

**REFORESTATION EFFORTS
IN OSM'S
MID-CONTINENT REGION**

May 22, 2006

I. INTRODUCTION

On February 3, 2006, the MCR Regional Director (RD) met with Andy Gilmore, Chief of the Alton Field Division (AFD), Perry Pursell, and Stephen Preston. During the meeting, the RD requested that reports be forwarded to him concerning historical and recent accomplishments in the areas of reforestation and establishment of fish and wildlife habitat on reclaimed land in the MCR. Andy Gilmore was assigned the task of coordinating information gathering among the field offices in the MCR, while Perry Pursell and Stephen Preston were charged with writing the Reforestation and Fish and Wildlife reports, respectively. The RD's specific instructions were that the reports were not to include a complete listing of all accomplishments, but were to include major accomplishments while minimizing the impact from information gathering on OSM and state Regulatory Authority staffs. In the case of the reforestation report, the RD requested the report also include a historical perspective on reforestation efforts within the Mid-Continent Region. The purpose of this report, therefore, is to provide the Regional Director with an update on any major reforestation accomplishments within the Region and a general discussion on historical and current reforestation efforts, both on Title IV AML project sites and Title V mine sites in all 11 states in the Mid-Continent Region.

II. METHODOLOGY

Andy Gilmore, contacted Field Office Directors (FODs) Art Abbs and Mike Wolfrom via e-mail on February 9, 2006, advising them of the reforestation work assignment and scope of the report. He also requested each FOD to establish a field office point of contact for each state's Title IV and Title V Programs. The points of contact for each program were established as follows:

	<u>Title IV Program</u>	<u>Title V Program</u>
Alabama	Jean O'Dell	Jean O'Dell
Arkansas	LaChelle Harris	Dan Trout
Illinois	Joy Schieferstein	Joy Schieferstein
Indiana	Russ Miller	Russ Miller
Iowa	John Coleman	John Coleman
Kansas	Dan Trout	Dwight Thomas
Louisiana	Jean O'Dell	Jean O'Dell
Mississippi	Jean O'Dell	Jean O'Dell
Missouri	Stephen Preston	Stephen Preston
Oklahoma	LaChelle Harris	Jeff Zingo
Texas	Dan Trout	Dwight Thomas

All those listed above were contacted by Perry Pursell and advised of the type and extent of information requested. Everyone was instructed to provide any readily available information to include data already compiled by OSM, the States, and mine operators, and any other

information that might be relevant: additional extensive data searches were not expected or desired. Photographs were also requested if they were already available or could be obtained in conjunction with field trips for regularly scheduled oversight purposes. Information was to be forwarded to the MCR no later than March 31, 2006. Due to the amount and diversity of the information submitted by the various MCR Offices, this material will not be included in this report as appendixes, but will be presented to the Regional Director separately for his use.

III. POST SMCRA REFORESTATION EFFORTS

BIRMINGHAM FIELD OFFICE

ALABAMA

Title IV

The Alabama Abandoned Mine Lands Program, administered by the Alabama Department of Industrial Relations (ADIR), is a national leader in the reforestation of abandoned mine lands. From 1976 through 2004, ADIR, first under grants from the



Tennessee Valley Authority's Orphan Mine Land Reclamation Program (1976 through 1980) and then as an OSM grantee under the AML Program, supervised the planting of 5.2 million pine seedlings, 1.9 million wildlife shrubs, and 173,000 hardwoods on abandoned coal mine sites throughout northern Alabama. During the 2004-5 planting season, an additional 37,000 pine seedlings, 2,400 cherrybark oaks, and 2,200 sawtooth oaks were planted on nine abandoned coal mine

sites. Birmingham Field Office oversight studies in EY 1999 and EY 2000 documented the success of Alabama's AML Program in reforesting AML sites. (October 2005 photo shows success of planted pines on the Natural Bridge North AML project that was reclaimed in October 1995.)

