Costs and Benefits of Requiring On-Site Wastewater System Treatment Standards Greater Than Nationally Recognized Standards

Session Law 2015-286, Section 4.15.(d)

Report to

The Environmental Review Commission

and

The Joint Legislative Oversight Committee on Health and Human Services

by

North Carolina Department of Health and Human Services

On Behalf of the Commission for Public Health

March 1, 2016

BACKGROUND

Session Law 2015-286, Section 4.15.(d) requires the Commission for Public Health, in consultation with the Department of Health and Human Services (DHHS), Local Health Departments (LHDs), and stakeholders representing the wastewater system industry, to report findings and recommendations to the Environmental Review Commission and the Joint Legislative Oversight Committee on Health and Human Services on its study of the costs and benefits of requiring on-site wastewater system treatment standards greater than those listed by nationally recognized standards. Session Law 2015-286 further requires the Commission to include in its report the recorded advantage of such higher treatment standards for the protection of the public health and the environment. This report provided by DHHS on behalf of the Commission for Public Health satisfies the legislative reporting requirement.

STUDY PROCESS AND FINDINGS

In developing this report, the Department directly compared North Carolina standards to those from nationally recognized certification bodies and surveyed stakeholder groups to gather their input.

Standards Comparison

The North Carolina Administrative Code includes treatment standards that establish benchmarks for effluent (treated wastewater) quality achieved through available wastewater treatment configurations. The intent of establishing such standards is to ensure that effluent from wastewater systems is renovated sufficiently prior to dispersal to the soil and ultimately to groundwater. The objective is to manage risk to public health and the environment. Use of advanced pretreatment wastewater systems allows distinct concessions: horizontal setback reductions, vertical separation reductions, or an increase in the soil loading rate that allow development of sites that would not otherwise be permitted.

While there are well-established federal treatment standards for centralized ("municipal") treatment works, there are no comparable federal standards for onsite/decentralized wastewater treatment systems. National and international organizations that test and certify technologies for use in the latter realm have emerged to fill the void created by the lack of any other governmental mandate. The standards established and their associated certifications serve to inform the industry of the *relative* performance of products. Individual states have historically set their specific standards but are increasingly cooperating on initiatives intended to standardize elements of the approach to assessing and approving technologies. One such example is the Chesapeake Bay Data Sharing Initiative.

North Carolina's treatment standards [National Sanitation Foundation (NSF) -40, TS-I and TS-II] were compared to a number of nationally recognized standards used for evaluation of on-site wastewater treatment systems. These standards include:

- Four (4) NSF International Standards (NSF-40, NSF-245, NSF-350, and NSF-360), and
- Two (2) Canadian Standards (Bureau de Normalisation du Quebec, or BNQ D3680-600 and D3680-900).

The standards were compared to North Carolina's NSF-40, TS-I and TS-II standards as well as to data collected under 15A North Carolina Administrative Code (NCAC) 18A .1970. The following elements were considered:

- Testing procedures,
- Influent quality parameters (raw wastewater strength and constituents),
- Effluent quality parameters (treated wastewater strength and constituents),
- Initial compliance standards, and
- Requirements for on-going compliance.

Influent strength: When considering results of testing by standards organizations, it is important to understand the nature and limitations of the testing procedures. Product testing for evaluation of advanced pretreatment products requires a consistent supply of influent on a daily basis for at least six months. The most readily available influent source is raw wastewater from a municipal wastewater treatment plant. This is weaker than wastewater typically discharged to on-site wastewater treatment systems. Design of municipal wastewater systems includes a "built in" allowance for inflow and infiltration (I/I). Inflow is water discharged into sewer service connections and sewer pipes from foundation and roof drains, paved areas, and similar sources. Infiltration is groundwater entering sewer service connections and pipes through cracks. These 'external' water sources dilute wastewater strength. On-site wastewater treatment system design precludes I/I from the system and the wastewater is thus stronger. Data from systems installed in North Carolina indicates influent strength ranging from fifty to one hundred percent greater than the strength of wastewater used in controlled evaluation and testing.

