THE MARYLAND COAL MINE MAPPING PROJECT

A JOINT COOPERATIVE VENTURE OF:

The Maryland Dept. of the Environment – Bureau of Mines,

The Maryland Dept. of Natural Resources – Power Plant Research Program,

and Frostburg State University – Lewis J. Ort Library

Corey Prescott – Mapping Specialist

Nat DeBruin – Project Manager

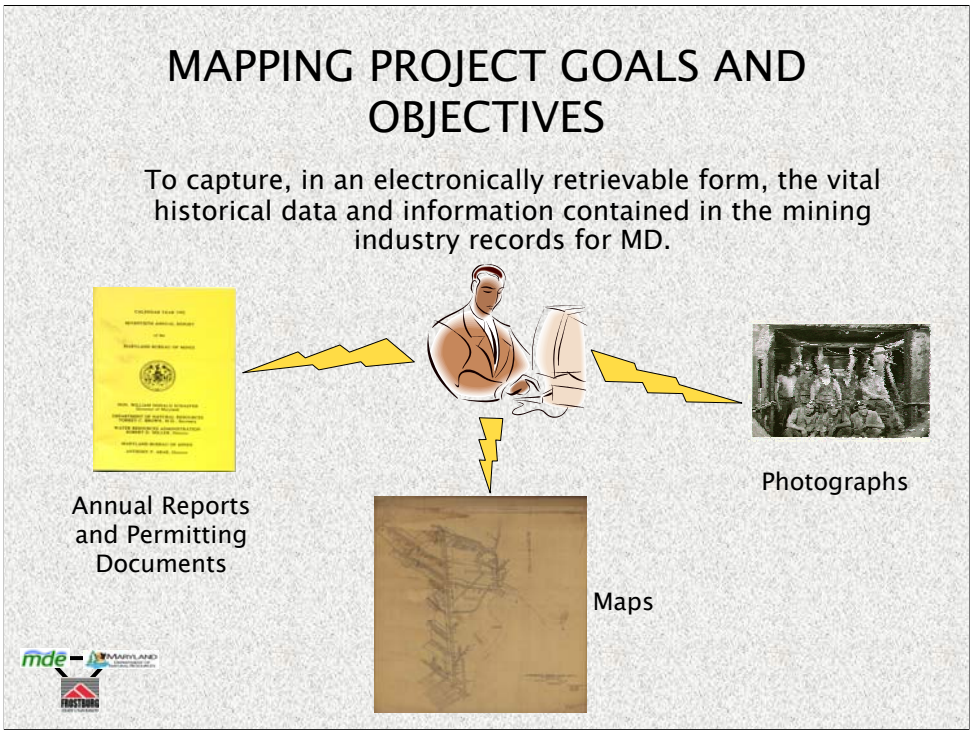
A BRIEF HISTORY OF COAL MINING IN MARYLAND

In 1755, George Washington describes the Georges Creek Coal Basin as possessing "…the fuel of the future" with so much mineral wealth as to "…astonish the countries of the Old World."

From the 1820's through the 1930's, industry and the railroads create demand for Western Maryland coal. By 1941, most deep mines are abandoned.

Maryland now has approximately 450 abandoned mines that predate the 1977 Surface Mine Control and Reclamation Act (SMCRA).

Served as a source of coal for nearly 250 years. So… even though coal is mined only in the 2 western most counties, it has been mined for a long time! 222 years before the SMCRA!



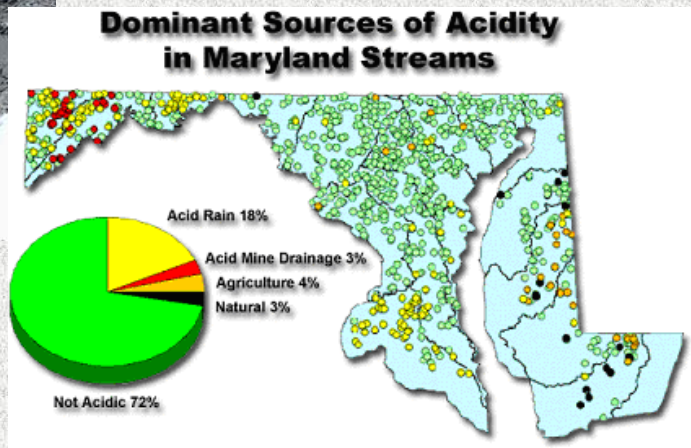
The records are located in the J.J. Rutledge Collection at FSU and the Bureau of Mines in Frostburg. The “historical” aspect is the pre-1977 period.

APPLICATIONS

Current Mining Operations and Permitting

APPLICATIONS

AMD and AML Remediation



APPLICATIONS

Mine Safety

THE CROSBY COURIER

FORTY-ONE MINERS MEET DEATH IN MILFORD MINE

SEVEN MINERS NARROWLY ESCAPE

1924 Mine Flooding Accident in Minnesota

2002 Quecreek, PA

APPLICATIONS

Mine Subsidence

APPLICATIONS

Bat Habitat and Conservation

APPLICATIONS

Public Awareness

PROJECT DEVELOPMENT

- The Vision: Four Phases over a period of five years, focusing on coal mine maps:
  - Phase I: Collection and Appraisal
  - Phase II: Preservation, Cataloging, and Indexing
  - Phase III: Consolidation and Interpretation
  - Phase IV: Maintenance

In 2003, when we anticipated finding close to 4,00 maps. The actual number of mine maps is closer to 400, but there have been nearly 1,500 mining related maps, charts, and engineering drawings have been found.

While final funding was still pending, we spent a lot of time trying to answer these questions! The answers were essential in determining what information to glean from each map. The bottom line…? EVERYTHING!

OUR **MOST** LIKELY USER –

To meet these needs – we had to ensure that we got all the geospatial data and mine specific data.

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THE KEY TO IT ALL?

