

NATURAL RESOURCES CONSERVATION SERVICE

CONSERVATION PRACTICE STANDARD

MANURE TRANSFER

(No.)

Code 634

DEFINITION

A manure conveyance system using structures, conduits, or equipment.

PURPOSE

To transfer animal manure (bedding material, spilled feed, process and wash water, and other residues associated with animal production may be included) through a hopper or reception pit, a pump (if applicable), a conduit, or hauling equipment to:

- A manure storage/treatment facility.
- A loading area, and
- Agricultural land for final utilization.

CONDITIONS WHERE PRACTICE APPLIES

The manure transfer component is a part of a planned manure management or comprehensive nutrient management system.

This practice applies where manure is generated by livestock production or processing and a conveyance system is necessary to transfer manure from the source to a storage/treatment facility and/or a loading area, and/or from storage/treatment to an area for utilization. This includes transferring manure from one geographical area with excess manure to a geographical area that can utilize the manure in an acceptable manner.

This practice does not include land application or other uses of manure. Criteria for land application of manure are included in Natural Resources Conservation Service (NRCS) Field Office Technical Guide (FOTG) Standard (590) Nutrient Management or FOTG Standard (633) Waste Utilization.

CRITERIA

General Criteria Applicable to All Purposes

Laws and Regulations. The manure transfer components shall comply with all federal, state and local laws, rules and regulations.

Structures. All structures, including those that provide a work area around pumps, shall be designed to withstand the anticipated static and dynamic loading. Structures shall be designed to withstand earth and hydrostatic loading in accordance with NRCS FOTG Standard (313) Waste Storage Facility. Covers, when needed, shall be designed to support the anticipated dead and live loads.

Reception pits shall be sized to contain a minimum of one full day's manure production. For reception pits collecting runoff, the reception pit shall be sized to also contain at least the volume of runoff from the 25-year, 24-hour storm. Additional capacity shall be added as needed for freeboard and emergency storage.

Openings to structures to receive manure from alley scrape collection shall be a minimum of 9 square feet with one dimension no smaller than 4 feet. The opening shall be equipped with a grate designed to support the anticipated loads.

Conservation practice standards are reviewed periodically, and updated if needed. To obtain the current version of this standard, contact the Natural Resources Conservation Service State Office, or download it from the electronic Field Office Technical Guide for your State.

When curbs are needed in conjunction with structures, they shall be constructed of either concrete or Chromated Copper Arsenate (CCA) or equivalent treated wood. Curbs shall be of sufficient height to ensure total manure flow into the structure and be adequately anchored.

Pipelines. Design of pipelines shall be in accordance with sound engineering principles considering the type of load on the pipe, exposure, etc. The minimum pipeline capacity from collection facilities to storage/treatment facilities shall be the maximum peak flow anticipated on a daily basis.

The minimum pipeline capacity from storage/treatment facilities to utilization areas shall ensure the storage/treatment facilities can be emptied within the time limits stated in the management plan for manure utilization.

Pipelines used for transferring waste to an irrigation system shall meet the requirements of NRCS FOTG Standard (430DD) Irrigation Water Conveyance, High Pressure, Underground, Plastic Pipeline or Standard (430EE) Irrigation Water Conveyance, Low Pressure, Underground, Plastic Pipeline.

Pipe used to transfer manure shall meet or exceed the applicable specification listed in Table 1 below. Pipe used with manure pumps shall be consistent with the pump manufacturer's recommendations. Manufactured fittings and seal joints with solvent cement or elastomeric O-rings shall be used. Joints shall be watertight.

Table 1. Pipe Specifications

Pipe Material	Applicable Specification
Polyvinyl chloride (PVC) Plastic	American Society for Testing and Materials (ASTM): D3034; D1785; D2241; F679; F794
High-Density Polyethylene (HDPE) Plastic	American Association of State Highway and Transportation Officials (AASHTO) : M294 Type S
Concrete	ASTM: C76
Steel	ASTM: A52; A134; A135; A139

All pipes shall be designed based on the type of material and total solids content and shall convey the required flow without plugging. Flow velocities shall be sufficient to minimize settling of solids in the pipeline.

Clean-out access shall be provided for gravity pipelines at a maximum interval of 100 feet. Gravity pipelines shall not have horizontal curves or bends except minor deflections (less than 10 degrees) in the pipe joints unless special design considerations are used.

Where slurry manure is transferred in a gravity system, a minimum of 5 feet of head is required on the pipe system.

Gravity discharge pipes used for emptying a storage/treatment facility shall have a minimum of two gates or valves, one of which shall be manually operated.

Pipelines shall be installed with appropriate connection devices to prevent contamination of private or public water supply distribution systems and ground water. Pipes and channels going through liners, such as clay, concrete, polyethylene, or geosynthetic clay shall be installed so the integrity of the liner is maintained.

- **Non-Bedded Manure.** The minimum pipe diameter for non-bedded manure shall be 6 inches with a minimum of 1.0% grade. Pipes for non-bedded manure shall enter at least 3 feet above the pond or tank bottom.

