

# **Digital Data in Support of Studies and Assessments of Coal and Petroleum Resources in the Appalachian Basin**

By Michael H. Trippi, Scott A. Kinney, Gregory Gunther, Robert T. Ryder, and Leslie F. Ruppert

Chapter I.1 of

## **Coal and Petroleum Resources in the Appalachian Basin: Distribution, Geologic Framework, and Geochemical Character**

Edited by Leslie F. Ruppert and Robert T. Ryder

Professional Paper 1708

**U.S. Department of the Interior**  
**U.S. Geological Survey**

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# Digital Data in Support of Studies and Assessments of Coal and Petroleum Resources in the Appalachian Basin

By Michael H. Trippi,<sup>1</sup> Scott A. Kinney,<sup>2</sup> Gregory Gunther,<sup>2</sup> Robert T. Ryder,<sup>1</sup> and Leslie F. Ruppert<sup>1</sup>

## Introduction

The Appalachian basin is a mature basin containing abundant oil, gas, and coal resources. Its fossil-fuel-bearing strata range in age from Cambrian to Permian and extend over the States of New York, Pennsylvania, Maryland, Ohio, West Virginia, Virginia, Kentucky, Tennessee, Georgia, and Alabama. The basin has provided abundant fossil fuels to support the Nation's economic growth for at least 150 years and U.S. Geological Survey (USGS) assessments suggest that substantial untapped resources remain. A merger of new and old geologic data and ideas is required to locate and extract those remaining resources.

This chapter brings together abundant existing datasets in a common and integrated spatial format to advance our understanding of the distribution, geologic framework, burial history, and geochemical character of the basin's oil, gas, and coal resources. These datasets support the information and findings in chapters B through G of this volume, which include (1) geologic cross sections, seismic profiles, and burial history models that document the depositional and structural framework of the basin; (2) assessments of Carboniferous coal-bed gas and Devonian shale gas; (3) studies about the distribution of oil, gas, and coal fields and the geochemistry of natural gas and oil; and (4) a history of fossil-fuel production in the basin.

The data that supported these studies were refined and made more accessible using geographic information system (GIS) tools. The following types of data are included: (1) the bedrock geology of States included within the boundary of the Appalachian basin, (2) the locations of oil and gas wells and fields, (3) data produced for the National Oil and Gas Assessment, and (4) the stratigraphy, geochemistry, and production of coal. Data layers are available in shapefile and Zipped Keyhole Markup Language (KMZ) formats, which can be viewed using ArcGIS, Google Earth, or any software package that supports these data formats.

Metadata for these datasets are available in HTML and XML formats. Metadata files contain information about the sources of data used to create the dataset, the creation process steps, the data quality, the geographic coordinate system and horizontal datum used for the dataset, the values of attributes used in the dataset table, information about the publication and the publishing organization, and other information that may be useful to the reader. All links in the metadata were valid at the time of compilation. Some of these links may no longer be valid. No attempt has been made to determine the new online location (if one exists) for the data.

## Spatial Data

Spatial data must first be downloaded to a local hard drive and unzipped using a zip utility before the files can be used in a GIS project. After unzipping, the user will have access to multiple files containing spatial data ("shapefiles"), each representing a particular feature. If using ArcMap, after opening the program, the shapefiles can be added to the project by clicking on "File," then clicking on "Add Data," and then browsing to the location of the desired shapefile; the file can then be selected and added. These shapefiles have a geographic projection and therefore should not need to be projected before use in any ArcMap project. Details of each feature are included below.

## Geology

### Boundary of the Appalachian Basin Study Area

This dataset represents the boundaries of the Appalachian basin resource framework study area for this Professional Paper.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)

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<sup>1</sup>U.S. Geological Survey, Reston, Va.

<sup>2</sup>U.S. Geological Survey, Denver, Colo.

## 2 Coal and Petroleum Resources in the Appalachian Basin

- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

### Geology of the Appalachian Basin

This dataset represents the bedrock geology of the Appalachian basin as defined by USGS Open-File Reports 2005–1323 (Dicken, Nicholson, Horton, Foose, and others, 2005), 2005–1324 (Nicholson and others, 2005), and 2005–1325 (Dicken, Nicholson, Horton, Kinney, and others, 2005). A KMZ file could not be created due to file-size limitations.

