Natural Resources Conservation Service

CONSERVATION PRACTICE STANDARD

WASTE TRANSFER

CODE 634

(no)

DEFINITION

A system using structures, pipes, or other conduits installed to convey wastes or waste byproducts from an agricultural source to a storage facility, treatment facility, or land application site.

PURPOSE

This practice is used to accomplish one or more of the following purposes:

- Prevent nutrient transport to surface or ground water
- Prevent transport of pathogens to surface or ground water

CONDITIONS WHERE PRACTICE APPLIES

The waste transfer system is included as a component of the agricultural production area, storage facility, treatment facility, and land application areas of the agricultural operation.

The practice applies where it is necessary to transfer waste material generated by livestock production or agricultural product processing between the generation site, storage facility, treatment facility, handling area, loading area, or land for agronomic application.

This practice does not apply to hauling waste material with equipment or vehicles.

CRITERIA

General Criteria Applicable to All Purposes

Laws and regulations

Notify landowner and/or contractor of responsibility to locate all buried utilities in the project area, including drainage tile and other structural measures. The landowner is required to obtain all necessary permits for project installation prior to construction. Plan, design, and construct the waste transfer system to meet all Federal, State, Tribal, and local laws and regulations.

Safety

Include appropriate safety features to minimize the hazards of the facility (refer to American Society of Agricultural and Biological Engineers (ASABE) Standard EP470, Manure Storage Safety for guidance, as needed). Provide warning signs, fences, ladders, ropes, bars, rails, and other devices, as appropriate, to ensure the safety of humans and livestock. Provide ventilation (when needed) for waste transfer reception pits in an enclosed facility or confined area, as necessary, to prevent explosion, poisoning, or asphyxiation. Depending on configuration, structures such as reception pits can be classified as a confined space. Include reference in Operation and Maintenance plan.

Safety signs shall be provided as needed at uncovered reception pit structures to warn about drowning, improper loading, and/or agitation hazards. Safety signs shall be provided as needed for covered

reception pit structures (including slatted tops) to warn about agitation hazards. Safety signs shall be posted at the drop structure to indicate the potential dangers of toxic gases.

Gypsum bedding, silage leachate, and other waste components containing high amounts of sulfur can produce excessive amounts of manure gases. These materials can create dangerous manure gas situations unless the sulfur is restricted, special design techniques used, or safety precautions provided for these waste transfer elements.

Gypsum based products and/or silage leachate shall not be directed into solid covered or slotted under the barn reception pit structures due to potential development of deadly gases during agitation while the facility is occupied. Open topped facilities that receive gypsum products can result in deadly gas production especially during agitation. Monitoring air quality is strongly recommended.

Design covers and grates over openings with a at least one dimension limited to 6 inches such that livestock or humans cannot accidentally displace them and fall into the facility. Include complete safety fencing and gates around openings when allowing larger grate spacing to avoid plugging or no grates for pump access.

The minimum fence height shall be 4.5 feet. Use the NRCS CPS Fence (Code 382) for design and specification of a fence that will prevent accidental entry by people or animals. When a reception pit's walls extend out of the ground, a combination of exterior wall and shorter fencing resulting in a total height of 4.5 feet is acceptable. Post universal warning signs to prevent children and others from entering reception pits structures.

Reception pit structures with drops of greater than 3.5 feet shall be fenced to exclude children and animals from accidental entry.

Prevent tractors and other equipment from slipping into waste transfer structures by placing barriers on push-off ramps and other manure loading areas.

When installing a horizontal fence around the perimeter of a reception pit structure openings are limited to 4" between horizontal fence rail members unless distance is limited to 6" and then spacing can be up to 6" (for example a 6" x 6" grid). Fencing around the perimeter of a liquid waste storage structure shall be limited to the use of small opening / "no-climb" fencing materials.

Fencing is optional when reception pit exterior walls exceed 4.5 feet.

Include a water-sealed trap and vent or similar devices where necessary to control gases from a pipeline entering an enclosed building or reception pit.

Protect pipes at risk of being damaged by equipment or livestock by placing fences or markers along the pipe.

