Underground Coal Mine Layers

Well APPNO - aAMY0000911

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

Overview

0 500 1,000
Feet
0 250 500
Meters

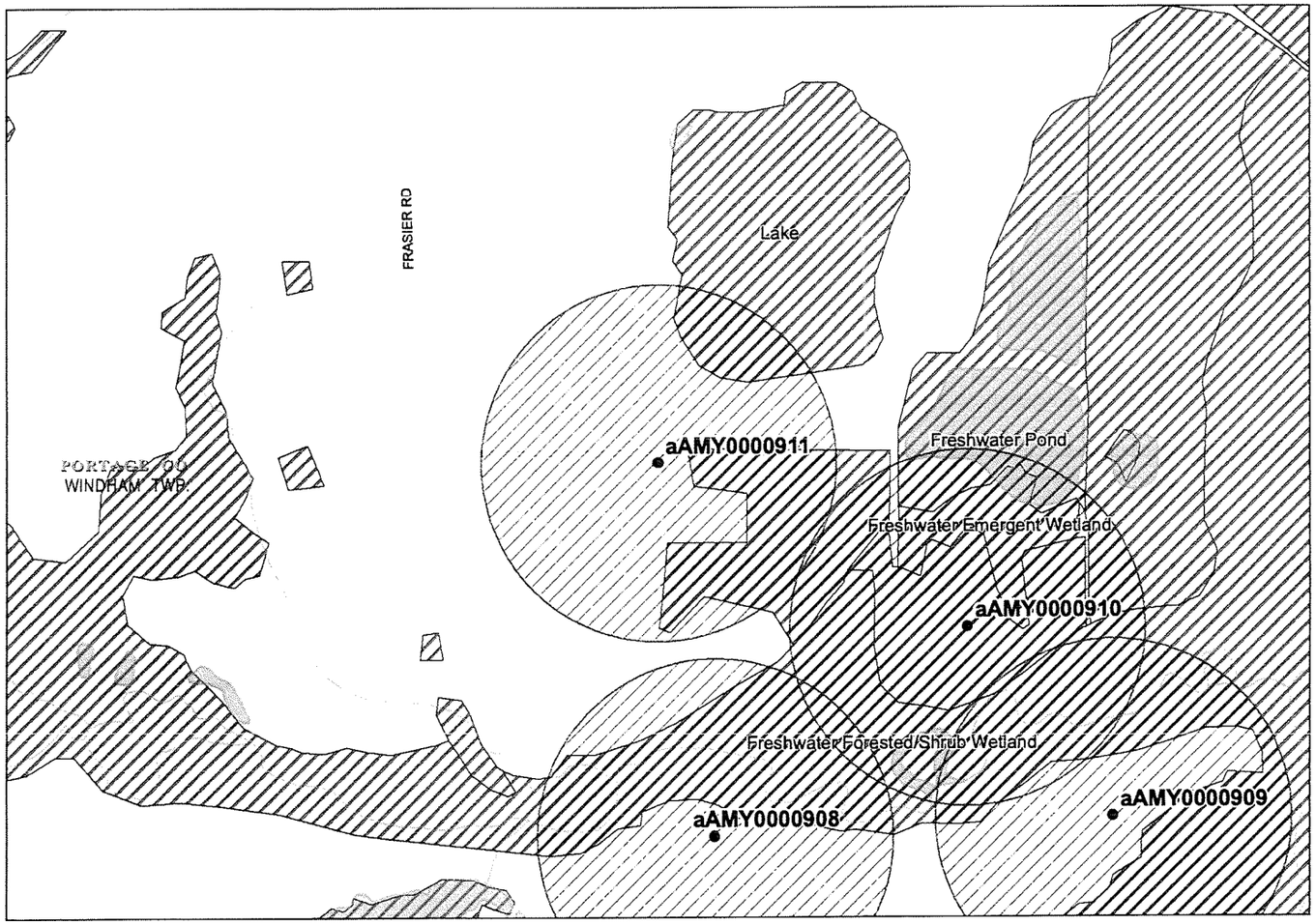
N

Date Created: 4/4/2012
Data Source: Underground Coal Mine Layers, Division of Geological Survey (DGS) and (DMRM)

Oil Gas Permit Wells
Directional Line
Well Radius Type
Dir
Direct Above Ground
Direct Below Ground
Non Direct Above Ground
Active
Active - 2006 IM Report
Active Opening
Entry Code
Air Shaft
Drift Entry
Vertical Mine Shaft
Inclined Mine Shaft
Abandoned Opening
Entry Code
Air Shaft
Drift Entry
Vertical Mine Shaft
Inclined Mine Shaft
TYPE_CODE
Drift Entry
Abandoned Extent
Abandoned Extent Partially Unknown
Abandoned Extent Unknown
Abandoned Extent Overlapped
Active Mine 1/4 Mile Buffer

Surface Water Layers

Well APPNO - aAMY0000911



Basemaps

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

Overview

0 500 1,000
Feet

0 250 500
Meters

N

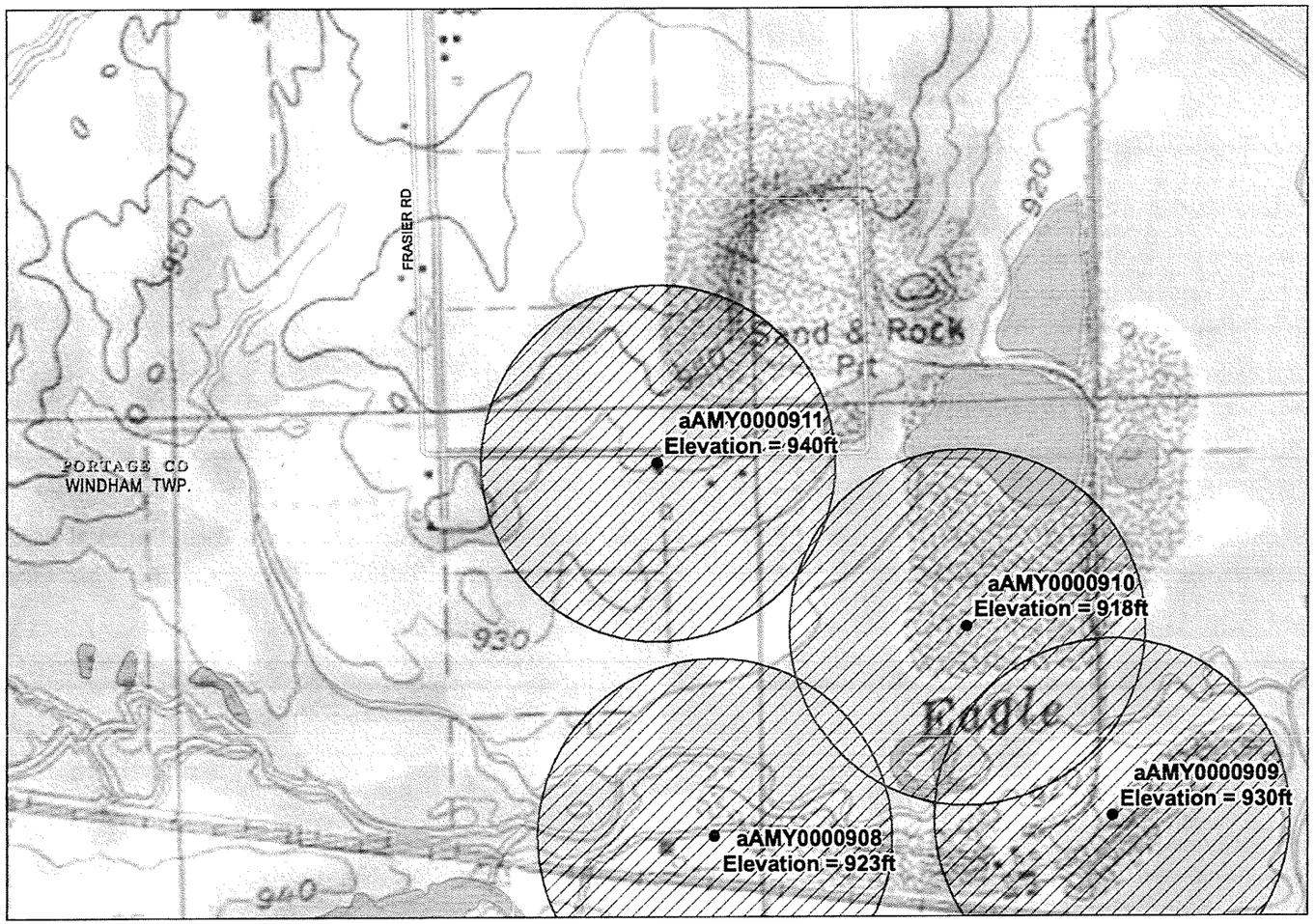
Date Created: 4/4/2012

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

- Oil Gas Permit Wells
- Directional Line
- Well Radius Type
- Dir
- Direct Above Ground
- Direct Below Ground
- Non Direct Above Ground
- Scenic Rivers
- National Wetland Inventory (NWI)
- Floodways
- Flood Hazard Zones (Generic)

Surface Topography Layers

Well APPNO - aAMY0000911



Basemaps

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

Overview

0 500 1,000
Feet

0 250 500
Meters

N

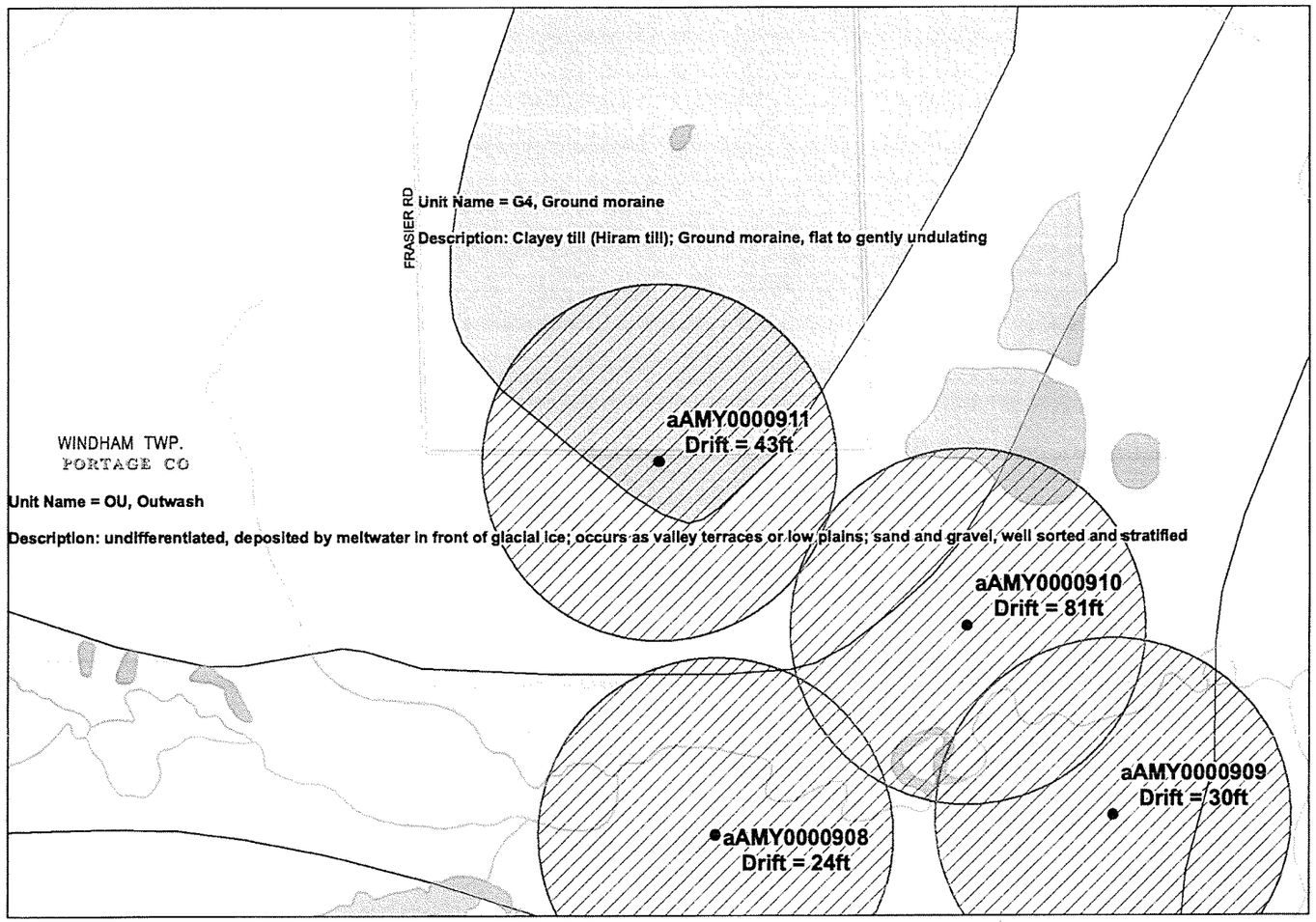
Oil Gas Permit Wells
Directional Line
Well Radius Type
Dir
Direct Above Ground
Direct Below Ground
Non Direct Above Ground

