WRITTEN COMMENTS
PUBLIC HEARING
PROPOSED RULE 410 IAC 6-8.2
TECHNICAL SPECIFICATION FOR ONSITE SEWAGE SYSTEMS, 2005 EDITION

This document contains all of the comments provided in written format during the public hearing process (July 1 – Aug. 13, 2003) for proposed rule 410 IAC 6-8.2 and Technical Specifications for Onsite Sewage Systems, 2005 Edition. The documents as provided by the hearing officer were scanned for inclusion in this document.

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INFILTRATOR® SYSTEMS INC

The world leader in chamber technology™

May 9, 2000

Alan Dunn
Supervisor, Residential Sewage Disposal
Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204

Subject: Comments on Draft Revisions 410 IAC 6-8.2 (April 5, 2000)

Dear Mr. Dunn:

We appreciate the opportunity to submit comments on the proposed rule and technical specifications. It is clear that the Department has made a significant effort to revise the rule and issue a technical specification that will upgrade the performance of on-site sewage systems in Indiana. We commend you and your staff for your diligence in finalizing this beneficial project. As the nations largest manufacturer of products supplied to the on-site industry, Infiltrator Systems Inc. is very interested in supporting efforts that will increase the reliability and acceptance of on-site wastewater management systems.

We respectfully request that the Department review our comments on the following sections of the proposed rule and technical specification. Where appropriate, we have suggested additional language or clarifications that we hope you will consider.

Rule 410 IAC 6-8.2

Section 37. Written Site Evaluation Reports

Section 37(b) requires a written site evaluation by a soil scientist only for commercial and alternative OSS. We believe that a professional site evaluation is critical to the proper functioning of all OSS. We suggest that one consistent site evaluation standard be used for all OSS.

Section 42. Alternative and Experimental Technology OSS

Section 42(b)(3) requires a description of the probable reasons for failure of the existing OSS. We believe that this requirement makes sense for all replacement systems whether conventional or alternative and should be included not in this section but in Section 34 of the rules and chapter 2 part II of the technical specification.

Section 42(c): The sufficiency of the required experience of alternative technology is not specifically defined. We suggest replacing 42(c) with the following requirement defining the advance from experimental alternative technology to general usage:

> The department shall certify an experimental alternative system for general use when the department determines that the manufacturer has demonstrated that the alternative system in general usage will provide a level of environmental protection and public health protection at least equivalent to that of a standard OSS when designed and constructed according to the manufacturer's instructions, while in compliance with 410 IAC-8.2 and the Technical Specifications for Onsite Sewage Systems (2001Edition). The department's evaluation shall consist of a review of broad scale field usage in Indiana or comparable use in one or more states where relevant physical and climatological conditions are

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ATTACHMENT
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comparable to those in Indiana.

The above suggested wording is borrowed from section 15.288 of the Massachusetts State Code, Title 5 – 310 CMR 15.000 (attached).

Section 42(e)&(f): These sections may require reporting and monitoring that would result in a significant burden for alternative technology owners, local regulators, distributors and manufacturers. These burdens would likely limit the use of technology new to Indiana that might provide better protection of public health and the environment. We suggest that the department's option to require this reporting and monitoring be applicable only to experimental alternative technology OSS. As such, we suggest removing "alternative technology OSS and" from Section 42 (e)& (f).

Technical Specification

Chapter 2, V. Sand Mound OSS Selection Criteria

The use of chambers as an alternative to aggregate in sand mounds has not been defined. We suggest that OSS system regulators, installers, and homeowners be allowed the option of using chambers as an alternative to aggregate in sand mounds. This could be achieved by adding the words, "or in chambers" after the words "aggregate bed" in line 526. We further suggest changing the title of line 2389 to Effluent Distribution Network and indicating that aggregate or chambers may be used.

Chapter 5, XI. D. Soil Absorption Fields – Specifications, Chambers

The sections 1-3 define the manufacture, product markings and design requirements for chambers. We believe that the definition of resin type and chamber marking described in these sections would not be generally acceptable to chamber manufacturers. A standard industry specification has been adopted that addresses the material and property requirements for chambers (International Association of Plumbing and Mechanical Officials Material and Property Standard for Plastic Leaching Chambers IAPMO PS 63-99a - attached). We suggest eliminating sections 1,2, and 3 of Chapter 5, XI. D and replacing them with the following items:

1. Chambers shall be normal duty H-10 units as manufactured and tested according to the International Association of Plumbing and Mechanical Officials Material and Property Standard for Plastic Leaching Chambers IAPMO PS 63-99a.

The IAPMO PS 63-99a standard does not address splash plates defined in part 3 of this section. As such, we suggest adding the following item in section D:

2. The inlet plate must be fitted with an integral splash plate below the inlet on the trench bottom and must protect the trench bottom from erosion.

The IAPMO PS 63-99a standard does not address month and year of manufacture. As such, we suggest adding the following item in Section D:

3. In addition to the marking and identification requirements defined in section 7 of the IAPMO PS 63-99a standard, the chambers shall also be permanently and indelibly marked with the month and year of manufacture.

Section 4. Requirements for the installation of chambers: Part (a) of this section requires that contractors must be trained and authorized by the manufacturer to install chambers. We fully

support the training of installers on the proper installation of all OSS types. We suggest that part (a) of this section be eliminated until a requirement is added to the rule that all contractors must be registered and authorized by the department or local health department in order to install any type of OSS.

Thank you very much for considering these comments and suggestions. We believe that the modifications that we have suggested will help insure protection of the environment and public health in Indiana. Please feel free to call me at (610)388-9667 if we can assist in gaining community support for the acceptance of the revised rule and technical specifications or if we can provide any clarifications on our comments.

Respectfully yours,

Carl W. Thompson, P.E.
Director of Government Relations

Infiltrator Systems Inc.

cc: Greg Miller, Infiltrator Systems Inc.

Jeff Iverson, Infiltrator Systems Inc.

Enclosure (2)

1. IAPMO Specification

Section 15.288 from Massachusetts Code 310 CMR – 540 (Title 5)

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From: "Carl Thompson" <cthompson@infiltratorsystems.net>
To: '"Alan Dunn'" <Adunn@isdh.state.in.us>
Date: 8/13/03 11:47PM
Subject: RE: Attn: Onsite sewage staff

Alan,

Thank you for this notification and the opportunity to comment on the proposed changes to the rule. We ask the Department to consider our comments made in our May 9, 2000 letter to you on the draft revisions to the rule and technical specification. Many of the comments in the 2000 letter made reflect our concern about the additional expensive and/or time consuming requirements placed on those who chose to use an alternative soil absorption field technology. Section 6-8.2-2 defines an alternative soil absorption field technology as one in which sufficient research, field performance, or field data for use in Indiana has been documented demonstrating that it meets the requirements of 410 IAC 6-8.2.43 and 54. If the performance of a soil absorption technology has been documented (as described in the definition), the siting, design, permitting, and notification requirements for the technology should not be more burdensome than the requirements for a soil absorption system defined in 6-8.2-37. Therefore, we suggest and request that additional requirements (not required for aggregate soil absorption systems) for alternative soil absorption field technologies be removed from the rule and technical specification. Those requirements include:

Sections in Draft Rule IAC 6-8.2
1. Requirement for site evaluation by a soil scientist (section 45 (b&c))
2. Notification on deed (section 54 (b))
Technical Specification
3. Notification and signature of the owner (chapter 8, II(A)(7))

Please note that we do not object to additional requirements for mechanical alternative systems and unproven experimental systems.

Thank you very much for the opportunity to comment. Please feel free to call me if we can provide clarification.

Carl W. Thompson, P.E.
Infiltrator Systems, Inc.
(860)577-7106

-----Original Message-----
From: Alan Dunn [mailto:Adunn@isdh.state.in.us]
Sent: Thursday, July 10, 2003 11:39 AM
To: cthompson@infiltratorsystems.net; gmiller@infiltratorsystems.net; rpaulus@infiltratorsystems.net
Subject: Attn: Onsite sewage staff

As you are aware, the Indiana State Department of Health is in the public hearing phase of the revisions to our onsite sewage systems rule. The information concerning the public hearings and the process for making official comment has been previously sent to you. The contents of the memo

is attached for your convenience.

At the first public hearing, on July 1, 2003, the IEHA Wastewater Management Committee provided numerous recommended changes to the draft that was preliminarily adopted. Two .pdf documents encompassing those changes are attached. The proposed changes are done in the "tracker" mode: proposed deletions are text with a line drawn through it, and proposed additions are underlined.

I would especially like to bring your attention to the changes proposed in the following portions of the Technical Specification: Chapter 3, Section VI, Requirements, Secondary Treatment for Nitrogen Reduction; Chapter 4, Site Drainage; Chapter 5, Section IV, Septic Tanks; Chapter 8, Section V, Requirements for Individually Designed Secondary Treatment Devices; and Appendix C, Figure 3-4, Soil Loading Rates.

If you desire to make official comment on any of the changes proposed by the Wastewater Management Committee, you may do so by following the procedures outlined in the attached memo. Please make certain, though, that you make it clear that you are commenting on the changes proposed by the Wastewater Management Committee.

If you have any problems downloading any of the attached documents, or have any questions, please let me know. If you need a hard copy of the attachments mailed to you, please call Katharine Knight at 317-233-7177.

Sincerely,

Alan M. Dunn, Supervisor
Residential Sewage Disposal
Sanitary Engineering
Indiana State Department of Health
2 North Meridian, Sec. 5-E
Indianapolis, IN 46204
Phone: (317) 233-7177
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e-mail: adunn@isdh.state.in.us

CC: <Bgarten@isdh.state.in.us>, "Miller, Greg" <GMiller@infiltratorsystems.net>, "Fleming, Douglas" <dfleming@infiltratorsystems.net>, "Hallahan, Dennis" <DHALLAHAN@infiltratorsystems.net>

NORWESCO

4JTP

July 16, 2003

Mr. Burton Garten
Office of Legal Affairs
Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204-3003.

Dear Mr. Garten:

SUBJECT: Comments on Proposed Changes; Rule & Technical Specification Revisions; Residential and Commercial Onsite Sewage Systems

Norwesco, Inc. manufactures polyethylene septic tanks at nine locations throughout North America. We have historically produced tanks for installation in the state of Indiana, and we will continue to do so.

We have reviewed the proposed *Rule 410 IAC 6-8.2,* and its associated document, *Technical Specification for Onsite Sewage Systems, 2003 Edition,* and we offer the following comments related to the Technical Specification:

1. Technical Specification Chapter 5, Section VI, Structural Integrity, Connectors, Quality Control, Product Marking states in Paragraph B that connector openings must incorporate a gasket that meets or exceeds ASTM C-923, and must use a stainless steel external compression take-up clamp. Since ASTM C-923 covers "Resilient Connectors Between Reinforced Concrete Manhole Structures, Pipes, and Laterals," we believe this technical requirement is too specifically directed toward concrete septic tanks, and does not allow for innovative solutions that may be technically equal or superior. Since polyethylene tanks have a smooth, non-porous surface, we have designed a PVC adapter for the inlet and outlet of our tanks that uses no metal, provides a resilient rubber gasket compressed against the tank surface, and can be solvent-welded directly to the inlet and outlet piping. (A cross-section drawing of that adapter is enclosed for reference.)

We believe the intent of this paragraph is to require a watertight seal at the tank inlet and outlet. We request that this section be re-written to require watertight connections, and to remove the reference to products that are designed specifically for concrete tanks.

2. Technical Specification Chapter 5, Section VI, Structural Integrity, Connectors, Quality Control, Product Marking states in Paragraph C that manufacturers of polyethylene and fiberglass-reinforced polyester tanks must select one in every (40) tanks to be tested in accordance with *CAN/CSA-B66-00, Section 8, Strength Test,* and one in every (20) tanks to be tested in accordance with *CAN/CSA-B66-00, Section 8.3, Watertightness Test.* The CSA strength and watertightness tests were designed to prove the acceptability of a tank design for purposes of issuing a CSA Approval; these tests were not designed to be used as a procedure for random verification. The CSA strength test for polyethylene tanks requires a minimum of 72 hours for completion.

NORWESCO, INC.
4365 Steiner Street • P. O. Box 439 • St. Bonifacius, MN 55375-0439 • Tel 952-446-1945 • Fax 952-446-8808

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We produce tanks for many approval jurisdictions, and we are not aware of any other requirements for specific "Quality Control" procedures such as the ones included in the Indiana Technical Specification. The typical expectation, whether implied or stated, is that manufacturers will exercise whatever control is necessary to ensure that production tanks conform to the specifications submitted for approval.

We request that this section be rewritten to remove the specific references to lot size and test methods for quality control.

If you have any questions, or if you need additional information, please contact me by phone (952-446-8810) or e-mail (jerry.paulson@norwesco.com).

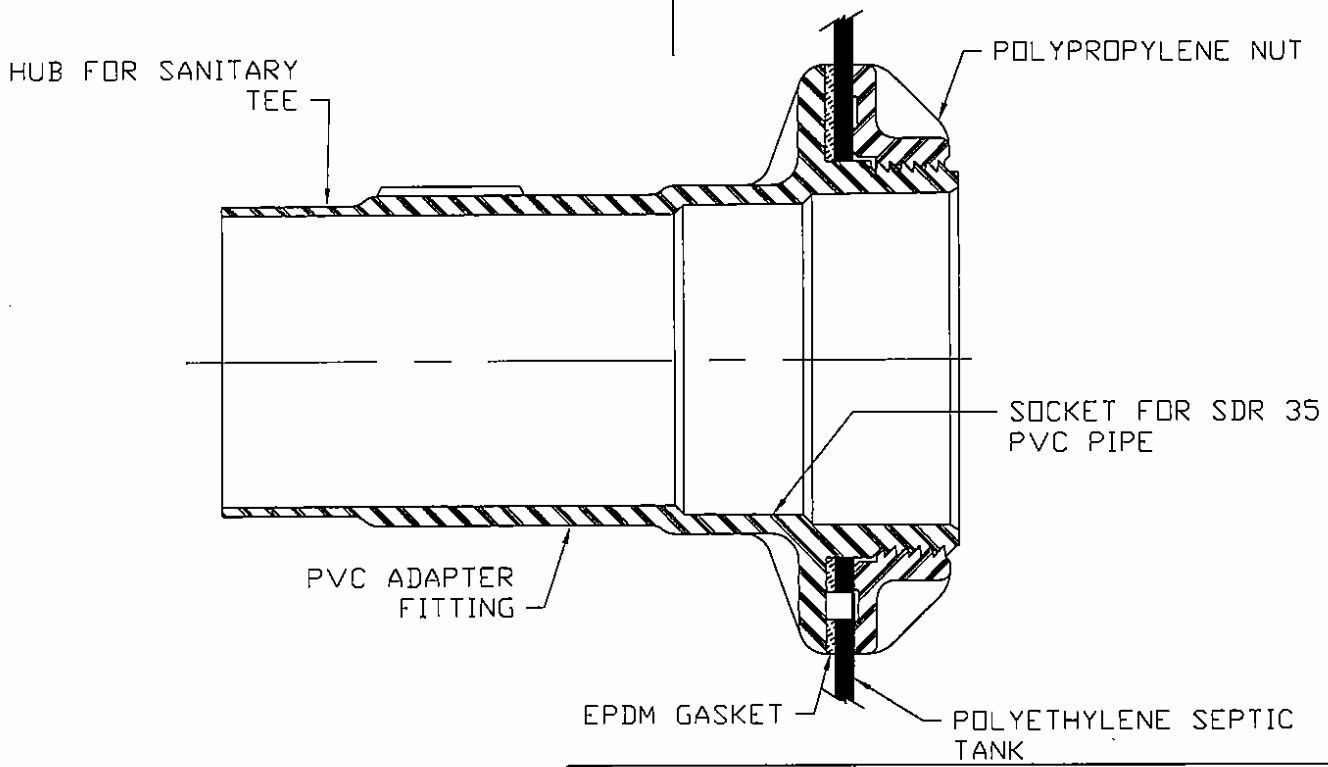
Sincerely,

Jerry T Paulson
Vice President Engineering

JTP:ejt

cc: Anastasia O'Hara

REVISIONS				
ZONE	REV	DESCRIPTION	DATE	APPROVED



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CROSS SECTION, SEPTIC ADAPTER FITTING

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	SCALE 1/2		SHEET	

4JWS

Wednesday, August 13, 2003

Chris Bourke
Indiana Dept. of Health
2 N. Meridian - , Sec. 5-E
Indianapolis, IN 46204

Attention: On-Site Wastewater Treatment

Subject: This letter is in regard to the new proposed rule, 410 IAC 6-8.2, On-Site Sewage Systems.

Dear Chris Bourke:

First, we would like to commend you and your staff on putting together a set of comprehensive requirements that protect the health and environment of the citizens of Indiana. We fully support the new rules, as written. During the Public Hearing on 410 IAC 6-8.2, I was surprised to hear some of the negative comments made on the new code. These comments revealed a lack of understanding of the significant environmental impacts of failed septic systems. The true overall costs of to homeowners of a septic system were overstated. The costs of installing inadequate septic systems that fail were understated.

It was reported to me that one of the speakers said that some septic systems are going to fail no matter what you do. This comment shows a lack of understanding in the technological advances in the design and manufacturing processes of on-site wastewater disposal systems. It is true that if we keep doing what we have been doing, the citizens of Indiana are going to continue to have failing septic systems.

The main argument employed by the opponents of the new rule is that it will make properties too expensive to build upon, is simply not true. It is true that some properties will require alternative systems not currently used on a wide scale in Indiana. This does not mean they will be so expensive that they will keep potential homeowners from building on these properties. The experience of others states, like Wisconsin, shows this is far from the case. I also understand at the meeting it was stated that these "alternative technologies" are unproven. This, too, is an exaggeration of the facts. Many of the alternative systems are used in other States with great success. Two such alternative systems are the sand filters and the Wisconsin Mound System. Both of these systems are very affordable and environmentally friendly.

One speaker stated we should be concentrating on the big problems, such as combined system overflows of larger municipalities. We agree that these systems need serious attention, but this does not mean that we should neglect the health and environmental consequences of inadequately designed and installed septic systems. As a lifelong citizen of Indiana, I want both of the problems addressed. This reminds me of several elected officials that have stated that there has to be one very large leak in their collection system producing large inflows to the treatment plant. They all want us to find that one leak and plug it. Unfortunately, experience has shown that it is thousands of small leaks throughout the system that produce large inflows on rainy days. The general public does not understand that thousands of faulty septic systems add up to a very significant environmental impact. Any one system can cause serious health problems if untreated effluent reaches a nearby drinking water supply.

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I am an Indiana business owner that employs over 80 Indiana citizens that would benefit from proposed rule 410 IAC 6-8.2 being passed. Some the products that would now be required to improve the quality of the septic tanks and D-Boxes are manufactured by our company in Fort Wayne. The section of the new rule that I am referring to is Section VI, B1, lines 1476, 1479, 1759, and 1809. These products are far superior than those currently required, for very little additional cost to the homeowner. Passage of the new rule generates jobs and revenue for the State of Indiana. Rejection of the new rule will keep jobs and revenue flowing out of Indiana to other states.

Respectfully submitted,
Press-Seal Gasket Corporation

James W. Skinner,
President

4LJM

Alan: Please forward my comments to the Hearing Officer

To Whom It May Concern:

Reference Figure 3-4, Soil Loading Rates for OSDS[12], SPECIAL NOTES: A.

The Wells County Health Department requires "pit" soil evaluations and soil sampling for mechanical analysis on every septic system installed in Wells County. Pits (of up to 10 feet in length) offer an undisturbed view of the soil profile unlike evaluations performed with a one inch push probe or a four inch auger. While the auger and push probe are important tools, I would propose a certified soil scientist has the ability to determine soil structure and to discern water movement in the "BC" horizon when they have a pit or pits to view. I am asking that an exception be added to the table for evaluations performed using pits. This request was written under the direction of Donald A. Dian, M.D., Wells County Health Officer.

