Use of Underground Mine Pools for Multiple Uses

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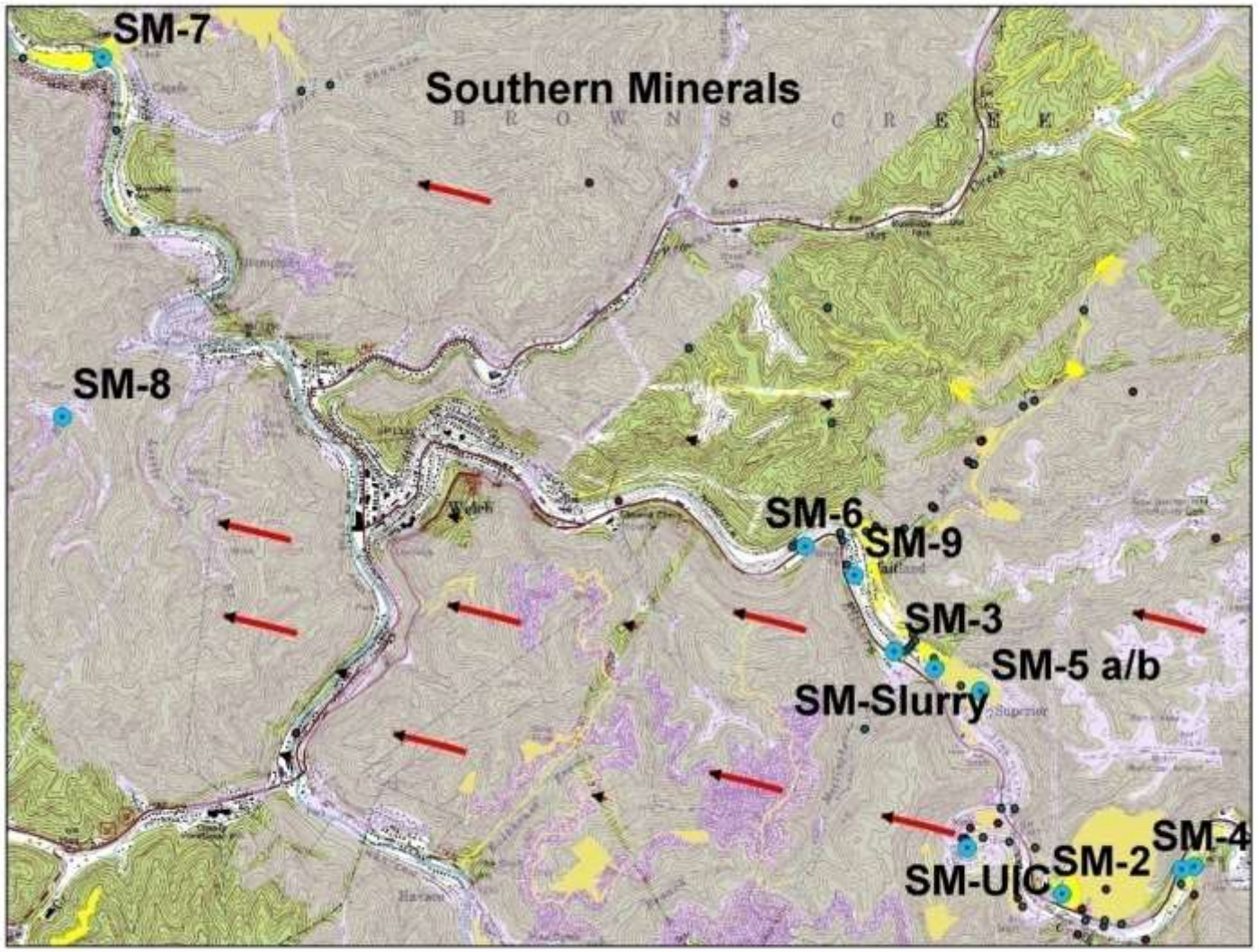
Mine Pools are Both Liability and Resource

- Mine pools and material damage
- Mine pools and watershed analysis and inter-basin transfer
- Mine pools and UIC
- Mine pools and oil and gas interaction
- Mine pools as a **resource**

Mine Pools as Resource

- Public Water Supply
- Mine Pools as Energy
- Mine Pools in Agriculture
- Mine Pools in Homeland Security
- Mine Pools as Temperature Regulators

Mine Pools as a Public Water Supply



Pool of Bethesda

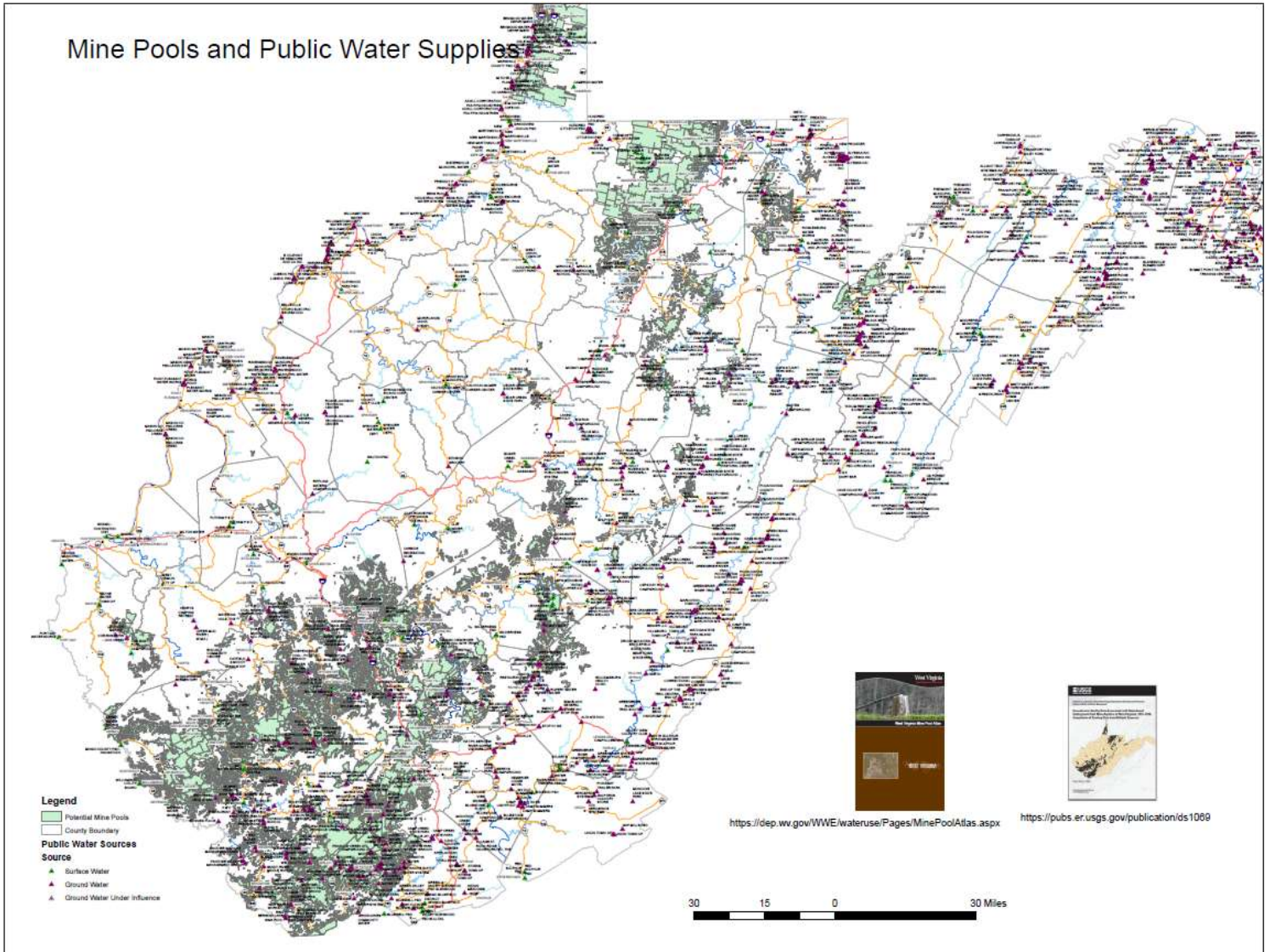
Quasi-Public Sources

- https://goo.gl/maps/hVZqjpWLPSk

Mine Pool as a Healing Spring?

