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Municipal Solid Waste Disposal Areas Leachate Collection Systems

This document provides additional guidance addressing the information requested in a permit application with respect to the design and/or operation of a leachate collection system at a municipal solid waste disposal area. This guidance document supplements the U.S. Environmental Protection Agency's [Solid Waste Disposal Facility Criteria - A Technical Manual](#). Both documents should be used when preparing the information in the permit application. The manual is available from the National Technical Information Service (NTIS). The telephone numbers are 1-800-553-NTIS or (703) 487-4650. The order number is PB94-100-450.

The Nebraska Department of Environment and Energy (NDEE) will be interested in the hydraulic conductivities of all the components of the leachate system. The application should document the method that was used to obtain the hydraulic conductivities used in the design. Hydraulic conductivity can be documented by tests or by manufacturers' certifications. If documentation of hydraulic conductivity is by a standard test method, the required test data as stated in the test method should be submitted. The American Society for Testing and Materials (ASTM) is a good source for appropriate standard test methods.

When the following features are utilized in the design of the facility, the NDEE will be interested in the following items:

A. Drainage Layer(s)

1. If a soil protection layer over the drainage layer is utilized, documentation that soil particles from the protection layer will not migrate into the drainage layer and clog it should be submitted. A geotechnical (soil mechanics) textbook or the USDA Natural Resources Conservation Service Soil Mechanics Note Series (SMN) are references for this subject.
2. The true slope of the drainage layer is a composite of the slope toward the drain pipe and the slope of the drain pipe and should be used in the determination of the head over the liner.

B. Piping In Leachate Collection System

1. Perforation or slot area is used to compute the capacity of the drain pipes in a leachate collection system. When these pipes are positioned at the bottom of a drain trench, the geometry of the trench and the laws of hydraulic flow may reduce the efficiency of the slots

or perforations. This set of circumstances is called hydraulic binding. A remedy for this condition is to raise the pipe above the bottom of the trench at least a distance of one nominal pipe diameter and increase the trench bottom width to seven times the nominal pipe diameter.

2. The length of pipe to be cleaned should not exceed the ability of the cleaning equipment. Therefore, the capabilities of the cleaning equipment should be evaluated and documented in the application.

C. HELP Modeling

1. There is only one storm event identified in Title 132 and that is the 24 hour–25 year storm event. The 24 hour–25 year storm is the rainfall that accumulates in 24 hours once in 25 years. The rainfall is given in inches. This means that the storm could occur on any given day in the 25 year period. The rainfall is found by consulting a storm atlas such as the National Weather Service’s “Technical Paper No. 40.”
2. Depending on site design and construction scheduling, it is possible that a newly constructed cell will be open without waste while an adjacent cell is active and still receiving waste. Storms that fall on open cells with a drainage layer pass quickly into the leachate collection pipe system. If no provision is made to divert this volume of water from the leachate generated by an active cell, the commingled liquid must be considered leachate. In addition, the amount of leachate generated from an active cell changes with time. The leachate holding pond or tank must be sized so that there is no possibility of a spill or overtopping of the pond or tank during the period the site receives waste to the end of the post-closure period. In order to insure there are not spills or overtopping, the volume of liquid to be controlled by the leachate pond or tank should be determined from the rainfall of a 24 hour–25 year storm falling on the involved cells. This storm is appropriate because run-on/run-off control structures are sized for that storm and the storm may occur at any time within a 25 year period. This is considered to be a worst case scenario with respect to volume of leachate. This sizing can be done with EPA’s “Hydrologic Evaluation of Landfill Performance” (HELP) computer program. The program is available from NTIS.
3. Modeling for worst case (conservative) conditions has been done in many ways when designing leachate collection systems. When adjusting rainfalls to add a 24 hour–25 year storm to the daily rainfall record, remember the definition above. 24 hours is one day and therefore, the 24 hour–25 year storm should be added to a day with no rain but probably in a wet period. The addition of waste over the leachate collection system will reduce the amount of leachate generated in the system on a volume basis. However, the amount of leachate generated does not approach zero with increasing depth of waste. Thus, depth of waste should be carefully modeled when designing the leachate collection system for capacity.
4. The HELP Model will ordinarily model five consecutive years of rainfall records. The rainfalls are developed from records taken at selected monitoring stations in Nebraska and are stored in the program by year. In order to model a 24 hour–25 year storm on an open cell, it will be necessary to modify the capability of the program by deleting some of the records. In order to correctly modify the program, it should be determined which of the five record years should contain the 24 hour–25 year storm. From a conservative standpoint, the most likely place to expect the 24 hour–25 year storm would be in the year with the highest total amount of rainfall within that same year. The maximum rainfall year and month are found by asking for a detailed printout. The 24 hour–25 year rainfall is simply added through program commands. In order to model only the maximum year with the 24 hour–25 year hour storm

added, delete all years up to the maximum year by program commands, and ask for only one year of analysis. The program will automatically analyze the maximum year and stop.

5. HELP modeling for worst case (conservative) conditions must be carefully done when designing leachate collection systems. When adjusting rainfalls to add a 24 hour–25 year storm to the daily rainfall records, remember the definition in “C #1” above. 24 hours is one day and therefore the 24 hour – 25 year storm should be added to a day with no rain.

D. Leachate Collection Ponds

1. At times, climate and waste volume may combine to produce little or no leachate at some sites. In cases where leachate is held in a lined collection pond, long periods of time in a dry condition may promote vegetal growth in the bottom area not inundated. Since it may be possible for some types of vegetation to penetrate a liner, a maintenance program should be part of the operational plan to keep vegetation from growing in the area of the pond that is usually inundated. Ultra-violet protection for membrane liners is also necessary.

RESOURCES:

- NDEE Home Page <http://dee.ne.gov/>

Contacts:

- NDEE Front Desk (402) 471-2186
- NDEE Toll Free Number (877) 253-2603
- NDEE Hazardous Waste Compliance Assistant (402) 471-8308
- Email questions to: NDEE.moreinfo@nebraska.gov

NDEE Publications:

- [Title 132 – Integrated Solid Waste Management Regulations](#)
Titles are available on the NDEE Home Page under “Laws/Regs & EQC”, “Rules & Regulations”

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