

Applicability of Gradient Terraces in Surface Mine Reclamation

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Abstract. Gradient terraces are a major component of traditional slope design for surface mine reclamation. In practice, terraces are often found to fill up with sediment and finally blow out, which requires further erosion control measures in the future. Therefore, Office of Surface Mining Reclamation and Enforcement (OSMRE) tends to not encourage the use of terraces in surface mine reclamation. However, gradient terraces are greatly needed if the slope is both steep and long like pit walls, where surface runoff and erosion can be extremely severe. To find out applicable conditions for terraces, **Erosion And Sedimentation Impact (EASI)**, a watershed runoff and erosion model, is used to conduct a sensitivity analysis about hillslope length, hillslope gradient, and terrace gradient. Results show that hillslope erosion rate super-linearly increases as hillslope length increases. Thus, by reducing hillslope length through terraces, hillslope erosion will decrease with a considerable amount. Results also demonstrate terraces should have a much larger gradient than current design guidelines to keep self-cleansing and avoid terrace failure.

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