DMME Web Based Mapping Application

Virginia Department of Mines Minerals and Energy

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Virginia Department of Mines Minerals and Energy

- Division of Mineral Mining
- Division of Mined Land Reclamation
- Division of Gas and Oil
- Division of Mines
- Division of Administration
  - Office of Management Information Systems
- Division of Energy
- Division of Mineral Resources

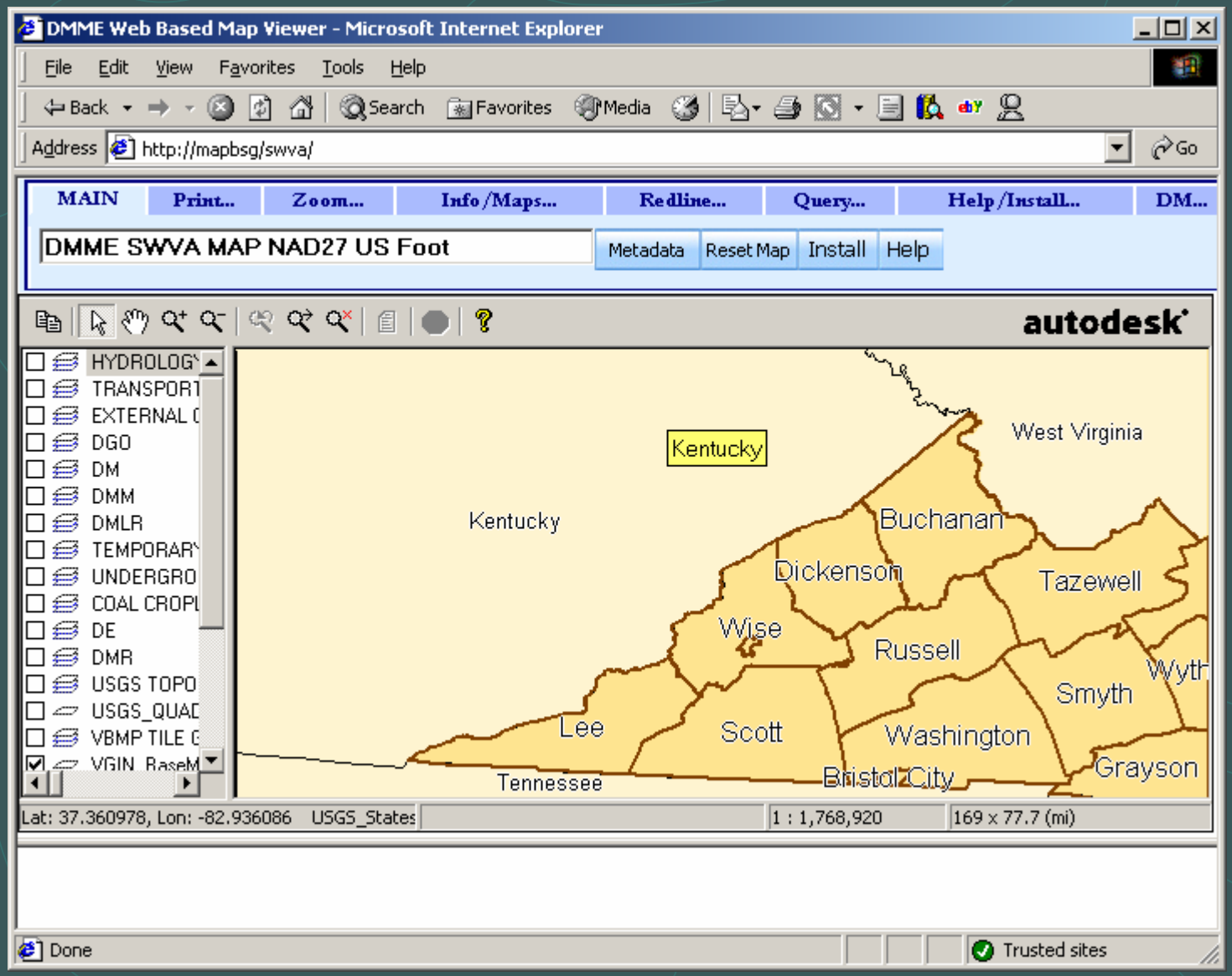
Current Status

Spatial datasets from the agency's Divisions of Mines, Mineral Mining, Mined Land Reclamation, Gas and Oil, Energy, and Mineral Resources are being served via Intranet Web Pages

Application installed on a Windows 2000 server, IIS 5.0, and Autodesk MapGuide® 6.3 platform. Uses HTML, DHTML, JavaScript, and ASP.Net integration

This server is also the DMME Digital Ortho Photo server (3+TB), and repository for DMR / DM MSHA Grant Project scanned maps

Southwest Virginia Map Application

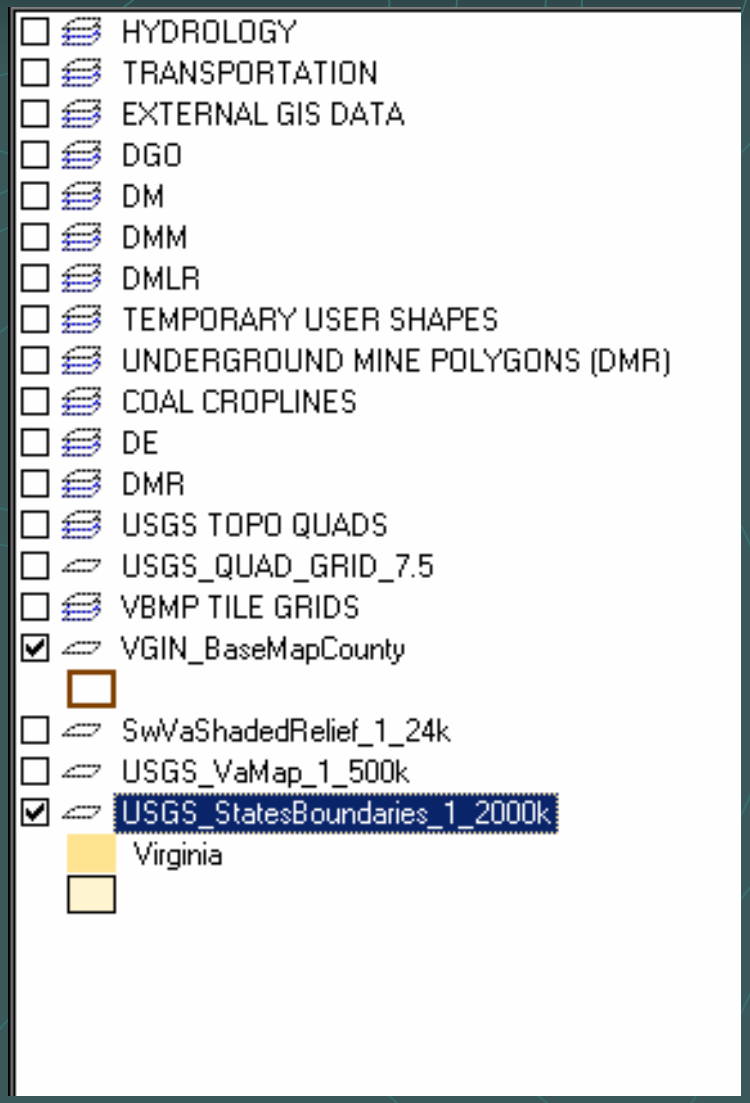


HTML Layered Menu System

Sample of Available Current layers

- Underground Coal Mine point location data
- Mineral Mine point location data
- Surface Coal Permit Boundaries and NPDES Locations
- Gas and Oil Wells with status and type
- Underground Coal Mine extent polygons
- Virginia USGS Topo Map Features (GNIS)
- Virginia Geologic Maps
- Wind Power resource maps
- VDOT, rail lines, Fed and State highways, hydrology
- Virginia Ortho Basemap
- USGS vector and raster topo maps

