Manure Transfer

(No.)

Code 634

Natural Resources Conservation Service
Conservation Practice Standard

I. Definition

A conveyance system using structures, conduits, or equipment.

II. Purposes

To transfer animal manure, *wastewater*[1], and contaminated runoff through a reception pit, pump, *channel* or conduit.

III. Conditions Where Practice Applies

The manure transfer component is part of a planned agricultural waste management system.

This standard applies where manure and other waste is generated by livestock production or processing and a conveyance system is necessary to transfer material from the source to a storage facility, treatment facility, or loading area.

This standard does not apply to conveyance systems using equipment or mechanisms such as barn cleaners, alley scrappers, or belts for moving manure in the housing facility to the reception pit, pump, channel, or conduit.

This standard does not apply to removal or transfer from the storage facility, treatment facility, or loading area to the field.

IV. Federal, State and Local Laws

Manure transfer shall comply with all federal, state and local laws, rules or regulations. The operator is responsible for securing required permits. This standard does not contain the text of the federal, state or local laws.

V. Criteria - The following **minimum** criteria shall apply to all transfer designs.

A. General Criteria

1. **Management Assessment** - A management assessment shall be conducted, documented, and incorporated into the design. The assessment shall be performed with the owner/operator to explore options and to determine the purpose of transfer components, available resources, manure handling practices, and waste characterizations. The Management Assessment criteria in V. A. 1. of Standard 313 - Waste Storage Facility, NRCS, Field Office Technical Guide (FOTG), Section IV, shall be followed.
2. **Site Assessment** - A site assessment shall be conducted, documented, and incorporated into the design. The assessment shall be performed to determine physical site characteristics that will influence the placement, construction, maintenance, and environmental integrity of a proposed manure transfer system. The Site Assessment criteria in V. A. 2. of Standard 313 - Waste Storage Facility, NRCS, FOTG, Section IV, shall be followed.
3. **Structures** -Structural components shall be designed to withstand all anticipated static and dynamic loads, and shall be designed in accordance with Standard 313 - Waste Storage Facility, NRCS, FOTG, Section IV.
4. **Safety** - The system design shall identify and minimize the hazards to animals and people. At a minimum, safety design shall include:
   a. Fences, gates, grates, or covers to restrict access of animals or people, and signs where access is possible.
   b. Ventilation for covered waste transfer structures to prevent the inhalation of poisonous gases, asphyxiation, or explosion.
   c. A water-sealed trap or similar devices where necessary to control gas entry into enclosed rooms.
   d. A minimum of one in-line manual valve in the transfer pipe where the storage facility is higher than the transfer structure.

[1] Words in the standard that are shown in italics are described in IX. Definitions. The words are italicized the first time they are used in the text.

5. **Operation and Maintenance** - An operation and maintenance plan shall be developed that is consistent with the purpose of this practice, intended life of the components, safety requirements, criteria for design, and the Operation and Maintenance plan in Standard 313 - Waste Storage Facility, NRCS, FOTG, Section IV,.

B. Specific Criteria

1. Reception Pits, Pumps, Channels and Transfer Pipes

a. Reception pits, pumps and channels shall meet the following criteria:

(1) They shall be liquid tight unless they are placed in soils and locations which meet the criteria of Table 1 in Standard 313 - Waste Storage Facility, NRCS, FOTG, Section IV.

(2) Separation distance criteria in Table 1 of this standard.

(3) Concrete reception pits and channels shall be designed according to the structural and soil criteria in Standard 313 - Waste Storage Facility, NRCS, FOTG, Section IV.

(4) Lateral seepage from *confined lenses* and *perched water* shall be controlled as needed for the structural integrity of reception pits and channels.

(5) Excavation of *bedrock* is permitted.

b. Transfer pipes shall meet the following criteria:

(1) Joints shall be liquid tight and bedded according to NRCS Wisconsin Construction Specification 15 - Plastic Pipe Conduits and backfilled according to NRCS Wisconsin Construction Specification 204 - Earthfill for Waste Storage Facilities.

