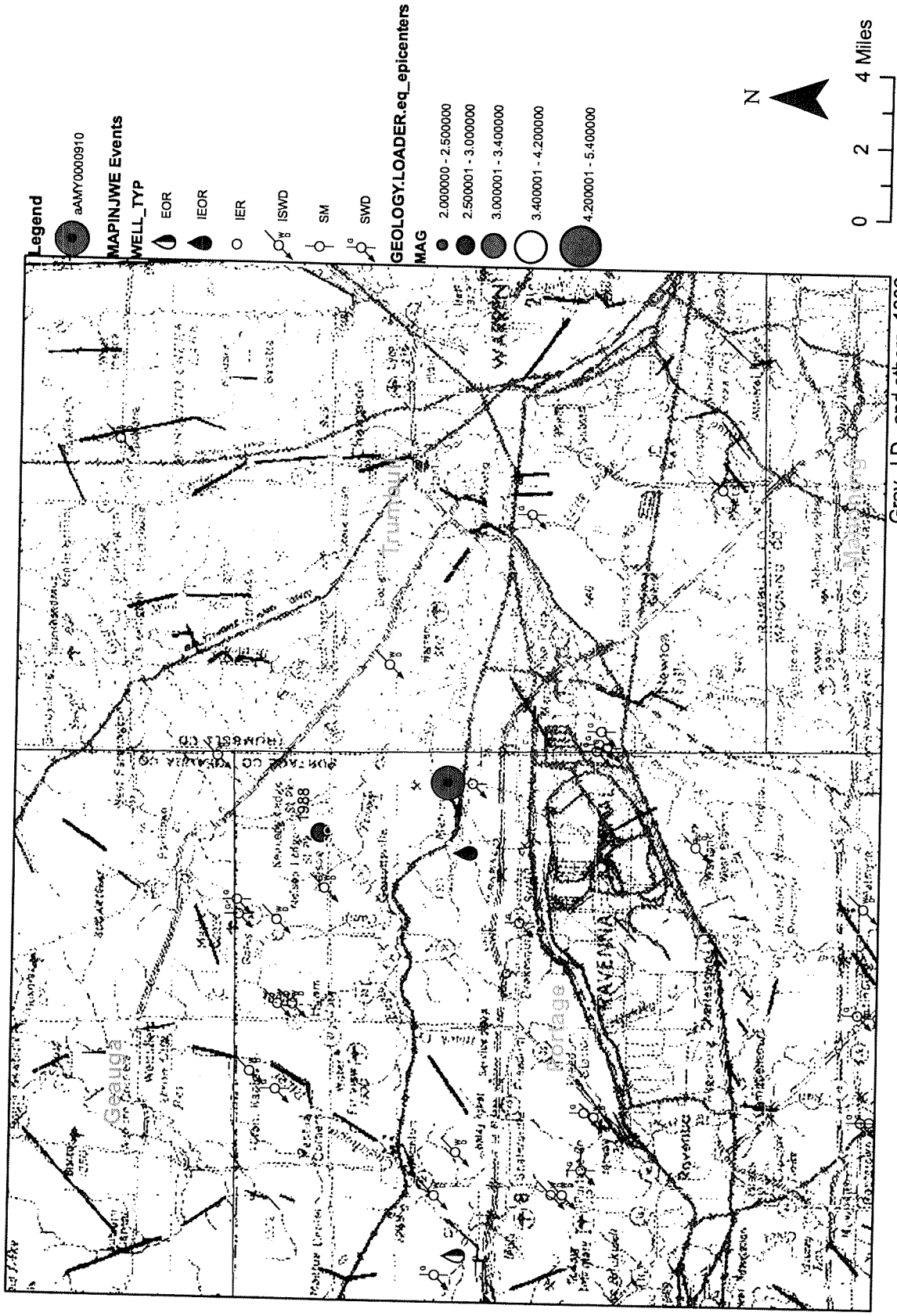
Bedrock Topography (C.I. = 50 feet)



