

OSM'S REFORESTATION INITIATIVE¹

by

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Abstract. Implementation of the Surface Mining Control and Reclamation Act (SMCRA) has discouraged reforestation in some situations where reforestation would be desirable. OSM is engaged in an initiative to increase the amount of mined land reclaimed to forest where appropriate. We are seeking to determine those elements of the Federal/State regulatory programs that discourage reforestation and find ways to offset these impacts. Potential factors militating against reforestation are identified and possible solutions are discussed.

Additional Key Words: reforestation, mined land

Introduction

Those of us who work with revegetation issues in OSM have for a long time felt that a lot of land in the East that should be returned to forest was inappropriately being reclaimed to other land uses, primarily pasture. OSM currently is engaged in an initiative to encourage reclamation to forest where appropriate. In this paper I trace the history of that initiative and the evolution of our thinking on the subject.

Reforestation Initiative

The impetus for OSM's reforestation initiative resides with OSM's Director, Kathy Karpan. On May 13, 1998, OSM headquarters held a planning session entitled Reforestation of Mined Lands and Carbon Emission Offsets. As the title indicates, the focus was the potential role of reforested mined lands in offsetting carbon emissions. From my perspective it was great to have a highly visible subject to which we could tie the need for reforestation. Unfortunately, carbon sequestration is a highly political subject at present and does not provide a reliable basis for justifying our reforestation effort. However, it is only one of several good reasons for wanting to increase the reforestation of mined land including protecting the forest products industry resource base as well as obtaining the wildlife, water quality and general ecological benefits that are associated with forest lands.

The "revegetation committee" met the day following the planning session and began planning for the Reforestation at Surface Coal Mines: Policy Outreach Symposium, which was held in Washington, D.C. on January 14, 1999. The revegetation committee is a group of six individuals within OSM who have met over a number of years to address issues associated with revegetation. In the meeting we considered the question of what the Agency needed to do to encourage reforestation of lands mined and reclaimed under Title V of the Surface Mining Control and Reclamation Act (SMCRA). It was our view that the low utilization of the forestry land use option following mining was primarily due to the way the Act was being implemented rather than do to technical constraints. The fix, we felt, would in all likelihood require changes to policy, and perhaps regulations, of both OSM and the States. We also felt that industry mind set and culture, right down to the level of the dozer operator, was part of the problem. Given the prevalence of long standing practices and a "culture" of reclamation, some of it going back to before SMCRA, we felt that education would in all likelihood be part of the solution to the problem. We also recognized a tension between the protection of water quality in the short run and the establishment of trees on mined land.

Another factor that we thought might play a role is the fact that some state regulations are "stricter" than Federal regulations in that they still reflect the interim regulations requiring the elimination of gullies that are greater than 9 inches deep. Alternately, these regulations

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might be considered to be not as effective as the Federal regulations in that they discourage forestry as a land use and encourage the production of an over compacted landscape stabilized with sod forming grasses and with reduced biological productivity compared to levels that potentially could be achieved. A search of COALEX indicated the following states have the gully rule in their regulations: PA, AL, KY, MS, IL, LA, TX, CO, MT, ND; MD and MO have the rule with modifications attached. (Since conducting this search, Pennsylvania has eliminated the rule.)

We also recognized that certain practical impediments to reforestation exist owing to lack of, or ready availability of, appropriate planting materials and inherent risks from drought, animals (deer, voles) and competition from grasses required for erosion control.

The problem we faced, then, was to determine how to obtain creditable information that would confirm or refute our initial view and that would reflect on the factors affecting land use choice in the states. Our solution was to request that the National Mining Association (NMA), the Interstate Mining Compact Commission (IMCC) and the Western Interstate Energy Board (WIEB) to tell us. On August 4, 1998, we sent a letter to NMA, IMCC & WIEB requesting that they identify

impediments to planting trees under OSM and State regulations;

regulatory or policy changes that would eliminate or offset these impediments;

research that might offset the identified impediments;

incentives that would prove helpful in significantly increasing the use of forestry as a post-mining land use;

We also asked these organizations to suggest state personnel who would be appropriate to be part of a team that will address the issues identified as a result of the questionnaire and to suggest industry contacts who would be willing to review and comment on team products. The reason for this peculiar structure lies in the Federal Advisory Committee Act which governs the interaction of the Federal Government and industry advisory groups.

The Policy Outreach Symposium

Certain themes were clear in the responses to our questionnaire.

