

**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

Manure Transfer is a part of a planned manure management or comprehensive nutrient management system.

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 hauling 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 use of manure. Criteria for land application of manure are included in NRCS Conservation Practice Standards 590 - Nutrient Management, or 633 - Waste Utilization.

CRITERIA

General. Manure transfer components shall comply with all federal, state, and local laws, rules and regulations.

Environmental protection. All Manure transfer equipment shall be liquid tight and well maintained to help prevent accidental damage or failure that could result in an uncontrolled discharge of manure and possible contamination of water.

The subsurface conditions, i.e., depth to bedrock, water table, etc., shall be considered when locating and designing structures.

Material. All material used for manure transfer shall be corrosion resistant.

Compatibility and capacity. The manure transfer system needs to be compatible with all components of the manure management system. The transfer system must have the capacity to meet the requirements for loading and unloading the manure management system.

Topography. Utilization of topography to generate head to reduce pumping requirements shall be considered.

The elevation differences between the source of the manure and its final location play a significant role in deciding which system can be used. Gravity systems must have sufficient working head to be feasible. Mechanical and pumping systems are limited to the height and head loss based on the capabilities of the equipment.

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 Conservation Practice 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 prevent excess cycling of transfer pumps.

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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.

When curbs are needed in conjunction with structures, they shall be of sufficient height to ensure total manure flow into the structure and be adequately anchored.

The reception pit or hopper shall be located to provide acceptable access for the scraping and cleaning equipment.

Pumps. Pumps installed for manure transfer shall meet the requirements of NRCS Conservation Practice 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.

Considerations for pump installations shall be based on manufacturer's recommendations.

Chopper style pumps are recommended for transfer purposes. These types of systems utilize a temporary storage and pump to transfer the manure over separators and to ponds. The temporary storage collects and stores the manure and serves as a pumping port or platform. Pumps are used to agitate and transfer the manure. These systems are limited by working head and pipeline distances, as well as available power sources.

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 need for appropriate check valves, anti-siphon protection, and open air breaks shall be considered in all pipelines.

Adjustments to the pressure rating for plastic pipe shall be made based upon the temperature of the manure.

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. The minimum pipeline capacity from collection facilities to storage / treatment facilities shall be based on the maximum daily flow anticipated. This capacity shall insure that the storage / treatment facilities can be emptied within the time limits stated in the management plan for nutrient management.

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. Pipelines shall be designed to have a minimum velocity of 2 feet per second. Flow velocity should not normally exceed 5 feet per second. Where manure is transferred in a gravity system, velocities can be reduced if a minimum of 5 feet of head is provided on the pipe system.

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

The diameter of the pipeline should be considered when determining the amount of time the manure will travel within the system. Manure that enters the pipe should exit within 48 hours. In the event that sawdust or chopped paper is used for bedding, less time shall be allowed to prevent formation of a dry plug.

Pipelines shall be installed with appropriate connection devices to prevent contamination of private or public water supply distribution systems and ground water. All changes in vertical direction shall be made with watertight fittings compatible with the type of pipe being used.

A vent shall be placed in any gravity transfer system at a location beyond the entrances to the pipeline to alleviate air locking of the system.

The vent shall be a minimum of one-fourth the diameter of the nominal pipe size.

All entrances to the pipes shall be made with a smooth, square edge. Vertical changes in direction in a pipeline shall not be greater than 45° angles at any one time.

Clean-out access shall be provided for gravity pipelines at a maximum interval of 200 feet for lines carrying non-bedded manure. For pipelines carrying bedded manure the maximum interval shall be 150 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.

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 used for transferring waste to an irrigation system shall meet the requirements of NRCS Conservation Practice Standard 430 - Irrigation Water Conveyance, Pipeline.

Other Conduits. Concrete lined ditches shall be designed in accordance with NRCS Conservation Practice Standard 428A – Irrigation Water Conveyance, Ditch and Canal Lining, Plain Concrete. A minimum design velocity of 1.5 feet per second shall be used.

Sprinkler irrigation systems. Sprinklers or sprinkler systems shall be designed in accordance with NRCS Conservation Practice Standard 442 - Irrigation System, Sprinkler. System capacity shall be adequate to apply the required volume of manure at a rate and uniformity that shall prevent runoff and not exceed the nutrient requirement of the crop. Nozzle size shall be appropriate for the consistency of the manure applied. Sprinkler-applied manure water shall contain less than one-percent solids unless provisions are made for straining or filtering before application.