- [Click here to access the shapefile](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

### Structural Features of the Appalachian Basin

This dataset represents the structural features of the Appalachian basin including faults, fault zones, thrust faults, anticlines, synclines, structural discontinuities, uplifts, and arches, as defined by USGS Open-File Reports 00–496 (Weary and others, 2000), 02–302 (Repetski and others, 2002), 2005–1078 (Repetski and others, 2005), 2005–1323 (Dicken, Nicholson, Horton, Foose, and others, 2005), 2005–1324 (Nicholson and others, 2005), and 2005–1325 (Dicken, Nicholson, Horton, Kinney, and others, 2005) and unpublished shapefiles used for maps in Repetski and others (2008); also chapter F.1 of this volume.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

### Location of Seismic Profiles

This dataset represents three regional seismic lines across the Rome trough and Allegheny Plateau in West Virginia, Maryland, and Pennsylvania as defined by USGS Miscellaneous Investigations Series Map I–2791 (Kulander and Ryder, 2005; also chapter E.5.1 of this volume).

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

## Coal

### Appalachian Basin-Wide Data

#### Coal Regions

This dataset represents the northern, central, and southern coal regions of the Appalachian basin.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

#### Coal Production, By County

This dataset represents the decade of maximum coal production, the maximum annual coal production, the cumulative coal production between 1830 and 2003, and the production of coal in 2003 for each county (Milici, 1999; updated in this volume, chap. D.3).

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

#### Coal, by British Thermal Unit (BTU) Values, Ash Content, and Sulfur Content

This dataset represents the British thermal unit value, standard ash in weight percent, and the sulfur composition in weight percent for 4,272 coal samples in the Appalachian Basin from USGS Open-File Report 97–134 (Bragg and others, 1997).

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

#### Coal, Pounds of Sulfur Dioxide Per Million British Thermal Units and Weight Percent Sulfur, From 1996 to 2005, by County

This dataset represents weighted average sulfur content (in weight percent) and sulfur dioxide (SO<sub>2</sub>) emissions (in pounds of SO<sub>2</sub> per million British thermal units

(lb SO<sub>2</sub>/mmBTU), assuming no post-combustion SO<sub>2</sub> removal) of bituminous coal that was mined in the Appalachian basin for electrical power generation. Data are averaged by county for the years 1996 to 2005.

- Click here to access the shapefile
- Click here to access the KMZ file
- Click here to access metadata in HTML format
- Click here to access metadata in XML format
- Click here to view a screenshot of the data

### Coal, Pounds of Sulfur Dioxide Per Million British Thermal Units and Weight Percent Sulfur, From 1983 to 1995, by County

This digital data layer represents weighted average sulfur content (in weight percent) and SO<sub>2</sub> emissions (in lb SO<sub>2</sub>/mmBTU, assuming no post-combustion SO<sub>2</sub> removal) of bituminous coal that was mined in the Appalachian basin for electrical power generation. Data are averaged by county for the years 1983 to 1995. Original data used to create this shapefile was derived from USGS Open-File Report 98-763 (Attanasi and Milici, 1998).

- Click here to access the shapefile
- Click here to access the KMZ file
- Click here to access metadata in HTML format
- Click here to access metadata in XML format
- Click here to view a screenshot of the data

## Coal Beds or Zones

### Pittsburgh Coal Bed

Two sets of data are included for the Pittsburgh coal bed. The coal bed extent shapefile and KMZ file represent the areas in which resources were calculated and are only part of the full areal extent of the Pittsburgh coal bed. The “by county” shapefile and KMZ file represent counties where the Pittsburgh coal bed resource is present and attributed with statistics on its thickness, elevation, and overburden thickness, in feet. The files have been generalized from detailed geologic coverages in USGS Professional Paper 1625-C (Northern and Central Appalachian Basin Coal Regions Assessment Team, 2001).

