

# Mine Mapping for GEOMINE

Mapping for the Cloud

# GeoMine Appalachian Pilot Project Progress and GeoCloud II Update for SMCRA States and OSM FODs

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# Purpose of Presentation

- Background
- Update on Progress
- Next Steps

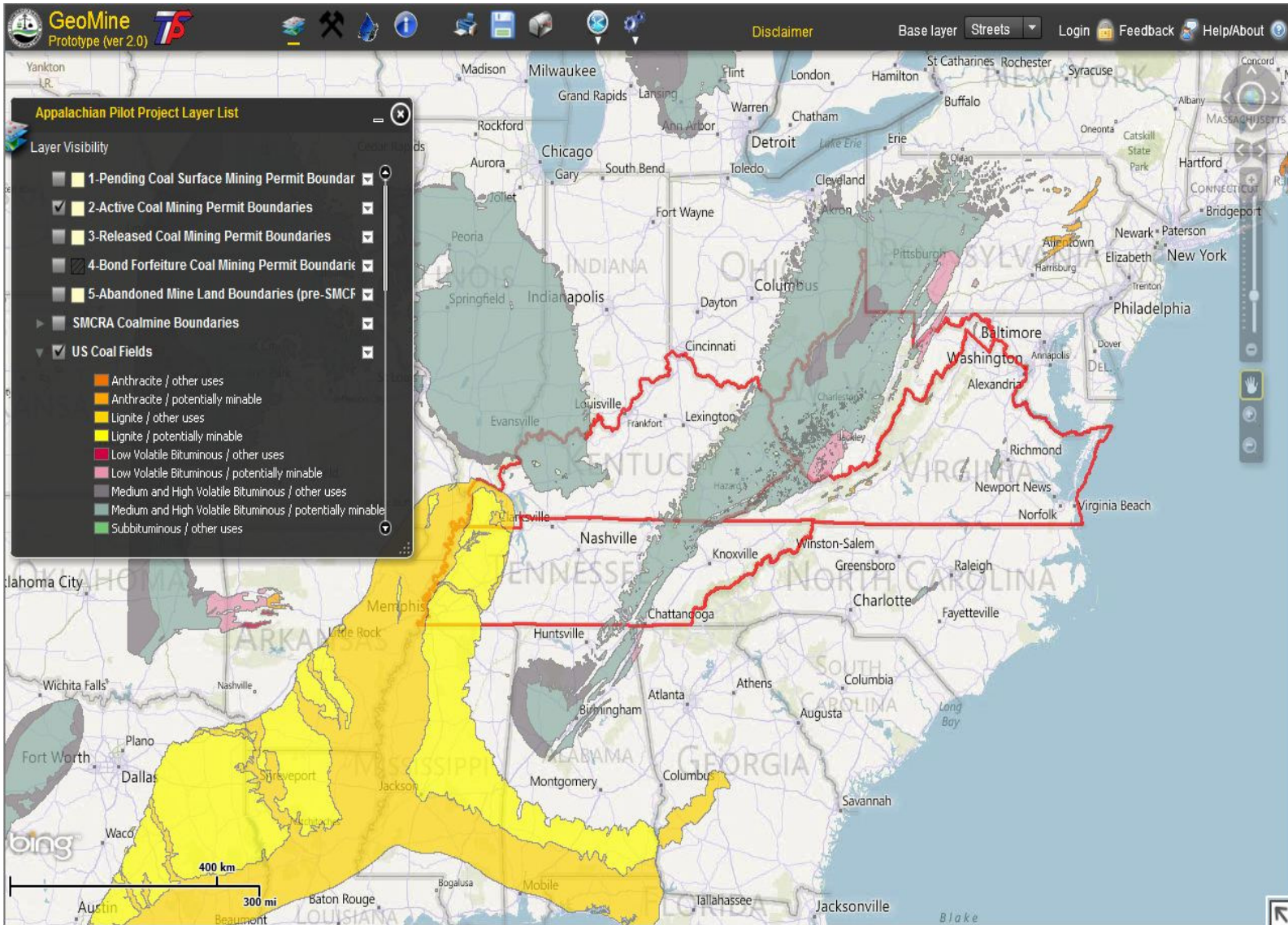


# Background

- Pilot Project → started August 2009
- Goal: develop a prototype interactive Internet-based mapping application that displays and shares easily available geo-data
- DOI, COE and EPA June 2009 MOU
- Partners: Feds--OSM, FWS, COE & EPA  
States--KY, VA, & WV

