

Minesoil Morphology and Genesis

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Minesoil properties vary because of differences in geology and soils, topography, climate, vegetation, and mining and reclamation methods. A, B, and C horizons of prime farmland soils are usually removed and saved during the mining process and then replaced during reclamation. In areas such as Appalachia, soils may be too thin to separate individual horizons, so "topsoil" becomes a mixture of all premining soil horizons. On old mines and some newer mines where "topsoil variances" have been acquired, the original soil may not be replaced during reclamation. Instead, the minesoil consists of suitable crushed rock from the coal overburden. Irregardless of the mining method, properties of replaced soil horizons will always differ from properties of the premine soils. Disturbance destroys or degrades soil structure and water flow channels. Even though mining disrupts the soil forming processes, these processes begin functioning again as soon as the minesoils are reclaimed, and rapid pedogenesis may take place in fresh unweathered materials. Distinct A horizons, 5 or 6 cm thick, may develop in 3 years or less. These A horizons generally have weak to moderate granular structure. Weak cambic horizons have been described in fine-textured minesoils after 10 to 20 years of weathering. Discontinuities are common in minesoils due to grading and layering of dissimilar spoil types. Subsurface layers are frequently compacted, limiting water movement and pedogenesis. Many minesoils either have undergone or are currently undergoing acid-sulfate weathering. The effect of this process on minesoil properties depends upon the amounts of pyrite (FeS_2) present in minesoil parent materials. Jarosite mottles and iron oxide stains may be common in subsurface horizons of pyritic minesoils, and the pH may be extremely low (<4.0), affecting the capability of minesoils to support vegetation. In western states, saline and sodic spoil materials are often placed beneath 1 to 3 feet of coversoil. Salts from spoils slowly migrate upward into the coversoil, causing concern as to the long-term minesoil productivity.

ADDITIONAL KEY WORDS: Minesoil properties, acid-sulfate weathering, soil development.