Provide a secure cover or otherwise restrict access to any manually operated in-line valves of a discharge pipe from a waste storage structure to prevent unauthorized release of effluent.

Structural design
Design structures with reinforced concrete, steel, wood, or masonry materials in accordance with NRCS National Engineering Manual (NEM) (Title 210), Part 536, "Structural Engineering." Account for all items that will influence the performance of the structure, including load assumptions, durability, serviceability, material properties, and construction quality. Ensure that the material used for a fabricated structure is compatible with the waste product being transferred.

Structures
Structures, including concrete reception pits, tanks, hoppers, manholes, and channels used for waste transfer, prefabricated or cast-in-place, must meet the criteria in NRCS Conservation Practice Standard

(CPS) Waste Storage Facility (Code 313) for liquid tightness and structural strength, regardless of materials used for construction.

Design all structures, including those that provide a work area around pumps or other equipment to withstand the design static and dynamic loading. Design structures to withstand earth and hydrostatic loading as specified for comparable structural criteria in NRCS CPS Waste Storage Facility (Code 313).

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

Investigate the subsurface conditions (e.g., depth to bedrock, soil classification, water table, etc.) when locating and designing structures.

Use NRCS CPS Roofs and Covers (Code 367) to design roofs or covers where needed for structures.

Location

Reception pits, hoppers, manure pumps, gravity drop structures, and gravity flow conduits shall be located away from a potable water well, spring or reservoir wherever possible unless design considerations are used to prevent the contamination of water sources. All transfer components shall be installed a minimum of one-foot above bedrock and the seasonal high-water table unless the water table is lowered or the transfer component is designed to withstand the external hydrostatic pressures. Refer to Pennsylvania Act 38 Nutrient Management Program CAO, CAFO, VOA siting requirements.

Reception pits

A reception pit is a temporary storage facility that will store manure for up to 28 days. The manure in a reception pit is generally transferred to the storage facility by means of pumps or dosing valves to gravity systems.

Size reception pits to contain a minimum volume of one full day's waste production. Provide additional capacity for reception pits receiving stormwater runoff to contain the volume of precipitation and runoff from the 25-year, 24-hour storm plus any required freeboard and emergency capacity. Design the reception pit to be protected from inundation or damage from a 25-year flood event when located in the 100-year floodplain. Reducing a reception pit design volume by flood routing the design storm runoff volume may be used only when there is dependable backup power supply for pumps and where no impact to surface water can occur should the reception pit pump fail.

Design reception pit openings to accomodate both manure loading and unloading pumps and other systems to ensure unrestricted access for the material being loaded. In the absence of evidence to support an alternate design, provide the floor opening with a minimum area of 9 square feet, having one dimension of that opening 4 feet or larger. Equip openings with grates, covers, and/or other protective devices with openings wide enough to pass the waste and engineered to support the anticipated live loads.

Design curbs, intended to convey waste, to be of sufficient height to ensure all waste flows into the transfer structure. Design curbs to be anchored to withstand working loads.

Gravity Drop Structures

A gravity drop structure is a vertical chute or hopper, which conveys waste into a large diameter transfer pipe. Construct structures of durable, corrosion-resistant, liquid tight material.

Size hoppers to contain a minimum of one half of a full day's manure or wastewater production unless an alternative design is approved by the design engineer. Additional storage shall be added for heavily bedded manure that may encounter delay in traveling through the pipe. This volume is to be above the maximum effective storage elevation in the waste storage facility. The inlet or loading opening to the drop structure shall be compatible with the scraping and cleaning equipment width and capacity.

The outlet of the drop structure shall be constructed to minimize the head loss at the inlet of the transfer pipe. The floor of the drop structure shall slope in the direction of the outlet to provide a smooth transition from the drop structure into the conduit. Fillets to reduce sharp corners and significant losses at the pipe inlet are required.

Gravity outlets from main waste storage facilities shall not be used.