# GeoMine Prototype Viewer v. 2.0

## December 2011



# Progress

1. “Cloud” solution—Amazon Web Services.
2. Download geodata capability (GIS software, Google Earth, iPhone/iPAD)
3. Agency Data Stewards:
  - providing data
  - quality assurance

# Progress (continued)

4. 22 products loaded:
  - » SMCRA agencies – 13 SMCRA permit-related information products
  - » Corps of Engineers – 4 products: Nationwide (NWP) 21 permits, Jurisdictional Determinations, and Impact and Mitigation Locations.
  - » FWS – 2 products: National Wetlands Inventory and Critical Habitat for threatened and endangered species.
  - » EPA – 3 products: 303(d) impaired waters, 303(d) impaired waters with Total Maximum Daily Loads, and STOrage and RETrieval (STORET) sampling locations linked to hydrologic databases.

# Progress (continued)

5. Used American Society for Testing and Materials (ASTM)-  
-Coal Mining and Reclamation Data Standards
  - AML standards approved 2/1/2011
  - Regulatory standards approved 12/15/2011



## 6. Metrics for Surface Mine Attribution by

Coal Mine CMAQRA Databases

<u>Detail by State</u>	<u>Kentucky</u>		<u>Tennessee</u>		<u>Virginia</u>		<u>West Virginia</u>	
<i>Table</i>	<i>Total Records</i>	<i>Avg. % of Attributes Populated</i>	<i>Total Records</i>	<i>Avg. % of Attributes Populated</i>	<i>Total Records</i>	<i>Avg. % of Attributes Populated</i>	<i>Total Records</i>	<i>Avg. % of Attributes Populated</i>
Surface Coal Mine Boundary	17,150	42	2,736	63	796	55	7,468	58
Underground Coal Mine Extents	64,085	34	29	38	6,153	42	15,907	42
Excess Spoil - Valley Fills	36,360	46	143	69	0	0	2,302	44
Coal Refuse Impoundments	0	0	0	0	0	0	273	38
Coal Mine Land Reclamation Status	0	0	0	0	352	63	0	0
Bond Status	0	0	0	0	30	57	0	0
Environmental Resource Monitoring Location	0	0	0	0	10,412	62	0	0
Post-Mining Land Use	0	0	0	0	516	66	0	0
Lands Unsuitable for Mining Petition (LUMP)	0	0	0	0	0	0	0	0
Coal Preparation Plant	0	0	0	0	0	0	0	0
<b>Total Records and Average of Averages</b>	<b>117,595</b>	<b>41</b>	<b>2,908</b>	<b>57</b>	<b>18,259</b>	<b>58</b>	<b>25,950</b>	<b>45</b>

<u>Summary</u>	<u>Total all States</u>	
<i>Table</i>	<i>Total Records</i>	<i>Avg. % of Attributes Populated</i>
Surface Coal Mine Boundary	28,150	49
Underground Coal Mine Extents	86,174	36
Excess Spoil - Valley Fills	38,805	46
Coal Refuse Impoundments	273	38
Coal Mine Land Reclamation Status	352	63
Bond Status	30	57
Environmental Resource Monitoring Location	10,412	62
Post-Mining Land Use	516	66
Lands Unsuitable for Mining Petition (LUMP)	0	0
Coal Preparation Plant	0	0
<b>Total Records and Average of Averages</b>	<b>164,712</b>	<b>52</b>

## 7. 1<sup>st</sup> Quarter GeoMine Progress through Federal Cooperative Grants to KY, VA, WV

- KY - digitized and attributed an additional 1,044 surface mine boundaries.
- VA - converted and attributed 681 of over 3,000 surface mines released from bond liability.
- WV - digitized boundaries of 2,492 AML problem areas.
- 16 Interns hired under Federal GeoMine grants:
  - KY - five interns
  - VA - one intern
  - WV - 10 Marshall University students (9 are graduate students)