Cost was clearly an issue affecting land use choice. It is probably worth noting that the regulations relating to land use and revegetation are unique among our regulations in that they provide a selection of performance standards for the industry to choose among. That is, to the extent the operator, working with the land owner, can determine the land use choice, the operator can choose among various land use/revegetation options that have different costs associated with them.

Risk was also identified as a factor in land use choice. In the simple model risk translates into potentially greater costs and there is an obvious need for the coal industry to try to minimize both.

Research, or lack of technology, was not considered to be part of the problem. However, based on information presented at the policy outreach symposium, I must take exception to this view as will be discussed later.

Second guessing — this relates back to risk and cost again — one commenter clearly articulated the idea that industry prefers rules where the meaning is clear and not subject uncertain interpretations by the State regulatory authority or OSM. In light of this concern, the land use pasture is a clear first choice. But we are not dealing with a simple independent variable here; the possibility of second guessing translates into risk which affects potential costs.

Nine inch gully rule — as mentioned earlier, enforcing this rule, which requires any gully greater than nine inches deep to be eliminated, would tend to discourage reforestation where development of large but stable gullies is more likely than in pasture and fixing them is more difficult.

80 - 60 rule — the requirement that at the time of bond release 80% of the woody vegetation be in place for 60% of the applicable minimum period of responsibility was seen as discouraging reforestation as it portends the possibility of delayed bond release. But again, repairing gullies (nine inch gully rule) and delaying bond release (80 - 60 rule) ultimately effect the cost of reclamation.

My mind set before the policy outreach symposium was that reclamation before SMCRRA often

involved reforestation but after the passage of SMCRA reclamation usually resulted in pasture. (The frame of reference here is primarily Appalachian and Midwestern areas.) After the symposium, I had to modify my view. The situation apparently varies widely by State. The qualitative information presented at the policy symposium indicates that a significant amount of mined land is being reforested in some states and very little in others. In Virginia, for example, 86 percent of the land mined since 1991 is reported to have been reclaimed to forest and in Maryland the figure is 70 percent of the land since 1988 (Data submitted in response to our questionnaire). In Ohio, on the other hand, since the implementation of SMCRA regulations only one percent of the land has been returned to forest whereas ninety percent was forested before mining. (Kaster, Gary and John P. Vimmerstedt, 1996) In West Virginia a similar situation exists. A Forest Service inventory of the acreage of forest lost to mining (111,000 between 1989 and 1995) when averaged over the entire time period closely compares to the acres disturbed during fiscal year 1997 as recorded by OSM (Burger, James A. and William R. Maxey, 1998). One must view these numbers with a good bit of caution. Some represent best guesses that are taken on faith and others come from published materials. But it does seem safe to conclude that the situation varies widely from state to state.

A significant question before us at the present time relates to the quality of the reclaimed forest land. If there is one idea that come out of the policy symposium loud and clear it is that over compaction of the rooting medium with resultant low productivity forests is the norm. But why is this the case. To some degree I believe it relates to fundamental tensions in the regulations and the Act.

There are tensions in the regulations that are germane to the issues at hand. An example of a tension in the regulations is the need to protect water quality and the need, or at least desire, to encourage reforestation. Sod forming grasses can't be beat for stabilizing soil and preventing sedimentation problems. However, if one wants to establish trees it is necessary to reduce the use of sod forming grasses for erosion control and accept a higher risk of erosion. Over emphasis on erosion control --the term erosion appears 95 times in the regs -- may militate against forest as a land use choice. If we as regulators are going to "hammer industry" for sediment violations, why should they choose a final land use that is likely to result in water quality violations or necessitate rill and gully repairs. I have heard the idea expressed that even pre SMCRA emphasis on erosion control reduced tree planting. We apparently are dealing with

fundamental tradeoffs here; it appears you can't maximize erosion control in the short run and reforestation at the same time. Ironically, forests, once established, result in excellent erosion control and water quality.

There is another more fundamental tension in the act itself that I believe is relevant to our desire to encourage reforestation. We are instructed in SMCRA to meet the energy needs of the nation and protect the environment -- two instructions that may be in conflict. It appears that in order to meet energy needs we permit operations that inevitably will result in over compaction.

