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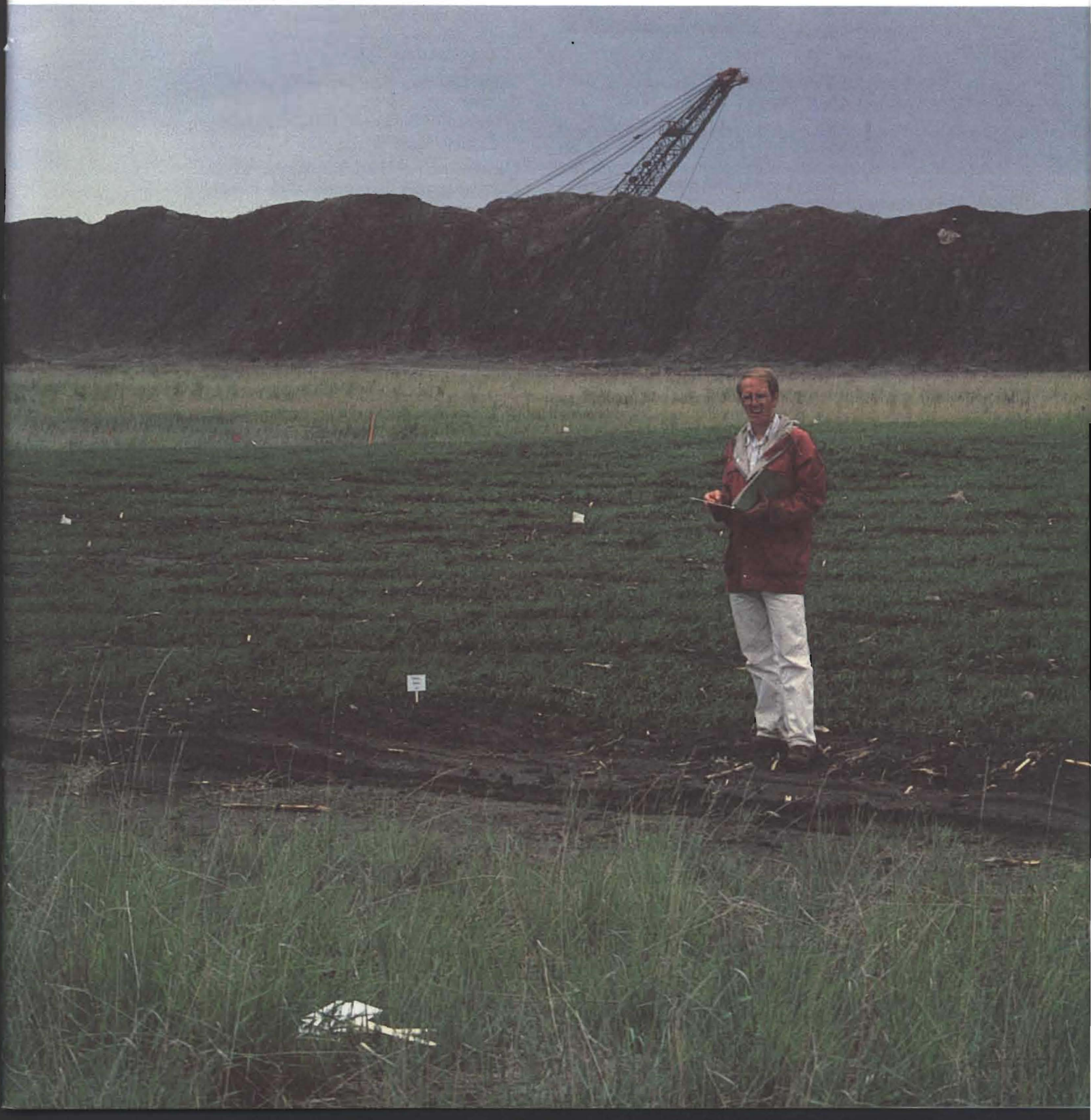

Guest Column

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LAND RECLAMATION RESEARCH: WHAT HAVE WE LEARNED?

Seven years ago in this column, I described the research program of the Land Reclamation Research Center, a unit of the North Dakota Agricultural Experiment Station. In this column, I'll review our past progress and discuss the current status of our research program.

