

Feasibility of Open Pit Restoration with Coal Ash Aggregates: Ground Water Quality Assessment

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ABSTRACT

This study was to investigate feasibility of coal combustion ash aggregates (CAA)-amended restoration of the open pits. PVC column reactors were designed by a statistical method and ground water quality was analyzed for water quality parameters. Two different levels of the volumetric ratio of the CAAs to the organic top soil, precipitation extent, and CAAs particle size were tested. Results showed the infiltrated water from each reactor containing the CAAs had a basic pH (~8.5). Turbidity was in the range between 0.5 and 1 NTU, except for a couple of outliers in the beginning of the experiment. However, it reduced to a value less than 0.5 NTU. Specific conductivity showed higher strengths in all treatment columns compared to that in the control reactor. Heavy metal analysis showed no concentrations of lead and cadmium. Statistically, the rainfall intensity undoubtedly significantly influenced on the amount of the infiltrated water. Significantly higher pH values were observed for the reactors with low-level rainfall intensities and small-sized CAAs. Turbidity was statistically higher for the reactors with low-level rainfall intensities, more CAAs ratio, and smaller size CAAs. However, in the later part of the experiment, the infiltrated water from the bigger size CAAs produced significantly higher turbidity. Statistically higher hardness concentrations were monitored for the reactors with more CAAs ratio up to the middle of the experiment. However, low-level rainfall intensity dominantly produced significantly higher concentrations of hardness in the later experiment.

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