

Ex Situ Anaerobic Biological Treatment of Perchlorate in Groundwater

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Background/Objectives. The site is former chlor-alkali manufacturing facility. The GWET system is used to control migration of groundwater impacted with perchlorate, chlorate, VOCs, hexavalent chromium, chloride, and pesticides. Groundwater is extracted from the well field, treated, and discharged to the adjacent river. Groundwater perchlorate concentrations have been observed up to 119 mg/L which need to be treated in order to achieve the discharge permit perchlorate effluent limit of 0.015 mg/L. Solids generated from the treatment processes are consolidated for offsite disposal.

Approach/Activities. The bioreactor utilizes bacteria to anaerobically digest perchlorate. The bioreactor requires inoculation with bacteria, followed a recirculation start up procedure to build the bacterial population. Forward flow was established using an incremental stepped up forward feed introduction. Nutrient dosing rates and target operating conditions were developed based on measured treatment efficiency during start up and initial forward flow. Solids are removed using a sand filter. The performance of the sand filter is affected by the operating conditions of the bioreactor and management of solids reject handling.

Results/Lessons Learned. Sustained operation of the bioreactor is dependent on stable operating conditions, developed through close management of biological growth and solids removal. The relationship between nutrient dosing rates, oxygenation rates, and coagulant dosing rates and the resulting performance of the bioreactor and solids management system are presented. Management of the quality and volume of chemical and biological solids are a critical component of sustaining operations. Turbidity monitoring and interpretation of relationship with key effluent parameters was used to develop adaptive management strategies and is used for day to day operational decision making.