#### Coal Extent

- Click here to access the coal extent shapefile
- Click here to access the coal extent KMZ file
- Click here to access metadata in HTML format for the coal extent shapefile

- Click here to access metadata in XML format for the coal extent shapefile
- Click here to view a screenshot of the coal extent data

#### By County

- Click here to access the by-county shapefile
- Click here to access the by-county KMZ file
- Click here to access metadata in HTML format for the by-county shapefile
- Click here to access metadata in XML format for the by-county shapefile
- Click here to view a screenshot of the by-county data

### Upper Freeport Coal Bed

Two sets of data are included for the Upper Freeport coal bed. The coal bed extent shapefile and KMZ file represent the areas in which resources for the Upper Freeport coal bed were calculated and are only part of the full areal extent of the coal bed. The “by county” shapefile and KMZ file represent counties where the Upper Freeport coal bed resource is present and attributed with statistics on its thickness, elevation, and overburden thickness, in feet. The files have been generalized from detailed geologic coverages in USGS Professional Paper 1625-C (Northern and Central Appalachian Basin Coal Regions Assessment Team, 2001).

#### Coal Extent

- Click here to access the coal extent shapefile
- Click here to access the coal extent KMZ file
- Click here to access metadata in HTML format for the coal extent shapefile
- Click here to access metadata in XML format for the coal extent shapefile
- Click here to view a screenshot of the coal extent data

#### By County

- Click here to access the by-county shapefile
- Click here to access the by-county KMZ file
- Click here to access metadata in HTML format for the by-county shapefile
- Click here to access metadata in XML format for the by-county shapefile
- Click here to view a screenshot of the by-county data

## 4 Coal and Petroleum Resources in the Appalachian Basin

### Lower Kittanning Coal Bed

The coal bed extent shapefile and KMZ file represent part of the areal extent of the coal bed. This file has been generalized from detailed geologic coverages in USGS Professional Paper 1625–C (Northern and Central Appalachian Basin Coal Regions Assessment Team, 2001).

- [Click here to access shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

### Fire Clay Coal Zone

Two sets of data are included for the Fire Clay coal zone. The coal zone extent shapefile and KMZ file represent the areas in which resources were calculated and are only part of the full areal extent of the coal zone. The “by county” shapefile and KMZ file represent counties where the Fire Clay coal zone resource is present and are attributed with statistics on its thickness, elevation, and overburden thickness, in feet. The files have been generalized from detailed geologic coverages in USGS Professional Paper 1625–C (Northern and Central Appalachian Basin Coal Regions Assessment Team, 2001).

#### Coal Extent

- [Click here to access the coal extent shapefile](#)
- [Click here to access the coal extent KMZ file](#)
- [Click here to access metadata in HTML format for the coal extent shapefile](#)
- [Click here to access metadata in XML format for the coal extent shapefile](#)
- [Click here to view a screenshot of the coal extent data](#)

#### By County

- [Click here to access the by-county shapefile](#)
- [Click here to access the by-county KMZ file](#)
- [Click here to access metadata in HTML format for the by-county shapefile](#)
- [Click here to access metadata in XML format for the by-county shapefile](#)
- [Click here to view a screenshot of the by-county data](#)

### Pond Creek Coal Zone

Two sets of data are included for the Pond Creek coal zone. The coal zone extent shapefile and KMZ file represent the extent of the Pond Creek coal zone resource areas,

which are only a subset of the entire areal extent of the coal zone. The “by county” shapefile and KMZ file represent counties where the Pond Creek coal zone resource is present and attributed with statistics on its thickness, elevation, and overburden thickness, in feet. The files have been generalized from detailed geologic coverages in USGS Professional Paper 1625–C (Northern and Central Appalachian Basin Coal Regions Assessment Team, 2001).

#### Coal Extent

- [Click here to access the coal extent shapefile](#)
- [Click here to access the coal extent KMZ file](#)
- [Click here to access metadata in HTML format for the coal extent shapefile](#)
- [Click here to access metadata in XML format for the coal extent shapefile](#)
- [Click here to view a screenshot of the coal extent data](#)

#### By County

- [Click here to access the by-county shapefile](#)
- [Click here to access the by-county KMZ file](#)
- [Click here to access metadata in HTML format for the by-county shapefile](#)
- [Click here to access metadata in XML format for the by-county shapefile](#)
- [Click here to view a screenshot of the by-county data](#)

### Pocahontas No. 3 Coal Bed

Two sets of data are included for the Pocahontas No. 3 coal bed. The coal bed extent shapefile and KMZ file represent the areas in which resources for the Pocahontas No. 3 coal bed were calculated and are only part of the full areal extent of the coal bed. The “by county” shapefile and KMZ represent counties where the Pocahontas No. 3 coal bed resource is present and attributed with statistics on its thickness, elevation, and overburden thickness, in feet. The files have been generalized from detailed geologic coverages in USGS Professional Paper 1625–C (Northern and Central Appalachian Basin Coal Regions Assessment Team, 2001).