Title V

Statistics from the Alabama Surface Mining Commission's database from the previous five calendar years (2000 – 2005) show that 57 permits were issued. Of these, five involved the forest land post-mining land use for a total of 1,394 acres (6.7 percent of total permitted acreage). Fifty-seven of the permits indicated that either all or part of the permit would have a post-mining land use of undeveloped. Many sites with an undeveloped post-mining land use are being reforested; however, no data on the acreage planted in trees is available.

In 2000, Drummond Company, Arkadelphia mine, received one of OSM's "Excellence in Surface Coal Mining Reclamation" awards. This award was given for the innovative and extensive reforestation of a large mining operation near Arkadelphia, Alabama.

LOUISIANA

Title IV

Louisiana has an approved Title IV program, but has not completed any reclamation projects.

Title V

The dominant post-mining land use on Louisiana surface coal mines is forest land. Through 2005, out of 2,756 bonded acres on the Oxbow Mine, Red River Mining Company, 337 acres have been planted in trees. Loblolly pines have been planted on the mine site as part of the post-mining land use since 1991. Although most of the acreage has been planted in pines, a few mixed hardwood areas have been planted for wildlife enhancement. The Red River Mining Company, Oxbow Mine, received one of OSM's "25th Anniversary Excellence in Surface Coal Mining Reclamation" awards for reclamation, because of its use of commercial forestry techniques in the reclamation of the mine.

For the Dolet Hills Mine, through 2005, 16,115 acres have been bonded. Of these, 5,627 acres have been planted in trees, predominately in pines. Some of these stands of pines are 10-15 years in age.

MISSISSIPPI

Title IV

Mississippi does not have an approved Title IV program.

Title V

The pre- and post-mining land uses for the Mississippi Lignite Mining Company (MLMC) Red Hills Mine the only coal mine in the state, are predominately forest lands. Forestland has been designated as the post-mining land use on 5,589 of the 5,809 permitted acres. Currently, pine seedlings have been planted on 247 acres at a stocking rate of 802 seedlings per acre (198,000 pine seedlings). Natural succession under the growing pine trees is replacing understory Bermuda grass with native vegetation. In addition, MLMC plants mixed hardwood seedlings along drainage



bottom corridors and on ridgetops. (January 2006 photo shows planted pines on the OPQ Area of MS-002; pines were planted in 2002.)

INDIANAPOLIS AREA OFFICE

ILLINOIS

Title IV

Twenty sites covering a total of 178 acres have been specifically reclaimed to forest. There have been two significant reforestation sites. Approximately 50 acres were planted with trees at the Osage Coal reclamation project in 1985. At the on-going Sahara #6 project, 20 acres have thus far been planted with trees.

Title V

Due to the greater than average depth and fertility of topsoil in Illinois, the state has emphasized reclamation to cropland. Reforestation, however, has accounted for a significant portion of the reclamation process. According to the Illinois Office of Mines



and Minerals, Phase III bond has been released on 1,100 acres of forest post-mining land use and 2,700 acres of woody wildlife habitat. The number of acres of reforested reclaimed land that is still going through the bond release process was not available, but it is believed to be substantial. (Photo shows successful tree planting at Consolidation Coal, Co., Burning Star #5 mine in southern Illinois)

INDIANA

Title IV

Information provided by the Indiana Department of Natural Resources shows that from 1999 through 2005, 981,400 trees were planted on a total of 1,248 acres at 55 different AML and bond forfeiture reclamation sites. Planned plantings for 2006 include 113,200 trees on 150 acres at 11 AML sites. In evaluation year (EY) 2002, the Indianapolis Office conducted an evaluation of AML tree planting success. The review found that Indiana's AML tree planting efforts were



generally successful. (June 2002 photo shows trees in middle of photo planted at the Burris - Hanson AML site.)