# Next Steps

- Incorporate new geodata created under the Federal Cooperative Agreement grants
- Focus on Priority Information Products for GeoMine:
  - 1) Active Surface Coal Mining Boundaries
  - 2) Pending Coal Surface Mining Boundaries
  - 3) Released Coal Mining Surface Boundaries
  - 4) Valley Fills
  - 5) **Deep Mine Extents**
- Incorporate WV non-STORET hydrologic data into GeoMine

TABLE 6 Underground Coal Mining Extents Attributes<sup>4</sup>

Attribute Name	Definition	Example	Data Type	Preferred Domain	Clarification
Permittee	See 5.6.16	ACME Coal Mining Co., Inc.	Text		The ADS should consider naming conventions for this attribute
Company	See 5.6.4	XYZ Coal Co.	Text		
Mine Name	See 5.6.8	Peterson Mine No. 1	Text		
Permit ID	See 5.6.14	2939829	Text		
MSHA ID	See 5.6.9	39-39022	Text		
State/Tribe Mine ID	See 5.6.19	WA001	Text		Alternate mine identification number
National ID	See 5.6.10	WV1201834	Text		Unique OSM identifier
National Mine Map Repository ID	See 5.8.6.2	700000A	Alphanumeric		
Coal Bed Name(s)	See 5.6.2	Appleton No. 2	Text		Local/regional name or state geological survey stratigraphic name
Date of Map	See 5.6.6	3/11/1977	Date		The source document used to show the actual "final" extent of mining
Mine Status	See 5.8.6.1	Active	Text	See Table 7 for domains and definitions	As defined by the approved RA
Underground Mining Method(s)	See 5.8.6.3	Longwall	Text	See Table 8 for domains and definitions	
Post-SMCRA	See 5.6.17	Yes	Text	Yes, No	To determine whether mining has occurred post-SMCRA
Calculated Area	See 5.6.1	23400	Numeric		For comparison with reported value
Reported Area	See 5.6.18	23600	Numeric		For comparison with calculated value
Permit Application Types	See 5.6.13	IBR	Text	See Table 4 for domains and definitions	
Permit Application Date	See 5.6.11	01/30/2009	Date		
Permit Application Approval Date	See 5.6.12	01/30/2009	Date		
Edit Date	See 5.6.7	01/30/2007	Date		To determine last update of data
Comment	See 5.6.3	Multi seam, combined surface and underground operation, highwall	Text		
Contact	See 5.6.5	West Virginia Department of Environmental Protection	Text		

<sup>4</sup>This data is also associated with the bonded areas for underground coal mine operations.

TABLE 7 Preferred Domain Definitions for Underground Mine Status

Domain Value	Definition
Active	Mine site has ongoing coal production and/or reclamation activities.
Inactive	Mine site has no coal extraction or reclamation activity taking place as defined in 30 CFR 840.11(f).
Abandoned	All surface and underground coal mining activities have ceased and operator has left the site without completing reclamation as defined in 30 CFR 840.11(g)(1-2).
Temporary Cessation	RA has granted cessation of mining pursuant to 30 CFR 816/817.131(b).
Pre-SMCRA	Underground mining that has occurred prior to the passage of SMCRA

TABLE 8 Preferred Domain Definitions for Underground Mining Method(s)

Domain Value	Definition
Long wall	A method of working a coal seam in a single operation by means of a long working face in a continuous line, generally several hundred feet in width. The resultant space from which the coal has been removed is allowed to collapse (caving) behind the mining face.
Room & Pillar	System of mining in which typically flat-lying beds of coal are mined in room-type openings, separated by pillars of undisturbed coal left for roof support.
Breast and Pillar	A system of working anthracite coal using passages with narrow pillars between them, connected at specific intervals.
Highwall	Highwall mining systems capable of mining parallel underground entries from the surface to predetermined depths to maximize mineral recovery and limit personnel exposure to underground hazards.
Auger	Method of recovering coal by boring into the coal seam exposed by excavation.

5.9.4 *Geographical Representation*—Performance Bond and Land Reclamation Status features will be represented using a polygon.

