Minnesota Pollution Control Agency

Permeability Testing Guidance for Secondary Containment Areas

Sampling and testing methods

Permeability testing is required for most aboveground storage tank (AST) secondary containment basins to verify compliance with Minn. R. 7001.4220, 7151.5400, and 7151.6400.

Containment basins constructed of concrete or those with geotextile or synthetic liners do not require testing. However, the liner type must be evaluated and proper installation methods verified.

Containment basins using native soils, amended soils, or an imported clay liner to provide secondary containment require permeability testing. For these basin types, a qualified soil technician collects soil samples using thin-walled tube samplers according to American Society for Testing and Materials (ASTM) method D 1587. An independent soil testing lab will test the vertical soil permeability using ASTM falling-head or constant head permeability test method D 5084. Previous permeability testing conducted according to any ASTM method may be approved.

Thin-walled tube samples should be collected to a three-foot depth below any cover material. The testing lab should log and classify the soil according to ASTM method D 2488.

If the soil is homogeneous, only one permeability test is required per thin-walled tube sample. If the soil is heterogeneous, conduct a permeability test on each soil type as defined by ASTM method D 2488.

Sample number and location

At least three, thin-walled tube samples should be collected per containment area. One sample should be collected at the lowest point in the containment basin. The remaining samples should be triangulated across the entire basin.

If there are more than three tanks in a single containment area, collect at least one sample per tank. Less frequent sampling may be approved on a site-by-site basis. Unusual site configurations or highly variable soil may require more sample locations.

Reporting

Site permeability evaluation results should be assembled in a report which includes sampling and testing method documentation. In addition, the report should include:

- a table of individual permeability tests with an average for each sample location and containment basin (Calculate the average using the geometric mean. Report the soil hydraulic conductivity in units of centimeters per second (cm/s).)
- soil descriptions and logs of each sample location
- a detailed map showing each sample location, buried utilities, pipelines, and sewers within the containment basin

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- classification of soils used in dike construction
- a table listing all tanks and their contents (can be taken from the facility's permit or permit application)
- the type and brand name of the artificial liner (if used) and a description of the construction method

Recommended testing

If the site has not been previously investigated for contamination, visually screen soil samples for contamination. Report any evidence of contamination immediately to the Minnesota Duty Officer at 800-422-0798, 24 hours-a-day.

Although not required, chemical analysis of soil samples is highly recommended, especially to verify that a site is clean. The analytical parameters should be relevant to products currently and previously stored at the site.

At least one detailed geologic log from a 20-foot deep soil boring is recommended. This can be from a previous site investigation or engineering boring.

Sites with complex geology may consider conducting additional borings.

Facilities that have submitted engineering plans to the MPCA for secondary containment basins may require less detailed testing. This will be evaluated on a site-by-site basis.

Need more information?

Visit the AST Program at http://www.pca.state.mn.us/cleanup/ast.html. The site has forms, fact sheets, and other information about ASTs and AST requirements.

You can also call the MPCA at 651-296-6300 or 1-800-657-3864.