Title V

The Indiana Title V Program began a database for final bond release acreage in 1996. Information in the database documents that 7,756 acres of trees have achieved final bond release since 1996. Although the Regulatory Program does not track what happens to the land after bond release, the belief is, based on general knowledge, that the vast majority of reclaimed reforested acres remain forested. One note of interest is that Peabody Energy has planted American chestnut trees at several of its Black Beauty Coal Company mine sites. The tree stock used was hybrid American chestnut/Chinese chestnut “backcrossed” several times to American chestnut to increase the percentage of American chestnut while maintaining the blight resistance of the Chinese chestnut. A paper concerning hybridized “backcross” American chestnut entitled, “American Chestnut as a Future Resource to Enhance Mine Reclamation Productivity”, was presented by Douglass F. Jacobs at the 2005 National Meeting of the American Society of Mining and Reclamation in July 2005. The Indianapolis Area Office sent a copy of the paper to the MCR, and it will be available for the Regional Director’s use. The Indianapolis Area Office also provided the MCR with another paper that exemplifies the interest in reforestation in the Mid-Continent Region. This paper, entitled, “Status of Reforested Mine Sites in Southwestern Indiana Reclaimed Under the Indiana Mining Regulatory Program”, is a product of research jointly conducted by Purdue University and Southern Illinois University (Carbondale). A copy of the paper will be forwarded to the Regional Director. (Photo shows trees planted at Peabody Turpin Hill Mine.)



The Indiana Department of Natural Resources Divisions of Reclamation and Forestry have joined together to help promote reforestation on mined land through a program called “Reclamation Re-leaf”. Landowners are given assistance in planting trees on land that was mined and reclaimed after 1977 and where all bond has been released. For the period 2002-2005, this program has accounted for the planting of 295,100 trees on 411 acres. The

Regional Director can read more about this program in the State’s brochure that was sent to the MCR by the Indianapolis Area Office.

IOWA

Title IV

Information provided by the Iowa Division of Soil Conservation shows that the Iowa Title IV program has reclaimed 1,388 acres. Of these, 44 acres have been planted with trees, the goal being establishment of commercial forest land. Additionally, 1,083 acres

have been reclaimed to provide wildlife habitat. Trees and shrubs were also planted on a number of these acres.

Title V

There are no active Title V mine sites in Iowa. A number of bond forfeiture sites still exist in the state. Title V efforts are currently associated with elimination of rills and gullies and establishment of proper drainage control. Most of these sites were originally reclaimed to cropland by the operators and they are currently being cropped by the landowners.

MISSOURI

Title IV

The Missouri Land Reclamation Program reported that reforestation plays a major role in reclamation at its Title IV reclamation projects. Although data concerning tree planting is not regularly put into a database, some information was available in the Program's 1991 Annual Report. This report noted that for the period 1984 through 1991, a total of 532,089 tree seedlings were planted on 403 acres at project sites located in six Missouri counties. A major problem has been landowner use of project sites for pasture after trees have been planted. The State now plants trees on project sites where the landowners want them, and also where riparian corridors cross project areas. Documentation of Missouri's commitment to reforestation can be found in the Missouri Land Reclamation Program's publication entitled, "Upper Cedar Creek Clean Streams/319 Project." The publication states that over 200,000 trees have been planted at this Title IV project site.

Title V

Reforestation efforts by Peabody Coal Company and Associated Electric Cooperative, Inc., at Title V mines in Missouri have been extensive. Peabody reclaimed a significant amount of acreage to



forest and woody wildlife habitat, but specific acreage figures are not readily available because all Phase III bond on Peabody's mines in Missouri has been released and the company is no longer active in the state. Although

Associated Electric is no longer producing coal, the company reported that approximately 1,700,000 trees were planted on about 1,900 acres at its three mine sites. Two relatively small operators are currently producing coal at two mines in southwestern Missouri. Cattle production is very important in this area, so most reclamation will be directed to returning the land to pasture or hay production. Trees were recently planted along a restored stream channel at another recently reclaimed mine in southwestern Missouri. (Photos show trees planted at Associated Electric Cooperative, Inc., Prairies Hill mine.)

TULSA FIELD OFFICE

ARKANSAS

Title IV

Landowners in Arkansas are most interested in having abandoned mine sites reclaimed to pasture. The Arkansas Title IV Program, however, promotes tree planting on reclaimed sites wherever practical. Even on sites reclaimed to pasture, trees are planted along waterways within the project areas. The State estimates approximately 120 acres of forestry wildlife habitat and 25 acres of riparian restoration with trees and shrubs has occurred on Title IV projects in Arkansas. A 40 acre site that is to be reclaimed next winter will be planted to trees. (Photo shows a Title IV mine site in Arkansas planted to pine trees.)