Date Created: 4/4/2012

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

Quaternary Geology Layers

Well APPNO - aAMY0000911



Basemaps

Railroad
Local Road
State Route
U.S. Highway
Interstate
Hydrography Line
Hydrography Polygon
Hydrography Polygon Intermittent
City
Township
County

Overview

0 500 1,000
Feet

0 250 500
Meters

N

Oil Gas Permit Wells
Directional Line
Well Radius Type
Dir
Direct Above Ground
Direct Below Ground
Non Direct Above Ground

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

Oil and Gas Layers

Well APPNO - aAMY0000911

Oil Gas Permit Wells
Directional Line
Well Radius Type
Dir
Direct Above Ground
Direct Below Ground
Non Direct Above Ground
Oil Gas Wells
Well Status
Unknown status
Brine for dust control
Coalbed methane
Dry hole
Dry hole with gas show
Dry hole with oil and gas show
Dry hole with oil show
Expired permit location
Gas
Gas with oil show
Gas show
Gas and oil show
Injection
Test hole
Observation
PBWW
Oil and gas converted to water
Oil
Oil and gas
Oil with gas show
Oil show
Permitted location
Plugged brine for dust control
Plugged gas
Plugged gas with oil show
Plugged injection
Plugged oil
Plugged oil and gas
Plugged oil with gas show
RAD
Radioactive tools lost in hole
Solution mining
Gas storage
Stratigraphy test
Water supply
Directional drilled wellbore
Injection Well Buffers
Other
WELL_TYP
SDR

Basemaps

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

Overview

0 500 1,000
Feet

0 250 500
Meters

N

Date Created: 4/4/2012
Data Source: Oil and Gas Layers, Division of Geological Survey (DGS)

Groundwater - Source Water Protection Area Layers

Well APPNO - aAMY0000911

Basemaps

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

Overview

0 500 1,000
Feet

0 250 500
Meters

N

Date Created: 4/4/2012

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

Oil Gas Permit Wells
Directional Line
Well Radius Type
Dir
Direct Above Ground
Direct Below Ground
Non Direct Above Ground
Unconsolidated Yield Aquifer
Highest Yield Bedrock Aquifer
SWPA TYPE
Inner Management Zone (1-year time of travel)
Source Water Protection Areas - 5-Year TOT
Protection 1/4 Mile Buffer

Groundwater - Pollution Potential Layers

Well APPNO - aAMY0000911

Basemaps

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

Overview

0 500 1,000
Feet

0 250 500
Meters

N

Date Created: 4/4/2012

Data Source: Groundwater - Pollution Potential Layers, Division of Geological Survey (DGS)

- Oil Gas Permit Wells
- Directional Line
- Well Radius Type
- Dir
- Direct Above Ground
- Direct Below Ground
- Non Direct Above Ground

DRASTIC - AUM and Strip Mines

Drastic AUM and Strip Mines

- Abandoned Underground Mines
- Strip Mines
- DRASTIC Index Value

DRASTIC Rating

- Low
- Intermediate
- High

Coal Layers

Well APPNO - aAMY0000911

Oil Gas Permit Wells
Directional Line
Well Radius Type
Dir
Direct Above Ground
Direct Below Ground
Non Direct Above Ground
Coal Control Point
Coal Geochemistry Samples
Soil Borings
<all other values>
TYPE
County Engineer
NRCS
ODOT
OEPA
Other
Rockies Express Pipeline
USACE
Area Affected
<all other values>
Law
Area Permitted
<all other values>
Law
OMRM Surface Mines from AMLIS
OMRM Surface Mines from Historical DRG

Basemaps

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

Overview

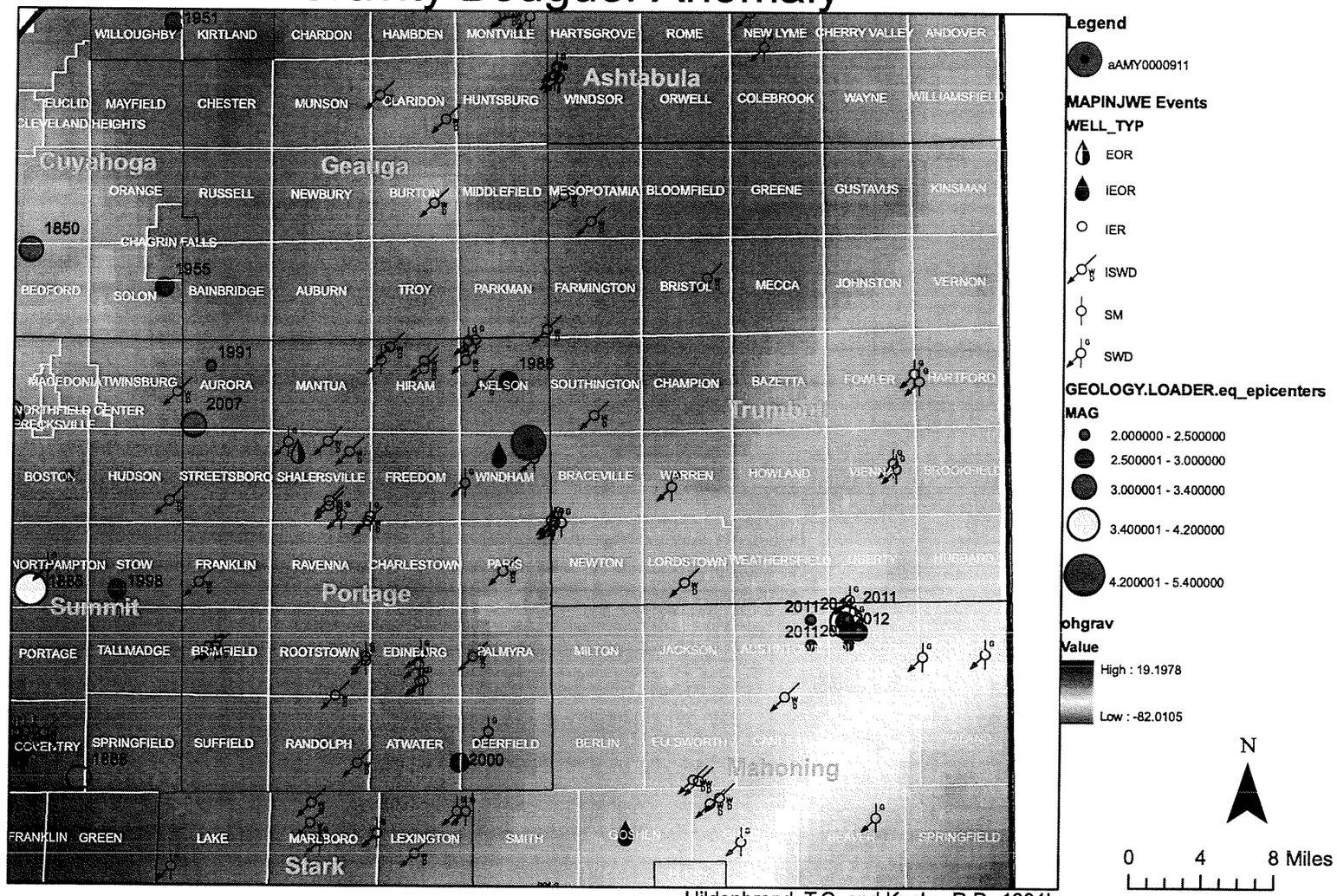
0 500 1,000
Feet

0 250 500
Meters

N

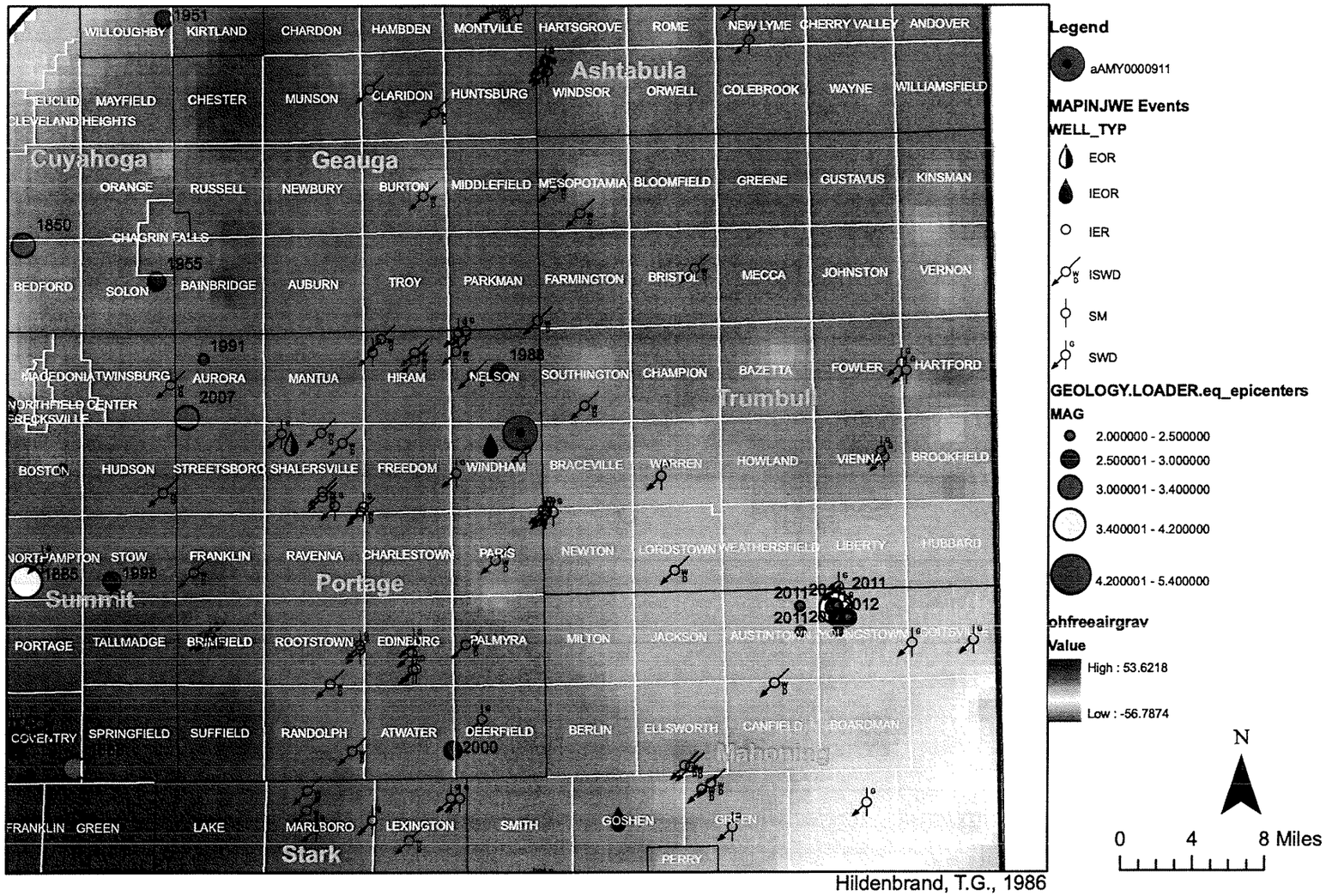
Date Created: 4/4/2012
Data Source: Coal Layers, Division of Geological Survey (DGS)