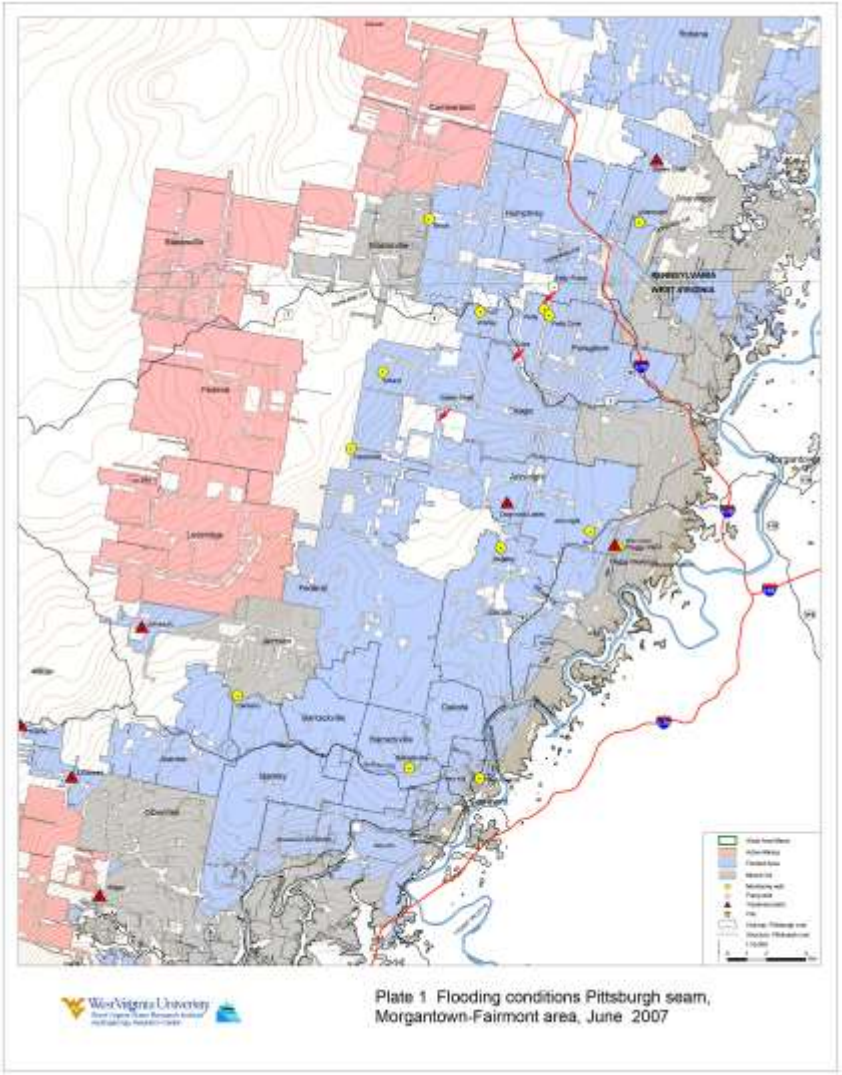
- Healing Spring and SNC Aquifer

Matching resources to needs



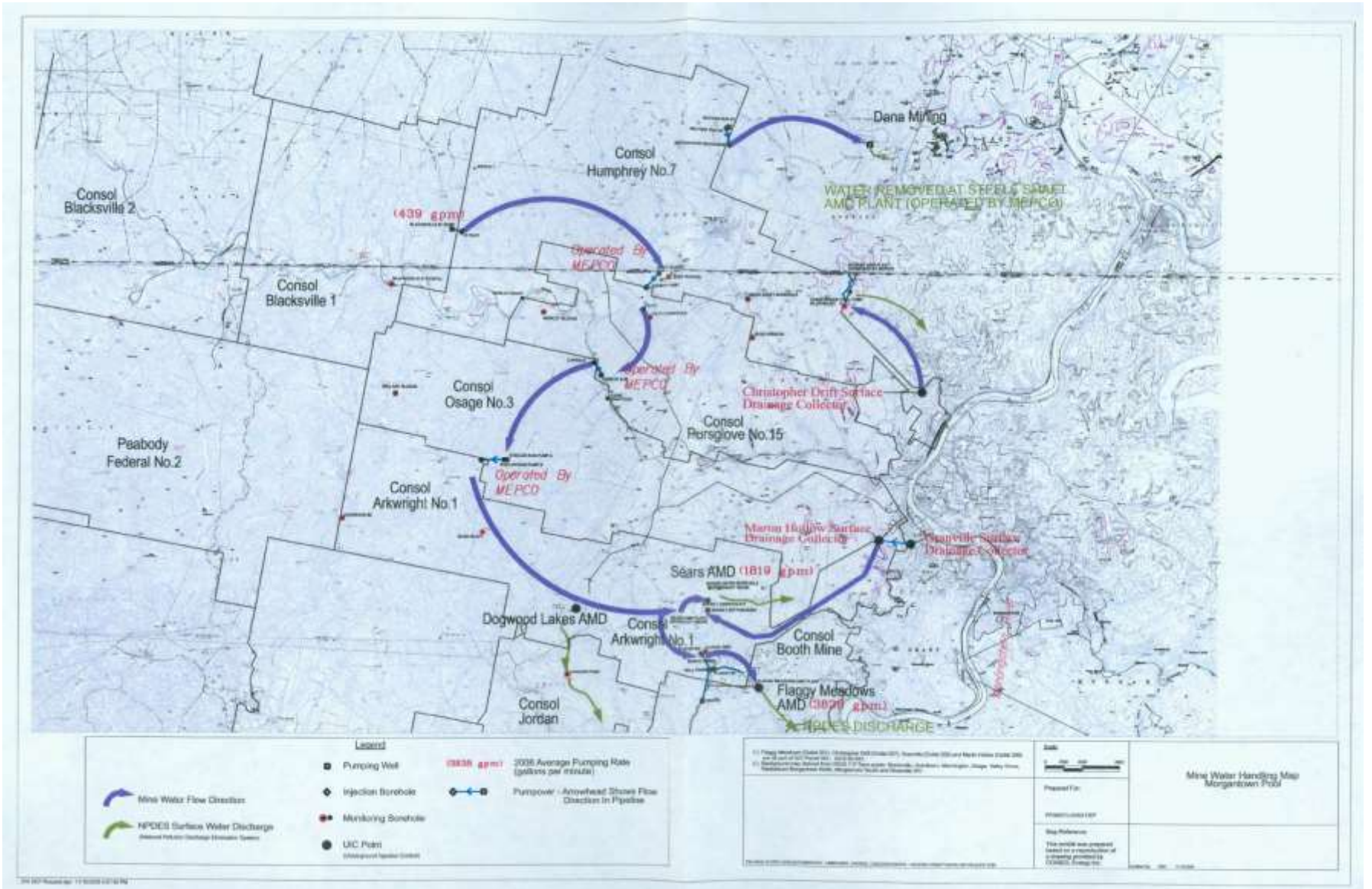
Liability to Resource

- Pittsburgh Coal seam
