

WASTE TRANSFER

(No.)
Code 634

Natural Resources Conservation Service
Conservation Practice Standard

I. Definition

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

II. Purposes

To transfer waste (manure, *manure processing derivatives*¹, *contaminated runoff*, and *wastewater*, which includes milking center waste, *leachate* from feed holding areas, and similar waste materials) in a manner which safeguards the environment. It includes transfer through a *hopper*, *reception structure*, a pump, *channel*, or permanently installed conduit to:

- A waste storage facility,
- A waste treatment facility,
- A wastewater treatment system,
- A loading area,
- Cropland.

III. Conditions Where Practice Applies

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

This practice standard applies where manure and other waste is generated by livestock production or processing, and a permanently installed conveyance system is necessary to transfer material from the source to a storage facility, treatment facility or system, loading area, or cropland. This includes moving nutrients from one geographical area with excess nutrients to a geographical area that can utilize the nutrients in an acceptable manner.

This practice standard does not apply to conveyance systems using equipment or mechanisms such as *gutters*, barn cleaners, alley scrapers, or belts for moving manure in the housing facility to the manure transfer system.

This practice standard does not apply to transfer by vehicles or temporary surface pipe or hoses from the storage facility, treatment facility or system, or loading area to the field or another storage facility.

IV. Federal, Tribal, State and Local Laws

Waste transfer systems shall comply with all federal, tribal, state and local laws, rules or regulations or permit requirements governing waste transfer. The operator is responsible for securing required permits. This standard does not contain the text of the federal, tribal, state or local laws.

V. Criteria

The following minimum criteria shall apply to all waste 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 characteristics.

The management assessment shall address the following:

- a. Waste Characterization.
 - 1) Sources, volumes and consistency of manure, contaminated runoff, manure processing derivatives, leachate, wastewater, and other inputs to the waste transfer system.
 - 2) Animal types.
 - 3) Bedding types and quantity.
- b. Waste handling, transfer methods and duration.
- c. Facility waste removal methods.
- d. Access needs and limitations.

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

- e. Safety needs.
- f. Labor and equipment needs.
- g. Odor production concerns and control strategies.
- h. Aesthetics and animal health.
- i. Provisions for facility expansion.

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 waste transfer system. The assessment shall include input from the owner/operator. The site assessment shall include the following.

- a. Locations and elevations of buildings, roads, lanes, soil test pits, property lines, setbacks, easements, wells, springs, floodplains, surface waters, surface drains, drain tile, utilities, overhead lines, *cultural resources*, and wetlands.
- b. Subsurface investigations for reception structures, channels and transfer pipes in the *animal production area* shall be located such that no portion of the structure, channel or pipe is greater than 100 feet from a subsurface investigation point. The investigation shall extend to a minimum depth to ensure required separation distances for the proposed component is achieved.
- c. Additional soil investigations shall be conducted if there are substantial variations within or between the soil investigations that may affect the design.
- d. Subsurface investigation logs shall include:
 - 1) Soil layers described with respect to thickness, texture using the Unified Soil Classification System (USCS), Munsell color, presence and color of redoximorphic features (soil mottling), *gleyed soil* and moisture condition.

- 2) The elevation of *bedrock* and bedrock type, if encountered, such as sandstone, limestone, dolomite, or granite.
- 3) The upper elevation of all saturated layers encountered shall be recorded in the field.

- e. Subsurface investigations shall include a narrative describing the design limitations that have been derived from the soils data.

3. Separation from Subsurface Saturation or Bedrock

The separation is determined to be the closest distance from any point on the inside surface of the component to the feature from which separation is required.

The definition of subsurface saturation is not intended for application in any context other than to protect components installed from hydrostatic loadings.