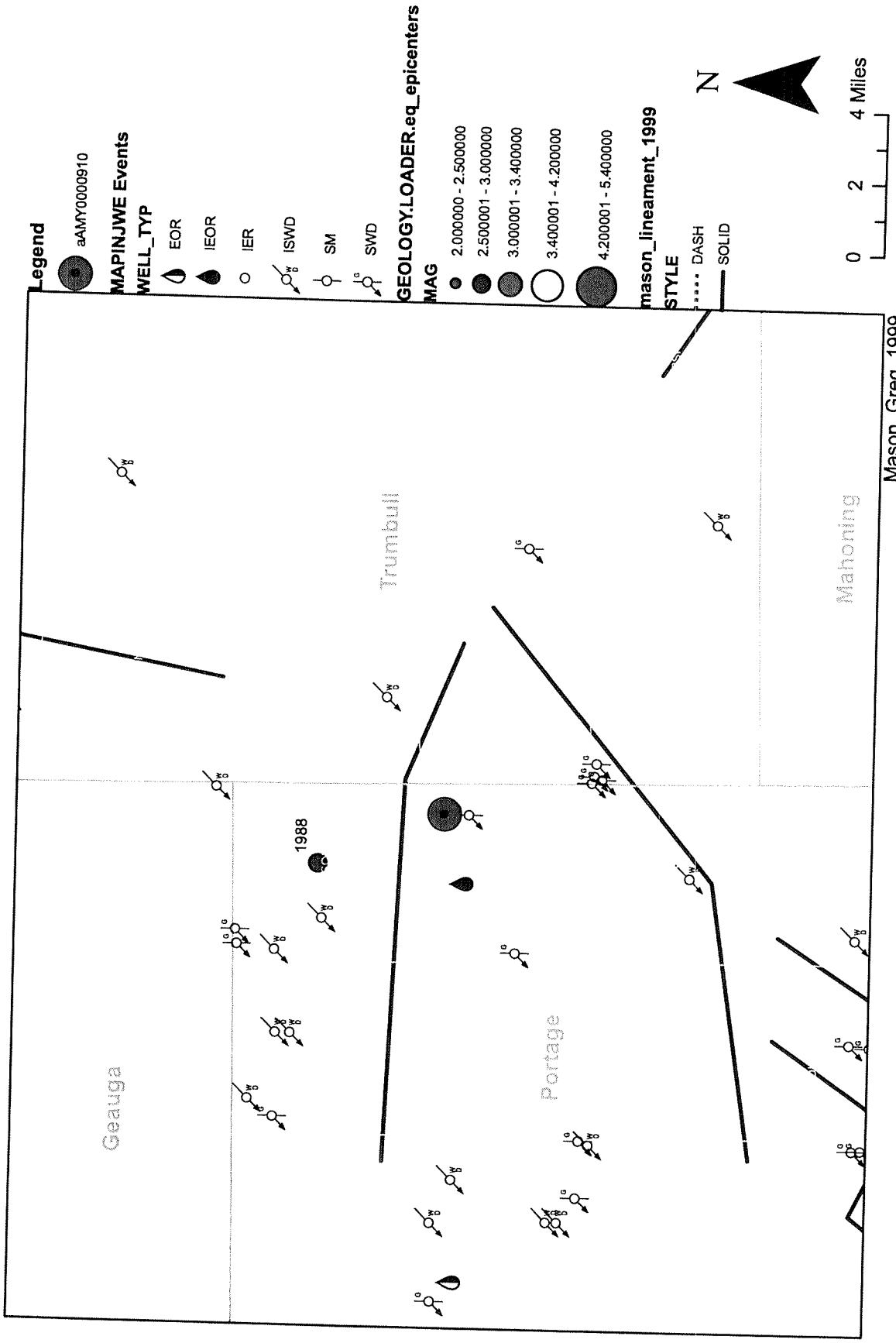
EGSP Aerial Photo Lineament



EGSP LANDSAT Lineament



Mason Lineament Map



Legend

● aAMY0000910

MAPINJWE Events

WELL_TYP

● EOR

● IEOR

○ IER

● ISWD

○ SM

○ SWD

GEOLOGY.LOADER.eq_epicenters

MAG

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● 2.500001 - 3.000000

● 3.000001 - 3.400000

○ 3.400001 - 4.200000

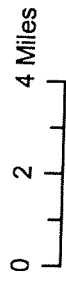
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mason_lineament_1999