OUR **MOST** LIKELY USER –

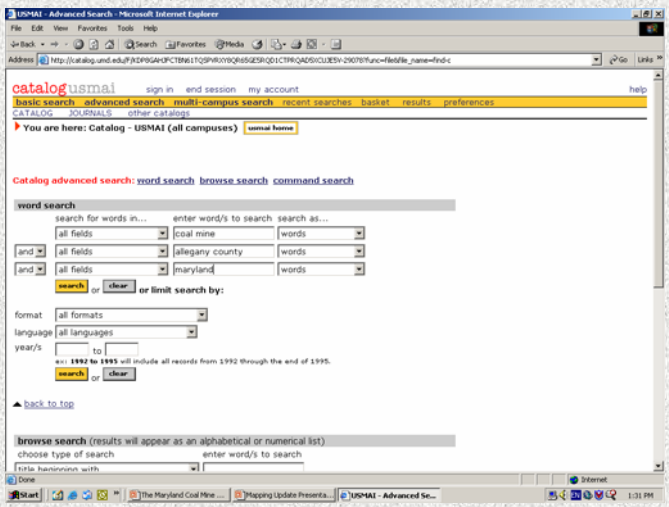
THE MINING AND/OR MAPPING PROFESSIONAL

OUR **NEXT MOST** LIKELY USER –

THE SERIOUS RESEARCHER OR STUDENT

OUR **NEXT MOST** LIKELY USER –

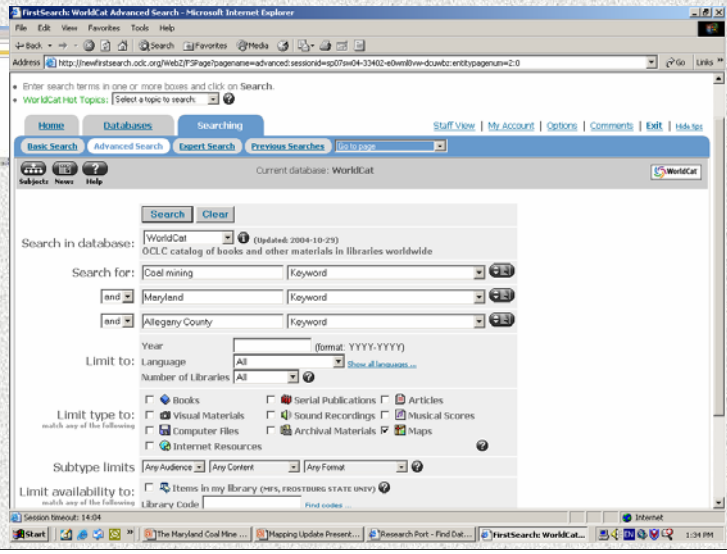
THE SERIOUS RESEARCHER OR STUDENT



University System of Maryland Library Catalog

OUR **NEXT MOST** LIKELY USER –

THE SERIOUS RESEARCHER OR STUDENT



WORLDCAT – Global Library Catalog

THE KEY TO IT ALL?

OUR **MOST** LIKELY USER –

THE MINING AND/OR MAPPING PROFESSIONAL

OUR **NEXT MOST** LIKELY USER –

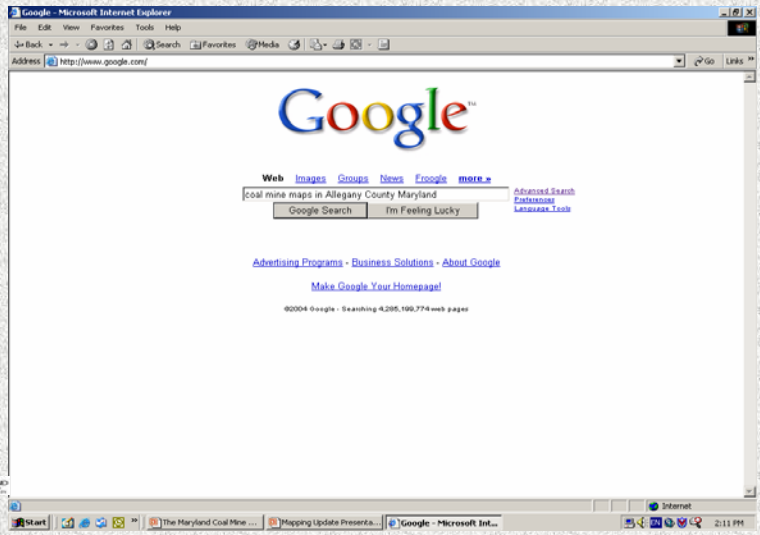
THE SERIOUS RESEARCHER OR STUDENT

OUR **LEAST** LIKELY USER –

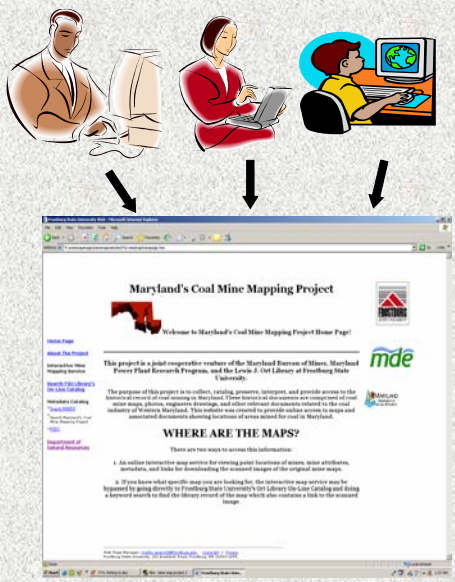
THE CASUAL WEB USER

OUR **LEAST** LIKELY USER –

THE CASUAL WEB USER



What will they need when they get there?



- Locations of mines
- Information about the mines, e.g. seam mined, operator, mine name etc…
- Links to the scanned and georeferenced mine maps and documents

GIS Database Development – The Methodology

A GIS database was chosen as the type of database best suited to the task…

- because of its ability to integrate data with a spatial component, perform data input/output, management, and analysis.
- because it can also link specific attributes to define the characteristics of a geographic feature.

GIS Database Development
The Methodology

Step 1.

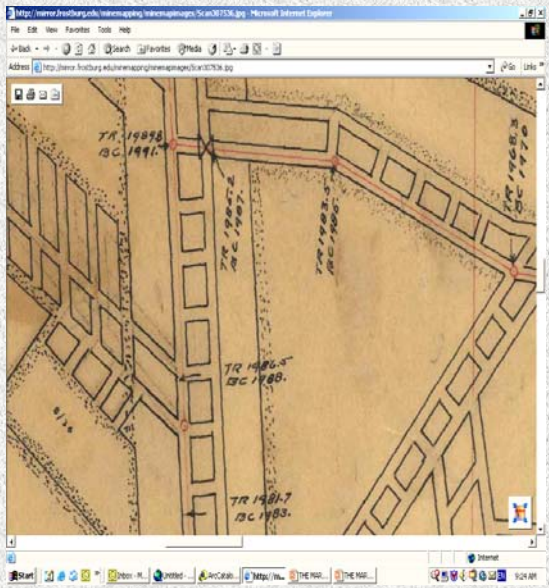
Scan the Map

Step 1.

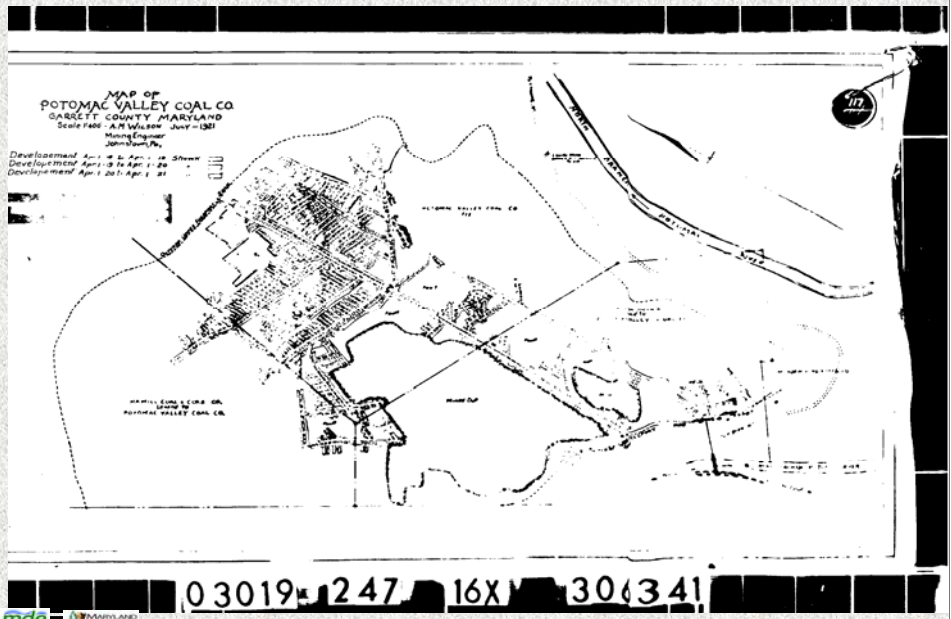
Scan the Map

- Verify OSM data from previously scanned maps –assign ID# if needed.
- Physically prepare map for scanning
- Determine best d.p.i. (200 d.p.i. default)
- Create .tif file for archival purposes, .jpg file for web
- Add to VisualBase index
- Merge multiple images (oversize maps that require multiple scans)
- Save color processed and optimized images to server
- Save .tif file to DVD for archives