5.9.5 *Permitted Coal Mining Performance Bond and Land Reclamation Status Attributes*—Attributes contain information about a particular polygon. Each attribute associated with a polygon contributes to the unique identity of the site and helps in analysis and retrieval of additional information. The feature attributes specific to the Performance Bond and Land Reclamation Status feature layer are defined below. See Table 9 and Table 11 for attributes.

5.9.5.1 *Bond Amount*—Amount of posted bond attached to a specific permit or incremental bond area within the permit area.

5.9.5.2 *Increment Area ID*—An identifier that helps in organization, retrieval, and analysis of individual state or tribal data associated with the area, based on increment identification(s) issued by the RA.

5.9.5.3 *Land Reclamation Status*—Designates the current state of reclamation on individual areas within permitted coal mining and reclamation operations represented by disturbed, backfilled/regraded, revegetated, topsoiled, TOJ, and not disturbed.

5.9.5.4 *Reclamation Bond Status*—Designated by the RA for individual areas within permitted coal mining and reclamation operations. The bond statuses may be represented by bonded, not bonded, Phase I Release, Phase II Release, or Phase III Release, Forfeited or TOJ.

5.9.5.5 *Reclamation Bond Status Date*—Date of approval by the RA.

5.9.5.6 *Release Eligibility*—Designates the phase of bond release for which an individual area within a permitted coal

mining and reclamation operation boundary is eligible and may represent Phase I, Phase II, and Phase III under SMCRA or Not Applicable (NA) if on interim lands.

5.10 *Lands Unsuitable for Mining Petition Area (LUMP)*—This dataset defines an area(s) that has been petitioned to be designated as unsuitable for mining.

5.10.1 *LUMP Area Feature Class*—This feature class contains polygons that depict areas that have been petitioned to be designated as unsuitable for CMO's.

5.10.2 The list of LUMP Area attributes represent the data necessary to develop and maintain a nationwide geospatial data set depicting these area types.

5.10.3 *Origin of LUMP Area Geometry*—The feature geometry and attributes must originate from the most accurate data available to the RA.

5.10.4 *Geographical Representation*—LUMP Area features will be represented using a polygon.

5.10.5 *LUMP Area Attributes*—Attributes contain information about a particular polygon. Each attribute associated with a polygon contributes to the unique identity of the site to help in analysis and retrieval of additional information. The feature attributes specific to the LUMP Area feature layer are defined below. See Table 14 for attributes.

5.10.5.1 *LUMP Basis*—The rationale for the petition or LUMP.

5.10.5.2 *LUMP Date*—Date petition received for review by the RA.

5.10.5.3 *LUMP Designation Date*—Designation date of petition decision assigned by RA.

5.10.5.4 *LUMP Name*—Name given to petition by RA.