Southwest Virginia Map Application Legend



Key Features and Benefits

- Provides easy-to-use / learn user interface
- Web-based user interface (quick updates/upgrades)
- Highly customizable user interface
- Can simultaneously display BMP/TIF/JPG raster data, ESRI shapefile, Access MDB, SQL Server tables/views, and SDF vector data
- Rapid access to very large data sets from remote locations or via dial-up
- Easy integration with a variety of existing data, and legacy apps

Key Features and Benefits

- Provides functions similar to ESRI ArcView® and AutoCAD Map®
- Allows users to access images with transparency
- Overlay data from many sources and coordinate systems (with the exception of raster image type data)
- Query and filter data through the user interface
- Utilizes ESRI world files to display scanned maps and other digital images
- Low cost per user (processor license)

Benefits to DMME

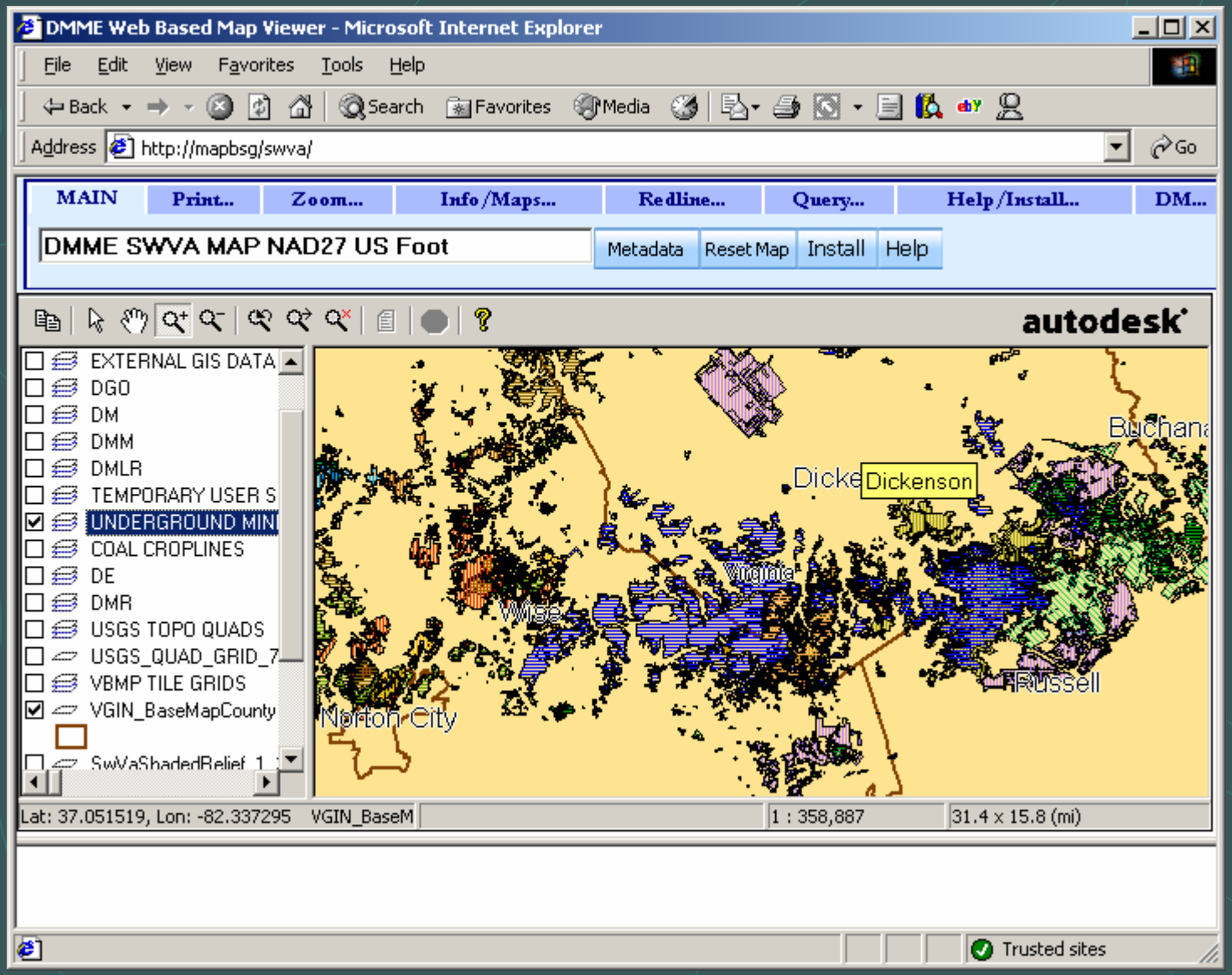
- Provides seamless interdivisional GIS data display and search capability
- Provides all DMME staff with a single repository for viewing critical DMME spatial data
- Provides mechanism for sharing, updating, and publishing spatial data

Benefits to DMME

- Provides access for DMME staff to any available spatial dataset and associated metadata. Metadata is critical for determining the fitness of the spatial data for the intended application

- Allows remote staff (connect to DMME network) to rapidly view very large data sets without downloading the complete data set

Underground Mine Extent Polygons



Selected Polygon Mine Map Report

http://mapbsg/swva/dmrminemaps/dmrminemaps.aspx?indexnum=10054 - Microsoft Internet Explorer

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Address http://mapbsg/swva/dmrminemaps/dmrminemaps.aspx?indexnum=10054 Go

DM Mine Index Number

10054

Display Maps on Layer:

Layer 2

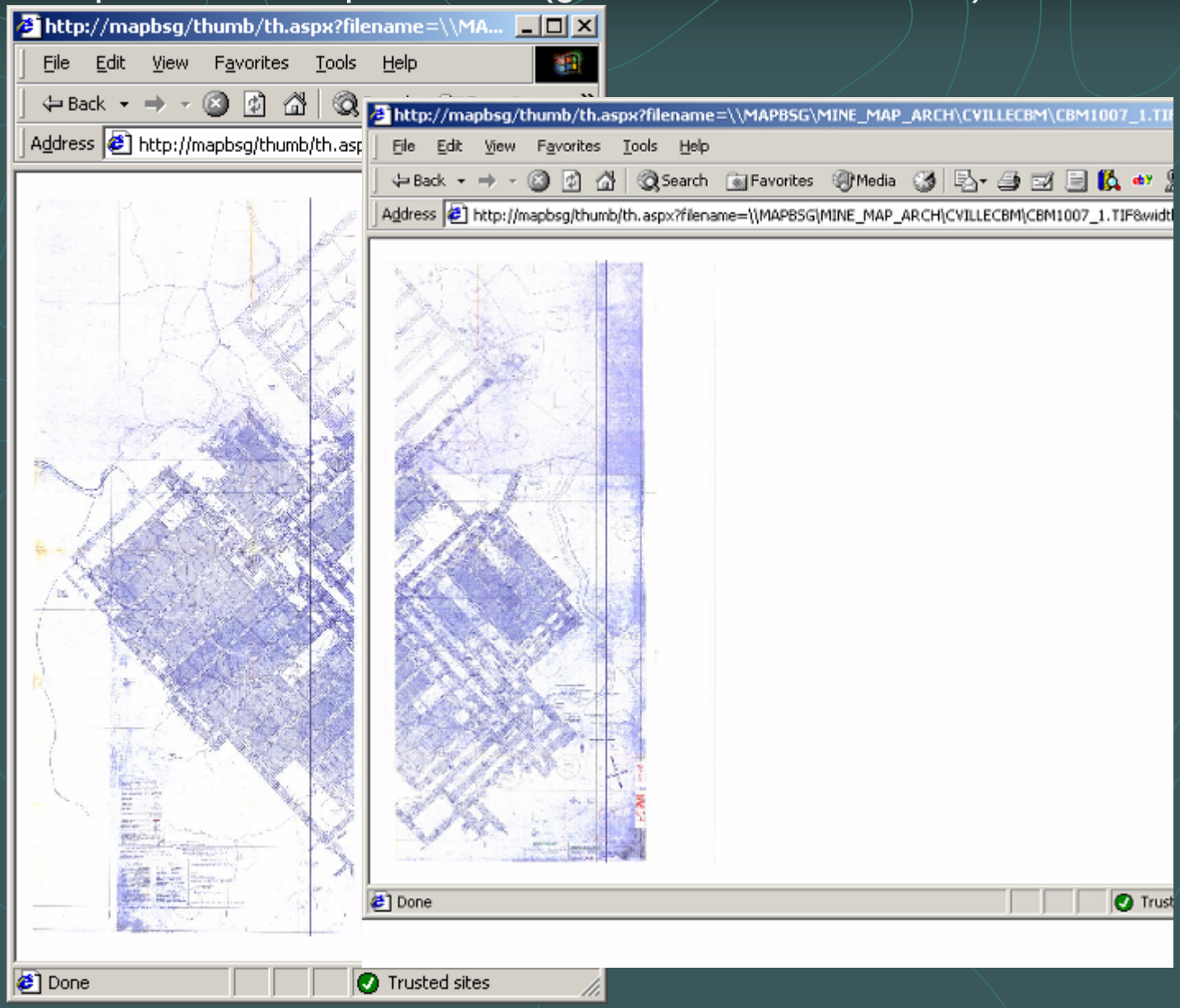
Coal Bed
JAWBONE
UPPER BANNER

Mine Maps

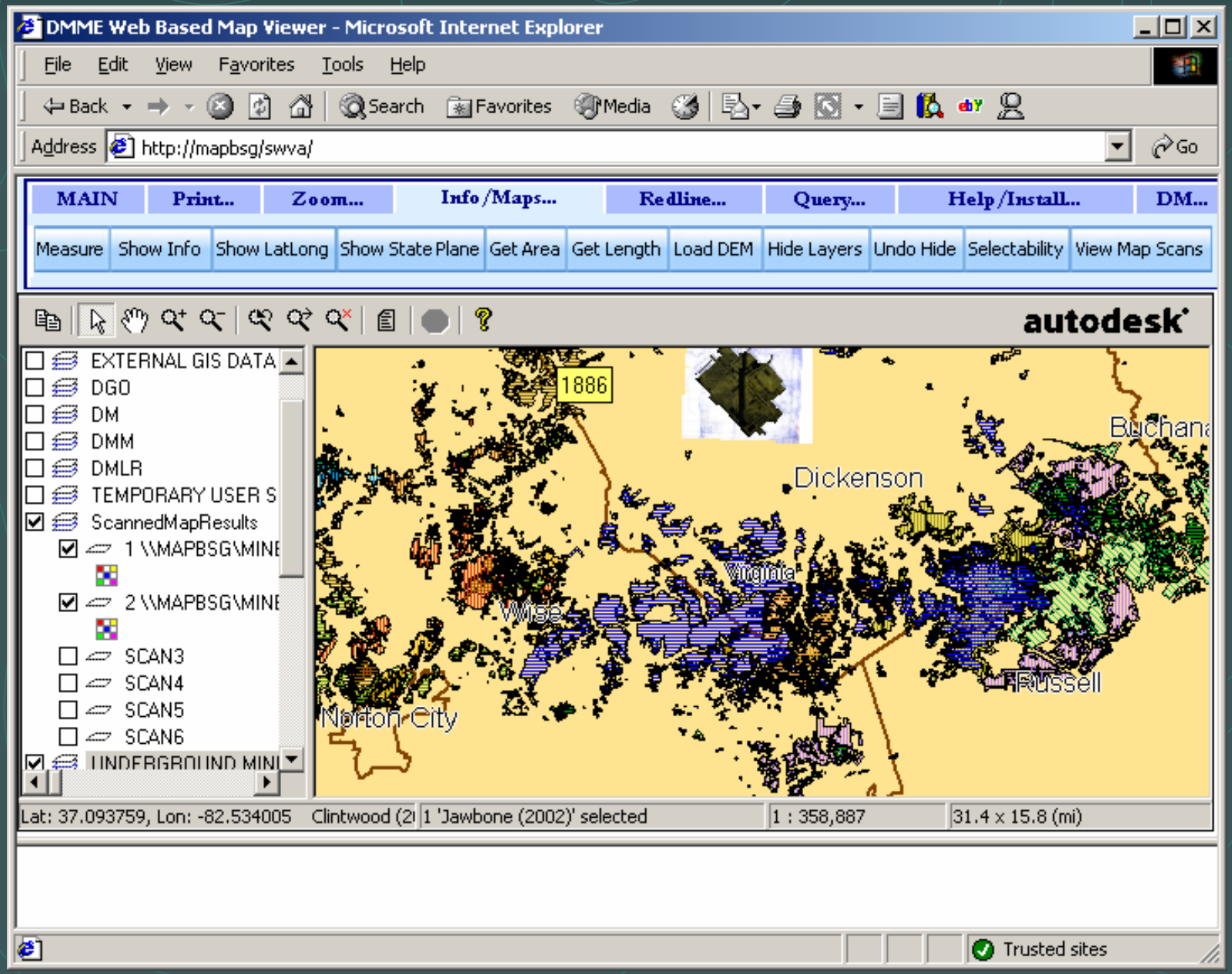
Display on Map	Map Date	GEOREF (T/F)	Mine Index #	DMME MAP ID #	Network Path to Scanned Image	Preview
Display	01/26/1995	True	10054	CBM1007	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM1007_1.TIF	Preview
Display	01/26/1995	True	10054	CBM1007	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM1007_2.TIF	Preview
Display	07/15/1991	False	10054	CBM1008	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\cbm1008_1.TIF	Preview

