Carbon Sequestration Surface Mine Lands

Quarterly Report

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DISCLAIMER

ABSTRACT

Over 160 acres (64.8 ha) of tree seedlings have been planted in eastern and western Kentucky that depict a mixed stand similar to the native vegetation of the area. All these sites have been assessed and various instrumentation is or is planned for installation to monitor environmental conditions and changes on the areas. The environmental conditions include temperature, aspect, slope, rainfall, and other treatment or condition factors.

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EXECUTIVE SUMMARY

The information found in Figure 1, milestones, (see appendix) depict the accomplishments of this reporting period. As we inspect the activities below DOE-1 project year (year 1, project quarter 2 and the months of January, February and March), this indicated quarter is the project initiation period. The first three months were planning with no real activity since the University of Kentucky never authorized a budget to begin any expenditures. A portion of the research team did travel to Morgantown to present the research plan during the month of December 2002.

The first year's tree seedlings were established as mixed species area plantings because time did not exist to initiate the more elaborate single species plot research that is planned for assessing individual species response to carbon sequestration. Future years will have trees planted as single area plots with mulch treatments, mycorrhizal treatments, both treatments or no treatments and compared with areas where no trees are established.

Monitoring systems have been initiated and planting boundaries are established and located on maps. Corners have been permanently located using GPS procedures. Acreages of each installation have been determined. Future planting areas are in the process of identification and baseline data gathering has been initiated.

EXPERIMENTAL

The experimental methods used to assess this research will involve a multitude of sampling systems and equipment. These will include but are not limited to field sampling, monitoring devices, tree extraction, soil, water, and tissue analysis, as well as habitat analysis for various wildlife species.

RESULTS AND DISCUSSION

When a budget of this project was finally approved by the University of Kentucky in December, the initiation of several objectives were indicated, key project staffing was initiated and others identified as future needs. Drafts of memorandums of understanding and entry consent agreements were begun as potential property owner participants were identified. If necessary, owners were requested to amend permits and initiate site preparations in advance of tree planting. Technicians on the ground began to collect baseline data and others initiated the process of analyzing the economic impact of future carbon sequestration that is expected to occur.

A diverse mixture of tree seedlings were ordered to emulate climax forest mixtures as near as possible given the species constraints of the native forests in eastern and western Kentucky. It was decided that the initial plantings would be area plantings of the mixtures since little of no time existed for the establishment of plot installations that are planned for the future. The species and numbers planted on the eastern Kentucky site at 17 West is shown in Table 1 and similar data for western Kentucky is shown on Table 2.

Table 1.
17 West DOE Plantings – Year 2003
Eastern Kentucky
72,760 seedlings
107 acres (43.3 ha.)

Species	Total	Per Acre
White Oak	14,959	139.8
Northern Red Oak	14,959	139.8
White Ash	14,959	139.8
Yellow Poplar	9,248	86.4
Sugar Maple	3,158	29.5
Black Locust	7,422	69.4
White Pine	4,133	38.6
Gray Dogwood	1,950	18.2
Redbud	1,950	18.2

Table 2.
Peabody DOE Plantings – Year 2003
Western Kentucky
38,760 seedlings
57 acres (21.5 ha.)

Species	Total	Per Acre
Cypress	3,341	58.6
Loblolly Pine	1670	29.2
Persimmon	1,000	17.5
Grey Dogwood	1,000	17.5
Cherry Bark Oak	5012	87.9
Shumard Oak	3,341	58.6
Southern Red Oak	3,341	58.6
White Oak	5,012	87.9
Northern Red Oak	5,012	87.9
Green Ash	5,012	87.9
White Ash	4,050	71.1
Black Locust	1,000	17.5

Maps of all the areas planted have been developed and furnished to the Department of Energy project director. These maps will be amended on a continuous basis as additional plantings are completed.

As the planting areas were completed all those sites were reviewed and potential locations were selected for installation of monitoring equipment. As assessment of down-gradient sediment controls was conducted to ensure protection of the environment. Project personnel also compared the suitability of various particle size analyzers from three manufacturers. One of these was selected and procurement was initiated.

A standardized protocol for training personnel in field data acquisition was developed as well as one for the inspection and monitoring of field data acquisition equipment. Several protocols were also developed for sediment analysis.

Field personnel have constructed six critical flow trapezoidal flumes and six stilling wells. They have also prepared ISCO samplers and calibrated pressure transducers for field deployment. They are in the process of reviewing pressure transducer data. Automated weather stations have been ordered for the far eastern and western Kentucky research sites.

Efforts are currently underway to prepare for the 2004 planting season.

Mycorrhizal inoculation of seedling beds was initiated to generate infected seedlings that will be utilized in experimental plots to examine the effects of fungal symbiosis and amendments on seedling growth and below ground carbon accumulation. Efforts to identify and characterize sites for these experiments were also initiated.

CONCLUSION

There are no conclusions available at this time since it requires years of time to conclude results from a forest establishment. I can conclude that this project has the potential to establish values for areas that have not been fully assessed before because the evaluation of carbon sequestration potential has not been determinable since 1978. Values could be apprised on areas mined before SMCRA, but no baseline data exists for them.

APPENDIX

Table 1: Milestones