- An inter-basin puzzle

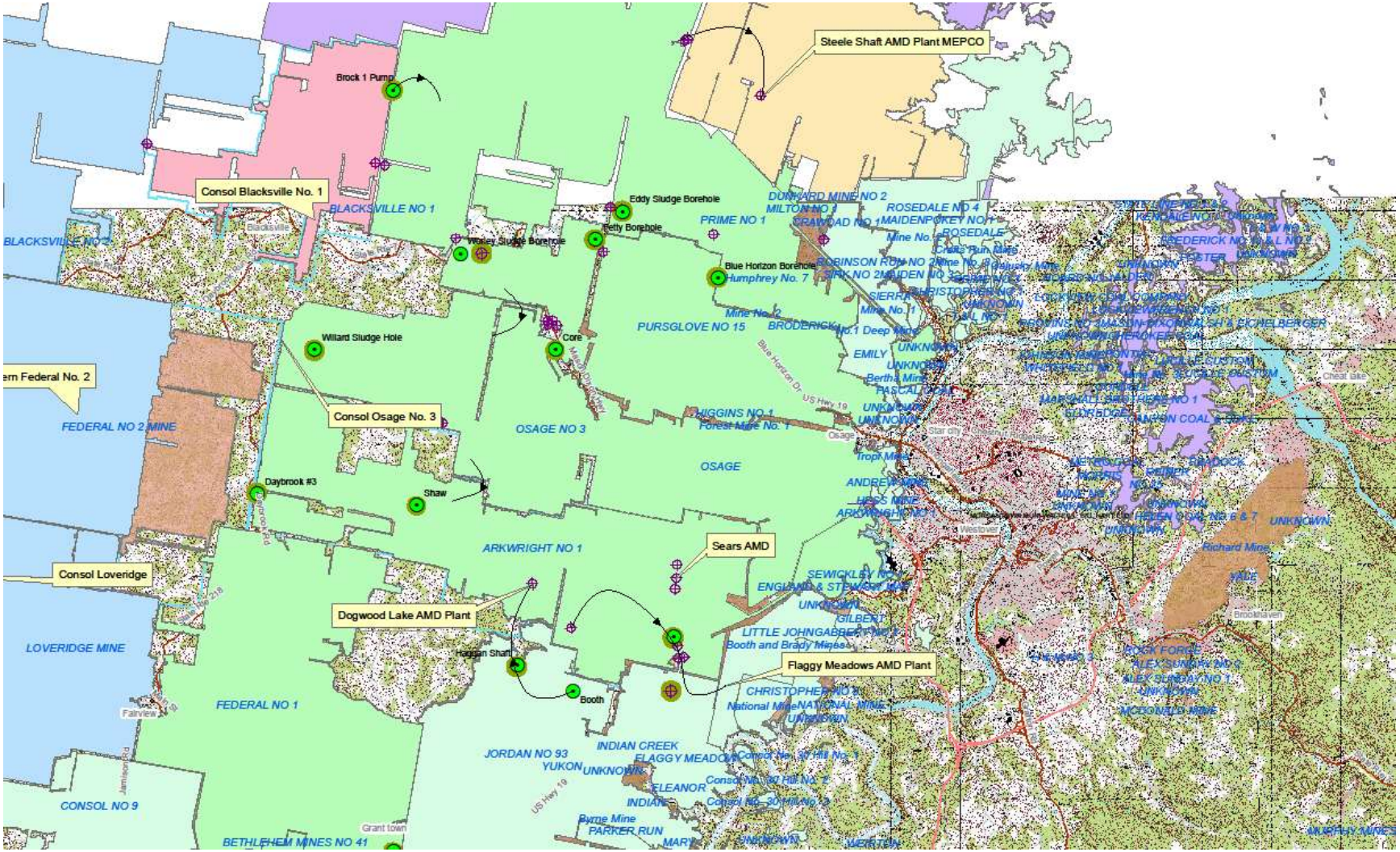


General Watershed HUC Analysis

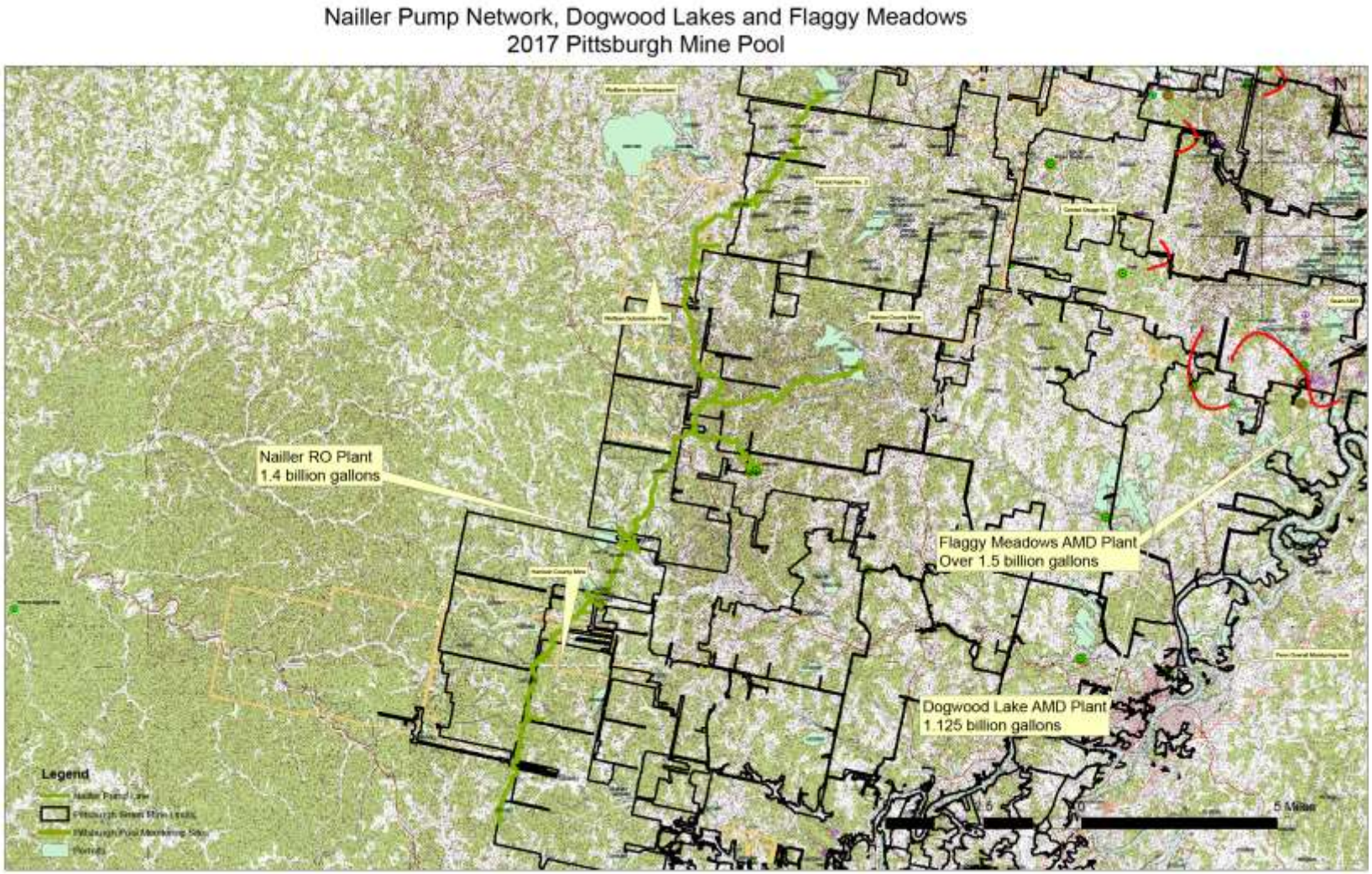
Time Analysis and Prediction



Possibly a Resource?