Effluent limits: The effluent limits used to determine compliance with NSF/ANSI (American National Standards Institute) Standards are based on secondary wastewater treatment effluent requirements for large municipal wastewater systems. Over time, NSF International has increased the number of testing standards for on-site wastewater treatment systems to a total of four (NSF-40, NSF-245, NSF-350, and NSF-360). The standards have expanded the number of parameters evaluated and lowered the effluent limits as the on-site wastewater industry's knowledge and experience has grown.

As shown in Table 1:

- North Carolina's current effluent parameter limits for initial approval are in the range recognized by NSF International and BNQ.
- North Carolina NSF-40 is identical to NSF/ANSI Standard 40.
- The North Carolina TS-II standard criterion is more stringent than criteria for NSF/ANSI Standard 245 for nitrogen reduction.
- The BNQ uses criteria for nitrogen standards both above and below North Carolina's.

The Department proposes to revise the nitrogen limits as part of the current effort to completely revise 15A NCAC 18A .1900. The draft proposes a higher nitrogen limit and lower percentage removal for compliance based on what is currently seen in the field. The proposal is also more closely aligned with both NSF/ANSI Standard 245 and BNQ Level I.

North Carolina's requirements for ongoing compliance closely mirror those of BNQ with 80% of all sites required to be in compliance. NSF/ANSI Standard 360 includes a standardized field evaluation procedure; however, no manufacturers have sought evaluation under that standard.

Table I – Comparison of Effluent Parameter Limits for North Carolina, National, and International Standards

Standards/ Class, Type, or Level	Effluent Parameter Limits					
	$CBOD_5$[1]	**TSS[2]**	**NH_3-N[3]**	**Fecal (or E-Coli)[4]**	**TN[5]**	**TP[6]**
North Carolina						
North Carolina On-Site Water Protection Branch Current Effluent Limits (Rule .1970)						
NSF-40	25	30	NA	NA	NA	NA
TS-I	15	15	10 mg/l or 80% reduction	10,000		
TS-II	10	10	10	1,000	20 mg/l or 60% reduction	
North Carolina Proposed Effluent Limits in Draft Rules (Draft Rule .1970)						
NSF-40	25	30	NA	NA	NA	NA
TS-I	15	15	10 mg/l or 80% reduction	NA		
TS-II	10	10	10	1,000	30 mg/l or 50% reduction	
Nationally recognized, US: NSF/ANSI Standards[7]						
NSF/ANSI-40 Class I[8]	25 (40)	30 (45)	NA	NA	NA	NA
NSF/ANSI-245[9]	25 (40)	30 (45)			50% reduction	
NSF/ANSI-350 Class R[10]	10 (25)	10 (30)		14 (240)	NA	
NSF/ANSI-350 Class C[10]	10 (15)	10 (15)		2.2 (200)	NA	
Nationally recognized, Canada: Bureau de Normalisation du Quebec (BNQ)[11]						
BNQ-Six Month[12]						
Level I	150 (225)	100 (150)	NA	50,000 (75,000)	50% reduction (25% reduction)	1.0 (1.5)
Level II	25 (40)	30 (45)		200 (300)	75% reduction (60% reduction)	0.3 (0.45)
Level III	15 (25)	15 (25)		ND (ND)	NA	
Level IV	10 (15)	10 (15)		NA		
BNQ-Twelve Month[13]						
Level I	150	100	NA	50,000	50% reduction	1.0
Level II	25	30		200	75% reduction	0.3
Level III	15	15		ND	NA	
Level IV	10	10		NA		

Notes:

1. $CBOD_5$: Carbonaceous 5-day biochemical oxygen demand, mg/l
2. TSS: Total suspended solids, mg/l
3. NH_3-N: Ammonia nitrogen, mg/l
4. Fecal (or E-coli): Fecal coliforms or Escherichia coli, MPN or CFU/100 ml (averages calculated as geomeans)
5. TN: Total nitrogen, mg/l
6. TP: Total phosphorus, mg/l
7. NSF/ANSI Standards, 6-month bench test. For all NSF/ANSI Standards, shows 30-day average limit (7-day average limit)
8. NSF/ANSI Standard 40 for Residential Wastewater Treatment Systems
9. NSF/ANSI Standard 245 for Wastewater Treatment Systems – Nitrogen Reduction
10. NSF/ANSI Standard 350 for Onsite Residential and Commercial Water Reuse Treatment Systems
    Class R- Single Family Residential Dwelling
    Class C- Multi-Family Residential Units and Commercial Facilities
11. BNQ standards recognize four independent types of treatment {Basic Treatment (B) which includes $CBOD_5$ and TSS; Disinfection (D) which includes fecal or E-coli; Nitrogen Reduction (N) that includes TN; and Phosphorus Reduction (P) that includes TP} and two to four Levels (B-4, D-3, N-2, and P-2).
12. 30-day average limit (weekly average limit)
13. Maximum concentration that will be complied with by 80% or more of samples for each parameter, individually

