

**Report On The Proper Maintenance Of Septic  
Tank Systems In Accordance With Section 13.5  
Of HB 1160(Clean Water Act Of 1999)**

**Submitted by the N.C. Commission For Health Services  
To The  
Environmental Review Commission  
North Carolina General Assembly**

On-Site Wastewater Section  
Division of Environmental Health  
NC Department of Environment and Natural Resources

March 15, 2000

**Report on the Proper Maintenance of Septic Tank Systems in Accordance with  
Section 13.5 of HB 1160 (Clean Water Act of 1999)**

**Section 13.5. :** The Commission for Health Services shall study issues related to the proper maintenance of septic tank systems. The Commission shall specifically study measures that prevent the failure of septic tank systems and the harm to public health, the environment, and natural resources that result from the failure of septic tank systems. The Commission for Health Services shall report its findings and recommendations, including any legislative proposals, to the Environmental Review Commission no later than 1 March 2000.

**INTRODUCTION**

Approximately 50% of North Carolinians currently rely on septic tank systems for their wastewater disposal needs. US Census Data indicates there were 1,365,632 systems serving primary housing units in our state in 1990. An additional 40,000 plus new systems and 15,000 repairs are permitted in North Carolina annually. It is imperative that these systems be appropriately maintained. Malfunctions and failures not only threaten the public's health, environment and natural resources, but may also have negative economic impacts.

Section .1961(a) of the Laws and Rules for Sewage Treatment and Disposal Systems requires that the persons owning or controlling the property upon which a system is sited be responsible for that system's maintenance. In reality many owners are unaware of their legal responsibility, as well as the steps they must take to assure proper maintenance. Septic tanks generally do not appear on an owner's radar screen until they experience problems with their system. At this point, serious damage may have already occurred. It is the purpose of this report to examine the problems that result from the malfunctioning and failure of septic tank systems, as well as to offer recommendations to remedy these problems.

**WHAT IS FAILURE?**

There are several indicators that alert us to system malfunctions and failures. The discharging of sewage or effluent to the ground surface or surface waters is one such indicator. Contaminated groundwater is another. The presence of odors and the back up of sewage or effluent into the home or other facilities are additional indications of failure.

There may also be invisible failures in systems that appear to be functioning properly. Tainted wells are a good indicator of these invisible failures. Section .1961(a)(1) (A), (B) and (C) of the Laws and Rules for Sewage Treatment and Disposal Systems provides detailed guidance to unacceptable conditions related to the improper maintenance of septic tank systems.

### **WHY DO SEPTIC SYSTEMS FAIL?**

Septic tank systems fail for a variety of reasons. Many, but not all of these reasons are related to improper operation (use) and maintenance. Owners are often unaware of the necessity of pumping their tanks on a regular basis. Tanks need to be pumped every three to eight years depending on the size of the tank, the daily flow of sewage and the amount of solids in the sewage. It is important that owners prevent unnecessary solids such as grease, food, cigarette butts, sanitary products, disposable diapers and kitty litter from entering the septic tank system. Neglecting to do so will cause pipes to clog, tanks to fill up quickly and can lead to premature drainfield failure.

Hydraulic overload is a significant cause of system failure. This may result from excessive water use or leaking plumbing fixtures in the home. Failure to use low-flow toilets, showerheads or other water-saving devices and drains that empty onto the drainfield will contribute to overload. Leaking tanks, groundwater, storm water, gutters and poor landscaping also hydraulically overloads systems. Drainfields must have time to rest between doses of effluent or the life of the drainfield may be shortened significantly.

Chemicals, pesticides, paint products, cleaners, etc. dumped into a tank can kill the bacteria in a system. Bacteria in the septic tank and the drainfield are an essential part of a properly functioning system. Bacteria in the tank help reduce solids and bacteria in the drainfield treats the effluent before it reaches ground or surface waters.

