



Chapter 5. MANURE TRANSPORTATION

This chapter describes the following issues related to transporting livestock manure:

- risks and considerations
- spillage and emergency planning
- costs

Manure transportation refers to the movement of manure from long-term storage or livestock facilities to either short-term storage locations or to field sites for application. The transfer may be completed using manure hauling equipment on roads or farm lanes or via pipeline systems across roads, ditches or fields. Safe and efficient manure transportation is an important component of good nutrient management.

5.1 TRANSPORTATION RISKS AND CONSIDERATIONS

Moving manure from storage to the field is an important part of a manure management system because of the costs incurred, the potential risks involved, and the possibility of nuisance for neighbours. The main risks associated with manure transportation include risks to human safety, the environment and the physical conditions of roads.

5.1.1 Reducing Manure Spillage Risks

Manure spills on the road can be in violation of Alberta's *Public Highways Development Act* (considered as litter) and Alberta's *Environmental Protection and Enhancement Act* (considered as pollution).

Spillage of liquid or solid manure during manure hauling may occur from seepage, overloading, blowing winds or equipment breaking. Appropriate management techniques and proper maintenance and operation of manure tanks or pipelines help to keep the roads and ditches free of manure spillage. Management techniques may include smaller loads, covered loads, or sealed end-gates on solid manure trucks.

BMPs for Nurse Tanks or Bladders

Nurse tanks or bladders are movable, temporary storage devices used in the field to store liquid materials prior to and during land application. The field application equipment either continually or intermittently fills from the nurse tanks or bladders, allowing the application equipment to continually apply manure without leaving the field. Tankers haul the liquid manure to the nurse tanks from the permanent storage facility.

Nurse tanks and bladders should be:

- leak-proof
- equipped with emergency shut-off valves
- equipped with safety grills to prevent human entry
- located a safe distance from potentially sensitive areas such as surface water bodies or water supplies

THE MAIN RISKS ASSOCIATED WITH MANURE TRANSPORTATION

include risks to human safety, the environment and the physical conditions of roads.



Tankers can be used to move manure to the field, allowing application equipment to continually apply manure.

BMPs for Permanent, Temporary or Portable Pipelines

Permanent pipelines are buried below-grade with risers/hydrants at specific locations. They are usually constructed with PVC or equivalent material. Temporary or portable pipelines are usually rigid aluminum pipe or large diameter hose material with threaded connectors. These pipelines can be dismantled and moved from field to field or farm to farm. Temporary lines may have to cross roads or highways to service fields; culverts may be used to facilitate this crossing. If pipeline systems are being used regularly, discuss with the Municipality or Province about the installation of small diameter culverts or a permanent, buried pipeline section specifically for use by the manure pipeline system.

WHEN WORKING WITH PIPELINE SYSTEMS

that cross highways or roads, farm workers should wear high visibility clothing while performing all operations near the highway or road.

One of the most significant risks associated with pipeline systems is a break or leak in the line, resulting in the potential spill of a significant amount of manure. To minimize the risk associated with a spill from a temporary pipeline system that crosses a road ditch

or culvert, make sure there are no connections near the culvert or ditch, and if possible use a single length of hose or pipe. Set secondary containment berms perpendicular to the road to contain spills or leaks. Flush the pipes with water, purge with air or cap the hose, and move the pipeline away from the culvert or ditch prior to disconnection.

Permanent or temporary pipelines should be:

- tested and inspected for leaks and breaks right after assembly and prior to each use;
- monitored for leaks during use and application;
- operated with two trained staff, connected with two-way communication at all times, or with one trained staff with automatic or remote-control shut-off technology to shut down the pump in case the pipeline breaks;
- constructed with pipe or hose that can support a flow velocity of 0.8 to 2.5 m/s
 - pipe or hose should be no less than 75 mm in diameter;
- fitted with connections that can withstand all likely conditions, such as head pressure from the pump; and
- flushed with water or air to clean out the hoses and pipes before moving to a different location.



Hard hoses and pipes carrying manure to fields should be monitored for leaks.



Try to minimize even minor losses of manure during transport. In the event of excessive spillage, clean-up measures, such as sweeping, scrapping, shoveling or vacuum pumping, may be required.

5.1.2 Emergency Spill or Accident Plans

Emergency plans are developed in case of a manure spill or accident and are implemented when manure or other contaminants are spilled or an accident occurs. It is important to remember that a plan is only useful if the information put into it is specific to your facility and if everyone involved with the handling and moving of manure is familiar with the plan. A well-designed and implemented response will minimize the risk to human and animal health, reduce economic losses and minimize the potential for environmental contamination.



To stop a manure pipeline spill, shut down pumps and valves.

Dealing with Spills

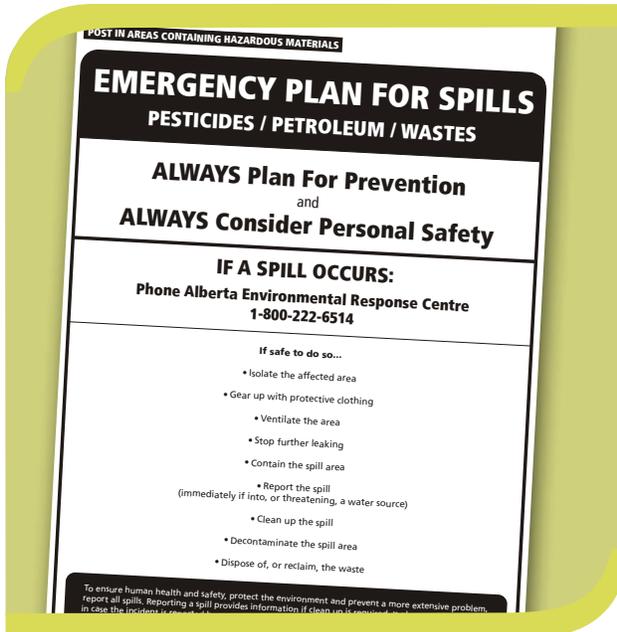
The best solution to any emergency is prevention. Sound management practices will prevent many manure situations from becoming emergencies. In the event that a spill does occur, an emergency response plan will provide guidance to minimize the manure's impact on the environment and human health. Once the spill is contained, contact the NRCB and Alberta Environmental Response Centre to make them aware of the spill and possibly request assistance with site clean-up.

