

# High Level Spray Irrigation of Manure in Ontario

The Livestock Manure Pollution Prevention Project (P3), was established as a sub-committee of the WQWG to identify ways by which manure spills and subsequent fish kills can be reduced in Ontario. To help achieve this goal, the sub-committee has been tracking the cause of spills with the help of data from the Spills Action Centre. Although the data is incomplete for certain regions of the province, one trend has clearly emerged. Spray irrigation of liquid manure has been responsible for at least 40% of the manure spills in the province over the past decade.

A summary of manure spills data from 1988 to 1998 shows that:

- 40% of the spills are spray irrigation related
- 16% are related to insufficient manure storage
- 11% tanker related
- 14% equipment failure
- 8% transportation related

When details of these spills are examined, most are the result of mismanagement. Most of these spills could have been avoided had certain BMPs been implemented. It is also interesting to note the high number of manure spills (approximately 60%) that entered a stream via underground field tile versus overland runoff.

As a result of this data, the sub-committee has decided to make a recommendation to the WQWG regarding the practice of high level spray irrigation of liquid manure. The following paper outlines the problem, options and recommendation for a course of action as preferred by the members of the P3 sub-committee.

## CONCERN

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Contamination of the province's rural watercourses has been well documented over the past 15 years. Although there is ongoing debate as to the specific sources of contaminants such as bacteria, nutrient loadings from agricultural sources are usually tied to either soil erosion, faulty septic systems or the by-products of livestock operations. These sources are all a concern and have been addressed through various education programs and BMP promotional initiatives.

All of these 'diffuse sources' (point and non - point) have an impact on stream health, however a manure spill has an immediate impact. The impact is sudden, and often catastrophic for local aquatic life and habitat. The implications for water users downstream can also be significant. Clean up is often difficult.

Although some manure spills are accidental, most can be avoided with better nutrient management planning, improved training and education, and a sound spills contingency plan.

# PROBLEM

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The data indicates that spray irrigation of liquid manure results in 2 to 3 times more manure spills than the next closest cause. Use of the technology may also be associated with a number of other issues. They include:

- uneven application
- lack of equipment supervision
- timing
- nutrient utilization
- wind drift and soiling
- odour
- negative visual impact

## Uneven Application

The ability to apply liquid manure onto cropland at an even rate is not easy. Recent studies have shown that spreading techniques apply manure at rates that vary from 2000 gal/acre to 20,000 gal/acre within the same field. Researchers and industry are working together to develop better equipment to solve this problem. High level irrigation guns can apply manure evenly if they are used under proper conditions. However, rates are easily affected by wind deflecting the stream of manure to one side of the application pattern area. When this happens, the soil is not always capable of absorbing the increased amount of manure. Overland runoff or leaching through soil macropores may carry the manure from the field to an eventual outlet. A 'Nutrient Management Plan' will be difficult to follow if the rate of manure is unevenly applied to the field.

## Supervision

The man-power to operate high level irrigation equipment is at issue. The records from the Spills Action Centre and conversations with Ministry of the Environment abatement officers, indicate that spills associated with the technology could have been avoided if the operation had been supervised more closely. Too often the equipment is left unsupervised once it is set up and operating. If equipment malfunctions, the problem is often not discovered in time to prevent a spill of manure. Burst pipelines, stuck nozzles or improper spray pattern are examples of manure spills associated with the technology, that in many cases could have been prevented or minimized with proper supervision.

## Timing

Spring application of manure should wait until the soil is dry enough to accept the manure without damage being done to the soil from compaction. A perceived advantage of high level irrigation as a method of manure application is that you are not running over the field with equipment at a time when the soil is easily compacted. The irrigation gun minimizes risk of compaction. The equipment is therefore often used earlier in the season before the soil is dry. Macro pores are usually running and may provide a direct pathway to carry excess manure to underground field tile. The risk of overland runoff is also higher because the ability of the soil to absorb the manure is often lower. If the equipment were used at a time when soil were drier and when the crop could best utilize the nutrients, these problems would be greatly reduced.

## Nutrient

Loss of nutrients through macro pore movement and volatilization is an issue farmers should be concerned about. Statistics are not available to quantify the amount of nitrogen loss from manure applied with different methods; however, spray irrigation likely contributes to a significant amount of the total. Keeping the nutrients on the field where they can be utilized by the crop will save money.

