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GUEST COLUMN

Eugene C. Doll
Superintendent
Land Reclamation Research Center

From 1974 through 1980, NDSU reclamation research was directed from Fargo by the Department of Soil Science; the reclamation soils staff was located at Mandan. Because of the increasing public interest in reclamation and because of the need for a broader-based research program, the Land Reclamation Research Center (LRRC) was established July 1, 1981 as a separate administrative unit to conduct and coordinate NDSU research in all agriculturally related areas of reclamation. Offices and laboratories are located at the USDA-ARS Northern Great Plains Research Center at Mandan. The USDA-ARS staff at Mandan is also involved in reclamation research; the NDSU and USDA groups work closely together for optimum efficiency.

Lignite deposits underlie about 18 million acres of western North Dakota, almost 40 percent of the state. However, not all of this coal is economical to mine. Economically recoverable reserves are estimated to underlie from one to two million acres. The mines currently operating or firmly committed to open by the mid-1980s will disturb between 80 and 100 thousand acres. As the demand for energy increases and as economic conditions change, it seems certain that surface mining in western North Dakota will continue to increase.

First attempts to reclaim strip-mined lands involved the revegetation of reshaped spoils. Initial results were not entirely satisfactory; productivity was not always restored to the pre-mine level. To overcome these problems, topsoil and subsoil materials were replaced over the reshaped spoil. It was soon found that even 2 inches of topsoil over sodic spoil greatly enhanced plant establishment. But the pre-mine productivity was not restored. Further experiments were conducted in which more topsoil and subsoil were replaced. Over highly-sodic fine-textured spoils, crop yields increased as the replaced soil thickness increased to 36 to 60 inches. When the underlying spoil was fine-textured and only moderately or non-sodic, replacement of 24 to 30 inches of soil material gave good yields. But when the underlying spoil was non-sodic but coarse-textured (with a low water-holding capacity), more than 30 inches of replaced soil was needed. One additional point needs to be emphasized. The level of post-mine productivity may frequently be limited by the amount of suitable topsoil and subsoil available for replacement. When this is the case, the best possible use of available soil materials becomes critical.

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CORRECTION: The volume number was listed incorrectly in the January-February issue. It should have been Vol. 41, No. 4.

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On the Cover: Eugene Doll is superintendent of the Land Reclamation Research Center located in Mandan. In this issue Dr. Doll describes the Experiment Station's research on reclaiming strip-mined farmland. Photo by James Berg.

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The most limiting factor for crop production in western North Dakota is usually moisture. This is why it is so important to plan a post-mine topography in which the amount of runoff is reduced and the amount of water that infiltrates into the soil is increased. Post-mine topographic designing is currently one of the weakest aspects of reclamation planning. This is partly due to the lack of adequate data relating water infiltration and retention to topographic factors, but more importantly because planning for water retention has not been sufficiently emphasized by reclamation workers. The reformed slopes should be as gentle as possible and still blend into the surrounding topography. Long slopes should be avoided, and slopes should predominately be concave in shape to decrease the rate of water runoff and thus increase water infiltration.

Reclamation of areas designated as prime soils is a matter of concern in North Dakota. Prime soils are highly productive soils that meet or exceed soil characterization criteria established by the Soil Conservation Service of the United States Department of Agriculture. Both federal and state reclamation laws require that soil materials from prime lands be removed, stockpiled, and respread separately from nonprime soils. Prime soils in western North Dakota are located in well-drained depressions and at the base of concave slopes where they receive runon water from higher-lying areas. Field and greenhouse experiments in North Dakota indicate that the higher yields on prime soils are primarily due to higher mosture levels from runon water from the surrounding nonprime areas and not to differences in soil properties. If this is true, then separate removal and replacement of prime soil materials is not justified. Rather, restoration of prime soils can best be accomplished by designing a topography conducive to their development. Eliminating the requirement for separate reclamation of prime soils would significantly reduce reclamation costs and at the same time offer the opportunity to improve the total productivity of the reclaimed area.

The first objective of reclamation has been and must continue to be the best possible reclamation of mined lands. But it is in the best interests of all concerned to do this at the lowest practical cost. Most past research has been directed at obtaining needed information to meet the requirements of current reclamation laws and regulations. Much of the future research must also be directed to immediate problems. The optimum depth of replacement of soil materials needs to be more precisely evaluated in terms of water-holding capacity and the movement of soluble salts and sodium. Water infiltration and retention need to be related to soil characteristics and topographic configuration; this information is needed to plan for optimum post-mine land use.

Respreading of available soil material uniformly over the entire area to be reclaimed may not result in the best post-mining land use. Perhaps part of the area should receive a deeper depth of replaced soil material than was originally present before mining, making it suitable for intensive cropping. The remaining area would receive less respread soil and be used less intensively. Should impoundments be designed when feasible to supply water for irrigating the area designed for intensive use? If land can be reclaimed to its pre-mining land use, but if a more expensive alternative plan can result in a higher post-mining producitive level, which plan should be followed? Future research must provide the basis for making these types of decisions.

North Dakota can be justly proud of its land reclamation program. The economy of the state is largely based upon its agriculture. And the maintenance of this agricultural base in turn depends upon the wise use, management, and conservation of the soil. Research has shown that even after the drastic disturbance caused by strip-mining, soils can be restored not only to their original use, but frequently to a higher productive level. Reclamation planning is in its infancy. Coal will be mined in North Dakota well into the next century. The opportunity exists to significantly improve the agricultural base in western North Dakota. Many decisions regarding reclamation and post-mining planning will need to be made. Researchers will not make these decisions — they will be made through the established political processes. But it is the responsibility and the obligation of the researchers to provide sound and reliable information upon which to base these decisions.

Agricultural Experiment Station
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H R Lund

DIRECTOR

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