Proper maintenance of the drainfield is also necessary to prevent system failure. Suitable vegetative covers must be maintained to prevent erosion and divert storm water from the field. Appropriate vegetation helps disperse water and remove nutrients from the wastewater. Poor landscaping over the septic system can contribute thousands of additional gallons. Trees and shrubs must be located far enough away so their roots do not interfere with the systems pipes. Lastly, owners must assure drainfields remain free

from vehicle traffic, impervious surfaces, construction or other activities that can compress the soil and damage trenches, pipes and, ultimately, effluent dispersion.

Another area of concern relative to owner maintenance involves those systems that require a certified operator. There are two significant problems in this realm. The first is the failure of the system owner to maintain the services of a certified operator. The second is the failure of the operator to properly maintain the system.

Improper maintenance is not the sole cause of system malfunction and failure. Septic tank systems that are installed incorrectly, or are defective from the outset will fail. North Carolina does not require the certification of installers. Without suitable training installers may be unaware of the fact that trenches should not be dug during rainy periods or care must be taken to avoid compacting the drainfield. They may not have the expertise necessary to recognize defects in the system components such as precast concrete tanks or poor gravel quality. Any one of these situations can lead to system failure and unnecessary owner expense.

Finally, problems have arisen when maintenance is required on underground utilities. Workers installing various underground utilities have damaged drainfields, as well as system components. Little or no effort is made by these underground utility contractors to locate the system and report the damage once it occurs.

### **IMPACTS OF FAILURE**

A wide range of problems can result from the malfunction and failure of septic tank systems. Wastewater pooling over treatment and disposal fields may contain water-borne diseases such as cryptosporidiosis, giardiasis and hepatitis. These diseases can be spread when humans or animals (vectors) come into physical contact with the wastewater. Diseases can also be spread when humans ingest contaminated drinking water. Wastewater running into our various water sources can pollute drinking water. In addition, underground wastewater can infiltrate poorly constructed wells resulting in negative health effects.

Nitrates pose a specific health threat to infants and pregnant women. “Blue baby syndrome” arises from an oxygen deficiency brought on by nitrate poisoning. Nitrates and phosphorous may also cause the acceleration of algae growth. Excessive algae growth may deplete oxygen levels thus upsetting the aquatic environment.

Properly functioning septic tank systems are an essential component of a community's economic health. New businesses and residents will not locate in an area that has inadequate wastewater disposal mechanisms. Obviously, new businesses and residents are critical factors for expanding a community's tax base and maintaining a healthy economy. A healthy economy helps ensure a community's level of services and quality of life.

### **FAILURE DATA**

Statistical data pertaining to system malfunction and failure in North Carolina is very limited. This is due in part to the lack of comprehensive information concerning the physical location, design and current ownership of many systems throughout the state. (Post 1995 data should be much more accurate due to statewide changes in permitting requirements.) Funding for compilation of this data has been very limited. Without funding assistance, local agencies are severely restricted in their ability to identify system locations. The process of educating owners in the proper maintenance of their septic tank systems is hindered if we do not know where these systems are located. This is a cycle that must be broken if North Carolina is serious about addressing the threats resulting from system malfunction and failure.

The North Carolina Office of State Budget and Management conducted a citizen survey in 1981. One of the survey questions requested information concerning problems with septic tank systems. The data collected indicated that 11.4% of these systems experienced malfunctions or failures during the past year. Analysis of the data concluded that 3.3% of the systems experienced problems due to poor soils, poor installation or hydraulic overload. The remaining 8.1% of the problems were attributed to lack of maintenance. (Grayson, ET al., 1982.)

A survey of 1,333 septic systems was conducted in Orange County, North Carolina that same year. This survey indicated 10.9% of septic tank systems experienced malfunctions or failures. Analysis of this data suggested that "...preventative maintenance was not being practiced and the majority of households waited until something went wrong before pumping the system." (Grayson, ET al., 1982.)

593 septic tank systems were examined in Brunswick County, North Carolina in 1983. One hundred fifty-one of these systems were sited on Leon soils. One objective of

this survey was to determine if the rate of system failure was greater for those systems located on Leon soils due to the presence of seasonally high water tables. The survey results indicated that 20.5% of the systems installed on Leon soils versus 7.5% of all other systems were failing. (Uebler, ET al, 1984.)