STYLE

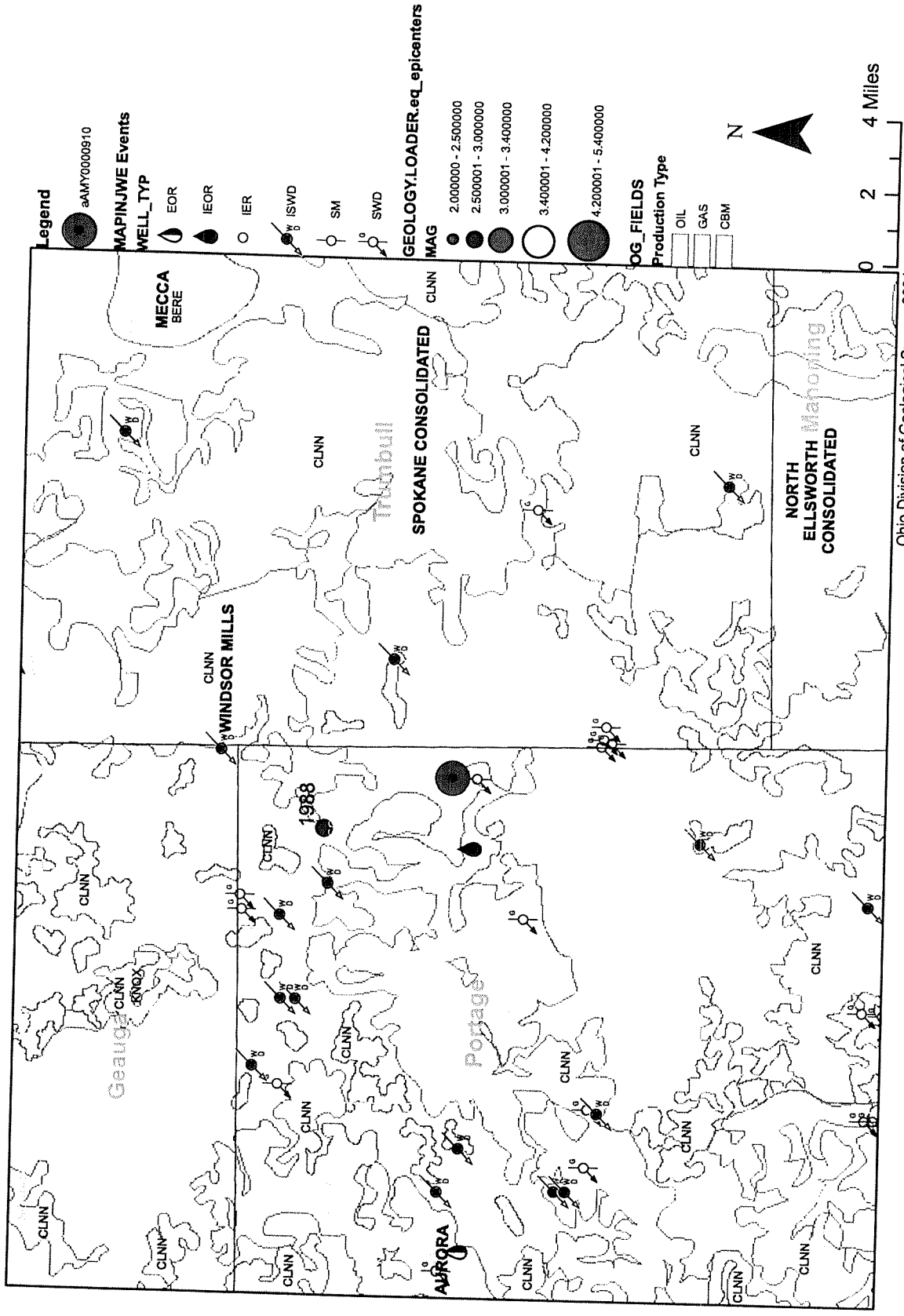
..... DASH

———— SOLID



Mason, Greg, 1999

Oil and Gas Fields





To: Tom Tomastik, ODNR-DOGRM
From: Michael Eggert, Assistant Chief, Ohio EPA-DDAGW
Date: June 19, 2012
Subject: Class II Injection Well Permit Reviews

Ohio EPA Division of Drinking and Ground Waters has completed its review of five (5) Class II underground injection well permits.

Our review of the Class II permits focused on well construction relative to the protection of underground sources of drinking water (USDW) and the location of the surface facilities relative to public water system source water protection areas and other sensitive hydrogeologic settings.

Our review indicated no major problems that should cause a delay in approving the permits. However, the following technical issues should be addressed by the applicants prior to well construction.