Thank you for your time and consideration,

Linda J. Mauller

Environmental Health Specialist

Wells County Health Department

223 West Washington Street

Bluffton, IN 46714

Phone: 260-824-6489

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July 21, 2003

Mr. Burton Garten
Office of Legal Affairs
Indiana State Dept. of Health
2 North Meridian Street
Indianapolis, IN 46204-3003

RE: Official Comments, Rule 410 IAC 6-8.2
Technical Specifications for Onsite Sewage Systems, 2003 Edition

Dear Mr. Garten:

After speaking with members of ISDH staff, we would like to take this opportunity to comment on Chapter 8 of the Technical Specifications, 2003 Edition.

In general, we support the proposed revisions to Chapter 8 made by the Indiana Environmental Health Association's Wastewater Management Committee. In addition, we have the following comments on specific Sections of the preliminarily adopted Technical Specification:

Technical Specification Chapter 8, Section I, G, 3, a

The Section, as written, does not specify the size of the required septic tank/pretreatment chamber. A specific retention time should be stipulated, based on the anticipated daily flow. Attached are several citations from industry publications that address the subject of pretreatment chamber sizing.

Several manufacturers of aerobic treatment units include a built-in pretreatment chamber as a part of their basic design. To require (by regulation) an additional pretreatment chamber for these manufacturers' systems will adversely affect treatment processes. The language of this Section should be modified to eliminate the possible interpretation that manufacturers who have already included pretreatment chambers in their designs would have to provide additional pretreatment tankage.

If ISDH is looking to add pretreatment chambers to aerobic treatment units in an effort to minimize the affects of hydraulic flow surges, we suggest that this Section of Chapter 8 be amended to require flow equalization equipment. Aerobic treatment units can be equipped with flow equalization devices that can equalize daily flow and eliminate the problems associated with hydraulic flow surges. Please consider the following wording:

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All secondary treatment units shall be equipped with equalization equipment to reduce flow surges. At the 500 gallon per day NSF Standard 40 Design Loading Schedule, minimum performance of the flow equalization equipment shall equalize daily flow an average of 45%.

Thank you for the opportunity to submit these comments. We would be happy to meet with representatives of the Department of Health to discuss our position in further detail. Your consideration is appreciated.

Sincerely,

NORWECO, INC.

Michael S. Price, R.S.
Vice President, Sales

cc: Chris Bourke

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Manuals of Practice for Water Environment Federation

The WEF Technical Practice Committee (formerly the Committee on Sewage and Industrial Wastes Practice of the Federation of Sewage and Industrial Wastes Associations) was created by the Federation Boa of Control on October 11, 1941. The primary function of the committee is to originate and produce through appropriate subcommittees, special publications dealing with technical aspects of the broad interest of the Federation. These manuals are intended to provide background informa through a review of technical practices and detailed procedures that re and experience have shown to be functional and practical.

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1985

Robert A. Canham, *Executive Director*

Operation of Extended Aeration Package Treatment Plants Manual of Practice No. OM-7

Prepared by
Task Force on Operation of Package Treatment Plants
CARL E. MILLER, JR., *Chairman*
T.W. OLSON, *Vice-Chairman*

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Hugh E. Wise, Jr.

Under the Direction of the
O&M Subcommittee
Technical Practice Committee

Water Environment Federation
601 Wythe Street
Alexandria, VA 22314-1994

GENERAL MAINTENANCE. Normal maintenance of the comminutor includes sharpening the cutter teeth and inspecting to ensure that nothing is caught in the unit. CAUTION: NEVER USE HANDS TO REMOVE OBJECTS STUCK IN THE CUTTER TEETH, even when there is no power to the unit. Work on a comminutor should never be done unless the power is OFF. Cutter teeth and combs must be replaced when worn. Finally, the drive motor should be serviced according to the manufacturer's service manual.

TRASH TRAP

This pretreatment unit is required by some states, but is not common to most package treatment plants. It operates similarly to a septic tank; materials that float, such as grease and oil, are allowed to rise to the surface while heavy solids such as sand and grit settle to the bottom. The trash trap is a tank, baffled at the inlet and outlet, with a volume that is approximately 10% of the aeration chamber. The outlet baffle should extend to 40% of the liquid depth to retain floating solids. Figure 4.4 illustrates a typical trash trap.

GENERAL MAINTENANCE. Trash traps must be routinely checked for solids accumulation. Pumping is required when about 40% of the volume is occupied by floating and settleable solids. The contents should be removed by a licensed septic tank pumper and disposed of at a nearby municipal facility. **This material must not be pumped into the package plant.**

The biggest disadvantage of a trash trap is that material retained in the unit will become septic, which could result in a septic package plant influent. The trash trap will also result in an underloaded wastewater treatment plant. Foul odors are also frequently associated with this unit. Consequently, trash traps are not recommended as a pretreatment device. If grease or oil is a problem, a grease trap can be installed locally on the sewer generating the problem.

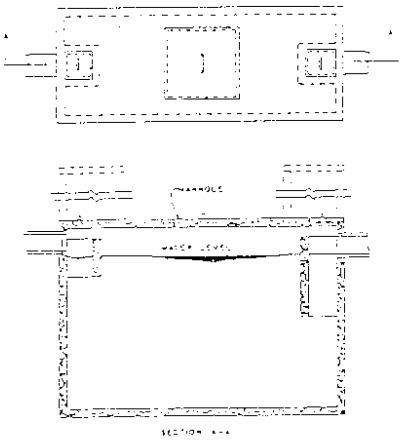

FIGURE 4.4. Typical trash trap.

WASTEWATER ENGINEERING: TREATMENT DISPOSAL REUSE

SECOND EDITION

METCALF & EDDY, INC.

Revised by
GEORGE TCHOBANOGLOUS
Professor of Civil Engineering
University of California, Davis

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London Madrid Mexico Montreal New Delhi Panama
Paris São Paulo Singapore Sydney Tokyo Toronto

and floating solids is probably its best application. It has been shown that short-period preaeration of 3 to 5 minutes formerly used does not significantly improve BOD or grease removal [8]. Current practice, when preaeration is used, frequently consists of increasing the detention period in aerated grit chambers. In this case, provisions for grit removal may be needed in only the first portion of the tanks.

The use of aerated channels for distributing wastewater to primary sedimentation tanks in large plants keeps the solids in suspension at all rates of flow so that the channel velocity is no longer critical. It also ensures a uniform distribution of solids to each tank, and, in conjunction with aerated grit chambers and preaeration tanks, adds dissolved oxygen to the wastewater and helps to reduce odors. The amount of air required ranges between 0.02 and 0.05 m^3/lin m · min (2 and 5 ft^3/lin ft · min) of channel. Aerated channels are often used for distributing mixed liquor to activated-sludge final settling tanks.

8-6 PRIMARY SEDIMENTATION TANKS

When a liquid containing solids in suspension is placed in a relatively quiescent state, those solids having a higher specific gravity than the liquid will tend to settle, and those with a lower specific gravity will tend to rise. These principles are used in the design of sedimentation tanks for treatment of wastewaters. The objective of treatment by sedimentation is to remove readily settleable solids and floating material and thus to reduce the suspended-solids content.

Primary sedimentation tanks may provide the principal degree of wastewater treatment, or they may be used as a preliminary step in the further processing of the wastewater. When these tanks are used as the only means of treatment, they provide for the removal of (1) settleable solids capable of forming sludge banks in the receiving waters, and (2) free oil and grease and other floating material. When they are used as a preliminary step to biological treatment, their function is to reduce the load on the biological treatment units. Efficiently designed and operated primary sedimentation tanks should remove from 50 to 70 percent of the suspended solids and from 25 to 40 percent of the BOD_5.

Primary sedimentation tanks that precede biological treatment processes may be designed to provide shorter detention periods and a higher rate of surface loading than tanks serving as the only method of treatment, except when waste-activated sludge is returned to the primary sedimentation tanks for blending with primary sludge.

Sedimentation tanks have also been used as storm-water tanks, which are designed to provide a moderate detention period (10 to 30 minutes) for overflows from either combined sewers or storm sewers. The purpose is to remove a substantial portion of the organic solids that otherwise would be discharged directly to the receiving water and that could form offensive sludge banks. Sedimentation tanks have also been used to provide sufficient detention periods for effective chlorination of such overflows.

Basis of Design

If all solids in wastewater were discrete particles of uniform size, uniform density, reasonably uniform specific gravity, and fairly uniform shape, the removal efficiency of these solids would be dependent on the surface area of the tank and time of detention. The depth of the tank would have little influence, provided that horizontal velocities would be maintained below the scouring velocity. However, the solids in most wastewaters are not of such regular character but are heterogeneous in nature, and the conditions under which they are present range from total dispersion to complete flocculation. The bulk of the finely divided solids reaching primary sedimentation tanks are incompletely flocculated but are susceptible to flocculation.

Flocculation is aided by eddying motion of the fluid within the tanks and proceeds through the coalescence of fine particles, at a rate that is a function of their concentration and of the natural ability of the particles to coalesce upon collision. As a general rule, therefore, coalescence of a suspension of solids becomes more complete as time elapses. For this reason, detention time is also a consideration in the design of sedimentation tanks. The mechanics of flocculation are such, however, that as the time of sedimentation increases, less and less coalescence of remaining particles occurs.

Detention time Normally, primary sedimentation tanks are designed to provide 90 to 150 min of detention based on the average rate of wastewater flow. Tanks that provide shorter detention periods (30 to 60 min), with less removal of suspended solids, are sometimes used for preliminary treatment ahead of biological treatment units.

Surface-loading rates Sedimentation tanks are normally designed on the basis of a surface-loading rate expressed as cubic meters per day per square meter of surface area (gallons per day per square foot of surface area). The selection of a suitable loading rate depends on the type of suspension to be separated. Typical values for various suspensions are reported in Table 8-6 Designs for municipal plants must also meet the approval of state regulatory agencies, most of which have adopted standards that must be followed.

The effect of the surface-loading rate and detention time on suspended-solids removal varies widely depending on the character of the wastewater, proportion of settleable solids, concentration of solids, and other factors. It should be emphasized that overflow rates must be set low enough to ensure satisfactory performance at peak rates of flow, which may vary from 3 times the average flow in small plants to 1.5 times the average flow in large plants (see discussion of peak flowrates in Chap. 2).

When the area of the tank has been established, the detention period in the tank is governed by water depth, as shown in Table 8-7. Overflow rates in current use result in nominal detention periods of 2 to 2.5 h, based on

Table 8-6 Typical design information for primary sedimentation tanks[a]

Item	Value	
	Range	Typical
Primary settling followed by secondary treatment:		
Detention time, h	1.5–2.5	2.0
Overflow rate, $m^3/m^2 \cdot d$		
Average flow	32–48	
Peak flow	80–120	100
Weir loading, $m^3/m \cdot d$	125–500	250
Dimensions (see Table 8-8)		
Primary settling with waste activated-sludge return:		
Detention time, h	1.5–2.5	2.0
Overflow rate, $m^3/m \cdot d$		
Average flow	24–32	
Peak flow	48–70	60
Weir loading, $m^3/m \cdot d$	125–500	250
Dimensions (See Table 8-8)		

[a] Comparable data for secondary clarifiers are presented in Table 10-7.

Note: $m^3/m^2 \cdot d \times 24.5424 = gal/ft^2 \cdot d$
$m^3/m \cdot d \times 80.5196 = gal/ft \cdot d$

average design flow. As design flows in all cases are usually based on some future condition, the actual detention periods during the early years of operation are somewhat longer.

Weir rates In general, it has been found that weir loading rates have little effect on the efficiency of primary sedimentation tanks. More important is the placement of the weirs (see following discussion) and the design of the tanks. Typical weir loading rates are given in Table 8-6.

Scour velocity Scour velocity is important in sedimentation operations. Forces on settled particles are caused by the friction of water flowing over the particles. In sewers, velocities should be maintained high enough that solid particles will be kept from settling. In sedimentation basins, horizontal velocities should be kept low so that settled particles are not scoured from the bottom of the basin. The critical velocity is given by Eq. 8-1, which was developed by Camp [4] using the results from studies by Shields:

$$V_H = \left[\frac{8k(s-1)gd}{f}\right]^{1/2} \tag{8-1}$$

OhioEPA

State of Ohio Environmental Protection Agency

Sewage: Collection, Treatment & Disposal

Where Public Sewers Are Not Available

1993 Edition

Above or below ground treatment units shall be accessible by stairways. When applicable, OSHA rules should be met.

Detail Design

Plants should be designed on the basis of a 24-hour aeration period for average or normal domestic sewage which has a BOD_5 of 0.17 lbs. per 100 gallons or approximately 200 ppm BOD_5.

The treatment plant peak design flow should be based upon representative diurnal flow records. See Appendix, page 30. The minimum peak plant daily design flow shall be calculated as follows:

$$\text{Peak Factor} = \frac{3.33 \times 24 \text{ (hours)}}{\text{Run-off period (hours)}}$$

Peak daily design flow (gpd) = peak factor x average daily flow

Stronger wastes from food service operations and waste containing garbage or other organic matter increases both the hydraulic and BOD_5 loadings and require special consideration. Excess organic materials, such as ground vegetables produced by supermarkets, should not be tributary to this type of plant. Garbage grinders are not permitted in commercial facilities tributary to a private on-lot wastewater treatment plant.

Grease interceptors are to be provided in compliance with plumbing requirements of 4101:2-51 of the Administrative Code.

The plant will normally consist of the following elements.

A) Preliminary treatment devices to screen, comminute, or otherwise prevent coarse solids from entering the aeration tank. Acceptable devices include:

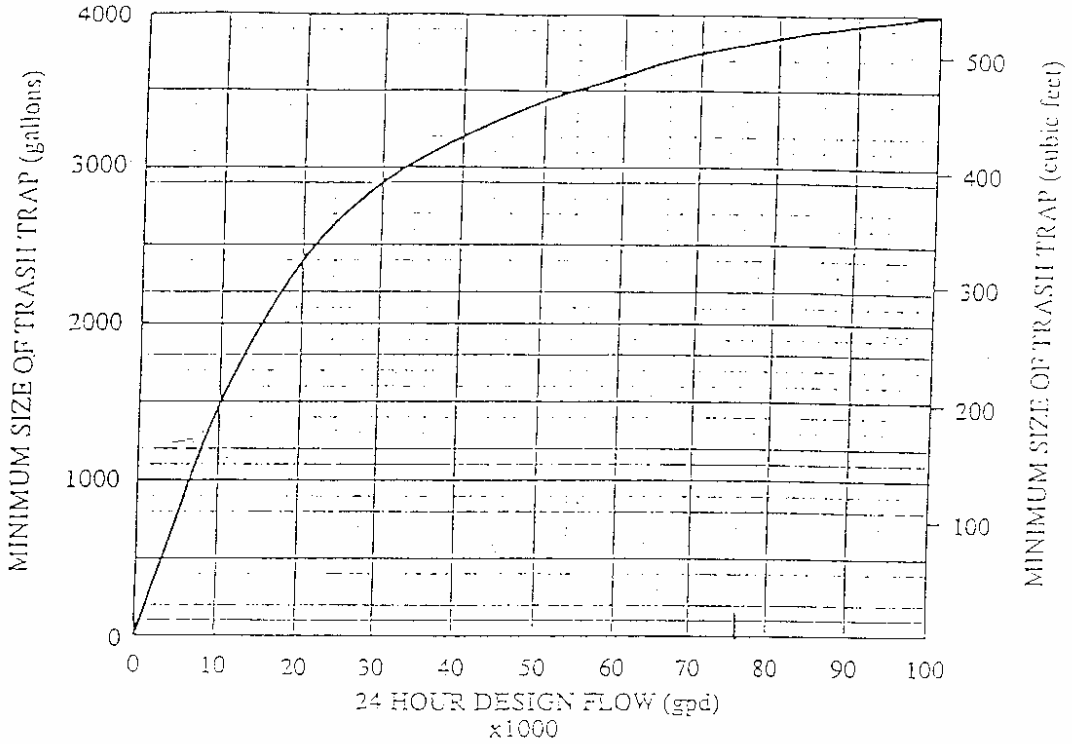
   1) Trash traps sized according to the Appendix, page 35. Outlet Ts shall be extended down to between 30 and 50 percent of the liquid depth.

   2) Comminuting devices with bar screen bypass may be substituted for trash traps on plants designed for 40,000 gpd or larger. Duplicate grinder pumps with automatic alternator and alarms may be substituted for comminuting devices. Field conditions (e.g., a lack of space) may be reason for considering installation of comminutors on smaller plants.

   3) Bar screens and trash baskets are not permitted as the only means of pretreatment.

B) Aerated flow equalization should be provided per Flow Equalization.

APPENDIX



24 HOUR DESIGN FLOW (gpd)	MINIMUM SIZE OF TRASH TRAP (gallons)	(cubic feet)	24 HOUR DESIGN FLOW (gpd)	MINIMUM SIZE OF TRASH TRAP (gallons)	(cubic feet)
1,000	150	20	10,000	1,500	200
2,000	300	40	20,000	2,400	321
3,000	450	60	30,000	2,900	388
4,000	600	80	40,000	3,200	428
5,000	750	100	50,000	3,430	459
6,000	900	120	60,000	3,600	481
7,000	1,050	140	70,000	3,740	500
8,000	1,200	160	80,000	3,840	513
9,000	1,350	180	90,000	3,920	524
10,000	1,500	200	100,000	4,000	535

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July 16, 2003

Mr. Burton Garten
Office of Legal Affairs
Indiana State Dept. of Health
2 North Meridian Street
Indianapolis, IN 46204-3003

RE: Official Comments, Rule 410 IAC 6-8.2
Technical Specification for Onsite Sewage Systems 2003 Edition

Dear Mr. Garten:

Please consider the following comments before finalizing the proposed Rule and associated document.

With regard to the *Technical Specification for Onsite Sewage Systems, 2003 Edition*, we support the changes proposed by the Indiana Environmental Health Association's Wastewater Management Committee and strongly recommend the Department of Health consider the Committee's revisions. We have the following comments on the changes proposed by the Wastewater Management Committee (WMC):

Technical Specification Chapter 3, Section VI, A (WMC Version)

The reference to nitrogen reduction in this Section is vague. If this Section is intended to limit the amount of total nitrogen in a secondary treatment system's effluent, the wording should be modified to reference total nitrogen. The specified limit of 10 mg/L total nitrogen is highly restrictive, considering the treatment technologies currently available. We ask the Department of Health to consider specifying a limit of 20 mg/L total nitrogen to increase the treatment system options available for use in the state.

Technical Specifications Chapter 8, Section I, E, 2 (WMC Version)

This Section should be amended to include an effluent quality requirement. Considering the treatment technologies currently available, we would recommend that secondary treatment systems be required to produce an effluent that contains no more than 10 mg/L CBOD, 10 mg/L TSS and 20 mg/L total nitrogen.

Technical Specifications Chapter 8, Section II (WMC Version)

The requirements of this Section should not be limited to secondary treatment units, high strength wastewater treatment devices, experimental technologies, and alternative treatment systems. It is well known that all onsite treatment and disposal systems require regular maintenance, and one reason so many systems fail in Indiana and in other states is that proper maintenance is not being provided. We believe that this Section should be broken out from Chapter 8 and developed into its own Chapter requiring maintenance for all onsite treatment and disposal systems.

Technical Specifications Chapter 8, Section IV (WMC Version)

This entire Section, and all references to it, should be deleted as its requirements put the Department of Health in the role of product evaluator and certifier. It has been our experience that wastewater treatment system evaluations, performance certifications, and product listing services are best performed by independent third party evaluators accredited by the American National Standards Institute. Most state health departments do not have the financial resources or staff to properly evaluate product performance and maintain a product listing program. We believe that all treatment technologies that currently exist for the treatment of domestic wastewater can be evaluated by ANSI accredited, third party certifiers per the requirements of internationally recognized standards.

Thank you for the opportunity to submit these comments. We would be happy to meet with representatives of the Department of Health to discuss our position in further detail. Your consideration is appreciated.

Sincerely,

NORWECO, INC.