Gravity Bouguer Anomaly



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

Gravity Free Air



Hildenbrand, T.G., 1986

Legend

aAMY0000911

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

ohfreeairgrav

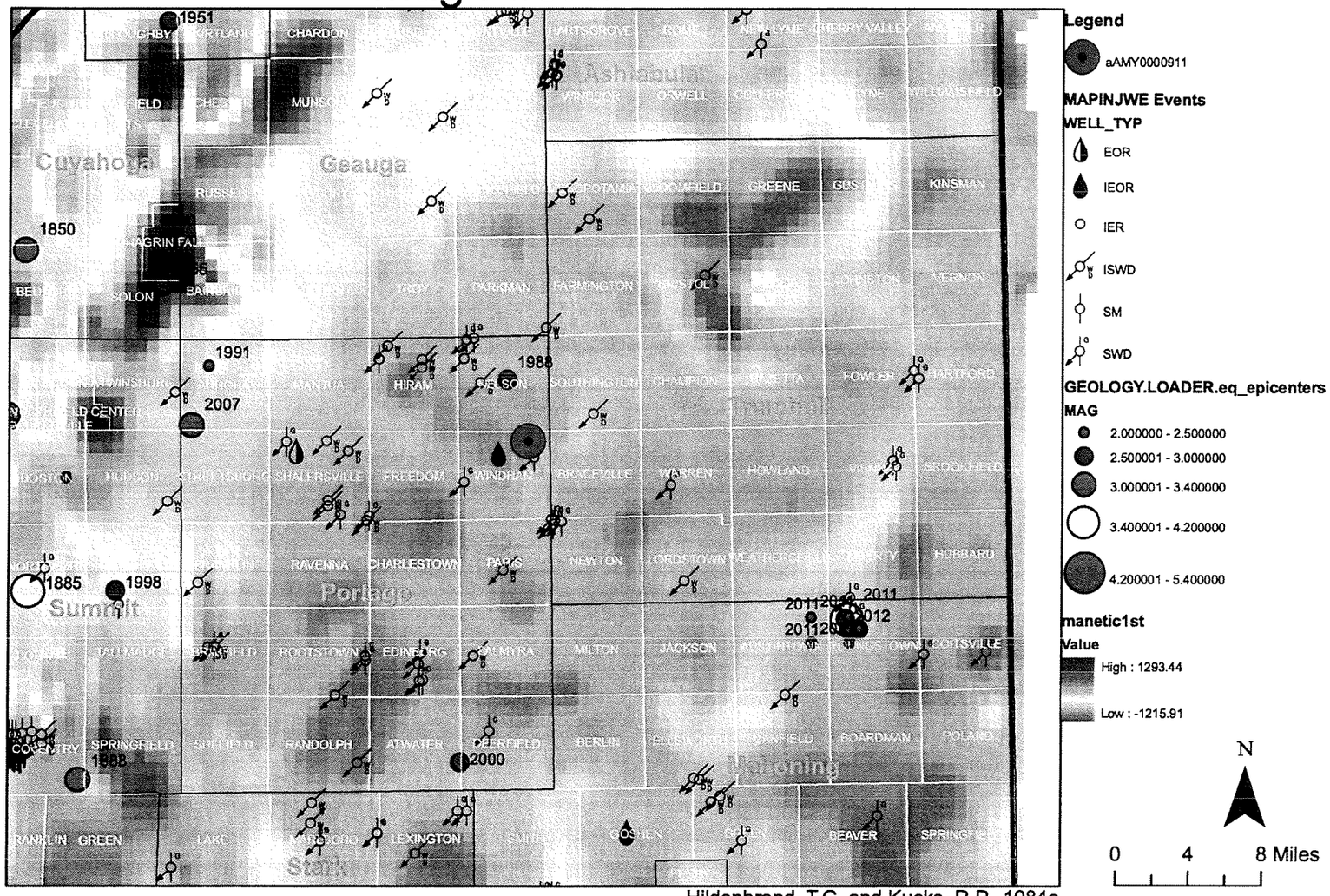
Value

- High : 53.6218
- Low : -56.7874

N

0 4 8 Miles

Mag First Derivative



Legend

aAMY0000911

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

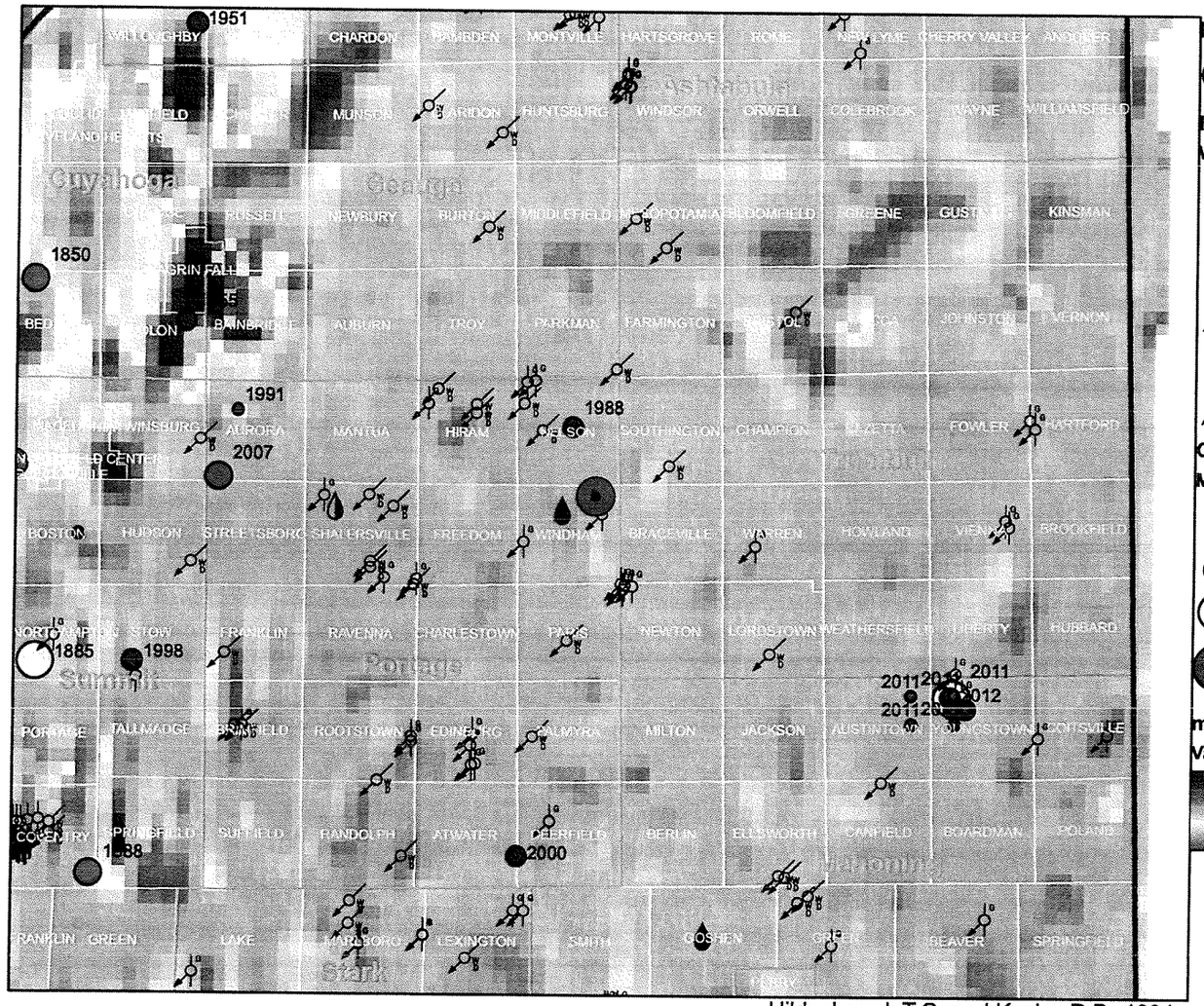
- High : 1293.44
- Low : -1215.91

N

0 4 8 Miles

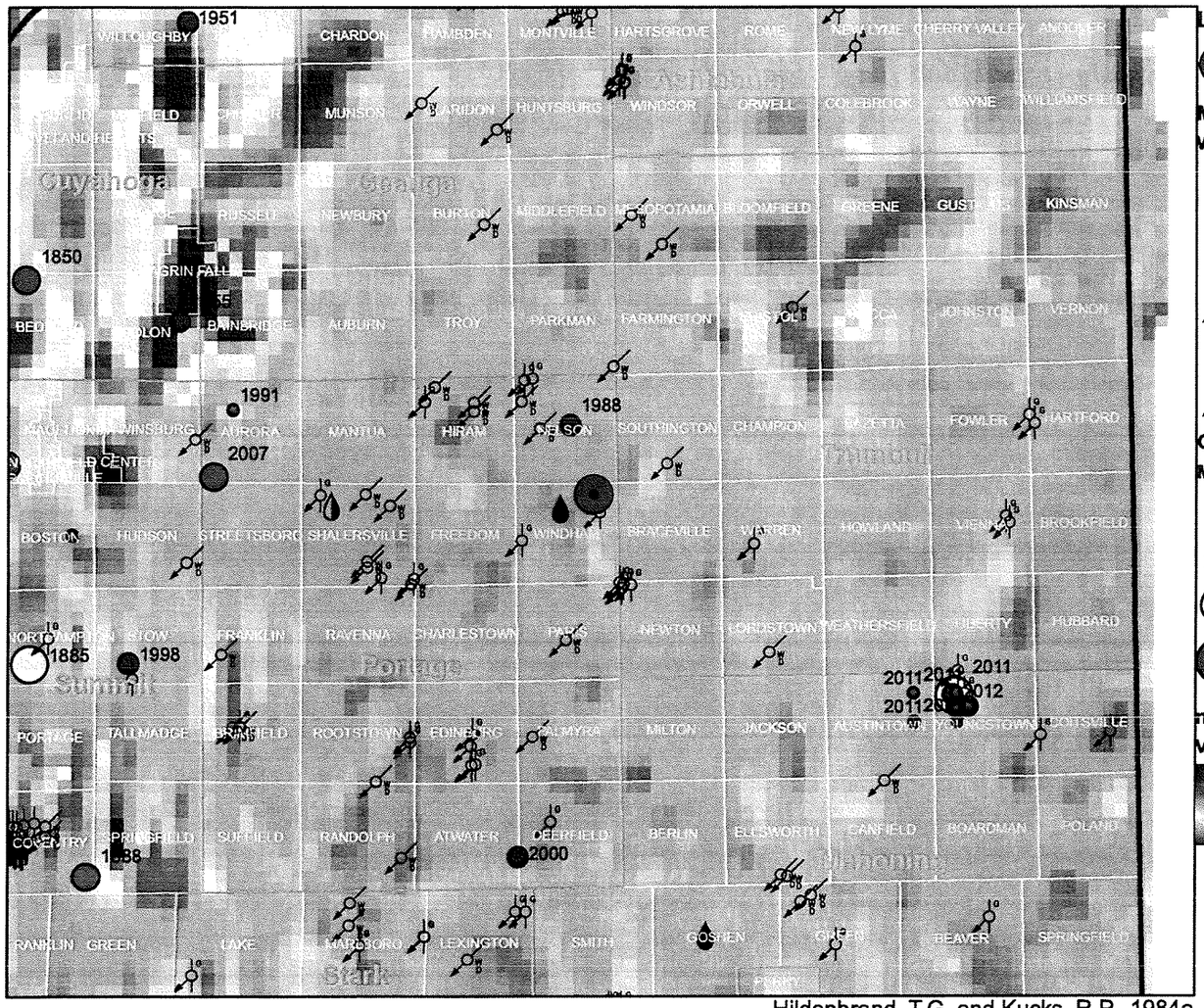
Hildenbrand, T.G. and Kucks, R.P., 1984a

