



# Geologic Investigation Waste Impoundment Planning and Design

TN313c

Jo Ellen Johnson, TN Geologist

## DEFINITION

A waste impoundment is made by constructing an embankment and/or excavating a pit dugout, or by fabricating a structure. In-ground storage systems include unlined, (as is) lined (engineered soil), flexible membranes, and concrete liners, and above ground storage systems include steel tanks and concrete tanks. Storing, treating, or utilizing agricultural waste has the potential to contaminate groundwater.



## WHEN APPLICABLE

A geologic investigation is required to properly select a site when an in-ground storage system is being considered. In-ground system storage type and geologic considerations are addressed in the table below. Many agricultural waste impoundments can be installed on properly selected sites without any special treatment other than good construction procedures. Information and equipment to be provided by the landowner for the geologic investigation are also addressed in the table.

In-ground Storage System Type	Geologic Considerations	Information and Equipment Provided by Landowner
Unlined (as is)	<ul style="list-style-type: none"> <li>• Soils with Permeability, <math>k &lt; 10^{-6}</math> cm/s</li> <li>• Depth to Bedrock at planned bottom elevation is <math>&gt;2</math> ft.</li> <li>• Ground Strength (no collapsing ground)</li> <li>• Depth to Water Table; <math>&gt;2</math> ft below grade</li> <li>• Distance to water supply well; <math>&gt;200</math> ft</li> <li>• Topography</li> </ul>	<ul style="list-style-type: none"> <li>• Information and access to the proposed site, location of rock outcrop, active or abandoned wells, springs, and other such features.</li> <li>• Utility locations.</li> <li>• <b>Equipment requirement</b> for test pits that are to be used as means of soil classification and sampling:               <ul style="list-style-type: none"> <li>○ For depths of 10 feet or less – wheel backhole or mini-excavator</li> <li>○ For depths greater than 10 feet – track excavator</li> </ul> </li> <li>• If a non-NRCS laboratory is used for expedited turn-around-time to test soil samples, the outside laboratory needs to test samples for the following and submit results to NRCS:               <ul style="list-style-type: none"> <li>○ Classification (ASTM D 2487)</li> <li>○ Atterberg limits (ASTM D 4318)</li> <li>○ Percent fines (<math>&lt; \#200</math> sieve)</li> <li>○ Hydraulic Conductivity (ASTM D 5084)</li> <li>○ Compaction/Proctor (ASTM D698)</li> </ul> </li> </ul>
Engineered Soil Liner	<ul style="list-style-type: none"> <li>• Same as for unlined, plus:</li> <li>• Perched water</li> <li>• Borrow material source</li> <li>• Soil amendments</li> </ul>	
Membrane Liner	<ul style="list-style-type: none"> <li>• Water table <math>&gt; 2</math> ft below grade</li> <li>• Puncture, angular gravel <math>&gt;3/8</math>-in, irregular rock surface</li> <li>• Excavation type</li> <li>• Topography</li> </ul>	
Concrete Liner	<ul style="list-style-type: none"> <li>• Depth to Water Table; <math>&gt;2</math> ft below</li> <li>• Settlement potential</li> <li>• Topography</li> </ul>	

## REFERENCES

Tennessee NRCS Conservation Practice Standards Waste Storage Facility, Code 313  
 NRCS Agricultural Waste Management Field Handbook, Appendix 10D Guidelines for Waste Impoundment Lined with Clay or Amendment-Treated Soil  
 NRCS Agricultural Waste Management Field Handbook, Chapter 7 Geologic and Groundwater Considerations