NCRDS FY11-12 PROGRESS REPORT

Kentucky Geological Survey

Agreement number: G10AC00465

Project Title: Kentucky Coal Data for the National Coal Resources Data System

Principal Investigator: Jerry Weisenfluh
                        Cortland Eble
                        jerryw@uky.edu   eble@uky.edu
                        859-323-0505     859-323-0540

Co-PI:               Co-PI:

Main objectives of project tasks:

The objectives of this study are to 1) expand the KGS catalog of drill hole data for both the eastern Kentucky (central Appalachian basin) and western Kentucky (Illinois basin) coal fields, 2) compile coal quality information from both in-house sample analyses and from records of industry drill hole data for inclusion in the KGS central database, and 3) digitize Kentucky mine permit boundaries for use in assessing surface mined lands and associated resources.

BASE AGREEMENT

Coal Thickness Database

A file of western Kentucky field notes pertaining to coal resource work were located in the KGS office. Most of the notes contain measured sections and diagrams of the localities. The locations given on the documents are in Carter Coordinates and have been converted to Latitude/Longitude and entered into the KGS database.

Coal Borehole Database

The KGS borehole database now contains a total of 17,890 records. Eastern Kentucky has 11,476 holes with 5,830 being publically available. Western Kentucky has 6,414 holes with 4,330 being publically available. 464 new boreholes were added to the Kentucky database this project year.

Stearns Coal Assessment (Task 1)

The Stearns coal zone includes some of the stratigraphically lowest coals in the eastern Kentucky coal field. These resources lie primarily in McCreary County, Kentucky. All drill holes in four 7.5-minute quadrangles were examined in order to correlate beds within the coal zone. Correlations have been assigned to the logs.

Lower Pennsylvanian Coal Correlations

New borehole data acquired from an operating company in southeastern Kentucky has facilitated a re-evaluation of the lowest mineable coals in that region. Those coal beds include Clintwood, Glamorgan, Hagy, Splash Dam, and Elswick. Several hundred well logs were reviewed and bed correlations were determined and entered into the KGS database.

Upper Elkhorn No.2 Assessment

Bed correlations were completed and a new coal thickness map has been prepared for this important eastern Kentucky coal bed. The isopach map has been digitized and mined out areas have been compiled to produce an up-to-date resource assessment.

Update of Mined Out Areas for Selected Coal Beds
2012 mine data were obtained, reviewed and compiled to reassess remaining resources for the Fire Clay, Fire Clay rider, Upper Elkhorn No.3, and Lower Elkhorn coal beds.

**Eastern Kentucky Mine Blowout Study**

A new project was initiated to evaluate the potential for underground mines in eastern Kentucky to catastrophically release mine pool waters. The project entails differentiating digitized surface and underground mines and assessing the dip direction of the mines with respect to portal locations.

**Kentucky Mine Permits (Task 3)**

The Kentucky Division of Mine Reclamation and Enforcement began posting surface mine permit areas to 1:24,000-scale mylar base maps in 1977 and continued the practice until the 1990’s. At that time the original maps were scanned and georeferenced for public access. KGS initiated a program to convert the images to vector format with attribution that included permit numbers that relate to the state regulatory program. The digitization of all permit boundaries was completed in 2011, and project was turned over to the Kentucky Division of Mine Permits for incorporation into their workflow. DMRE will continue to add new permit boundaries to the database going forward. The geodatabase was published to the KyGeonet, a GIS data repository for the state of Kentucky and can be accessed at the following Web address:

http://kygisserver.ky.gov/geoportal/catalog/search/viewMetadataDetails.page?uuid=%7B33502CD4-B28A-4BCD-9554-B8049BDF6503%7D

**Future Goals**

1. Complete the publication of the Upper Elkhorn No.2 bed
2. Collect and analyze coal samples for metallurgical properties
3. Update the KGS coal quality database with new sample data
4. Create an internet map service with coal resource information

**ADD-ON PROJECTS**

**Petrographic and Geochemical Examination of Pennsylvanian Marine Shale Beds as a Potential Petroleum (Gas, Oil) Resource in the Appalachian and Illinois Basins**

A new project was initiated at the end of fiscal 2010-2011. The project involves the characterization of organic matter in Pennsylvanian shale beds of marine origin (at least in part), which occur throughout Pennsylvanian age strata in both the Appalachian and Illinois basins. Some of these beds are thick (> 5 m), laterally extensive, and occur below regional stream drainage level across much of their geographical extent. These beds, though recognized and used extensively as marker beds for correlation, are poorly-understood as a potential petroleum (gas and oil) resource. This study proposes to examine and document the organic composition, both petrographically and geochemically, of these beds in an effort to better evaluate their potential as a petroleum resource.

The project will be carried out by Cortland Eble and Steve Greb. The award amount is $26,730.

**Summary of Activities**

47 roof shale samples, 20 from western Kentucky, 17 from eastern Kentucky, and 10 from SW Virginia, were collected during the past year from (mainly) drill core and outcrop exposures. Sample preparation involved crushing the samples to -18 mesh (particle top size, 1 mm), and
then splitting the samples. One split was used to construct petrographic pellets for maceral analysis in reflected light (white and UV). A second split was further reduced to -60 mesh for geochemical (TOC and Rock Eval) and palynologic analyses. Remaining sample material was retained for future work.

Petrographic and geochemical analyses for some of the western Kentucky samples resulted in a presentation at the 2011 Pittsburgh, and a manuscript that has been approved for publication in *The International Journal of Coal Geology*.

A final report of the entire project findings is being prepared.