(2) Pipes shall meet the criteria in Table 2. Pipes of equivalent strength, durability, and liquid tightness are acceptable. All joints shall be liquid tight in accordance with the manufacturer's specifications. Use standard manufacturer pieces for angles and couplings. Concrete thrust blocks shall be at least 0.5 cu. yd. and installed at all angles for pumped systems. For pump systems the pipe selection shall be compatible with the pump characteristics.

(3) 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.

(4) Pipes shall be at least 6 in. above bedrock. Excavation of bedrock is acceptable. There is no separation required from the *regional water table.*

(5) Pipes shall be protected from frost with a minimum of 4 ft. of soil cover or an equivalent amount of soil and insulation. This criteria does not apply to pipes that are empty following transfer.

2. Gravity Transfer

Gravity Transfer - For systems using pipes to carry manure between reception pits and storage facilities, treatment facilities, or loading areas. There shall be no gravity outlets from the waste storage facility.

a. *Reception pits with a gravity pipe outlet* shall follow all previous reception pit criteria (V.B.1.a.(1-5)) plus the following additional criteria:

(1) Reception pits built with pre-manufactured manholes or pipes on end shall follow the criteria in Table 2.

(2) Reception Pit Top and Volume -The design shall meet the following criteria:

Slower Flowing Manure - For manure which tends to be slower flowing due to bedding, feed, or dryness (typically stanchion barns) the top of the reception pit must be a minimum of 4 ft. above the freeboard elevation of the storage facility (see Standard 313 - Waste Storage Facility, NRCS FOTG, Section IV, for information on freeboard). The volume of the reception pit above the freeboard elevation must be at least one-half of the daily manure production.

Faster Flowing Manure - For manure which tends to be faster flowing due to lack of bedding or additional liquids (typically free stall barns, veal or hog facilities), the top of the reception pit must be a minimum of 1 ft. above the freeboard elevation, plus 1% of the pipe length. There is no minimum volume for the reception pit with this type of manure.

b. Gravity transfer pipes shall follow all previous transfer pipe criteria (V.B.1.b.(1-5)) plus the following additional criteria:

(1) The pipe top shall be ≥ 4 ft. below the top of the reception pit for the slower flowing manure and ≥ 2 ft. for faster flowing manure.

(2) The pipe length shall be a maximum of 150 ft. for slower flowing manure and a

maximum of 400 ft. for faster flowing manure.

(3) The pipe diameter shall be a minimum of 24 in. for slower flowing manure.

(4) Pipe Vent/Access - For pipes carrying slower flowing manure, a vent pipe (4 inch diameter minimum) shall be installed within 10 ft. of the reception pit.

Table 1 - Separation Distances for Pumps, Reception pits, and Channels [1]

Transfer Components	Floor Surface or Bottom of Pump Relative to Bedrock	Floor Surface or Bottom of Pump Relative to *Regional Water Table* (RWT)	Well Separation Distance [2]
Piston Pumps			
Pumps encased in concrete	≥6" separation (bottom of pump)	Bottom of pump maximum depth into RWT shall be 2 ft.	≥50'
Pumps housed in tank	≥1' separation (floor of tank)	Floor may be at the level of the RWT	≥50'
Reception Pits			
Small Pits where plan view is ≤ 100 sq. ft.	≥1' separation	Floor may be at the level of the RWT	≥50'
Large Reception Pits	≥2' separation	≥2' separation (≥1 ft. for sumps)	≥100'
Channels			
(≥2' depth)	≥2' separation	≥2' separation (≥1' for sumps)	≥100'

[1] The separation is determined to be the closest distance from any point on the inside surface (bottom and sides) of the pumps, reception pits, channels and tanks to the feature from which separation is required.

[2]Well separation distances are in accordance with NR 812 - Well Construction and Pump Installation.