Another study on the performance of septic tank systems was conducted in a Piedmont county of North Carolina in 1988. Of the 91 conventional systems sampled, 25% were malfunctioning and an additional 9% showed evidence of past failure. The study concluded that these problems were due largely to improper maintenance and installation. (Hoover and Amoozegar, 1989.) An additional study on system performance was conducted in Northeastern North Carolina in 1991. Of the 93 conventional systems sampled, 28% were malfunctioning and an additional 6% showed evidence of past failure. This study noted that malfunctions tended to increase with the age of the system leading the authors to suggest that improper maintenance was a factor in this study. (Hoover, ET al., 1993.) It should be pointed out that the 1984, 1988 and 1991 studies were conducted on a limited number of systems and represent stratified sampling rather than the random sampling used in the 1981 surveys.

### **FUNDING**

Currently, the State provides very little state funds for the implementation of local environmental health programs. The only state funding for local environmental health programs that is not categorical in nature is a \$600,000 Aid to County appropriation that is distributed to each county on an equal basis (\$6,000 per county). There is limited funding to local environmental health programs that is program-specific. Food and Lodging funds are distributed to local health departments according to compliance with mandated inspections of food and lodging establishments. Also, there are funds for the investigation of cases of childhood lead poisoning. These latter two programs contribute a total of approximately \$800,000 to local health departments, based on formulas that take into account the number of facilities inspected and the number of poisoning cases investigated. There is no funding from the state that specifically supports the local on-site wastewater program.

## **RECOMMENDED MEASURES FOR THE PREVENTION OF ON-SITE WASTEWATER SYSTEM FAILURES**

### **1. Accurate Location of On-Site Wastewater Systems:**

Comprehensive owner education is one key to preventing the failure of septic tank systems. It is difficult to address this issue without identifying the actual locations of septic tank systems when they are installed. Local health departments should be trained and equipped with Global Positioning Systems and the information gathered placed on documents supplied to the public and the County Geographic Information System. Local health departments, armed with this data can then develop a program appropriate to their needs for contacting and educating owners. The State can serve as a resource for developing both programs and materials. Realistically, funding may only initially be available to begin a pilot project in four or five counties.

### **2. Notification System for On-Site Wastewater System Maintenance:**

One aspect of any program should include a method for reminding owners on a regular cycle (i.e.: every three to five years) that their system should be checked to determine the need for pumping. A list of local pumpers can be included along with the notice. Pumpers can then be required to notify the local health department upon completion of their inspection and indicate if further maintenance or repairs are necessary. This program piggybacks with our newly enacted septic tank effluent filter requirements. Similar to Recommendation 1, this may initially be available as a pilot project.

### **3. Creation of a Certification Program for Installers/Contractors of On-Site Wastewater Systems:**

Enactment of legislation for the establishment of a certification program for installers/contractors of on-site wastewater systems. The Commission for Health Services shall adopt rules for certification, which shall be implemented by local health department employees authorized as agents of the State. The rules shall establish requirements for issuance, renewal, training, experience, and continuing education for certified installers/contractors. As development continues to expand in areas whose soils are not as receptive as in the past and as systems become more

complex to accommodate these conditions, the need for this type of regulatory program becomes more critical. (See Appendix A for Draft Bill.)

**4. Inspection and Disclosure Statement for On-Site Wastewater Systems:**

Owner education should begin prior to the purchase of a property that relies on an on-site system for its wastewater disposal needs. Too often new owners are unaware of the condition of their system at the time of purchase and the steps they must take to assure proper maintenance. (System maintenance information appears on the Operation Permit.) Legislation should be enacted requiring that a disclosure statement be prepared, signed and acknowledged prior to the transfer of property to a new owner. The disclosure statement should indicate the maintenance history, any observed uncorrected defects or problems known by the seller, and a statement to the new owner that there may be operational requirements for the system and that the local health department may be contacted for more information specific to the system. (See Appendix B for Draft Bill.)

