THE RECLAMATION OF THE STRIP-MINED COAL LANDS OF WEST VIRGINIA
WITH FORAGE SPECIES

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The most economic and, in many areas, the only safe method of mining shallow coal deposits or coals near their outcrop is to expose these for direct recovery by removing the overburden.

Strip-mine operations are usually subject to considerable public condemnation. Sediments originating from the erosion of the barren areas occasionally cover nearby bottomland soils, overload small streams, increase flood hazards, and sometimes threaten local urban water supplies. The creation of waste areas and the effect that these may have on the social and economic stability of the local community is viewed with concern by some.

A number of states have passed or contemplate regulatory legislation. The first action to regulate strip-mining in West Virginia was taken in 1939. A legislative act (1) passed in that year which became effective January 1, 1941, required the posting of bond with the chief of the State Department of Mines. The bond, known as a performance bond, was released after the banks or ridges of overburden material commonly known as “spoil” had been smoothed or leveled to the satisfaction of a state mines inspector.

The 1939 act governing strip-mine operations was superseded by further legislative action (2) in 1945. Leveling under the new act was required only where land utilization prior to strip-mining had been either for pasture or cropland purposes. The strip-mine operator, however, was made responsible for planting all spoil areas regardless of previous land use with trees, shrubs, grasses, or vines, subject to the choice of the surface owner.

The present investigation was initiated to secure information on the factors involved in establishing vegetation on spoil and to determine the adaptability of forage species on different types of spoil.

PHYSICAL AND CHEMICAL PROPERTIES
AS THEY AFFECT RECLAMATION

The physical and chemical properties of spoil are dominated by the character of the geologic strata from which the spoil is derived. Some spoil consists essentially of dense clay and soft mud shales which rapidly weather into heavy plastic material. The impermeability of this spoil and its lack of physical stability gives rise to high runoff. Restricted infiltration and shallow rooting indicate that drouth may be a serious factor in establishing certain types of vegetation in these areas. Chapman (3) suggests that rapid decadence of 10-year-old black locust on certain fine-textured spoil in Ohio is probably due to this cause. Other spoil consists primarily of resistant shale fragments intermixed with some fine material. Erosion even on barren slopes does not appear serious. Aeration is apparently good to considerable depths. Drouth does not hinder vegetative growth as much as one might expect considering the preponderance of coarse material.

The spoil derived from operations on the Pittsburgh and Redstone coals have the most desirable properties of any spoil thus far encountered. These sections consist of sandy and silty shales and sandstone. The sandstone stratum is usually broken by numerous joint, sheeting, and bedding planes along its outcrop. Blasting and shoveling break the sandstone into numerous blocks of variable size which are dispersed through the spoil. The regraded surfaces are usually quite open. The smaller sandstone blocks readily break down into coarse sand and gravel giving rise to open, friable spoil. Other sections consist of dense and sandy shales associated with blocks of variable hardness. In general, the limy remains in large blocks. As a result, the regraded surfaces are usually less stony than in the sections previously discussed. At present these have medium texture and porosity. This may develop into a rather heavy material.

The hydrogen-ion concentration of fresh spoil that subsequently developed on weathering was found to be the primary factor determining the rate of revegetation. This is in agreement with the work of Croxton (4) who reports that the distribution of vegetation on spoil areas in Illinois is correlated with the surface hydrogen-ion concentration.

The slope of unleveled spoil is also a contributing factor in the slowness of plant invasion which depend solely on seed for distribution in invading steep areas. Even so, the rate of favorable reaction revegetates more rapidly and completely than spoil with less favorable reaction.

The oxidation products of pyrites are the source of the high acidity found in some spoil. The pyrites are introduced into the spoil through the card of highly pyritic roof coals and black shales. The hydrogen-ion concentration subsequently...