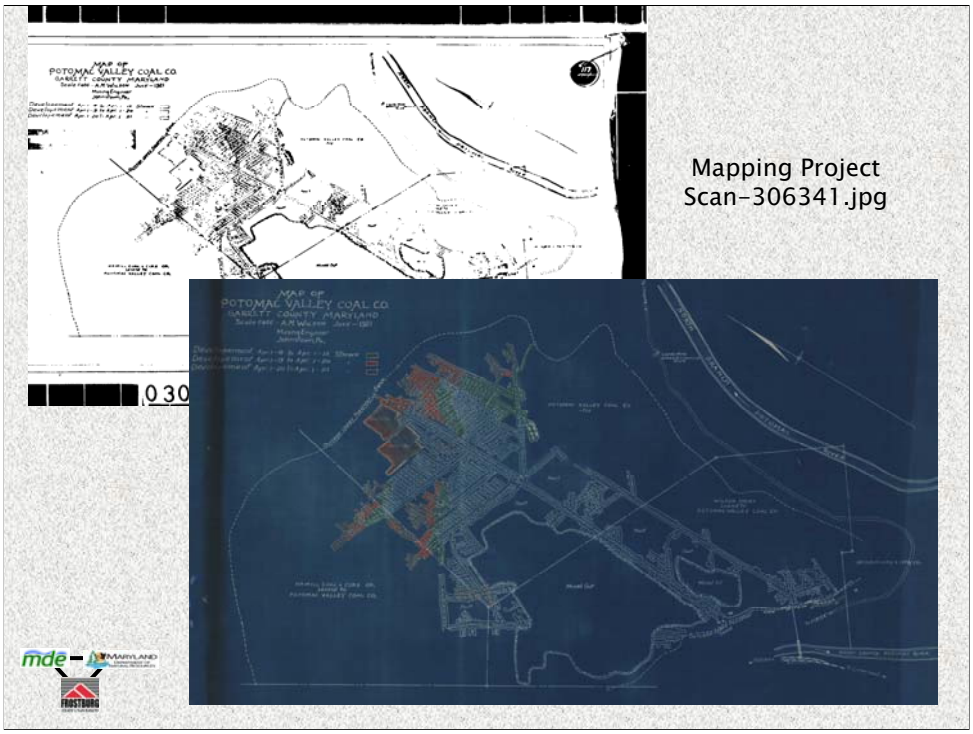
Determine best resolution



- If you can read it on the paper map, you must be able to read it on the digital image!
- Most maps, 200 dpi works best.
- If there is a lot of detail, 300 dpi is better.

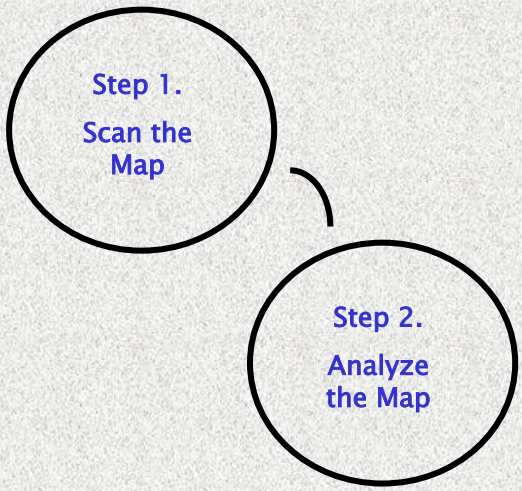


OSM Scan Map ID #306341



Mapping Project
Scan-306341.jpg

GIS Database Development
The Methodology



ID #_____

Map Data and MARC Data Collection Worksheet

Image File Name/URL _____ (MARC 856u) Image Scan Resolution (d.p.i.) _____ (MARC 500) Physical Size (cm) _____ (MARC 300c)

Map Title_____(MARC 245)

Map Source: B of M ____ Rutledge Collection ____ OSM____ Other _____ (MARC 561)

Map Created by (Company Name): _____ (MARC 500 and 710) Scale: _____ (MARC 034a and 255a)

Date Published _____ (MARC 260c) Date of Representation _____ (MARC 500) Base Date_____ (MARC 250) Revision Date _____ (MARC 250)

Mine Closure Date _____ (MARC 500) Primary Mine Name _____ (MARC 500/610/710) Secondary/Alternate Mine Name (MARC 500/610/710)_____

Names of ADJACENT mines found on map (MARC 500/610/710)_____

Quadrangle Name _____ (MARC 650) State (s)_____ (MARC 500 and 740) County Name_____ (MARC 650)

Coordinates (UTM)_____ (MARC 500) Company Coordinates?_____ Name(s) of Land Surface Owners_____

Latitude/Longitude Point? (MARC 500) North Latitude:_____ Degrees _____ Minutes _____ Seconds
West Longitude:_____ Degrees _____ Minutes _____Seconds

Property Lines or Boundaries?_____ State Plane? Northing _____ Easting_____

Coal Basin: Georges Creek ___ Upper Potomac ___ Lower Youghiogheny ___ Upper Youghiogheny ___ Casselman_____ Other_____ (MARC 500/650)

Geographic Features: (MARC 520, 651 and 691) _____
Man-Made Features: (MARC520, 651651 and 691)
_____

Additional Notes _____

MARC SPECIFIC DATA ONLY

Relief Code _____ (MARC 008) Legend (Y/N)___ (MARC 500)

Type of Cartographic Material Code _____ (MARC 008)

Blueprint (Y/N)__ Color (Y/N)__ Negative (Y/N) __ (MARC 300b)

Projection Code _____ (MARC 255 and 008)

Other Format Available (microfiche?) _____ (MARC 533)
(Microfilm?)_____

Publisher ?_____ (MARC 260b)

Place of Publication _____(MARC 260a)

Mine Size:
Small _____ (less than 435,600 ft. squared or 10 acres)
Medium_____ (between 435,600 ft. squared and 4,600,000 ft squared or between 10 and 100 acres)
Large_____ (more than 4,600,000 ft squared or more than 100 acres)
Standard Coalbed/Seam Name_____
Company Coalbed/Seam Name _____
Former Coalbed/Seam Name_____
Subsequent Coalbed/Seam Name_____