**5. On-Site Wastewater Systems Damaged by Excavations:**

Legislation requiring that any utility (i.e.: power, gas, cable) be responsible for immediately reporting any damaged on-site wastewater disposal system to the system owner. (See Appendix C for Draft Bill.)

**6. Comprehensive Plan for All Wastes:**

The recommendations in this report should be further developed by the Environmental Review Commission and the North Carolina General Assembly to be consistent with and to be an integral part of a comprehensive state plan for the management of all North Carolina waste in an ecologically sound manner.

**7. Funding:**

There shall be a continuing appropriation of \$5,000,000 to employ and support additional environmental health specialists for local health departments to work in the On-Site Wastewater Program and assist with the implementation of this program.

## REFERENCES

1. Grayson, S.C., D.F. Olive and S.J. Steinbeck. July 1982. **The North Carolina Septage Study**. Division of Health Services, Raleigh, NC.
2. Hinson, T.H. 1994. **Performance of Sand Lined Trench Septic System Used In Conjunction With Drainage**. Department of Soil Science, North Carolina State University, Raleigh, NC.
3. Hoover, M.T. and A. Amoozegar. September 1989. **Performance of Alternative and Conventional Septic Tank Systems**. In: Proceedings of 6<sup>th</sup> Northwest On-site Wastewater Treatment Short Course. Office of Engineering Continuing Education, University of Washington, Seattle, WA.
4. Hoover, M.T., R.O. Evans, T.H. Hinson and R.C. Heath. 1993. **Performance of Sand Lined Trench Septic Systems on Wet, Clayey Soils in Northeastern North Carolina: A Summary Report**. College of Agriculture and Life Sciences, North Carolina State University, Raleigh, NC.
5. Ingram, T., T. Hull and T. Goodman. September 1999. **On-site Wastewater Management: An Integrated Approach to Improving Water Quality and Preventing Disease**. Environmental Health.
6. North Carolina Rural Communities Assistance Project, Inc. February 1994. **Considering the Alternatives: A Guide to Wastewater Management for Small Communities in North Carolina**.
7. Otis, R.J. and D.L. Anderson. December 1994. **Meeting Public Health and Environmental Goals: Performance Standards for Onsite Wastewater Treatment Systems**. In: Proceedings of 7<sup>th</sup> National Symposium on Individual and Small Community Sewage Systems. ASAE. Atlanta, GA.
8. Uebler, R.L., S.J. Steinbeck and J.D. Crowder. 1984. **Septic System Failure on a Leon (Hardpan) Soil and Feasibility of Drainage to Improve System Performance**. In: Proceedings of 4<sup>th</sup> National Symposium on Individual and Small Community Sewage Systems. ASAE. New Orleans, LA.
9. Velez, L.E. September 1997. **Locating Septic Tanks and Analyzing Contamination Risk Using Geographic Information Systems**. In: 9<sup>th</sup> Northwest On-Site Wastewater Treatment Short Course and Equipment Exhibition. Department of Civil Engineering. University of Washington, Seattle, WA.

**APPENDIX A**

**DRAFT BILL**

Short Title: Certification of Wastewater System Contractors

(Public)

Sponsors:

Referred to:

1           A BILL TO BE ENTITLED AN ACT TO AMEND THE STATUTES FOR  
2           “WASTEWATER SYSTEMS” TO REQUIRE THE COMMISSION FOR HEALTH  
3           SERVICES TO ADOPT RULES FOR THE CERTIFICATION OF WASTEWATER  
4           SYSTEM CONTRACTORS.  
5  
6

7           **Section 1.**

8           Proposed amendment to the “Wastewater Systems Act.” G.S. 130A-335. by adding a  
9           new paragraph(i)

10          (i) The Commission shall adopt rules to provide for the certification of a person  
11          installing, constructing or repairing a wastewater system permitted under this Article.  
12          The Commission shall adopt rules governing certification, which shall include  
13          requirements for the following:  
14