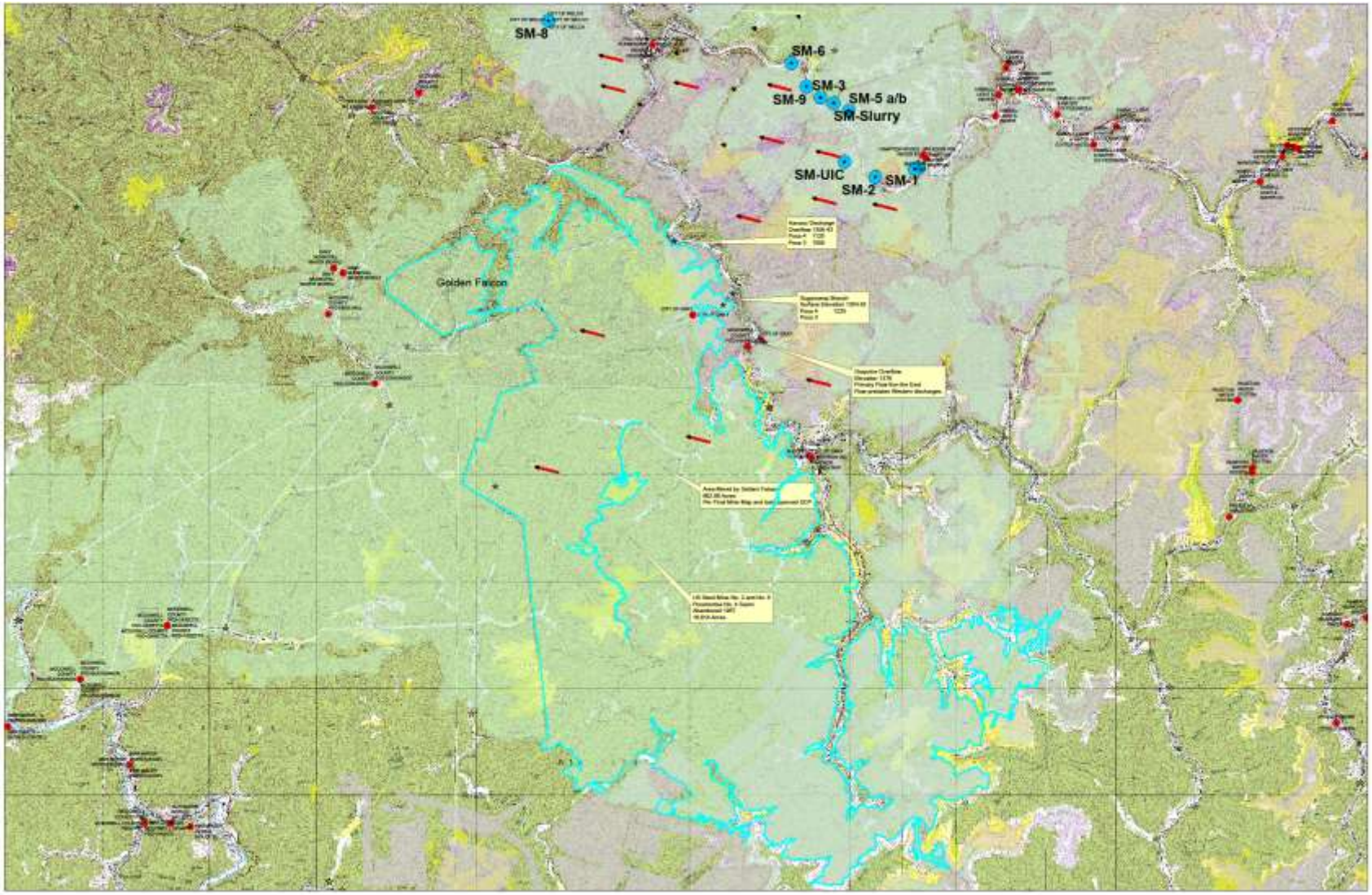


Possible Billion Gallon Supplies



Havaco Up-welling

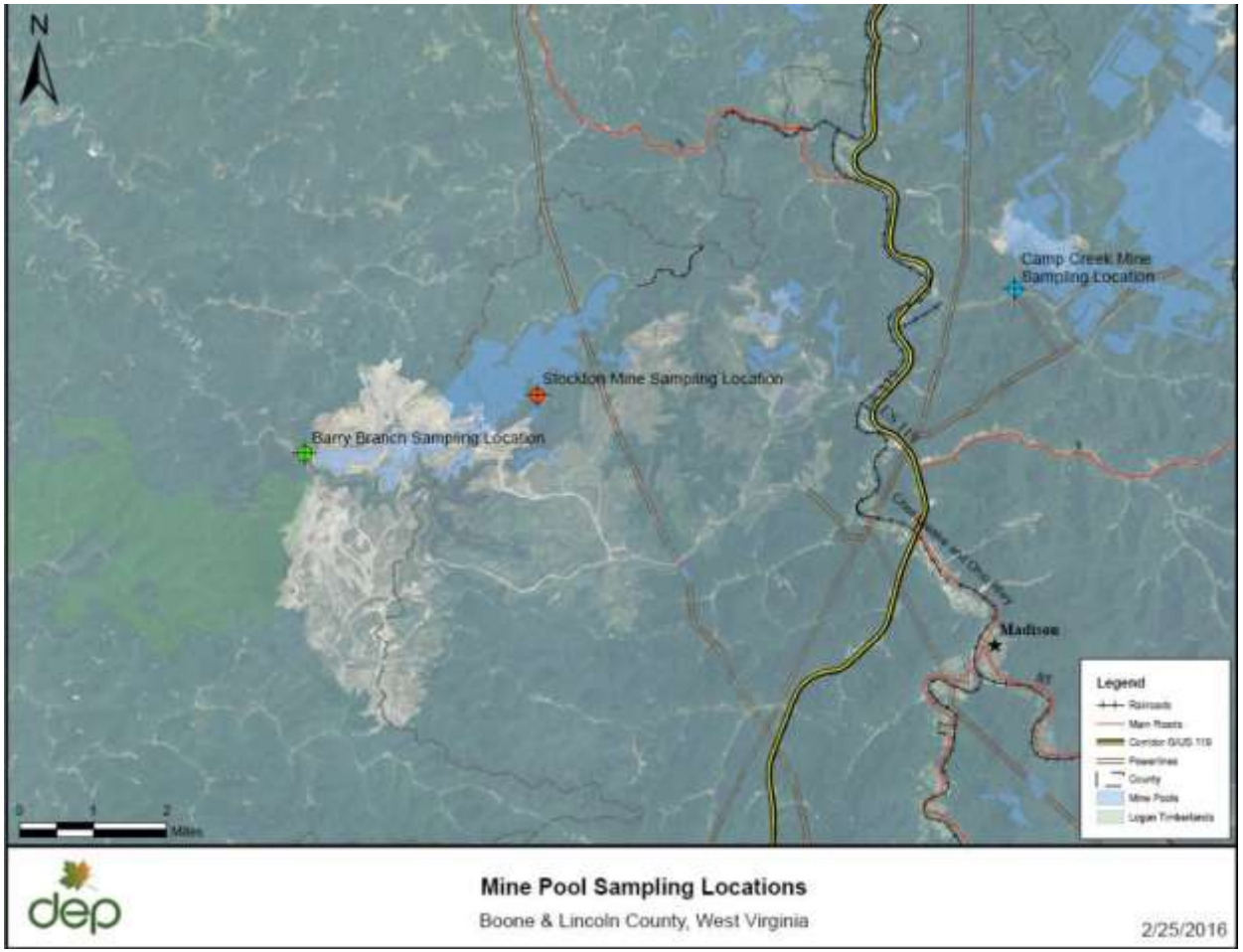
Gary Water Resources



It may not look pretty but…

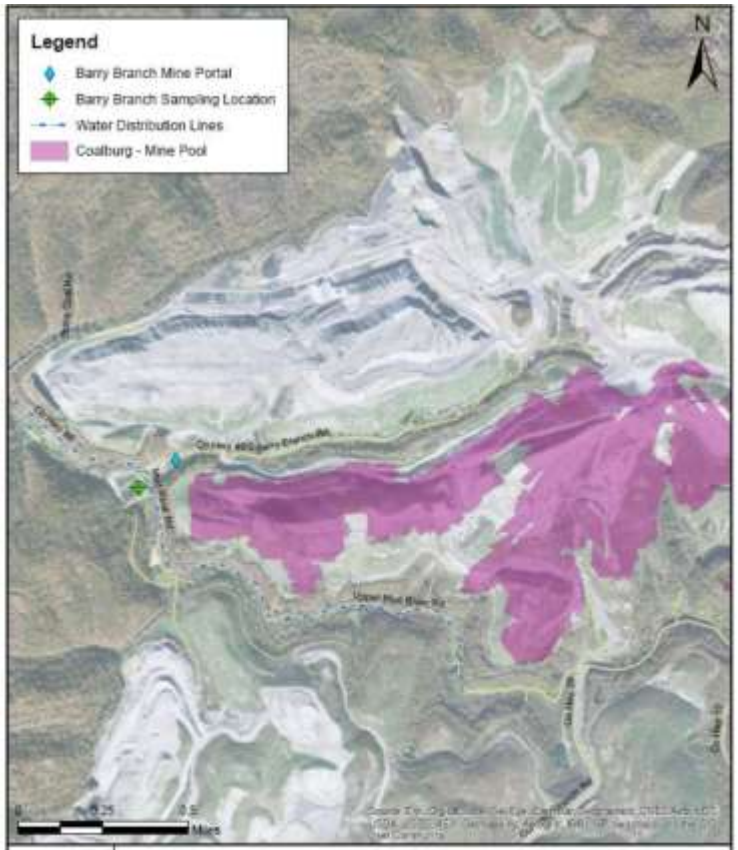
- WVSCI score rises 20 points down stream
- Possible Supply for Hatfield and McCoy Trails
- Other McDowell County Development

Hobet 21 Pools as Agriculture Sources



Patriot Gardens and mine pools

Barry Branch Pool and SE Treatment



Barry Branch Deep Mine

Coal Seam: Coalburg

Estimated Storage (Millions of Gallons): 71.4

Discharge Location: N 38° 06' 03.65" W 81° 59' 21.12"

Site Overview: The discharge is located in Lincoln County near hundreds of acres of reclaimed area, railroad access, transmission lines, and public water. There are limited amounts of top soil which could be an issue for agricultural uses.

Site Characteristics	
Distance to Public Water (Miles)	0 (on site)
Distance to Public Sewer (Miles)	10
Distance to Railroads (Miles)	4
Distance to Power Lines (Miles)	5
Water Table Elevation (Feet)	723

Access: The discharge location is in Hobet 21 on Mud River Road approximately 10 miles west of US-119 (Corridor G). Mud River Road would need improvements and expansion for heavy vehicle traffic.

Sampling Results: The sampling results have a client sampling ID of MP-1-CBA and are on pages 2-5 in the attached REIC analytical report. High Selenium levels are present in the Barry Branch mine pool water. There were multiple biochemical reactors on site anaerobically removing selenium.

Water Chemistry Overview	
Temperature (Celsius)*	12.06
Ph (SU)*	7.18
Conductivity (µmhos/cm)*	2,200
Dissolved Oxygen (mg/L)*	9.23
Total Dissolved Solids (mg/L)	1,920
Fecal Coliform (col/100mL)	not detected

*Measured with field equipment

Stockton Pool

Stockton Deep Mine

Coal Seam: Stockton

Estimated Storage (Millions of Gallons): 1.78

Discharge Location: N 38° 06' 42.40" W 81° 55' 59.84"

Site Overview: The discharge location is located in Boone County on the Hobet 21 surface mine complex near reclaimed areas for facilities, railroad access, and transmission lines. There are limited amounts of top soil which could be an issue for agricultural uses.