Title V

Mine operators in Arkansas reclaim Title V sites in accordance with landowner's wishes. Most often, the landowners want land returned to pasture after mining is completed. Some Title V sites have been planted to pine trees, and State Title V personnel encourage forest establishment, especially on areas with rocky soil. The State Regulatory Authority has noted that pines often invade reclaimed land with pasture post-mining land use.

KANSAS

Title IV

Kansas does not keep historical information on reforestation at AML project sites, but the Kansas Department of Health and Environment Surface Mining Section was able to report that 10,045 trees have been planted on 23+ acres at AML sites since 2001. (Photos are of tree planting at the Overman, left, and Foxtown South, right, AML project sites.)



Title V

Due to the flat nature of the terrain where mining is conducted in Kansas, the typical pre-mining land use is agriculture. The post-mining use of trees in Kansas is intended to replace/enhance wildlife habitat values, while allowing for the landowners to pursue their usual desire for agricultural activities following reclamation. The Regulatory Authority in Kansas has noted that trees planted on Title V reclaimed land are usually destroyed shortly after bond release when landowners return the land to its historical pasture or grazing land use.

OKLAHOMA

Title IV

Oklahoma's Title IV Program actively encourages reforestation of reclaimed project sites, but reforestation efforts have been hampered because sites are reclaimed according to landowners' wishes. Most landowners want to graze cattle. In the last five years, 6,650 trees have been planted on a total of about nine acres at two project sites.

Title V

According to the Tulsa Field Office, coal companies most often lease the land in Oklahoma and it returns to the landowner after reclamation is completed. Reclaimed mined land in the state provides excellent pasture and landowners usually do not want trees planted on the reclaimed ground. In several instances, trees have been established on relatively small portions of a permit (about 10 percent of the acreage), only to be destroyed by cattle after bond release. Two attempts at tree establishment for future commercial harvesting failed. There have, however, been several successful reforestation attempts. Approximately 675 acres of a 700 acre permit was planted completely to pines in the 1980s and a pine forest has become established. A mix of deciduous and coniferous species was established on 10 of 37 acres of another permit, and another pine forest of about 40 acres has been successful on a 52 acre permit.

TEXAS

Title IV

Nearly all of the Title IV project sites in Texas have been located in the western part of the state. This is an arid region where reforestation is not a practical option. Reclaimed sites usually revert to native brush species within a few years after reclamation is completed.

Title V

Figures from a Railroad Commission of Texas Summary Report on acres released from Phase III bond through February 1, 2006, show that of 23,115 acres released from bond, 980 acres (4.24 percent) had a post-mining land use of forestry. In addition, 2,600 acres



(11.25 percent) had a fish and wildlife post-mining land use. Usually, a portion of fish and wildlife habitat will have been planted to woody species. The Tulsa Field Office said that these figures are misleading because they reflect past reclamation, while current reclamation efforts are much more directed toward a forest post-mining land use. An example of this is a TXU permit issued for

30,529 acres, with 10,117 acres having an approved post-mining land use of forestry. Only 2,323 acres of the permit had a pre-mining forestry land use. (First two Photos show successful tree plantings at TXU Martin Lake Mine and last photo shows successful tree plantings on both sides of the road at, TXT Monticello Mine.)

SUMMARY REPORT ON STATE REFORESTATION AND TREE PLANTING STATISTICS

In 1999 and 2002, OSM co-sponsored interactive forums entitled, “Enhancement of Reforestation at Surface Coal Mines”, and Market Based Approaches to Mined Land Reclamation”, respectively. At the first forum, Greg Conrad, Executive Director of the Interstate Mining Compact Commission (IMCC), gave a presentation entitled, “Summary Report on State Reforestation and Tree Planting Statistics.” The basis of the presentation was information gathered through a survey seeking information and statistics on state reforestation and tree planting efforts that was distributed by the

IMCC. Following are some interesting findings from the presentation concerning the mid-continent states:

- Reforestation reclamation typically costs more than other reclamation. Mid-continent states universally agree the best enhancement for increased tree planting at AML projects was more AML money allocated to the states from the AML Trust Fund.
- Landowners often prefer land uses that will provide a faster money return than that offered by timbered land.
- When asked to rank the reforestation initiatives the states would support, the highest ranked initiative was, “Policy/guidance changes or enhancements”, closely followed by, “Technology exchange.”
- Seven mid-continent states provided answers to a request to provide statistics, estimates, etc., regarding the number of trees planted over the past several years at Title IV and Title V sites. The reported total number of trees planted for the seven states was over 27,000,000; however, the way the states responded varied so much (i.e. different time periods, partial responses, etc.) that it is not possible to make an accurate estimate of the reforested acreage in the Mid-Continent Region.
- The Pre/Post Mining Land Uses – Mid-Continent Region table indicates the acreage reclaimed to forest and wildlife habitat is greater than existed prior to mining.

PRE-LAW REFORESTATION EFFORTS

Reforestation efforts on mined land in the Mid-Continent Region began long before passage of the Surface Mining Control and Reclamation Act. Among the numerous pieces of information provided by the Field Offices are several references to pre-law tree planting by government agencies and other entities, including mine operators. The U.S. Forest Service was responsible for plantings at numerous previously mined sites in the Mid-Continent Region, and the Tennessee Valley Authority was involved with reforestation in Alabama. The author is personally aware of three sites in southern Illinois where trees were planted on bare spoil banks, with some of the planting dating back to the 1930s.

The extent of pre-law reforestation is illustrated by figures in a “Nomination for Excellence in Mining and Reclamation Award” package recently submitted to OSM by Peabody Coal Company for its Lynnville Mine in southern Indiana. The nomination states that 6,847 acres of forest and 2,986 acres of wildlife habitat were planted with 6,730,789 trees during the life of the mine from 1958-2005. In addition, it states that, historically, 9,301 acres were planted with 7,225,250 trees at three pre-law mines where mining operations spanned the years 1942-1964. Collectively, 19,134 acres were planted

with 13,956,039 trees at just four mine sites in Indiana. Similar reforestation efforts were exerted by Peabody Coal Company in several states in the Mid-Continent Region where the company conducted extensive operations; specifically, Illinois, Indiana, and Missouri.

IV. REFORESTATION RESEARCH IN THE MID-CONTINENT REGION

Reforestation research on post-SMCRA sites began soon after passage of the act in 1977. Dr. W. C. “Clark” Ashby, forest ecologist and now Professor Emeritus, Southern Illinois University – Carbondale (SIUC), began experimental tree plantings at Sahara Coal Company, Inc., Mine No. 6 in 1978. Trees were planted on pre-law mined land, post-law mined land both with and without subsoil and topsoil replacement, and unmined reference areas. These tree plantings continued through 1982, after which tree survival and growth data were collected. This research was actually a continuation of Dr. Ashby’s previous work (early 1960s through the mid-1970s) with tree growth on un-reclaimed pre-law mined land in which he documented excellent growth rates on ungraded spoil material. His more recent findings indicate tree growth is slower on post-law graded and topsoiled reclaimed land due to soil compaction caused during the reclamation process. Dr. Ashby, although retired from SIUC, remains active in reforestation research. He continues to make presentations at forums and symposiums, and has plans to collect more data on the 1978-1982 tree plantings.

Research on and interest in reforestation of reclaimed mine land is by no means limited to Dr. Ashby’s work. As previously mentioned in this report, OSM has co-sponsored interactive forums entitled, “Enhancement of Reforestation at Surface Coal Mines”, and Market Based Approaches to Mined Land Reclamation.” During these two forums, 13 presentations were made concerning reforestation in seven of the eleven states in the Mid-Continent Region. The presenters represented a wide range of disciplines including researchers, regulators, coal mine operators, and consultants.

V. CONCLUSIONS AND RECOMMENDATIONS

Personnel associated with the Title IV and Title V Programs of all the mid-continent states are interested in reforestation, and all of the states encourage reforestation efforts. In general, trees are being planted where practical on both Title IV and Title V sites throughout the Region. Available data indicate that in most, if not all, Mid-Continent states, more forest and wildlife habitat acreage exists post-mining than existed pre-mining.