Michael S. Price, R.S.
Vice President, Sales

MSP/rlc

cc: Alan Dunn

NORWECO.
NORWALK WASTEWATER EQUIPMENT COMPANY
220 REPUBLIC STREET NORWALK, OHIO 44857-1196

From: Richard Wise <rjwise@prodigy.net>
To: Alan Dunn <adunn@isdh.state.in.us>, Burton Garten <bgarten@isdh.state.in.us>
Date: 8/13/03 11:39PM
Subject: revised comments

Hello,

Here are revisions to the comments I sent earlier today regarding the rule and tech specs.

thanks!

richard wise

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EEE

August 12th, 2003

Burton Garten
Office of Legal Affairs
Alan Dunn
Sanitary Engineering
Indiana State Department of Health
2 North Meridian
Indianapolis, IN 46204

RE: Comments to the proposed Rule, 410 IAC 6-8.2 and Technical Specifications for onsite sewage systems, as amended by the IEHA Wastewater Management Committee.

Rule

Section 6. The definition of "commercial facility", as written, conflicts with two of the listed examples, thereof, i.e. (3) and (7). To eliminate this conflict, I prose the following language change in the body of the definition

"Commercial facility" means any building or place not used exclusively as a residence or residential outbuilding, **or a single structure used or intended to be used for permanent or seasonable human habitation for sleeping three (3) or more families, or any grouping of residences where each residence is not connected to a residential onsite system or a wastewater treatment plant.** A commercial facility includes but is not limited to:
(1) An office building
(2) A manufacturing facility
(3) An apartment, multiplex or townhouse containing more than two residences
(4) A motel
(5) A restaurant
(6) A regulated facility

Section 28. The definition of "Regulated Facility" does not contain sufficient language to address cluster onsite systems owned and operated by homeowner associations or nonprofit public or private utilities under IURC jurisdiction. I prose the following language change in the body of the definition

"Regulated Facility" means any facility, owned or operated by a person, and regulated under Indiana Administrative Code of the department or other state agency, such as a school facility, a state facility, a long-term care facility, an acute care facility, a correctional facility a state facility, a mobile home park, a campground, an agricultural labor camp or **a private or public utility.**

Section 43. Revise (c), (d) and (k) to read as follows
(c) Any residence, residential out building or commercial facility, that generates sewage, and is not connected to a wastewater treatment plant, shall comply with 410 IAC 6-8.2.

(d) Any residence or residential out building that generates sewage, and is not connected to a wastewater treatment plant, shall have an onsite system that is not in failure.

(k) Any commercial facility for which a permit for an onsite system has been, **or is to be** issued pursuant to 327 IAC 3 or As amended, and which is owned, operated, or maintained by an incorporated city or town, conservancy district established pursuant to IC 14-33, or a regional sewer district established pursuant to IC 13-3, is exempt from the requirements of 410 IAC 6-8.2, **except that the incorporated city or town, conservancy or a regional sewer district, along with approval from the department and the Indiana Department of Environmental Management or the Indiana Department of Natural Resources, through a memorandum of understanding, agrees it to be in the best interest of the owner and the state regulatory agency, to not be exempt from the requirements of 410 IAC 6-8.2.**

After (k) insert the following, which will now become (l) and shift the current (l) to (m) etc.

(l) Any person who owns a commercial facility which involves a grouping of two or more residences and an onsite system approval letter is required from the department, shall comply with the requirements of the Indiana Utility Regulatory Commission

Section 47. Revise (b) to read as follows
(b) The owner shall obtain all necessary state and local permits, certificates and approvals before construction begins on an onsite system.

Technical Specification:

Chapter 3, Section VI, Requirements, Secondary Treatment for Nitrogen Reduction; The change allows time and flexibility to create appropriate monitoring models from counties. However, I would like it to read…must not average more than 10mg/ml **monthly…**

Chapter 1., II. Definitions
A. 5. **"Commercial facility"** means any building or place not used exclusively as a residence or residential outbuilding, **or a single structure used or intended to be used for permanent or seasonable human habitation for sleeping three (3) or more families, or any grouping of residences where each residence is not connected to a residential onsite system or a wastewater treatment plant.** A commercial facility includes but is not limited to:
(1) An office building
(2) A manufacturing facility

(3) An apartment, multiplex or townhouse containing more than two residences
(4) A motel
(5) A restaurant
(6) A regulated facility

Chapter 4, Site Drainage; no comment

Chapter 5, Section IV, Septic Tanks: re Chapter 8, Section I.G.3.a.is not in the Tec Spec?

Appendix A: Glossary

Commercial facility: any building or place not used exclusively as a residence or residential outbuilding, **or a single structure used or intended to be used for permanent or seasonable human habitation for sleeping three (3) or more families, or any grouping of residences where each residence is not connected to a residential onsite system or a wastewater treatment plant.** A commercial facility includes but is not limited to:
(1) An office building
(2) A manufacturing facility
(3) An apartment, multiplex or townhouse containing more than two residences
(4) A motel
(5) A restaurant
(6) A regulated facility

Regulated Facility:
Any facility, owned or operated by a person, and regulated under Indiana Administrative Code of the department or other state agency, such as a school facility, a state facility, a long-term care facility, an acute care facility, a correctional facility a state facility, a mobile home park, a campground, an agricultural labor camp or **a private or public utility.**

Sincerely

Richard Wise
President
Indiana Capacity Center
PO Box 88754

Indianapolis, IN 46208

4SC

RECEIVED ISDH

July 24, 2003

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Incorporated

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Mr. Burton Garten
Office of Legal Affairs ISDH
2 North Meridian Street
Indianapolis, IN 46204

RE: Preliminary Adopted ISDH 410 IAC 6-8.2 for Onsite Sewage Systems

Dear Mr. Garten:

These comments are in reference to Chapter 8 of the above-mentioned rules. We would recommend that some additional language and/or requirements be added that would apply to all secondary treatment units. Some of these suggestions are essential to prevent the discharge of untreated sewage, optimize treatment performance, and ensure the maintainability of the system.

General Rule:

1. All secondary treatment units shall:

   - Have a visual and audible alarm*, placed at a location acceptable to the Agent, which are activated upon an electrical or mechanical malfunction;
     -An alarm notification, to the homeowner or service provider, needs to occur when an integral component of the treatment system is not functioning properly (pump, blower, float etc.). In cases where a blower or fan is being used a pressure switch, monitoring whether or not the blower/fan is actually running, needs to be utilized.

     **When a remote telemetry control panel is used the local audible alarm may be suspended for a short duration to allow for operator response.*

   - All components shall be constructed of durable material not subject to excessive corrosion or decay;

   - Have provisions to prevent surging of flow through the aeration and/or settling compartments;
     -The main secondary treatment compartment in any onsite system needs to be protected or be designed to accommodate surge flows. Surge flows occur in most residences on a daily basis as a result of morning and evening routines by the occupants. This can be accomplished by pumping into the secondary treatment unit (see enclosed "Surge Control and Bypass Protection" example)

   - Have access to each compartment for inspection and maintenance;

   - Have provisions for convenient removal of solids;

ATTACHMENT
Y

2. Be designed to prevent:

   - Short circuiting of flow;

   - If applicable, excessive accumulation of sludge in the aeration compartment;
     -The treatment system needs to be designed to reduce the sludge accumulation in the aeration compartment to ensure treatment capability is not compromised. The eventual sludge accumulation needs to be monitored closely to determine pump out intervals (See enclosed "EPA Onsite Wastewater Treatment Systems Manual" Technical Sheet 1 "Continuous-Flow, Suspended-Growth Aerobic Systems (CFSGAS)" for pump out interval recommendations)

   - The passage of untreated sewage into the disposal field if a critical component of the treatment system malfunctions.
     -This is critical to ensure the protection of the drainfield. In cases where a pump or blower has malfunctioned, sewage should not be allowed to pass through the system w/o being treated. Some provision needs to be designed into the system so that untreated sewage is captured in a tank with enough reserve volume to allow the operator to respond and fix the problem. (see enclosed "Surge Control and Bypass Protection" example)

Operation & Maintenance Suggestions:

1. Chapter 8, Section II, Part A (2) "O&M must be performed at least once every six (6) months."

   While most secondary treatment systems should be maintained twice per year, advances in technology have allowed for reduced visits on some systems to once per year.

   Remote telemetry control panels that have advanced logic allow the operator to closely monitor the system without having to make additional site visits. These panels can be designed to record and perform many different operations from simple alarm notification, via email and pager, controlling the pump when a float malfunctions, to detecting higher than normal daily flows that may effect system performance.

   Maintenance visits should be allowed to be reduced to once per year where telemetry control panels, that have 24/7 advanced logic (System monitoring, event data logging, alarm notification etc..), are used.

Treatment Standard Levels:

1. Figure 8-1 "Effluent Quality for Discharge to a Soil Absorption Field"

   - General:

     The BOD_5 column should be changed to $CBOD_5$ to reflect the applicable testing parameter. The current limit of ≤ 30 BOD_5 when using a secondary treatment device should be changed to ≤ 25 $CBOD_5$ to be consistent with the current NSF Class I discharge requirements.

   - Different Treatment Levels:

     There are many states incorporating different performance and/or treatment levels into their rules to accommodate varying site and soil conditions. There is an increasing amount of development on sites that are marginal where there is no room for error and a one size fits all treatment level may not always be applicable. Secondary treatment systems that treat wastewater to a standard of $\leq$ 25 $CBOD_5$ and ≤ 30 TSS may not be suitable for disposal into poorly drained soils, high groundwater areas, or surface discharge sites. There are secondary treatment systems on the market that have been developed to achieve a higher quality of effluent (≤ 10 $CBOD_5$, ≤ 10 TSS, & other constituents like nitrogen) that can be utilized on these difficult sites where necessary.

     Florida – Brad Croft - 850-245-4070
     Washington - John Eliasson - 360-236-3041
     North Carolina – Joe Pearce - 919-715-3270
     Rhode Island – Russel Chateauneuf - 401-222-6822

     These states are incorporating different treatment levels into their rules to facilitate solutions for these tougher sites. Please consider the attached research document prepared by John Eliasson for Washington States Rule Development Committee.

Thank you very much for considering these recommendations. If you have any questions please contact me at 1-800-536-4192.

Best Regards,

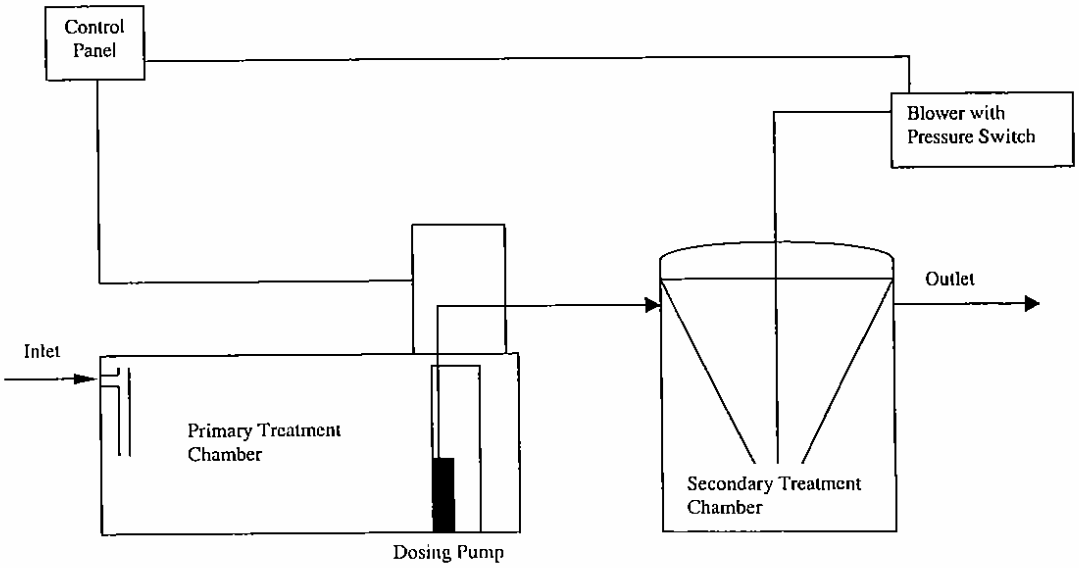
Sam Carter
Regulatory Relations Coordinater
Orenco Systems Inc.
scarter@orenco.com

Surge Control and Bypass Protection

Explanation:

The primary treatment chamber provides three critical control points to any secondary treatment system: primary settling & treatment, surge control, and a method for preventing the discharge of solids in event of power or blower failure. A programmable timer installed in the control panel actually controls the dosing to the secondary treatment unit. This allows daily surges, for example, residential flows occurring in the morning and evening on a daily basis, to be captured upfront. The secondary treatment chamber can then be fed wastewater, not in big surges where treatment would be compromised, but in a controlled and consistent manner allowing optimal treatment.

This configuration will also protect the drainfield during a blower malfunction or power outage. If the blower stops operating for any reason the pressure switch sends a signal to the panel, which disables the dosing pump, and sounds an alarm. The reserve volume in the primary treatment chamber would then be utilized until a service provider can come out to fix the problem or until the power comes back on.



Onsite Wastewater Treatment Systems Technology Fact Sheet 1

Continuous-Flow, Suspended-Growth Aerobic Systems (CFSGAS)

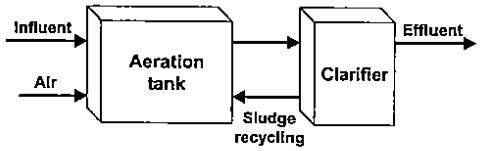
Description

The activated sludge process is an aerobic suspended-growth process that maintains a relatively high population of microorganisms (biomass) by recycling settled biomass back to the treatment process. The biomass converts soluble and colloidal biodegradable organic matter and some inorganic compounds into cell mass and metabolic end products. The biomass is separated from the wastewater through settling in a clarifier for recycling or wasting to sludge handling processes. Preliminary treatment to remove settleable solids and floatable materials is usually provided by a septic tank or other primary treatment device. Most onsite designs are capable of providing significant ammonia oxidation and effective removal of organic matter.

The basic system consists of a number of interrelated components (as shown in figure 1):

- An aeration tank or basin.
- An oxygen source and equipment to disperse atmospheric or pressurized air or oxygen into the aeration tank at a rate sufficient to always maintain positive dissolved oxygen.
- A means to appropriately mix the aeration basin and ensure suspension of the biomass (usually accomplished by the aeration system).
- A clarifier to separate the biomass from the treated effluent and collect settled biomass for recycling to the aeration basin.

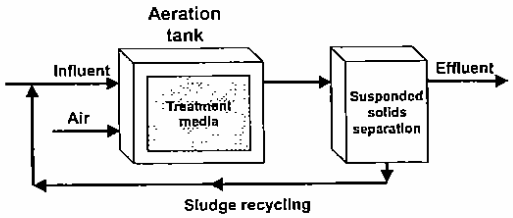
Figure 1. A basic CFSGAS configuration



Several modifications of this basic process are commercially available. These include different aeration devices; different means of sludge collection and recycling to the aerator; the use of coarse membrane filters in lieu of, or in addition to, the clarifier; and process enhancement through the addition of an inert media area on which biofilms can grow. The addition of surfaces where biota can become attached and grow increases the capacity of the system (increased organic loading possible). This last modification is the most significant enhancement and is described below.

The combined fixed-film/suspended growth process is sometimes referred to as a class of treatment processes called coupled contact aeration, enhanced, or high biomass systems. To enhance performance and increase the capacity of the aeration tank, an inert support medium is added to the aeration tank. This allows a fixed film of biomass to attach and grow on the medium to augment the suspended microbial population, providing more biomass to feed on wastewater constituents (figure 2). Synthetic trickling filter media, loops of fiber bundles, and a variety of different plastic surface configurations can be suspended in the aeration tank. Advantages include increased active microbial mass per unit volume, enhanced potential for nitrification, reduced suspended solids loading to the clarifier, improved solids separation characteristics, reduced sludge production, and resilience under variable influent conditions.

Figure 2. An enhanced CFSGAS or "high biomass" system



Typical application

These systems are usually preceded by a septic tank and followed by a subsurface wastewater infiltration system (SWIS). Despite some claims of reduced SWIS sizing when compared to the conventional septic tank pretreatment, the designer is cautioned to consider ground water protection. These systems should be applied only where onsite system management services are available. For surface water discharge, the system must be followed by disinfection at a minimum to consistently meet discharge standards. However, some subsurface (non-human-contact) reuse may be implemented without further treatment. High biomass systems can be a low-cost means of upgrading existing overloaded CFSGAS units that currently do not meet BOD or nitrification goals. They can also compete directly with conventional designs because they have greater stability in handling highly variable loadings.

Design assumptions

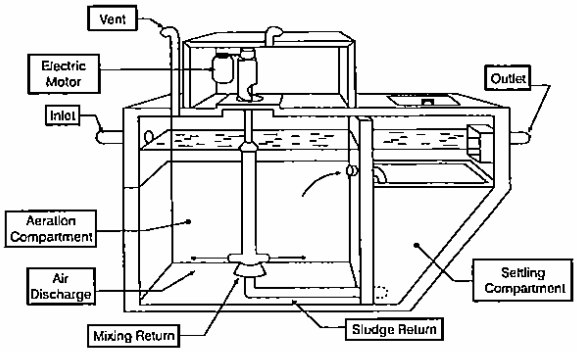
The extended aeration type of CFSGAS is the most commonly used design. At present there is no generic information on design parameters for fixed film activated sludge systems. Package plants are delivered based on design flow rates. A conservative design approach for extended aeration systems is presented in table 1. The inert medium should support additional biomass and add to the total system microbial mass. Because the increase in microbial population is difficult to measure, any "credits" for this addition would have to be based on empirical observation. Claims for significantly decreased sludge production, increased oxygen transfer efficiency, and improved settleability of the sludge have not been universally proved. However, a number of successful installations for onsite and small municipal systems have been in operation throughout the world for more than 10 years (Mason, 1977; Rogella et al., 1988; Rusten et al., 1987).

Table 1-1. Design parameters for CFSGAS extended aeration package plants

Parameter	Extended Aeration
Pretreatment (if needed)	Septic tank or equivalent
Mixed Liquor Suspended Solids (mg/L)[a]	2,000–6,000
F/M Load (lb BOD/d/MLVSS)[b]	0.05–0.15
Hydraulic Retention Time (h)	24–120
Solids Retention Time (days)	20–40
Mixing Power Input[c]	0.2–3.0 hp/1,000 ft^3
Clarifier Overflow Rate (gpd/ft^2)	200–400 avg., 800 peak
Clarifier Solids Loading (lb/d/ft^2)	30 avg., 50 peak
Dissolved Oxygen (mg/L)	>2.0
Residuals Generated	0.6–0.9 lb TSS/lb BOD removed
Sludge Removal	3–6 months as needed

[a]TSS in aeration tank.
[b]Organic loading (pounds of BOD per day) to aeration tank volatile fraction of MLSS.
[c]Power input per cubic foot of tank volume.

Figure 3. Components of a typical aerobic treatment unit



Onsite package treatment units (see figure 3) should be constructed of noncorrosive materials, such as coated concrete, plastic, fiberglass, or coated steel. Units may be stand-alone or manufactured to drop into a compartmented septic tank. Some units are installed aboveground on a concrete slab with proper housing to protect against severe climatic conditions. Units may also be buried underground as long as easy access is provided to all mechanical parts, electrical control systems, and water surfaces. All electrical components should follow NEC code and be waterproof and/or housed from the elements. If airlift pumps are used, large-diameter units should be provided to avoid clogging. Blowers, pumps, and other mechanical devices should be designed for continuous use because they will be abused by climatic conditions and the corrosive atmosphere within the treatment environment. Easy access to all moving parts should be provided for routine maintenance. An effective alarm system should be employed. Typical land area requirements for package plants are modest.

For engineered package plants, final clarifier designs should be conservative for high MLSS and poor settleability of biomass. Because of the potential for bulking sludge, secondary clarifiers should be equipped with surface skimming devices to remove greases and floating solids, as well as efficient screens.