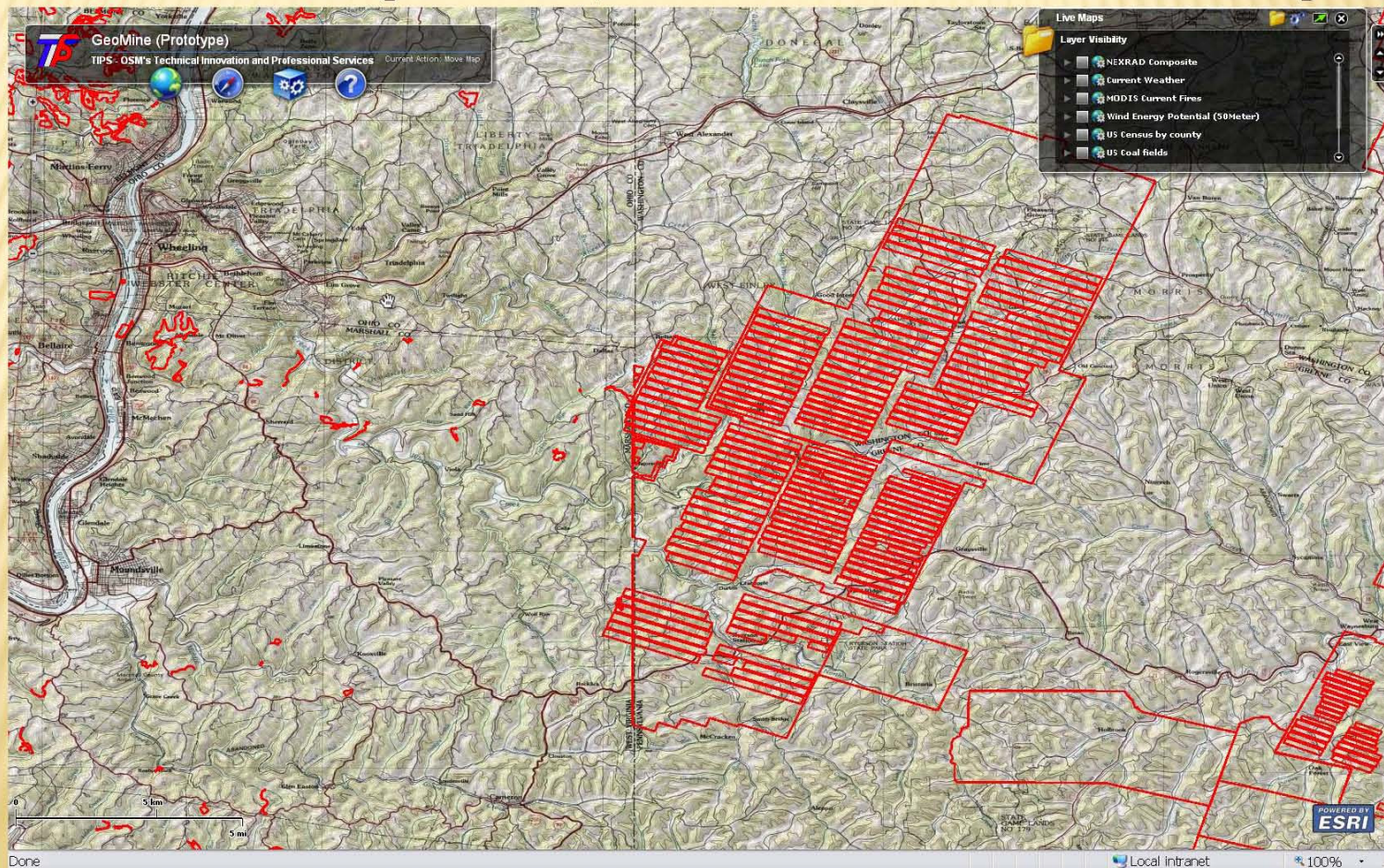
5.10.5.5 *LUMP Status*—The status of the decision regarding petition area.





# DEMONSTRATION – PAN AND ZOOM

- ✘ Pan & zoom. Change base map to NatGeo. Show cross-border mining.





# DEMONSTRATION – ADD AMLIS LAYER

The screenshot displays a GIS application interface. At the top left, a logo for 'GeoMine (Prototype)' is visible, along with the text 'TIPS - OSM's Technical Innovation and Professional Services' and 'Current Action: Identify'. The main map area shows a topographic view of a region in West Virginia, with red lines indicating Abandoned Mine Lands Inventory System (AMLIS) areas. A scale bar at the bottom left shows 5 km and 5 mi. A toolbar at the bottom right includes 'Local intranet' and '100%' zoom.

**Live Maps**

**Layer Visibility**

- MODIS Current Fires
- Wind Energy Potential (50Meter)
- US Census by county
- US Coal fields
- Abandoned Mine Lands Inventory
- Permit Boundaries

**Identify**

Abandoned Mine Lands Inventory System  
(11/24/2008)

PRIOPROB: 300  
PRIORITY: 3  
PROB\_STAT:  
ST\_CODE: WV  
OWNER\_OF: 0  
UNFD\_METR: 0.81  
FUND\_UNITS: 0  
CORNERDD:  
OWNER\_ST: 0  
PA\_NUMBER: 001199  
COMP\_UNITS: 0  
UPDTE\_CODE:  
FUND\_METR: 0  
ORETYPES:  
CORNERWS:  
FUND\_COSTS: 0  
PU\_NAME: SAND HILL  
COMP\_METR: 0  
LASTUPDATE: 12/01/1998  
CORNERCTY:  
COUNTY: MARSHALL  
COMP\_COSTS: 0  
PU\_NUMBER: 9  
STATEKEY: WV  
FIPSCODE: 54051  
FUND\_SRC: 000  
OWNER\_IN: 0  
PROGRAMS: SGA  
amlis\_key: WMO01199856A  
PROB\_TY\_CD: 00  
QUAD\_NAME: MAJORSVILLE  
Shape: Point  
CONG\_DIST: 1  
UNFD\_COSTS: 10000  
CORNERCD:

Done

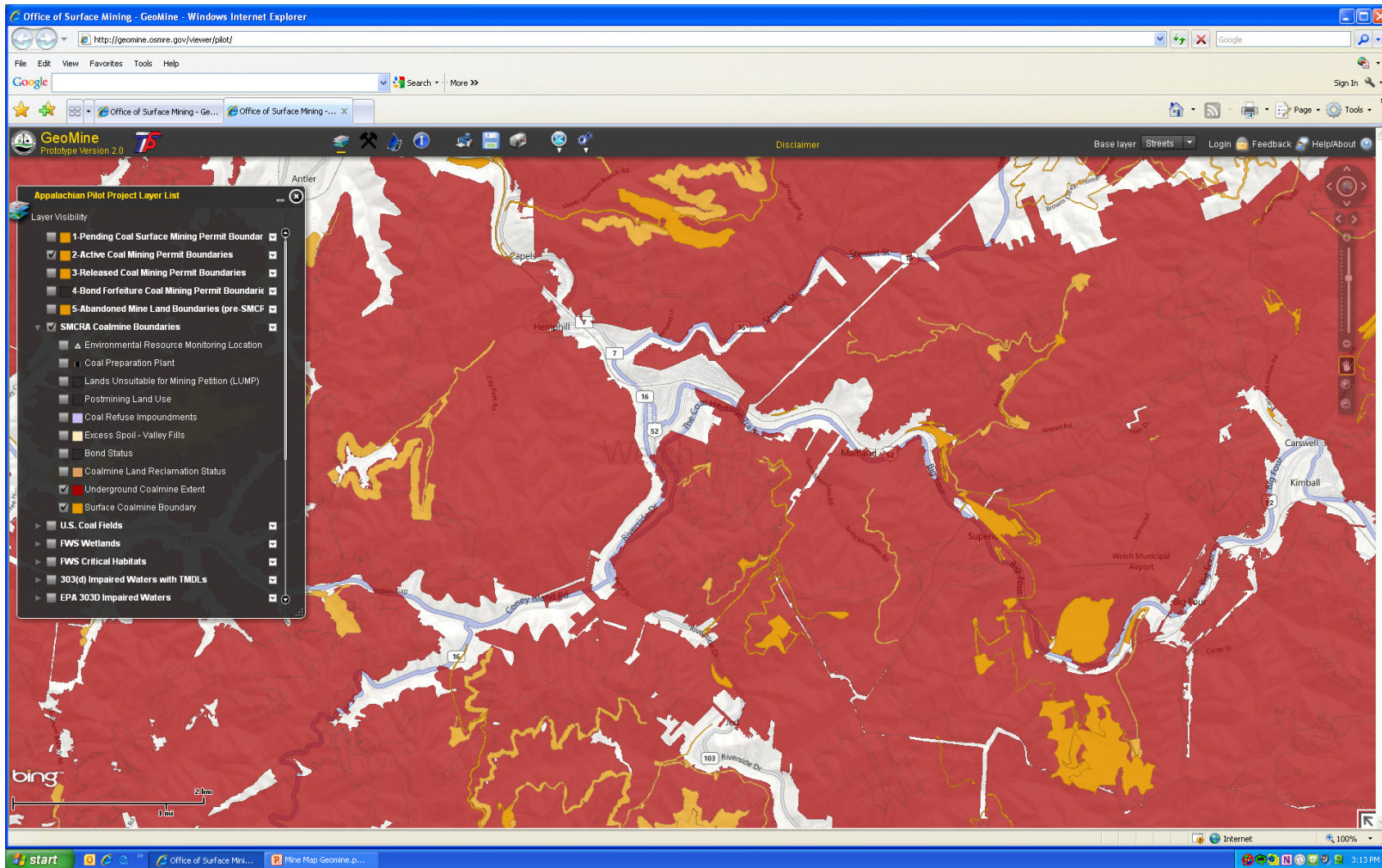
Local intranet 100%

ESRI



# The Complexity of Mine Void Hydrology

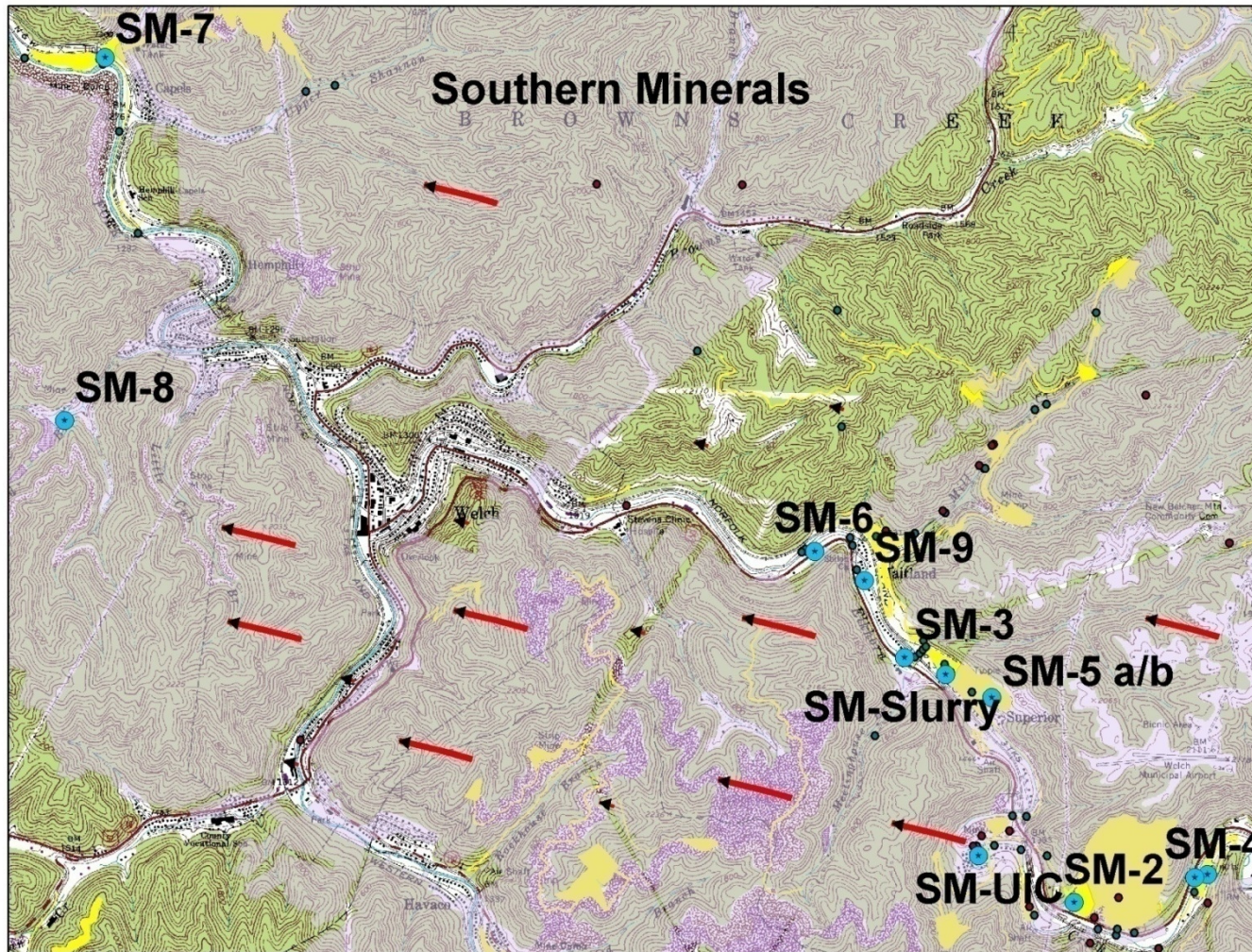
Southern Minerals





# The Complexity of Mine Void Hydrology

## Southern Minerals



Virginia department of environmental protection  
*Promoting a Healthy Environment*

# Questions



west virginia department of environmental protection  
*Promoting a Healthy Environment*

<http://geomine.osmre.gov/viewer/pilot/>



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