Done Trusted sites

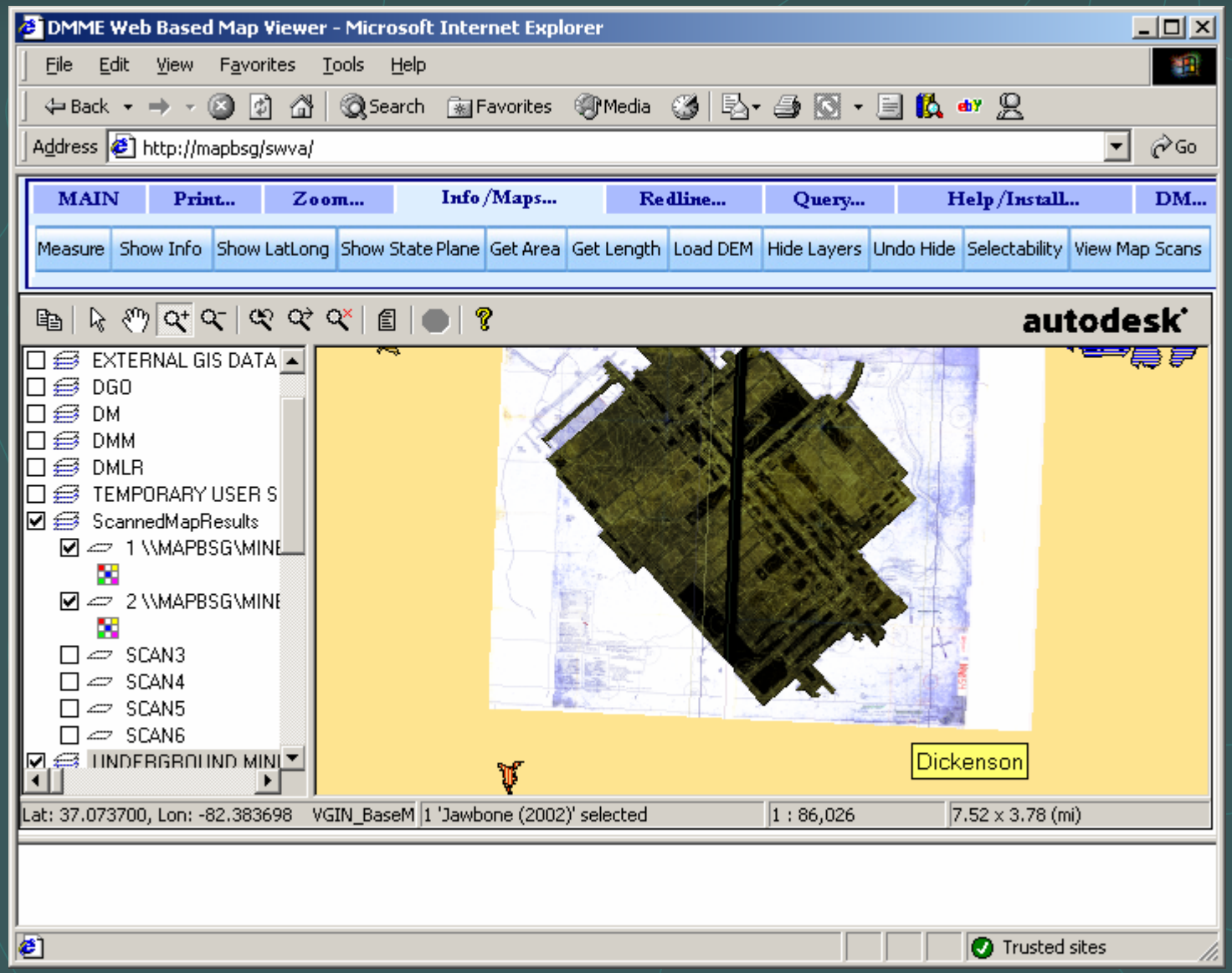
Mine Map Thumbnail previews (generated server side)



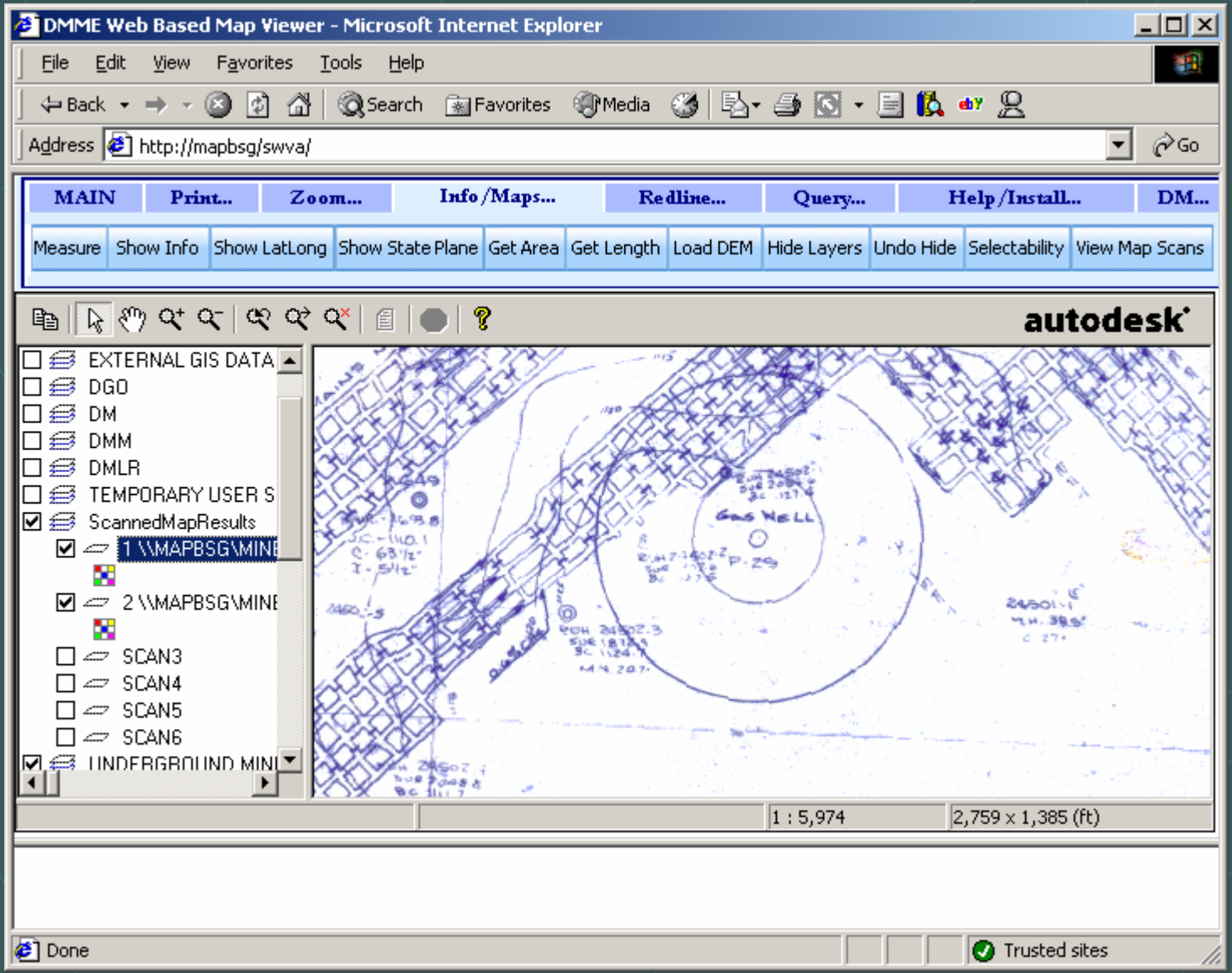
Selected Georeferenced Maps overlaid on Mine Polygons



