POST-SMCRA RECLAIMED MINESOILS: SLOPE AND COVER EFFECTS ON RUNOFF UNDER NATURAL CONDITIONS[1]

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Abstract. In West Virginia, surface coal mining disturbs a large area of mountain landscapes. A special type of soils called "reclaimed minesoils" or simply "minesoils" is established through the mining reclamation process. West Virginia has placed special emphasis into the planning and executing of effective reclamation work, however the task has been proven to be challenging. During the reclamation processes, surface grading for stability requirements often causes high surface compaction and consequently high bulk density and low porosity, which are properties that will affect soil hydrologic behavior. Minesoils are considered to restrict water movement and to be poorly drained with low infiltration rate and high runoff potential, therefore, they are at greater risk for runoff and erosion; based on this consideration and due to environmental regulations, mine companies are required to install drainage structures to control surface runoff. On-site observations and research should be conducted on individual mine sites with the goal of characterizing variable soil properties, which will guide the implementation of appropriate land use management practices. The objective of this study was to measure the effect of slope and vegetative cover on runoff and infiltration in reclaimed minesoils under natural rainfall. Twelve-research runoff/infiltration plots were placed on a 20 ha reclaimed mine surface in Webster Co, WV. A completely randomized 2x2 factorial experiment with three replications was designed for our study. The factors considered were soil cover (vegetation) and slope. Selected slope levels were 3-5% and 10-15%, and soil cover was grass or forest (a combination of grass and forest). For the slope factor average runoff (cm^3) was 3144 ± 3303 at low and 3651 ± 2278 at high slopes; average runoff (cm^3) for vegetative cover was 3768±3380 for forest and 3034±1998 for grass. Slope and cover significantly affected sediment production (g). Forested-low slope plots yielded 5.1g ± 15.2g, forested-high slope plots 13.4g ± 17.3g, grass-low slope plots 1.2g ± 1.3g, and for grass-high slope yielded 9.3g ± 10.3g. Grass cover was more effective in reducing sediment production regardless of slope. Although in our study slope and cover did not statistically affect the runoff and infiltration, these factors were determinant in sediment production.

Additional Key Words: infiltration, compaction, erosion

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