- a. For the purposes of this standard, factors used to identify subsurface saturation shall include observed saturation, gleyed soil, gray mottles, and soil color in conjunction with nearby surface water features. The highest subsurface saturation elevation identified in a test pit/soil boring will be identified by any of the following soil properties.
 - 1) Free water or wet soil identified by glistening, due to the slow release of water.
 - 2) Gleyed soil, that may extend uninterrupted from an observed free water surface.
 - 3) The presence of distinct gray redoximorphic features with a chroma of 2 or less based on Munsell color charts.
 - 4) Depleted matrices having a value of 4 or more and chroma 2 or less based on Munsell color charts. In some cases soil parent materials have a natural color of 2 chroma or less or gleyed color that is not due to saturation. In these cases other indicators may be used: landscape

position, elevation or soils in relation to nearby water features.

- b. In soils not conducive to mottling, such as sand, the subsurface saturation elevation shall be established by evaluating the soil morphology of the soil profile. Other indicators that may be considered in making the determination are the position of the soil in the landscape, topography, nearby wetlands and well construction logs.
- c. Subsurface saturation, if encountered, shall not be drained (or have water-bearing layers removed) except as described for *perched conditions*. Perched conditions may be drained or water-bearing materials removed to achieve separation distances in the tables and relieve hydrostatic loads. Documentation to demonstrate that subsurface saturation is perched and of drainable extent or its effects otherwise eliminated shall be included in the site assessment. All *drainage systems* shall drain by gravity. The effect of temporary tailwater on the component and the effects of outletting to perennial and intermittent waterways shall be evaluated. A drainage system shall be located around the outside perimeter of the component footprint and drain to a surface outlet.
- d. If the site assessment indicates artesian features, a hydrogeologic and geotechnical evaluation of the site shall be completed to determine the site suitability for in-ground components.
- e. Excavation of bedrock is permitted to achieve the required separation distance as specified in the tables. Bedrock shall not be removed by blasting. The exposed bedrock surface shall be evaluated to ensure a structurally sound base. Fractures or voids shall be treated to prevent migration of soil material. The surface of excavated bedrock shall have a positive grade, minimum of 1 percent, under and away from the component, as to prevent any significant ponding on the rock surface unless otherwise stated in specific criteria sections. If bedrock is excavated, the material placed between the component

and the bedrock shall have a minimum of 20% passing the #200 sieve.

4. Flood Prone Areas

- a. Reception structures, channels and hoppers located in *flood prone areas* shall be protected from inundation, structural damage and instability from the maximum water elevation resulting from the 25-year, 24-hour rainfall event.
- b. Waste transfer components located within the maximum water elevation resulting from the 25-year, 24-hour rainfall event, shall be designed for additional loadings such as hydrostatic pressures and buoyancy/uplift. These systems shall also be evaluated for additional protections such as automatic shutoff systems, backflow prevention valves or check valves, watertight connections, main power disconnects, submersible type splices on electrical lines, etc. Any vents, power supplies, and automatic or manual shutoff controls shall be located at or above the maximum water elevation resulting from the 25-year, 24-hour rainfall event so that access is possible.

5. Safety

The system design shall identify and minimize the hazards to animals and people during construction and operation. Waste transfer designs may create *confined spaces*, which can pose significant hazards to people. At a minimum, a design shall include the following.

- a. Open structures shall be provided with covers or barriers such as gates, safety fences (see Wisconsin NRCS Field Office Technical Guide, Section IV (WI FOTG), Conservation Practice Standard 382, Fence), etc., to restrict access of animals or people. Include warning signs as necessary.
- b. Tank covers shall be designed to withstand both dead and live loads. The live load values for covers contained in ASAE EP378.4, Floor and Suspended Loads on Agricultural Structures Due to Use, and in ASAE EP393.3, Manure Storages, shall be the minimum used. For vehicles or equipment in excess of 20,000 pounds

gross vehicle weight, the actual axle load shall be used.