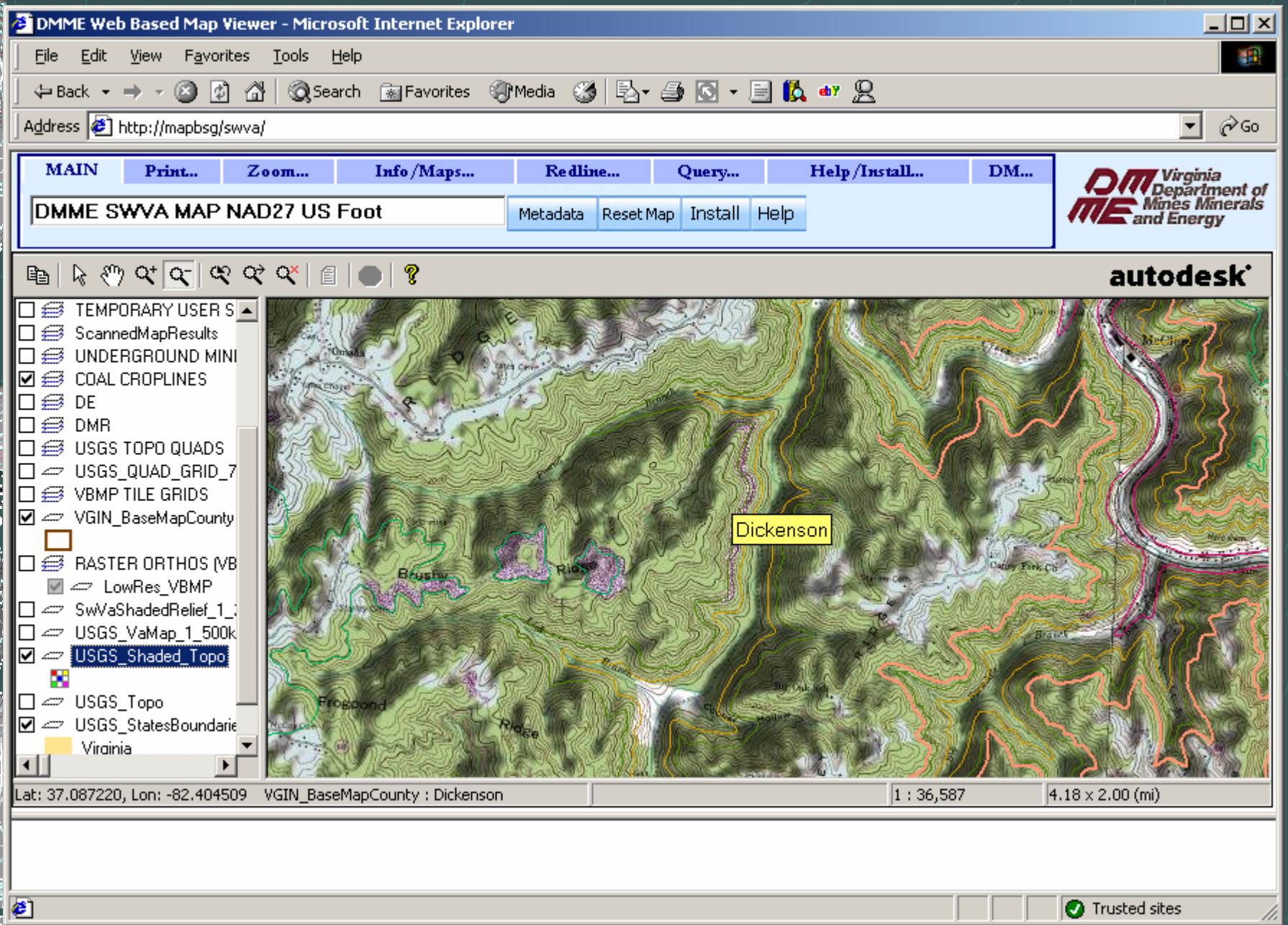
Multiple Maps can be overlaid dynamically