Magnetic Second Derivative



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

Magnetic Second Derivative



Legend

aAMY0000911

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

mag2nd

Value

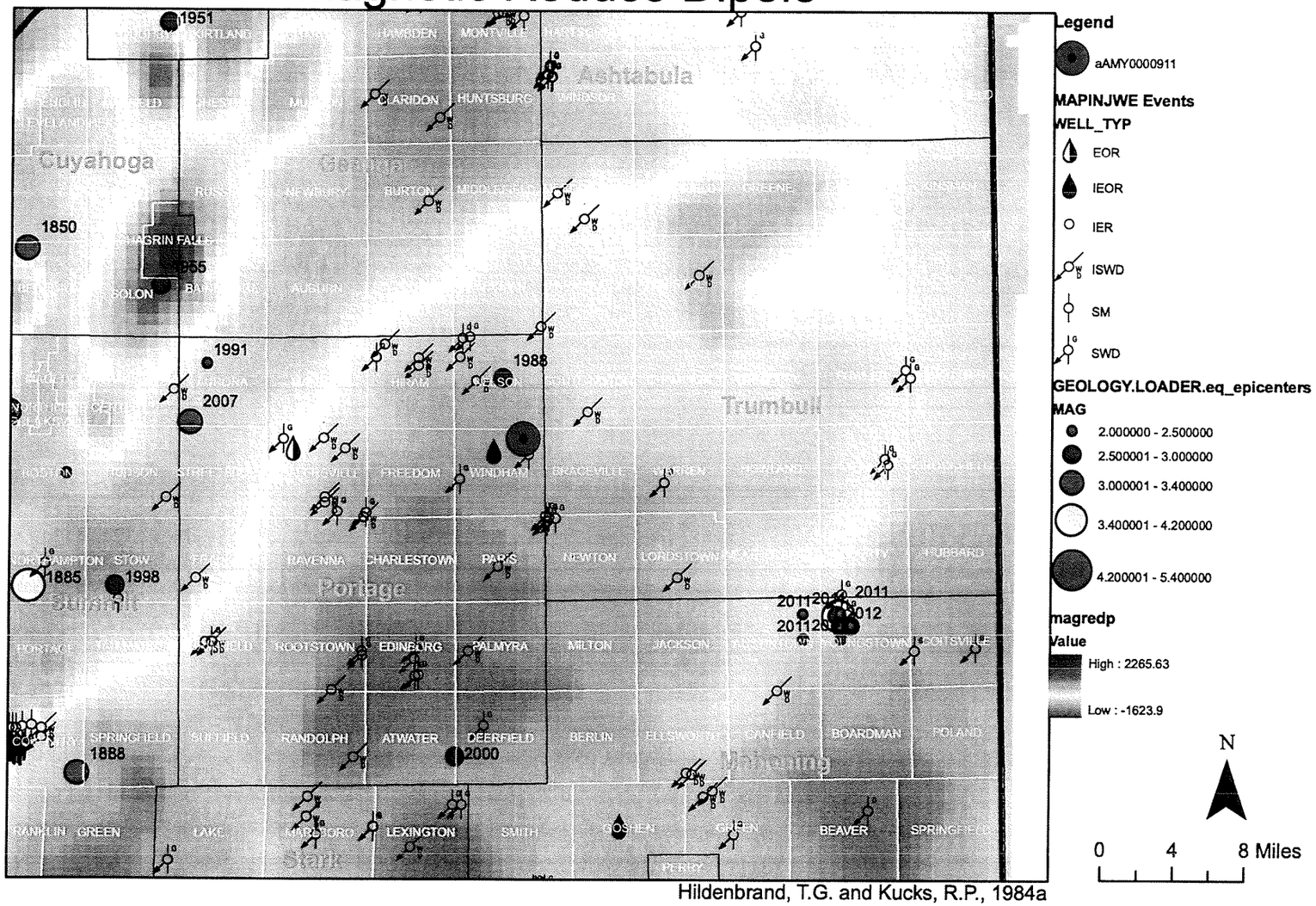
- High : 1366.31
- Low : -1526.25

N

0 4 8 Miles

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

Magnetic Reduce Dipole



Legend

aAMY0000911

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

magredp

Value

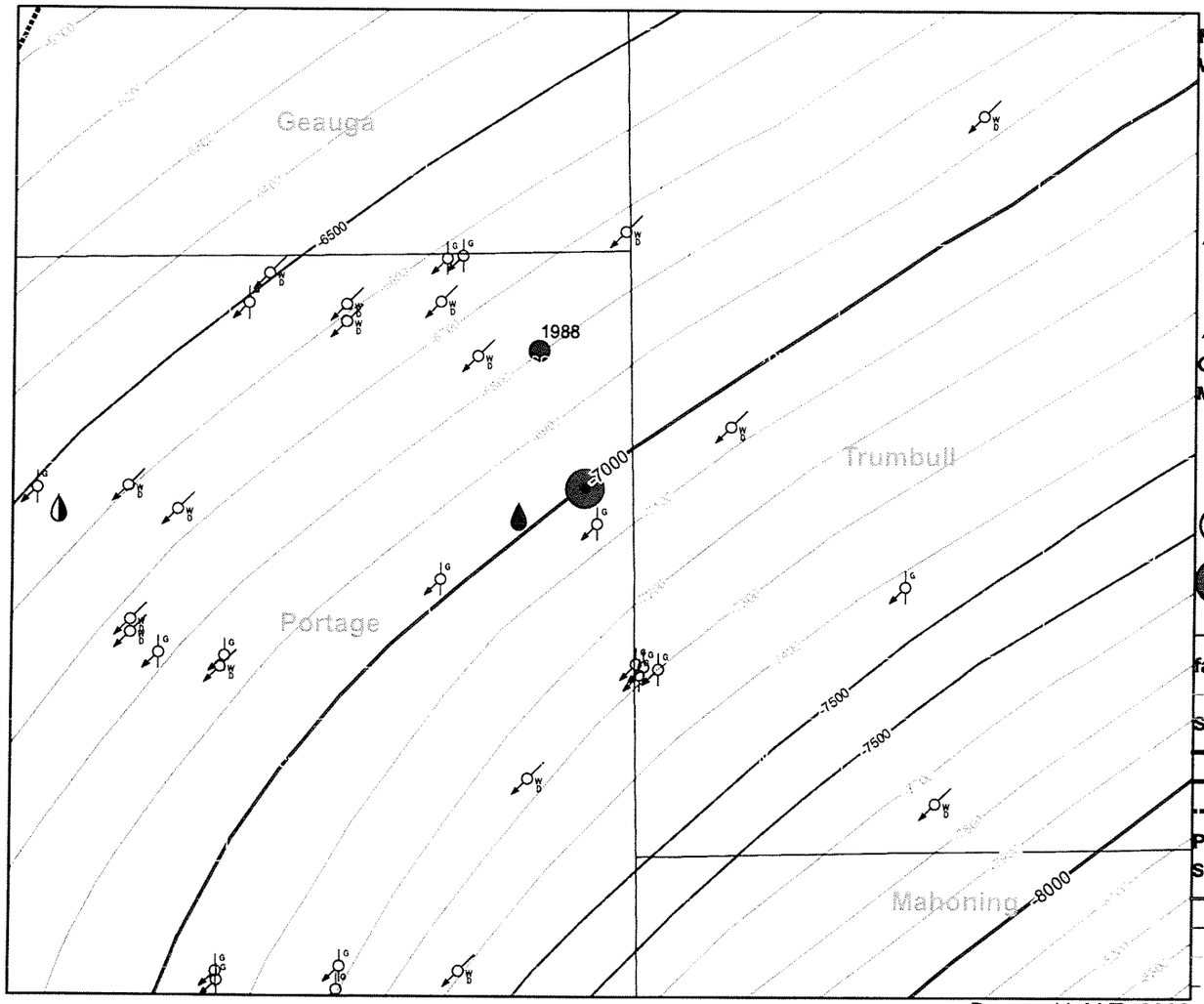
- High : 2265.63
- Low : -1623.9

N

0 4 8 Miles

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

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



Baranoski, M.T., 2002

Legend

aAMY0000911

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

- cocorp

faults

- <all other values>

STYLE

- Know
- Infered
- Questionable displacement

PCMB_contours

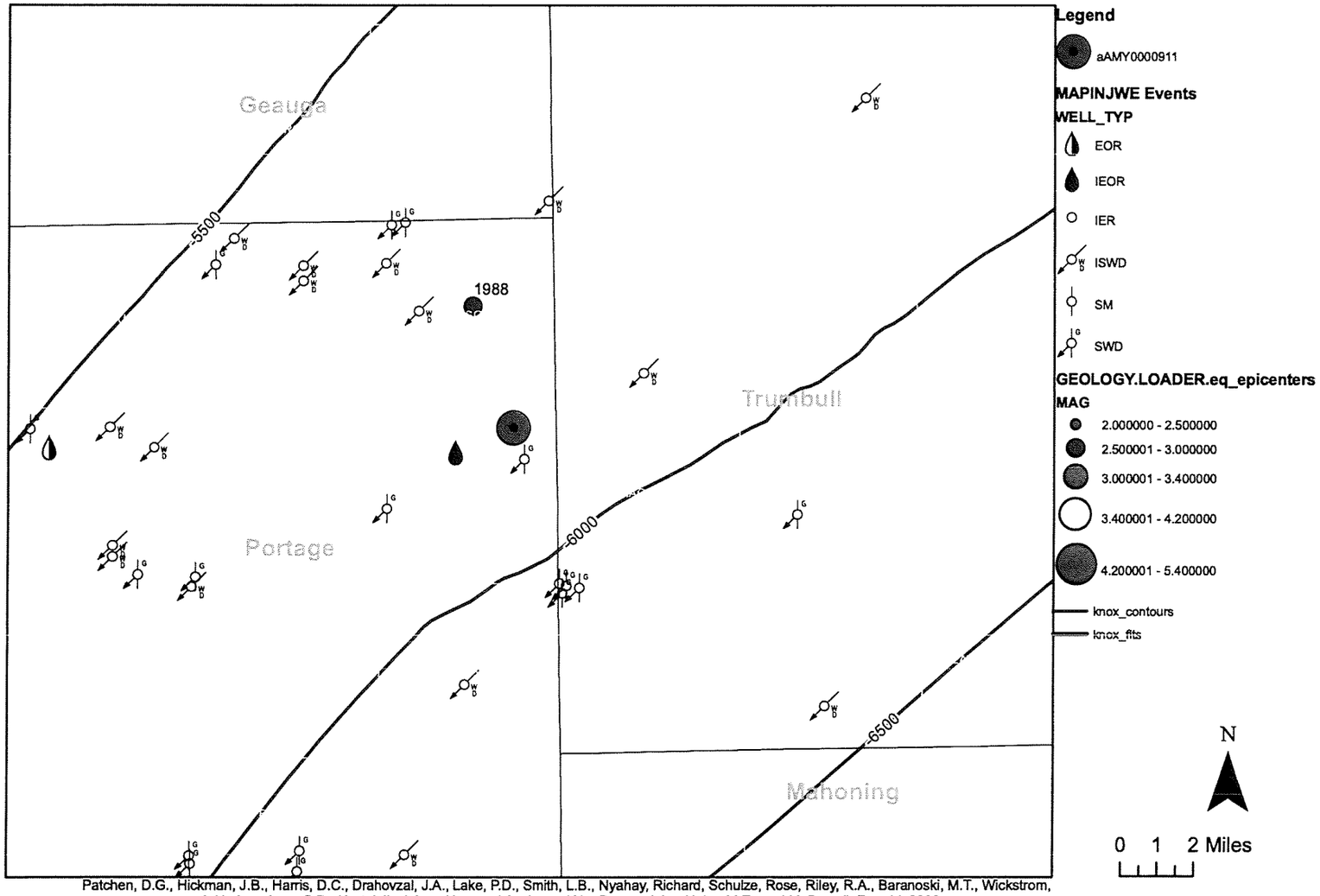
SPOT

- 1000's
- 500's
- 100'2
- all other

N

0 2 4 Miles

Knox Structure (C.I. = 500 feet)



