

ArcIMS Illinois Coal Mine Permit HTML Viewer¹

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Abstract. For many years, the Illinois Office of Mines and Minerals (OMM), Land Reclamation Division has maintained GIS data for Illinois coal mine permits. With the availability of ArcIMS 4 and strides toward an enterprise GIS at Illinois Department of Natural Resources (IDNR), technology now exists to serve this information to a larger audience. A brief discussion of development issues such as data organization, enhancements to the interface, and uncertainties with the next release of the software will be followed by a live, real time internet demonstration of the Illinois Coal Mine Permit HTML Viewer. Data layers include regulatory information such as Bond Release Status and collateral information such as aerial photography.

Additional Key Words: GIS, bond release, enterprise GIS

¹Paper was presented at the 2004 Advanced Integration of Geospatial Technologies in Mining and Reclamation, December 7 – 9, 2004, Atlanta, GA.

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Introduction

Development of a State-wide GIS for the Illinois Department of Mines and Minerals was a necessary step for the program to consolidate the various pieces of existing GIS infrastructure. The GIS and IT activities were centralized in Springfield in 1995 and led to dedicated ArcSDE and ArcIMS servers. This presentation will review the development of the ArcIMS viewer currently used by OMM.

The current viewer is structured using data layers through an interface with the ArcIMS Illinois Coal Mine Permit HTML Viewer. Data layers include regulatory information such as Bond Release Status and collateral information such as aerial photography. The interface includes a few enhancements added to the out-of-the-box product.

Development & History

At the beginning of the permanent program, OSM invested sizable amounts of money for GIS in Illinois state agencies through the Lands Unsuitable for Mining Program. The idea was to have this GIS resource in place so that a Land Report could be generated quickly for any part of the state. After considerable expenditure on hardware, software, training, and data development, only two Land Reports were ever generated.

The focus of the state-wide GIS was then directed toward digitizing certain mine maps for all permits in the permanent program and storing them in the form of ESRI coverages. To assist in this task, an Arc Macro Language program called PINFO was developed. This program is still in use today. This program resulted in great consistency in data development, but with the down side of linking the data and GIS platform with an aging technology.

In 1995, the Illinois state government was reorganization. The former Illinois Department of Mines and Minerals became the Office of Mines and Minerals (OMM) under the Illinois Department of Natural Resources. Fortunately, the other state agencies providing GIS services to Mines and Minerals were also included in the new Department.

As a result of the reorganization, the Office of Mines and Minerals now independently maintains the GIS database for all mine permit information.

Over time, a sizable and diverse GIS data infrastructure developed in the state of Illinois with all IT activities centralized in Springfield, IL. By centralizing the IT activities and high speed networks, a state-wide Enterprise GIS was made possible. Dedicated ArcSDE and ArcIMS servers exist, but fiscal shortfalls in state government and the resultant staffing shortages leave great uncertainties in the future of the GIS enterprise development and provide no backup in the event of server failure.

Interface

OMM uses a generic ArcIMS HTML viewer. This means that Microsoft Internet Explorer can be used without additional plug-ins and allows the standard Graphical User Interface tools: Author, Designer, and Administrator, to be used to build the ArcIMS viewer. Other methods, products, and technologies may also be used to create somewhat similar viewers. The GIS data is served by ArcSDE on top of MS SQL Server 2000 to provide great efficiency in data transfer.

The visibility of map features and labels can be controlled by the absolute scale of the screen display; producing a less cluttered large scale map or detailed information at smaller scales. These tools create a configuration file (.AXL file) used to create a *service* running on the ArcIMS server. This *service* is started using the Administrator program. The IDNR ArcIMS server uses a MS Internet Information Server (IIS) as the web server with the ServletExec Connector from New Atlanta. The Designer program creates a suite of HTML and Java Script files that comprise the ArcIMS HTML Viewer. One thing that the Author program will not do is work with raster data such as aerial photography. A text editor must be used to add rasters to the .AXL configuration file.