Environmental factors, such as the arid conditions in west Texas, and landowners wishes for grazing land in plains states such as Kansas and Oklahoma, sometime hamper tree establishment. Tree planting typically adds to the cost of reclamation, and this has a dampening effect on reforestation reclamation.

Based on the partial and inconsistent forms of information available for this report, an accurate estimate of the acres in the Mid-Continent Region that have been successfully reforested under SMCRA is not possible. A very conservative estimate of reforested acres at completed Title IV sites and Phase III bond released acres at Title V sites is 35,000 acres, but the actual acreage may be double that amount.

The Program Support Division (PSD) in the Mid-Continent Regional office in Alton, Illinois should continue to encourage reforestation efforts in the Region by providing technical support and information to the states when requested. OSM should consider funding worthy reforestation research studies in the Mid-Continent Region.

VI. FIELD OFFICE SOURCE MATERIAL

Support Material Received from the Birmingham Field Office

Alabama – Title IV

“Alabama’s Reforestation of Abandoned Mine Lands”, Alabama’s Treasured Forests, Spring 2005

EY99 and EY00 OSM oversight studies, entitled “Success in Revegetation and Tree Planting – Phase I” and “Success in Revegetation and Tree Planting Study – Phase II”

Annual Reports from the Walker County Soil and Water Conservation District Board Concerning Tree Planting

“Reforestation of Alabama’s Abandoned Mine Lands” by Dr. E. S. Lyle, Sr., and J. L. Kitson

Photograph

Alabama – Title V

OSM Excellence in Surface Coal Mining Reclamation Awards

Louisiana – Title V

OSM Excellence in Surface Coal Mining Reclamation Awards

Mississippi – Title V

Photograph

Support Material Received from the Indianapolis Area Office

Illinois – Title IV

Information supplied by the Illinois Title IV Program

Illinois – Title V

Information supplied by the Illinois Title V Program

Photograph

Indiana – Title IV

Information provided by Indiana’s Title IV Program

Peabody Energy Lynnville Mine – Permit #S-00330, Nomination Package for Excellence in Mining and Reclamation Award

EY 2002 OSM oversight study entitled, “Indiana AML Tree planting Success”

Photographs

Indiana – Title V

Information provided by Indiana’s Title V Program

“American Chestnut as a Future Resource to Enhance Mine Reclamation Productivity”
by Douglas F. Jacobs

Peabody Energy Lynnville Mine – Permit #S-00330, Nomination Package for Excellence in Mining and Reclamation Award

“Reclamation Re-leaf” brochure published by the Indiana Department of Natural Resources – Divisions of Reclamation and Forestry

“Status of Reforested Mine Sites in Southwestern Indiana Reclaimed under the Indiana Mining Regulatory Program”, by Ron Rathfon, Stephen Fillmore, and John Groninger

Photographs

Iowa Title IV

Information provided by Iowa’s Title V Program

Missouri Title IV

Information provided by Missouri's Title IV Program

Missouri Land Reclamation Program's 1991 Annual Report

Document entitled, "Upper Cedar Creek Clean Streams/319 Project" published by the Missouri Department of Natural Resources - Land Reclamation Program

Missouri Title V

Photographs provided by the Missouri Land Reclamation Program

Reforestation information provided by Associated Electric Cooperative, Inc

Support Material Received from the Tulsa Field Office

Arkansas Title IV

Information provided by Arkansas' Title IV Program

Photographs

Arkansas Title V

Information provided by Arkansas' Title V program

Kansas Title IV

Information provided by Kansas' Title IV Program

Photographs

Kansas Title V

Information provided by Kansas' Title V Program

Oklahoma Title IV

Information provided by Oklahoma's Title IV Program

Oklahoma Title V

Information collected in the Tulsa Field Office

Texas Title V

EY 2005 OSM oversight study entitled, "Texas Post-mining Land Use"

Railroad Commission of Texas Summary Report of Coal Mining Phase III Bond Release Actions through February 1, 2006

Photographs