Legend

aAMY0000911

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

knox_contours

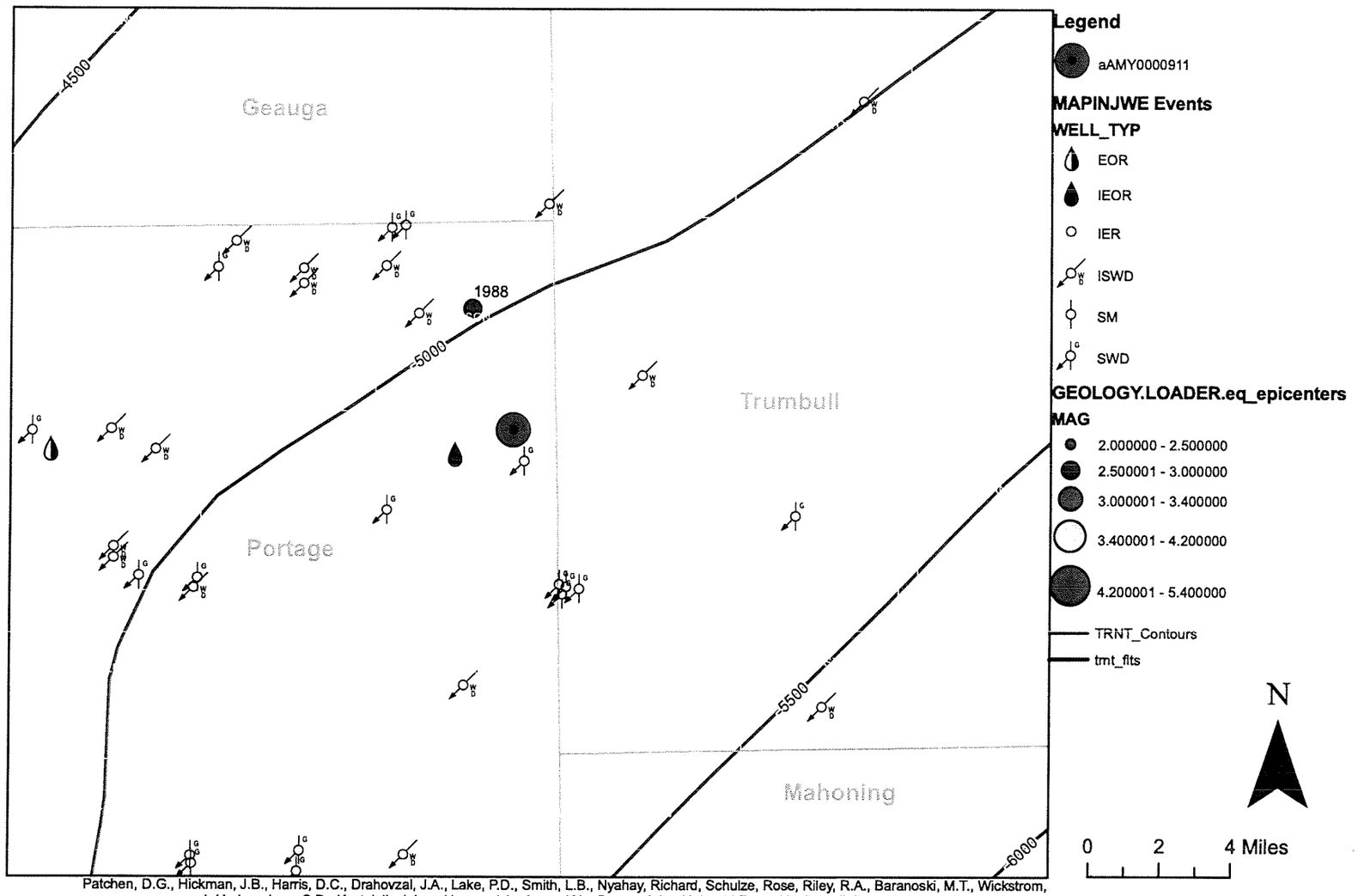
knox_fits

N

0 1 2 Miles

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

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



Legend

aAMY0000911

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

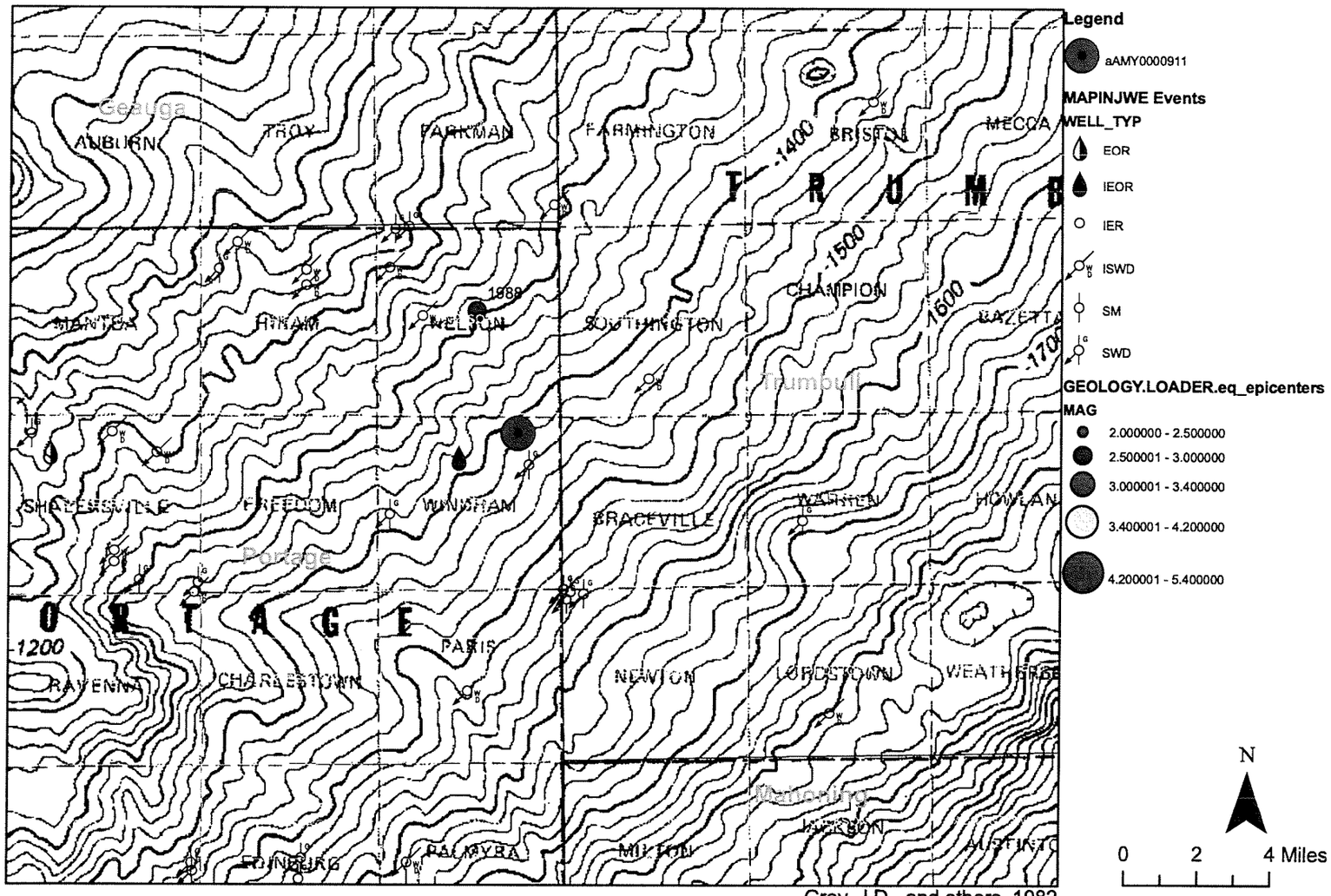
- TRNT_Contours
- tmt_fits

N

0 2 4 Miles

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

EGSP Onondaga Structure (C. I. = 20 feet)



Legend

aAMY0000911

MAPINJWE Events

WELL_TYP

- EOR
- IEOR
- IER
- ISWD
- SM
- SWD

GEOLOGY.LOADER.eq_epicenters

MAG

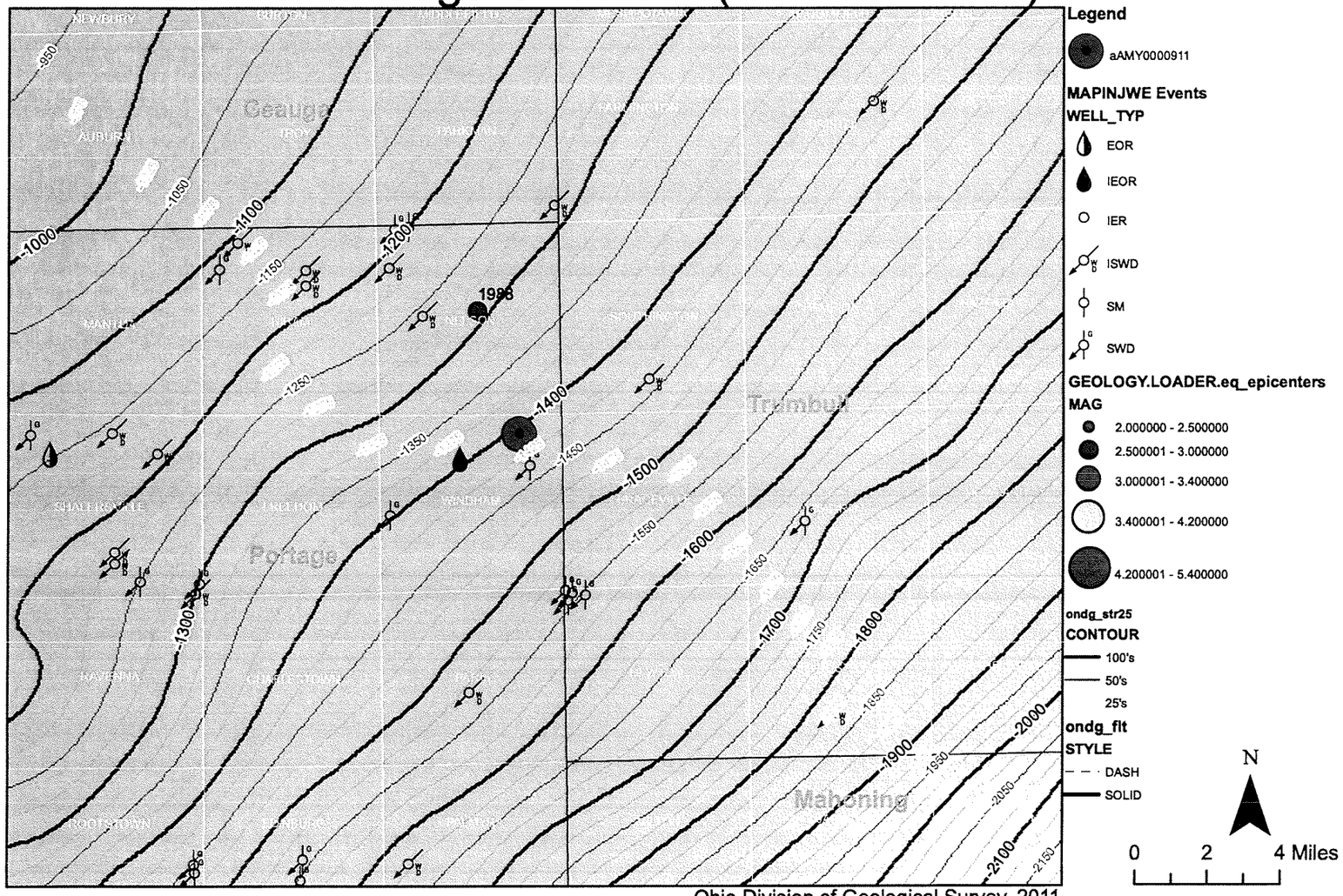
- 2.000000 - 2.500000
- 2.500001 - 3.000000
- 3.000001 - 3.400000
- 3.400001 - 4.200000
- 4.200001 - 5.400000

N

0 2 4 Miles

Gray, J.D., and others, 1982

MRCSP Onondaga Structure (C. I. = 25 feet)