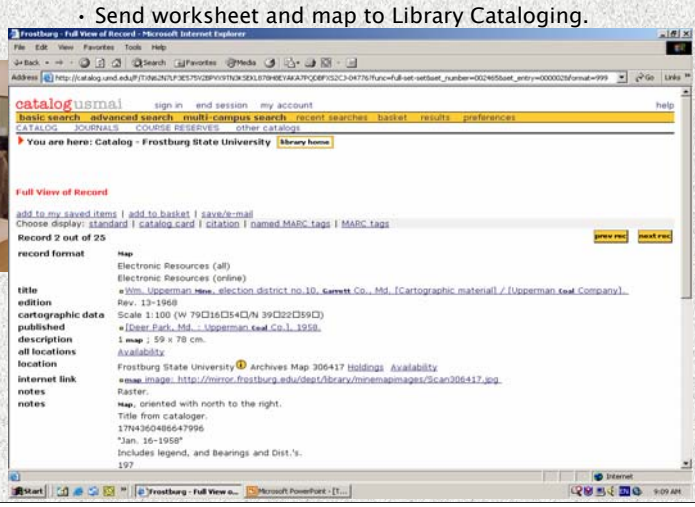
Mining Method: Surface _____ Underground_____
Room and Pillar (Old- prior to 1950)_____
Room and Pillar (modern – after 1950) _____
Room and Pillar (Mixed)_____
Long Wall _____

Overburden Analysis ___ Sulfur Content of Mine Pavement ___ Portals ___ Roof Falls ___ Thickness Data ___
Sump and/or Pumping Reports ____ Surface Subsidence _____ Elevation Data ___ Crop Line ___ Adjacent Mines ___ Gas Wells Present ___ Power Lines ___ Water ___ Boreholes Present ___ Mine Fires ___
Elevation of Water Lines___ Drains _____ Ventilation Data _____ Mined/Worked Out Areas ___

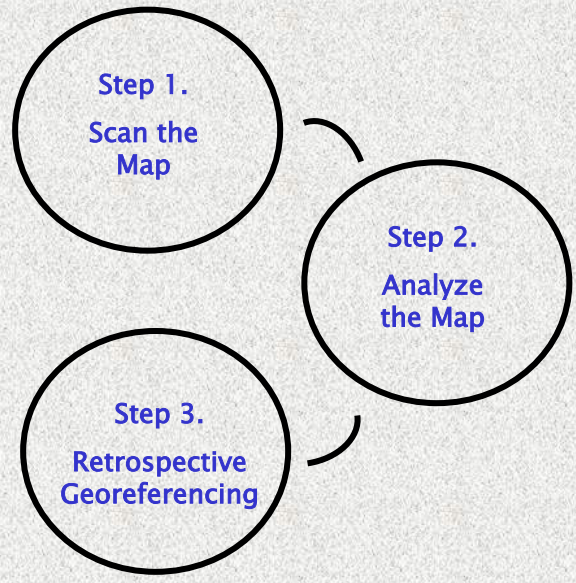
Step 2.

Analyze the Map

- Use the Data Collection Worksheet to capture all geospatial and bibliographic data possible.
- Capture desired mine specific data (coal seam name, mining method, dates, etc.)
- Update the directory with map images and mine information
- Send worksheet and map to Library Cataloging.



GIS Database Development
The Methodology



Step 3.

Retrospective Georeferencing

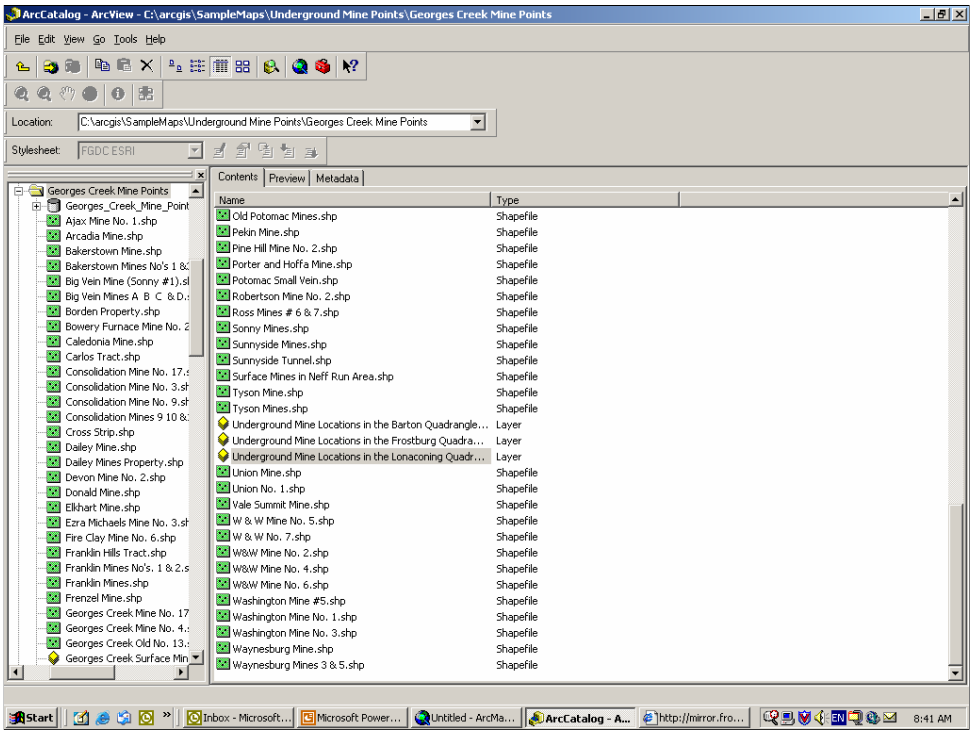
- No GPS when these maps were made.
- We must go back and assign coordinates to the historic maps based on any surface or descriptive features shown on the map.
- Point shapefiles were created for each mine and assigned absolute x,y coordinates (UTM).
- The point coverage represents entries, and/or the general location of a mine.

Step 3.

Retrospective Georeferencing

Group Layers

- Currently the database has a logical collection of data layers that can be turned on or off by the user.
- Data layers are further broken down into group layers for ease of use by the general public.
- For example, a layer such as underground mine points is separated into group layers by coal basin, watershed, and topo quad.