- c. In push-off areas, barriers shall be installed to prevent the accidental entry of tractors or other equipment.
- d. Warning signs shall be provided for waste transfer systems as necessary to warn of the danger of entry and to reduce the risk of explosion, poisoning, or asphyxiation. Appropriate signage shall be visibly located at all access points.
- e. Ventilation of enclosed areas shall be provided as necessary to reduce the risk of explosion and asphyxiation.
- f. Waste transfer lines from enclosed buildings shall be provided with a water-sealed trap and vent or similar devices where necessary to control gas entry into buildings.
- g. A minimum of one in-line manual valve in the transfer pipe, located as close to the storage facility as practical, shall be installed when the top of the storage facility is higher than the top of the transfer structure. An in-line valve is not required if the transfer pipe does not penetrate the liner and terminates at an elevation above the top of the storage facility, thus providing an air gap.
- h. Confined spaces where human entry may occur shall be designed and operated in compliance with the provisions contained in ASABE EP470, Manure Storage Safety. Covered channels and reception structures that require humanly occupied equipment operated in the transfer system for cleaning shall not be utilized because they do not meet this safety standard.

6. Failure Analysis

The overall functionality of the waste transfer system shall be evaluated for possible malfunctions that could lead to a release of the waste transfer system contents outside the normal operational confines of the waste management system. Identified potential failures should be addressed in the design phase, the operation and maintenance plan, and the emergency response plan.

7. Construction Plans and Specifications

Construction plans and specifications for installing waste transfer systems shall be in accordance with this standard and shall describe the requirements for applying the practice to achieve its intended purpose, including the maximum design *working pressure* and the *transfer system pressure rating* of each transfer system. Construction plans and specifications shall include a location map, plan view, profiles, cross sections, details and specifications to ensure that the project can be properly constructed.

8. Engineering Design Documentation

Engineering design documentation shall be prepared in compliance with the Design Deliverables in the Wisconsin NRCS Statement of Work for the WI FOTG Standard 634, and shall demonstrate that the criteria in the NRCS practice standard have been met. Design documentation shall include all substantiating data, assumptions, computations and analyses, and the maximum design working pressure and the transfer system pressure rating of each transfer system.

9. Quality Assurance Plan

A quality assurance plan is required that describes the type and frequency of testing, the items requiring inspection, the documentation required, and the qualifications of the person doing the work.

The quality assurance plan shall address the following items:

- a. Site and Contact Information.
- b. Introduction and Project Description – Narrative Format.
- c. Responsibilities of Key Parties.
- d. Pre-Construction Meeting.
- e. Items Requiring Inspection, Observation, and Testing.
- f. As-built Plans and other Certification (Attesting) Documentation.

10. Operation and Maintenance

An Operation and Maintenance (O&M) Plan shall be prepared and reviewed with the landowner and/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 routine maintenance needed to assure the effectiveness and useful life of this practice. The O&M Plan shall be consistent with the purpose of this practice, safety requirements, criteria for design and the Operation and Maintenance Plan in WI FOTG Standard 313, Waste Storage Facility.

At a minimum, the O&M Plan shall include the following items:

- a. System information including the general system description, assumed system performance, maximum design working pressure and the transfer system pressure rating of each transfer system.
- b. Safety and emergency response including actions to address potential component failures identified in the waste transfer system failure analysis and an emergency response plan for actions needed to address spills and overflows.
- c. Operating procedures including: typical operating procedures, procedures for proper start-up and shutdown for the operation of pumped transfer systems and valve operation sequence if applicable.
- d. Maintenance items including: scheduled routine maintenance required by the component manufacturer, procedures for cleaning and unplugging pipe, and inspection and maintenance of all safety items.

B. Specific Criteria

1. Reception Structures, Channels, Hoppers, and Pumps

Reception structures, channels, hoppers, and pumps shall meet the following criteria.

- a. Joints and appurtenances shall be liquid tight.

- b. Separation distances criteria in Table 1 shall be met.
- c. Reception structures shall be sized as follows:
 - 1) Reception structures that are part of a manure transfer system.
 - a) Reception structures not receiving runoff and/or precipitation shall be sized to contain a minimum of one full day's manure production, plus six inches extra depth for safety; or
 - b) Reception structures receiving runoff and/or precipitation shall be sized to contain a minimum of one full day's manure production, plus six inches extra depth for safety, and the volume of runoff and/or precipitation from a 25-year, 24-hour rainfall event. The increase in storage volume due to runoff and/or precipitation may be reduced if a portion of this runoff and/or precipitation can be safely routed to and contained within the waste management system.
 - 2) Reception structures that are part of a contaminated runoff or wastewater management system.
 - a) Reception structures not receiving runoff and/or precipitation shall be sized according to the appropriate conservation practice standard and design needs of the system; or
 - b) Reception structures receiving runoff and/or precipitation shall be sized according to the appropriate conservation practice standard and design needs of the system, plus the volume of runoff and/or precipitation from a 25-year, 24-hour rainfall event. The increase in storage volume due to runoff and/or precipitation may be reduced if a portion of this

runoff and/or precipitation can be safely routed to and contained within the waste management system.