The **Evrol #1 Evrol LLC** (Portage Co., Atwater Twp., Lot 98) has the following concerns:

- The surface casing and cement appear adequate. However, the type of cement (Class A is recommended) to be used and the placement of centralizers should be specified.
- The proposed injection zone is an open hole completion in the Newburg Dolomite. Atwater Twp. has been heavily drilled, with eight (8) Clinton Sandstone wells within the area of review (1/2 mile). Review of the cementing practices for the completion casing shows that the industry standard was to place cement over the producing (Clinton) interval with the cement top below the Newburg. Surface casing was set below the lowermost USDW and cemented to surface. However, the interval between the top of the Clinton cement and the base of the USDW is open. The potential for fluid movement out of the Newburg exists through these un-cemented well bores.
- The requested maximum injection pressure (1103 psi) exceeds the calculated value (958 psi) using a specific gravity of 1.2.

The **Hard Rock Drilling & Producing Soinski Wells 1-I, 2-I, 3-I and 4-I** (Portage Co., Windham Twp. Lots 89 & 90) have the following questions:

- The proposed depth of the surface casing listed for each well in the proposed casing program (No. 21) does not agree with the depths shown in the well construction and operation (No. 32) and the well schematic (No. 37). The latter are considered to be the correct depths. The type of cement to be used (Class A is recommended) and the placement of centralizers should be specified.
- A description of the surface facility for each well was given, but the locations were not shown. It is assumed that a single unloading facility was envisioned by Hard Rock Drilling, but not specified. If this is the case, then the locations of the flow lines and any stream crossings should be shown.
- The requested maximum injection pressure (1000 psi) exceeds the calculated value (968 psi).

Tomastik
June 19, 2012
Page 2 of 2

Attachment A is a summary of source water protection comments and two figures of the injection wells location in relation to public water systems. None of the proposed Class II injection wells are within one half mile of a public water system well or within a source water protection area. Note our review did not evaluate the location of private water system wells.

If you have any questions, please contact either Chuck Lowe or Craig Smith.

Attachments

cc: Chuck Lowe, DDAGW
Craig Smith, DDAGW

Attachment A

The Division of Drinking and Ground Waters has reviewed the UIC Class II injection well permits submitted for the Kelly Disposal Well (Evrol, LLC) and the Soinski #1I, #2I, #3I and #4I Wells (Hard Rock Drilling & Production, LLC) with regard to the following features within ½ mile:

Public water system wells and intakes;
Drinking water source protection areas for surface and ground water sources;
Federally-designated Sole Source Aquifers;
Unconsolidated aquifers capable of producing 100 or more gallons per minute;
Sand and gravel aquifers; and
Other glaciated areas covered by less than 25 feet of glacial material.

The following provide the results of this review:

Evrol (Kelly Disposal Well) (Evrol, LLC)

- No public water system wells or intakes are located within ½ mile of the proposed well location.
- No drinking water source protection area for a public water system using a ground water source extends to within ½ miles of the proposed well location.
- The proposed well location is within the corridor management zone determined for the City of Alliance's Dale Walborn Reservoir and Deer Creek Lake intakes. The corridor management zone for the intake extends 1,000 feet inland from the Mahoning River and 500 feet from each bank of tributary streams. The corridor management zone extends ten miles upstream of the intake. The project area is approximately 5.6 river miles upstream of the Dale Walborn Reservoir intake and 10 river miles upstream of the Deer Creek Lake intake. Based on the distance between the proposed well and the City of Alliance's intakes there is a very low probability that proper operation of a Class II injection well will impact Alliance's water quality.
- The proposed well location does not lie over a Federally-designated sole source aquifer.
- The well location is over the sand and gravel deposits of the Mahoning Buried Valley Aquifer.
- The well location does not lie over an unconsolidated aquifer capable of producing 100 or more gallons per minute or other glaciated areas covered by less than 25 feet of glacial material.

Soinski #1I, Soinski #2I, Soinski #3I & Soinski #4I (Hard Rock Drilling & Production, LLC):

- No public water system wells or intakes are located within ½ mile of the proposed well locations.
- No drinking water source protection area extends to within ½ miles of the proposed well locations.

- The proposed well locations do not lie over a Federally-designated sole source aquifer.
- The proposed well locations are over the sand and gravel deposits of the Mahoning Buried Valley Aquifer.
- The proposed well locations do not lie over an unconsolidated aquifer capable of producing 100 or more gallons per minute.
- Glacial deposits less than 25 feet thick, Alliance Thin Upland, are located within ½ mile of the proposed well locations.

The attached maps show the spatial relationships of these features to the Kelly Disposal Well and the Soinski #1I, #2I, #3I and #4I Wells and are provided for your files.