ArcCatalog - ArcView - C:\arcgis\SampleMaps\Underground Mine Points\Georges Creek Mine Points
File Edit View Go Tools Help
Location: C:\arcgis\SampleMaps\Underground Mine Points\Georges Creek Mine Points
Stylesheet: FGDC ESRI
Contents Preview Metadata
Name Type
Georges Creek Mine Points
Georges_Creek_Mine_Point
Ajax Mine No. 1.shp
Arcadia Mine.shp
Bakerstown Mine.shp
Bakerstown Mines No's 1 &
Big Vein Mine (Sonny #1).sl
Big Vein Mines A B C & D.
Borden Property.shp
Bowery Furnace Mine No. 2
Caledonia Mine.shp
Carlos Tract.shp
Consolidation Mine No. 17.
Consolidation Mine No. 3.sh
Consolidation Mine No. 9.sh
Consolidation Mines 9 10 &
Cross Strip.shp
Dailey Mine.shp
Dailey Mines Property.shp
Devon Mine No. 2.shp
Donald Mine.shp
Elkhart Mine.shp
Ezra Michaels Mine No. 3.sh
Fire Clay Mine No. 6.shp
Franklin Hills Tract.shp
Franklin Mines No's. 1 & 2.s
Franklin Mines.shp
Frenzel Mine.shp
Georges Creek Mine No. 17
Georges Creek Mine No. 4.
Georges Creek Old No. 13.
Georges Creek Surface Min
Old Potomac Mines.shp Shapefile
Pekin Mine.shp Shapefile
Pine Hill Mine No. 2.shp Shapefile
Porter and Hoffa Mine.shp Shapefile
Potomac Small Vein.shp Shapefile
Robertson Mine No. 2.shp Shapefile
Ross Mines # 6 & 7.shp Shapefile
Sonny Mines.shp Shapefile
Sunnyside Mines.shp Shapefile
Sunnyside Tunnel.shp Shapefile
Surface Mines in Neff Run Area.shp Shapefile
Tyson Mine.shp Shapefile
Tyson Mines.shp Shapefile
Underground Mine Locations in the Barton Quadrangle... Layer
Underground Mine Locations in the Frostburg Quadra... Layer
Underground Mine Locations in the Lonaconing Quadr... Layer
Union Mine.shp Shapefile
Union No. 1.shp Shapefile
Vale Summit Mine.shp Shapefile
W & W Mine No. 5.shp Shapefile
W & W No. 7.shp Shapefile
W&W Mine No. 2.shp Shapefile
W&W Mine No. 4.shp Shapefile
W&W Mine No. 6.shp Shapefile
Washington Mine #5.shp Shapefile
Washington Mine No. 1.shp Shapefile
Washington Mine No. 3.shp Shapefile
Waynesburg Mine.shp Shapefile
Waynesburg Mines 3 & 5.shp Shapefile
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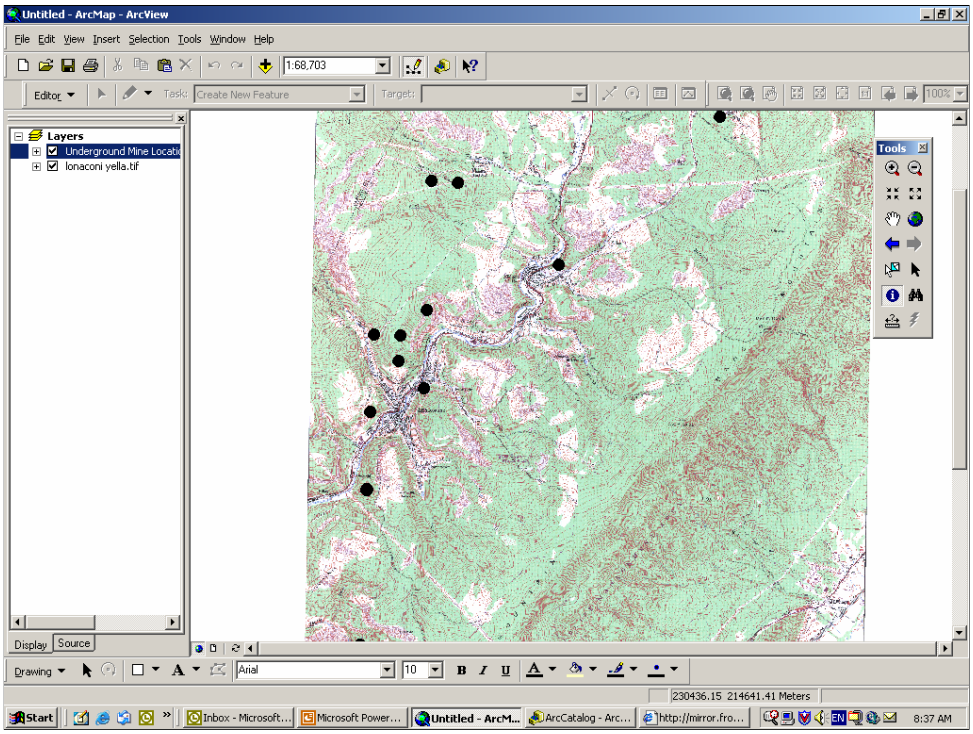
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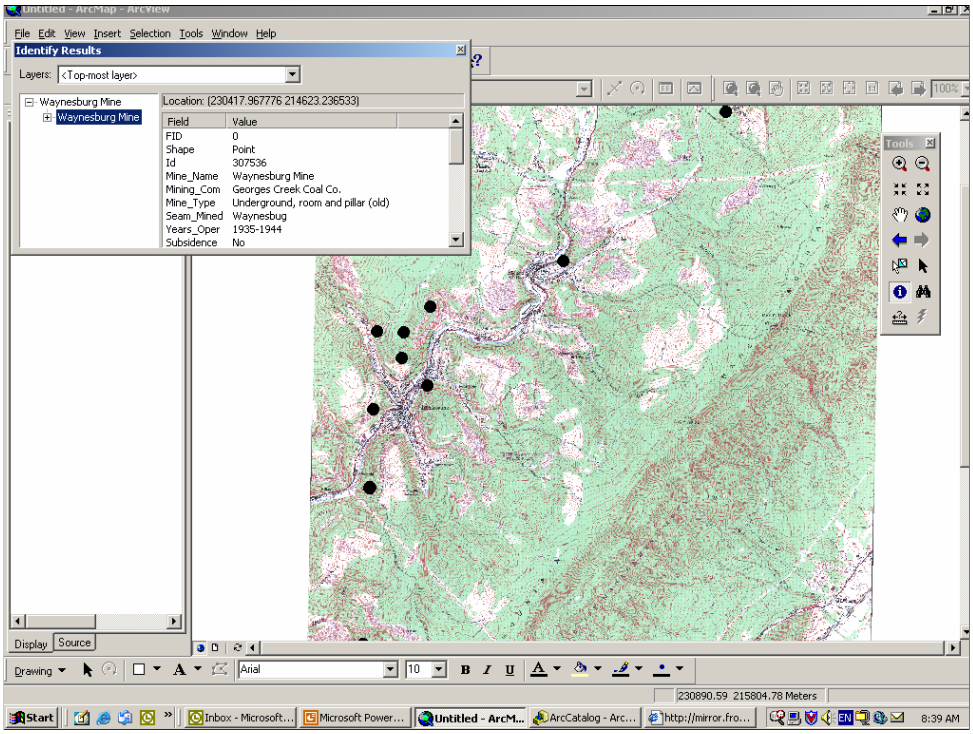
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Identify Results
Layers: <Top-most layer>
Waynesburg Mine
Waynesburg Mine
Location: (230417.967776 214623.236533)
Field Value
FID 0
Shape Point
Id 307536
Mine_Name Waynesburg Mine
Mining_Com Georges Creek Coal Co.
Mine_Type Underground, room and pillar (old)
Seam_Mined Waynesbug
Years_Oper 1935-1944
Subsidence No
Tools
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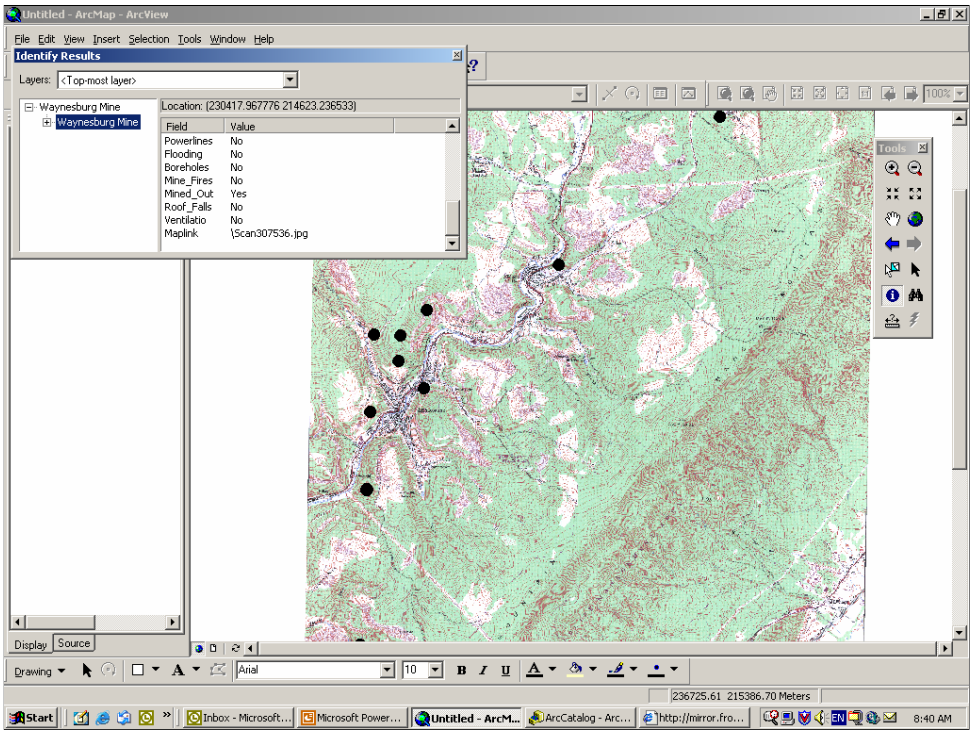
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File Edit View Insert Selection Tools Window Help
Identify Results
Layers: <Top-most layer>
Waynesburg Mine
Waynesburg Mine
Location: (230417.967776 214623.236533)
Field Value
Powerlines No
Flooding No
Boreholes No
Mine_Fires No
Mined_Out Yes
Roof_Falls No
Ventilatio No
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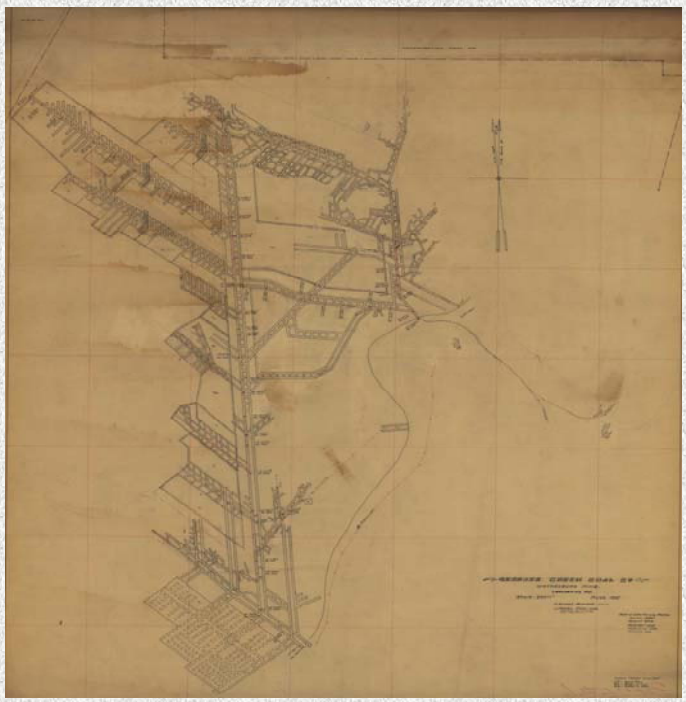
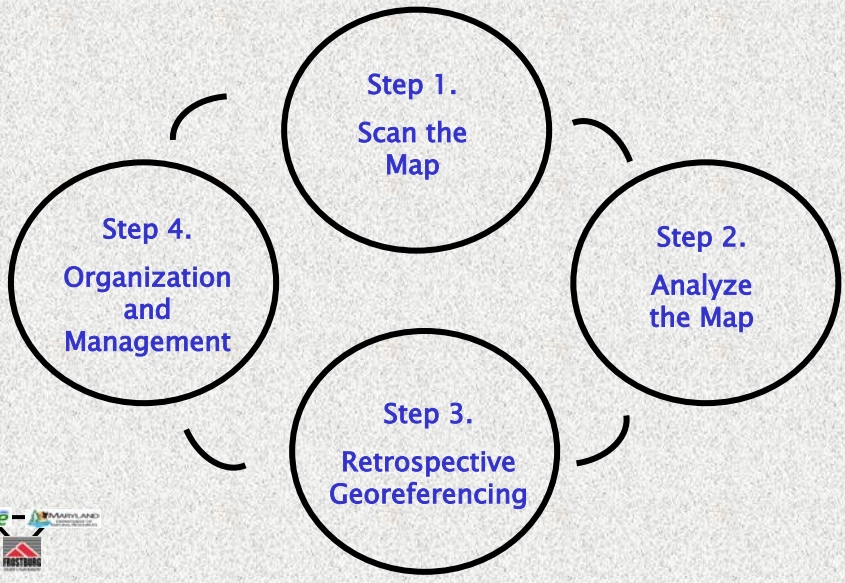