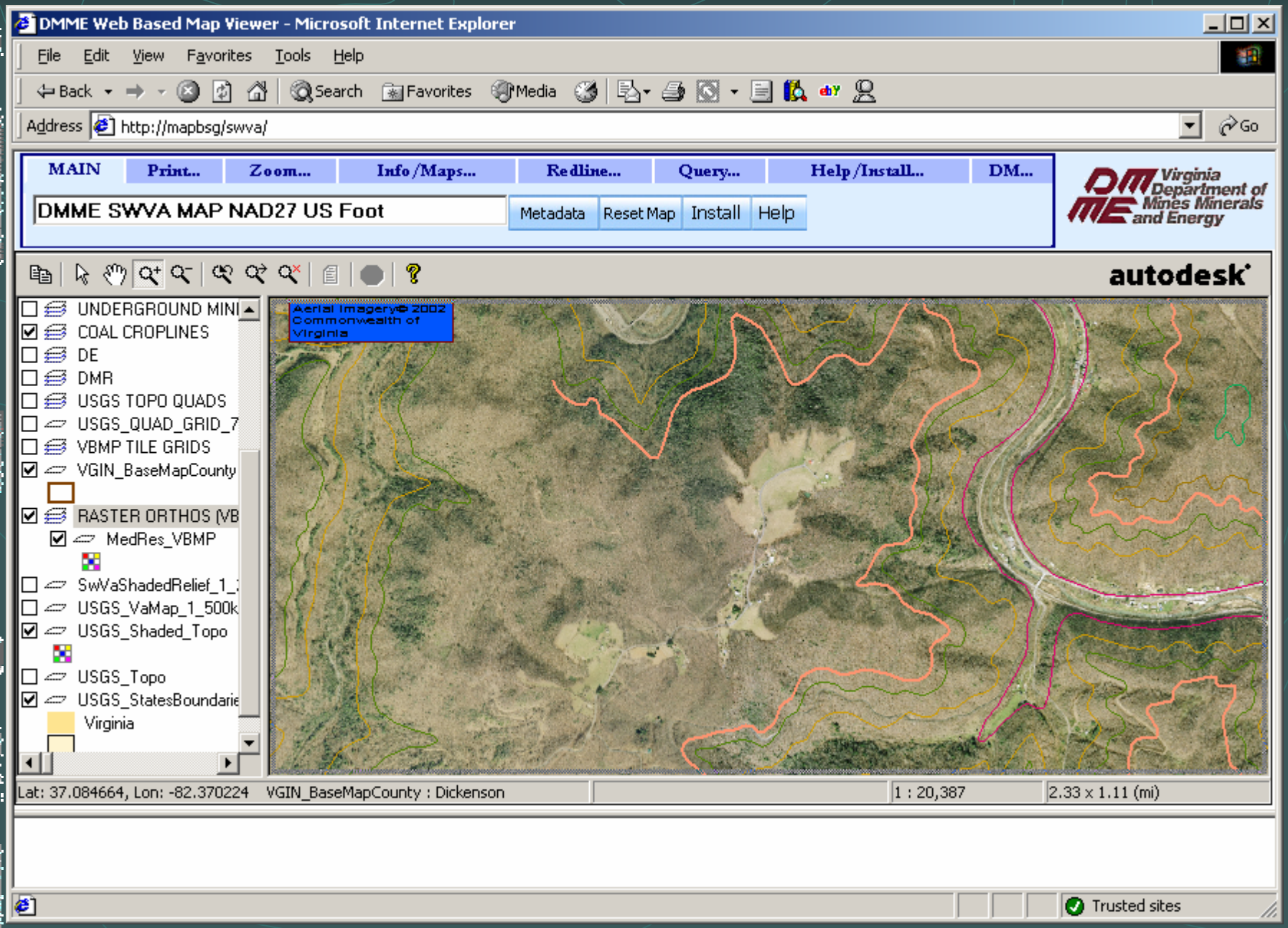
Zoomed Map View



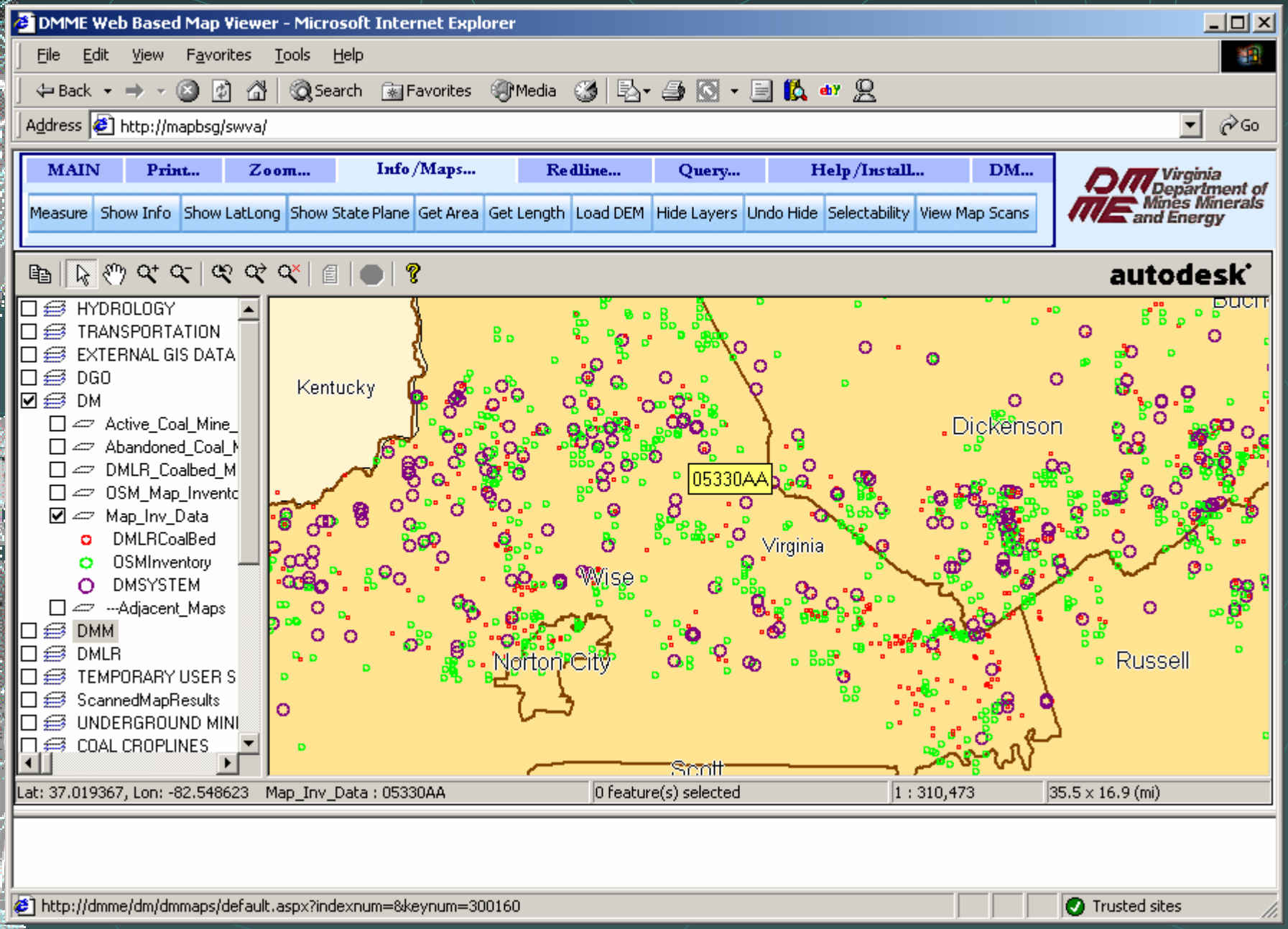
Coal Croplines with Shaded USGS Topo



Croplines with Orthophotography



Mines with known X/Y points (not georeferenced)



Available maps for that mine index number and known adjacent mines

http://mapbsg/swva/dmrminemaps/dmrminemaps.aspx?indexnum=05330AA - Microsoft Internet Explorer

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Address http://mapbsg/swva/dmrminemaps/dmrminemaps.aspx?indexnum=05330AA Go

DM Mine Index Number

05330

Display Maps on Layer:

Layer 1

Coal Bed

NORTON

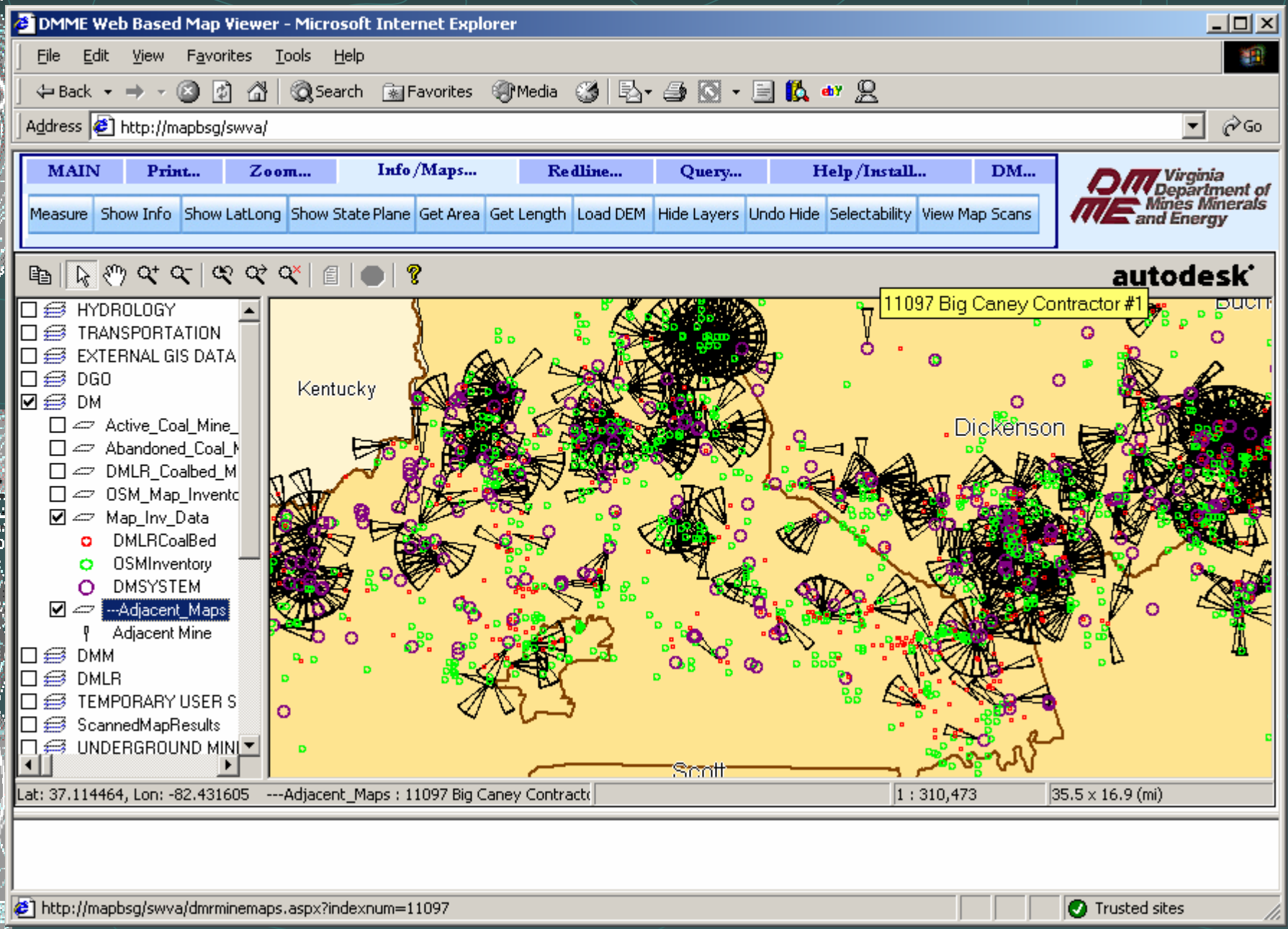
Mine Maps

Display on Map	Map Date	GEOREF (T/F)	Mine Index #	DMME MAP ID #	Network Path to Scanned Image	Preview
Display	10/09/1985	False	05330	CBM778	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM778_1.TIF	Preview
Display	10/09/1985	False	05330	CBM778	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM778_2.TIF	Preview

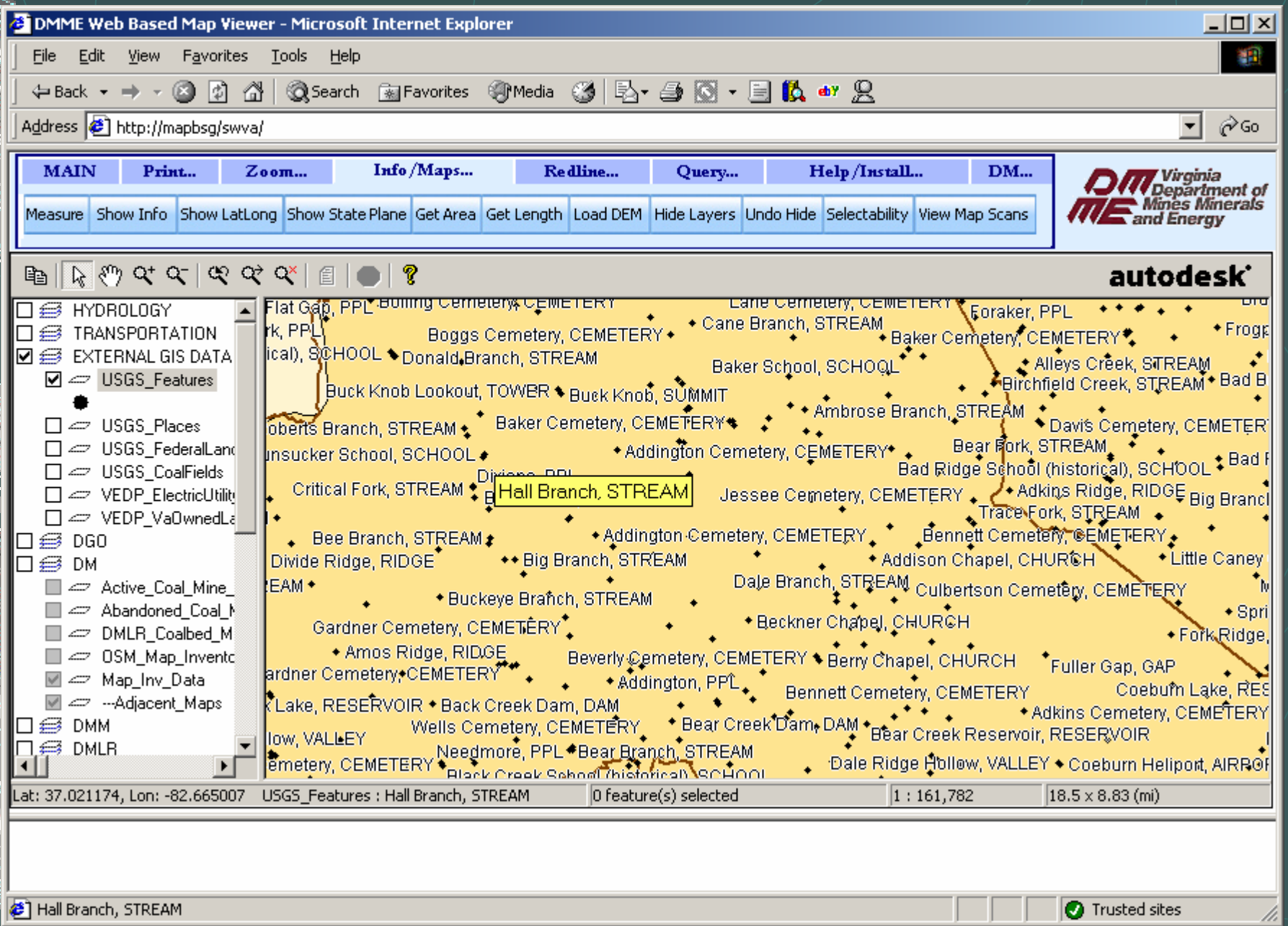
Adjacent Mine Maps

Display on Map	Map Date	GEOREF (T/F)	Mine Index #	DMME MAP ID #	Network Path to Scanned Image	Preview
Display	10/09/1985	False		CBM778	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM778_1.TIF	Preview
Display	10/09/1985	False		CBM778	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM778_2.TIF	Preview
Display	10/09/1985	False	04051	CBM778	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM778_1.TIF	Preview
Display	10/09/1985	False	04051	CBM778	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM778_2.TIF	Preview

Adjacency shown (pie slices) using relations from database



USGS Ground Features (from GNIS data)



USGS Feature Report of Mine Maps Associated by Feature

http://mapbsg/swva/mapfeatures.aspx - Microsoft Internet Explorer

File Edit View Favorites Tools Help

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Address http://mapbsg/swva/mapfeatures.aspx Go

DMR Mine Maps Scans

Feature Name Hall Branch

DMMEID	Feature_Name	Scan_Path	Std_Unit_Name	MineID	MineName	HasGeoRef	HasVector
CBM810	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM810_1.TIF	DORCHESTER			False	False
CBM810	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM810_2.TIF	DORCHESTER			False	False
CBM810	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM810_3.TIF	DORCHESTER			False	False
CBM525	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\CVILLECBM\CBM525.TIF	IMBODEN			False	False
LOV4706	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\LOV\LOV4706_1.JPG	KELLY			False	False
LOV4706	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\LOV\LOV4706_2.JPG	KELLY			False	False
LOV4706	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\LOV\LOV4706_3.JPG	KELLY			False	False
DMA34	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\APERTURE\DMA34.TIF	PARDEE	05188	APACHE COAL #1	True	False
DMA34	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\APERTURE\DMA34.TIF	PARDEE	12411	APACHE COAL #1	True	False
DMA34	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\APERTURE\DMA34.TIF	PARDEE	PAR_002	APACHE COAL #1	True	False
DMA34	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\APERTURE\DMA34.TIF	PARDEE	05183	APACHE COAL #1	True	False
DMA34	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\APERTURE\DMA34.TIF	PARDEE	05395	APACHE COAL #1	True	False
DMA34	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\APERTURE\DMA34.TIF	PARDEE	06090	APACHE COAL #1	True	False
DMA34	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\APERTURE\DMA34.TIF	PARDEE	09423	APACHE COAL #1	True	False
PVA91	HALL BRANCH	\\MAPBSG\MINE_MAP_ARCH\PENNVA\PVA91.TIF	WILSON		BETTY B 12	False	False

