

NATURAL RESOURCES CONSERVATION SERVICE
CONSERVATION PRACTICE STANDARD

WASTE TRANSFER

(No.)

CODE 634

DEFINITION

A system using structures, conduits or equipment to convey byproducts (wastes) from agricultural operations to points of storage or usage.

PURPOSE

To transfer agricultural material associated with production, processing, and/or harvesting through a hopper or reception pit, a pump (if applicable), a conduit, and/or hauling equipment to:

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

CONDITIONS WHERE PRACTICE APPLIES

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

Material generated by livestock production or agricultural product processing and a conveyance system is necessary to transfer the byproducts 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 hauling nutrients from one geographical area with excess nutrients to a geographical area that can utilize the nutrients in an acceptable manner.

This practice does not include land application or other use of manure. Criteria for land application of manure are included in NRCS conservation practice standard Nutrient Management, Code 590 or Waste Utilization, Code 633.

CRITERIA

General Criteria Applicable to All Purposes

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 practice standard Waste Storage Facility, Code 313. 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 production. For reception pits receiving runoff, sufficient storage shall be provided to also contain the volume of runoff from the 25-year, 24-hour storm plus any required freeboard and emergency storage.

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Openings to structures to receive material 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.

Manure scraping areas installed under this standard shall be concrete, and meet the slab on grade criteria described in practice standard Waste Storage Facility, Code 313

When curbs are needed in conjunction with structures, they shall be constructed of either concrete or pressure treated wood. Curbs shall be of sufficient height to ensure all materials flow into the structure and shall be adequately anchored.

Pipelines. Design of pipelines shall be in accordance with sound engineering principles considering the waste material properties, management operations, exposure, etc. The minimum pipeline capacity from collection facilities to storage/treatment facilities shall be the maximum peak flow anticipated.

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 nutrient utilization.

Pipelines used for transferring material to an irrigation system, or when waste is pumped, shall meet the requirements of NRCS conservation practice standard, Irrigation Water Conveyance, Pipeline, Code 430. Pipelines meeting 430DD, Irrigation Water Conveyance, Pipeline, High-Pressure, Underground, Plastic are most commonly used.

All pipes shall be designed to convey the required flow without plugging, based on the type of material and total solids content. To minimize settling of solids in the pipeline, design velocities shall be between 3 to 6 feet per second. Fluid velocities shall not exceed 5 feet per second if pipe is not buried or securely tied down.

Pipelines shall be installed with appropriate pressure rated connection devices to prevent contamination of private or public water supply distribution systems and ground water.

Pipelines installed under or within the right-of-way of public roads shall meet the installation requirements of the applicable public entity, and associated correspondence shall be documented in the assistance notes or design folder.

Gravity Transfer Pipes. The transfer pipe is a conduit used to transfer manure and liquid waste by gravity from the source to a waste storage facility.

The pipe must meet or exceed the requirements of the applicable standard specifications listed in the following table:

Pipe Material Specification

Polyvinyl Chloride (PVC)	Polyethylene	Steel	Concrete
ASTM D 2241	AASHTO M252, Type S	ASTM A52,	ASTM: C76
ASTM F 679	AASHTO M294, Type S	ASTM A134,	
ASTM D1785		ASTM A135	
ASTM D3034		ASTM A139	
ASTM F794			

All pipes must withstand the static and dynamic loads. Pipes shall have a minimum cover of 3 feet or be otherwise protected where surcharges are anticipated over the pipe. Where the soil cover must be less than 3 feet over the pipe, it shall be insulated or otherwise protected from freezing

Clean-out access shall be provided for gravity pipelines at a maximum interval of 150 feet unless an alternative design is approved by the design engineer. 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.

In a gravity flow pipe system, a minimum head is required, depending upon the consistency of the material: 4 feet for bedded manure, 2 feet for slurry manure, and 1 foot for liquids and liquid manure.