#### Coal Extent

- [Click here to access the coal extent shapefile](#)
- [Click here to access the coal extent KMZ file](#)
- [Click here to access metadata in HTML format for the coal extent shapefile](#)
- [Click here to access metadata in XML format for the coal extent shapefile](#)
- [Click here to view a screenshot of the coal extent data](#)

### By County

- [Click here to access the by-county shapefile](#)
- [Click here to access the by-county KMZ file](#)
- [Click here to access metadata in HTML format for the by-county shapefile](#)
- [Click here to access metadata in XML format for the by-county shapefile](#)
- [Click here to view a screenshot of the by-county data](#)

## Oil and Gas

### Location and Type of Public Oil and (or) Gas Wells

This dataset represents oil and gas wells in the Appalachian and Black Warrior basins that are included within the study area of this report. The shapefile is derived from the oil and gas well databases of the State geologic surveys of New York, Pennsylvania, Maryland, Ohio, West Virginia, Virginia, Kentucky, Tennessee, and Alabama. A KMZ file could not be created due to file-size limitations.

- [Click here to access the shapefile](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

### Location and Type of Oil and (or) Gas Fields

These datasets represent oil and gas fields within the Appalachian basin, including the Devonian sandstone play, Oriskany, Newburg-Lockport, Clinton-Medina, Trenton-Black River fields, Knox-Rose Run, and Rome-Conasauga.

#### Devonian Sandstone Play Oil and Gas Fields

This dataset represents the Devonian sandstone play oil and gas fields in the Appalachian basin that are included within the study area of this report.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

#### Oriskany Oil and Gas Fields

This dataset represents the Oriskany oil and gas fields in the Appalachian basin that are included within the study area of this report.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

#### Newburg-Lockport Oil and Gas Fields

This dataset represents the Newburg-Lockport oil and gas fields in the Appalachian basin that are included within the study area of this report.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

#### Clinton-Medina Oil and Gas Fields

This dataset represents the Clinton-Medina oil and gas fields in the Appalachian basin that are included within the study area of this report.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

#### Trenton-Black River Oil and Gas Fields

This dataset represents the Trenton-Black River oil and gas fields in the Appalachian basin that are included within the study area of this report.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

#### Knox-Rose Run Oil and Gas Fields

This dataset represents the Knox-Rose Run oil and gas fields in the Appalachian basin that are included within the study area of this report.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

### Rome-Conasauga Oil and Gas Fields

This dataset represents the Rome-Conasauga oil and gas fields in the Appalachian basin that are included within the study area of this report.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

### National Oil and Gas Assessment (NOGA)

The NOGA shapefiles and metadata below (with the exception of those for the “Appalachian Basin Test Penetrations”) were taken from the USGS National Oil and Gas Assessment website and can be found at the following URL: <http://certmapper.cr.usgs.gov/geoportal/catalog/main/home.page>. These shapefiles and their metadata were not modified in any way. The “Appalachian Basin Test Penetrations” dataset and its metadata were created for Professional Paper 1708 and do not appear on the NOGA website.

### Appalachian Basin Province Boundary

This dataset represents the geologic boundaries of the Appalachian Basin Province (province 67) as defined for the 2002 USGS NOGA project (Gautier and others, 1996).