GIS Database Development
The Methodology



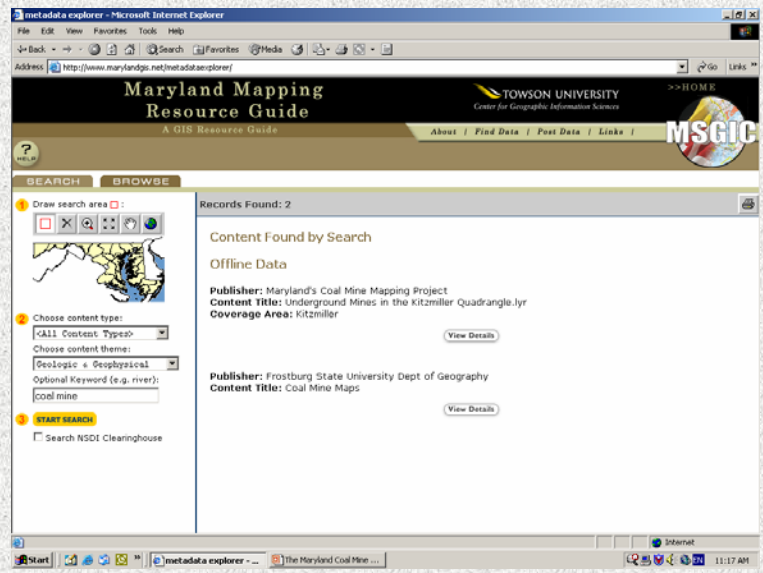
Step 4.

Organization and Management

- Update Environmental Data Management System.
- Upload images to website.
- Create DVD for archival purposes
- Write and post metadata to MMRG catalog and project website
- Preserve original maps

Have we met our goal to: Capture, in an electronically retrievable form, the vital historical data and information contained in the mining industry records for MD ?