Consider the following:

Sec. 515(b)(2) of the Act. — "restore the land affected to a condition capable of supporting the uses which it was capable of supporting prior to any mining, or higher or better uses of which there is reasonable likelihood"

Sec. 102(d) of the Act — "assure that surface coal mining operations are so conducted as to protect the environment;"

Sec 102(f) of the Act — "assure that the coal supply essential to the Nation's energy requirements, and to its economic and social well-being is provided and strike a balance between protection of the environment and agricultural productivity and the Nation's need for coal as an essential source of energy;"

But, to the best of my knowledge, we never articulate how the balance is being struck!

As stated earlier, it was clear at the policy symposium that over compaction is the norm on reforested land. It can be argued that over compaction is part of the price we pay for balancing the need for energy production against protection the environment within the context of currently available technology. Our unwritten policy apparently is that we allow over compaction as a necessary price of coal production in today's world.

To the extent the above is true then the solution to the problem of over compaction lies more in the realms of research than policy. Perhaps research along the lines of that currently going on in Kentucky is necessary to reduce the environmental impacts of the unstated compromise. This research is investigating the use of minimum grading to provide cost effective production of forest land with a high site index.

But judging from discussions, both formal and informal, at the policy symposium, this is not the whole story. Other parts of the problem include a culture that desires precise grading, lapses in management that allow dozer operators to kill time while appearing productive through excessive grading, and simply failing to recognize that driving over recently replaced soil (rooting medium) to make the next dump is very damaging to the rooting medium and the future plant community.

I left the policy symposium with the impression that the percentage of land being returned to forest, where such is the appropriate land use, is greater than I anticipated, but that the quality of much of that land might prove to be unacceptable in the long run. Additionally, for the purposes of the symposium, we used a rather liberal definition of forest; a definition which included fish and wildlife land with woody vegetation. Thus, while it appears that a significant amount of mined land is being returned to forest in some states, it is not clear at this point whether or not all of this land should properly be classified as forest.

OSM came under criticism at the policy symposium for not considering productivity as a criteria for bond release of forest land. It is, after all, productivity that translates into board feet of lumber, tons of carbon sequestered and dollars in the bank. Also, restoring the productivity of the land is necessary to fully meet the requirements of Sec. 515(b)(2) of the Act; i.e., "restore the land affected to a condition capable of supporting the uses which it was capable of supporting prior to any mining." I was curious how the authors of our regulations viewed the subject of productivity. While I was not able to research the subject in depth, a quick look at the preamble to the 1979 Permanent Regulatory Program (44 FR 14902, 15241, March 13, 1979) offers an interesting insight into what the authors of the regulations intended to accomplish. In response to a commenter addressing reforestation it is stated that "(t)he regulations have a self-regenerative requirement for vegetation and the operator is held liable until the regulatory authority is satisfied that the status required by the regulations is achieved. When this is achieved, as in successful reforestation activities, the vegetation will continue to increase and the former biomass will be achieved in the future." At the present time this looks like wishful thinking. But, the important point here is that apparently the authors of the revegetation regulations thought they were drafting regulations that would result in productive forests.

If indeed the regulations are not producing the desired result, perhaps they should be revised. Torbert et

al. (1994), in a project funded by OSM, proposed a "white pine bioassay" as a way of evaluating the productivity of reclaimed forest lands. In the proposed test the annual growth of young white pines, at least 25 per acre, planted as part of the tree crop or for test purposes, would be used to predict the site index of the reclaimed land. Another approach to over compaction and the resultant low forest productivity might be to frame the regulations in terms of rooting media design standards and stocking specifications. The design standards would address how the top four foot of material is placed and the stocking standards would continue to specify the number of live stems per acre required for bond release. The idea here is that appropriate design standards, if enforced, would result in a superior growth medium compared to what is currently being produced. In this case the design standard and performance standard address variables that are, in a practical sense, independent. Thus we avoid the undesirable situation of requiring the industry both to do something in a particular way and to obtain a particular result.

Alternately, the argument could be made that if current soil handling regulations were enforced forest productivity would not be an issue. These regulations require that when soil substitute and supplements are used (30 CFR 816.22(b) "the resulting soil medium is the best available in the permit area to support vegetation" and that excess compaction be prevented (816.22(d)(ii)).

The Reforestation Technical Interactive Forum

The "Reforestation Technical Interactive Forum" was held on March 23 and 24, 1999, in Fort Mitchell, Kentucky. Many of the ideas that came to light at the policy forum were reinforced at the technical forum. In my view we are dealing with a difficult situation and that situation is perhaps best summed up in a remark made by Bob Postle, one of the members of the revegetation committee, in our first meeting addressing reforestation. He made the offhand comment "what we are talking about here is social engineering for trees" and that indeed is what we are talking about. What can OSM do to its program that will influence State programs that will in turn cause coal operators and landowners working together make land use choices we think are appropriate. Adding to the problem is the fact that pasture, which myself and others tend to cast as the nemesis of reforestation, is a legitimate land use. What is not legitimate is reclamation to pasture when there is no intention to utilize the pasture. In that case reclamation is to an unmanaged non native grassland which is an undefined land use under OSM regulations.

