



AN AEM GUIDELINE FOR THE EVALUATION OF UNDESIGNED MANURE AND WASTEWATER TRANSFER SYSTEMS

REFERENCE

National Handbook of Conservation Practices – Code NY634 Waste Transfer

INTRODUCTION

On-farm manure and wastewater transfer systems may have been installed without being designed by a qualified professional. The New York State Board for Engineering and Land Surveying (SBEL) of the NYS Education Department regulates Professional Engineering in NY. They define the practice of the profession of engineering as performing professional engineering service where the safeguarding of life and health is concerned. Therefore Waste Transfer Systems are required to be designed by an engineer licensed to practice in New York State (P.E.) or by a Natural Resources Conservation Service (NRCS) employee with appropriate job approval authority.

Manure and wastewater may also include bedding material, spilled feed, process and wash water, silage leachate and other residues associated with animal agricultural production. Transfer systems are often part of many on-farm manure and wastewater handling systems from collection to treatment to storage to land application.

This guide describes the recommended evaluation process for the engineer of record or their designated person to utilize in determining if an existing waste transfer system that has no records of being designed or has no As-Built documentation substantially meets the NRCS 634 Standard. This guideline does not apply to new practices installed.

The New York State Concentrated Animal Feeding Operation (CAFO) permits require that all Comprehensive Nutrient Management Plans (CNMPs) meet NRCS standards and comply with appropriate state laws. This includes compliance with the NYS Education Department requirements. The permit specifically requires that all permanent waste transfer structures that were not installed under the direction of a PE or NRCS employee with the appropriate job approval authority be evaluated by a P.E. by 3/31/2011. **All new waste transfer systems installed on CAFO farms must meet the NRCS standard and be designed by a PE or by a NRCS employee with appropriate job approval authority.**

Commonly Associated Practices or Processes

Note: To determine whether a National or New York Conservation Standard applies to this and any other associated practices, check the following website: www.ny.nrcs.usda.gov. Click on the “Technical Resources” button and then look in the left-hand column for “eFOTG”. Under “**Access eFOTG**”, click on NY State on the U.S.A. map. Choose the county of interest. Then click on section IV under eFOTG in the left column to look for the Conservation Practice Standards located in Section IV.

Table A: Commonly Associated Processes or Practices

Number	Title	Typical Use
561	Heavy Use Area	Used for scrape alleys
430	Irrigation Water Conveyance	Used for pipes and pumping
430DD	Irrigation Water Conveyance: High pressure, underground plastic pipeline	Used for pipes
430EE	Irrigation Water Conveyance: Low pressure, underground plastic pipeline	Used for pipes
430FF	Irrigation Water Conveyance: Steel Pipeline	Used for pipes
468	Lined Waterway or Outlet	Used for channels
634	Manure/Waste Transfer	Guideline
353	Monitoring Well	Monitoring practice
590	Nutrient Management	Associated practice
582	Open Channel	Associated practice
783	Pathogen Management	Associated practice
516	Pipeline	Used for Pipes
533	Pumping Plant	Used for pumping
632	Solid/Liquid Waste Separation Facility	Associated practice
578	Stream Crossing	Associated practice
635	Vegetated Treatment Area	Associated practice
367	Waste Facility Cover	Used for structures
312	Waste Management System	Used for CNMP compliance
313	Waste Storage	Used for structures
629	Waste Treatment	Associated practice
633	Waste Utilization	Associated practice
355	Well Water Testing	Monitoring practice

OTHER REFERENCES

The following references may be useful in an evaluation if the site has unique situations that require more careful analysis.

Agricultural Waste Management Field Handbook

<http://www.wsi.nrcs.usda.gov/products/W2Q/AWM/handbk.html>

Animal Waste Management Software, AWM.

http://www.wsi.nrcs.usda.gov/products/W2Q/AWM/AWM_home.html

Article 17 Environmental Conservation Law, 6NYCRR, Part 750, State Pollution Discharge Elimination System (SPDES). <http://www.dec.state.ny.us/regs.2485.html>

Confined Spaces, U.S. Department of Labor – Occupational Safety and Health Administration <http://www.osha.gov/SLTC/confinedspaces/index.html>.