The Maryland Mapping Resource Guide
http://www.marylandgis.net/



The Maryland Mapping Resource Guide
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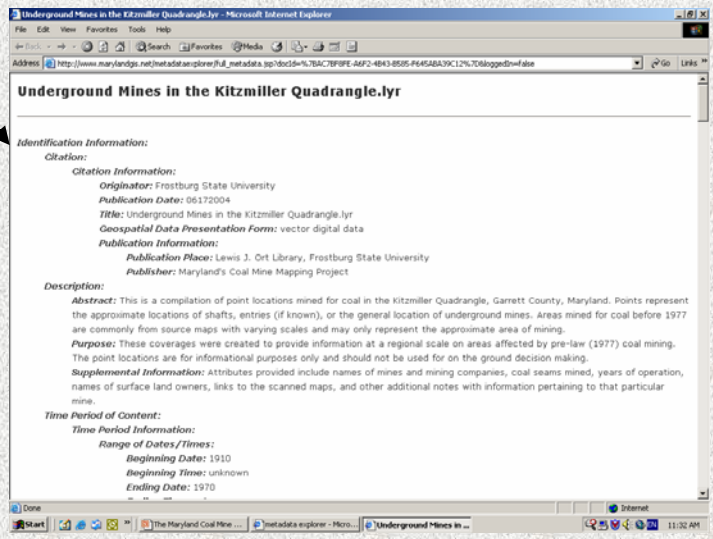


Underground Mines in the Kitzmiller Quadrangle.lyr - Microsoft Internet Explorer

File Edit View Favorites Tools Help

Address http://www.marylandgis.net/metadata/explorer/full_metadata.jsp?docId=%7BAC7BF8FE-A6F2-4B43-8585-F645ABA39C12%7D&loggedIn=false

Underground Mines in the Kitzmiller Quadrangle.lyr

Identification Information:

Citation:

Citation Information:

Originator: Frostburg State University

Publication Date: 06172004

Title: Underground Mines in the Kitzmiller Quadrangle.lyr

Geospatial Data Presentation Form: vector digital data

Publication Information:

Publication Place: Lewis J. Ort Library, Frostburg State University

Publisher: Maryland's Coal Mine Mapping Project

Description:

Abstract: This is a compilation of point locations mined for coal in the Kitzmiller Quadrangle, Garrett County, Maryland. Points represent the approximate locations of shafts, entries (if known), or the general location of underground mines. Areas mined for coal before 1977 are commonly from source maps with varying scales and may only represent the approximate area of mining.

Purpose: These coverages were created to provide information at a regional scale on areas affected by pre-law (1977) coal mining. The point locations are for informational purposes only and should not be used for on the ground decision making.

Supplemental Information: Attributes provided include names of mines and mining companies, coal seams mined, years of operation, names of surface land owners, links to the scanned maps, and other additional notes with information pertaining to that particular mine.

Time Period of Content:

Time Period Information:

Range of Dates/Times:

Beginning Date: 1910

Beginning Time: unknown

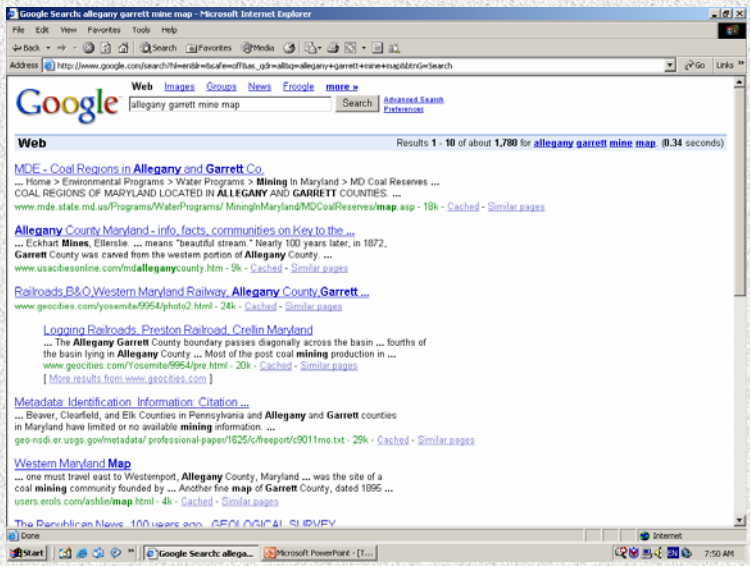
Ending Date: 1970

Done | Internet

Start | The Maryland Coal Mine ... | metadata explorer - Micro... | Underground Mines in ... | 11:32 AM

The University System of Maryland and
Affiliated Institutions (USMAI) Library Catalogs

World Cat – OCLC's
(Online Computer Library Center) Global Library Catalog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Google
Web Images Groups News Froogle more »
allegany garrett mine map
Search
Advanced Search
Preferences
Web
Results 1 - 10 of about 1,780 for allegany garrett mine map. (0.34 seconds)
MDE - Coal Regions in Allegany and Garrett Co.
... Home > Environmental Programs > Water Programs > Mining in Maryland > MD Coal Reserves ...
COAL REGIONS OF MARYLAND LOCATED IN ALLEGANY AND GARRETT COUNTIES. ...
www.mde.state.md.us/Programs/WaterPrograms/ MiningInMaryland/MDCoalReserves/map.asp - 19k - Cached - Similar pages
Allegany County Maryland - info, facts, communities on Key to the ...
... Eckhart Mines, Ellerslie. ... means "beautiful stream." Nearly 100 years later, in 1872,
Garrett County was carved from the western portion of Allegany County. ...
www.usacitiesonline.com/mdalleganycounty.htm - 9k - Cached - Similar pages
Railroads,B&O,Western Maryland Railway, Allegany County,Garrett ...
www.geocities.com/yosemite/9954/photo2.html - 24k - Cached - Similar pages
Logging Railroads, Preston Railroad, Crellin Maryland
... The Allegany Garrett County boundary passes diagonally across the basin ... fourths of
the basin lying in Allegany County ... Most of the post coal mining production in ...
www.geocities.com/Yosemite/9954/pre.html - 20k - Cached - Similar pages
[More results from www.geocities.com]
Metadata: Identification Information: Citation ...
... Beaver, Clearfield, and Elk Counties in Pennsylvania and Allegany and Garrett counties
in Maryland have limited or no available mining information. ...
geo-nsdi.er.usgs.gov/metadata/ professional-paper/1625/c/freeport/c9011mo.txt - 29k - Cached - Similar pages
Western Maryland Map
... one must travel east to Westernport, Allegany County, Maryland ... was the site of a
coal mining community founded by ... Another fine map of Garrett County, dated 1895 ...
users.erols.com/ashlie/map.html - 4k - Cached - Similar pages
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Microsoft PowerPoint - [T...
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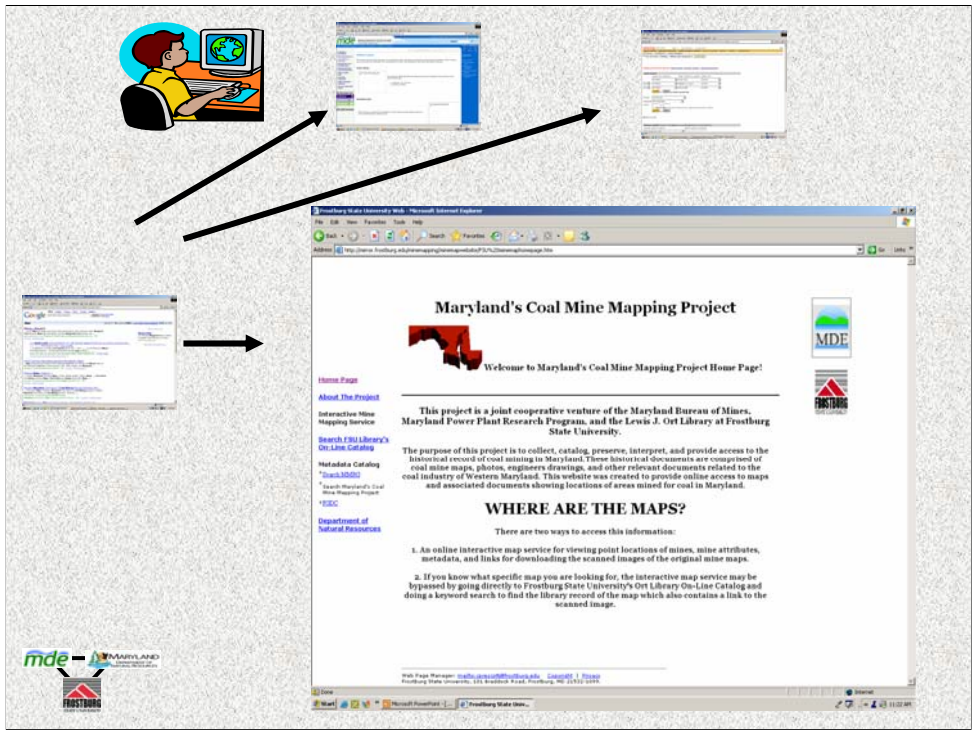