Pipelines and Conduits — General
Design pipes and other conduits considering the waste material properties, management operations, pipe exposure, static and dynamic loads on the pipe, working pressure, transfer system pressure rating, required capacity and all applicable design factors. Pipe pressure rating required may need adjustment based on effluent temperatures and consistency.

Use watertight or sewer grade pipes and connection devices for waste transfer pipes. The type of liquid waste material and the total solids content will determine the pipe designs needed to convey the required flow without plugging.

Provide cleanout access for all pipes transferring waste material to allow for removal of settled solids or obstructions. Space pipe cleanouts 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 cleanouts are used. A pipeline intervention device, such as a foam cleanout ball, is an acceptable method of cleaning out pipes instead of a cleanout access. Incorporate pipe cleanout methods into the design and describe the methods in the operation and maintenance plan.

Design the pipe or conduit from the collection facility to have a minimum flow rate equal to the maximum anticipated design flow. Design flow should be a 25-year, 24-hour event to prevent discharge from the system, otherwise, use a design flow that is required for system operation.

Design the pipe to empty the storage or treatment facility in accordance with the planned application rates outlined in the comprehensive nutrient management plan.

Protect pipes exposed to sunlight from ultraviolet (UV) deterioration by selecting UV-resistant pipe materials or by painting the pipe exterior to withstand UV damage throughout the intended life of the pipe.

Install pipe properly at all locations to accommodate any traffic crossing, farming operations, frost depth, subsurface saturation, or bedrock elevations. Protect pipe from uplift if subjected to hydrostatic forces. Separate pipe installed near bedrock with at least 6 inches of bedding material. Excavation and removal of bedrock is acceptable to provide bedding depth.

Design transfer pipe to be insulated, heated, buried below anticipated frost depth, constructed of freeze-resistant material, or installed such that it can be drained after use when cold weather operation is planned.

Consider the anticipated peak flow when using transfer or lift stations. Design the station using the reception pit criteria for a station receiving gravity flow and pumping the outflow.

Install pipes with appropriate backflow prevention devices, when applicable.

Install air vents and vacuum relief valves where necessary to eliminate air locks, as well as to protect the pipe against negative pressures.

Pipelines — Pressure
Select pipeline, fittings, and appurtenance material that meet the design working pressure criteria of the system. Pipe fittings must be specifically selected to match the pipe working pressure. Include in the analysis any pressures used to clear the pipeline.

As a safety factor against surge, the pipeline working pressure must not exceed 72 percent of the pipe rating.

Provide thrust control designed in accordance with NRCS National Engineering Handbook (NEH) (Title 210), Part 636, Chapter 52, “Structural Design of Flexible Conduits,” for all buried pressure pipelines 4 inches and larger in diameter and for fittings and valves. Mechanical joint restraint may be used and must be certified by the manufacturer as adequate to withstand the unbalanced thrust forces in the system, as computed in 210-NEH-636-52.

Maintain the integrity of a wall or liner at pipe penetrations of waste storage structures, reception tanks, and channels. Protect the pipeline where it penetrates the liner of a waste storage facility by providing a cast-in-place concrete restraint or other support, as necessary. Provide pipe restraint where pipeline movement may damage the integrity of the pipe, wall, or liner system.

For a pumped system, design so that the velocity in the pipeline, when operating at system capacity, will be between 3 and 8 feet per second unless surge protection that is adequate to prevent damage from sudden blockages or water hammer is provided. Limit the velocity in the pipeline to 5 feet per second or less if the transfer pipe is not buried or securely fastened down. Velocity in the pipeline may exceed 5 feet per second without a surge analysis if the pipeline is buried or otherwise secured, installed without gates or valves, and discharges freely to a tank or pond.

The 3 feet per second lower limit for velocity in the pipeline does not apply to a system that is powered by a pump such as a ram plunger or piston type pump that operates by pushing semisolid waste material in a periodic stroke cycle.

Install a check valve near the outlet of each pump except where backflow is incorporated into the design.

Provide a pressure relief valve after the check valve, near the pump(s) to protect the pipeline against any pump shutoff head due to a blockage (unless the pump shutoff head is less than the working pressure of the transfer system).