- d. 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, or otherwise protected to prevent accidental entry.
- e. Cast in place reception structures and channels shall be designed for static and dynamic loading, including uplift (buoyancy). Reception structures and channels shall be designed to withstand soil and hydrostatic loading in accordance with WI FOTG Standard 313, Waste Storage Facility. Covers, when needed, shall be designed to support the anticipated dead and live loads.
- f. Prefabricated reception structures and channels used to transfer manure and manure processing derivatives shall be designed according to the structural and soil criteria in WI FOTG Standard 313, Waste Storage Facility.
- g. Prefabricated reception structures used to transfer only wastewater and/or contaminated runoff are not required to meet the structural and soil criteria in WI FOTG Standard 313, Waste Storage Facility, but shall meet, at a minimum, the following requirements:
 - 3) No structural modifications to prefabricated structures, such as pump attachments, shall be made unless approved in writing by the manufacturer.
- h. Pre-manufactured manholes shall conform to the criteria in ASTM C478 and the base section shall have the riser wall and base slab cast monolithically as a single unit.
- i. Pumps shall be sized to transfer waste at the required system head and flow rate. The type of pump shall be based on the consistency of the waste and the type of bedding used, if applicable. Requirements for pump installations, including connecting appurtenances, shall be based on manufacturer's recommendations. Pumps installed for transfer shall meet the requirements of WI FOTG Standard 533, Pumping Plant.
- l. When penetrating waste storage liners, the performance and integrity of the liner shall be maintained. All penetrations and restraints shall meet the criteria in WI FOTG Construction Specification 634, Waste Transfer (Spec. 634).
- m. When solid/liquid waste separation is planned, 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 shall be designed in accordance with WI FOTG Standard 632, Solid/Liquid Waste Separation Facility.

The structure shall be currently listed in the Wisconsin Department of Safety and Professional Services (DSPS), Safety and Building Division, Plumbing Products Database.

- 1) The structure shall comply with all stipulations listed in the Wisconsin DSPS approval that relate to liquid tightness and/or structural strength.
- 2) The structure shall be located a minimum of 15 feet from established or planned roadways, or designed for anticipated loads.

Table 1
Separation Distances for Reception Structures Hoppers, Channels, Pumps, and Pipes

Transfer Components	Bottom of Pump, Floor Surface, or Pipe Invert Relative to Bedrock	Bottom of Pump, Floor Surface, or Pipe Invert Relative to Subsurface Saturation	Well, Spring, and Reservoir Separation Distance^{Note 1}
Pumps			
Pumps encased in concrete	≥ 6 inches	Bottom of pump maximum depth into saturation shall be 2 feet	≥ 50 feet
Pumps housed in a drywell ^{Note 2}	≥ 6 inches	Floor may be at the subsurface saturation level	≥ 50 feet
Reception Structures and Hoppers			
Capacity < 6,000 gallons	≥ 1 foot	Floor may be at the subsurface saturation level ^{Note 3}	≥ 50 feet
Capacity ≥ 6,000 gallons	≥ 2 feet	≥ 2 feet (≥1 foot for sumps) ^{Note 3}	≥ 100 feet
Channels			
(≥ 2 foot depth)	≥ 2 feet	≥ 2 feet (≥1 foot for sumps) ^{Note 3}	≥ 100 feet
Pipes			
All	≥ 6 inches	No restrictions	≥ 25 feet

^{Note 1} Well, spring, and reservoir separation distances are in accordance with NR 812, Well Construction and Pump Installation. Items not listed in the table shall also be in accordance with NR 812. DNR-permitted animal feeding operations need to follow the 250-foot well separation distance requirements of NR 243.

