

ODH Report to the Ohio Lake Erie Phosphorous Task Force

April 18, 2008

Purpose:

This report was created by the Bureau of Environmental Health at the request of the Ohio Lake Erie Phosphorous Task Force. The report attempts to compile the best, known information concerning discharging sewage treatment systems located within Ohio's Lake Erie Watershed. Information was gathered for the Ohio Lake Erie Phosphorous Task Force in hopes that it may provide some assistance in estimating discharging household sewage treatment systems (HSTS) contribution to the total phosphorous load received by Lake Erie.

Scope:

Information provided to the Ohio Lake Erie Phosphorous Task Force in this report was acquired through two separate surveys of local health districts. The surveys were collected by the Bureau of Environmental Health in surveys running from 4/5/06 to 4/14/06 and 3/12/08 to 4/15/08 respectively. Local health districts responded to survey forms by telephone, fax and e-mail.

Limitations:

There are limits to the accuracy of this report due to the fact that much of the information requested by the task force is not accessible at this time. Some limitations are listed below:

- Many health districts surveyed did not have access to direct counts of sewage treatment systems while completing the surveys. Many counts are estimates based on the general knowledge of local health district staff.
- The procedures used to estimate numbers of discharging systems in nonreporting districts are not standard and the results should not be used for purposes outside the parameters of this report.
- This report considers only discharging HSTS located within the watershed. Soil based HSTS provide varying levels of phosphorus removal, dependent on the depth of the soil and its characteristics (USEPA, 2002). It should be noted that soil based systems, when designed poorly or failing, may contribute to the phosphorous loading of nearby ground and surface water.

Conclusions:

The sum of the provided and estimated counts of discharging sewage treatment systems located within Ohio's Lake Erie Watershed is 147,975. The 2000 US Census identifies an average of 2.49 persons per household in Ohio. USEPA estimates an inhabitant of a residential household will use 69.3 gallons of water per day (USEPA, 2002). Based on these figures it is estimated that there are 368,458 citizens living in dwellings with discharging HSTS within Ohio's Lake Erie Watershed. These citizens discharge approximately 25,534,122 gallons of effluent each day.

Wide variations in phosphorous concentrations have been reported in wastewater. The phosphorous concentration of wastewater is highly dependent on the inhabitants of the

dwelling. The inhabitants diet, choice of detergents, and use of a garbage disposal effect the concentration (Minnis, 2008). The USEPA estimates the concentration of phosphorus in domestic wastewater to be in the range of 5- 15mg/L (USEPA, 2002). Using a concentration of 10mg/L, it is estimated that 1.063 ton a day or 388.1 ton a year of phosphorous is discharged into the environment by discharging HSTS within Ohio's Lake Erie Watershed.

Estimating the mass of phosphorous that actually reaches Lake Erie is very difficult. Some of these systems may discharge to the surface of the ground and the effluent is absorbed into the receiving soil before it ever reaches a body of water. Some systems do discharge directly to surface water bodies such as road ditches and streams. Other discharging systems may utilize soil absorption to limit the amount of effluent that is discharged.

Sub Am HB 119 limits the authority of local health districts to issue permits for discharging HSTS. The bill requires homeowners to obtain a NPDES permit from the Ohio EPA before a permit to install a discharging HSTS can be issued. Currently NPDES Permit Number 0HK000001 does not include standards for the phosphorous concentration of discharges.

Calculations:

147,975 homes × 2.49 persons/ home	= 368,458 people
368,458 people × 69.3 gpd/person	= 25,534,122 gpd
25,534,122 gpd × 3.7853 L/gal	= 96,654,312 L/day
96,654,312 L/day × 10mg/L	= 966,543,120 mg/day
966,543,120 mg/day × (1.1×10 ⁻⁹ ton/mg)	= 1.063 ton/day
1.063 ton/day × 365 day/year	= 388.1 ton/year

References:

US EPA. 2002. *Onsite Wastewater Treatment Systems Manual*. EPA-625/R-00/008. US EPA Office of Water Programs/ Office of Research and Development, Cincinnati, OH.

Minnis, Dr. Peggy, 2008,

<http://www.ces.ncsu.edu/plymouth/septic3/MinnisNutrientsText.pdf>

US Census Bureau, 2000, <http://quickfacts.census.gov/qfd/states/39000.html>

Local Health District	Total Number of Systems in the District	Total Number of Systems Discharging into the Watershed
Allen	9,000	2366(1)
Ashland	33,000	2376(3)
Ashtabula	13-15,000	6120(3)
Auglaize	9,000	1800 (1)
Crawford	?	1525(1)
Cuyahoga	13,000	11006(1)
Defiance	4-5,000	7000(1)
Erie	10,000	500(1)
Fulton	?	?
Geauga	37,000	17760(2)
Hancock	?	2591(1)
Hardin	16,000	3840(3)
Henry	6,000	1722(1)
Huron	9,000	3886(1)
Lake	14,000	802(1)
Lorain	25,000	13432(1)
Lucas	?	25(1)
Marion	5,000	360(3)
Medina	18,000	11667(1)
Mercer	4872	1669(1)
Ottawa	10,000	847(1)
Paulding	5,000	2400(2)

Local Health District	Total Number of Systems in the District	Total Number of Systems Discharging into the Watershed
Portage	45,000	10800(3)
Putnam	7990	3836(2)
Richland	18,000	730(1)
Sandusky	8,000	323(1)
Seneca	9,000	5793(1)
Shelby	10,000	225(1)
Summit	27,000	8424(3)
Trumbull	30,000	447(1)
Van Wert	5,000	5050(1)
Williams	3,000	4932(1)
Wood	14,000	10000(1)
Wyandot	3582	3588(1)
Akron City	ns	2(1)
Ashtabula City	ns	21(1)
Cleveland City	ns	?
Barborton City	ns	?
Conneaut City	ns	110(1)
Total		147975

- (1) Counts of discharging STS within the watershed were provided by the LHD.
- (2) Counts of discharging STS within the watershed were estimated by multiplying the total number of systems in the district by the estimated percentage of systems that discharge. The estimated percentage of systems that discharge, was calculated using the submitted counts of total systems and discharging systems for districts located completely in the watershed that reported to both the 2006 and 2008 surveys (Allen, Cuyahoga, Henry, Huron, Lake, Lorain, Ottawa, Sandusky, Seneca, Van Wert, Williams, and Wood $60,159/125,000= 48\%$)
- (3) Counts of discharging STS within the watershed were estimated by multiplying the total number of systems in the district by the estimated percentage of systems that discharge and then multiplying the product by the approximate percentage of land area located within the watershed (Ashland 15%, Ashtabula 85%, Hardin 50%, Marion 15%, Portage 50%, and Summit 65%)

?- information not provided

ns - not surveyed