For continuous flow systems, the minimum grade shall be 1.0%. Flush type systems, which accumulate waste in a hopper or temporary storage at the head of the system, can be designed with steeper grades though they shall not exceed 10.0%. For pipes entering below the design volume elevation, a cleanout shall be installed.

- **Bedded Manure.** For pipelines carrying bedded manure the minimum diameter shall be 24 inches, and shall not exceed 5% grade and 200 feet in length. Pipes for bedded manure shall enter at the pond or tank bottom. The head on these pipes shall be at least 5 feet from the loading hopper to the full level in the storage facility.

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Other Conduits. Concrete lined ditches shall be designed in accordance with NRCS FOTG Standard (468) Lined Waterway or Outlet. A minimum design velocity of 1.5 feet per second shall be used.

Pumps. Pumps installed for manure transfer shall meet the requirements of NRCS FOTG Standard (533) Pumping Plant. Pumps shall be sized to transfer manure at the required system head and volume. Type of pump shall be based on the consistency of the manure and the type of bedding used. Requirements for pump installations shall be based on manufacturer's recommendations. Pumps shall not be used for sand bedded operations.

Safety. The system design shall consider the safety of humans and animals during construction and operation.

Open structures shall be provided with covers or barriers such as gates, fences, etc. Ventilation and warning signs shall be provided for manure transfer systems as necessary to warn of the danger of entry and to reduce the risk of explosion, poisoning, or asphyxiation.

Pipelines from enclosed buildings shall be provided with a water-sealed trap and vent or similar devices where necessary to control gas entry into buildings.

Barriers shall be placed on push-off ramps to prevent tractors or other equipment from slipping into waste collection, storage, or treatment facilities.

Biosecurity. Manure from diseased animals shall be handled in accordance with the recommendations of the State Veterinarian.

Equipment leaving the farm shall be sanitized as appropriate to prevent the spread of disease.

Additional Criteria in Support of Agricultural Land for Final Utilization

Waste Utilization. Manure shall be applied to the utilization area in amounts, uniformity, rates, and at a time consistent with the requirements of NRCS FOTG Standard (590) Nutrient Management or (633) Waste Utilization.

Liquid or Slurry manure shall be adequately agitated prior to transfer for the purpose of land application both on and off the farm.

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Hauling Equipment. Equipment used for hauling manure from one geographical area to another area shall be capable of hauling the manure without spillage, leakage, or wind-blown losses during transport. Hauling equipment shall meet all applicable local, state, and federal laws regarding highway transportation.

Weight limits of roads used for hauling waste shall be followed.

CONSIDERATIONS

General

Consider economics (including design life), overall manure management system plans, and health and safety factors.

On Farm Transfer

In locating structures, utilize existing topography to the greatest extent possible to generate head on structures and reduce pumping requirements.

Consider the operating space requirements of loading and unloading of equipment in the vicinity of manure transfer components.

Consider the subsurface conditions, i.e., depth to bedrock, water table, etc., when locating and designing structures.

Pipelines used for transferring manure should be flushed with clean water after use.

When applicable and compatible, consider the joint use of manure transfer pipelines with irrigation system design requirements.

The pipe pressure rating required may need adjustment based on manure temperature.

Consider corrosion resistance and water tightness in the selection of pipe material and joints.

Consider the potential for salt (struvite) deposits in smaller diameter pipes.

Consider the need for appropriate check valves, anti-siphon protection and open air breaks in all pipelines.

Provisions should be made for removing solids from conveyance conduits such as concrete lined ditches, etc.

Off Farm Transfer/Transport

Consider route selection and timing of manure transfer to minimize impact of nuisance odors on others.

Consider equipment type and covering of manure to minimize particulate matter generation during transportation of the manure.

Vehicles used to transfer manure should be sized to reduce the danger of rollover.

PLANS AND SPECIFICATIONS

Plans and specifications for installing manure transfer systems shall be in accordance with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

OPERATION AND MAINTENANCE

An Operation and Maintenance (O&M) Plan must be prepared and reviewed with the landowner or operator responsible for the application of this practice. The O&M Plan shall provide specific instructions for proper operation and maintenance of each component of this practice and shall detail the level of repairs needed to maintain the effectiveness and useful life of the practice. The plan shall also address the operation to be able to empty the facility within the appropriate time periods.

The operation and maintenance plan shall describe what actions will be taken to minimize flies and other insects during the transfer of manure.

For the hauling of manure from one geographical area to another, record keeping by the producer or his/her designated representative will be required and may include such items as :

- The type, nutrient content, and amount of manure transferred.
- The solids percentage of the manure.
- The date of transfer.
- The name and address of the source and destination of the manure.

- The condition of the manure as left at the destination (spread, stockpiled and covered, etc.)

REFERENCES

Agricultural Waste Management Field Handbook (AWMFH) – Part 651, National Engineering Handbook, USDA-NRCS, April 1992.

Midwest Plan Services (MWPS) Publications:

MWPS – 1, Structures and Environment Handbook.

MWPS – 18, Livestock Waste Facilities Handbook.

MWPS – 36, Concrete Manure Storages Handbook.

Indiana Confined Feeding Rules.

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