Site Characteristics	
Distance to Public Water (Miles)	2.0
Distance to Public Sewer (Miles)	4.6
Distance to Railroads (Miles)	0 (on site)
Distance to Power Lines (Miles)	1.0
Water Table Elevation (Feet)	900

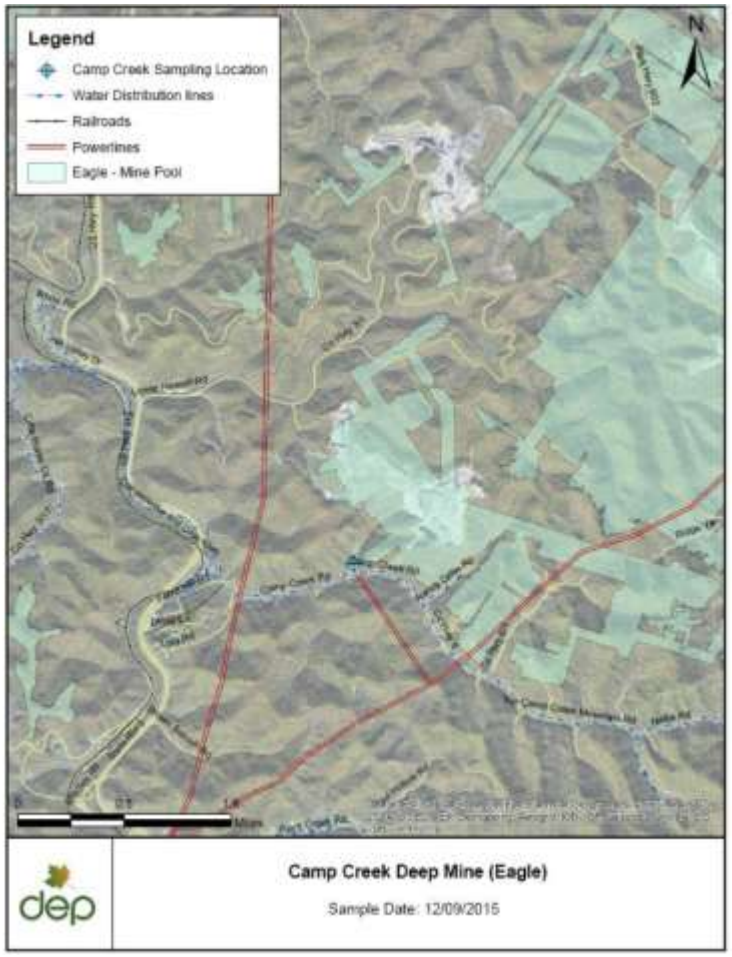
Access: The mine pool discharge is located on Smith Run Road approximately 3 miles southwest of Morrisvale, WV. Stockton can be accessed off of US-119 (Corridor G). The roadways off of Corridor G would require improvement and expansion to accommodate heavy vehicle traffic.

Sampling Results: The sampling results have a client sampling ID of MP-1-STA and are found on pages 6-8 in the attached REIC analytical report. The sampling point was located 20 yards off the road in a fenced cattle grazing pasture. The mine pool discharge was located upslope from our sampling location.

Water Chemistry Overview	
Temperature (Celsius)*	9.69
Ph (SU)*	6.06
Conductivity (µmhos/cm)*	492
Dissolved Oxygen (mg/L)*	8.62
Total Dissolved Solids (mg/L)	423
Fecal Coliform (col/100mL)	41

*Measured with field equipment

Camp Creek Pool



Camp Creek Deep Mine (U-5008-94)

Coal Seam: Eagle

Estimated Storage (Millions of Gallons): 946.8

Discharge Location: N 38° 08' 01.20" W 81° 48' 51.88"

Site Overview: The discharge is located in Boone County near hundreds of acres of reclaimed area, railroad access, transmission lines, and public water.

Site Characteristics	
Distance to Public Water (Miles)	0 (on site)
Distance to Public Sewer (Miles)	3.6
Distance to Railroads (Miles)	1.4
Distance to Power Lines (Miles)	0 (on site)
Water Table Elevation (Feet)	701

Access: The mine discharge is located in Hobet 21 approximately 1.5 miles off US-119 (Corridor G) on Camp Creek Road. The mine pool was sampled out of a pipe discharge.

Sampling Results: The sampling results have a client sampling ID of MP-2-EgA and are on pages 9-11 in the attached REIC analytical report.

Water Chemistry Overview	
Temperature (Celsius)*	11.68
Ph (SU)*	7.6
Conductivity (µmhos/cm)*	987
Dissolved Oxygen (mg/L)*	10.36
Total Dissolved Solids (mg/L)	610
Fecal Coliform (col/100mL)	not detected

