

Study of soil plugging beneath a manure lagoon

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A study was undertaken to verify the existence of a biological seal beneath a liquid manure, storage lagoon. Piezometers were used to delineate the water table configuration which was, in turn, used to locate 4 sampling wells. One well was constructed up-gradient of the lagoon to establish the background conditions and 3 wells were installed in a line directly down-gradient of the lagoon to determine the extent of groundwater contamination in this area. The groundwater chemistry of the water in the lagoon and the background water quality were compared to that detected from the wells. Slug tests were performed on the sampling wells to determine the hydraulic conductivity of the upper portions of the aquifer. Permeability tests were conducted, in the laboratory, on disturbed soil samples obtained from a test pit excavated to bedrock in the study area.

The study has shown that the concentration of most chemical constituents from all sampling wells was elevated above background levels. The concentration of most parameters also decreased with distance from the lagoon. Most constituents were near background concentrations in the well farthest from the lagoon. The concentration of chloride in the groundwater was not substantially different from the other ions and in addition, it decreased with distance, at a similar rate. Thus it appeared that dilution, not adsorption, was the major cause of the decrease in concentration. The concentration of manganese provided evidence of a halo effect which indicated that the plume front was probably straddled by the sampling wells.

Although the lagoon had caused some down-gradient groundwater contamination the level of contamination was

less than expected. Assuming that dilution was the dominant process, and that the values determined for hydraulic conductivity were correct, the concentration of a conservative ion, such as chloride, should have been much higher. It was

evident, therefore, that there is some sealing of the soils beneath the lagoon. Further work of a more controlled nature was recommended to confirm and quantify this conclusion.