

An Application Of Phased Element Removal Technology For Passive Treatment Of Fly Ash Leachate Contaminants

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Abstract: To evaluate a more cost-effective alternative for meeting NPDES standards, the Electric Power Research Institute and Allegheny Power Service Corporation jointly funded construction of a passive water treatment system for leachate emanating from the closed Springdale fly ash disposal facility in Allegheny County, Pennsylvania. The system employs Phased Element Removal Technology (PERT™) to combine multiple input-sensitive passive treatment environments to target specific contaminants. Influent leachate is characterized by circumneutral pH, and average total iron of 13.48 mg/L, manganese of 2.74 mg/L, and flows of 2.2 L/s. The leachate is collected and pumped to a flow equalization basin for aeration and iron precipitation, then enters eight sequential treatment cells: four vegetated aerobic wetland cells to remove residual iron; two rock drains for bacterial manganese removal; an organic upflow bed for trace element removal; and an algal basin for polishing prior to discharge. Operating results for the first 14 months show average removal efficiencies of 97% for iron and 89% for manganese, with removal efficiencies for both parameters trending towards 99% as the system equilibrates. Water monitoring and testing of plant and substrate materials is conducted to evaluate the treatment effectiveness of the chosen technologies for additional trace metals, and to determine the effective operational life of the individual passive components. Results to date indicate a 50 year system life expectancy, with a projected 50 year present value savings of approximately \$2.7 million compared to conventional chemical treatment alternatives.

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