Legend

aAMY0000911

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

ondg_str25

CONTOUR

- 100's
- 50's
- 25's

ondg_flt

STYLE

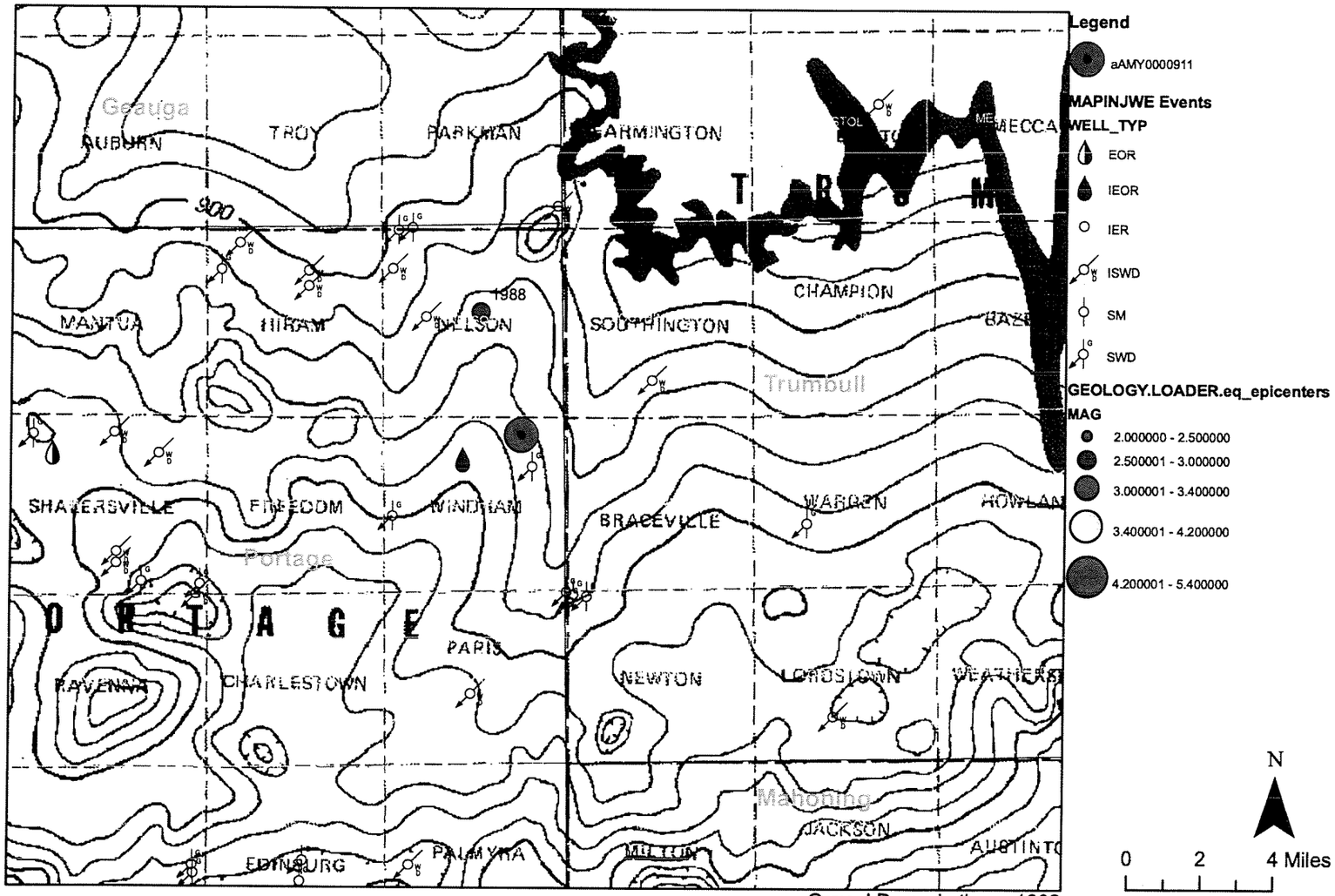
- DASH
- SOLID

N

0 2 4 Miles

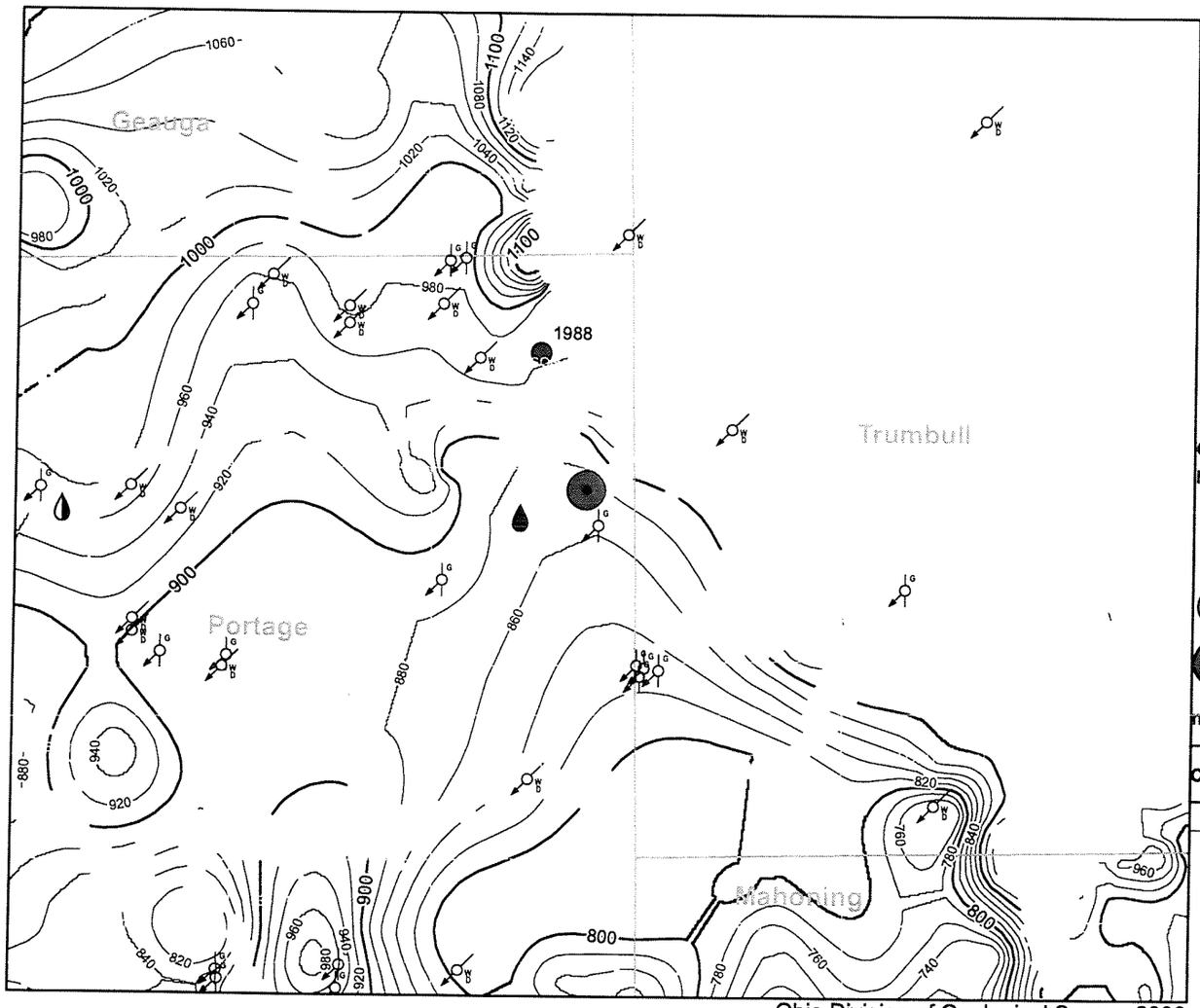
Ohio Division of Geological Survey, 2011

EGSP Berea Structure (C. I. = 20 feet)



Gray, J.D., and others, 1982

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



Ohio Division of Geological Survey, 2003

Legend

aAMY0000911

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

mpstructure_Ciip

- <all other values>

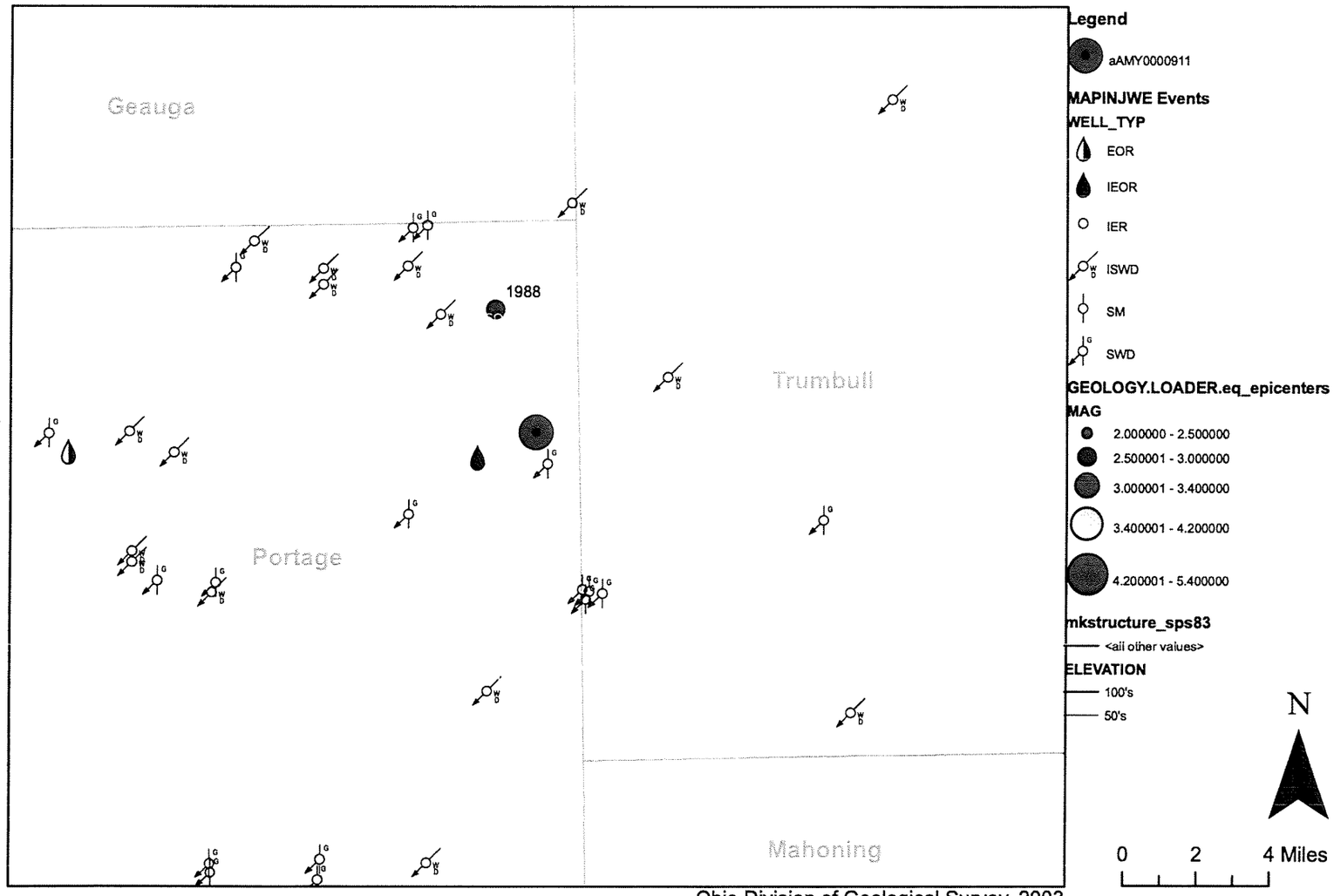
CONTOUR

- 100's
- 20's

N

0 2 4 Miles

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



Legend

aAMY0000911

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

mkstructure_sps83

- <all other values>

ELEVATION

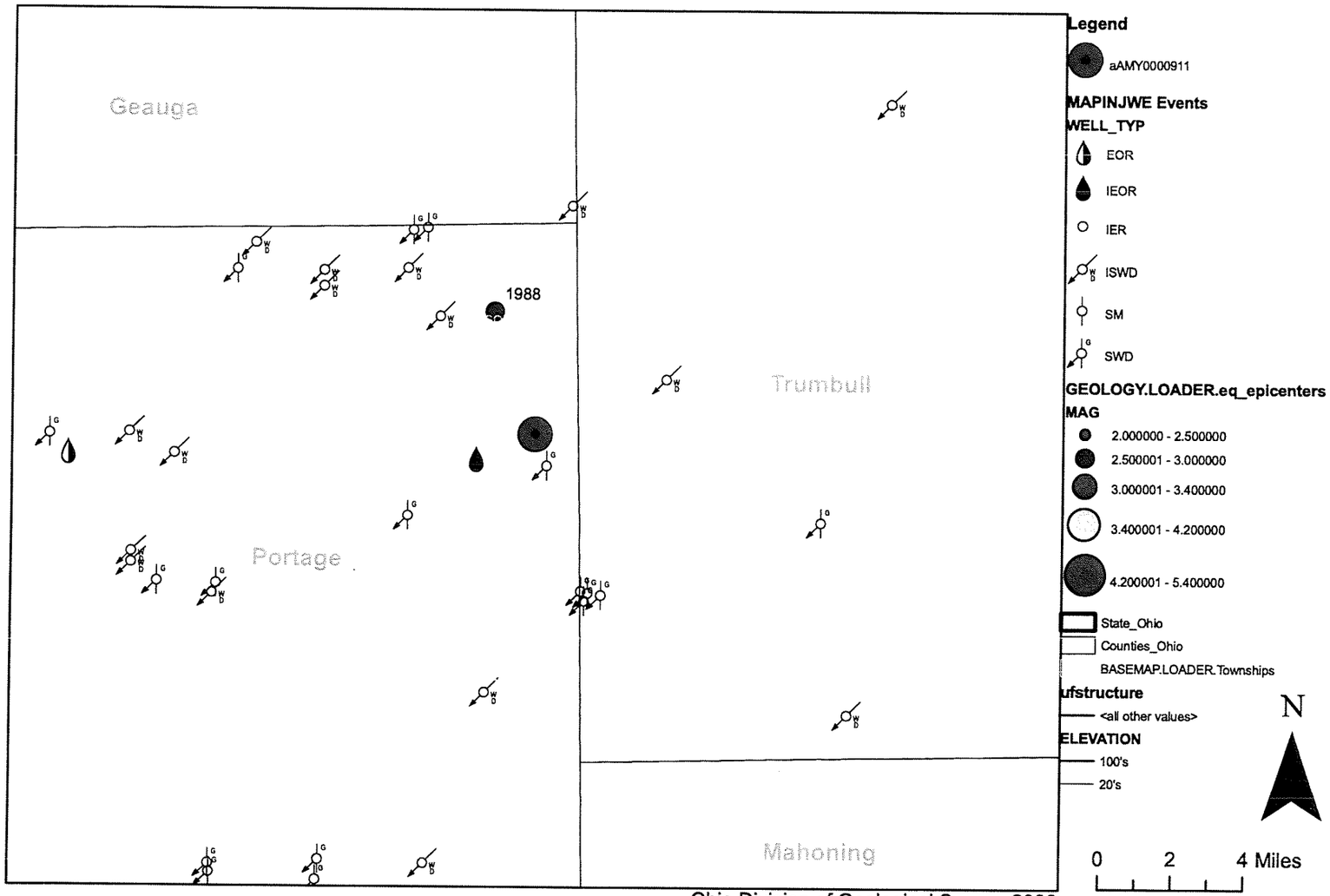
- 100's
- 50's

N

0 2 4 Miles

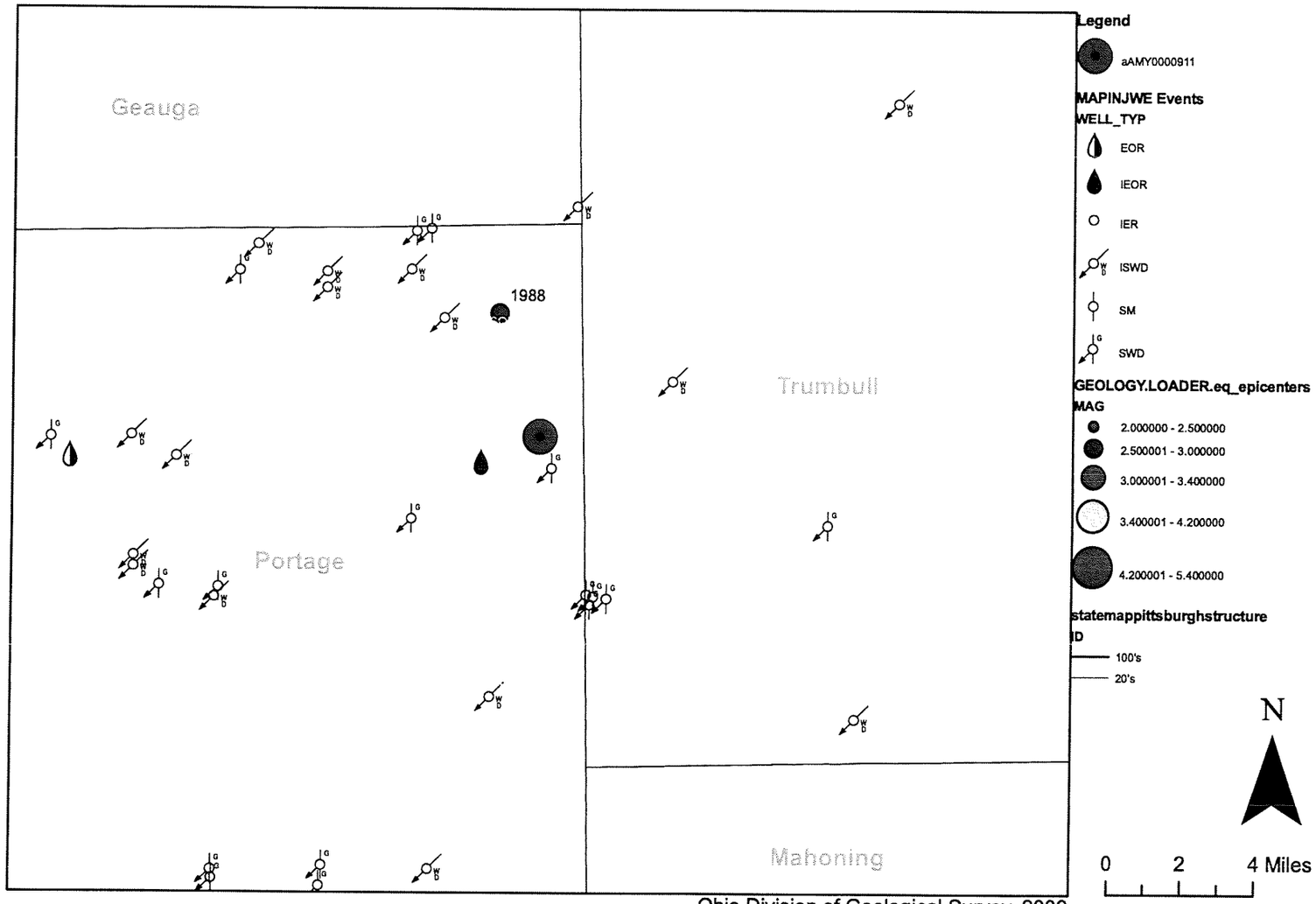
Ohio Division of Geological Survey, 2003