*Measured with field equipment

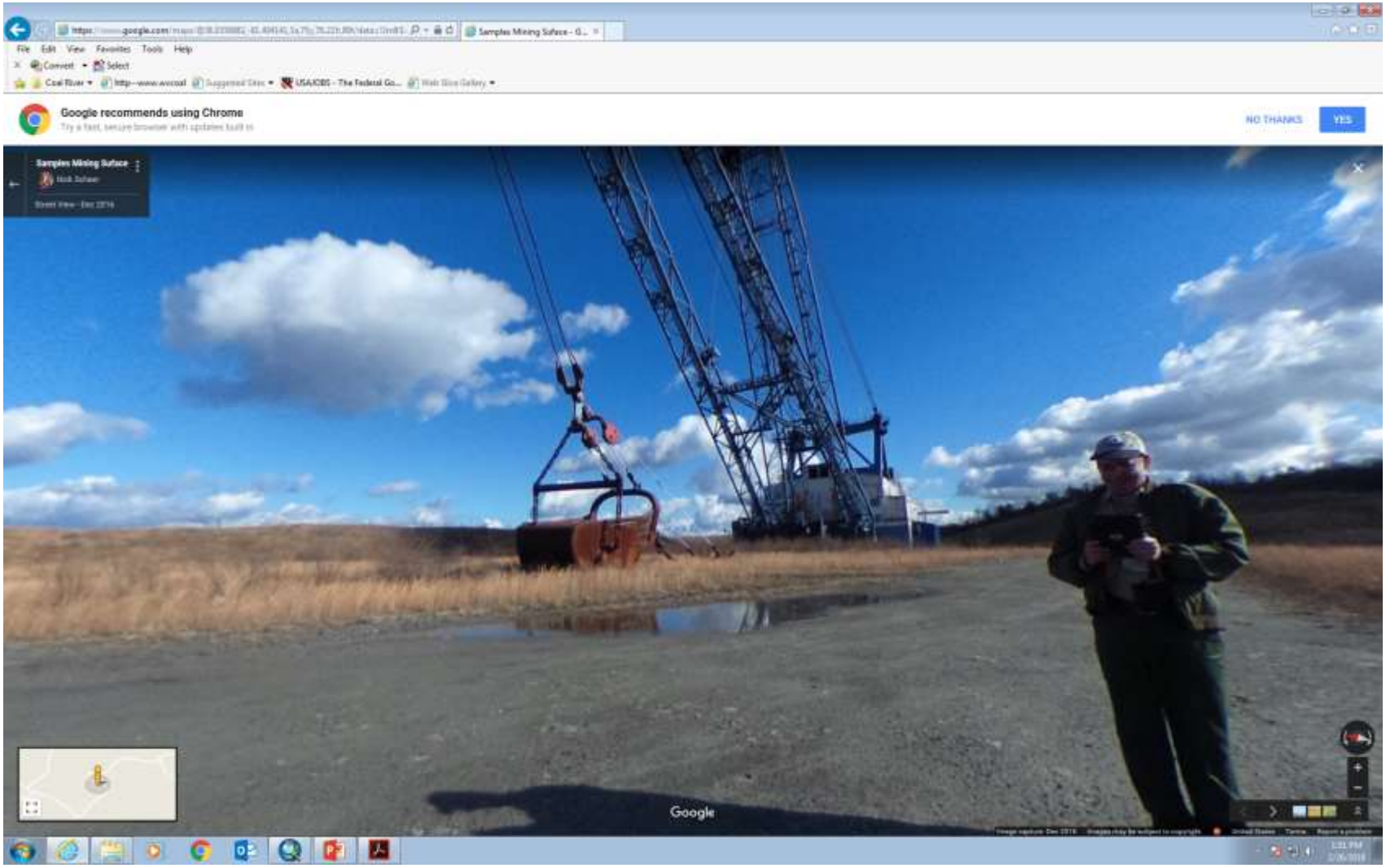
Hobet 21 and Homeland Security

Temperature as a Resource

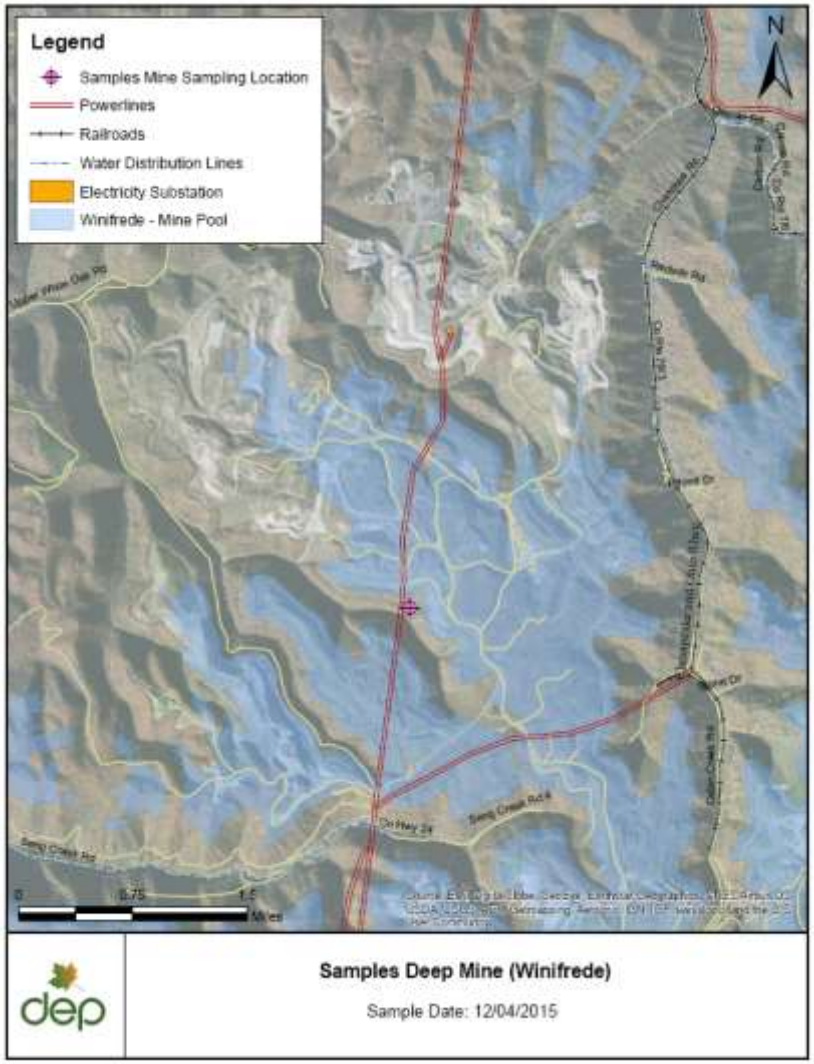
- As a warming vessel
- As a cooling vessel

Temperature Variation

Samples Acme Mine as a Battery



Samples Mine Site



Samples Deep Mine (S-3004-95)

Coal Seam: Winifrede

Estimated Storage (Millions of Gallons): 3,050

Discharge Location: N 38° 01' 15.94" W 81° 29' 08.75"

Site Overview: The discharge is located in Boone County surrounded by reclaimed areas, railroad access, transmission lines, and public utilities.

Site Characteristics	
Distance to Public Water (Miles)	**1.5**
Distance to Public Sewer (Miles)	**2.1**
Distance to Railroads (Miles)	**2.4**
Distance to Power Lines (Miles)	**0 (on site)**
Water Table Elevation (Feet)	**1,540**

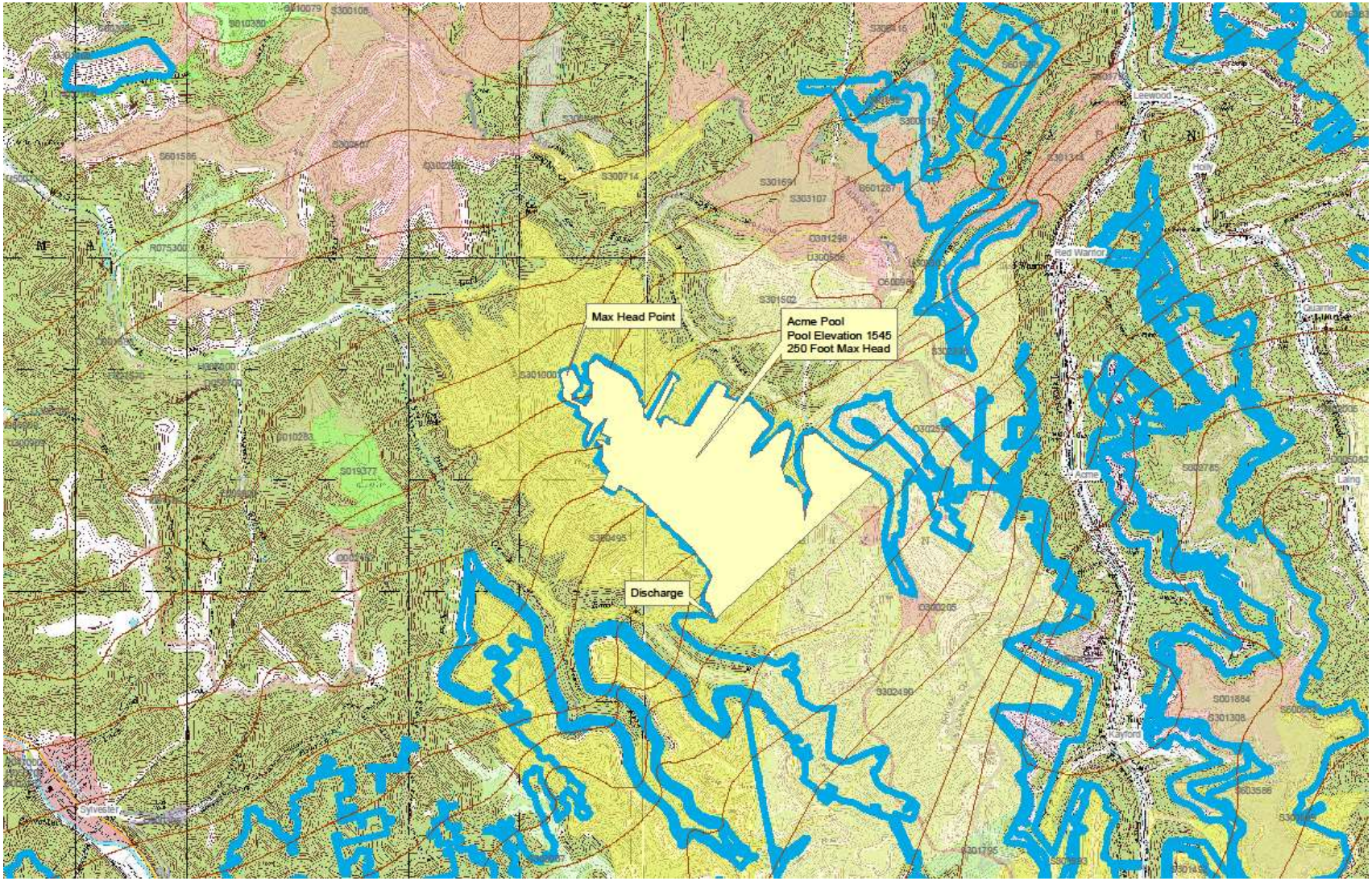
Access: The discharge is located in a reclaimed area. The Samples mine can be accessed from Charleston by traveling 20 miles south on the West Virginia Turnpike (I-64) and continuing onto Cabin Creek Road for 7 miles. Cabin Creek Road would require improvements and expansion for heavy vehicle traffic.

Sampling Results: The samples mine discharge was located halfway up a valley fill discharging approximatly 100 gallons/minute. The sampling results have a client sampling ID of MP-4-WA and are on pages 3-5 in the attached REIC analytical report.

Water Chemistry Overview	
Temperature (Celsius)*	**10.58**
Ph (SU)*	**7.84**
Conductivity (µmhos/cm)*	**668**
Dissolved Oxygen (mg/L)*	**10.13**
Total Dissolved Solids (mg/L)	**487**
Fecal Coliform (col/100mL)	**5**