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

### Total Petroleum System Boundaries

This dataset represents the geographic limit and geologic boundaries of the following total petroleum systems (TPSs) for the 2002 USGS NOGA project (Milici and others, 2003): Conasauga-Rome/Conasauga, Sevier-Knox/Trenton, Utica-Lower Paleozoic, Devonian Shale-Middle and Upper Paleozoic, Carboniferous Coal-bed Gas, and Pottsville Coal-bed Gas TPSs.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

### Assessment Unit Boundaries

This dataset represents the geographic limits and geologic boundaries of the following assessment units (AUs) within the Appalachian basin (province 67) for the 2002 USGS NOGA project (Milici and others, 2003): Rome Trough, Lower Paleozoic Carbonates, Lower Paleozoic Carbonates in Thrust Belt, Knox Unconformity, Black River-Trenton Hydrothermal Dolomite, Lockport Dolomite, Clinton-Medina Basin Center, Clinton-Medina Transitional Northeast, Clinton-Medina Transitional, Tuscarora Basin Center, Oriskany Sandstone-Structural, Oriskany Sandstone-Stratigraphic, Greenbrier Limestone, Mississippian Sandstone, Greater Big Sandy, Northwestern Ohio Shale, Devonian Siltstone and Shale, Marcellus Shale, Catskill Sandstones and Siltstones, Berea Sandstone, Pocahontas Basin, East Dunkard (Folded), West Dunkard (Unfolded), Central Appalachian Shelf, Appalachian Anthracite and Semi-Anthracite, and Cahaba Basin.

- [Click here to access the shapefile](#)
- [Click here to access the KMZ file](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

### Appalachian Basin Cells

This dataset represents the exploration maturity, type of production, and distribution of production in quarter-mile cells in each oil and gas assessment unit and province defined for the 2002 USGS NOGA project (Milici and others, 2003). A KMZ file could not be created due to file-size limitations.

- [Click here to access the shapefile](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

### Appalachian Basin Test Penetrations, 2005

This dataset represents the exploration maturity, type of production, and distribution of production in quarter-mile cells in each oil and gas assessment unit and province defined for the 2002 USGS NOGA project (Milici and others, 2003), updated in 2005. A KMZ file could not be created due to file-size limitations.

- [Click here to access the shapefile](#)
- [Click here to access metadata in HTML format](#)
- [Click here to access metadata in XML format](#)
- [Click here to view a screenshot of the data](#)

## Cross Sections

Shapefiles and KMZ files are available for 10 cross sections across the Appalachian basin, including 5 through Cambrian and Ordovician strata, 3 through Lower Silurian strata, and 2 regional sections. Shapefiles, KMZ files, and accompanying metadata are available for the individual sections.

## Cross Sections, Wells, and Structural Features Through Cambrian and Ordovician Strata

These datasets represent the lines of section and well locations for cross sections  $B-B'$ ,  $C-C'$ ,  $D-D'$ ,  $G-G'$ , and  $H-H'$  through Cambrian and Ordovician strata. In addition, the structural movement lines for well locations are included for four of these five cross sections ( $B-B'$ ,  $C-C'$ ,  $D-D'$ , and  $G-G'$ ). Each cross section has its own shapefiles, KMZ files, and metadata in both HTML and XML formats.

- Click here to view a screenshot of the data, showing all five cross sections

### Cambrian-Ordovician Cross Section $B-B'$

#### Well Locations

- Click here to access the shapefile representing the well locations used in constructing cross section  $B-B'$
- Click here to access the KMZ file representing the well locations used in constructing cross section  $B-B'$
- Click here to access metadata in HTML format about the well locations used in constructing cross section  $B-B'$
- Click here to access metadata in XML format about the well locations used in constructing cross section  $B-B'$

#### Palinspastically Restored Points

- Click here to access the shapefile representing the palinspastically restored points along cross section  $B-B'$
- Click here to access the KMZ file representing the palinspastically restored points along cross section  $B-B'$
- Click here to access metadata in HTML format about the palinspastically restored points along cross section  $B-B'$
- Click here to access metadata in XML format about the palinspastically restored points along cross section  $B-B'$

#### Structural Movement Lines

- Click here to access the shapefile representing the structural movement lines for the palinspastically restored points along cross section  $B-B'$

- Click here to access the KMZ file representing the structural movement lines for the palinspastically restored points along cross section  $B-B'$
- Click here to access metadata in HTML format about the structural movement lines for the palinspastically restored points along cross section  $B-B'$
- Click here to access metadata in XML format about the structural movement lines for the palinspastically restored points along cross section  $B-B'$

