ONSITE SEWAGE TREATMENT PROGRAM
UNIVERSITY OF MINNESOTA
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Rice County Seepage Pit (Dry Well) Research Summary

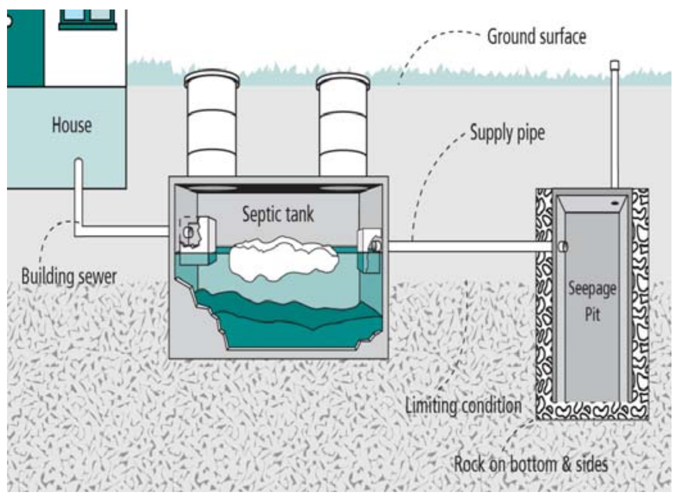
November 2011

Background

Rice County, Minnesota, implemented a septic system inventory and inspection program to evaluate and upgrade septic systems in select areas of the county. The inventory resulted in the identification of over 60 seepage pit/dry well systems, which are considered an Imminent Threat to Public Health and Safety by the local ordinance.

In the summer of 2011, the University of Minnesota Onsite Sewage Treatment Program field-investigated 16 of these dry well systems to determine if any of these systems meet existing system compliance criteria. For more information about cesspools, drywells and seepage pits see the UMN fact sheet titled "Effective Wastewater Treatment and Cesspools" (http://septic.umn.edu/professionals/systemoptions/CesspoolsandSeepagePits/)

The primary purpose of the U of M investigation was to determine if any of these systems meet the current compliance criteria in the State of Minnesota. The existing system compliance criteria for these systems include:



1. A watertight septic tank preceding the dry well;
2. A minimum inside diameter of the dry well of five feet;
3. A minimum of three vertical feet of separation to periodically saturated soil;
4. The dry well is not in contact with any sandy textured soils;
5. The dry well is not in contact with a drinking water source;
6. The dry well has an absorption area that has been determined by dividing the design flow in parts 7080.1850 to 7080.1885 by the soil loading rate under Table IX or IXa in part 7080.2150, subpart 3, item E, based on the weighted average of each vertical stratum penetrated by the seepage pit, dry well, or leaching pit; and
7. Meets all setback requirements.

Findings

None of the 16 systems meet the compliance criteria based on our data collection. All the systems lacked the three feet of unsaturated soil below the dry well for proper aerobic treatment as well as having significantly undersized distribution areas. Without these two conditions being met, rapid movement of water into the surrounding environment has been well documented. This movement will allow any contaminants in the waste water to also move into surface and subsurface waters. Watertightness of the preceding septic tank varied by parcel, but 10 of the 16 parcels had compliant septic tanks. Many tanks have not been properly maintained and have likely caused solids to enter and plug the dry well systems. This may be the best explanation for the finding that 9 of the 16 dry wells inspected had visible overflow pipes (see photo). The existence of an overflow pipe clearly results in the system classification of an imminent threat to public health and safety.

Additional research was conducted on a subset of these systems to investigate the potential for environmental impact. Soil phosphorus and chlorides were strategically sampled. The research found excessive levels of phosphorus in all of the soil layers likely to be receiving effluent from these systems. The soil samples were collected to depths of greater than 5 feet below the surface and still remained well above any recommended levels for production agriculture or turf grass. These levels indicate that phosphorus is moving along with the subsurface water away from the dry wells and building up soil test phosphorus to excessive levels even 40' away from the selected dry wells.

We also collected water samples at 5 sites in order to determine movement of potential contaminants in the shallow periodically saturated soils. We collected soil-water from our two soil borings 5 and 40 feet down gradient of the dry well (when a water-table was present), surface water (when adjacent to property), and/or well water (when homeowner availability allowed). These samples were analyzed for chlorides, which are salts that humans add to water via road salts, fertilizers, and human and animal wastes. Chloride levels over 10mg/L would clearly indicate influences from these sources. Chlorides themselves typically do not present a problem in surface or ground water, but are commonly used as a marker for other human-induced contaminants in the water.

Table 1 shows the values for chlorides from all of the sampled locations. It is clear that each site (and 10/13 total samples) has elevated chlorides present in the water. For all of the samples collected near the dry wells, high chloride values indicate high potential for contamination. For the samples further away from the systems, the chloride levels vary due to water movement patterns and dilution from groundwater.

Site	Sample Location	Chlorides (mg/L)
1	Near Dry Well	1240
2	40' Down Gradient	132
3	Near Dry Well	1080
3	40' Down Gradient	8.8
3	Domestic Well	197
3	Lake Surface	18.5
4	40' Downgradient	147
4	Domestic Well	2.9
4	Lake Surface	38.8
5	Near Dry Well	13.3
5	40' Downgradient	3.8
5	Lake Surface	10.7
6	Domestic Well	36.5

Table 1. Locations of chloride water samples for six dry well sites.

Several markers were used to determine contamination. On many of these sites, more than one indicator of human influences is found. Based on this data collection and summary, it is clear that many of the sampled dry well sites have adversely impacted the surrounding soil and water. We expect that similar data collected on other dry well sites around Rice County, MN, would yield comparable results.

The complete report can be found online at septic.umn.edu/research/index.htm