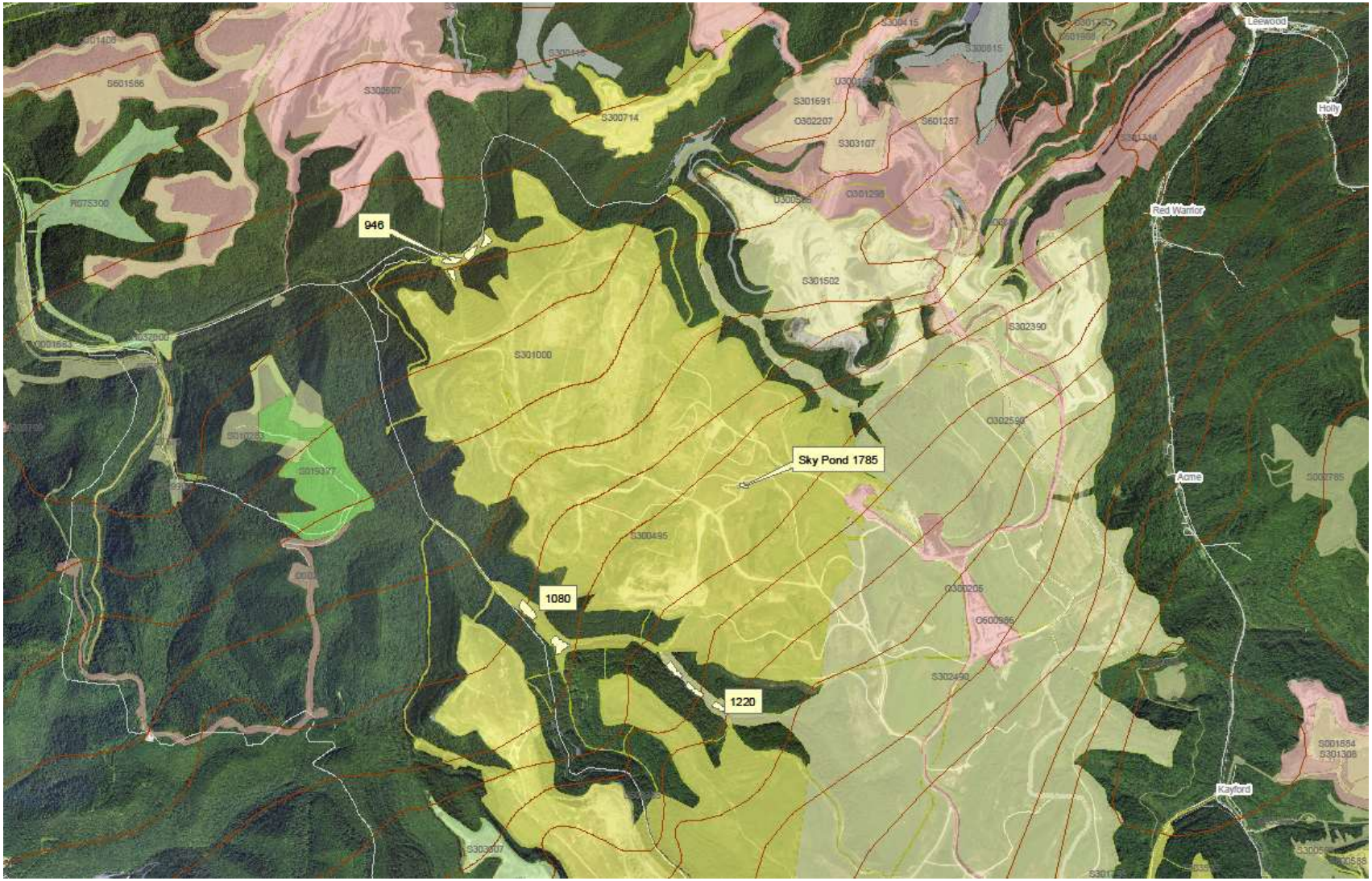
*Measured with field equipment

Winifrede Mine Pool



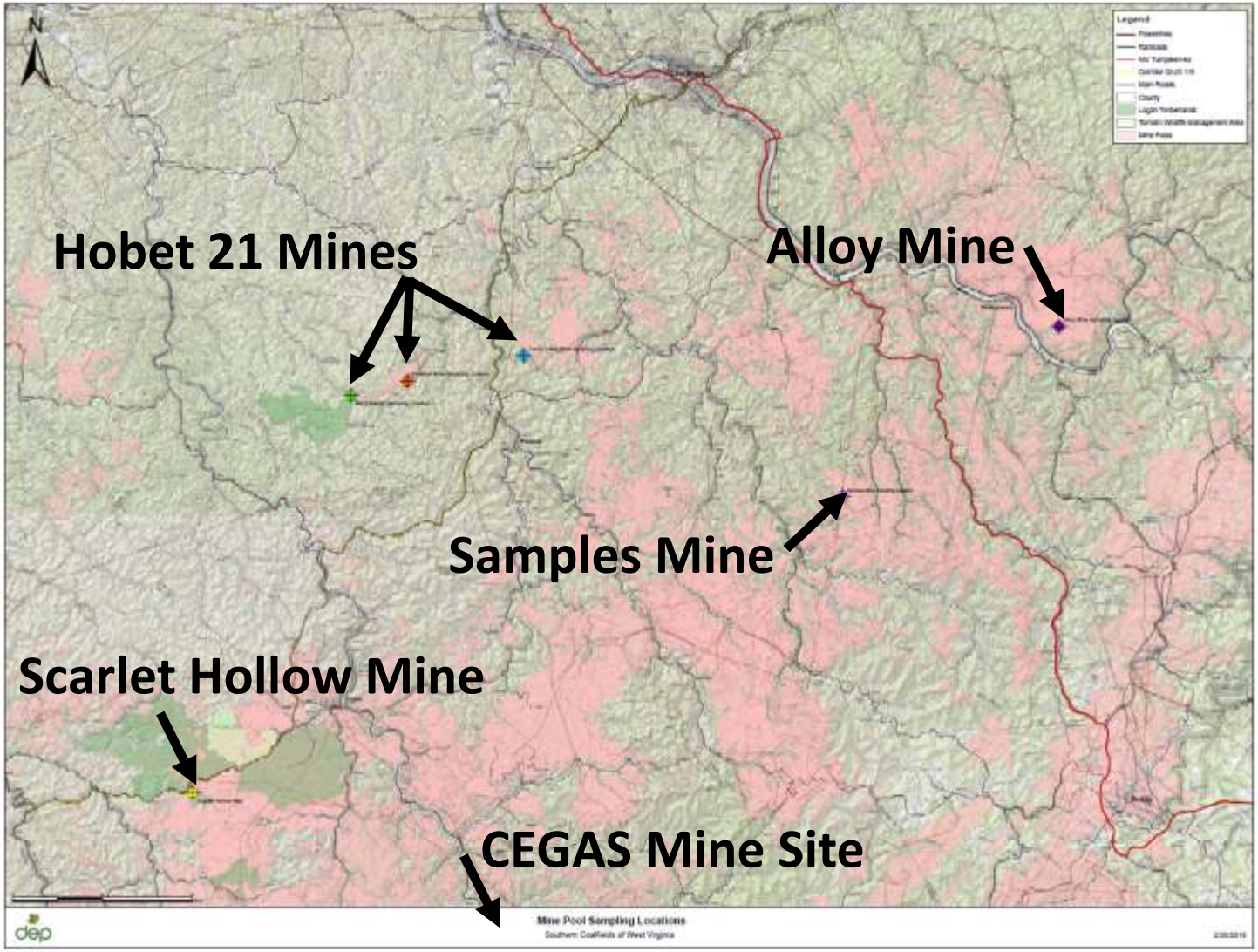
Mine Pool Discharge

Large Ponds with Elevations

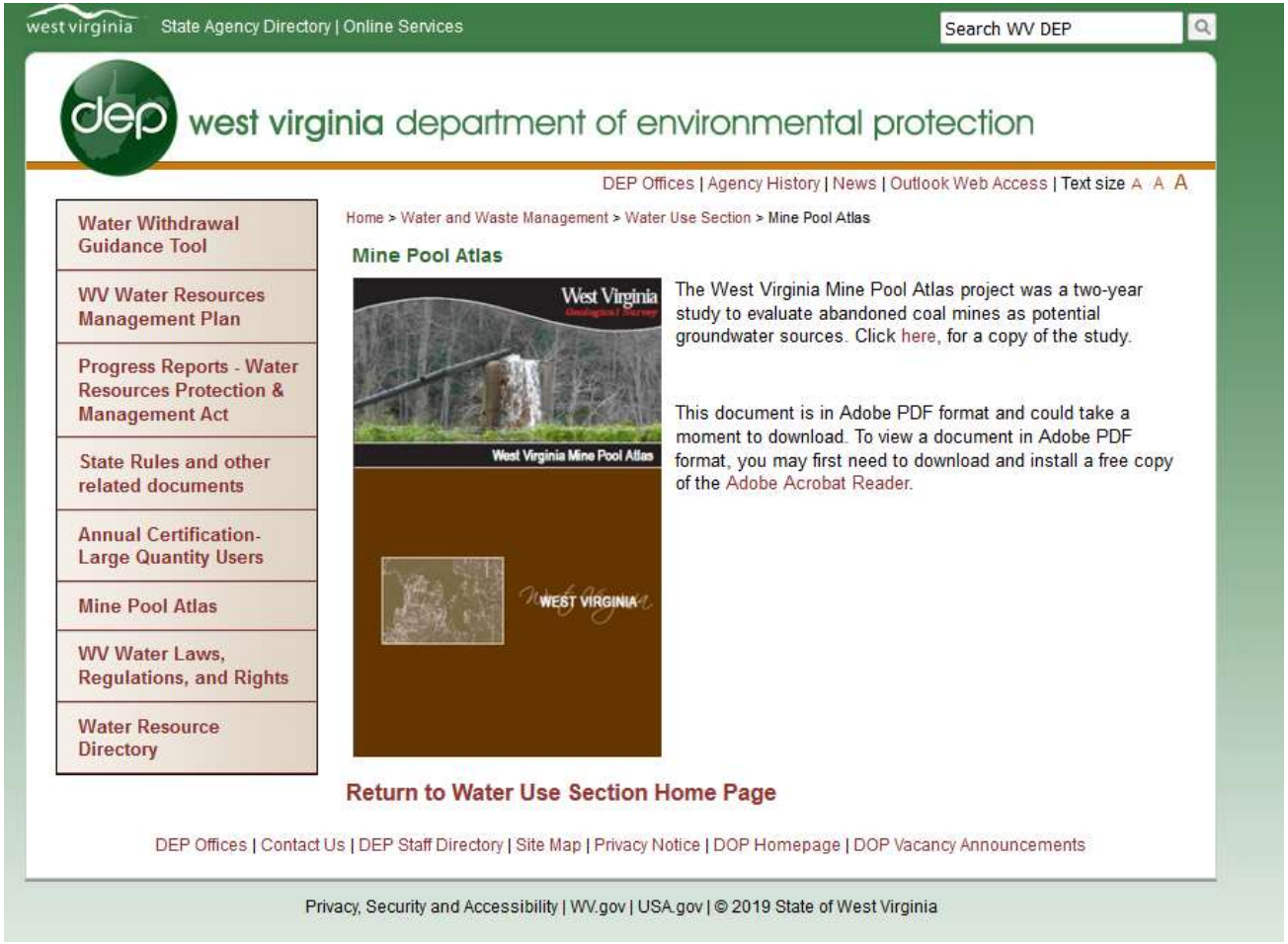


Other Lower Mine Pools With Elevations

Creating a WVDEP Database



Mine Pool Atlas WVGES



USGS Mine Pool Database

USGS
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Groundwater-quality data associated with abandoned underground coal mine aquifers in West Virginia, 1973–2016: Compilation of existing data from multiple sources

