EARTHEN MANURE STORAGE MONITORING: PSC ELSTOW RESEARCH FARM INC.

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Introduction

Rapid growth in the Saskatchewan hog industry has caused an increase in environmental awareness among the public. This has led to more stringent environmental standards being imposed on the construction of earthen manure storages. Most storages are now required to have a minimum 600-mm thick liner made of recompacted clay soils. More extreme cases require a geotextile liner. These recommendations have resulted in a significant improvement over the unlined and uncompacted storages constructed in the past. Unfortunately, these improved liners have done little to alleviate public concern in some areas. In answer to this concern, a program was initiated to monitor solute migration through the liners of different hog manure storages throughout Saskatchewan.

Objectives

The main objectives of this project are to:

- Determine changes in groundwater chemistry with depth over time,
- Determine effectiveness of clay liners and clarify liner requirements, and,
- Determine safe separation distance between EMSs and any potential aquifers.

The new Prairie Swine Center Research Facility at Elstow has been included in this study as one of the new sites.

The System

The system installed allows in situ measurement of hydraulic head, temperature and oxidation/reduction potential as well as the ability to retrieve water samples at 16 locations within and below the liner of each cell and 8 locations adjacent to each cell (see Figure 1). Figure 2 shows the instrument bundle, containing two lines of suction tubing, a pneumatic piezometer, a thermocouple, and a redox tip. This bundle is placed in the 16 locations underneath the EMS. When suction is applied to the sample tubing, a water sample can be retrieved for nutrient analysis. The pneumatic piezometer gives the water head at the depth. The thermocouple allows temperature to be recorded, and the reduction-oxidation probe gives the redox conditions of the groundwater, which can help to determine the groundwater chemistry.

To date, this system has been installed in three newly constructed sites and two established sites.

Acknowledgements

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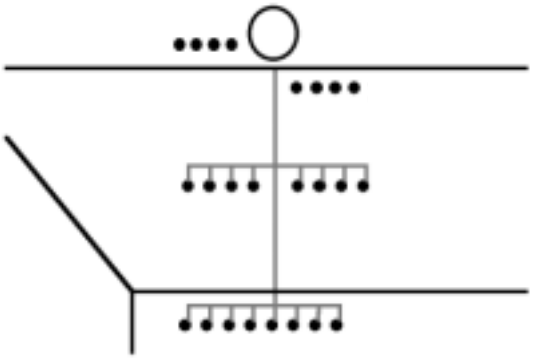

Figure 1 - Schematic of hole locations

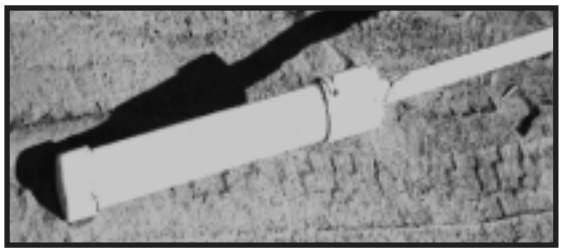

Figure 2 - Instrument Bundle

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