^{Note 2} Drywells contain pump hardware and are not intended to contain waste.

^{Note 3} Separation distances from subsurface saturation is not required if the reception structure, hopper, or channel is designed to withstand anticipated hydrostatic loads and uplift (buoyancy).

2. Transfer Pipe and Severe Service Transfer Pipe

This applies to systems using pipes to carry waste to reception structures, waste storage facilities, waste treatment facilities, wastewater treatment systems, loading areas or cropland. Transfer pipe and severe service transfer pipe shall meet the following criteria.

a. Transfer Pipe

Transfer pipes shall meet the following criteria:

- 1) Design of transfer pipe systems shall be in accordance with sound engineering principles taking into account the static and dynamic loads on the pipe, working pressure, transfer system pressure rating, site conditions, required capacity, and other applicable design factors. Pipe shall be designed based on the properties of the material to be transferred and shall convey the required flow without plugging. Working pressure shall not exceed 72% of the transfer system pressure rating.
- 2) Flow velocity for pumped systems, other than pumps which produce pulsating flow, shall be between 3 feet per second and 6 feet per second to minimize settling of solids. Flow velocity may exceed 6 feet per second if the transfer system design takes into account requirements for joints and other appurtenances that accommodate the velocity and any potential loss of pipe integrity due to internal erosion by the materials being transported.
- 3) Pipe exposed to sunlight shall be made of materials, or otherwise protected, to withstand ultraviolet radiation throughout the intended life of the pipe.
- 4) Pipe at risk to being damaged shall be identified by fences or markers placed along the pipe.
- 5) Pipe shall be installed in accordance with the requirements of the Wisconsin FOTG Specification 634, or equivalent specification. All joints, couplings and appurtenances shall be liquid tight in accordance with the manufacturer's specifications and Wisconsin FOTG Specification 634.
- 6) Pipe shall meet the criteria in Wisconsin FOTG Specification 634. Pipe of equivalent strength, durability, and liquid tightness are acceptable.
- 7) Pipe and appurtenances shall be compatible with the working pressure of the system. Air and water pressures used to clear the pipe shall not exceed the transfer system pressure rating. A warning sign shall be placed on all risers indicating the transfer system pressure rating. Pressure pipe shall be matched to the pump connected to it, and pipe working pressures shall be no less than the *pump shut-off head*; otherwise, pressure relief (designed per Section V.B.2.b.(2) below) shall be provided near the pump.
- 8) Thrust control for all buried pressure pipe 4 inches and larger in diameter shall be provided at all angled fittings and valves, and be designed in accordance with standard engineering practices.
- 9) Pipe penetrating waste storage liners, reception tanks, or channels shall be installed so that the performance and integrity of the liner is maintained. Pipes shall be continuous through walls. The section of pipe that penetrates the liner of a waste storage facility shall be a minimum of 10 feet in length and shall be supported with a cast-in-place concrete restraint. All joints within 25 feet of where the pipe penetrates the inside surface of the waste storage facility (measured along the length of the pipe) shall have a mechanical and/or concrete restraint. All penetrations and restraints shall meet the criteria in Wisconsin FOTG Specification 634.

- 10) Pipe may be installed in any location within the soil profile regardless of subsurface saturation or bedrock elevations. Pipe subjected to hydrostatic forces shall be protected from uplift. Pipe shall have at least 6 inches of bedding providing separation from bedrock. Excavation of bedrock is acceptable. Storage structure liners shall be protected from hydrostatic pressures that may be caused by preferential flow paths along installed pipe.
- 11) If cold weather operation is planned, transfer pipe shall be: insulated, heated, buried below anticipated frost depth, constructed of freeze tolerant material, or installed such that it can be evacuated after each use by draining or using compressed air. Buried pipe shall be protected from freezing with either a minimum of 4 feet of soil cover or an equivalent amount of soil and insulation, unless the pipe is evacuated after each use.
- 12) For all pipe, except those used for transfer to cropland application, *clean-out access* shall be provided at a maximum interval of 150 feet along the pipe length, or a maximum interval of 300 feet along the pipe length if bi-directional clean-outs are used, to allow for removal of settled solids. A minimum of one in-line manual valve in the pipe, located as close to the storage facility as practical shall be provided if any clean-out riser is lower than the top of the waste storage structure. For pipes that are used for cropland application, a method to clean plugged pipes shall be incorporated into the design and described in the Operation and Maintenance Plan.
- 13) Pipe shall be installed with appropriate backflow prevention devices to prevent contamination of private or public water supply distribution systems and groundwater.
- 14) Air vents and vacuum relief valves shall be provided where necessary to

