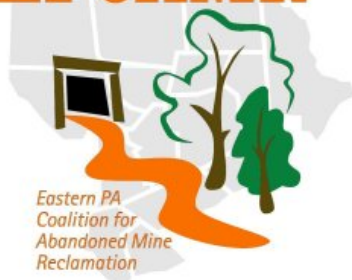


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Re: Quarterly Report of work done for Mine Pool Mapping Grant (1st Qtr. 2008)

Narrative Report

EPCAMR staff have continued to gather and georeference maps showing underground flow of water and digitize these characteristics in separate layer files in ArcMap. To date 4 layers have been completed to show mine pool dynamics in the Southern and Western Middle Anthracite Coal Fields as well as the Northern and Eastern Middle Fields.

The first collection of delineated data is a mine pool layer. This layer showcases the extent of mine pools as show on a collection of maps which are mentioned in the layers metadata. The layer shows the estimated area, water level from maps and flooded volume where available. A reference attribute was recorded for each feature. Many of the water levels and flooded volumes were taken from Bureau of Mines Reports, aka the "Ash Reports". Care was taken to draw the most recent extents of the mine pools, say from Operation Scarlift Reports or other more recent maps, to judge their estimated volumes based on discharge location (elevation) and status of the mines when the data was estimated (ex. Were the mines being actively pumped?). There is also a determination made if the area was an actual pool of water or a drainage basin. Currently there are 163 mine pools and hydrogeologic basins digitized in the Southern and Western Middle Fields. 112 of these are separate pools of water that existed in mine workings, most of these pools were drawn directly from the Bureau of Mines Reports. The other 51 are areas that drain directly to a mine pool or a certain (or associated) above ground outlet (ex. drainage tunnel), also referred to as multi-colliery hydrogeologic units.

The second in the collection is a barrier pillar layer. This layer shows the barrier pillar number or name and judgment of the pillar's integrity. Several pillars are still intact and holding back water, but some are breached or partially breached either intentionally or weakened over time. There are 118 separate barrier pillars identified for the Southern and the Western Middle Fields.

The third in the collection is a drainage tunnel layer. This layer shows the drainage tunnel name, the recorded length, portal elevation, inside elevation, history of the tunnel where available, mine it drains and reference information. Future development of this layer may include separating the features by type (ex. rock driven tunnel, borehole, shaft, airway...etc). There are 43 separate drains identified for the Southern and the Western Middle Fields.

The final layer in the collection is a mine water flow line layer. This layer shows the direction of flowing mine water in mine pools. In the Southern Field most of these lines were taken from the "Ash Reports" except for the Panther Valley Area (the extreme northern tip). The Ash Reports show a general flow direction (usually toward the discharge), while the Panther Valley Report, produced by James Gague, shows actual mine water flow paths as recorded based on mine pool hydrogeology. Judgment was

again made on the direction of flow in this layer based on discharge location (if it had moved after the most recent report) and status of the mines when the flow lines were drawn (ex. Were the mines being actively pumped?). There are 300 separate mine flow direction lines identified in the Southern and Western Middle Fields.

In summary, this collection is a representation of underground abandoned mine features and are to be used in conjunction with PA DEP BAMR's AMLIS Database which is a collection of abandoned mine surface features. It is generally difficult to picture these features under the ground, but thinking of them as surface water features the layers are Watersheds & Lakes, Streams & Currents, Dams and Outlets respectively.

A fifth layer is in development which identifies infiltration points or where surface water enters a mine pool identified by either field tours or Operation Scarlift reports. This layer is mainly propagated with points in the Northern and Eastern Middle Anthracite Coal Fields however, after a field tour of the Heckscherville Valley with Paul Lohin, Schuylkill Headwaters Association, and follow up with Operation Scarlift Reports, EPCAMR staff were able to add an additional 27 infiltration points to the layer for the Southern Anthracite Field. This layer records a name/description, estimated flow loss in gallons per minute (where available), the related AMLIS Problem Area, the type (ex. stream flow loss, surface water loss, stream blockage or reclaimed) and reference information. This layer is an attempt to connect surface water loss to AMD discharge gains, or losses as infiltration points are reclaimed.

