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MANAGING RESIDUAL PHOSPHORUS AND NITROGEN FROM TREATED SWINE SLURRY USING A DISPOSAL FIELD: BEHAVIOUR OVER FOUR YEARS OF ON-SITE OPERATION

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ABSTRACT Treated effluents can be discharged back into the natural environment by using a disposal field. The main concerns with regard to this technology involve the effectiveness of the phosphorus retention by the receiving soil and the behaviour of the residual nitrogen, in the ammoniacal or nitrate form, in the groundwater. The disposal field used as a test bench at the outlet of a large-scale BIOSOR^{TM}-Swine Slurry treatment system had an area of 750 m². Samples were taken on a monthly basis over a period of four years from the treated swine slurry and from some ten control piezometers. The average flow of swine slurry was 8 m^3/d. The contents of the residual phosphorus at the treatment outlet ranged from 16 to 18 mg/l. At a distance of 6 metres after the disposal field, the concentrations measured were equivalent to those present at the start of the field (< 1.5 mg/l). The main mechanisms that come into play in phosphorus reduction are sequestration by physico-chemical adsorption in the receiving soil. For values of between 42 and 46 mg/l of ammoniacal nitrogen (N-NH_4) at the disposal field's inlet, the objective of 14 mg/l at the resurgence point was met. The presence of an aerobic zone on the disposal field's upper layer is necessary to promote nitrification. The nitrate (N-NO_3) concentration at the treatment system's outlet ranged from 400 to 550 mg/l and the objective of 100 mg/l at the resurgence point was met. The lack of any carbon element at the treatment system's outlet was compensated for by the presence of iron, playing the role of electron acceptor necessary for denitrification. The results obtained in the framework of this project have made it possible to better understand a disposal field's mechanisms with regard to managing the phosphorus and nitrogen stemming from swine-related effluent.

Keywords: Disposal field, treatment, swine slurry, phosphorus, nitrogen, denitrification.