A gravity pipe, when used to empty a storage pond, shall be equipped with a minimum of two gates or valves to prevent an accidental release, one of which shall be manually operated. One valve is to be located near the pipe inlet below the frost line, and the other located near the pipe outlet. Each valve shall be dual acting (able to apply pressure to flow in either direction). Valves are to be protected from vandalism.

Bedded Manure. For gravity pipelines carrying bedded manure and all dairy manure, the minimum diameter shall be 24 inches, and shall not exceed 5% grade, and 200 feet in length. Manholes may be used for slope changes and to provide cleanout ports. Pipes for bedded manure shall enter at the pond or tank no higher than two feet above the bottom. The head on these pipes shall be a minimum of 4 feet from the top of the loading hopper to the full level in the storage facility

Liquid Waste. The minimum gravity pipe diameter for liquid waste shall be 6 inches with a minimum grade of 1.0% grade. Pipes for liquid waste 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. For swine and veal manure with no bedding, a system to prevent the buildup of solids shall be used. This can be a flush type system or other system that maintains a minimum velocity of 2 fps in the pipeline

Other Conduits. Concrete lined ditches shall be designed in accordance with NRCS conservation practice standard Lined Waterway or Outlet, Code 468. A minimum design velocity of 1.5 feet per second shall be used.

Pumps. Pumps installed for transfer shall meet the requirements of NRCS conservation practice standard Pumping Plant, Code 533. Pumps shall be sized to transfer material at the required system head and volume. Type of pump shall be based on the consistency of the material and the type of solids. Requirements for pump installations shall be based on manufacturer's recommendations.

Solid/liquid waste separation. A filtration or screening device, settling tank, settling basin, or settling channel used to separate a portion of solids from the manure or liquid waste stream will be designed in accordance with NRCS conservation practice standard Solid/Liquid Waste Separation Facility, Code 632.

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 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. Products 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. Nutrients shall be applied to the utilization area in amounts, uniformity, rates, and at a time consistent with the requirements of NRCS conservation practice standard Nutrient Management Code 590 or Waste Utilization, Code 633 as appropriate.

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

Where manure is to be spread on land not owned or controlled by the producer, the manure management plan, as a minimum, shall document the amount of manure to be transferred, the nutrient content of the manure, the date of transfer, and who will be responsible for the environmentally acceptable use of the waste. Provisions shall be made to inform the receiver of the manure of the proper storage and/or utilization requirements.

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 nutrient management system plans, and health and safety factors.

The successful transfer of manure from livestock production areas into manure storage using gravity pipelines is dependent on the manure solids content, bedding types, frequency of manure transfer, and presence of frozen materials (not recommended). Chapter 3—Manure-Management Systems: Collection, Transfer, and Storage; of OSU Extension Bulletin 604 should be referenced to plan these facilities and prepare the O&M plan.

Gravity flow systems using sand bedding require extreme design considerations such as elimination of water, extra cleanouts, more drop in pipe outlets and/or pull plug flow systems and provisions for periodic sand removal near the pipe outlet

Consider the timing and location of agitation and transfer activities to minimize odor formation and transport and to minimize the breeding of insects within the material.

Consider covering and/or minimizing the amount or number of times the material is disturbed to reduce the likelihood of air emissions of particulate matter, volatile organic compounds, and ammonia air emissions formation and release.

Transfer Operations

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 the transfer components.

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

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

The pipe pressure rating required may need adjustment based on material 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.

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

Off Farm Transfer/Transport

Where material is to be spread on land not owned or controlled by the producer, a nutrient management plan is recommended, establishing environmentally acceptable utilization of the material.

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

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

Pipelines used for transferring waste material should be flushed with clean water after use to reduce the risk of gas build up and pipeline explosion.

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

For the hauling of material 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 material transferred;
- the solids percentage of the material;
- the date of the transfer;
- the name and address of the source and destination of the material; and
- the condition of the material as left at the destination (spread, stockpiled and covered, etc.).

REFERENCES

Ohio Livestock Manure Management Guide (Bulletin 604), 2006, Ohio State University Extension:
<http://ohioline.osu.edu/b604/>