eliminate air locks, as well as to protect the pipe against negative pressures.

b. Severe Service Transfer Pipe

Severe service transfer pipe includes pressure pipes supplying flush water to gravity flume systems and pipe extending to cropland application. It does not include gravity transfer pipe. In addition to the transfer pipe criteria in V.B.2.a (1)-(12), severe service transfer pipe shall meet the following criteria:

- 1) A check valve shall be provided near the outlet of each pump except when backflow is incorporated into the design of the transfer system.
- 2) A pressure relief valve shall be provided near the pump(s) to protect the pipe against pump shut-off head due to a blockage (unless the pump shut-off head is less than the working pressure of the transfer system). A pressure relief valve or properly sized water hammer arrestor shall be provided on the pressure side of shut-off valves to protect against water hammer due to the sudden closing of a valve. Pressure relief valves shall be no smaller than ¼-inch nominal size for each inch of the pipe diameter. Pressure relief valves shall be set to open at a pressure no greater than 5 lb./in² above the transfer system pressure rating.
- 3) Air and water pressures used to clear the pipe shall not exceed the transfer system pressure rating. A warning sign shall be placed on all risers indicating the transfer system pressure rating.
- 4) Pipe shall be pressure tested prior to being placed into service. The test protocol and results shall be included in the as-built documentation. The pipe shall be tested for leaks in accordance with Wisconsin FOTG Specification 634. Pipeline used for transferring material to an irrigation system shall meet the requirements of WI FOTG Standard 430, Irrigation Water Conveyance, Pipeline.

c. Gravity Transfer System

This criteria applies to systems using pipe to carry waste to reception structures, waste storage facilities, waste treatment facilities, wastewater treatment systems, loading areas or cropland. Gravity transfer pipe and structures shall meet the following criteria.

- 1) There shall be no gravity outlets used to empty waste storage facilities.
- 2) There shall be no gravity outlets from transfer systems to load-out areas without secondary containment volume greater than the transfer system capacity.
- 3) Gravity discharge pipe used for transferring waste from one storage facility to another shall have a minimum of two shut off valves if one facility can release a volume that would exceed the maximum operating level of the receiving facility. The valves shall be located as close to each of the storage facilities as practical. One valve shall be manually operated.
- 4) Gravity transfer pipe shall follow all previous transfer pipe criteria (V.B.2.a 1)-14)) plus the following additional criteria listed in Table 2.

Table 2
Summary of Criteria for Gravity Transfer Systems

	Slower Flowing Wastes	Faster Flowing Wastes
Description	For wastes that tend to be slower flowing due to bedding, feed, or dryness (typically stanchion barns or thick slurries with higher viscosities).	For wastes that tend to be faster flowing due to additional liquids or lack of bedding (typically free stall barns, veal or hog facilities, and contaminated runoff with lower viscosities).
Minimum Pipe Diameter	24 inches	No minimum diameter
Minimum Head in Gravity Flow Systems (as measured from the Maximum Operating Level (MOL) of the Waste Storage Facility)	<p>Shall be a minimum of 4 feet below the bottom of the barn cleaner, scrape alley, etc.,</p> <p>For pipe over 100 feet in length an additional height equal to 1% of the transfer pipe length shall be included.</p>	<p>Liquid or semi-solid wastes shall have a minimum of:</p> <ul style="list-style-type: none"> • 2 feet below the scrape alley, barn cleaner, channel, etc., <u>and</u> • An additional height equal to 1% of the transfer pipe length <p>Diluted wastes shall have a minimum of:</p> <ul style="list-style-type: none"> • 1 foot below the scrape alley, barn cleaner, channel, etc., <u>and</u> • An additional height equal to 1% of the transfer pipe length
Minimum Volume of Reception Structure	One full day's manure production. A minimum of one-half a day's manure volume must be between the MOL of the waste storage facility and the bottom of the barn cleaner or scrape alley.	One full day's manure production.
Vent Pipe	A 6-inch diameter minimum vent pipe is required. Install within 10 feet of the reception structure.	A 6-inch diameter minimum vent pipe installed within 10 feet of the reception structure is required for reception structures with knife valves.