Performance

Well-operated CFSGAS extended aeration units that are well operated can achieve BOD concentrations ranging from 10 to 50 mg/L and TSS concentrations ranging from 15 to 60 mg/L. Some studies (Brewer et al., 1978; Hutzler et al., 1978) have indicated poorer performance owing to surge flows, variable loading, and inadequate maintenance. Nitrification can also be significant in these aeration units during warmer periods. Some nitrogen removal can be achieved by denitrification, which can remove 30 to 40 percent of the total nitrogen (TN) under optimum conditions. Average total nitrogen effluent concentrations in residential extended aeration units range from 17 to 40 mg/L. Fecal coliform and virus removal has been reported in the range of 1 to 2 logs.

High biomass systems have produced BOD and TSS effluents of 5 to 40 mg/L. Although they are less dependent on temperature than the extended aeration CFSGAS, temperature does have an impact on their seasonal capability to nitrify the influent ammonium-nitrogen to nitrate-nitrogen. All CFSGAS systems do an excellent job of removing toxic organics and heavy metals. Most CFSGAS systems do not remove more than a small percentage of phosphorus (10 to 20 percent) and nitrogen (15 to 25 percent).

Management requirements

CFSGAS systems must be managed and maintained by trained personnel rather than homeowners to perform acceptably. Power requirements vary from 2.5 to 10 kWh/day. They should be inspected at least every 2 to 3 months. During these inspections, excess solids pumping should be based on the mixed liquor measurements. It is estimated that an effective program will require between 12 and 28 person-hours annually, in addition to analytical testing of the effluent, where required. Management contracts should be in place for the life of the system. Common operational problems with extended aeration systems are provided in table 2. Residuals generated will vary from 0.6 to 0.9 lb TSS per lb BOD removed, over and above the normal septic tank sludge produced.

Table 1-2. Common operational problems of extended aeration package plants

Observation	Cause	Remedy
Excessive local turbulence in aeration tank	Diffuser plugging Pipe breakage Excessive aeration	Remove and clean Replace as required Throttle blower
White, thick, billowy foam on aeration tank	Insufficient MLSS	Avoid wasting solids
Thick, scummy, dark tan foam on aeration tank	High MLSS	Waste solids
Dark brown/black foam and mixed liquor in aeration tank	Anaerobic conditions Aerator failure	Check aeration system, aeration tank DO
Billowing sludge washout in clarifier	Hydraulic or solids overload Bulking sludge	Waste sludge; check flow to unit See EPA, 1977
Clumps of rising sludge in clarifier	Denitrification Septic conditions in clarifier	Increase sludge return rate to decrease sludge retention time in clarifier Increase return rate
Fine dispersed floc, turbid effluent	Turbulence in aeration tank Sludge age too high	Reduce power input Waste sludge
Poor TSS and/or BOD removal	Excess flow and strength variations	Install flow smoothing system
Poor nitrification	Low temperatures Excessive biocide use	Insulate, upgrade to high biomass, etc. Reduce biocide loading

Risk management issues

CFSGAS systems require effluent disinfection at a minimum to meet surface discharge or any surface reuse water quality requirements. They are quite sensitive to temperature, interruption of electric supply, influent variability, or shock loadings of toxic chemicals. The septic tank helps protect these units from the latter problems. Aesthetically, noise from the blowers is the major irritant, while odors can be significant during power outages or organic overloading periods. High biomass units are more resistant to the above impacts. The systems are not well suited to seasonal use because of long start-up times.

Costs

The installed costs of package plants are highly variable but are usually less than $10,000. Operation and maintenance (O/M) costs are primarily dependent on local power and labor costs, varying from $400 to $600 per year in most cases.

References

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RULE DEVELOPMENT COMMITTEE ISSUE RESEARCH REPORT

DRAFT

APPLICATION OF TREATMENT STANDARDS 1 AND 2 -

DOH Staff Researcher(s): John Eliasson

Date Assigned: 12/17/02

Date Completed: 3/29/02

Research Requested by: ☐ RDC ☒ TRC ☐ Other:

Issue Subject: Technical ☒ Issue ID: T1
Administrative ☐
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Definitions ☐

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Topic & Issues:

Application of Treatment Standard 1 & 2

- **Should we continue using treatment standards to manage on-site sewage systems?**
- **Is there a need to make adjustments to our existing standards?**
- **What are the important parameters and indicators of public health and environmental significance for us to consider?**
- **How do we match risk reduction strategies to the actual receiving environmental risk factors?**

Summary:

This report summarizes the literature on the topic of treatment standards for on-site sewage systems. Traditional regulations assume that a prescribed detailed system design will be adequate for those sites meeting certain minimum requirements for setbacks, distance to high water table, etc., and presume that public health will be protected if these specifications and on-site system design requirements are followed. While the prescriptive approach has generally worked well where site conditions are suitable, there are many sites in this state with less than suitable conditions.

In recent years there has been increasing discussion on the use of the performance-based regulations, which would provide more flexibility in the design and use of technologies as long as specific established treatment standards are met. Most treatment standards contain three basic elements: critical parameters of concern (e.g. FC, nitrate nitrogen NO_3-N, phosphorous), maximum allowable concentration or mass loading of the parameter(s), and the point at which the allowable concentration or loading must be met. Parameters for which treatment standards are commonly set for on-site sewage systems have included fecal coliform bacteria, total suspended solids, biochemical oxygen demand, nitrogen and phosphorus. Specific treatment standards should be defined by using risk-based analyses on a regional or site-specific level. To better match risk reduction strategies to the actual receiving environmental risk factors, multiple treatment standards should be developed. Depending on the type of specific public health risks or environmental impacts, different standards can be identified and applied to address specific resource sensitivity.

Even though it is difficult to accurately predict what level of treatment is required before the wastewater is released to the soil environment, the literature suggests treatment standards set at the point prior to the release into the soil is preferable than at some point in the receiving environment. The development of a treatment standard for nitrogen would help address the risks of pollutant delivery to sensitive water resource protection areas and would help encourage the further development of nitrogen reducing technologies.

KEYWORDS: Treatment standards, performance standards

Introduction:

Similar to most on-site sewage system regulations throughout the country, our state rules are typically based on prescriptive requirements for system location, design, and installation. Prescriptive codes identify the specific technologies that must be used under specified soil and site conditions (e.g. conventional gravity system with a three feet vertical separation distance between the trench bottom and restrictive layer). While the prescriptive approach of specifying detailed system designs for sites meeting minimum conditions generally has worked well where soils and site conditions are suitable, there are many sites in Washington State with less than suitable conditions (such as soil with high or very low permeability, high water tables or inadequate soil depth to a restrictive layer).

Many programs using prescriptive requirements are based on empirical and historical information that do not necessarily result in appropriate on-site system performance for the variety of conditions encountered in the field. Site-specific factors can also result in inadequate treatment of OSS effluent where a prescriptive approach is used. Local political pressure to approve specific types of systems for use on sites where prescriptive criteria are not met is another factor that leads to the installation of inadequate systems.

There has been a trend toward the use of performance-based codes to accomplish the same goals of public health and water quality protection as our traditional prescriptive requirements. Performance-based codes are regulations requiring that on-site systems meet specific measurable performance criteria in the form of effluent treatment standards, such as specific levels of fecal coliforms or nitrogen. The use of a performance-based approach specifies advance pretreatment requirements for sites where the prescriptive rules cannot be met. More advanced pretreatment is used at the more limited sites and in the more sensitive receiving environments.

Some members of the on-site sewage industry have expressed concerns regarding the implementation of a performance-based approach using treatment standards. In practice, it is often difficult to certify the performance of various treatment technologies under the wide range of climates, site conditions, hydraulic loads, and pollutant outputs they are subjected to in the field. Since the soil will provide significant additional treatment as the wastewater reaches the groundwater, it is also difficult to predict what level of treatment is required before the wastewater is released to a subsurface soil absorption system. The inherent difficultly of determining cumulative loadings and their impacts on a watershed, the technical difficulties of monitoring OSS to ensure system performance, the evaluation of new technologies and the potential costs, and staffing and expertise needed to implement a performance-based program can make this option more costly and difficult to implement.

The purpose of this review is to synthesize the literature available on the topic of treatment standards so that the Technical Review Committee can make appropriate recommendations about how standards regarding effluent treatment should be set and applied in Washington State. More than 40 publications, which include peer reviewed journal articles, conference proceedings, text books and government reports were collected and reviewed. Even through the majority of the publications are conference proceedings, which typically not peer reviewed, they provide useful information regarding the subject of treatment standards.

Body:

Washington State Treatment Standards (TS I & 2)

The concept of integrating performance standards with on-site sewage system management was first introduced in proposed system repair regulation during the state rule revision process in 1988. The rule revision committee at the time proposed a treatment standard of 10 mg/l BOD_5, 10 mg/l total suspended solids and 800 fecal coliform per 100 ml prior to subsurface disposal where a repaired system could not meet the required setback to wells or surface water (Woolrich, 1989). As the available horizontal separation or vertical separation decreased, the treatment standard stiffens to a 200 fecal coliforms per 100 ml limitation. The committee was cautious about including the standards in the repair regulations because of the difficulty of comparing a known and measurable performance standard with the immeasurable level of treatment provided by prescriptive

system siting standards. Nevertheless, the committee decided a treatment standard was a logical choice when the effluent quality of an alternative system is known and there is virtually direct discharge of the effluent to surface water or ground water (Woolrich, 1989).

During the course of the rule revision process in 1989, the state legislature passed Engrossed Substitute House Bill 1369. The focus of this legislation was to assure that marine shoreline repair and expansion issues were specifically addressed in state on-site regulations. The legislature found that new technologies at the time had developed effective ways to treat the wastewater from these residences in order to protect against significant health hazards and water quality degradation that the existing state's on-site sewage rules did not allow. The bill provided a single treatment standard (10/10/200) to apply to all systems on sites adjacent to marine waters, required subsurface discharge and directed the State Board of Health to adopt regulations to address these sites and issues (Soltman, 1992).

In response to this legislation directive, the state Board of Health revised the on-site sewage rules in November of 1989 to facilitate the repairs of on-site sewage systems in marine shoreline areas. In doing so, it established Treatment Standards 1 and 2 for systems installed as repairs along marine shorelines (see Table 1). To address lot size and soil limitations often found at these sites, the treatment standards established the numerical parameter for on-site sewage system treatment performance needed to offset the restrictive site conditions. As sites with vertical and horizontal separation constraints exhibit diminishing capability to provide adequate sewage treatment in the soil with conventional systems, alternative systems capable of providing a known level of treatment prior to discharge to the soil for final treatment and disposal are used. The higher level of treatment (Treatment Standard 1) is required in cases where both the horizontal separation to marine water is less than 25 feet and vertical separation is less than two feet.

After completion of the on-site sewage rule revision in 1994, the state Board of Health adopted more comprehensive amendments, which included extended applicability of Treatment Standard 1 and 2 to non-shoreline repairs and to systems installed on new sites with inadequate vertical separation or sites with Type 1A soil (very gravelly coarse sands or coarser, or extremely gravelly soil) (see Table 2). The rule allowed reduced vertical separation to as little as one foot provided that wastewater is treated to Treatment Standards 2 prior to discharge to the soil. The use of systems capable of achieving Treatment Standard 2 is also required for all new installations in Type 1A soils regardless of soil depth.

TABLE 1. Treatment Standards 1 and 2

(From WSDOH. List of Approved Systems and Products. November 2001)

Standard	Treated effluent from Alternative On-site Sewage Systems Must meet (or exceed) these performance standards:		
	BOD_5 (5-day Biochemical Oxygen Demand) Maximum 30-day average (mg BOD / liter Effluent)	TSS (Total Suspended Solids) Maximum 30-day average (mg TSS / liter Effluent)	Fecal Coliform Maximum 30-day geometric mean, (Colonies/100 ml Effluent)
Treatment Standard 1:	< 10 mg *	< 10 mg	< 200
Treatment Standard 2:	< 10 mg *	< 10 mg	< 800

* A 30 day average of less than 8.3 mg /L of carbonaceous biochemical oxygen demand (5-day $CBOD_5$) will be accepted in lieu of the BOD_5 value when data are submitted in the course of NSF Standard No. 40 testing and reporting protocols.

Table 2. Application of Treatment Standards 1 & 2

(From WSDOH. List of Approved Systems and Products. November 2001)

Permit Event	System Must Meet Treatment Standard	Applies When & Where:
Repair or Replacement	1 or 2	Horizontal separation to a water supply or surface water cannot meet the standards for new construction.[1]
New Construction or Expansion	2	• Vertical separation is less than 2 feet in Soil Types 1B, 2A &B, and 3-6.[2] • Development where Soil Type 1A exists.[3]

[1] Table VI in the SBOH rules, Chapter 246-272 WAC

[2] Table IV in the SBOH rules, Chapter 246-272 WAC

[3] Table IV in the SBOH rules and Table VII in the SBOH rules, Chapter 246-272 WAC

When selecting a treatment system, or issuing a permit, for a site requiring either treatment standard to be met, the on-site sewage system rules limit the local health officer to alternative systems for which there are alternative system guidelines and to proprietary products on the department's List of Approved Systems and Product (WAC 246-272-04001). The Department of Health develops and annually updates the Approved List, which enumerates all proprietary alternative and experimental systems approved for use in Washington State and identified systems recognized by the Department as meeting Treatment Standard 1 and 2. Systems and products meeting the treatment standards may be used at these conditional sites without further evaluation of the treatment system's performance. Appropriate design, installation and inspection, followed by proper operation by the system's owner and routine monitoring and maintenance by qualified service providers support presumption of satisfactory system performance. However, discretion concerning whether to allow installation of any specific state approved alternative or proprietary system or device is left with local health jurisdictions.

Trend Toward Performance Based Standards

On-site sewage system performance standards were first discussed in the literature by Reed (1977), who identified the shortcomings of relying on detailed compliance standards in the rapidly evolving field of on-site wastewater treatment. He recommended use of the performance standards framework, which speaks to desired outcomes as an alternative to detailed specifications of how things should be done. Reed pointed out that until the year 1974, the only statewide on-site sewage regulation in Washington state was a simple performance standard proclaiming that " No privy, urinal, cesspool, septic tank, or other receptacle for human excrement shall be constructed, maintained, or used which directly or indirectly drains or discharges over or upon the surface of the ground, or into any waters of the state either directly or indirectly; unless the content of such urinal, cesspool, septic tank, or receptacle for human excrement are subjected to some recognized sterilization treatment approved by the State Department of Health."

In more recent years, there has been increasing criticism of prescriptive on-site wastewater codes, which require certain specific site conditions, design, and technologies for installation of a system, and discussion of a possible shift to performance-based codes, which would provide flexibility in design and use of technologies as long as specific treatment standards were met. These standards would vary with the sensitivity of nearby surface or groundwater or resources and other factors.

The necessity of implementing performance standards as opposed to prescriptive standards for wastewater treatment was discussed in detail by Otis and Anderson (1994). They pointed out that prescriptive standards, which specify site requirements and codified technical specifications for system design, were principally

developed for on-site systems using septic tanks followed by drainfields; the main emphasis historically was on disposal rather than treatment. System performance cannot adequately be assessed on a routine basis since the prescriptive code provide no effluent standard for the treatment systems and thus, periodic compliance monitoring is not required. Performance standards, on the other hand, specify measurable performance requirements in the form of treatment efficiencies or effluent standards that can be monitored on a routine basis to assess system performance and ensure regulatory compliance. They do not require that site characteristics or treatment methods be specified. The authors also recognized that this new approach would have a significant effect on regulating programs which would have to place "greater responsibilities on the regulating agencies, site evaluator and design professional, construction contractor, system operator and system owner".

Smithson (1995) provided a regulator's viewpoint on the performance-based framework and expressed concerns about the practical reality and user friendliness of performance based standards. The presumption is that giving increased responsibility to all parties will ensure that "interested, motivated, confident, well informed, well equipped and open minded regulators, designers, installers, service providers and home owners "advance" in a cooperative march to a shared objective. However, the actual responsibility will still fall on the regulator who could be "left standing alone without the protection and support of the prescriptive provisions most codes afford". He argued that prescriptive codes, with their specified standards, provide a shelter for regulators who, in acting for a smaller local authority, lack the support or education, training and experience, and often are the lone officer involved in approvals along with a wide range of other environmental health duties. Smithson concluded that performance codes only can be acceptable if backed up by improved and standardized prescriptive requirements, which guarantee implicit performance standards by prescribing certain prerequisites for installation and use of an on-site system.

Another regulatory perspective on the use of performance standards for on-site wastewater treatment systems was presented by Crosby et al. (1998). The authors indicate that the current practice of prescriptive standards has been described as primitive and arbitrary, but they point out an equal number of difficulties with performance approaches if not addressed will lead to equal or greater failure of performance approaches than has been seen in prescriptive approaches. They suggest that the prescriptive-based approach has been recognized to work well where site and soil conditions are suitable, whereas the performance-based approach is more suited for difficult site conditions. The authors conclude that prescriptive standards will remain a useful and inexpensive management tool.

Sherman (1995) believes that performance based standards will not replace their prescriptive counterparts, but rather augment them in difficult or unusual sites. Because of the resource burden of implementing a total performance-based program, some regulatory agencies are using a performance based approached while retaining prescriptive requirements for technologies that have been proven effective under a wide range of site conditions. For example, jurisdictions might elect to use prescriptive standards in areas where it has been determined that on-site systems are not a significant contributing source of pollutants or in areas where on-site systems are not likely to cause water quality problems. Prescriptive designs might also be appropriate and practical for sites where previous experience with specified system designs has resulted in the demonstration of adequate performance (Ayres Associates, 1993).

If prescriptive designs are allowed under a performance-based program, Otis and Anderson (1994) advises these systems should be proven capable of meeting the same performance requirements as a system specifically designed for the site. Under this approach, the management entity should determine through experience (monitoring and evaluation of the prescribed systems on sites with similar site chacteristics) that the system will perform adequately to meet state performance requirements given sufficiently frequent operating inspections and maintenance. Combining prescriptive designs with performance-based programs would still require the prescriptive design for a prescribed site to have a "definite performance" which is acceptable to the regulating agency. Designers may then have the option to "engineer" a system or use a prescriptive design determined by the site and soil condition (Otis and Anderson, 1994).

Points of Treatment Standards Application

Depending upon an agency's regulatory jurisdiction, there can be different points where treatment standards might be applied. They can be applied to the effluent port of a single treatment component, the end of the treatment train (a series of treatment units connected together) or the receiving environment, which receives treated wastewater from an on-site system. When applied to a treatment train or to an individual on-site system component, the standards are a measure of the pretreatment provided by that treatment unit or series of system components prior to final treatment and dispersal in the SSAS and underlying soil. When applied to a receiving environment they are a measure of the level of treatment provided at a critical location in the receiving environment (such as at the groundwater table directly beneath the system, at the groundwater review boundary, compliance boundary or at the property lines).

EPA recommended that performance standards should be set for wastewater effluent after it has passed through the SSAS at the point of entry into groundwater or surface waters. Specific water quality standards would be imposed based on a determination of likely use of these waters, density of development, time of travel through soils, and other factors (EPA, 1999). This approach can be characterized as a fairly pure example of the concepts that standards should be based on outcomes rather than best available technology and standards are set close to the end user.

Corry (2000) pointed out that the receiving environment is not an effective point of standards measure for most on-site systems for several reasons; namely, monitoring groundwater is expensive and often ineffective because locating the plume is difficult, and travel times from the system to the point of monitoring can be long. This creates a zone where the characteristics of the effluent stream can be modified by further treatment, dilution or the addition of pollutants from other sources. He suggested two stages for applying treatment standards before pretreated wastewater is released to the environment and the outputs be measured at the end of each state. The first stage and point of measure is between the input of the first treatment device and the outfall of the last treatment device prior to introduction to soil (from a septic tank, sand filter, ATU – prior to the drainfield) measured at the outfall. The second stage is between the outfall of stage one and the end of the design treatment zone, measured at some point after introduction of the wastewater to the soil. Stage one assumes domestic strength waste; therefore, it would be necessary to pretreat wastewater from a restaurant prior to introduction to a system classified as a "domestic" treatment system.