## Wind Drift

Atmospheric conditions must be right in order to control liquid manure once it has left the nozzle of the irrigation gun. Winds create a large problem for operators of high level irrigation systems. Manure through the gun often does not stay confined to field or property boundaries. Winds can effectively carry liquid manure mist a long distance. The soiling of neighbouring properties or passing vehicles is also a nuisance.

## Odour

Odour has become a huge issue in general. Although odour from manure application is a fact of life, high level irrigation guns can worsen the situation. Odour from manure sprayed high into the air appears to travel much farther than odour from manure applied at low levels or directly onto or into the soil surface.

## Visual

A final issue that has been raised though the committee, is the negative visual impact of the high level application of liquid manure. With the current pollution issues from agriculture industry so high in profile, we do not need to intensify the situation by encouraging the use of high level application. It is highly visible, and does not look like a normal farming practice to the unknowing person. It looks bad.

The combination of these issues has created a negative image of the use of high level irrigation as a method to apply liquid manure. It is important to note that the technology is used to apply other substances such as bio-solids, vegetable wash water and irrigation water. The committee is not addressing these other uses for the technology at this time.

## OPTIONS

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The committee has considered several options to assist the WQWG with a recommendation on the use of high level irrigation guns as a method to apply liquid manure. There are four ways to address the issue, they include:

- 'ban' spray irrigation of liquid manure
- restrict or 'certify' the use of the technology
- voluntary compliance
- leave the situation 'status quo'

## **Option 1: Banning (replacement of the technology)**

Banning the use of high level spray irrigation of liquid manure has been the route some jurisdictions have taken. The most notable of these is Quebec. However, an outright ban in Ontario would require legislation to support the ban. The required amendments to the law would not likely pass through the legal scrutiny required of such an amendment.

If a ban were imposed, farmers and custom operators with existing equipment would be required to find new ways of using their equipment or scrapping it. The number of systems operating on Ontario farms is thought to be in the range of 1000 units.

There are essentially three options for operators who wish to modify their high level irrigation system. They are:

- towable boom system
- low trajectory system
- drag-hose system

Of these systems, the drag-hose system is the easiest and least expensive to adopt. Most of the existing equipment used for the high level method of application could be incorporated into the new system. The nozzle would not.

Banning use of the technology for liquid manure application has been supported in principle by some members of the agricultural community. An opinion survey of their membership was conducted by Ontario Pork in January 1999. Over 60% of the membership would support a ban. These figures are mirrored by a similar survey conducted by the Christian Farmers Federation of Ontario.

If a ban were the chosen option, a phase out period of 5 years would be desirable to help ease the transition.

It must be emphasized that a legal ban would require legislation and a willingness of provincial government to actively police the situation.

## **Option 2: Certification (equipment and operators)**

If the technology is used correctly and all environmental factors are taken into consideration before application begins, spray irrigation of liquid manure is a viable method of application. However, all too often it is used either at a time and/or location with a high risk to the environment. Through a certification program, a SAR (Standard Approval Regulation) type approach could be taken. Areas where manure could and could not be applied would be identified. In doing this the environmental concern would be dealt with providing some level of assurance to the public.

A component of the certification option would include a mandatory training course. The course would be run similar to the septic installers course or the tile drainage installers course. The course would provide detailed information on all technical, agronomic and environmental factors that would help the operator make the proper decisions when using the equipment.

Political will is required to implement this option.

### **Option 3: Voluntary Compliance (discourage use)**

A program of 'voluntary compliance' would strongly discourage use of high level irrigation method of manure application, and would send a clear message to the manufactures and suppliers that the system is no longer in favour. A voluntary compliance initiative would be most effective if it were strongly supported by farm leaders and their organization, and accompanied by a campaign of press articles and educational literature.

### **Option 4: Status Quo**

The final option is to continue to encourage improved management through current education process with BMPs and EFP program. The technology is not perceived to be a special problem environmentally, socially, or agronomically.

## **RECOMMENDATION**

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The recommendation of the P3 sub-committee of the WQWG is to follow 'option 2'. In support of this recommendation the follow course of action could take place:

1. Develop a certification training course or operators and owners of high level manure irrigation systems.
2. Continue working with industry to improve the development of alternative options in spreading equipment. Monitor the use of this technology.
3. Current information and education material should be produced in conjunction with certification initiatives to keep the landowners informed of the issue.
4. Farm leadership support the recommendation and encourage all farm groups in the province to work together to address this problem.