Provide a pressure relief valve or properly sized water hammer arrestor on the pressure side of shutoff valves to protect against water hammer due to the sudden closing of a valve.

Size pressure relief valves to be no smaller than one-fourth inch for each inch of the pipe diameter. Set pressure relief valves to open at a pressure no greater than 5 pounds per square inch above the transfer system working pressure.

Pipelines — Gravity
In a gravity flow pipe system, a minimum head is required depending upon the consistency of the material. See table 1.

Table 1: Minimum Required Hydraulic Head and Consistency

Minimum Feet of Hydraulic Head	Consistency
4 feet	heavily bedded undiluted manure
2 feet	slurry or semi-liquid manure
<1 foot	liquids and 1:1 dilute liquid manure

For manure gravity pipes over 100 feet in length, increase minimum feet of head by an additional 1 percent of the pipe length exceeding 100 feet. Design for a minimum velocity of 3 feet per second.

Minimum diameter of gravity pipe is 24 inches for heavily bedded manure, including sand-laden manure.

The smallest diameter for liquid manure shall be 18 inches. The smallest diameter for flush systems shall be 12 inches. Discharge pipes from manure separators shall meet the manufacturer’s recommendations.

Convey waste into and through the pipe to minimize ponding in the production area. Design the gravity pipe to follow as direct a route as possible. Horizontal curves or bends in the pipe joints of a gravity pipe require special design considerations except for minor deflections of less than 10 degrees. Use drop structures or manholes for other changes in horizontal direction.

Account for the process of sand settling out of the waste stream in a gravity flow design that transfers sand-laden manure. The minimum gravity pipe flow velocity for sand-laden manure is 5 feet per second. Design transfer systems to handle potential loss of pipe integrity due to internal erosion by the materials being transported for a flow velocity exceeding 6 feet per second.

Use watertight couplings designed for the maximum anticipated head in the gravity pipelines.

Install vents in gravity lines where needed. Top of vented openings shall be above maximum storage elevations.

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.

The maximum pipe length for manure with chopped hay or saw dust bedding shall be 150 feet. The length of the pipe can be increased to 200 feet between manholes if water is added to the manure at the inlet of the pipe. Chopped hay or sawdust bedding must be kept to a minimum to avoid plugging of the pipe. Gravity flow pipe systems are not recommended for manure with long hay. 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. Where possible, the gravity pipe shall be installed on five percent slope or flatter. The minimum slope shall be 1 percent.

The maximum slope for a gravity pipeline shall be 15 percent. The maximum grade can be exceeded for liquid manure or short distances not exceeding 25 feet. Abrupt changes in grade or alignment with steep gradient pipes may warrant the use of thrust blocks.

The pipe outlet invert elevation shall be within 2 feet of the bottom of a waste storage facility whenever possible. When this is not possible, the design and/or operation and maintenance plan shall address freezing, drying, and odor issues related to prolonged exposure of the pipe outlet. When using sand or there are other settling concerns the elevation shall be higher. Changes in the pipe grade shall be kept to a minimum. In locations where the pipe grade changes, the pipe shall be vented to prevent an air lock. The end section of the pipe shall be sufficiently anchored to prevent movement of the section into the clay or other such lined storage facility. A headwall or dead-man anchors may be required.

For swine and veal manure with no bedding, a system to prevent the build-up 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. The minimum diameter pipe shall be 6 inches for pipe slopes greater than 1.0 percent, and 10 inches for pipe slopes between 0.5 to 1.0 percent.

The minimum pipe diameter for scraper type systems shall be 12 inches.

For wastewater including milk house and parlors, the minimum pipe diameter shall be 4 inches for pipe slopes greater than 1.0 percent and 6 inches for pipe slopes between 0.5 and 1.0 percent. A minimum velocity of 2 fps shall be maintained in the pipeline.

For a flume system with slurry manure, limit the design depth of flow in the pipe to 50 percent of the pipe depth to maintain the scouring effect of the flow.

Gravity Outlet Pipes
The outlet pipe is a conduit used to convey manure from the storage facility to a spreader or other hauling unit for application of manure to the field. Due to the potential hazard and management requirements, gravity outlet pipes shall not be used.