From a practical point of view, Hoover et al. (1998) suggested it might be easier to apply treatment standards to a specific treatment unit or treatment train rather than to the soil or ground water system. This is a pertinent viewpoint, particularly if the treatment performance of operating system will be regular assessed by routine collection of sample and laboratory analyses. Hoover points out most pretreatment units can be easily modified to facilitate a sampling port that will accommodate regular sampling. On the other hand, sampling and data interpretation is much more complex when sampling the vadose zone in the soil above the water table or when sampling the ground water systems itself. Effective sampling networks within the vadose zone and/or the ground water system usually require multiple sampling points.

Nelson (2000) indicated that variable standards set at the intersection with groundwater or surface fail to meet other criteria described in the literature: specifically, they are not uniform or clear; and they are not easily measurable or enforceable. Once the soils are considered part of the treatment train, then required performance of pretreatment units would be expected to vary substantially. And, more significantly, measurement of water quality after soils treatment is highly problematic. From a monitoring perspective, it can be quite expensive to find where the wastewater plume is actually entering the groundwater and to monitor that plume periodically and groundwater levels rise and fall with rainfall and the seasons.

Other members of the on-site industry believed that on-site performance standards should be set after treatment in the soils and that these standards should vary with density of development, use of ground or surface water and other risk-related factors. This is the same approach as the "design Management Zone" concept recommended by NOWRA (1996). States, such as Minnesota and Wisconsin, have adopted this approach when developing performance-based state rules and standards (Docken and Burkes,1994; Wespetal et al. 2001).

However, Nelson (2001) pointed out that from a market development perspective, the best approach is a simplified set of treatment standards prior to release into the soils, coupled with prescriptive requirements for where these standards should be mandates and for the design of the SSAS. The process of designing standards will have additional impacts on the evolution of the market and on technology development in the decentralized wastewater field. If standards are designed properly, it may be possible to jump-start expanded use of advanced treatment technologies and management, to elevate the performance and lower the cost of such systems. The author developed a table summarizing a number of states and communities already beginning to implement such an approach (Table 3).

Table 3. Effluent Treatment Standards Prior to Discharge to Soil (Adapted after Nelson, 2000)

	BOD Mg/l	TSS mg/l	Total N mg/l	No_3 mg/l	TP mg/l	Fecals MPN/100ml	FOG Mg/l
Washington State							
TS 1	<10	<10				<200	
TS 2	<10	<10				<800	
Florida							
Secondary treatment	≤20	≤20				≤200	
Advanced secondary treatment	≤10	≤10	≤20		≤10	≤200	
AWT	≤5	≤5	≤3		≤1	≤25	
La Pine, Oregon	≤10	≤10	≤10			≤100	
Block Island, Rhode Island							
T2N	≤30	≤30	≤19				
T2C	≤10	≤10				≤1000	
Albuquerque/Bernalillo County, NM							
Conventional System (Class 1)	≤150	≤60				$\leq 10^6$	
Secondary Systems (Class 2)	≤30	≤30				$\leq 10^4$	
Tertiary Systems (Class 3)	≤30	≤30				$\leq 10^3$	
Disinfection						≤200	
Canada	15	15				50,000	
Northeast Minnesota (study targets)	25	30		10		<200	
North Carolina							
Conventional Loading Rate Systems	200	75	75				30
High Loading Rate Systems	30	30	30			10,000	10

National Numerical Treatment Standards

Nelson (2001) suggests that a single set of strict mandatory national effluent standards is unlikely, largely because Congress is unlikely to approve national standards against the resistance of state governments, who would fiercely oppose such a costly new federal set of regulations, and against the inevitable backlash of millions of homeowners. Nevertheless, industry, researchers, and regulators can collaborate in developing recommendations on basic approaches toward treatment standards, which then could be adopted by states and

counties to their particular climate, soils, and other conditions. Hoover (1997) and Jantrania (1999) have both outlined how such as approach could be developed and a number of states and counties have already implemented treatment standards for difficult lots.

A series of voluntary national standards for on-site systems was first introduced by Hoover et al. (1998). Specifically, seven treatment performance standards (primary treatment, secondary treatment, tertiary treatment, nutrient reduction, disinfection, wastewater reuse, and nears drinking water) are suggested to either augment or replace existing prescriptive on-site codes. Regulatory agencies can determined which of the seven standards are most appropriate for different soil conditions (e.g. vertical separation to water table, etc.) or specific watersheds within their jurisdiction. These decisions will depend upon public health concerns and/or environmental conditions in their watershed. The most advanced pretreatment was recommended at the most limited sites and in the most sensitive receiving environments. Table 4 summarizes the standards, measurement parameters, and quantifiable limits for them.

Table 4. Proposed On-site System Treatment Standards in Various Control Zones

(From Hoover, 1998)

Standard	BOD_5 (mg/l)	TSS (mg/l)	PO_4-P (mg/L)	NH_4-N (mg/L)	NO_3-N (mg/L)	Total N (% removed) [a]	Fecal coliform (CFU/100 ml)
TS1- primary treatment							
TS1u – unfiltered	300	300	15	80	NA	NA	10,000,000
TS1f- filtered	200	80	15	80	NA	NA	10,000,000
TS2-secondary treatment	30	30	15	10	NA	NA	50,000
TS3 – tertiary treatment	10	10	15	10	NA	NA	10,000
TS4 – nutrient reduction							
TS4n nitrogen reduction	10	10	15	5	NA	50%	10,000
TS4p phosphorus reduction	10	10	2	10	NA	25%	10,000
TS4np- N & P reduction	10	10	2	5	NA	50%	10,000
TS5 – bodily contact disinfection	10	10	15	10	NA	25%	200
TS6- wastewater reuse	5	5	15	5	NA	50%	14
TS7- near drinking water	5	5	1	5	10	75%	<1[b]

a. Minimum % reduction of total nitrogen (as nitrate-nitrogen plus ammonium-nitrogen) concentration in the raw treated wastewater
b. Total coliform colony densities <50/100 ml

Hoover (1998) presents these treatment standards under the assumption that they will be applied as a measure of the level of pretreatment that occurs prior to the wastewater being applied to the soil. For example, treatment standard number one (TS1) in Table 4 is the minimal treatment level expected within the septic tank itself, and thus, represents septic tank effluent. This standard defines the minimum level of pretreatment that must be obtained prior to treatment in the soil. The soil will provide additional treatment beyond this primary level. However, the amount of soil treatment that occurs will depend upon the soil conditions at a given site.

How these multiple treatment performance standards based on risk could be used was illustrated by Hoover et al. (1998). The authors explained the reasons for multiple standards as opposed to a single treatment standard are as follows. "There are multiple local health and natural environments that have varied tolerance for wastewater effluent constituents. For example, scattered agricultural homesteads dense subdivisions and lakeside cottages pose different health and environmental risks. Because solutions to reduce risk are expensive for homeowners it is important to match risk reduction strategies to the actual localized factors. One size fits all regulation of a single performance standard either results in needless cost to homeowner or increased risk to the human or natural environment."

NOWRA is currently underway in developing a model performance code for the on-site industry that is based on performance rather than prescriptive regulations (Corry, 2000). The code is proposing a performance matrix that relates effluent quality to water quality or treatment standards and quality assurances. The quality assurance standards are a set of management requirements to attain the effluent quality with the technologies chosen in a particular design. The series of treatment standards would recognize that the health and environmental risks of specific treatment designs vary with site conditions and proposed uses of the treated wastewater. Consequently, successively more stringent wastewater constituent treatment standards and related quality assurance measurements will be arrayed in matrices, with treatment standards on the vertical axis, or variance control, standards on the horizontal axis. Treatment system designs and components will then be able to evaluated against the matrix.

Kreissl et al. (2002) raised questions regarding whether a model code, such as NOWRA's, being developed on the basis of incomplete and conflicting existing data would be universally accepted by regulatory agencies. The adoption of such a code requires significant changes in any regulatory program taking years to accomplish and cannot be implemented unless management of more advanced technologies can be assured. The authors suggested that such national standards always would be incomplete by definition because it will fail to account for all local site conditions and may stifle the adoption of new ideas.

Wastewater Parameters of Concern

Domestic wastewater contains microbial and chemical constituents that poses significant risk to public health and the environment if not treated effectively before being released to the receiving environment. Some of the traditional parameters for which treatment performance standards are commonly set for on-site wastewater treatment systems include suspended solids, biochemical oxygen demand, fecal coliform, while other parameters used to a lesser extent include nitrogen, phosphorus, and oil and grease.

BOD

BOD, biochemical oxygen demand, is an analytical measure of how much oxygen is consumed in biological processes that degrade organic mater in wastewater. BOD is widely used as an indicator of treatment efficiency, while it has only indirect significance to human and environmental toxicity. BOD can be used to determine the amount of organic pollution in surface water and also is used to determine the strength of wastewater by measuring how much dissolved oxygen is used by microorganisms during biochemical oxidation of any organic matter present in wastewater. High wastewater strength (high BOD values) could aggravate the condition of soil with poor aeration by further depleting available oxygen and produce reducing conditions in the soil.

Sewage sources can contribute organics that can lead to high levels of dissolved oxygen in the water body. Low dissolved oxygen is one of the leading causes of water quality impairment for rivers, lakes, and estuaries. High BOD effluent discharging to surface water can result in the depletion of dissolved oxygen in the aquatic environment, which can lead to a die-off of aquatic organisms and anaerobic conditions. The BOD of raw sewage is about 300 mg/L (Bitton, 1999) and drops to 10-30 mg/L in treated wastewater (Asano, 1998).

TSS

TSS, total suspended solids, is a measure of the amount of suspended solids found in wastewater effluent. Large quantities of suspended solids in wastewater can affect wastewater treatment process in several ways. Suspended solids can interfere with the flow of water in transport pipes, distribution components, and soil pores. Plugging of the orifices by these sediments reduces distribution efficiency. Plugging of the soil pores with particulate solids accelerates soil clogging. Suspended solids in groundwater and surface water can cause anoxic conditions. The average concentration of TSS in untreated wastewater in the U.S. is 210 mg/L (Crites and Tchobanoglous, 1998) and it ranges from <1 to 30 mg/L in treated wastewater (Asano, 1998).

Fecal Coliform

Fecal coliform bacteria specifically originate from the intestinal tract of warm-blooded animals. These organisms are used as an indicator of the presence of pathogenic microbes or level of disinfection because they occur naturally in the feces of warm-blooded animals in higher concentrations than pathogens and are easily detectable. They exhibit a positive correlation with bacterial pathogens and respond similarly to environmental conditions and treatment processes. Fecal coliform determinations by themselves do not as precisely predict the presence or concentration of pathogenic viruses or protozoa as they do bacteria. However, because of the general reliance on fecal coliform as the universal pathogen indictor, system performance criteria have not been set for viruses or protozoa. A number of sources report the level of fecal coliform in septic tank effluent at 10^6-10^8 MPN/100 ml (Siegrist, 2001).

Nitrogen

Nitrogen is an aquatic plant nutrient that can contribute to eutrophication and dissolved oxygen loss is surface waters especially in nitrogen-limited lakes, estuaries, and coastal embayments. Algae and aquatic weeds can contribute trihalomethane (THM) precursors to the water column that might generate carcinogenic THMs in chlorinated drinking water. Excessive nitrate-nitrogen in drinking water can cause methemoglobinemia in infants and pregnancy complications.

Phosphorus

Phosphorus is essential to the growth of algae and other biological organisms and is most often the limiting freshwater nutrient for algae and aquatic weeds. Lake studies have shown that when total phosphorus concentrations exceed 0.03 mg/L lakes tend to be highly productive or eutrophic (Schindler, 1977). Excessive algal growth lowers water quality, and its eventual decay at the lake bottom can release stored phosphorus, perpetuating a cycle of recurring algae blooms.

Oil and Grease

If present in excessive amount, oil and grease will interfere with aerobic biological process and lead to decreased wastewater treatment efficiency. Grease, which is insoluble in and less dense than water, may harden in tanks and can accumulate and completely clog soil pores.

Determining Effluent Allowance Concentration

Treatment standards are the minimum numerical values, based on performance criteria that can be used to define the acceptable public health risks and environmental impacts of on-site sewage systems in order to meet performance goals. The standards may be based on the type of water body that is ultimately receiving the treated wastewater effluent (groundwater or surface water) and the present or projected uses of the water body (e.g. for drinking water, shell fishing, recreation). For example, a treatment standard for fecal coliform might be established in a shellfish growing area where bacterial pollution is a problem.

Treatment standards have been advocated (e.g. Otis and Anderson, 1994; Hoover et al., 1998a), but there appears to be no agreement as to the performance criteria, pollutants of concern, the performance to be achieved within a prescribed space-time domain, or the methods to be used to measure and assess compliance. Many factors need to be considered such as system type, size, and the sensitivity of the primary receiving environments. There appears to be general agreement that the standards should be clear and quantifiable to allow credible verification of system performance through compliance monitoring. From a realistic point of view, the standards that are selected also should be simple and direct using cost-effective, long-standing standard analyses that are routinely analyzed at most wastewater laboratories.

Crosby et al. (1998) advises performance standards that are unrealistic may cause alternative technologies to fail to meet high expectations. Specific standards should recognize the dynamics of the system performance, including the use of annual averages (or the mean of monthly means) instead of strict numerical limits. They also suggest performance-based standards be tied to specific environmental concerns of an area. For example, if a nitrogen sensitive saltwater environment or a drinking water well is located near a treatment system, a nitrogen standard may be appropriate for the treatment system.

Although the concepts of risk assessment and risk management have not generally been applied to on-site technologies, recent explicit risk-based decision-making has been advocated (Otis and Anderson, 1994; Hoover et al. 1998 a,b; Loomis et al., 1999). Risks associated with potential threats to public health and environmental quality must be maintained within acceptable limits over the range of permitted applications. As the risk of systems not meeting their performance requirements increases (e.g. increasing environmental sensitivity, treatment system complexity, daily wastewater flows, or wastewater strength), management control must increase proportionately to ensure the risk to public health and the environmental quality remain with in acceptable limits (Eliasson et al., 2001). Treatment performance requirements must be appropriate to protect public health and sustain environmental quality. Performance requirements may vary with environmental sensitivity, population density, and treatment technologies used.

In a document for the Massachusetts-based ad hoc Task Force for Decentralized Wastewater Management, Hoover (1997) provides a risk-management framework, which could be adopted by any community anywhere in the country. This document includes a logical process for qualitatively assessing the risks from on-site systems on a watershed basis and then goes on to provide a detailed management scheme for controlling risks. The crux of the risk management approach is a groundwater and surface water protection matrix that classifies each subwatershed area into five control zones (called R5, R4, R4, R3, R2, or R1). For each control zone (R5 through R1) the document identifies appropriate treatment performance standards that must be achieved by the on-site system and specifies when and where these systems can be used. These zones reflect the sensitivity and importance of drinking water sources, estuaries, and other natural resources, and treatment standards vary for nitrogen or phosphorous removal, disinfection, etc.

Hoover (1997) illustrates how such treatment standards can be targeted to specific watershed areas to manage the potential risks from on-site systems in a community. One potential application of these standards could be to specify additional wastewater treatment in areas that need additional ground water and /or surface water protection. Another potential application could be to augment the existing prescriptive code criteria to allow reduced vertical separation distances to the water table, bedrock and unsuitable soil horizons using pretreatment to provide public health and environmental protection. Research by Duncan et al. (1994) and Converse and Tyler (1998) supports this approach of substituting soil depth with pretreatment.

While Hoover et al. (1998) have developed risk-based approaches for managing on-site systems, their approach is qualitative. Formal risk-based models that are quantitative have rarely been applied to the on-site sewage systems. Although there are currently some proposals to apply these quantitative models to on-site systems, it will take some time before this effort becomes fully developed for application (Siegrist, 2001).

Cost-benefit Information:

When treatment performance standards are defined and imposed, the least costly option to meet that standard can be chosen. For sites that are more vulnerable to risks to public health and the environment, then the technology options to manage those risks will change, likely increasing the cost and need for management oversight. Cost of site evaluation and design would be substantially higher than for a prescriptive code. A standard for the pretreated effluent could be overly conservative, unnecessarily increasing the cost of the on-site sewage system.

In contrast, prescriptive type approaches could be overly conservative in an attempt to address the worst-case scenario in rules, thereby increasing cost of an on-site system unnecessarily. On the other hand, prescriptive approaches can limit options and flexibility for alternative systems design thereby resulting in increase potential for inadequate performance of permitted systems on poorly suited sites or denials of appropriate alternative technologies.

Conclusions:

A comprehensive review of the literature to address identified key issues on the subject of treatment standards for on-site sewage systems was conducted. The following conclusions can be drawn from the information available in the literature:

1. A performance-based approach that specifies advanced pretreatment requirements (treatment standards) can replace or augment existing prescriptive codes and facilitate progressive siting and design strategies.

2. Most treatment standards contain three basic elements: critical parameters of concern (e.g. FC, nitrate nitrogen NO_3-N, phosphorous), maximum allowable concentration or mass loading of the parameter(s), and the point at which the allowable concentration or loading must be met.

3. Parameters for which treatment standards are commonly set for on-site sewage systems have included fecal coliform bacteria, total suspended solids, biochemical oxygen demand, nitrogen and phosphorus.

4. The literature suggests the best approach to set treatment standards is at the point prior to release into the soil. From a market development perspective, standards set at the point of release into the SSAS are far preferable than at some point in the receiving environment.

5. The treatment standards should take into account the treatment due to physical (filtration), biological, and chemical processes in the soil. Research has shown that pretreatment can be substituted for soil depth to obtain similar levels of wastewater treatment. However, it is difficult to accurately predict what level of treatment is required before the wastewater is released to the soil environment.

6. Systems designed to meet specific treatment standards using a risk-based analyses on a regional or site-specific level are needed. To better match risk reduction strategies to the actual receiving environmental risk factors, multiple treatment standards should be developed. Depending on the type of specific public health risks or environmental impacts, different standards can be identified to address specific environmental sensitivity.

7. Developing a treatment standard for Total Nitrogen would be beneficial in addressing the risks of pollutant delivery to sensitive water resource protection areas in the state and would help encourage the further development of nitrogen reducing technologies.

8. Formal quantitative risk-based models have rarely been applied to the on-site wastewater field. Although there are currently some proposals to apply these quantitative models to on-site systems, it will take some time before this effort becomes fully developed for use.

- **Should we continue using treatment standards to manage on-site sewage systems?** Yes.
    - **If yes, should we continue to set the treatment standards at the point prior to release into the soil?** Yes.
    - **If yes, should we set standards at some point in the receiving environment?** No.
- **Is there a need to make adjustments to our existing standards?** Yes.
- **If yes, what adjustments should be made?**
    - **Additional parameters?** Yes.
    - **Additional levels?** Yes.
    - **Different maximum allowable concentrations?** Yes.
    - **Add mass loading of the parameter(s)???**

- **What are the important parameters and indicators of public health and environmental significance for us to consider?** Fecal coliform bacteria, total suspended solids, biochemical oxygen demand, nitrogen and phosphorus.
- **How do we match risk reduction strategies to the actual receiving environmental risk factors?** Develop site vulnerability and treatment standard matrixes, which identify the level of wastewater treatment needed to protect ground water and surface water quality and match site vulnerability and relative risks to the required treatment standards. This question should be further addressed under the topic area of Table IV issues.

References:

Asano, T. (1998). Wastewater Reclamation, Recycling, and Reuse: Water Quality Management Library Volume 10, Takashi Asano, (ed), Technomic Publishing, Lancaster, Pennsylvania, pp. 40.

Ayres Associates. 1993. Onsite Sewage Disposal System Research in Florida, An Evaluation of Current Practices in Florida. Rep. to the Dept. of Health and Rehab. Services, Tallahassee, FL. p. 5-1 through 5-3.

