

SOIL ECOLOGICAL INDICATORS OF SURFACE MINELAND RECLAMATION SUCCESS¹

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Abstract: As the nation's leading producer of coal, Wyoming has thousands of acres of land that are affected by surface mining each year. In the year 2000 alone, over 330 million tons of coal was surface mined in Wyoming (OSM, 2002). Although topsoils are removed from mine sites and stockpiled for protection to be later redeposited, soil organisms including plants, animals and microorganisms are negatively impacted by surface mining activities. Microorganisms in soils play important roles in organic matter decomposition, nutrient cycling, and vegetation reestablishment, as well as soil development and stabilization. The response of soil microorganisms to disturbance and their recovery during reclamation of surface mine sites is not well understood, yet extremely important to sustainable mine land reclamation. The objective of this study was to examine the recovery of soil microorganisms and ecosystem processes they control by analyzing a chronosequence of nine different aged reclamation sites (ranging in age from 2 to 32 years since reclamation was initiated) and adjacent undisturbed sites on the Dave Johnson Coal Mine located in Central Wyoming. Results indicate that the soil microbial community may take much longer than 30 years to recover to native undisturbed levels. Even though the plant community may recover in terms of biomass production and surface cover within twenty years or less, amounts of soil microbial biomass carbon were only approximately half of that found in adjacent undisturbed soils. Concentrations of organic matter in reclaimed soils, however, appear to increase to levels above that found in adjacent undisturbed soils.

Additional Keywords: carbon storage, mine land reclamation, organic matter content, soil physico-chemical properties, soil microbial biomass

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