Water resource protection: Often common sense and simple approaches can be taken to interrupt the flow of manure toward and into surface waters. For example, tillage across and down slope of the manure path will slow the velocity of the flow. Berms or dams may need to be installed to restrict and direct the flow of manure and create a containment area. Berms can be constructed from soil with high clay content, used feed, straw, round bales or other absorbent organic matter. Once berms are installed, manure can easily be collected from the contained area and moved to an appropriate storage structure or field applied.



Contain spills. Prevent entry of manure into ditches and culverts.

Manure tanker or applicator accident: There is a good chance that a spill resulting from a manure tanker or applicator accident may include personal injuries (e.g. car accident). As in any manure emergency, *human injuries take precedence over all other responses*. Once the threat to human life or injury is under control, limiting the environmental impact becomes the main goal. Use warning devices, such as flares, flags or flashing lights, to protect on-coming motorists and individuals assisting with the clean-up. Once the site is safe, make every effort to immediately contain or block the flow from moving further downstream and implement removal and recovery procedures to abate or lessen the impact to water resources, as described above.



In the event of a manure spill, call the Alberta Environmental Response Centre at 1-800-222-6514.

Equipment malfunctions: A leak from a manure truck or tanker can result in a relatively small volume of manure being spilt, but a leak from large volume systems such as draglines (umbilical cord systems) and irrigation systems can result in a very large volume of manure being spilt. However, even small volumes of manure spilt in close proximity to an environmentally sensitive area may have adverse impacts. Contain the spilt manure to stop it from moving into environmentally sensitive areas. Once the manure spill has been contained and cleaned up, the equipment needs to be fixed to prevent future malfunctions or leaks.

Developing a Plan

An emergency spill or accident plan that includes key contact numbers such as the NRCB, Alberta Environment and the Municipality, and standard operating procedures in the event of a spill or accident, is highly recommended. The plan may also identify areas of concern and available equipment. The plan should be kept in the cab of manure transport trucks for quick accessibility.

Standard Operating Procedures in the Event of a Manure Spill or Accident

You can adapt the following procedures to your own situation.

1. Make sure the area is safe to enter following an accident.
2. Tend to any human injuries.
3. Eliminate the source of the spill. If the spill is coming from a dragline or irrigation pipeline system turn off the pump and close valves to prevent siphoning.
4. Evaluate the site to determine if risks to the environment such as water bodies can be affected by the spill and assess the extent of the spill. Note any damages.
5. Contain the spill, possibly by using equipment to construct a holding area, berm or dike or by using sand bags or bales to construct a berm.
 - If the spill is in the field, till the soil ahead of the flow and perpendicular to the path of the flow to slow flow velocity and increase infiltration.
 - If flow is concentrated in a ditch or stream, create a set of earthen dams: first, downstream to minimize the movement of manure; second, upstream (if needed) to minimize additional clean water from becoming contaminated; and third, another dam further downstream to act as a back-up for the first dam.
 - Refer to your spill response resource list to quickly access equipment and/or labour necessary to address the spill.
6. Contact key agencies such as the Alberta Environmental Response Centre, NRCB, and the Municipality to notify them of the spill.
7. Clean up spilled material immediately to limit risk of injury and liability.
8. Document the spill in writing and take photos of the spill and clean-up efforts if possible.
9. Repair any components or equipment to prevent future spills.
10. Apply captured manure on cropland.



FOR MORE INFORMATION on manure transportation costs and calculating value from manure application systems, go online to www.agriculture.alberta.ca and search for the Manure Transportation Calculator.

5.2 TRANSPORTATION COSTS

The transportation of manure can result in significant costs depending on the travel distances and time required. The type and moisture content of the manure are also factors that affect transportation costs.

Solid manure generally has a low nutrient content and can contain a significant percentage of water. The greater the moisture content of the solid manure, the higher the costs associated with transportation and handling of the material. Composting of solid manure reduces its moisture content and decreases its volume by two-thirds. Reducing the volume and moisture of solid manure reduces transportation costs, so greater hauling distances become more economically feasible.

Liquid manure can contain a significantly higher concentration of nutrients than solid manure. The costs of transporting liquid manure are impacted by the water content of the material. The use of pipeline or dragline/umbilical manure application systems can significantly reduce the transportation costs associated with liquid manure management.



The use of pipeline or dragline manure application systems can significantly reduce the transportation costs associated with liquid manure management.

5.2.1 Maximizing the Value of Manure

The cost of transporting manure can be offset by maximizing the value captured from the manure through effective management and land application. The greater the value or benefit from the manure, the greater the offset.

The value of manure is a function of the manure's nutrient content, method and timing of manure application, field fertility levels and soil quality, and the crop to be grown. Value can be attributed to manure through the production of a crop, the reduction of input costs associated with crop production and the improvement in soil quality. The application of manure to fields that are already high in nutrients and do not require additional nutrients reduces the potential value or return from the manure.

To maximize the value of manure, apply it to fields in which the crop will be able to take advantage of the manure nutrients as much as possible, and to fields that have the lowest organic matter levels, poorest soil quality and/or have received no or minimal manure over the years.