Table 2 - Transfer Pipes

Material	Materials Components and ASTM Specifications [1]	Well Separation Distance [2]
Pipes Carrying Pumped Manure		
PVC	D-3034 (SDR 35), F-789, F-679 --- D-2241 (SDR 21), D-1785 (Sch. 40 or 80) [3]	≥50' --- ≥25'
Pipes Carrying Gravity Flow Manure		
PVC	F-679, F-794, D-3034, F-789, D-2241, D-1785, Sch. 40 or 80	≥25'
PE	F-667 (smooth inside wall, liquid tight joints)	≥25'
Concrete	C-76, C-789, C-478	≥25'

[1]Pipes listed in NR 812 - Well Construction and Pump Installation are deemed equivalent.

[2]Well separation distances are in accordance with NR 812 - Well Construction and Pump Installation.

[3]Use D-2241, SDR 21 or D-1785, Schedule 80 for pipes from chopper pumps.

VI. Considerations – *Additional recommendations relating to design which may enhance the use of, or avoid problems with, this practice but are not required to ensure its basic conservation function are as follows:*

A. Use appropriate check valves, anti-siphon protection and open air breaks.

B. Operation and maintenance of gravity pipes carrying faster flowing manure may be enhanced by using venting and clean-out access pipes.

C. Flow through the transfer pipe may be enhanced by using guillotine gates at the outlet of gravity reception pits.

D. Flow characteristics may be enhanced by adding dilute waste water to gravity flow systems.

E. Addition of very liquid wastewater to manure containing sand bedding enhances sand settling. Add water when sand settling is desired.

F. A wet sump may be useful for gravity reception pits.

G. Gravity pipes should be as straight as possible. Risers, such as pre-manufactured manholes, can be used to change direction.

H. Consider restraining the last section of concrete pipes used for gravity transfer.

I. Evaluate the need for frost protection to reduce plugging in transfer gutters and channels.

VII. 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. An inspection plan is required.

VIII. References and Technical Guidance

Agricultural Waste Management Field Handbook, Part 651, NRCS.

Chapter NR 812, Well Construction and Pump Installation Wisconsin Administrative Code, Department of Natural Resources.

Standard 313 - Waste Storage Facility, NRCS, Wisconsin Field Office Technical Guide, Section IV.

Wisconsin Construction Specification 204 - Earthfill for Waste Storage Facilities, NRCS, Wisconsin Field Office Technical Guide, Section IV.

Wisconsin Construction Specification 15 - Plastic Pipe Conduits, NRCS, Wisconsin Field Office Technical Guide, Section IV.

IX. Definitions

Bedrock (V.B.1.a.(4), V.B.1.b.(3), Table 1) - Consolidated rock material and weathered in-place material with > 50%, by volume, larger than 2 mm in size.

Channels (II, III, V.B.1., V.B.1.a., V.B.1.a.(3), V.B.1.a.(4), V.B.1.b.(3), Table 1. VI. I.) - Structures used to convey manure to reception pits, tanks, or waste storage facilities. They generally are made from concrete and range from 2' to 12' wide and from 2' to 12' deep.

Confined Lenses and Perched Water (V.B.1.a.(3)) - Water bearing deposits of stratified lacustrine material or material laid down by glaciers between deposits of less permeable till. Perched water is saturation found above and separated from the regional high water table.

Reception pits with a gravity pipe outlet (V.B.2.a.) - Any manure containment structure having a gravity pipe outlet to the waste storage facility.

Regional Water Table (V.B.1.b.(3), Table 1, Bedrock Definition) - The seasonal high, free water surface of a large body of groundwater covering a region. All soil below the regional water table is saturated. Soil mottling (redoximorphic features) is not necessarily an indicator of the regional high water table, but is an indication of soil saturation.

Wastewater (II., VI.E.) - Milking center waste, flush water, leachate from feed holding areas, and similar waste materials.