VI. Considerations

Considerations include additional design recommendations that are not required criteria, but may be used to enhance, or avoid problems with, the design and function of this practice.

- A. Consider the operating space requirements of loading and unloading of equipment in the vicinity of the transfer components.
- B. Consider the use of leak detection methods and equipment for monitoring and periodic pressure testing of waste transfer systems.
- C. Consider how operating temperatures may affect the *pressure rating* of the pipe.
- D. Consider installing thrust control consisting of a cast-in-place thrust block installed at every third joint, or a mechanical joint restraint device installed at every joint for gasketed pipe subjected to pulsating flow.
- E. Consider the need for additional check valves, clean-outs, vent risers, knife valves, anti-siphon protection, vacuum relief valves and open air breaks, as appropriate, on all transfer pipe systems.
- F. Consider the potential for salt (struvite) deposits in small pipe. Preventative measures may be needed, such as acid washing the pipe to prevent deposits.
- G. Consider pressure testing pipe installed in sensitive areas, large daily flow volumes, long flow lengths, high flow pressures, etc.
- H. Consider installing permanent aboveground or buried pipe for hoses and temporary pipe that is used on a regular basis to transfer waste.
- I. Consider the effects of adding liquid to manure that contains sand bedding. Liquid can enhance sand settling.
- J. Consider having gravity pipe follow as direct a route as possible. Risers, such as pre-manufactured manholes, may be used to change direction.
- K. Consider installing a clean-out or vent riser within 10 feet of the reception structure, for gravity transfer systems that are not required to have a vent riser in order to reduce the risk of air lock in the pipe.
- L. Consider installing a manually operated shut off valve for isolation purposes for gravity discharge

pipe used for transferring waste from one structure to another.

- M. Consider the use of a wet sump to reduce solids separation within the gravity reception structure.
- N. Consider abandonment, relocation, or additional floodproofing for existing reception structures located in flood prone areas. For additional information on floodproofing structures, see "Floodproofing Non-Residential Structures," FEMA 102, May 1986, Federal Emergency Management Agency.

VII. References

USDA, NRCS, Agricultural Waste Management Field Handbook, Part 651.

Wisconsin Department of Safety and Professional Services (DSPS), Safety and Building Division, Plumbing Products Database: <http://dsps.wi.gov>.

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

FEMA, Floodproofing Non-Residential Structures, FEMA 102, May 1986.

USDA, NRCS, National Handbook of Conservation Practices.

USDA, NRCS Wisconsin Field Office Technical Guide (FOTG), Section IV, Practice Standards and Specifications.

American Society of Agricultural and Biological Engineers (ASABE), Standard EP470, Manure Storage Safety.

VIII. Definitions

Animal Production Area (V.A.2.b) – Means any part of the livestock operation that is used for the feeding and housing of livestock. This includes the entire animal confinement and feeding area, and any adjacent manure storage areas, raw materials storage areas, and waste containment areas. This does not include pasture and cropland.

Bedrock (V.A.2.d.2) – The solid or consolidated rock formation typically underlying loose surficial material such as soil, alluvium or glacial drift. Bedrock includes but is not limited to limestone, dolomite, sandstone, shale and igneous and metamorphic rock.

Note: Although solid or consolidated bedrock can sometimes be removed with typical excavation

equipment, these materials are included in the above definition.