Mine Pool Mapping Update Work Progress Report (chronological)

- EPCAMR Staff ordered Printhead, InkJet Cartridges, and coated color InkJet bond 42" x 150' rolls from Summit Media, Inc. for map productions
- Triet Tran from PA DEP informed EPCAMR that our CRP review came back fine and stated that there are no e-FACTS records on EPCAMR
- EPCAMR Regional Coordinator added a reference document from Exelon of the Wadesville Pit Pump Drawdown Study to our collection of resources for the project;
<http://www.state.nj.us/drbc/wadesville/06index.htm>
- EPCAMR Regional Coordinator updated all of the partners that attended the previous coordinating meeting on 11-20-07; Added the individuals and agencies who were not directly related to the Project in the Anthracite Region to a Mine Pool Mapping State-wide Technical Review Group for EPCAMR; Agreed with Chuck and Roger that EPCAMR should meet every six months or so to keep apprised of the work that is going on and that we should try and share and exchange any data that each of the Bureau's, DMO's, BAMR, OSM, SRBC, USGS, PA Geological Survey; References that EPCAMR is still looking for include:
 - OSM Folios Scanned-Cross Sections
 - 2nd Geological Survey Map-Anthracite Seams
 - Structure Contour Maps-Western Middle Fields
 - Schuylkill Headwaters Association-Kimball Assessment in GIS in electronic format (EPCAMR may have this already, Ian might as well)
 - Guide for Technical Writing, mentioned by Roger (Mike Potthoff-Dauphin CCD may have this that we can borrow)
 - Coal Resource Reports
 - Mine Map Repository

- Jim Charowski, MRAB Chair, requested that EPCAMR consider taking members of the MRAB on a Summer Tour of some of the sites that will be included in the Mine Pool Mapping Project Study area
- Called by Charles Kirsty, a representative from MIKEGeoModel, a private firm that is involved with underground modeling of groundwater that sent EPCAMR a demo of their software bundle; EPCAMR has yet to review the model and compare it to USGS's MODFLOW
- Keith Previc, PA DEP Bureau of Mining & Reclamation provided EPCAMR with some contacts in the PA Geological Survey that deal with publications and reports
- EPCAMR Regional Coordinator followed up on some contacts with the PA Geological Survey and talked with Bill Kochanov, P.G. to see if we can identify any other mapping resources within the PA Geological Survey
- Kim Snyder, Senior Civil Engineer, PA DEP BAMR was interested in meeting with EPCAMR to review some of the areas that we would need the OSM Folios and the 2nd Geological Survey Sheets for the project since the amount of data that is being held in the BAMR Office is so large for the entire Anthracite Region; EPCAMR will just look to obtain the Folios and 2nd Geological Survey Sheets for the Western Middle and Southern Coalfields; EPCAMR needs to set up a meeting with Kim in Wilkes-Barre
- Roger and EPCAMR Regional Coordinator talked with Jay Parrish, PhD, P.G., State Geologist/Director about working with EPCAMR to jointly publish/produce several PA Geology Publications and or Water Resource Reports that tie into the grant; PA Geological Survey will produce 3 Reports as long as they are CD "camera ready"
- Worked on GIS Mine Pool Mapping Reimbursement, completed paperwork, and mailed copies to the PA DEP Grants Center and the Pottsville DMO
- Reviewed the Western Middle Anthracite Fields PA DEP BAMR Borehole data files that Mike had reformatted and sent along to Chuck Cravotta, USGS
- Reviewed some information on, [CrossView for ArcGIS](#), which is an extension that allows the user to view cross-sections of boreholes and underground workings; \$500 for the extension, however, EPCAMR is going to make a request to OSM to see if they have it available under our current MOA
- On January 7, 2008, EPCAMR Staff met with PA DEP Pottsville DMO, Ian Palmer, and Roger Hornberger to review information that has been gathered to date to see if there was enough information compiled that would provide the necessary details for the analyses of the multi-colliery hydrogeologic units
- On January 14, 2008, EPCAMR and its partners met at the USGS New Cumberland Office with USGS Staff to discuss the project goals and roles of participants and to determine what data would be needed for development of the ground-water model; Regional water-resource appraisal--study area, approach, data sources, participant roles, and schedule (Hornberger/Hughes/Cravotta); GIS data base (Hewitt); PA DEP mine permit and borehole data (Koury); Geologic and hydrologic data from mine maps (Hornberger); Ground-water modeling example and data needs (Goode); Identification of case study area(s)/issue(s) for prototype

ground-water model within study region (all); Documentation of data sources, modeling, and water-resource interpretations (all); and Coordination and scheduling of activities (all)

