Bacterial dechlorination of chlorinated solvents often causes accumulation of the intermediate cis-DCE. Back diffusion of e.g. cis-DCE, due to the dual porosity of limestone, often limits the remediation efficiency. A remediation scheme capable of establishing contact between contaminant, degrading bacteria and electron donor within the low permeable limestone matrix is required. The technology EK-BIO, which combines enhanced reductive dechlorination and electrokinetics (EK), was assessed. This novel technology has not previously been tested in limestone. An experimental set-up was designed to meet the requirements of anaerobic bacteria and to manage the volatile contaminants and extreme pH development prompted by electrolysis. The experimental set-up was tested and recommendations for design improvements presented. In this study, supplementary methods were developed for e.g. sampling of intact bryozoan limestone cores and for saturation and contamination of the cores with cis-DCE. EK induced transport processes for delivery of the donor lactate and mixed bacteria culture KB-1® were studied. EK was shown to enhance delivery of lactate and bacteria resulting in fermentation of lactate in the limestone. Lactate was delivered by electromigration causing an increase in electric conductivity. No indications of establishment of electro-osmotic flow in limestone were observed. Presence of specific cis-DCE degraders, Dehalococcoides, in the limestone could not be verified. However, the results indicated that fermentative bacteria were distributed by electrophoresis. This study suggests that EK application can establish the essential contact and overcome back diffusion. Thereby, EK-BIO may be superior to advection-based technologies for bioremediation of chlorinated solvent contaminated limestone matrices.