This manual covers a wide array of topics on on-site wastewater systems including: design, management, failure modes and wastewater characteristics. The scope of this manual, similar to the EPA Onsite Wastewater Treatment & Disposal System Manual, is limited to what is applicable in the state of Florida. Sludge disposal, however, is not covered. Many tables include hard to find data on special wastewater characteristics, concentrations of metals in septic tanks, and septic tank effluent monitoring.

Bitton, G. 1999. Wastewater Microbiology. 2nd Edition. Wiley-Liss, NY, pp 592.

Bruuresema, Tom. 1998. Onsite Product Performance Standards: A Time of Change. In: NOWRA 1998 Conference Proceedings of Onsite Treatment: First Choice For Protecting the Environment, Ft. Mitchell, KY. p. 12-14.

Focus on new initiatives underway and recent completed revisions to the NSF standards for onsite wastewater treatment technologies, with discussion of an accreditation program for individuals providing home inspections of onsite well and septic systems.

Converse, J.C. and E.J. Tyler. 1998. Soil Treatment of Aerobically Treated Domestic Wastewater with Emphasis on Modified Mounds. In On-Site Wastewater Treatment: Proceedings of the Eighth National Symposium On Individual and Small Community Sewage Systems. ASAE, St. Joseph, MI. p. 306-319.

Wastewater treatment by soil beneath 35 modified mounds and 4 at-grade soil absorption units receiving aerobically treated wastewater was determined. The soil texture ranged from sand to clay loam and estimated seasonal saturation was just below ground surface in many cases. Thirty-six of the dispersal units received wastewater from aerobic units and two from single pass sand filters. Effluent was distributed via pressure distribution to all systems. On approximately 50% of the soil absorption units, effluent was delivered to only half of the unit which increased the effluent loading to the other half of the unit. To evaluate the treatment effectiveness, soil cores were taken from beneath and adjacent to the system at 15 cm (6 in.) increments to a depth of 105 cm (42 in.). Fecal coliforms, nitrogen compounds and chlorides were evaluated. Median (50% above and 50% below) fecal coliform in the aerated wastewater was 10^3 counts/100mL. Wastewater fecal coliform counts ranges from <1 (not detectable) to >10^5 counts/100 mL. Median fecal coliform counts were below detection limits at 30 cm (1 ft) beneath the infiltrative surface. At 105 cm (42 in.) below the infiltrative surface <10% of the samples contained fecal coliform >1 MPN/g dry soil. When wastewater with <10^3 counts/100 mL was added, median soil fecal coliform counts were <1

MPN/g dry soil within 15 cm (6 in.) of the infiltrative surface and at 60 cm (2 ft) below the infiltrative surface <10% of the samples contained fecal coliform > 1 MPN/g dry soil. Separation from the wastewater infiltrative surface might be based on the odds of meeting a treatment goal for the soil. For example, based on median values fro all samples collected being below detection limits, it may be reasonable to set the separation distance at 30 com (1 ft). Based on only 10% of the values exceeding the detection limits, a separation limit of 60 cm (2 ft) may be selected. Similar separation distance could be assigned based of the ability of the treatment unit reducing fecal coliforms. Median total nitrogen concentration of the aerobically treated wastewater was 32 N/L. Median soil nitrated concentrations was 26 N/L at 105 cm (42 in.) and similar to amounts found beneath mounds and at-grade systems receiving septic tank effluent.

Corry, Mike. 2000. NOWRA Onsite Performance Model Code Proposed Development Process. In NOWRA 2000 Conference Proceedings of Onsite: The Future of Water Quality, Grand Rapids, MI. National Onsite Wastewater Recycling Association, Laurel, MD. p 193-203.

Corry, Michael. 2001. NOWRA Model Performance Code Committee Report To NOWRA Membership. National Onsite Wastewater Recycling Association, Laurel, MD. pp. 17.

Crites, R, and Tchobanoglous, G. 1998, Small and Decentralized Wastewater Management Systems. McGraw-Hill Series in Water Resources and Environmental Engineering, pp.1084.

Crosby, Jeff, McCarthy, B., Craig, Gilbertson, and Richard Axler. 1998. A Regulatory Perspective on Impediments and Solutions to the Use of Performance Standards for Onsite Wastewater treatment. In On-Site Wastewater Treatment: Proceedings of the Eighth International Symposium On Individual and Small Community Sewage Systems. ASAE. St. Joseph, MI. p. 259-267.

The current interest in using performance standards to define wastewater treatment is necessary but problematic. An example presented on how to overcome problems is of interest to regulators, design engineers, and researchers. Regulatory perspectives on performance-based standards are critical to the success or failure of difficult projects using alterative technologies. Introducing experimental/alternative technologies and new innovations are a challenge to public perceptions of right and wrong. Reaction may result in an unrealistic expectation of solving all problems or in establishing unrealistic standards (i.e., drinking water). Standards which are unrealistic may cause alternative technologies to fail (high expectations). Solutions utilized recently in northern Minnesota have the potential to solve problems. These include a pro-active regulatory approach using experimental/alternative technologies toward solving existing problems. Prescriptive standards will remain a useful and inexpensive management tool. A goal is to keep prescriptive standards for prescriptive situations and performance standards for performance situations. Strategies that include annual performance averaging and establishment of reasonable standards are critical to encouraging change, solving problems, and protecting public health and financial resources. A community lakeshore constructed wetland treatment system is described as a model for problem for problem resolution.

Docken, L. and B.D. Burkes. 1994. Wisconsin's On-Site Code: A Status Report. In On-Site Wastewater Treatment: Proceedings of the Seventh International Symposium On Individual and Small Community Sewage Systems. ASAE. St. Joseph, MI. p. 16-21.

The State of Wisconsin is in the process of drafting and introducing a revised on-site waste code that incorporates performance standards for the on-site industry. Included in the code development process is re-engineering the management of on-site systems in Wisconsin and developing education for many licensed individuals.

Duncan, C.S., R.B. Reneau, and C. Hagedorn. 1994. Impact of Effluent Quality and Soil Depth on Renovation of Domestic Wastewater. In On-Site Wastewater treatment: Proceedings of the Seventh National Symposium On Individual and Small Community Sewage Systems. ASAE, St. Joseph, MI. p. 219-228.

Many soils are marginally suited for installation of on-site wastewater disposal systems. With soil limitations, additional wastewater treatment prior to soil application may allow for a reduction in soil depth. Undisturbed 20-cm-diameter soil columns (fine loamy, mix, mesic Typic Hapludult), in a factorial arrangement between depth of soil (15, 30, and 45 cm) and type of effluent (septic tank, constructed wetlands, and recirculating sand filter), were used in this study. Effluent (670 cm3/d) was applied 6 times daily. Additional treatment of septic tank effluent by a constructed wetland and a recirculating sand filter resulted in 30 and 70% higher average soil infiltration rates, 92 and 96% reduction in fecal coliforms, 34 and 44% reduction in total nitrogen, and a 60 and 94% reduction in BOD5, respectively. Fecal coliforms were present only in soil leachate from the 15 and 30 cm soil depths receiving septic tank effluent and the 15 cm depth that received constructed wetland effluent. Average soil leachate NO3- -N concentrations were 19, 10 and 14 mg/L from soil columns receiving septic tank, constructed wetland, and recirculating sand filter effluents, respectively. Soil leachate contained <5 mg/L TKN and 1.8 mg/L NH4+-N. Total nitrogen losses were 55,73, and 66 for the septic tank, constructed wetland, and recirculating sand filter treatments, respectively. BOD5 averaged less than 4 mg/L in the soil column leachate, despite a 10 fold difference among influent types. In comparing the 1993 and 1994 growing seasons, average plant tissue dry weight, percent N, and percent P were greater during the 1994 growing season. The results from this study indicate that additional treatment of septic tank effluent can be substituted for soil depth.

Eliasson, J.M., D.A. Lenning, and S.C. Wecker. Critical Point Monitoring – A New Framework For Monitoring On-Site Wastewater Systems. In On-Site Wastewater Treatment: Proceedings of the Ninth International Symposium On Individual and Small Community Sewage Systems. ASAE. St. Joseph, MI. p. 461-469.

Continuous oversight of on-site wastewater system performance is important in order to avoid public health and water quality problems, high system repair costs, and impaired consumer confidence. The Critical Point Monitoring (CPM) process is being developed to help meet a statewide monitoring mandate for local health agencies in Washington State to develop and implement plans to initiate periodic monitoring of all on-site wastewater systems. The principles of the Hazard Analysis and Critical Control Point (HACCP) system were integrated into the monitoring process to provide more rigorous control and oversight of operation, monitoring and maintenance activities to ensure systems are consistently meeting their performance requirements. The CPM process provides a systematic preventive-based approach for monitoring on-site wastewater systems. By concentrating on the wastewater flow points in a system that are most critical to monitor and control, CPM catches problems in the early stages before they become serious and expensive to correct. While CPM is a process standard, in practice its application requires choosing performance standards for the identified critical monitoring points. The seven steps in the CPM process include a system hazard analysis, critical monitoring point identification, establishing critical limits, monitoring procedures, corrective actions, record keeping, and verification procedures.

EPA. 1986. Septic Systems and Ground-Water Protection. An Executive Guide. EPA, Office of Ground-Water Protection, Washington, D.C. pp. 13.

EPA. 1997. Response to Congress on the Use of Decentralized Wastewater Treatment Systems (832-R-97-001b). EPA, Office of Water. Washington, D.C. pp. 35.

Haffner, Richard. 2000. Small Wastewater Treatment Systems Consensus Standards. Presented at the Small Drinking Water and Wastewater Systems Conference. Phoenix, AZ. pp. 8.

The American National Standards Institute has accredited NFS International to develop American National Standards in the area of small wastewater treatment systems. ANSI/NSF Standards in this area include ANSI/NSF 40, Residential Wastewater treatment Systems, ANSI/NSF 41, Non-liquid Saturated Treatment Systems, and ANSI/NSF 46, Evaluation of Components and Devices Used in Wastewater Treatment Systems. Each of these standards establishes minimum materials, design, and construction, product literature, and performance requirements for the products meetings their scopes. ANSI/NSF 40 also requires certain service-related obligation of the product manufacturers. Technical Committees of the International Organization for Standardization develop international standards. To date, no international standards for small wastewater treatment systems have been developed. However, several member bodies of the International Organization of Standardization, in addition to ANSI through NFS International, have developed national wastewater treatment standards for use within their county.

Heber, J. 1997. Performance Based Standards for Onsite Sewage Treatment and Disposal Systems in Florida. In: NOWRA 1997 Conference Proceedings of Onsite Performance: form, function & final results. College Station, Texas. p. 5-9.

Florida is the fourth most populous state in the nation and is heavily dependent on onsite systems for the treatment and disposal of residential and commercial wastewater. Onsite sewage treatment and disposal system (OSTDS) standards were first introduced in Florida in 1921. Changes in these standards evolved slowly until the 1970's, however, beginning in 1972 major progress in the siting, design, construction and use of OSTDS has occurred. This paper chronicles some of the significant changes in Florida's OSTDS laws, standards and program, including the recent development of performance-based standards.

Hoover, M.T. 1997. A Framework for Site Evaluation, Design, and Engineering of On-Site Technologies Within a Management Context. Marine Studies Consortium, Waquoit Bay National Estuarine Research Reserve, and *ad hoc* Task Force for Decentralized Wastewater Management. Marine Studies Consortium, 400 Heath St., Chestnut Hill, MA 02167. pp. 81.

Hoover illustrates a risk-management framework, which is intended to apply to specific watershed areas to manage the potential risks from on-site systems in a community. The document provides a logical process fro qualitatively assessing the risks form on-site systems on a watershed basis and then goes on to provide detailed management scheme for controlling risks. The soul of the risk management approach is a groundwater and surface water protection matrix that classifies each subwatershed area into on of five control zones (called R5, R4, R4, R3, R2, or R1). For each control zone (R5 through R1) the document identifies appropriate treatment performance standards that must be achieved by the on-site system and specifies when and where these systems can be used. It suggests that zones should be established around sensitive resources or drinking water supplies, and that there should be even sets of effluent treatment standards roughly equivalent to primary, secondary, and tertiary treatment, additional nutrient reduction, disinfection, wastewater reuse, and near drinking water, which apply based on a simple analysis of soil depths and types.

Hoover, M.T., A. Arenovski, D. Daly, and D. Lindbo. 1998. A Risk-Based Approach to On-Site System Siting, Design and Management. In: On-site Wastewater Treatment. Proceedings of the Eighth National Symposium on Individual and Small Community Sewage Systems, ASAE, St. Joseph, MI. p. 66-78.

On-site system siting and design has traditionally been based upon the specific conditions on the lot in question with little regard to the surrounding environment or the cumulative effect of all on-site systems in the watershed. A newly developed risk-based approach to on-site technologies provides a logical process for qualitatively assessing the risks form on-site systems on a watershed basis utilizing a siting, design and management approach to control these risks. Risk assessment and management begins by ranking the value and vulnerability to pollution of surface water and ground water receiving environments in the watershed. The next step is to develop a two-way table called a ground water and surface water protection

matrix. This protection matrix determines the control measures to be used within each receiving environment depending upon the value of the receiving environment to the community and it's vulnerability to pollution. Control measures include siting criteria, treatment performance standards, system inspection requirements, operation and maintenance activities, and resource impact assessments of the cumulative impacts of on-site systems in the watershed. Periodic system inspection, operation and maintenance and ecological resource assessments are the responsibility of a local or regional management entity. This risk-based approach affords substantial flexibility of a local or regional management entity. This risk-based approach affords substantial flexibility to the site evaluation and design process; particularly when compared to the prescriptive approaches that are currently used in most state and local codes. This flexibility is possible because of the long-term system monitoring, assurance of maintenance and control of environmental impacts form on-site systems. In essence, the management entity assures that both public health and environmental are protected. Communities can then reliably depend upon both conventional and advanced on-site technologies to meet their long-term wastewater treatment needs. This option fits between the two traditional community wastewater infrastructure extremes of poorly maintained conventional septic systems and highly maintained centralized wastewater treatment plants.

Hoover, M. T., D. Siever, and D Gustafson. 1998. Performance Standards for On-Site Wastewater Treatment Systems. In On-Site Wastewater Treatment: Proceedings of the Eighth International Symposium On Individual and Small Community Sewage Systems. ASAE. St. Joseph, MI. p. 346-355.

A series of voluntary national standards for on-site technologies are proposed. Specially, seven treatment performance standards are suggested to either augment or replace existing prescriptive on-site codes. Once national treatment performance standards are developed, state county and town regulatory agencies can determine which of the seven standards are most appropriate for different soil conditions with their jurisdictions. These decisions will depend upon public health concerns and/or environmental conditions in their watersheds. From a manufacturers point of view, this approach would reduce the hundreds of local standards they have to meet to a more manageable few standards. The seven wastewater treatment performance standards for on-site technologies that are proposed are: 1) primary treatment, 2) secondary treatment, 3) tertiary treatment, 4) nutrient reduction, 5) disinfection, 6) wastewater reuse and 7) near drinking water. The primary wastewater treatment standard includes two levels: unfiltered and filtered. The nutrient reduction standard includes three levels: nitrogen reduction, phosphorus reduction, and nitrogen/ phosphorus reduction. These performance standards can be applied to pretreatment units themselves, or alternatively to the receiving environment.

Jantrania, Anish. R. 1998. Are We Ready For the 21st Century? In: NOWRA 1998 Conference Proceedings of Onsite Treatment: First Choice For Protecting the Environment, Ft. Mitchell. KY. p. 2-8.

Overview of the current state of the onsite wastewater industry, with suggestions for establishing goals and objectives that will enable the industry to continue moving forward from various perspectives such as regulations, technology, O&M and customer service.

Jantrania, Anish. R. 2000. Building a Foundation for Performance Based Regulations. In: NOWRA 2000 Conference Proceedings of Onsite: The Future of Water Quality, Grand Rapids, MI. p. 185-192.

Joubert, Lorrine, Brenda, Dillman, George, Loomis, David, Dow, and James Lucht. 1999. Case Study: Using On-site Wastewater Treatment Standards to Achieve Community Water Quality Goals in Block Island, RI. . In: NOWRA 1999 Conference Proceedings of NOWRA: New Ideas For A New Millennium!, Jekyll Island, GA. p. 7-13.

Everybody's talking about the watershed or risk-based approach to managing onsite systems, but how does this translate to small communities with limited staff? A report on a practical, watershed-specific strategy for managing pollution risks of onsite wastewater treatment systems adopted by the Town of New Shoreham,

an island community located 10 miles off the coast of Rhode Island, on Block Island. The process of developing the wastewater management program, elements of the adopted ordinances, and helpful hints for others considering this approach.

Kreissl, James F. and Paul Chase. 2002. Proposed National Onsite Standards: A Broad Assessment of Their Relative Benefits to Industry. Small Flows Quarterly, National Small Flows Clearinghouse, University of West Virginia, Winter 2002. Vol. 3, No. 1. p. 28-33.

In most states, onsite wastewater treatment system manufacturers and suppliers are restricted by regulatory systems that are dominated by prescriptive codes. When a site does not meet prescriptive code requirements, states often do not allow many alternative onsite system designs, even if their performance has been proven elsewhere on similar sites. Local code administrators usually have no incentive to try new systems that are not already approved by the state. In this article, the authors examine the impact of the current state regulatory environment on the onsite wastewater industry as well as various ideas being proposed for its reform. Potential benefits of these reforms to the onsite industry are assessed.

Loomis, George, Lorraine Joubert, Brenda Dillmann, David Dow, James Lucht, and Arthur Gold. 1999. A Watershed Risk-Based Approach to Onsite Wastewater – A Block Island Case Study. In Proceedings Tenth Northwest On-Site Wastewater Treatment Short Course, College of Engineering, University of Washington, Seattle, WA. p. 249-262.

This paper reports on a practical, risk-based wastewater management program adopted by the Town of New Shoreham, a community located 10 miles off the coast of Rhode Island, on Block Island. Joubert et al. (1999) summarizes this program's septic system inspection ordinance, wastewater treatment levels for new construction and repairs, retrofitting of existing systems, and public education and technology transfer. This paper will focus primarily on elements of the adopted ordinances, and helpful hints for others developing community wastewater management programs.

Nelson, V.I. 2000. Market Growth Strategies: Lessons From the Literature. In: NOWRA 2000 Conference Proceedings of Onsite: The Future of Water Quality, Grand Rapids, MI. p. 75-82.

Nelson, V.I. 2001. A Market Analysis of the Need for Standards In the Decentralized Wastewater Industry. In On-Site Wastewater Treatment: Proceedings of the Ninth International Symposium On Individual and Small Community Sewage Systems. ASAE. St. Joseph, MI. p. 516-523.

The economics literature suggests that national agreement on standards is one of the most important needs to stimulate market growth in an emerging industry. High national effluent standards for on-site or cluster wastewater systems for all lots requiring advanced treatment would stimulate product innovation and investment in low-cost production and distribution facilities, particularly if no existing technologies could meet those standards at this time. Some industry professionals have proposed that on-site performance standards be set after treatment in the soils and that these standards should vary with density of development, use of ground or surface water, and other risk-related factors. However, from a market development perspective, the best approach is a simplified set of effluent standards prior to release into the soils, coupled with prescriptive requirements for where these standards should be mandated and for the design of soil-absorption systems. Agreement on these and related management standards should be facilitated by regulatory-industry-academic partnerships and should be informed by increased research into fate and transport and relative risks from nutrient and pathogen releases into the environment.

NOWRA, 1996. Recommended Onsite Wastewater Treatment Performance Criteria. National Onsite Wastewater Recycling Association. Northbrook, IL. pp. 4.

Oakley, Stewart M. 1995. Developing Protocols for Onsite Wastewater Treatment Standards: A Preliminary Report from Butte County, California. In Proceedings Eighth Northwest On-site Wastewater Treatment Short Course, College of Engineering, University of Washington, Seattle, WA p. 303-318.