Mobile spreaders. Manure spreaders and/or tank wagons shall have adequate capacity to insure the emptying of storage / treatment facilities within appropriate time periods as stated in the operation and maintenance plan.

Manure utilization. Manure shall be applied to the irrigated area in amounts and at a time consistent with the nutrient management plan and NRCS Conservation Practice Standards 590 - Nutrient Management, or 633 - Waste Utilization.

Miscellaneous. Surface and subsurface systems used in conjunction with gravity application shall be designed to insure highly efficient and uniform application amounts not exceeding the nutrient requirements of the plants.

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

Open structures shall be provided with covers or barriers such as gates, fences, etc. Fences shall comply with NRCS Conservation Practice Standard 382 – Fence.

Excavation depths near or under building foundations should be the minimum required. Support for the foundation may be necessary to protect the building and workers during construction.

Manure spreaders or tank wagons shall be towed with properly sized equipment.

To insure the safety of humans and livestock to help prevent explosion, poisoning, or asphyxiation, warning signs shall be posted in enclosed manure holding structures, and near hoppers and reception pits, describing the hazards associated with the hopper and accumulated gases, as appropriate. Ladders, guard rails, shields, lighting, and other devices shall be installed as needed. Safety shields or devices supplied with equipment shall not be removed or altered in any way.

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.

Buildings shall be well ventilated.

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

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recommendations of the New Mexico Environmental Department.

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 Conservation Practice Standards 590 - Nutrient Management, or 633 - Waste Utilization, 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.

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

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

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.

The following manure transfer systems should be considered for handling liquid manure:

- Gravity systems, which include a hopper or inlet system, a pipeline and outlet, slopes, gutters, or chutes.
- Mechanical, direct transfer systems, which may include a hopper, ram pump, chute, chain, valves, and pipeline.
- Storage and pump system, which include storage, a reception pit or collection tank, pump, valves, pipeline, separators, and media filters.

Location. The manure transfer system should be located near, and have direct access to the source of the manure such as gutter cleaners, push offs, sumps, or drains. It should be accessible for operation and maintenance. The system should take a direct path from the source of the manure to its final destination.

Capability. Management flexibility such as alternative transfer methods, supplemental water, and temporary stacking or mixing capacity should be considered where dry or frozen manure might be a problem.

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 the manure transfer components.

System 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.

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

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 and traffic congestion.

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

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.

The plans must show all features required for the proper installation and functioning of the practice, including (but not limited to):

- Location map,
- Plan view,
- Profiles,
- Sub-grades,
- Foundation requirements,
- Structural design,
- Inverts,
- Cross sections with details such as bedding and elevations,
- Type of pipelines,
- Pump size and horsepower requirement.
- Fasteners,
- Joint seals,
- Drainage,
- Erosion/sediment control,
- Access, and
- Safety devices.

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

Site specific operation and maintenance requirements shall be developed for each system, and shall be provided to and reviewed with the operator/owner. These requirements shall be consistent with Conservation Practice Standards 313 - Waste Storage Facility, 590 - Nutrient Management, and 359 - Waste Treatment Lagoon, and equipment manufacturer's requirements and recommendations for separate components.

Gravity system design shall include instructions to add water to the system when it appears to function slower or when material has been added which could affect the consistency of manure and performance of the system. The water shall be added at the bottom of the hoppers.

Clean water to flush system

Frozen or dried manure can cause plugging of the transfer system. Before loading frozen manure into the transfer system it should be piled or stacked until it thaws. Dried manure should be liquefied before loading into the system.

As a minimum, the O&M plan shall contain items related to maintenance of the system as follows:

- Integrity,
- Operational procedures,
- Safety requirements, and

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- A contingency or emergency procedure to be followed in the event of accidental spill or seepage or unforeseen circumstances.

In the event a custom operator empties the storage facility, it shall be the responsibility of landowner/operator to review the plan with the custom operator prior to operating the system.

DOCUMENTATION

A manure transfer system shall not be reported as complete until adequate documentation, showing proper installation, has been prepared. The as-built drawings shall be signed and dated by the person with installation approval authority to indicate that the structure was installed as designed, except as noted by redline changes.

In addition, the as-built drawings shall include the names of the installer, component manufacturer, and date of completion of each system component. The as-built records shall also include any applicable "Statement of Conformance" presented or certified by suppliers of structures or equipment. The design folder, as-built drawings, certifications and specifications shall be filed in the Comprehensive Nutrient Management Plan.