Other conduits
The minimum design velocity for waste transfer in open ditches and channels is 1.5 feet per second.

A minimum concrete thickness of 5 inches is required for a reinforced cast-in-place concrete-lined ditch or channel for waste transfer.

Pumps
Use NRCS CPS Pumping Plant (Code 533) for a waste transfer pump where needed.

Select the pump to transfer the waste material at the system pressure head and rate required. Determine the type of pump by the consistency of the material and the type of solids. Use pump manufacturer's recommendations for the installation requirements.

Correct the total dynamic head for viscosity and specific gravity of the liquid waste used in pump selection. Reference 210-NEH, Part 651, Chapter 11, "Waste Utilization," for increased friction losses caused by higher fluid viscosity, and 210-NEH-651, Chapter 12, "Waste Management Equipment," for pump selection guidance.

Agitators
Include agitators, as needed, to facilitate pumping of liquid or slurry waste for transfer. Size the agitation equipment to provide adequate agitation of the volume of storage. Select equipment compatible with the type and consistency of the waste material. Base requirements for agitator sizing, installation, and operation on manufacturer's recommendations.

Solid/liquid waste separation
Use NRCS CPS Waste Separation Facility (Code 632) to separate a portion of the solids from the manure or liquid waste stream, as needed.

Pump Station
A pump station is a tank, pump and other appurtenance used to collect milk house, and parlor wastewater, or other wastewater, and transfer it to a storage or treatment facility.

The minimum size tank for dairy operations with milking parlors shall be 1,000 gallons or as approved by the design engineer. The minimum tank size for pipeline/milk house systems shall be 500 gallons or as approved by the design engineer. Tanks shall be installed in ground below frost elevation. If a tank cannot be installed in ground, other provisions, such as insulation and supplementary heat, shall be provided to prevent freezing in the tank. Provisions shall be made to install tanks above the seasonal high -water table or designed to withstand buoyant forces.

A settling tank shall be used ahead of a pump station where solids will be a concern. The capacity of the settling tank shall be a minimum of 500 gallon and be accessible for cleaning.

Pumps and appurtenances shall be designed or selected in accordance to manufacturer's recommendation. Sump pumps shall only be used for clean water with no solids. Sewage rated transfer pumps or equal (grinder pumps, chopper pumps) shall be used with liquids containing manure solids.

Pumps shall be selected based on solids handling capacity and working head. Pumps shall be installed to allow for easy access for maintenance and repair. Transfer pipes shall be installed in ground below frost elevation. If transfer pipe is installed above ground, the pipe shall be installed so the wastewater left in the pipe after the pump shuts off is allowed to drain freely out of the pipe, unless insulated to prevent freezing. Where possible, above ground transfer pipes shall be installed through barns or other buildings. Above ground pipes should not be directly exposed to cold weather. Backflow from pipelines when pumps shut

down shall be included in the storage volume of the pump station tank. Pipelines shall drain sufficiently to prevent back siphoning and freezing.

Manure Stacker
The manure stacker is an elevator that transports solid and semi-solid manure and bedding from the barn (e.g., gutter cleaner) to the storage facility. Manure stackers are not designed to handle liquid manure. The stacker shall be installed as recommended by the manufacturer. The discharge end of the manure stacker shall be suspended over the storage facility approximately one-third to one-half the total length of the facility. The support structure for the manure stacker shall be designed and installed in accordance to *Waste Storage Facility (PA313)* and manufacturer's recommendations.

Push-Off Ramp
Push-off ramps are designated locations to allow manure to be safely loaded directly into the manure storage facility, spreader, or hauler by means of front-end loader or other scraping equipment.

Push-off ramps shall be constructed of concrete, masonry, wood, or other durable materials. Push-off ramps shall be design to withstand all anticipated static and dynamic loads in accordance to standard NRCS CPS Waste Storage Facility Code 313. Prevent accidental entry at push-off locations with prefabricated guards, bars, chain link fence, etc.

