

Seepage from Earthen Manure Storage Ponds in Alberta

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Earthen ponds are the most popular method of storing the liquid manure produced from intensive hog production. Concerns have been raised that earthen manure storage (EMS) reservoirs may leak and contribute contaminants into the groundwater system. The literature suggests that manure solids and biological slimes can create an impermeable seal that can effectively eliminate seepage from liquid manure storage ponds. Research is inconclusive regarding the durability and reliability of these natural seals. This extensive field study is aimed at determining if EMS reservoirs constructed in Alberta soil and geologic conditions pose a substantial environmental risk.

Potential sites for the study were selected using a Geographic Information System (GIS). A hog producer database (>900 hogs per year) was combined with a digital soil inventory. A phone survey of potential cooperators was conducted to obtain permission to test EMS ponds for indications of seepage. The EMS ponds of project participants are subjected to an electromagnetic Induction (EM 31) survey to detect possible seepage plumes. Plumes are indicated by variations in soil electrical conductivity, an indication of soil solution salt content. The EM 31 results were also used to help design a drilling investigation program to confirm the location, extent and severity of seepage patterns. This phase of the investigation includes collection of soil and water samples and to installation of groundwater instrumentation.

We have acquired 103 cooperators for the study and 35 have been screened for potential seepage. Eight sites have been drilled for confirmation of results, which includes an equal number of sites indicated and not indicated to leak according to the EM surveys. Preliminary results indicate that the EM 31 can be used to indicate potential seepage problems at existing manure ponds. Results from the EM survey are also useful to design traditional investigation programs to investigate potential seepage problems. Study results will be used in the future to help determine the site criteria and construction standards necessary to ensure environmentally safe construction of EMS ponds in Alberta.