Data Series 1069

Prepared in cooperation with the West Virginia Department of Environmental Protection Division of Water and Waste Management

By: Mitchell A. McAdoo and Mark D. Kozar

https://doi.org/10.3133/ds1069

Tweet

Links

- Document: **Report** (4.89 MB pdf)
- Data Release: **USGS data release** - Site and Groundwater-Quality Sample Data for Abandoned Underground Coal Mine Aquifers in West Virginia, July 13, 1973 through September 7, 2016
- Open Access Version: Publisher Index Page
- Download citation as: RIS | Dublin Core

Abstract

This report describes a compilation of existing water-quality data associated with groundwater resources originating from abandoned underground coal mines in West Virginia. Data were compiled from multiple sources for the purpose of understanding the suitability of groundwater from abandoned underground coal mines for public supply, industrial, agricultural, and other uses. This compilation includes data collected for multiple individual studies conducted from July 13, 1973 through September 7, 2016. Analytical methods varied by the time period of data collection and requirements of the independent studies.This project identified 770 water-quality samples from 294 sites that could be attributed to abandoned underground coal mine aquifers originating from multiple coal seams in West Virginia.

First posted November 14, 2017

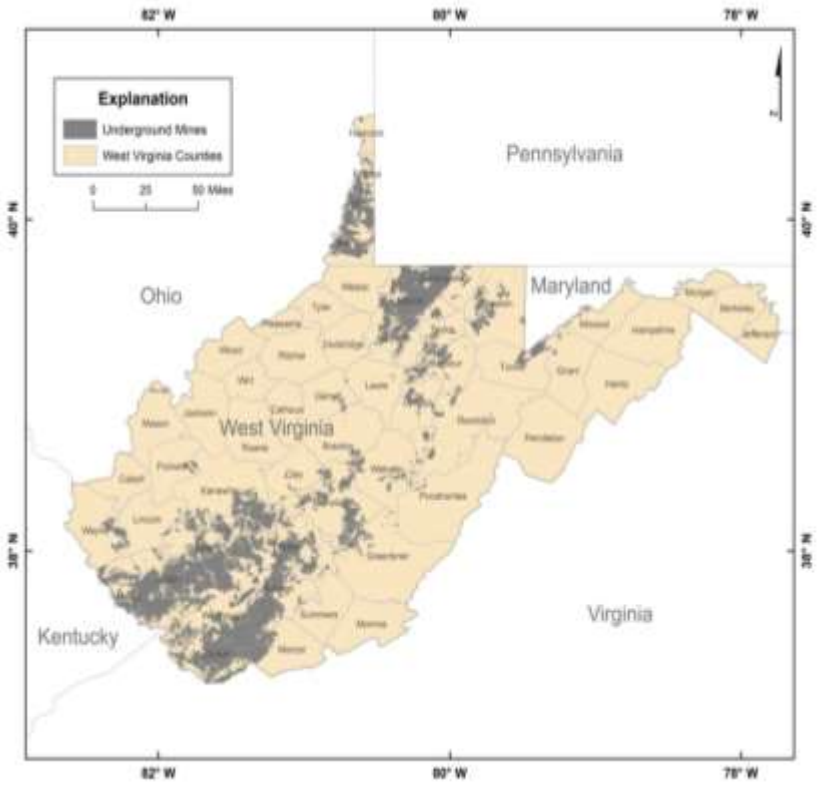
For additional information, contact:

Director, West Virginia Water Science Center
U.S. Geological Survey
11 Dunbar Street
Charleston, WV 25301

Abandoned Underground Coal Mine Aquifer Water Quality Assessment - USGS, WVDEP

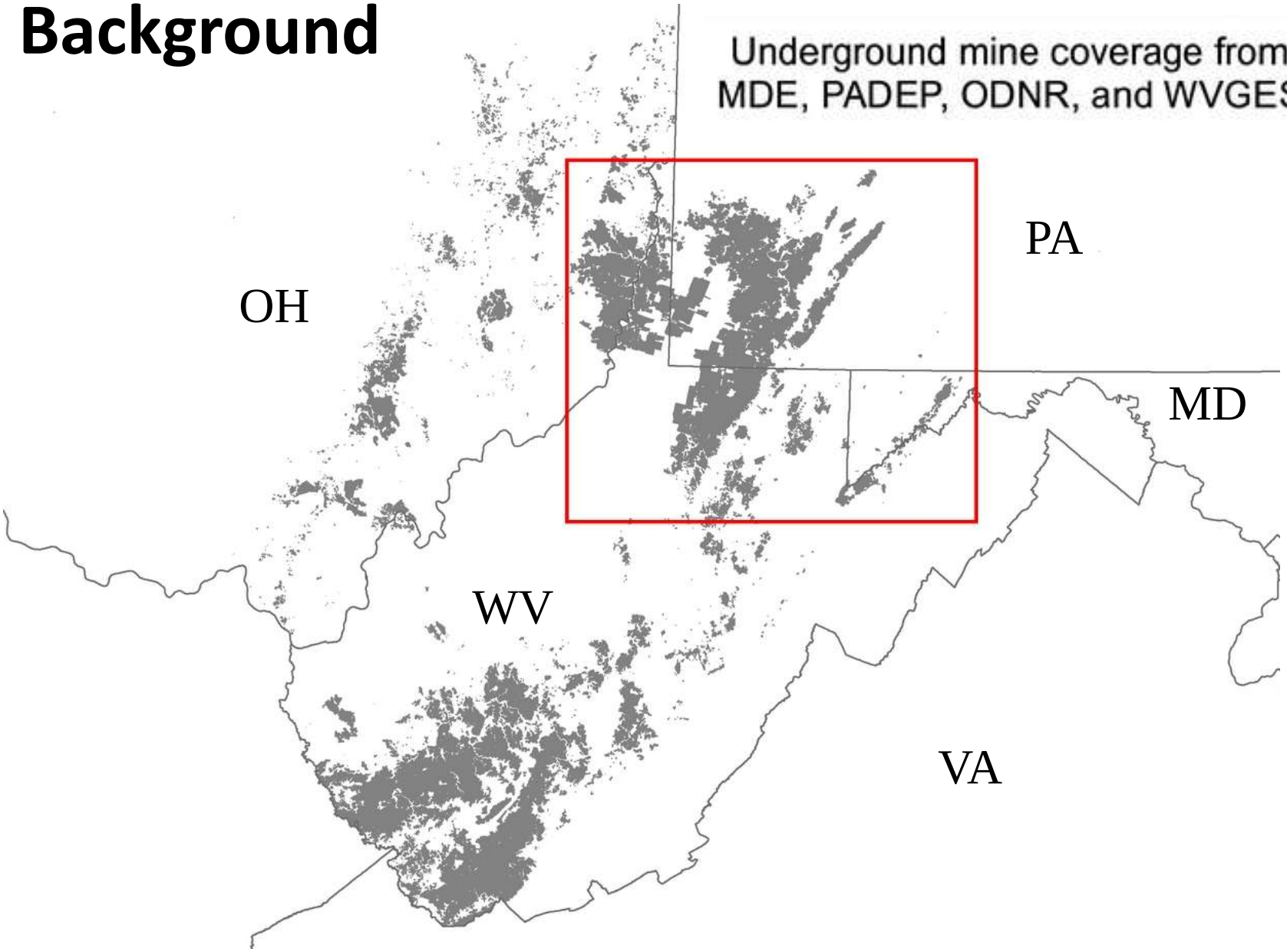
- Compile available water-quality data from abandoned underground coal mine aquifers (AUCMA) in to a consistent dataset
- Analyze dataset to understand spatial and statistical distribution of water quality in AUCMA
- Provide a reconnaissance tool to aid in development of AUCMA water resources for public supply, agriculture and industrial use

Mitch McAdoo, USGS
Mark Kozar, USGS



Eastern Mine Drainage Federal Consortium (EMDFC)

Background



Eastern Mine Drainage Federal Consortium

Any Questions