### Cambrian-Ordovician Cross Section $C-C'$

#### Well Locations

- Click here to access the shapefile representing the well locations used in constructing cross section  $C-C'$
- Click here to access the KMZ file representing the well locations used in constructing cross section  $C-C'$
- Click here to access metadata in HTML format about the well locations used in constructing cross section  $C-C'$
- Click here to access metadata in XML format about the well locations used in constructing cross section  $C-C'$

#### Palinspastically Restored Points

- Click here to access the shapefile representing the palinspastically restored points along cross section  $C-C'$
- Click here to access the KMZ file representing the palinspastically restored points along cross section  $C-C'$
- Click here to access metadata in HTML format about the palinspastically restored points along cross section  $C-C'$
- Click here to access metadata in XML format about the palinspastically restored points along cross section  $C-C'$

#### Structural Movement Lines

- Click here to access the shapefile representing the structural movement lines for the palinspastically restored points along cross section  $C-C'$
- Click here to access the KMZ file representing the structural movement lines for the palinspastically restored points along cross section  $C-C'$
- Click here to access metadata in HTML format about the structural movement lines for the palinspastically restored points along cross section  $C-C'$
- Click here to access metadata in XML format about the structural movement lines for the palinspastically restored points along cross section  $C-C'$

## 8 Coal and Petroleum Resources in the Appalachian Basin

### Cambrian-Ordovician Cross Section $D-D'$

#### Well Locations

- Click here to access the shapefile representing the well locations used in constructing cross section  $D-D'$
- Click here to access the KMZ file representing the well locations used in constructing cross section  $D-D'$
- Click here to access metadata in HTML format about the well locations used in constructing cross section  $D-D'$
- Click here to access metadata in XML format about the well locations used in constructing cross section  $D-D'$

#### Palinspastically Restored Points

- Click here to access the shapefile representing the palinspastically restored points along cross section  $D-D'$
- Click here to access the KMZ file representing the palinspastically restored points along cross section  $D-D'$
- Click here to access metadata in HTML format about the palinspastically restored points along cross section  $D-D'$
- Click here to access metadata in XML format about the palinspastically restored points along cross section  $D-D'$

#### Structural Movement Lines

- Click here to access the shapefile representing the structural movement lines for the palinspastically restored points along cross section  $D-D'$
- Click here to access the KMZ file representing the structural movement lines for the palinspastically restored points along cross section  $D-D'$
- Click here to access metadata in HTML format about the structural movement lines for the palinspastically restored points along cross section  $D-D'$
- Click here to access metadata in XML format about the structural movement lines for the palinspastically restored points along cross section  $D-D'$

### Cambrian-Ordovician Cross Section $G-G'$

#### Well Locations

- Click here to access the shapefile representing the well locations used in constructing cross section  $G-G'$
- Click here to access the KMZ file representing the well locations used in constructing cross section  $G-G'$
- Click here to access metadata in HTML format about the well locations used in constructing cross section  $G-G'$

- Click here to access metadata in XML format about the well locations used in constructing cross section  $G-G'$

#### Palinspastically Restored Points

- Click here to access the shapefile representing the palinspastically restored points along cross section  $G-G'$
- Click here to access the KMZ file representing the palinspastically restored points along cross section  $G-G'$
- Click here to access metadata in HTML format about the palinspastically restored points along cross section  $G-G'$
- Click here to access metadata in XML format about the palinspastically restored points along cross section  $G-G'$

#### Structural Movement Lines

- Click here to access the shapefile representing the structural movement lines for the palinspastically restored points along cross section  $G-G'$
- Click here to access the KMZ file representing the structural movement lines for the palinspastically restored points along cross section  $G-G'$
- Click here to access metadata in HTML format about the structural movement lines for the palinspastically restored points along cross section  $G-G'$
- Click here to access metadata in XML format about the structural movement lines for the palinspastically restored points along cross section  $G-G'$

### Cambrian-Ordovician Cross Section $H-H'$

#### Well Locations

- Click here to access the shapefile representing the well locations used in constructing cross section  $H-H'$
- Click here to access the KMZ file representing the well locations used in constructing cross section  $H-H'$
- Click here to access metadata in HTML format about the well locations used in constructing cross section  $H-H'$
- Click here to access metadata in XML format about the well locations used in constructing cross section  $H-H'$

