

(The) Use of Groundwater Vulnerability Mapping for Regional Risk-Screening of Confined Feeding Operations in Alberta

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There is an increasing awareness in Alberta of the importance of water quality protection in land use planning. A potential source of groundwater contamination is manure storage associated with the operation of confined feeding operations (CFOs) in the province. There are currently about 2000 documented CFOs in the province. The NRCB, through the Agricultural Operation Practices Act (AOPA), regulates the CFO industry. Regulatory activities include the issuance of permits for new operations or expansions, and response to complaints. To date, compliance issues have been dealt with through a complaint-based system. While effective, the complaint-based system did not provide enough of a sample of CFOs for an overall assessment of the effects of manure storage on groundwater quality. To better understand potential impacts of these facilities on groundwater quality, a risk-based compliance program has been developed to augment the existing complaint driven compliance program. The risk-based compliance program allows the NRCB to focus its resources on higher risk operations that are located in areas where there is a higher potential to impact groundwater quality.

This presentation provides an overview of the process used to select CFOs for further risk characterization in the risk-based compliance program. Operational risk factors used include the age of the facility, and whether or not earthen manure storage was used. Operations older than 2002 were deemed to be a higher risk because they were established before AOPA was introduced, when more stringent design and operation requirements for CFOs came into force. CFOs with liquid manure storage (predominantly dairy and hog operations) were given a higher risk rating because these storage systems have a higher potential to impact groundwater quality if not properly constructed and maintained. Groundwater vulnerability maps prepared by Alberta Agriculture and Rural Development and the Agri-Environment Services

Branch (previously known as the Prairie Farm Rehabilitation Administration) were used as a screening tool to identify high groundwater vulnerability areas of the province. The maps, which were designed to assess the vulnerability of the nearest-to-surface aquifer to surface contaminants, were prepared using surficial geology information from published maps. A general groundwater vulnerability rating was assigned to each geological class using information from the maps such as texture. Lithologic information from selected water well and testhole records from the Alberta Environment Groundwater Information System were used to identify the uppermost aquifer and to estimate the approximate time for water to move downward through the layers above the aquifer. This information was used to adjust the general groundwater vulnerability ratings assigned using the surficial geology maps.

The authors believe that the basic data inputs for the vulnerability maps are sparse and of uneven distribution for many parts of Alberta. Nevertheless, we believe that the maps provide a good screening tool.

Information from the risk-based compliance program will contribute to our understanding of the potential impacts of manure storage on groundwater quality in Alberta. This information will be useful for landuse planning activities associated with the application of the Land Use Management Framework which is a priority for the provincial government.

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