Transfer to Fields
The transfer of manure or wastewater to fields consists of the pumping from the storage facility or reception pit to the field, portable storage tank, wastewater treatment strip, or constructed wetland.

Irrigation pumps, conduits, sprinklers, and other appurtenances shall be designed, installed, maintained and operated in accordance with NRCS CPS Irrigation Pipeline (Code 430), and NRCS CPS Sprinkler System (Code 442), as applicable to the planned system. NRCS CPS Irrigation Pipeline (Code 430) shall be followed in designing a system to convey manure or wastewater to a drag hose field application system. Other components not covered by the standards shall be designed, installed, maintained and operated according to manufacturer's recommendation.

Transfer of wastewater to a treatment strip or constructed wetland shall be designed in accordance with this standard and NRCS CPS *Vegetated Treatment Area (Code 635)* or NRCS CPS *Constructed* Wetland *(Code 656)*, as applicable.

Additional Criteria for Managing Silage Leachate and Runoff
Use low-flow collection devices, dilution, storage, or other acceptable methods to control fermentation leachate and runoff flow from the feed storage areas.

Follow the PA Design Guide 10, Design Guidelines for Silage Leachate and Runoff.

Refer to the Pennsylvania NRCS conservation practice standards for *Waste Storage Facility (Code 313)* and S*torm Water Runoff Control (Code 570)*. For sensitive sites refer to *Vegetated Treatment Area (Code 635)*, *Waste Treatment (Code 629)*, or a *Constructed Wetland (Code 656)* for alternative options.

CONSIDERATIONS

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

Time and locate agitation and transfer activities to minimize odor formation and the breeding of insects within the material.

Consider access locations for cleanout and unplugging when sand or lime is used as bedding material. Present the operation with potential risks, costs of frequent cleanout, and equipment O&M.

Cover and/or minimize the disturbance of waste to reduce the likelihood of air emissions, hydrogen sulfide formation, and release of particulate matter, volatile organic compounds, methane, and ammonia.

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 Buildings” (FEMA P-936, 2013).

Consider performing subsurface investigations for large and/or complex waste transfer structures sufficient in detail and analysis to support the design in accordance with NRCS NEM, Part 531, Geology.

Transfer operations
Install permanent aboveground or buried pipes to replace hoses and temporary pipes that are used on a regular basis to transfer waste.

Protect storage structure liners from hydrostatic soil pressures that may be caused by preferential flow paths along the outside of the installed pipe.

Consider a positive displacement pump for liquid waste with total solids exceeding 8 percent.

Pumping manure slurries may require the total dynamic head to be increased, refer to NRCS AWMFH Chapter 11, Table 11-1.

Use a wet sump and agitation pump to reduce solids separation within the gravity reception structure.

Select a pump with a low speed for manure slurries which contain abrasives such as sand.

Use a semi-open impeller pump to handle manure slurry with straw, twine, hair, and sludge. Pumps with cutting knives and recirculation agitation capacity also reduce plugging.

Install a cleanout or vent riser within 10 feet of the reception structure and other grade change locations on gravity transfer systems to reduce the risk of an air lock in the pipe.

Use premanufactured manholes as risers at stations to change direction for needed transitions.

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

When applicable and compatible, consider the dual use of waste transfer pipelines for irrigation water delivery.

Install a locator wire in the trench with transfer pipelines.

Consider corrosion resistance and water tightness in the selection of pipe material and joints due to the nature of the waste material.

Consider the potential for struvite phosphate (magnesium ammonium phosphate) mineral deposition in smaller diameter pipes and places where there is high turbulence such as pipe connections and valves. Preventative measures may be needed, such as acid washing the pipe to prevent the buildup of deposits.

Consider the need for additional check valves, cleanouts, vent risers, knife valves, anti-siphon protection, and vacuum relief valves and open-air breaks, as appropriate, on all pipe systems.

Use leak detection methods and equipment for monitoring and periodic pressure testing of waste transfer systems installed in sensitive areas having large daily flow volumes, long flow lengths, or high flow pressures.

Post a warning sign on all risers indicating the pipe pressure rating.