Channel (II) – A narrow structure, 4 feet or less in width, into which wastes are scraped or flushed for immediate transfer to reception structures, hoppers or waste storage facilities. They include field-fabricated or cast-in-place drop inlet structures incorporated into gravity transfer pipe. They also include existing gutters modified from how they were originally operated and constructed. Channels may include internal mechanical or hydraulic transfer mechanisms.

Clean-out Access (V.B.2.a.12) – Pipe appurtenances such as air flushing valves, risers, manholes, and accessible openings of pipe into reception structures or storage facilities that allow mechanical cleaning or unplugging of a pipe.

Confined Space (V.A.5) – Confined Space is a space that 1) contains or has the potential to contain a hazardous atmosphere; 2) is large enough and so configured that a person can bodily enter; 3) has limited or restricted means for entry or exit; and 4) is not designed for continuous human occupancy.

Contaminated Runoff (II) – Runoff that has come through or across a barnyard or animal lot or feed storage area. It generally includes the runoff and any manure, sediment, feed, or other material carried in the runoff. It contains lower concentrations of contaminants than leachate from feed or manure.

Cultural Resources (V.A.2.a.) – Cultural resources are the traces of any past activities and accomplishments of people. They include tangible traces such as historic districts, sites, buildings, structures, historical documents and cemeteries. They also include traces of less tangible objects such as dance forms, aspects of folk-life, cultural or religious practices, and some landscapes and vistas.

Flood Prone Areas (V.A.4.a.) – These include areas delineated as floodplains on Federal Emergency Management Agency (FEMA) maps, or local floodplain maps as well as areas along perennial streams (blue lines) shown on the United States Geologic Survey quadrangle sheets that may be subject to out of bank flows.

Gleyed Soil (V.A.2.d.1) – Soil that has been subject to prolonged saturated conditions, exhibited by gray, blueish gray, greenish gray, dark greenish gray, dark blueish gray as the dominant soil colors. (These colors appear on the Munsell color charts for Gley) Soil color and patterns must be observed immediately upon excavation because air exposure may rapidly transform colors to a mottled pattern of reddish, yellow or orange patches.

Gutters (III) – Existing open troughs within housing facilities that are used to transfer wastes to a reception structure or waste storage facility. Existing gutters modified from how they were originally operated and constructed are considered to be channels.

Hopper (II) – Structure meant solely to feed wastes into a transfer pump. Hoppers larger than 6,000-gallon capacity are defined as reception structures.

Leachate (II) – Concentrated liquid waste which has percolated through or drained by gravity from a pile of manure, manure processing derivative, or animal feed. It contains much higher concentrations of contaminants than contaminated runoff.

Manure Processing Derivatives (II) – The by-products and waste components that are produced as a result of treatment and processing practices. These include, but are not limited to, the following waste components: flush water, separated sand, separated manure solids, precipitated manure sludges, supernatants, digested liquids, composted biosolids, and process waters.

Perched Conditions (V.A.3.c.) – Perched conditions describe a soil moisture regime where saturated soil is located above unsaturated soil.

Pump shut-off head (V.B.2.a.7) – Maximum pressure a pump can produce. Represented by the highest point on the pump flow curve.

Pressure Rating (VI.D) – Estimated maximum water pressure the pipe is capable of withstanding continuously with a high degree of certainty that failure of the pipe will not occur. Pressure rating is determined by the pipe manufacturer.

Reception Structure (II) – A collection vessel that will hold waste and facilitate its transfer.

Transfer System Pressure Rating (V.A.7) – The lowest pressure rating of any pipe, pipe fittings, and other appurtenances. This is independent of pump shut-off head pressure.

Wastewater (II) – Milkhouse and milking parlor washwater, leachate from feed storage areas, and similar waste materials. Wastewater from holding area is considered manure.

Working Pressure (V.A.7) – The maximum designed operating pressure of the transfer system. Working pressure is a maximum of 72% of the transfer system pressure rating. For pumped systems, this is determined by the shut-off head of the pump and static head.