- We're looking at acre-ft of mine pool water; Identification of volume of water in the mine pools; Accessibility; Consumptive Use; Drawdown
 - What are the connected multi-colliery hydrogeologic units; water levels in the mine pools; gradient; yield; flow/drainage area
 - Top water-meets standards' shallow; Bottom water-deeper water, smells of hydrogen sulfide;
 - Permeability and Porosity are unknown, but factor into the hydrogeologic budget; There is an uncertainty on how much void space is in the underground mines, both in the Anthracite (63%), Bituminous (11%), due to subsidence
 - Structural contours of the coal seams would be helpful along with elevations for the coal seams
 - Hydraulic conductivity and Storage Coefficient are related to porosity and water storage
 - Pumping data compilation, if found could prove helpful-need coordinates, pump depths, pump rate
 - **Gilberton Shaft** and the **Wadesville Pit-Exelon Project** will give us the most information
 - Latitude and Longitude of boreholes need to be ground-truthed; Each borehole will represent the mine pool water level; Need to be cognizant of barrier pillars that while may show up on maps as intact, could in fact be removed or have been robbed; Coal ash sites have up gradient and down gradient data points
 - Elevation of pond surfaces or water elevations around discharges
 - Anthracite Colliery boundaries in the same projection (UTM 18N, NAD 83)
 - National Hydrography Dataset might prove helpful; Obtain from Scott Hoffman
 - EPCAMR already has the streams layer-TMDL, 303 (d) Listing, Loss points or losing reaches of streams from Operation ScarLift Reports
 - Climate data, if available from NOAA or NWS
- Received and reviewed a copy of Roger Hornberger's Monthly Progress Report; **See attached Progress Report 1**; Submitted Invoice to EPCAMR for reimbursement
 - Received and reviewed a copy of Ian Palmer's Monthly Progress Report' **See attached ICP 08 01 Progress Report**; Submitted Invoice to EPCAMR for reimbursement; Provide Ian with some additional advice on how to reference documents and or maps that he's reviewing at the PA DEP Pottsville DMO
 - On January 18, 2008, following a trip to PSU with Roger to meet the two PSU Economists; Provided copies of the Scope of Work and the grant summary to Dr. Shortle and Dr. Kleit, who will be assisting EPCAMR in putting together a Economic Analysis of the Value of Abandoned Mine Pool Water Report
 - Chuck Cravotta, USGS provided EPCAMR with the links to the following reports:
 - The SRBC reports on the Eastern Middle Field by Ballaron and Hollowell Water Balance for the Jeddo Tunnel Basin Luzerne County, PA (August 1999) <http://www.srbc.net/pubinfo/docs/jeddowaterbalance.pdf>
 - Assessment of Conditions Contributing Acid Mine Drainage to the Little Nescopeck Creek Watershed, Luzerne County, PA and an Abatement Plan to Mitigate Impaired

Water Quality in the Watershed (July 1999)

<http://www.srbc.net/pubinfo/techdocs/Publications/nescscopeckreport204.pdf>

- The Shamokin Creek (<http://pa.water.usgs.gov/reports/wrir03-4311.pdf>)
- Mahanoy Creek (<http://pubs.water.usgs.gov/sir2004-5291/>)

- Reviewed the database that Mike created and provided to Roger and Dan to record the bottom elevations of the **307** Anthracite Collieries from the Deep Mine Safety Maps; EPCAMR will probably only focus on around **55** Collieries and **12-15** major AMD discharge points for this project

- Received and reviewed the USGS Quarterly Report and corresponded with the Dauphin County Conservation District with regards to the billing; **See attached USGS Quarterly Report**

- Received and reviewed a copy of Ian Palmer's Monthly Progress Report' and Reference Document for the Northumberland County Coalfields; **See attached ICP 08 02 Progress Report**; Submitted Invoice to EPCAMR for reimbursement; Followed up with Ian to see if he was actually able to find any borehole data in the files because of the lack of borehole data collected; Most water quality data being collected is from seeps, streams, discharges, and weirs

- Received and reviewed an outline from Professor Kleit and Professor Shortle, PSU Economists, on how they would like to approach looking at the Economic Analysis of the Value of the Abandoned Mine Pool Water for both private and public uses; Corresponded with Dan Koury, PA DEP Pottsville DMO Project Officer to see if he had any comments on the approach being taken by the two Professors

- Received and reviewed a copy of Roger Hornberger's Monthly Progress Report; **See attached Progress Report 2**; Submitted Invoice to EPCAMR for reimbursement

- Received discharge points that need ground-truthing GPS locations from Ian Palmer that EPCAMR Staff will re-locate in the field with Roger Hornberger, PA DEP Pottsville DMO Staff, EPCAMR OSM/VISTA on March 10 & 11th, 2008 in the Western Middle Anthracite Coalfields

- EPCAMR Regional Coordinator prepared second GIS Mine Pool Mapping Report to keep everyone updated on the project through March 2008