Done Trusted sites

User Interface Customizations

- Added SQL “where” clause filter with query builder
- Added get polygon area and line Length functions
- Added dynamic image display per polygon capability
- Added capability to raise and lower relative layer position (priority)
- Created DHTML menu system for ease of use
- Zoom to point Lat/Long, State Plane Coordinates

User Interface Customizations

- Dynamically Disable object selectability
- Hide layers via object selection
- Added switch zone button to switch between VA State Plane N/S coordinate systems for statewide map
- Added redline editing functions to displayed maps
- Display of data based on known location adjacencies
- Dynamic Commonwealth of Virginia Copyright statement for hardcopy output and copy/paste of Copyrighted Virginia Ortho Photos

User Interface Customizations

- Metadata display / search capability
- Layer info/details selection display customization (show Lat/Long, state plane, …)
- Created help pages and links
- Created integrated error reporting tools to provide feedback to data custodians
- Zoom Gotos for Key features, License/Permit Number,USGS features, etc.

Other Application Customizations

- Integrated hyperlink application connections to individual data layers
- Created lower resolution sub-sampled layers for VGIN Ortho VBMP data to increase performance
- Loaded USGS GNIS VA feature name layer for rapid feature search/zoom capability
- Windows 2000 Active Directory Security
- Created Shade Relief versions of the USGS Topographic DRGs.

Reports…

- Integrate DMME's spatial and business data

- Gas and Oil production and location (by selection, radius, polygon)
- Water Monitoring Data reporting (by selection, radius, polygon)
- Mine Reporting (by mine polygon extent, USGS feature, adjacency)
- This list continues to grow by request

Next Steps

- Create offline mobile applications using ESRI's MapObjects
- Complete metadata compilations for all spatial datasets
- QA and repair (if needed) data quality
- Expand existing and add additional datasets

Application Development Tools

- Autodesk Raster Workshop® (raster optimization)
- Autodesk MapGuide Author 6.3®
- Frontpage 2003® (HTML and JavaScript)
- ASP.NET WebMatrix® 0.6 (ASP.Net apps/reports)
- Visual Studio.Net 2003® (ASP.Net apps/reports)
- Global Mapper 6® (raster DRGs)

Challenges…

- System quickly demonstrates data quality issues
- End users are not aware of the scale the dataset was intended for unless metadata is consulted
- Spatial data accuracy varies within the agency (e.g. DGPS vs. GPS)
- Extremely important that raster images be georeferenced with the same coordinate system (VA State Plane NAD 27/83 or UTM)

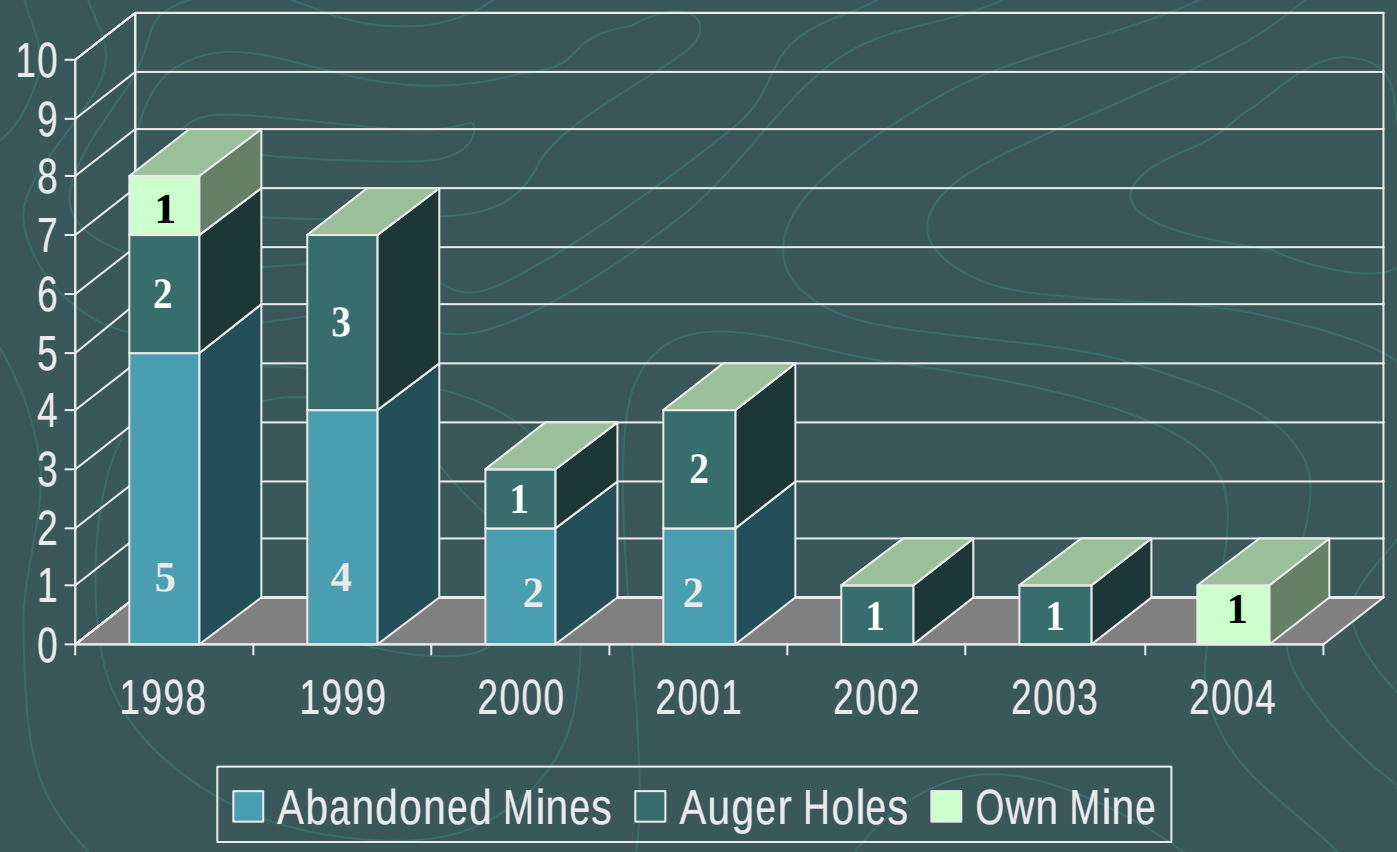
Future Plans

- Publish selected datasets for general public and/or industry via Internet
- Specialized applications which provide advanced analysis functions
- Resource Analysis tools for internal and general public use
- Find funding sources to continue to expand and improve the quality of data and application function

Why?

- Prevent accidental mine hole throughs
- Improve mine worker safety
- Research abandoned mine-related problems
- Provide tools for mine inspectors and engineers
- Provide tools for DMME staff georeferencing scanned mine maps

Accidental Mine Hole Throughs in Virginia



Note: Last cut-through into abandoned mine occurred January, 2001.

Questions?

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