

Spoilbank Reclamation Research

Activities of the North Dakota

Agricultural Experiment Station

Armand Bauer

Commercial coal mining in North Dakota began as early as 1884 when about 35,000 tons were excavated (Brant, 1953). Most of the early activity was underground. Open pit (strip) mining was generally adopted by the industry in North Dakota by about 1927 (Van Sant and Ellman, 1959). In general, the tonnage mined increased from decade to decade with minor annual fluctuations. Prior to 1970, the maximum tonnage of lignite mined in any year was less than 5 million short tons (Brant, 1953; Switzer, 1969). During fiscal year 1976 tonnage mined was approximately 10.3 million tons¹ The land area disturbed per ton of lignite mined varies with seam thickness, but average seam thicknesses are such that approximately 15,000 tons of lignite are recovered per acre in North Dakota (USDI, 1967).

Research to ascertain the reclamation problems and to determine how best to return spoilbanks to suitable vegetative productivity is of relatively recent origin in North Dakota in relation to mining activities. One of the earliest, if not the earliest, study was that of Switzer (1969) who evaluated grass and woody species establishment potential at the Knife River north and south mines. Agricultural Research Service scientists

located at the Northern Great Plains Research Center in Mandan began research at four mine sites in 1970 (Sandoval et al., 1973), and their studies involving numerous facets of investigation have been in continuous progress since then.

Research activities of the North Dakota Agricultural Station began in the summer of 1973. Dr. Warren C. Whitman, Department of Botany, began work designed to "achieve revegetation with native prairie species through the acceleration of the process of natural succession". These investigations are underway on four mine sites, and include topsoil thickness as a variable. Fred Schroer, Department of Soils, began sampling spoilbanks and overburden to evaluate chemical and physical characteristics at five operating mines in the state. His studies have continued to the present. Some of the data he developed are presented in this issue of North Dakota Farm Research. Physical and chemical characterization of overburden samples by Schroer's laboratory, has included those submitted from other departments at NDSU, from the North Dakota Geological Survey, from state agencies and from the coal industry, in addition to his own samples.

Reclamation research activities in the N. D. Experiment Station were expanded in 1974. Dr. Whitman began a study designed to evaluate the adaptability of native wood plants and forbs to mine spoil rehabilitation work. This work is continuing. The major expansion came about as a result of a grant of \$420,000 from the Old West

¹Private communication from James Deutsch, North Dakota Public Service Commission.

Dr. Bauer is professor, Department of Soils.



Dr. Armand Bauer "on location" at the reclamation research site near Stanton, North Dakota.

Regional Commission, an entity of the Department of Commerce, to the North Dakota State Planning Division, largely through the efforts of Governor Arthur Link's office. Of this total, \$318,102 was sub-contracted to the Agricultural Experiment Station to conduct reclamation research over a two-year period in the Departments of Soils, Botany and Agricultural Engineering. The remaining \$102,000 was sub-contracted to the North Dakota Geological Survey for ground water hydrology and geology studies.

The sub-contract with the Experiment Station commenced on July 18, 1974, with expiration date on June 30, 1976. Assembly of research personnel began in August, 1974, but staffing was not completed until March, 1975. The staff was located at the Northern Great Plains Research Center at Mandan.

The research conducted under the Old West Regional grant was divided into three tasks. The three (1) evaluated the effects of physical and chemical characteristics of shaped mined lands on plant performance, (2) characterized root zone hydrology (water accumulation, water runoff and erosion) of shaped spoil materials, and (3) investigated plant establishment and culture on shaped spoils. Results of some of this research will be presented in a future issue of Farm Research. Although no longer supported by funds from the Old West Regional Commission, much of the work

initiated under their grant is being continued for at least another season and longer, depending on availability of funds.

This brief summary is a resumé of spoilbank reclamation research activities of the Agricultural Experiment Station, but it was not intended to be and it is not a listing of all of the energy-related research activities of the Station. Numerous other studies in the agricultural physical science sectors of soils, plants and atmosphere; in the agricultural social science sector of economics; and in the engineering sector are underway. Results of some of these will be included in future issues of Farm Research.

Literature Cited

1. Brant, R. A. 1953. **Lignite resources of North Dakota.** U. S. Geol. Sur. Circ. 226. 78 p.
2. Sandoval, F. M., J. J. Bond, J. F. Power and W. O. Willis. 1973. **Lignite mine spoils in the Northern Great Plains — Characteristics and potential for reclamation.** Symp. Mined-land Reclamation, Bituminous Coal Res. Inc. Pittsburgh, Pa. 17 p.
3. Switzer, Kenneth B. 1969. **Revegetation of some North Dakota lignite strip-mine spoil banks.** M.S. Thesis, Univ. North Dakota, Grand Forks.
4. U. S. Department of Interior. 1967. **Surface mining and our environment.** Special report to the Nation. USDI, Washington, D. C.
5. Van Sant, J. N. and R. C. Ellman. 1959. **Methods and costs of mining lignite in North Dakota.** Bur. Mines Inf. Circ. No. 7891. 82 p.