High groundwater nitrate levels are a common problem in rural water quality. Septic tanks and agricultural runoff are the primary culprits in most instances. This article discusses such a contamination problem in the Chico, CA area. Nitrates from the area's 12,000 septic systems were contaminating groundwater to levels exceeding 10 mg/l. To combat this problem, Butte County, CA implemented a Nitrate Compliance Program. Recommendations of the plan included sewering areas where densities exceeded 3-20 EDU (equivalent dwelling units) per acre, implementing groundwater sampling protocols, establishing an on-site wastewater management district and furthering public education.

Otis, Richard J. 1995. The Elusive Alternative. In Proceedings Eighth Northwest On-Site Wastewater Treatment Short Course, College of Engineering, University of Washington, Seattle, WA. p. 1-8.

Otis, R.J. 2001. Boundary Design: A Strategy for Subsurface Wastewater Infiltration System Design and Rehabilitation. In On-Site Wastewater Treatment: Proceedings of the Ninth International Symposium On Individual and Small Community Sewage Systems. ASAE. St. Joseph, MI. p. 245-260.

Design of onsite wastewater treatment systems primarily focuses on the placement and size of the infiltration surface in the soil. Emphasis in design is on the hydraulic capacity of this surface. Where soils are less permeable, alternative designs have been employed in an effort to maximize the hydraulic capacity of the system. Many alternative designs have been developed and promoted to enhance wastewater infiltration. Unfortunately, hydraulic and treatment failures still occur in unacceptably high numbers. Rehabilitation of failing systems also is often less than satisfactory. This suggests that inappropriate application of traditional and alternative designs is occurring because of insufficient attention to other factors that can impact system performance. This paper presents a rational strategy for system design and diagnosing system failures.

Otis, R.J., and D.L. Anderson. 1994. Meeting Public Health and Environmental Goals: Performance Standards for On-Site Wastewater Treatment Systems. In On-Site Wastewater Treatment: Proceedings of the Seventh International Symposium On Individual and Small Community Sewage Systems. American Society of Agricultural Engineers (ASAE). St. Joseph, MI. p. 1-10.

Design of onsite wastewater treatment systems primarily focuses on the placement and size of the infiltration surface in the soil. Emphasis in design is on the hydraulic capacity of this surface. Where soils are less permeable, alternative designs have been employed in an effort to maximize the hydraulic capacity of the system. Many alternative designs have been developed and promoted to enhance wastewater infiltration. Unfortunately, hydraulic and treatment failures still occur in unacceptably high numbers. Rehabilitation of failing systems also is often less than satisfactory. This suggests that inappropriate application of traditional and alternative designs is occurring because of insufficient attention to other factors that can impact system performance. This paper presents a rational strategy for system design and diagnosing system failures.

Reed, S.I. 1977. State Programs and Perspectives. Individual Onsite Wastewater Systems. In Proceedings of the Fourth National Conference; National Sanitation Foundation, Ann Arbor, MI. p. 27-34.

Identifies the shortcomings of relying on detailed compliance standards in the rapidly evolving field of on-site wastewater treatment. Recommends the increased use of performance standards as an alternative. The major role of federal, state and local environmental health organizations should be to provide leadership for public involvement and for the cooperation of all concerned parties in determining priorities and goals.

Schindler, D.W. 1977. Evolution of Phosphorus Limitation in Lakes. Science. 195(4275):260-262.

Sherman, Kevin M. 1995. A Prescription for Performance-Based Codes: Another Perceptive. Small Flows, National Small Flows Clearinghouse, Fall 1995. Vol. 9, No. 4. pp. 13.

Sherman, Kevin M. 1997. The Future of Onsite Wastewater Systems. In Proceedings Ninth Northwest On-Site Wastewater Treatment Short Course, College of Engineering, University of Washington, Seattle, WA p. 1-7.

Siegrist, Robert R. 2001. Advancing the Science and Engineering of Onsite Wastewater Systems. In On-Site Wastewater Treatment: Proceedings of the Ninth International Symposium On Individual and Small Community Sewage Systems. ASAE. St. Joseph, MI. p. 1-10.

Onsite wastewater systems represent a necessary and appropriate component of the wastewater systems infrastructure in the U.S. In contrast to disposal oriented systems of the past, current and future systems are focused on advanced treatment that is protective of public health and environmental quality. System designs can now be assembled from an expanding array of options from which choices can be made regarding a given application. There is a considerable knowledge base regarding onsite system design, implementation, and performance that enables most commonly used systems to be effectively deployed in most settings. However, the current state-of-knowledge and standard-of-practice does have gaps and shortcomings that can preclude rational system design to predictably and reliably achieve specific performance goals. While choices today are often constrained by prescriptive regulatory codes, they also can be hampered by the absence of a sound science and engineering knowledge base. This paper discusses the basis and need for advancing the science and engineering of onsite wastewater systems to secure their necessary and appropriate status as a component of a sustainable wastewater infrastructure in the U.S.

Smithson, A.B. 1995. A Prescription for Performance Based Codes. Small Flows, National Small Flows Clearinghouse, University of Web Virginia, Summer 1995. Vol. 9, No. 3. p. 9-10.

Soltman, J. M. 1992. Repair of Systems Along Marine Shorelines - Application of Treatment Standards 1 and 2. In Proceedings Seventh Northwest On-site Wastewater Treatment Short Course, College of Engineering, University of Washington, Seattle, WA p. 249-263.

Puget Sound, a large inland sea, located in Western Washington, is enjoyed for its scenic beauty, recreational opportunities, and its aquatic resources. The shorelines of its bays and islands are dotted with housing structures with a wide variety in size, age, shape, occupancy, and pattern of use. These structures rely primarily on on-site sewage systems for sewage treatment and disposal. A factor in the significance of these on-site systems is the distribution of and increase in population during the past two or three decades. Existing and proposed building sites are commonly characterized by shallow, high-permeable or very-slow permeable soils, steep slopes or cliffs, small size, questionable water supplies, and a high potential for precipitation. To specifically address existing systems, the State Board of Health established rules for the repair and replacement of individual on-site sewage treatment and disposal systems. This paper describes the development of

Washington's marine treatment standard approach, introduce guidelines for alternative system applications, and present examples of this approach.

Wespetal, M.S., and L.L.C. Frekot. 2001. Development and Implementation of Performance Standards Assessing Performance Designs. In On-Site Wastewater Treatment: Proceedings of the Ninth International Symposium On Individual and Small Community Sewage Systems. American Society of Agricultural Engineers (ASAE) . St. Joseph, MI. p. 488-497.

In October 1999, the Minnesota Pollution Control Agency amended its state rule for individual sewage treatment standards to include performance standards. The standards were developed after assessing the outcomes achieved by conventional systems and applying those outcomes to performance standards. The standards are broad in nature to allow maximum design flexibility. The standards are based on protection of public health, safety, the environment, and include provisions for consumer awareness. A design assessment model for performance systems is based on giving treatment "credit" for known treatment components such as loading rates, soil separation, soil texture and dosing frequency. In this manner, the designer can adjust the various design parameters to conceptually meet performance expectations. This paper describes the process used to develop performance standards, justification for the selected standards, and a method to assess a system design.

Woolrich, Robert and David Lenning, 1989. New Washington State On-Site Sewage Regulations. In Proceedings Sixth Northwest On-site Wastewater Treatment Short Course, College of Engineering, University of Washington, Seattle, WA p. 1-14.

Washington State Department of Health. 1994. On-Site Sewage Systems: Rules and Regulations of the State Board of Health. Chapter 246-272 Washington Administrative Code.

Washington State Department of Health. 1997. Barriers Assessment Study and Action Plan for Alternative On-Site Sewage Systems. Prepared by Adolfson Associates, Inc. for WA State Dept. of Health. pp 72.

Washington State Department of Health. 2001. List of Approved Systems and Products. November 2001. Wastewater Management Program.

Zachritz, Walter H., Clara Cates, and Frank Huang. 1998. Development of Technology-Based Standards for On-Site Systems for Groundwater Protection in Albuquerque, New Mexico. In On-Site Wastewater Treatment: Proceedings of the Eighth International Symposium On Individual and Small Community Sewage Systems. ASAE. St. Joseph, MI. p. 254-258.

According to the 1990 US Census, about 17,800 conventional septic tank/drainfield systems are operating in Bernalillo County, New Mexico. Although the extent of groundwater contamination caused by these systems is not clear, recent studies indicate that groundwater contamination caused by the septic drainfield systems may be widespread. Based upon the "Albuquerque/Bernalillo County Ground-Water Protection Policy and Action Plan" a two-year field study is currently underway to demonstrate the ability of selected alternative on-site systems to remove conventional wastewater pollutants, particularly nitrogen species organic-N, NH_4^+, and No_3-N). Six alternative systems and a conventional septic tank/drainfield system are being evaluated for their ability to remove nitrogen species, organics, suspended solids, fecal coliform, and other constituents while in place at various homesites throughout Bernalillo County. Performance standards of the alternative on-site systems developed in this study will be used to modify City and County on-site liquid waste ordinances.

4TA

Wednesday, August 13, 2003

Chris Bourke
Indiana Dept. of Health
2 N. Meridian - , Sec. 5-E
Indianapolis, IN 46204

Attention: On-Site Wastewater Treatment

Dear Chris Bourke:

Subject: IN Dept. of Health Proposed Rule– 410 IAC 6-8.2

This letter is Press-Seal Gasket Corp's. comments on the new proposed rule, 410 IAC 6-8.2, On-Site Sewage Systems.

First, we would like to commend you and your staff on putting together a set of comprehensive requirements that protect the health and environment of the citizens of Indiana. We fully support the new rules, as written. I attended the Public Hearing on 410 IAC 6-8.2 and was perplexed and surprised to hear some of the negative comments made on the new code. These comments revealed a lack of a true understanding of the significant environmental impacts of failed septic systems and most importantly, the true overall costs of to homeowners of a septic system and the true costs of associated with installing inadequate septic systems that fail. The comments were more of the "sky is falling" type of comment.

I found it very ironic that one of the speakers said that some septic systems are going to fail no matter what you do. This comment shows a lack of understanding in the technology advances and manufacturing processes in on-site wastewater disposal systems. It is true that if we keep doing what we have been doing the citizens of Indiana are going to continue to have failing septic systems.

Overall, I feel the main argument employed by the opponents of the new rule is that it will make homes or properties to expensive to build upon are exaggerated. It is true that some properties will require alternative systems not currently used on a wide scale in Indiana but this does not mean they will be so expensive that they will keep potential homeowners and homeowners from building on these properties. The experience of others states, like Wisconsin, shows this is far from the case.

I also heard it said at the meeting that these "alternative technologies" are unproven. This, too, is an exaggeration of the facts. Many of the alternative systems are used in other states with great success. Two such alternative systems are the sand filters and the Wisconsin Mound System. Both of these systems are very affordable and environmentally friendly.

One other comment I must comment on is the speaker who said we should be concentrating on the big problems, such as combined system overflows of larger municipalities. I could not agree with him more. However, does this mean that we should neglect the health and environmental consequences of inadequately designed and installed septic systems? As a lifelong citizen of Indiana, I want both of the problems addressed.

My final point is that as an employee of an Indiana company who employs over 80 Indiana citizens that would benefit from proposed rule 410 IAC 6-8.2 being passed. This is because some the products that would now be required to improve the quality of the septic tanks and D-Boxes are manufactured by Press-Seal Gasket Corp. in Ft. Wayne IN. The section of the new rule that I am speaking of is Chapter 5, Section VI, B1, and Chapter 5, Section IX, 2.D. These products are far superior than those currently required for very little additional cost to the homeowner. Passage of the new rule generates jobs and revenue for the State of Indiana. Rejection of the new rule will keep jobs and revenue flowing out of the Indiana and to other states. .

I would like to take this opportunity to support the specific sections of the new code upon that I am an expert. My first comment is on Chapter 5, Section VI, B.1. A rubber connection for the inlet and outlet is imperative to achieving a watertight tank. The only way to insure that you get a connection that is watertight is to write a

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specification around the only specification that covers both the physical and performance requirements and that is ASTM C-923. Including the stainless steel take-up clamp insures that you receive a connection that meets both criteria of ASTM C-923 not just the physical requirements.

I know you are getting pressure to include the so-called plastic connections that say they meet the performance requirements of ASTM C-923. These connections do not meet any aspect of ASTM C-923 including the performance requirements. As supporting evidence of this fact I have included, with this letter, a disk will validate my claim. This is the disk shows the results of some benchmark testing we preformed on the Polylok II in our laboratory.

As you have heard many say on numerous occasions, plastic is good for containment and terrible for a sealing gasket.

I would strongly encourage you keep the new rule, Chapter 5,Section VI, B.1 covering watertight connections as it is currently written.

I would like to address John Hudson's comment on the connection portion of the rule. First, I respect John very much and I think if there were more quality producers such as John the industry would be a far better position but I disagree with him. He stated that the connector will allow the filter to "wander" around the tank. If this should happen it is not the result of the connector or the filter but shoddy installation. The pipe would have to have no support or back filter for this to happen to the degree John insinuated could take place. Furthermore, plastic does not adhere to concrete and a void or crack always develops between the concrete and the plastic pipe or fitting and this allows infiltration and exfiltration. I understand that with the shape of John's tanks that some connectors may not work but there are connectors on the market that will work in his forms. I checked with Zabel, they told me this has not been an issue on their standard filters, and on their larger filters, they are manufactured with a way to support them from underneath.

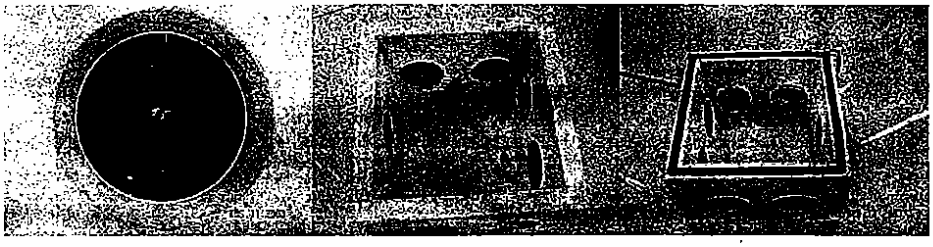
We respectfully request that Chapter 5, Section XI, part B.1 remain in the new rule.

Another portion of the rule, I would like to address is the rubber connection for the D-Box. In the meeting I attended with you and your staff on 12-28-02, we spent a great deal of time addressing improving the quality of the D-Box. There were two issues your staff felt needed to be improved in the D-Box to improve their quality. These were the pipe connections and a different sealing material for the lid.

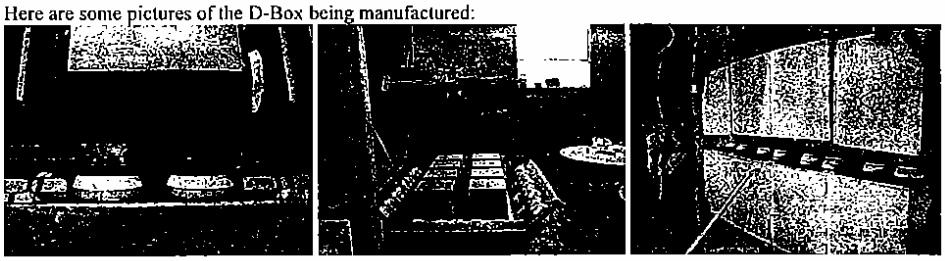
First, I want to focus on the rubber connectors for the D-Boxes. Press-Seal Gasket Corp. spent a great deal of time and money developing a rubber connector that conforms to ASTM C-923 and meets the criteria outlined in the 12-28-03 meeting. We estimate our investment to develop this product to be in the $35,000 range. We developed this product based on the new rules and we want it left in the new rules so that we can recover our investment. Furthermore, passage of this portion of the new rule helps Indiana by keeping jobs and revenue within the state because we are located in Indiana. We respectfully request that Chapter 5, Section IX, Line 2.D remain within the new rule.

The gasket does not add any significant cost to the D-Box and requires no retooling on the tank producer's part. It provides a much better seal than any plastic connector does. I have included some benchmark testing on the Polylok II for your review.

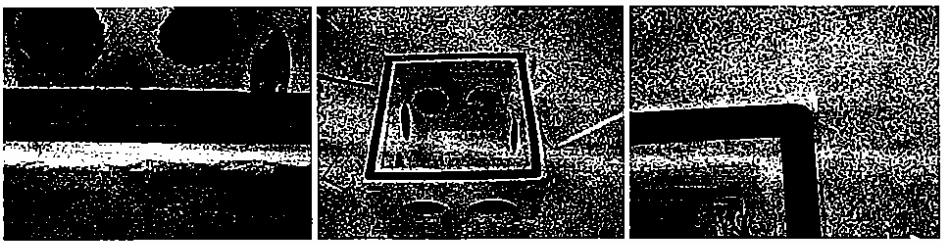
Here are some pictures of a D-Box with the new Econoseal.



Here are some pictures of the D-Box being manufactured:



The sealing of the lids was another improvement your staff wanted to see. In the new rule, Chapter 5, Section IX, part 5.2, you have written in a closed cell gasket material conforming to ASTM D 1056. This part of the new rule needs to be revised. The part of the section that needs revised is the size of 1" x 1". This size is much too large for a D-Box. The weight of the lid is not enough to compress this size of material to achieve a seal and too large to allow the lid to keep from shifting. The size that I would recommend is ¾" W x ¼" T with a self-adhesive backing. See the below pictures for more details:



There are issues that need to be addressed to successfully use this product. The corners of the D-Box present some sealing and manufacturing issues. The material comes in rolls and when it comes to making the corners the supplier has to either "butt" splice the rolls together or to keep a continuous loop, a 45 degree section must be removed. See pictures below:

Even if you take out a 45 degree, section the last corner still would need to be "butt" spliced in some form. The only other alternative is to stamp out a complete gasket from a sheet of closed cell and this would be expensive.

We have not evaluated this product for testing, costing and manufacturing to determine if it is even a product we would offer for sale. There are other variables that may make it unattractive for that and us is the fact that there is no uniformity in the D-Boxes manufactured within the state. I am sure there are other suppliers that would be more than willing to offer this product for sale. We just do not have enough data to determine if we are one of them.

In conclusion, we support the Indiana Department of Health and offer our assistance and expertise to you. If you have any questions, or need further information, please do not hesitate to contact me.

Best regards,

Tim Andrews
Press-Seal Gasket Corp.
804 W, Manor Dr.
Marion IN 46952
(765)651-9156
tandrews1@indy.rr.com
www.press-seal.com
cell 617-803-1752

NSF International

4TJB

August 6, 2003

Mr. Burton Garten
Office of Legal Affairs
Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204-3003

RE: Comments on ISDH **410 IAC 6-8.2 for Onsite Sewage Systems**

Dear Mr. Garten,

Thank you for the opportunity to comment on the Indiana State Department of Health (ISDH) preliminary adopted 410 IAC 6-8.2 for Onsite Sewage Systems, and related Technical Specifications for Onsite Sewage Systems, both dated January 8, 2003. We applaud the efforts of ISDH to develop a set of requirements that keep pace with the needs and benefits of onsite wastewater treatment systems.

Please consider this letter as evidence of NSF's written support and concurrence with the suggestions put forth by the Indiana Environmental Health Association, Wastewater Management Committee, dated July 25, 2003 and submitted to the hearing officer on July 30, 2003.

In addition, please consider this letter as evidence of NSF's written support for the following, additional changes:

Technical Specification, Chapter 5, Section F.4.b.
This section requires that no more than two (2) riser sections be used on the top of a septic tank when installed below grade. It is unclear why there would be such a limitation. To facilitate and optimize routine maintenance, it is our recommendation that there be no unnecessary limitations in system design with respect to risers.

Technical Specification, Chapter 5, Section G.2.a.
Change from "Conform to *ANSI/NSF Standard 46, Evaluation of Components and Devices Used in Wastewater Treatment Systems*; and." to the following:

"Conform to the current edition of *ANSI/NSF Standard 46, Evaluation of Components and Devices Used in Wastewater Treatment Systems*, maintain a current product listing with an ANSI accredited third-party certifier, and bear a listing mark, and."