Stakeholder Surveys

The On-Site Water Protection Branch of the DHHS Division of Public Health solicited input from Local Health Departments and on-site wastewater industry stakeholders through an e-mail survey and in person stakeholder meetings.

- Survey questions were drafted to address the items identified in S.L. 2015-286 Section 4.15.(d). Some survey questions solicited open-ended comments which were documented verbatim.
- The survey questions were distributed to the following email lists or listservs:
  - Statewide Environmental Health List Serve (which consists of Environmental Health Specialists in Local Health Departments and private sector stakeholders with an interest in environmental health issues),
  - Rule review e-mail list (mixture of public and private stakeholder contacts engaged in the ongoing rule review process), and
  - Pretreatment product manufacturer (vendor) e-mail list.

In order to receive maximum input from stakeholders, the Department also collected input during five stakeholder meetings held in February 2016. Comments received from the audience are included in this report.

The Department reached out to 209 stakeholders with survey questions and received 56 responses. Out of those 56 responses, a broad cross section of the on-site wastewater industry replied: engineers, operators, installers, Local Health Departments, designers and advanced pretreatment manufacturers. Of the respondents having experience with advanced pretreatment systems, 68% said that they felt no changes were needed to the North Carolina standards.

Over two thirds of all respondents expressed concern about potential harm to public health and the environment if North Carolina adopts less stringent standards. With recent public health issues raised in other states, respondents expressed concern that North Carolina is considering a reduction in limits.

All responding manufacturers felt that their advanced pretreatment systems could meet the treatment standards in North Carolina and that the industry as a whole is moving towards more stringent standards because they are increasingly achievable. Advanced pretreatment manufacturers' biggest concern was the cost associated with the approval process in North Carolina, not the treatment standards.

Private sector stakeholders who attended the February 29, 2016 meeting reinforced the need to view NSF International and BNQ standards and testing results within the scope of their limitations (relative influent strength and stress testing). Some individuals again expressed concern over the relaxing of the TS-II standard as proposed in the draft Rules. North Carolina's rules are already less stringent relative to surrounding states with respect to the depth of soil required for permitting. Many states are "raising the bar" by establishing more protective treatment standards. Thus, treatment standards established in our Rules must address the associated risk of using less soil for final renovation of wastewater.

RECOMMENDATIONS

North Carolina's treatment standards are within the range of testing standards used by national and international organizations. While the national standards present a valuable tool for evaluation of new products (in that data sets from testing are made available to the Department), they must be viewed within the scope of limitations inherent in the testing procedures.

The greatest concern expressed by stakeholders (besides the opinion that reducing the treatment standards results in increased risk to public health and the environment) is regarding the *process* for approval of new products. The Department is actively engaged in addressing this concern not only through revision of the Administrative Code governing these systems, but also by addressing inconsistencies and delays in the approval process itself. This is a cooperative effort in that the Department and industry stakeholders are assisting in the improvement process.

The review and approval process for new products to be used in North Carolina is being standardized and streamlined to ensure that protocols are consistently and efficiently applied to all products for which approval is sought. This includes specification of data that will be considered, including that collected from installations outside of North Carolina in addition to data from nationally recognized certification bodies as mandated in S.L. 2015-286.

The extensive rewrite of the rules includes proposed revision of TS-I and TS-II based on field data from existing North Carolina installations. However, stakeholder discussions continue. The timeline for completion of this initiative is ambitious in that the Department has a stated goal of presenting a complete rule draft for consideration in mid-summer of 2016.

With firm support for the revision of 15A NCAC 18A .1900, North Carolina will note drastic improvement in regulatory implementation. Revised processes for review and approval of new technologies have already been implemented and the effects of that effort should be evident well before the rule-writing effort is complete.