Earthen Manure Storage Design Considerations, NRAES-109, NRAES, Cooperative Extension www.nraes.org, 152 Riley-Robb Hall, Ithaca, NY 14853-5701.

Engineering Field Handbook Chapters 2, Estimating Runoff and Peak Discharges, 4, Elementary Soils Engineering. <http://policy.nrcs.usda.gov/RollupViewer.aspx?hid=17092>

Great Lakes – Upper Mississippi River Board of State and Provincial Public Health and Environmental Managers Recommended Standards for Wastewater Facilities.
<http://10statesstandards.com/wastewaterstandards.html>

Guideline for Dairy Manure Management from Barn to Storage, NRAES-108, NRAES, Cooperative Extension www.nraes.org, 152 Riley-Robb Hall, Ithaca, New York, 14853-5701.

Liquid Manure Application Systems Design Manual, NRAES-89, NRAES, Cooperative Extension www.nraes.org, 152 Riley-Robb Hall, Ithaca, New York, 14853-5701

Livestock and Poultry Environmental Stewardship Curriculum
http://www.lpes.org/les_plans.html

Livestock Waste Facilities Handbook Third Edition, MWPS-18
http://www.mwps.org/index.cfm?fuseaction=c_products.view&catID=719&productID=6341

Manufacturers' specifications and operating and maintenance procedures

NYS Consolidated Laws, Environmental Conservation Title 10, Water Pollution Control, Section 17-0803, SPDES Permits; Application.
<http://public.leginfo.state.ny.us/mengetf.cgi?COMMONQUERY=LAWS>

Pump Handbook: Third Edition by Igor J. Karassik (Author), Joseph P. Messina (Author), Paul Cooper (Author), Charles C. Heald, McGraw-Hill

Site/operation specific Comprehensive Nutrient Management Plan.

Soil Survey Data <http://websoilsurvey.nrcs.usda.gov/app/HomePage.htm>

CULTURAL RESOURCES

Cultural resource reviews are normally required for all ground disturbing practices, components, or other activities, as per the State Level Agreement between NRCS and the New York State Historic Preservation Officer. Unless modification of the existing system is needed, this will not be required for the activities covered by this guide.

PERMITS AND NOTIFICATIONS

All permits, easements, and rights-of-way are the responsibility of the landowner. **Dig Safely NY** (formerly the Underground Facilities Protection Organization, or UFPO) and non-member local utilities needs to be contacted according to the time required before excavation or digging to mark all applicable facilities in the construction area. This is the responsibility of the landowner and excavator. Identification and the location of all other farmstead underground or overhead facilities is the responsibility of the landowner.

If construction or evaluation of the manure transfer system will involve soil disturbances of one (1) or more acres of land (5,000 square feet in the New York City Watershed East of the Hudson), but less than five (5) acres, the landowner is required to implement

erosion and sediment control practices, designed in conformance with the New York Standards and Specifications for Erosion and Sediment Control, during construction. However, the landowner is not required to obtain coverage under the SPDES General Permit for Stormwater Discharges from Construction Activity for the purposes of this evaluation. If the soil disturbance associated with the construction or reconstruction of the manure transfer system will be five (5) or more acres of land, the landowner is required to obtain coverage under the SPDES Construction Permit by submitting a SPDES Construction Permit Notice of Intent (NOI) to the Department of Environmental Conservation (DEC) prior to soil disturbance. The owner or operator of these facilities are also required to develop and implement a Stormwater Pollution Prevention Plan (SWPPP) that includes erosion and sediment control practices designed in conformance with the New York Standards and Specifications for Erosion and Sediment Control. For sites constructing certain structural ag BMPs that include the construction or reconstruction of impervious area, the SWPPP must also address post-construction stormwater management practices designed in conformance with the New York State Stormwater Management Design Manual unless otherwise notified by the DEC. An Erosion and Sediment Control plan may be needed if modifications to the manure transfer system are required.