#### Line of Section

- Click here to access the shapefile representing the line of connected segments along cross section  $H-H'$
- Click here to access the KMZ file representing the line of connected segments along cross section  $H-H'$

- Click here to access metadata in HTML format about the line of connected segments along cross section *H-H'*
- Click here to access metadata in XML format about the line of connected segments along cross section *H-H'*

## Cross Sections Through Lower Silurian Strata

This dataset represents the lines of section of cross sections *A-A'*, *E-E'*, and *F-F'* through Lower Silurian strata. The shapefile, KMZ file, and metadata contain data on all three cross sections combined.

- Click here to access the shapefile
- Click here to access the KMZ file
- Click here to access metadata in HTML format
- Click here to access metadata in XML format
- Click here to view a screenshot of the data

## Regional Geologic Cross Section *D-D'*

Two datasets are included for regional geologic cross section *D-D'*. One represents the line of section of geologic cross section *D-D'* that spans a portion of the Appalachian basin in Ohio, West Virginia, Pennsylvania, and Maryland. The second represents the point locations of wells on that cross section.

- Click here to view a screenshot of the data for regional cross section *D-D'*

### Well Locations

- Click here to access the shapefile representing the well locations used in constructing regional cross section *D-D'*
- Click here to access the KMZ file representing the well locations used in constructing regional cross section *D-D'*
- Click here to access metadata in HTML format about the well locations used in constructing regional cross section *D-D'*
- Click here to access metadata in XML format about the well locations used in constructing regional cross section *D-D'*

### Line of Section

- Click here to access the shapefile representing the line segments used in constructing regional cross section *D-D'*

- Click here to access the KMZ file representing the line segments used in constructing regional cross section *D-D'*
- Click here to access metadata in HTML format about the line segments used in constructing regional cross section *D-D'*
- Click here to access metadata in XML format about the line segments used in constructing regional cross section *D-D'*

## Regional Geologic Cross Section *E-E'*

Two datasets are included for regional geologic cross section *E-E'*. One represents the line of section of geologic cross section *E-E'* that spans a portion of the Appalachian basin in Ohio, West Virginia, and Virginia. The second represents the point locations of wells on that cross section.

- Click here to view a screenshot of the data for regional cross section *E-E'*

### Well Locations

- Click here to access the shapefile representing the well locations used in constructing regional cross section *E-E'*
- Click here to access the KMZ file representing the well locations used in constructing regional cross section *E-E'*
- Click here to access metadata in HTML format about the well locations used in constructing regional cross section *E-E'*
- Click here to access metadata in XML format about the well locations used in constructing regional cross section *E-E'*

### Line of Section

- Click here to access the shapefile representing the line segments used in constructing regional cross section *E-E'*
- Click here to access the KMZ file representing the line segments used in constructing regional cross section *E-E'*
- Click here to access metadata in HTML format about the line segments used in constructing regional cross section *E-E'*
- Click here to access metadata in XML format about the line segments used in constructing regional cross section *E-E'*

## Metadata

Metadata are viewable and exportable through Arc Catalog or Web browsers. To view in a Web browser, double click on one of the metadata files with the “.htm” extension or drag the file to your browser’s icon. To view in ArcCatalog, click on any of the shapefiles and then click the Metadata tab (the Description tab in ArcCatalog 10.1 and newer).

## National Coal Resources Data System

The National Coal Resources Data System (NCRDS; U.S. Geological Survey, 2014) is a publicly available, geo-referenced database that contains stratigraphic data for coal in the United States. NCRDS began as a cooperative venture between the USGS and State geological agencies in 1975 and is continually updated with new data. Currently, there are 113,286 unique records for Appalachian basin coal beds and coal zones. Individual records include information about coal bed or zone name, host formation name, coal rank, surface elevation, coal thickness, range of depths, and other information. The NCRDS database is available at <http://energy.usgs.gov/Tools/NationalCoalResourcesDataSystem.aspx>. The Web interface allows users to query, browse, and download descriptive and stratigraphic data associated with Appalachian basin coal beds and coal zones.

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