Consider installing a manually operated shut off valve for isolation purposes for gravity discharge pipe used for transferring waste from one structure to another.

Consider the potential for deposits of solids to accumulate in pipes or their outlets.

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

A two-foot earthen berm may be installed around the loading platform to contain any manure spilled during normal unloading operations. A pipe with a shut off valve shall be installed through the berm as an outlet.

When exporting solid waste material off-farm, consider NRCS CPS Waste Recycling (Code 633).

PLANS AND SPECIFICATIONS

Prepare plans and specifications for constructing a waste transfer system that describe the requirements for applying this practice to achieve its intended use.

- Construction plans and specifications must include a location map, site specific survey, plan view, profiles, cross sections, details and specifications of all structures, etc., to ensure that the project can be properly constructed.
- NRCS acceptance may require pressure testing of a pressure pipe system prior to waste transfer service. If required, include the test protocol and results in the as-built documentation.

OPERATION AND MAINTENANCE

Prepare an operation and maintenance (O&M) plan for review with the landowner or operator responsible for the application of this practice. Provide specific instructions in the O&M plan for proper operation and maintenance of each component of this practice and any detail needed for the level of repairs to maintain the effectiveness over the useful life of the practice. Include—

- Evaluating the overall functionality of the waste transfer system for possible malfunctions that could lead to a spill or release of waste material. Address the identified potential failures in the inspection procedures of the O&M plan. Prepare an emergency response plan to be implemented in the event of such a failure.
- Agitating liquid or slurry waste material adequately prior to transfer.
- Flushing pipes used for transferring waste material with clean water after use and to reduce the risk of gas buildup and pipeline explosion.
- Periodically removing solids from conveyance conduits such as concrete-lined ditches, grates, etc.
- During outbreaks of disease, handling waste products according to the State veterinarian guidance on biosecurity for animal waste material.
- Sanitizing equipment leaving the farm, as appropriate, to prevent the spread of disease during an outbreak.
- Documenting use of confined space entry points and signage requirements and their review prior to entering areas with possible gas buildup or asphyxiation concerns.

The plan shall include contingency or emergency procedures to be followed in the event of accidental spill, seepage, or unforeseen circumstances. A copy of the O&M Plan shall be immediately available at all times.

The protective cover or barrier for the hopper or drop structure inlet shall be maintained to provide safety for animal and human traffic. The cover or barrier shall be replaced immediately after each cleaning.

Address the possibilities of confined spaces as appropriate.

Heavily bedded, frozen or dried manure can cause plugging of the transfer system. Frozen manure should be piled or stacked until thawed before loading into transfer system or design safe locations to load manure directly into the manure storage with appropriate tractor guards (dumping over chain link fence is a safety hazard).

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

Consider flushing pipelines once per year and drawing the storage down completely at least every two years.

Shields and other safety devices on gutter cleaners, manure pumps, and other equipment shall be maintained according to manufacturer's recommendations.

Loading areas for the manure should be capable of containing spills or directing spill back into the storage.

Equipment operators should exercise care when loading the transfer system and unloading the storage structure to prevent damage to the system. Any damage to the system should be repaired as soon as practical. The landowner should train all persons involved in the operation of the gravity transfer systems. All control valves shall be closed at the end of each day.

The landowner shall ensure that all personnel and visitors are aware of waste transfer manure gas dangers.

Consider alarms when over flows could cause water quality impairment. Valves should be operated regularly.

Operation and maintenance manuals for pumps and other such equipment should be provided to the operator and be included in the O&M Plan or by the product supplier.

Silage Leachate

For silage leachate and runoff control sites the O&M plan shall be developed consistent with the purposes of the practice, intended life of the components, safety requirements, and the criteria for the design. At a minimum, the plan shall include:

- Handling and disposal practices for waste feed.
- Handling and disposal practices for snow associated with the feed storage area.
- Frequency for cleaning the floor of accumulated feed.
- Intervals for removing accumulated solids from the system components.
- Proper treatment and disposal practices for leachate and contaminated runoff.
- Schedule of inspections.

REFERENCES

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