Reclamation research is a fascinating area for a soil scientist. In the past we've taken the soils as they occur naturally and tried to develop management systems that conserve the soil while increasing productivity. We have been fairly successful. Management systems have been developed that can sustain productivity. But in reclamation, we don't have to accept the soils as they naturally occur. We can take the available soil and underlying overburden materials and construct a soil to our specifications. The problem is that in the past we have been so restricted to studying soils as they naturally occur that we haven't developed adequate specifications for the soils that we can now construct. Developing these specifications is the idealized objective of all our reclamation research. While our research has shown that we can successfully reclaim stripmined lands, I feel that the greatest longtime benefits of our reclamation research will be our contribution to understanding all soils, not just reclaimed soils.

Seven years ago, I estimated that the mines currently operating or firmly committed to open would disturb between 80 and 100 thousand acres. Production has continued to increase for the past seven years. Given current conditions, I would not expect the total distributed acreage to be much more than 100 thousand acres in the foreseeable future. When we have more than 40 million acres in the state, why are we so disturbed about reclaiming this relatively small acreage of stripmined land?

The first answer might be that reclamation is required under the provisions of the federal Surface Mining and Reclamation Act of 1977. But that would not be entirely true. The North Dakota Legislative Assembly enacted our first reclamation law several years before the passing of the federal act; in fact, several provisions of the federal act were modelled after the existing North Dakota law.

Stripmining is a highly visible drastic disturbance which has an aesthetically displeasing appearance. Sediments and surface waters which move out of the mined areas can severely pollute surrounding land and streams, greatly increasing the affected area. Adjoining groundwater aquifers

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In This Issue

On the Cover: Gary Halvorson of the Land Reclamation Research Center inspects plots on a reseeded area evaluating the effectiveness of reclamation of mined areas. In this issue Gene Doll of the LRRC discusses what has been learned from land reclamation research. Photo by Gene Doll.

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may be polluted. Without proper reclamation, agricultural land will be lost. Long-range projections of changes in population and land use indicate that even though we now are in a period of overproduction, we will need all of our agriculturally productive land in the not too distance future. But these are not the dominant reasons for reclamation. We are an agricultural state. North Dakotans love their land and will not tolerate its degradation. That is why the public insists upon reclamation of stripmined lands.

The first reclamation research projects in North Dakota were designed to determine the optimum depths of topsoil and subsoil required to restore agricultural productivity. Because of the initial success of these experiments, many people came to believe that replacement of the original soil materials was all that was needed for successful reclamation. But the researchers soon found that consideration must be given to movement of soluble salts and sodium, to compaction from the use of heavy equipment during reclamation, to the effect of postmine topographic configuration on surface and subsurface moisture distribution, and to the accelerated loss of newly reapplied soil materials due to erosion. Subsequently, research emphasis evolved into studies of (1) salt and sodium distribution, (2) surface and subsurface moisture movement and retention, (3) optimum topographic configurations for most effective utilization of rainfall, and (4) levels of soil parameters such as bulk density, pore size distribution, and hydraulic conductivity needed for optimum productivity.

Research on salt and sodium movement has largely been completed, but research is continuing on the last three objectives. We are now trying to define and quantify those topographic and soil factors necessary for the restoration of optimum productive levels so that they can be used as a guide in developing reclamation procedures. Measurements of these same factors can also be used as a measure of success after reclamation has been completed and the area has been revegetated.

We do not feel that reclamation plans should be based only upon premine land use. I maintain that the goal of reclamation should be the establishment of a permanently stable landscape that is aesthetically and environmentally compatible with surrounding undisturbed lands. I further maintain that the postmining land use should be the one that contributes most effectively to the productive capacity and stability of the entire ecosystem of which it is one component. The size of this ecosystem will depend upon practical considerations at each site. In areas where surface ownership is predominantly private, each privately owned block could comprise the ecosystem; where surface ownership is predominantly public, the ecosystem may be much greater in extent. This means that we cannot consider each mined area as a separate entity, but rather as one component of the ecosystem in which it occurs.

Reshaping to the postmining topography that contributes best to the stability and productive capacity of the entire area becomes more important than reshaping to premining contours. Vegetative reestablishment should involve species that will contribute most to the stability and utilization of the entire system. Furthermore, the land should be reclaimed in such a way as to be suited for as many alternative uses as may be practically feasible.

If we follow these concepts when planning reclamation, we can develop a more productive and a more stable land use pattern for the entire area in which the mined land is one component.

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