INVENTORY

The inventory and evaluation should start with a review of the current CNMP. The P.E. may use the AEM Certified Planner, the local Soil and Water Conservation District (SWCD) or others, (with contact and control by the P.E.) to perform some of the tasks in the inventory and evaluation below. First evaluate the watershed and specific site using professional judgment to determine the potential risk to the environment. Based on risk potential, the investigation should be adjusted for thoroughness. Examples of sites that are low risk are: far from a surface or ground water source, in relatively impermeable soils, with low volumes of waste, low concentration of potential pollutants, and/or continuously visible to operators. These would only require a minimum of evaluation. Examples of sites that are high risk are: sites that have already shown problems, or sites that if a failure occurs, a major environmental impact could result. These would need to be documented and evaluated more thoroughly.

Using existing AEM work sheets and professional judgment determine the potential resource concerns and conduct a risk assessment that evaluates the relative risks associated with manure transfer systems to include:

- Topography (down slope risks, low terrain, high head requirements, road and stream crossings etc.)
- Geography (depth to bedrock, aquifer recharge, karst or other uncertain conditions etc.)
- Near site surface water at risk (including conveyances to surface water)
- Near site ground water at risk (including tile drainage systems and wells)
- Soils (permeability, depth to bedrock, depth to watertable, stoniness etc.)
- Other environmental considerations (air quality, bio-security etc.)
- **Inventory the existing system(s).** Use the existing farmstead and farm maps and narratives included in the CNMP to gain an overview of the entire system including:
 - Manure Storage and monitoring systems

- CAFO regulations state that:

Enclosed under barn storages are not required to be evaluated (unless there is a cause for concern). Undocumented open storages (with a capacity of more than 7 days or 10,000 gallons) should be evaluated using the AEM Tool for the Evaluation of Undesigned Waste Storage Facilities. Enclosed under barn reception pits would not need to be evaluated (unless there is a cause for concern). Open reception pits are to be evaluated. Open storages or reception pits are those that have a potential to overflow during a 25-year, 24-hour precipitation/runoff event or chronic rainfall events.

- Milking Center Wastewater collection and transport
- Silage Leachate collection and treatment
- Manure treatment (storage, separation, digestion, etc.)
- Structures and adjacent properties (if any)
- Manure transfer systems

- CAFO regulations state that:

Temporary manure transfer systems, those that are unhooked or disassembled and/or moved to other sites on the farm do not need to be evaluated by the P.E. These systems would be evaluated by the AEM Certified Planner. The AEM Certified Planner will evaluate and develop monitoring and O&M procedures for all temporary manure transfer systems.

- Permanent systems evaluation to include:

- Tanks and open reception pits
- Pipes (both gravity and pressure) especially at any stream or road crossing
- Valves
- Pumps
- Channels
- Uncovered alleys where manure is scraped

- **Collect design and construction data and any subsequent modifications as appropriate to the environmental risk.** This information may include:
 - Design (if any)
 - Construction, contractor, date, equipment, materials used, construction methods, inspection records, soil conditions encountered, etc.
 - Operation and Maintenance documentation such as repairs and modifications - compare with and actual practice

EVALUATION

- **Consider the risk potential** identified above and adjust the investigation for the specific elements of the manure transfer systems as they are applicable and warranted by the potential environmental risk. The investigation may include where appropriate:

- Design: flows and velocities, compatibility with pipe size and material being conveyed.
 - Pumps: type (positive displacement, dynamic, chopper, etc.), power, material handling capability, current draw, duty point (flow and head), efficiency pump curves and operating specifications
 - Agitation: method, propeller diameter, power.
 - Electrical controls: Programmable Logic Controller (PLC) program, float types, emergency shut offs, warning systems etc.
 - Pipes and channels: location, sizes, materials, joints, gaskets, allowable pressure, velocity, dynamic loading, pipe bedding, position of thrust blocks, cleanouts, traps, backflow prevention, anti-seep collars, air vents, drains and risers. Visual check of the ground along buried pipe for wet areas, settlement and/or sink holes. Pressure tests may be needed if the risks associated with failure and the materials or construction methods are not well defined.
 - Backfill compaction: especially through dikes, stream crossings and roads.
 - Valves: manufacturers O&M, compatibility with material being conveyed, debris build up and life span
 - Alleys and curbs or channels: materials and dimensions
 - Reception pits: size, runoff volume, access, solid removal, wall-pipe penetrations.
 - Roof/outside clean water runoff diversions
 - Operation and Maintenance: during loading, agitation, unloading, inspection process, flushing and or drainage, cleanout procedures, struvite and corrosion prevention and procedures in the emergency action plan
 - Safety: guards, barriers, signage, ventilation
 - Vacuum breaks
- **Based on this inventory, risk assessment and evaluation;** determine the need for any additional investigations.
 - **Monitoring System:** It may be necessary to install a monitoring system or well to check for future leakage if the site is sensitive environmentally and the system is marginal. Shallow wells that are sampled on a regular basis may be appropriate. There may also be tools like the electromagnetic induction (EMI) survey that can be used to map areas of higher nutrients leaving a manure transfer without installing and monitoring wells.

FINAL DOCUMENTATION REQUIREMENTS

An as-built documentation package will be developed for each un-designed manure transfer system that is evaluated using this guide. Professional judgment is to be used to determine the extent and intensity of the documentation within the context of the site and the environmental risk should failure occur. The as-built package will include the following:

1. **MANAGEMENT ASSESSMENT** showing or describing:
 - a. that the current transfer system(s) meets the producer's objectives.
 - b. that the transfer system meets the needs of the current farming operation. Maintenance history of the transfer system shall also be included.

- c. the management practices being implemented to ensure transfer safety and proper operation.
 - d. the existing contingency plan for when the transfer system is compromised and an alternative method is required to safely move material.
 - e. any monitoring and leakage collection systems that are currently implemented for the manure transfer system.
 - f. that the Emergency Action Plan in the CNMP responds to a manure transfer failure.
2. **SITE ASSESSMENT** showing or describing:
- a. the existing plan map from the CNMP with pertinent locations of buildings, barnyards, manure or process wastewater storages, transfer lines including sumps, pipes, alleys used to push manure, soil test pits (if applicable), property lines, setbacks, wells, floodplains, surface waters, surface drains, drain tiles, utilities, cultural resources, and wetlands as part of the CNMP.
 - b. the soil information, which may include soil survey data, soil test results, any test pit or soil boring logs, and soil permeability if available.
 - c. locations, dimensions, and elevations of any sinkholes, karst or other susceptible features near the facility.
 - d. local well test or drain outlet information if testing and/or monitoring has been performed as part of the CNMP.
3. **DESIGN ASSESSMENT** describing:
- a. properties of material being conveyed (type of bedding, TS content, etc.)
 - b. design velocities, head and capacities.
 - c. process equipment requirements
 - d. safety and operation controls electrical/mechanical controls, PLC program, float types, emergency high level shut offs and warnings, etc.
4. **CONSTRUCTION ASSESSMENT** showing or describing:
- a. when the manure transfer system was built.
 - b. the contractor and type of equipment used during construction, if known.
 - c. the materials (pipes, pumps, joints, thrust blocks, bedding, etc.) used for construction if known.
 - d. the results of any engineering or geological inspections performed.
 - e. pipe-line and channel profiles, if known. Assessments of discharge locations (i.e. submerged or to daylight).
5. **CERTIFICATION LETTER.** The P.E. performing the evaluation shall provide a letter certifying the manure transfer system based on the information included in this package. The following statement, including recommendations, and signature must be included with the certification letter:
- It is my professional opinion based on observations made on <insert date> the structure substantially meets (or does not meet) NRCS Standard 634 with the following exceptions"... (if any)
- 1) Monitoring Requirements..... (if any)
 - 2) Additional Operation and Management Requirements.....(if any)
 - 3) Reconstruction Requirements.....(if any)

OPERATION AND MAINTENANCE

Facilities, structures, and practices must be operated and maintained to ensure proper function and longevity. Periodic follow-up with the landowner by the CNMP planner is essential to ensure

that all operation and maintenance (O&M) requirements are understood and followed. Changes in the O&M may require consultation with a P.E.