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



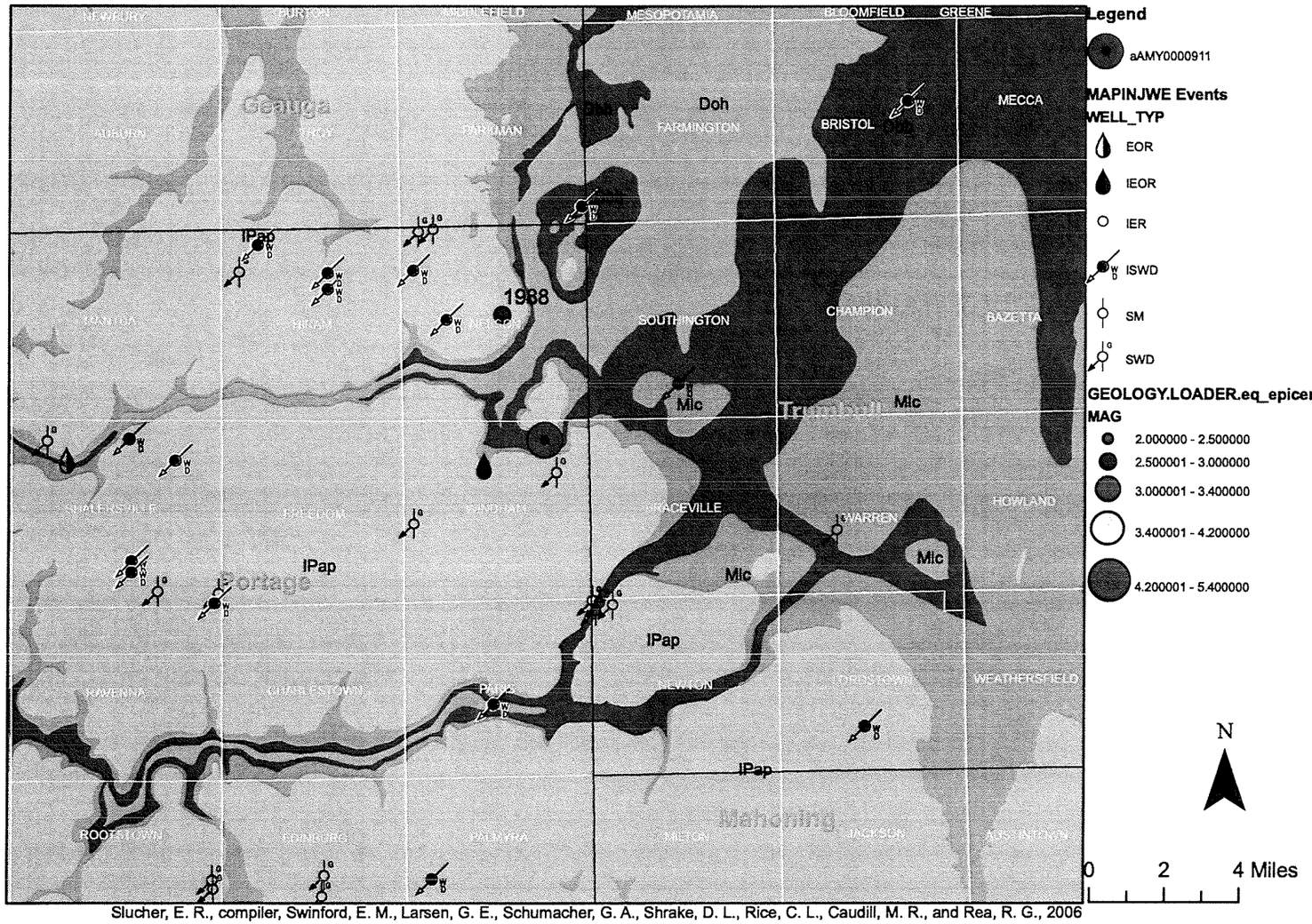
Ohio Division of Geological Survey, 2003

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



Ohio Division of Geological Survey, 2003

Bedrock Geology



Legend

aAMY0000911

MAPINJWE Events
WELL_TYP

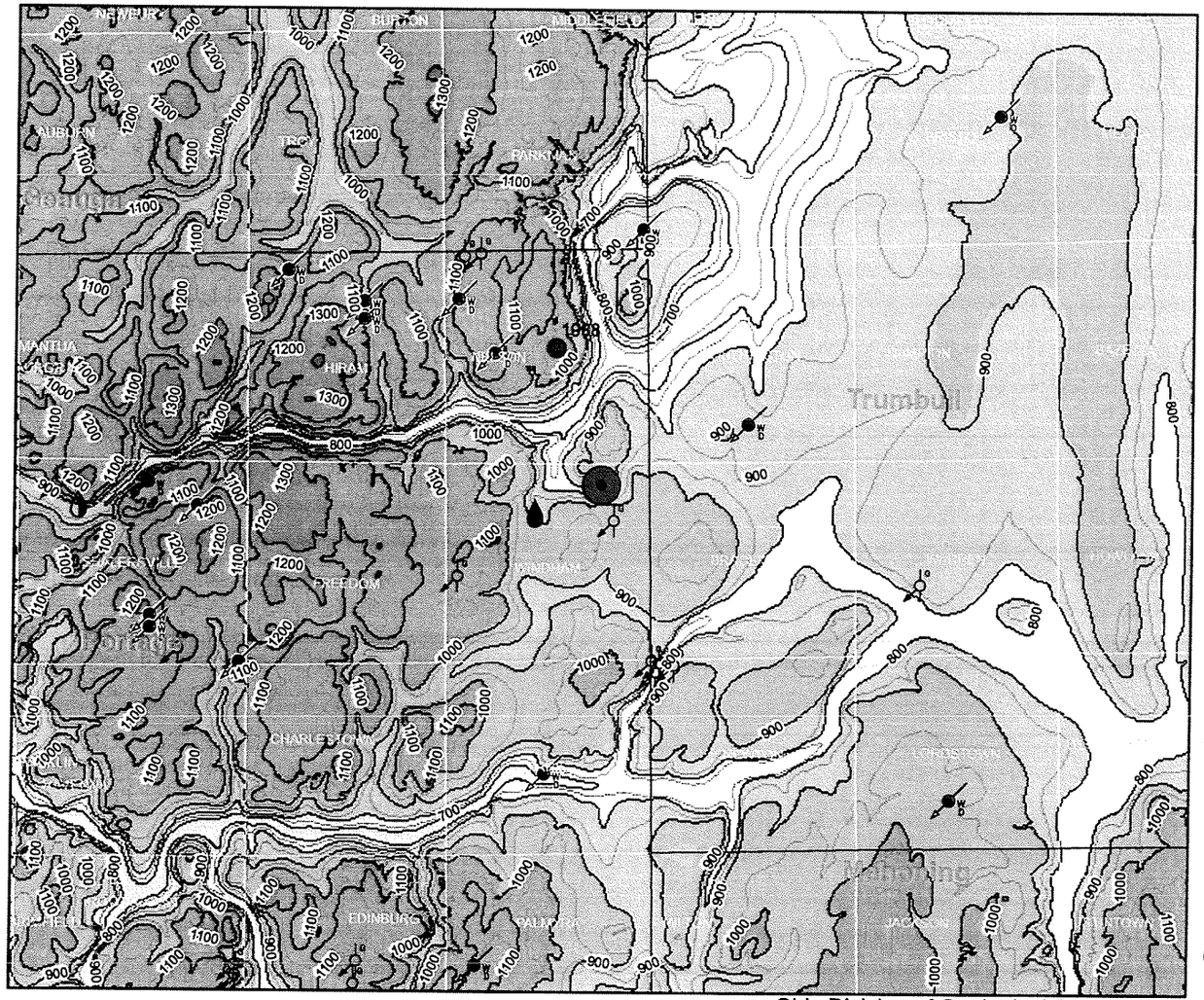
- EOR
- IEOR
- IER
- ISWD
- SM
- SWD

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

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 Topography (C.I. = 50 feet)