- 15           (1) Provisions for Certification issuance, denial, suspension or revocation.
- 16           (2) Evidence of knowledge and skills to construct, install, or repair a wastewater  
17           system including; modified, alternative, and innovative systems.
- 18           (3) Evidence of familiarity with applicable State laws and rules governing the  
19           wastewater systems.
- 20           (4) Proof of liability insurance or other means of financial responsibility for any  
21           liability which may be incurred in the installation or construction of a  
22           wastewater system.
- 23           (5) Requirements for certification renewal, continuing education and training.
- 24           (6) Provisions for implementation of a uniform certification program by local  
25           health departments through agents authorized by the Department and for the  
26           Certification to be issued at various levels depending on system size or  
27           complexity.
- 28           (7) Exemption for a person installing a conventional septic tank system that is  
29           located entirely on land owned by that person and that is intended solely for  
30           use by that person and members of that person’s immediate household.
- 31           (8) That fees to cover the costs of administering this certification program may  
32           be imposed by a local health department as provided in G.S. 130A-39(g).

- 1           (9) That the person seeking certification, or certification renewal shall make  
2           application with the local health department in the county where that  
3           person's business is located.
- 4           (10) That certification and enforcement by an authorized agent in a local health  
5           department shall be valid in all counties.
- 6           (11) That no system required to be installed or constructed by a person having a  
7           valid certification shall be approved or issued an Operation Permit by the  
8           local health department unless the system has been installed or constructed  
9           by a person having a valid certification.

10 **Section 2.**

11           Section 1 shall become effective July 1, 2002, and apply to wastewater systems  
12 requiring an Operation Permit on and after July 1, 2002. The Commission shall adopt  
13 temporary rules to implement Section 1 by July 1, 2001.  
14

**APPENDIX B**

DRAFT BILL

Short Title:

(Public)

Sponsors:

Referred To:

A BILL TO BE ENTITLED  
THE RESIDENTIAL WASTEWATER DISCLOSURE ACT

AN ACT TO AMEND THE STATUTES FOR THE “RESIDENTIAL PROPERTY DISCLOSURE ACT” (G.S. 47E-1 THROUGH 47E-10), THE “HOME INSPECTOR LICENSURE ACT” (G.S. 143-151.43 THROUGH 143-151.64) AND THE “RECORDATION OF WASTE DISPOSAL ON LAND (G.S. 47-29.1)

**Section 1.**

Proposed amendment to the “Residential Property Disclosure Act:”

G.S. 47E-4. (a) (3)

Notwithstanding sub paragraphs (1) and (2), prior to entering any agreement or any conveyance with any prospective purchaser where a subsurface wastewater disposal system is permitted for installation or is constructed, the owner (seller) shall prepare and sign and the purchaser of the property shall receive and sign an acknowledgement of receipt of a disclosure statement. The disclosure statement shall fully and completely disclose the following information:

1. Maintenance history of the system by owner;
2. Any observed uncorrected defects or problems.
3. That permits and any operation requirements are available from the local health department.

The disclosure settlement shall contain a duplicate original and copies of all permits issued under the provisions of Art. 11, Chap. 130A of the N.C.G.S..

**Section 2.**

Proposed amendment to the “Home Inspector Licensure Act:”

G.S.143-151.45.

- (4) Home inspection. – A written evaluation of two or more of the following components of a residential building: heating system, cooling system, plumbing system, electrical, system, structural components, foundation, roof, masonry structure, exterior and interior components, private water supply and wastewater system, or any other related residential housing component.

1 **Section 3.**

2 Sections 1 and 2 shall become effective 1 January 2002, however the North  
3 Carolina Real Estate Commission and the North Carolina Home Inspector Licensure  
4 Board shall amend their codes and standards for complying with Section 1 or 2 when this  
5 bill becomes law with an effective date of 1 January 2000. Section 2 shall apply to  
6 subsurface wastewater disposal systems receiving an Operation Permit after 1 January  
7 2002.