The generic HTML interface displays scale dependent data layers in the Layer List, located on the right side of the viewer. The data layers may be toggled *on* or *off* by

checking the *Visible* Check Box. The “map” may be navigated with icons on the Tool Bar, located on the left, which also provides interactions with the data layers.

The HTML viewer at OMM has a few enhancements as well. The new viewer has:

- Help pages with instructions and other information;
- Splash screens unique to OMM;
- Select Permit Buttons
 - Lets you chose a permit number from a scrolling list with results identical to using the Query navigational Button by choosing a permit number.
- The Print Button has been modified so that you may print a larger hard copy map for a large format printer.

The HTML viewer includes hyperlink capabilities with basic viewer functionality, but the resulting web page is not compatible with ArcIMS technology. After engaging the hyperlink icon, clicking on a well symbol returns a new window with tabular data for that well.

Certain state wide data layers used in the interface, as well as many others layers not used in this viewer, were developed as a universal resource. The enterprise vector layers include: State and county boundaries, public land survey system with section line boundaries and NWI wetlands which were added at the request of staff. The enterprise raster layers include: Digital Orthophoto Quads (DOQ) which are aerial photography; Digital Raster Graphics (DRG) which are USGS quad map images; and digital plat maps (DPM) which are licensed, georeferenced, and tiled plat book images. Surface and underground mined areas are also maintained for OMM by the Coal Section of the Illinois State Geological Survey.

Future changes may include:

- Replacing the HTML viewer with an ActiveX viewer for greater control and efficiency;

- Data symbolization may be modified to incorporate better symbol definition

High contrast and/or delineation of symbol appearance is desirable, but is difficult when using the transparency features of the viewer. Transparency features also use greater computing resources.

OMM Regulatory

Some of the data layers in the interface were developed exclusively for use in the Title V regulatory program. Others may be added in the future.

GIS permit data was created and maintained as coverages. A coverage is the traditional data model developed for ESRI's software product ArcInfo (now called ArcGIS Workstation). Each individual permit is represented by a suite of coverages digitized from paper maps submitted with the permit application. Receiving maps electronically, such as AutoCAD drawing files, is not yet the common method of transmittal. With the nationwide move toward electronic permitting, it is hoped that electronic submissions will become standard.

For technical reasons, it is difficult to combine individual permit coverages into an encompassing state wide coverage, especially if any overlapping line work exists. For example, in Illinois re-permitted areas exist where permit boundaries intentionally overlap. The ArcMap 8.3 MERGE procedure was used to deal with this overlap issue when combining coverages. The MERGE procedure creates shapefiles from the coverages and combines them into one state wide layer. Because the shapefile does not use topology, any permit boundary overlap is viewed as one permit superimposed on another. It is sometimes awkward to comprehend symbolization for these overlapping layers. The MERGE procedure was used to combine all permanent program coverages into the layers used with the ArcIMS viewer. Permit document merging also creates a temporal problem due to constant permit modifications through time. The remedy is to periodically update the GIS data. No practical alternative currently exists to handle

cataloging hundreds of individual permits and keep abreast of every permit modification.

Note: ArcMAP 9 no longer has this MERGE procedure available! There is an alternative but this change is a great disruption.

The OMM Regulatory GIS layers includes: Permit boundaries; Annual Affected Acres; Post Mining Land Use; Soil Capability; Incremental Bonding; Phase 1 Bond Release; Phase 2 Bond Release; Phase 3 Bond Release; and Ground Water Monitoring Wells with the well's associated tabular data displayed with the hyperlink.

Much uncertainty exists for the immediate future regarding data development. Newer and hopefully better software and data formats are becoming available but transition will not be easy. However, there is now an ongoing effort to adjust the line work of existing permit data to better fit the orthophoto base.

Appendix A

This appendix contains images that approximate the real time demonstration. If a real time demonstration is not possible these images will comprise a *MS Power Point\Corel Presentations* alternative. The images in this appendix illustrate the data layers and interface used in the ArcIMS Illinois Coal Mine Permit HTML Viewer.