As mentioned above, the technical forum reinforced many of the concepts brought to light at the policy forum. These include:

- the fact that cost is an overriding issue. As one speaker noted, trees have to pay or they won't be planted.
- the need to address the productivity of forests and prevent the conversion of forest land to pasture land when there is no intention of utilizing the land as pasture. The speaker stated that we need to fully account for all forest values — timber, water, wildlife, landscape aesthetics, recreation, carbon sequestration etc. and inform landowners of the forest products value. Releasing bond on forest land based on stocking rather than productivity was criticized as a poor regulatory process resulting in low productivity forests. Addressing the problem of productivity is particularly difficult as anything that makes reclamation to forest appear more costly or risky compared with other land use options will, in my opinion, militate against its use as a reclamation option by coal operators.
- Examples of successful reclamation to commercial forests in Texas (Texas Utilities) and Washington (Centralia Coal Mine) were presented. In both cases trees make economic sense
- Promising research on reforestation in Appalachia was presented where minimum grading is the key to controlling costs and providing for productivity. Real world demonstration projects are needed to demonstrate the applicability of such research.
- Some desirable changes with possible immediate benefits — allow augmented tree planting as a normal husbandry practice; eliminate the 80/60 rule; eliminate the requirement that all gullies greater than 9 inches in depth be repaired (PA has recently eliminated the rule.)
- Forest values — the point was made that forests are good wildlife habitat; also forests are typically planted with native species which is considered desirable in terms of current thinking.

- Research to find a surrogate for site index based on soil properties was suggested. A limited amount of research addressing this subject has been done.
- A great opportunity exists for reforestation on abandoned mine lands; extensive planting has occurred in Alabama.
- Miscellaneous factors that could encourage reclamation to forests: provide information of how to manage forest plantings to control voles; provide awards for productive forests; count invaders towards success; reduce erosion control standards for forest; provide tax incentives.

Where do we go from here?

I feel the three conferences that have been held on reforestation have painted a consistent picture of the situation that has evolved since the passage of SMCRA. While there are a couple of notable success stories, by and large it is clear that the quality of reclamation under SMCRA in much of the forested East leaves much to be desired. A considerable amount of land that should have been planted to trees or vegetation to support wildlife was planted to tame grasses and abandoned. The general consensus is that much of the land that has been reforested is of low quality due to overcompaction of the substrate and lack of suitable overburden selection.

As we look to the future and try to facilitate reforestation where it is appropriate, I think there are some questions we as regulators need to ask ourselves:

- How much of the over compaction we accept today is necessary to allow mining to occur and how much represents regulatory failure?
- Does our failure to directly address the productivity of reclaimed forest lands represent a regulatory failure?
- Are there new approaches to regulation that we should consider to improve the quality of reclamation; e.g., design standards for the replacement of the top 4 feet of material.
- Would enforcement of existing soil handling regulations resolve the forest productivity problem? 30 CFR 816.22 requires that soil substitutes be the best available in the permit area to support vegetation and that excess compaction be prevented. My impression is

that we give little attention to selective overburden handling beyond that required to keep toxic materials out of the surface and it is clear that we allow excessive compaction to occur.

- And , the ultimate question, do we have to revise the regulations to encourage reforestation and improve the quality of the reclaimed forests or can adequate improvement be achieved through policy initiatives and research?

Literature Cited

Burger, James A. and William R. Maxey, 1998. Maximizing the value of forests on reclaimed mined land, Green Lands Vol. 28 No. 2, pp 37-46.

Kaster, Gary and John P. Vimmerstedt, 1996. in Norland, Eric R. and Mark S. Ervin eds. Forest Resource Issues in Ohio, Legistator's Handbook, Second edition, pp 15-17.

Torbert, John L., James A. Burger, James E. Johnson, and Jeffery A. Andrews, 1994. Final Report, Indices for Indirect Estimates of Productivity of Tree Crops, OSM Cooperative Agreement GR996511, College of Forestry and Wildlife Resources, Virginia Polytechnic Institute and State University, 22p.