Maryland's Coal Mine Mapping Project
Welcome to Maryland's Coal Mine Mapping Project Home Page!
Home Page
About The Project
Interactive Mine Mapping Service
Search FSU Library's On-Line Catalog
Metadata Catalog
Department of Natural Resources
This project is a joint cooperative venture of the Maryland Bureau of Mines, Maryland Power Plant Research Program, and the Lewis J. Ort Library at Frostburg State University.
The purpose of this project is to collect, catalog, preserve, interpret, and provide access to the historical record of coal mining in Maryland. These historical documents are composed of coal mine maps, photos, engineers drawings, and other relevant documents related to the coal industry of Western Maryland. This website was created to provide online access to maps and associated documents showing locations of areas mined for coal in Maryland.
WHERE ARE THE MAPS?
There are two ways to access this information:
1. An online interactive map service for viewing point locations of mines, mine attributes, metadata, and links for downloading the scanned images of the orginal mine maps.
2. If you know what specific map you are looking for, the interactive map service may be bypassed by going directly to Frostburg State University's Ort Library On-Line Catalog and doing a keyword search to find the library record of the map which also contains a link to the scanned image.
MDE
FROSTBURG

Have we met our goal to: Capture, in an electronically retrievable form, the vital historical data and information contained in the mining industry records for MD ?

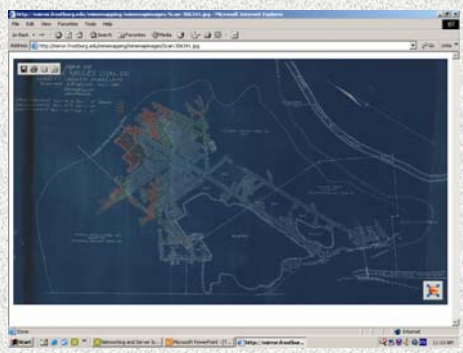
YES!

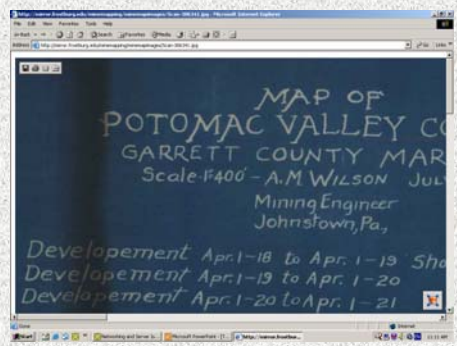
However, it is a work in progress.

There is still a lot to be done…!

WORKING ISSUES

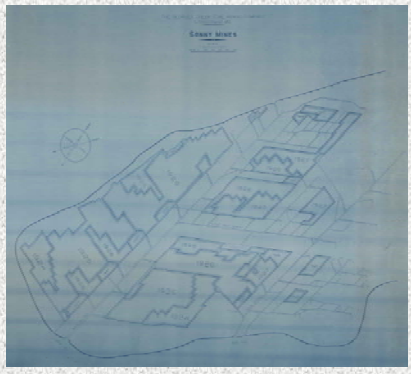
- Maps not yet interactive on the World Wide Web



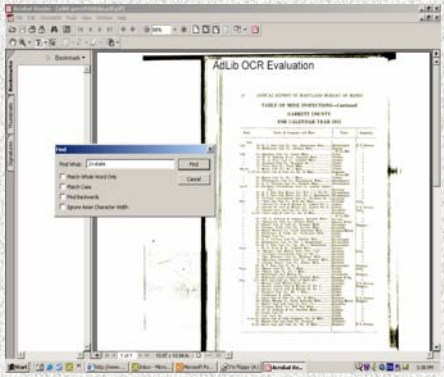


WORKING ISSUES

•Mine related materials



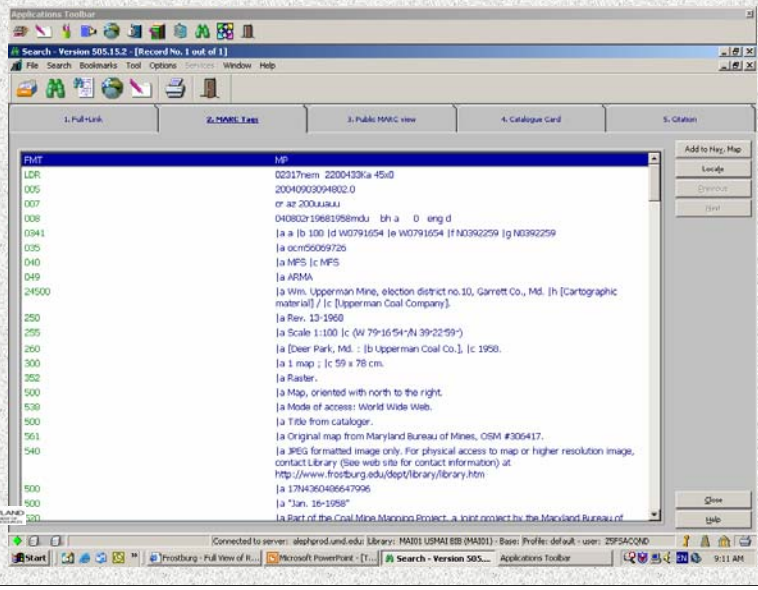
Mining Maps and
Engineering Drawings



Optical Character Recognition
(Searchable Text) for Annual Reports
and Permitting Documents

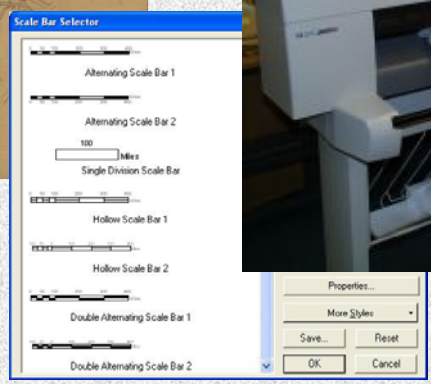
WORKING ISSUES

- Time required for cataloging in MARC format



WORKING ISSUES

- “Hard Copy” Printing – Proper scaling from the map’s Ratio Scale



SUMMARY

The Maryland Coal Mine Mapping Project has been a very successful cooperative venture among several state agencies that has, to date, significantly improved access to the historical record of coal mining in the state.