Legend

aAMY0000911

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

geology.LOADER.btcontours

ELEVATION

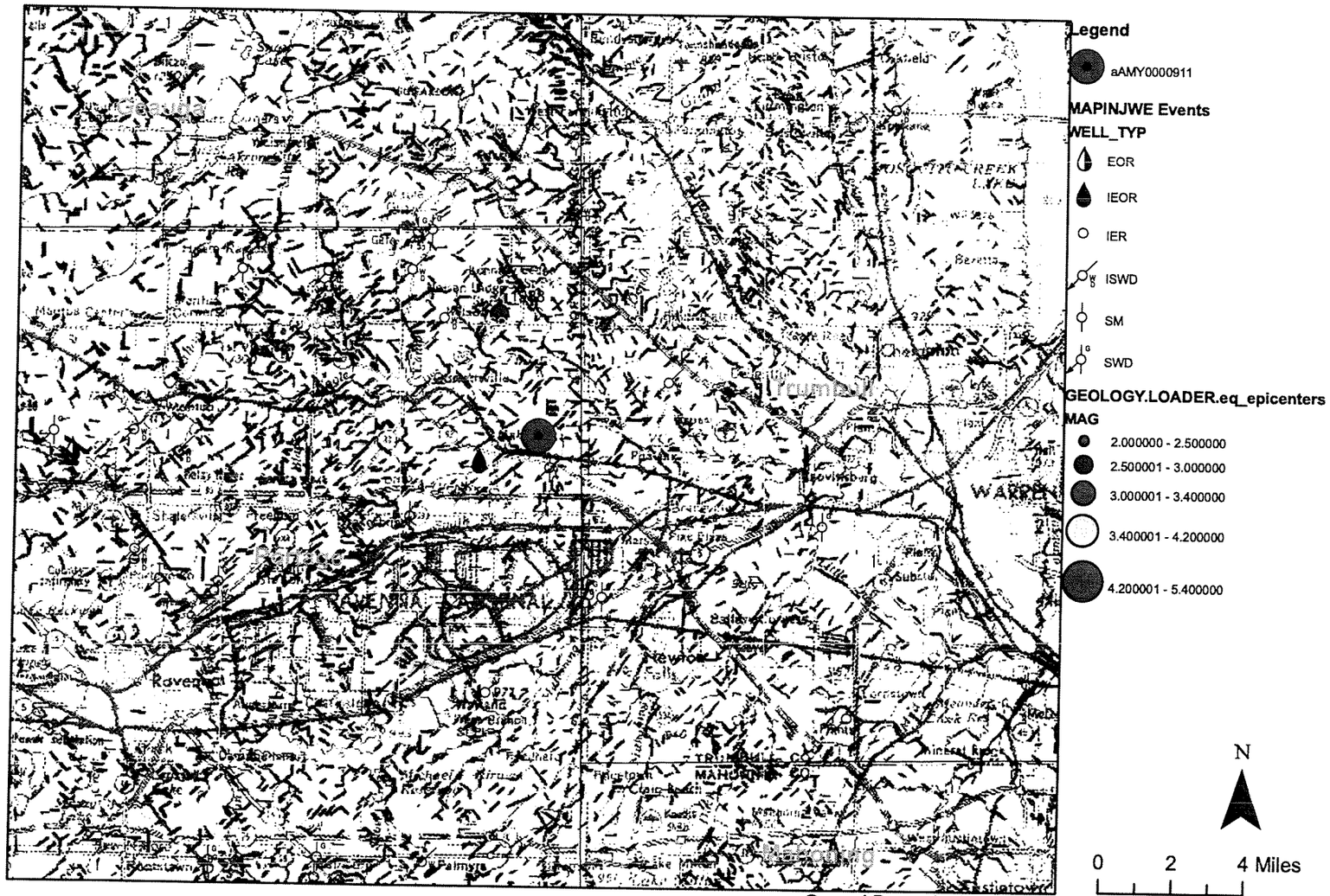
- 100's
- 50's

N

0 2 4 Miles

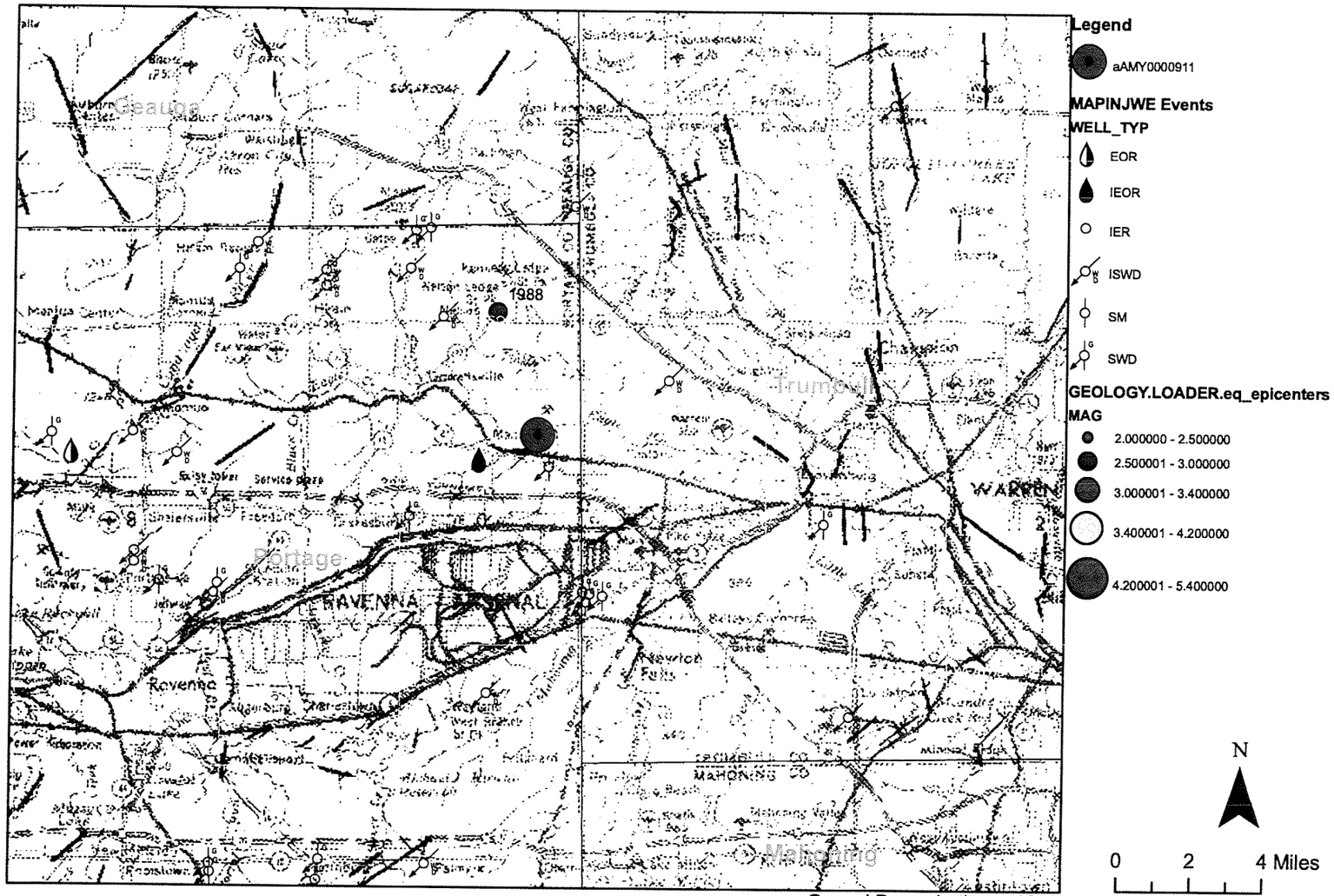
Ohio Division of Geological Survey, 2003

EGSP Aerial Photo Lineament



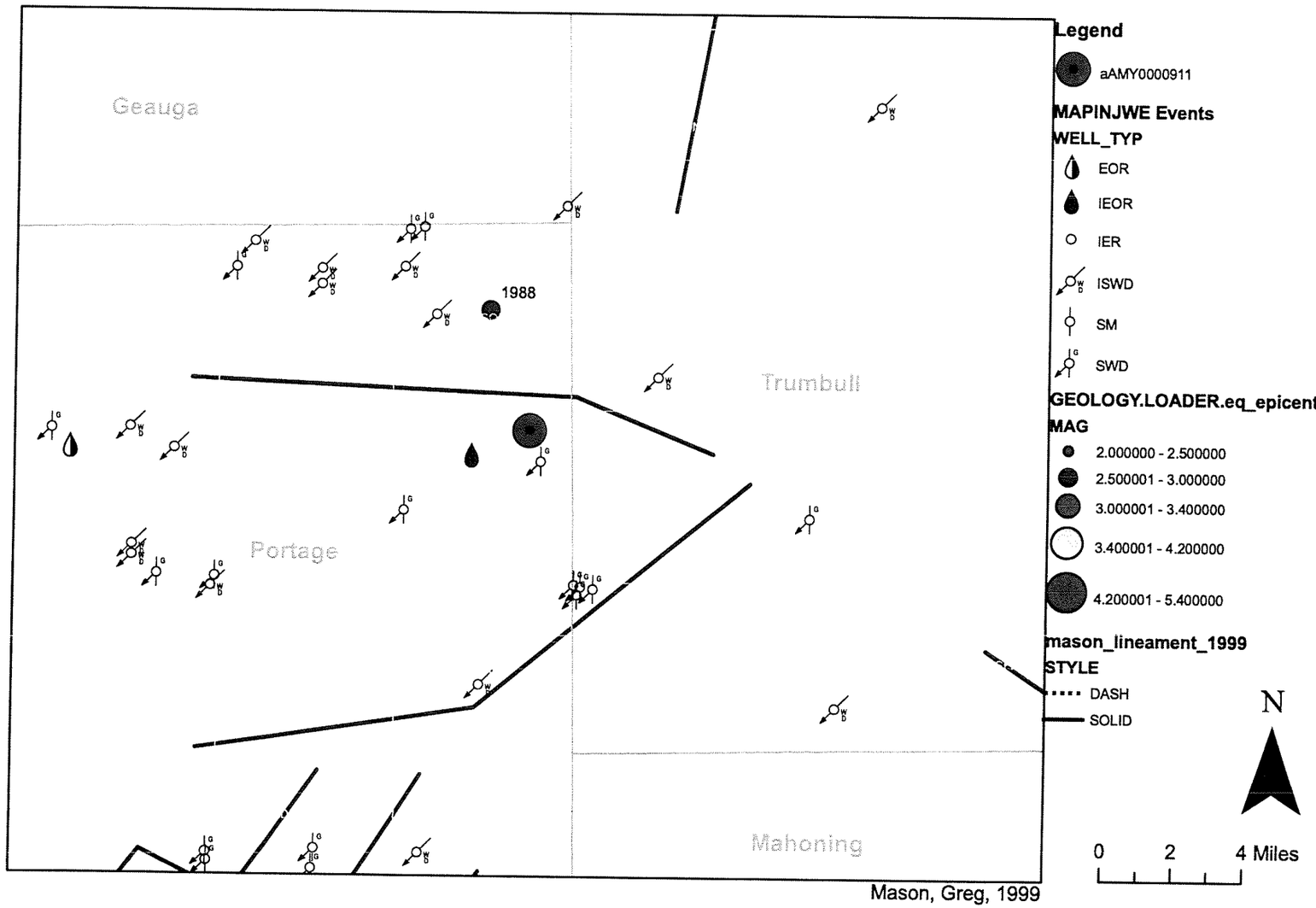
Gray, J.D., and others, 1982

EGSP LANDSAT Lineament



Gray, J.D., and others, 1982

Mason Lineament Map



Legend

aAMY0000911

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

mason_lineament_1999

STYLE

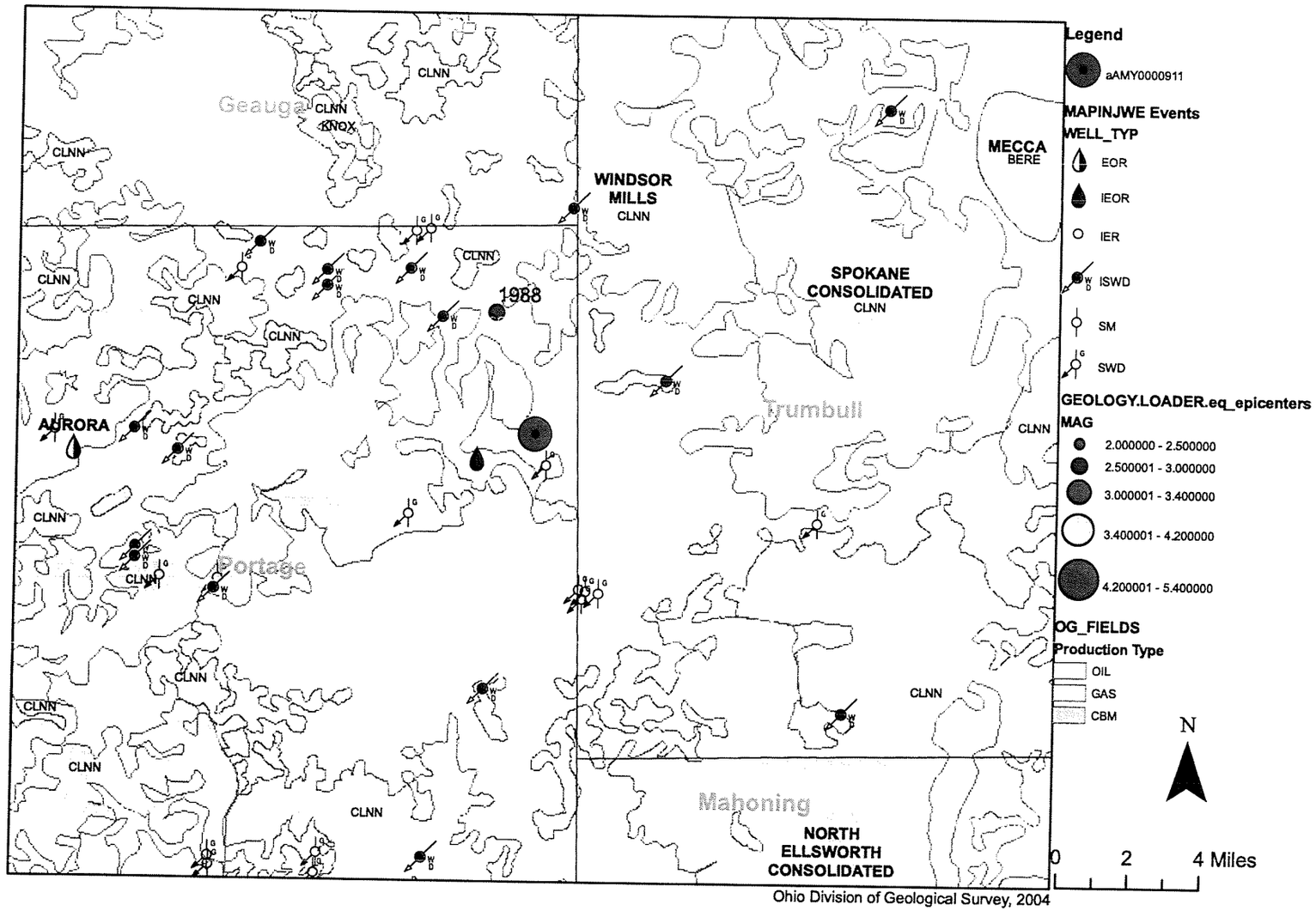
- DASH
- SOLID

N

0 2 4 Miles

Mason, Greg, 1999

Oil and Gas Fields



Ohio Division of Geological Survey, 2004

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.

ATTACHED SPECIAL PERMIT CONDITIONS
Soinski #201, Portage County, Windham Twp.

- The proposed Soinski #201 oil and gas well is located within the ½ mile area of review of the Soinski #4, SWIW#40 injection well, which is owned and operated by Hard Rock Drilling & Producing, LLC
- Since the Soinski #201 well will be penetrating the New burg dolomite injection zone being utilized by the Soinski#4 injection well, during the drilling of the Soinski #201 well, intermediate casing must be set at least to a depth of 4200 feet and then cement must be emplaced behind the intermediate casing across the Newburg dolomite in the Soinski #201 from a depth of 4000 to 4200 feet.
- A copy of the intermediate casing cementing record shall be sent to Tom Tomastik in the UIC Section at the Division of Oil and Gas Resources Management at the same time as submission of the Well Completion Record.

ATTACHED SPECIAL PERMIT CONDITIONS
Soinski #202, Portage County, Windham Twp.

- The proposed Soinski #202 oil and gas well is located within the ½ mile area of review of the Soinski #4, SWIW#40 injection well, which is owned and operated by Hard Rock Drilling & Producing, LLC
- Since the Soinski #202 well will be penetrating the New burg dolomite injection zone being utilized by the Soinski#4 injection well, during the drilling of the Soinski #202 well, intermediate casing must be set at least to a depth of 4200 feet and then cement must be emplaced behind the intermediate casing across the Newburg dolomite in the Soinski #202 from a depth of 4000 to 4200 feet.
- A copy of the intermediate casing cementing record shall be sent to Tom Tomastik in the UIC Section at the Division of Oil and Gas Resources Management at the same time as submission of the Well Completion Record.

Ohio | Environmental Protection Agency

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).

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.

HAS LARGE MAP -

CAN'T SCAN

SOINSKI #1-1
#2-1
#3-1
#4-1
#5-1
#6-1
#7-1