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www.nsf.org

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This change ensures that products approved by ISDH continue to meet the requirements of ANSI/NSF Standard 46, as demonstrated through the product listing. It also ensures that the certifier is in compliance with international standards for third-party certification organizations, demonstrating their capabilities, competencies, quality measurements, and independence in the product evaluation.

Technical Specification, Chapter 8, Section IV.
This overall Section refers to field monitoring of experimental and alternative systems using periodic effluent grab samples as the measurement tool. NSF supports routine measurement of individual, onsite wastewater treatment system performance. However, while measurement of effluent quality serves as a critical basis for determining compliance with established product standards, such as ANSI/NSF Standard 40, it is not an appropriate tool for the sole measurement of field performance.

ANSI/NSF Standard 40 collects a total of 118 composite samples over the course of 26 weeks. Performance is determined based upon effluent quality averages at 7 and 30 day intervals. The 7-day average effluent requirements are 40 mg/L $CBOD_5$ and 45 mg/L TSS. The 30-day average effluent requirements are 25 mg/L $CBOD_5$ and 30 mg/L TSS. There are no grab samples, nor are there performance requirements for individual sample days. The reason is simple. Grab samples and individual sample day performance are not sufficient to demonstrate the true performance of the system. A larger, more representative data set is required.

The proposed requirements include sampling as frequent as once per month using grab sample collection. If we assume the collected sample is 1 liter in size to represent one month of flow, and daily flows may average 300 gallons (1,100+ liters), the sample accounts for approximately 0.003% of flow for that period. Put another way, somewhere around 33,000 liters are being represented by one. Basing system performance solely on such an insignificant amount of flow is inappropriate. Basing the result of this insignificant amount of flow on the same basic pass/fail criteria as that used in ANSI/NSF Standard 40 where composite samples are collected five days/week and averaged for the 30-day period is unreasonable.

While more frequent sampling using composite samplers would help to better capture a more representative picture of the effluent quality performance of the system, there will be significant cost for the collection and analysis of these samples. It will create an unfair market barrier to these technologies.

A recommended alternative is to perform routine inspections of the systems. Inspections can assess the overall performance of the system for a much longer period of time. A determination can be made of various treatment components, solids accumulation, odors, effluent quality appearance, and more. If the inspection suggests there is reason for

concern, the manufacturer should be given the opportunity to remedy the situation as appropriate. If routine inspections, or homeowner complaints suggest the system has ongoing performance concerns, then the health department will have adequate evidence to take more aggressive actions.

It is our recommendation that inspections be done at least every six months, as is required now in ANSI/NSF Standard 40 for the first two years of service. This would also be consistent with the operation and maintenance requirements of Chapter 8 Section II.A.3.

Thank you again for the opportunity to present our comments and suggestions. If you would like to discuss these matters further, please contact me at your convenience. I can be reached direct at (734) 769-5575, toll free at 1-800-NSF-MARK, or by email at bruursema@nsf.org.

Sincerely,

Thomas J. Bruursema
General Manager
Drinking Water and Wastewater Treatment Unit Programs

BIO-MICROBICS® INCORPORATED

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RECEIVED
OFFICE OF LEGAL AFFAIRS

August 12, 2003

Mr. Burton Garten
Office of Legal Affairs
Indiana State Dept. of Health
2 North Meridian Street
Indianapolis, IN 46204-3003

RE: Official Comments, Rule 410 IAC 6-8.2
Technical Specifications for Onsite Sewage Systems, 2003 Edition

Dear Mr. Garten:

We congratulate your department on its efforts to rewrite the current rules in Indiana. We realize this is never an easy task. In order to help you in this process, Bio-Microbics, Inc. has already visited with you on different occasions and has prepared the following comments on the proposed rule.

410 IAC 6-8.2-42 Authority

Authority: IC 16-19-3-4; IC 16-19-3-5

Affected: IC 16-19-3

Section 42(d).

(d) Local health departments shall not issue a permit for an experimental or alternative onsite system for which operation and maintenance is required in Technical Specification for Onsite Sewage Systems, 2003 Edition, Chapter 8 until:

(1) Local mechanisms and procedures have been established for the oversight and documentation of operation and maintenance of experimental or alternative onsite systems; and

(2) Local mechanisms and procedures have been established for enforcement of the operation and maintenance requirements of experimental or alternative onsite systems.

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There could be some reluctance on the part of the local authorities to put a system in place to manage the information that will be generated. Will the State be able to issue these permits in the absence of such a plan?

410 IAC 6-8.2-43 General onsite system requirements

Authority: IC 16-19-3-4; IC 16-19-3-5

Affected: IC 13-3; IC 13-18-12; IC 13-18-19; IC 13-26; IC 14-33; IC 16-19-3

Sec. 43. (r)

This section allows the discharge of water softeners and "normal household cleaners" into onsite systems. We think that there is a need to for clarification somewhere in the rule that allows secondary treatment devices the leeway to set restrictions on what can enter their treatment system. This is somewhat implied in the Technical specifications, but we feel it needs to be in rule also. Perhaps the regulation could read:

(r) An onsite system may not be used for the disposal of chemical waste or chemical wastewater other than water softener or iron filter waste, unless strictly prohibited by the manufacturer or designer of a secondary treatment device. For the purposes of this rule, the normal use of housekeeping cleaners and detergents do not constitute chemical waste, unless such cleaners or detergents are strictly prohibited by the manufacturer or designer of a secondary treatment device.

Technical Specification Chapter 8, Section I (F)(3) reads as follows:

3. All secondary treatment devices must be designed to:
a. Stabilize microorganism colonies during periods when a residence or commercial facility is generating surge flows of sewage; and
b. Minimize the die-off of microorganisms during periods when a residence or commercial facility is not generating sewage.

We would contend we have that design already in place and would only need flow equalization on larger commercial systems.

However, we do believe that there should be wording in Technical Specification Chapter 8, Section I (G) (3) (a) about the settling tank sizing that would leave this requirement either up to the designer or the manufacturer.

This would eliminate any liability taken on by the department changing the prescribed design or the manufacturer or designer. It could read as follows:

3. Aerobic treatment units must be:

a. Preceded by a septic tank or a pretreatment tank that shall be specifically sized in an aerobic treatment unit's design, and/or approved by the department;

Technical Specification Chapter 8, Section IV (A)

States the Department may require sampling of up to 10 units of each model size. We did not see a reason given as to why you would not require this sampling. Would it be because there is a sufficient amount of operating data on the system to eliminate the need for further testing? We contend that sampling places a huge financial burden on the homeowner and is not always as accurate as one would hope it would be at determining actual field performance. This is especially true if very strict protocols are not followed when sampling.

If you have any questions or comments please do not hesitate to contact me at (800)753-FAST(3278) or ablodig@biomicrobics.com.

Regards,

Allison Blodig, REHS
Regulatory Affairs Coordinator
Bio-Microbics, Inc.
(913)422-0707

amb/AMB

cc: Indiana Regulatory File

(1)

5AD

AL DONALDSON
6533 POPLAR GROVE ROAD
FREETOWN, IN 47235
August 6, 2003

RE: PUBLIC HEARING 410 IAC 6 - 8.2

What is the status of this Revision to 410 IAC 6 - 8.2?

Some counties are using portions of the revision now. So why have this public hearing?

I think you should listen to the comments from the Wastewater Committee and IOWPA.

Page 4, line 121 - Who signs the site evaluation report?

Page 5, line 146 - GPS and measurements to scale - This doesn't make sense GPS is the point...

Page 5, lines 156 to 170 (Depth) - This sounds like you need to know the depth of the perimeter drain before you know what the soil is.

The nitrate leaching index is not consistent among counties. A soil listed in one county should be listed in all counties where it occurs.

Why don't we use the same form (format) for all soil reports? Including the state form?

I think this would be an excellent time to begin using the metric system for all measurements.

Al Donaldson, Soil Scientist

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AJ's CONSTRUCTION SERVICES,LLC

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July 30, 2003

Mr. Burton Garten
Office of Legal Affairs
Indiana State Dept. of Health
2 North Meridian Street
Indianapolis, IN 46204-3003

RE: Official Comments, Rule 410 IAC 6-5.2
Technical Specification for Onsite Sewage Systems 2003 Edition

Dear Mr. Garten:

Please consider the following comments before finalizing the proposed Rule and associated document. With regard to the Technical Specification for Onsite Sewage Systems, 2003Edition, we support the changes proposed by the Indiana Environmental Health Association's Wastewater Management Committee and strongly recommend the Department of Health consider the Committee's revisions. We have the following comments on the changes proposed by the Wastewater Management Committee(WMC):

Technical Specification Chapter 3, Section VI, A (WMC Version)

The reference to nitrogen reduction in this section is vague. If this Section is intended to limit the amount of total nitrogen in a secondary treatment system's effluent, the wording should be modified to reference total nitrogen. The specified limit of 10 mg/L total nitrogen is highly restrictive, considering the treatment technologies currently available. We ask the Department of Health to consider specifying a limit of 20 mg/L total nitrogen to increase the treatment system options available for use in the state.

Technical Specifications Chapter 8, Section 1, E, 2 (WMC Version)

This Section should be amended to include an effluent quality requirement. Considering the treatment technologies currently available, we would recommend that secondary treatment systems be required to produce an effluent that contains no more than 10 mg/L CBOD, 10 mg/L TSS and 20 mg/L total nitrogen.

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Boone County Solid Waste Management District
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5BEL

July 07, 2003

Ms. Jan Berg
Hearing Officer
1010 N. High School Road
Indianapolis, IN 46224

Re: Comments on the proposed 410 IAC 6-8.2 and Technical Specification Document for On Site Sewage Systems

Dear Ms. Berg,

The Indiana Solid Waste Management Districts were created in 1990. They were charged to prepare a plan to address the solid waste management needs of the District aiming toward a goal of reducing the amount of solid waste going to final disposal facilities by 35% in 1996 and 50% in 2001.

While the Boone County Solid Waste Management District has not been beset by waste tire problems as in other areas of the state, we none the less are always searching for innovative ways to reduce and reuse various components of the municipal waste stream.

It has become apparent that the use of shredded and properly sized rubber chips from waste tires may be used in lieu of aggregate in the construction of on site sewage systems and may provide a viable market for reuse of a portion of the waste tires currently generated .

If this material were readily available, and processors could store and handle the chips as "material" and not "waste," we could in a small way encourage the development of a business infra-structure that could help the state meet its diversion goals.

To accomplish this we recommend that:

1. On page 53 line 1960 of the Technical Specification document, after the word "stone" insert "chipped rubber tires."
2. Or alternatively the department publish a list of "approved" substitutes that includes chipped tires in order to expedite development of markets for the use of recycled materials.
3. The use of chipped rubber tires in lieu of aggregate must not be considered an "experimental site sewage system" (ETOSS) or an "alternative on site sewage system" ATOSS as defined in 410 IAC 6-8.2. Our suggestion to use chipped tires in lieu of aggregate in no way affects the design, sizing or construction of the system.

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As we have stated previously, at virtually no cost to state or local governments a viable market for reuse of a portion of the waste tires currently generated would be created. If this material was readily available and processors could store and handle chips as "material" and not "waste", we could in a small way encourage the development of a business infrastructure that could help the state meet its diversion goal.

In summary, we support the development of alternative markets for chipped rubber including the use in on site sewage systems. We hope these comments are of value to you. We look forward to the implementation of an effective On Site Sewage rule.

Very Truly Yours,

Byron E Loveless

Byron Loveless
President

cc: C. Steven Poe, Indiana Department Environmental Management
Tiffany Sorge, Indiana Department of Commerce

email: bcswmd@tds.net
word: Ltrs-Misc: OSSS - Berg

website: www.ibccn.org/bcswmd

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Madam Hearing Officer, Executive Board Members, other concerned citizens:

My Name is Bob McKean. I am a member of the Indiana Builders Association, an eleven-year member of the IBA Septic Committee, a builder from Howard Count,y Indiana for the last twenty-three years, and a licensed Septic Installer since the inception of licensing in Howard County. I am here speaking to you in opposition to the rule.

In my eleven years of working on various drafts of the Indiana Septic Code I have been involved in numerous meetings with Mr. Howard Cunduff, Mr. Alan Dunn, and Mr. Chris Bourke. IBA was a partner in drafting the Indiana Septic Code 410 IAC 6-8.1 and supported its adoption. 410 IAC 6-8.1 changed the way that septics were installed in a very positive way, incorporating science and technology into the design and installation of septic systems. Today's modern On Site Sewage Disposal Systems work very well, have a very low failure rate, and last a very long time. Mr. Cunduff publicly stated that he felt that with proper operation and maintenance a system could last indefinitely. Protecting the health and safety of Indiana's residents and the environment are goals that are now being accomplished under Rule 410 IAC 6-8.1. The current rule is familiar and its enforcement is within the means of any health department that wishes to enforce it.

When consideration is given to changing a working rule, we feel it is very important to be cognizant of the practicality of implementing new technology, equipment, and installation procedures. It is also very important to be sensitive to the concept of maintaining affordability in housing for the residents of Indiana. We do not think that Proposed Rule 410 IAC 6-8.2 satisfactorily addresses these goals.

Our most serious concern about the new rule is its attempts to require secondary treatment of septic effluent before it enters the dispersal area. The new rule would require that in many parts of the state, that septic effluent nitrate levels be reduced to 10 milligrams per liter before that effluent entered the dispersal area. We have been told that ISDH is doing this to maintain compliance with EPA guidelines, yet Professor Robert Rubin, a visiting scientist with the USEPA office of Wastewater Management, stated that EPA has issued no mandate that says that any state has to take this approach to nitrate reduction. In fact, we have found no other state that has decided to approach EPA groundwater standards in this manner.

We have asked for evidence that directly links high nitrate levels in the ground water to septic systems. We are told that there is no direct evidence. This was agreed to by the Executive Board of the State Department of Health. We have asked if there has been a threat to the public health caused by high nitrate levels in groundwater. We were told that there was anecdotal evidence of a case in northern Indiana that could possibly link one case of blue baby syndrome, that resulted in death, to a failed septic system. While we are sympathetic to the image that this example imprints in one's mind, we do not feel that un-documented, anecdotal information about a failed, non functioning septic system, qualifies as evidence.

ATTACHMENT
1

We are concerned about the manner in which it will be determined that secondary treatment will be required. The proposed method for determining the need for secondary treatment is to use agricultural soils maps. These are maps that were designed to be used for the application of fertilizers. When we attempted to get the maps referenced in the published rule we were told that we would have to accept copies, because these maps were no longer in publication. We were told that eventually new maps would become available and that it was expected that they would be very different. In Elkhart County alone it is estimated that these changes would increase the land requiring secondary treatment from 19% to 33%. Currently two-thirds of Elkhart County's building is in the area represented by the first 19%. I am sure that you can appreciate the fiscal impact that increasing this area another 14% would have. Consider also the practicality of trying to comply with a rule that references non- published data. How do you conduct business while dealing with ever changing information?

We asked, how effective will secondary treatment be in reducing nitrate levels? We were told that presently no manufacture would say that their system would achieve the levels required in this rule.

Secondary treatment is currently considered experimental technology. We are concerned that the wide spread implementation of experimental technology that does not perform to the standards required by law is a formula for disaster.

There are only two manufacturers that can supply the equipment required by this rule. Installers have very little experience with the installation of this equipment. This equipment requires operation and maintenance; there is no operation and maintenance industry in place at this time.

Local health departments do not have staff or funding to oversee the nightmare that this situation would create.

We are concerned about the cost of this secondary treatment equipment to the home owner and the effects that this cost will have on the affordability of housing. We asked ISDH staff for an estimate of the fiscal impact of this rule. We were told the total cost of implementing the entire rule would be 8.7 million dollars per year. We prepared our own analysis and came up with a figure of nearly forty two million dollars per year. LSA has completed their analysis and are predicting a cost to the residents of the State of Indiana to be up as high as 28.1 million dollars per year. In real dollars to the home owner the cost of one secondary treatment system will add $6,500.00 to $11,500.00 to the cost of a system. The average cost of a home is $94,300.00. This is an increase of seven to twelve percent in the cost of a new home, and it does not include the cost of annual monitoring and maintenance.

This will also be a loss of revenue within the only industry that is currently performing at acceptable levels in the state of Indiana. Indiana is in a state of economic hardship. A March 23, 2003 article in the Indianapolis Star lists 25 statistics that show Indiana is

falling behind the rest of the country in terms of jobs, personal income, economic development, education, and housing prices. Housing has been a leading economic force while others have sagged and failed. An increase such as the one created by this rule will result in fewer housing starts, and a decline in the value of existing homes requiring a septic repair. It is possible that some people may have to walk away from their homes when faced with astronomically high repair costs.

Under Indiana Code IC 13-18-17-5, the Water Pollution Control Board has been empowered to adopt rules through the IC 4-22-2 process, establishing groundwater quality standards that include numeric and narrative criteria, a groundwater classification plan, and a method of determining where the groundwater quality standards must apply. The Executive Board in the health statute IC 16-19-3-4 is empowered to adopt reasonable rules on behalf of the State Department of Health to protect and improve public health in Indiana. Is this Proposed Rule reasonable? Should the Water Pollution Control Board consider whether this is an area that the standards being mandated should apply? We think this should be given careful consideration before a rule so disruptive to affordable housing is made into law.

The IBA is concerned about the issue of nitrates and any health hazard that would exist if septic systems were contributing to unsafe nitrate levels. In an attempt to find scientific answers to the questions that exist, we asked the IBA at its last Board of Directors' meeting to approve the expenditure of ten thousand dollars to start a study by Purdue University, that would give us scientific answers to the questions that we have been asking. The IBA has agreed to do this. Dr. Brad Lee and Dr. Don Jones are currently formulating the groundwork for this study. Once this study is complete we will have case history that documents the flow of nitrates through the soils from functioning septic systems. If a problem exists we would support measures to remedy the problem. At this time we have not been shown that there is a problem.

We are also concerned about the prescriptive content of the Proposed Rule. We have had meetings with ISDH staff and expressed our concerns on a line-by-line basis to them. Our line-by-line review in preparation for meeting with ISDH staff was conducted with the assistance of soil scientists, representatives from local health departments, representatives of the Wastewater Management group, and scientists from Purdue University. During these meetings it was unanimously agreed that none of those present supported this draft of the rule. The list that we presented to ISDH was very similar to the list prepared by the Wastewater Management Committee. We applaud the work that this group did. There are corrections to one hundred and five of the one hundred and fifty pages of the rule. When we presented our objections during our meeting with ISDH staff, we were told, "Don't worry about that issue, it has already been addressed by the wastewater group." However, the proposed rule, as you are presently viewing it and as it was published, contains none of our corrections. We don't know how many, if any, corrections will be endorsed by ISDH staff at this public hearing. We feel that this is an abuse of the rule making process. Objections of the magnitude presented should be remedied before publication of a Proposed Rule.

We also have concerns about the legality of this rule and have given that list to the Attorney General's Office. Our list of concerns is eight pages long. I have that list here and would like to present it to you at this time. Our list addresses such issues as:

Prescriptive requirements that cannot be met;

Vague and arbitrary standards determined by the ISDH that they can change as they see fit; and

Numerous issues concerning improper rule form.

However, our most serious legal concern is that the ISDH is improperly applying their authority in the way that they are treating the entire denitrification process. In an opinion from Barnes and Thornburg, they feel the rule does this. Under the authority of 327 IAC 2-11, the ISDH does have the right to establish groundwater quality standards. However, according to IC 13-18-17-5, this is not just a set of numbers that apply to all groundwater all the time. In fact, these standards must only apply at or beyond a defined groundwater management zone. However, the secondary treatment requirement in the Proposed Rule, the denitrification provision, is that the nitrate level of 10 mg/liter applies as wastewater leaves the secondary treatment unit, before it even enters the leach field. As such, under this rule there is no groundwater management zone. This is not allowed, and should be reason enough for the Attorney General to reject this rule as contrary to state law.

In conclusion, I ask the Executive Board to at this time reject Rule 410 IAC 6.8-2. The rule writing process needs to be conducted by a committee of experts consisting of no less than representatives from academia, soil scientists, the Indiana Builders Association, local health departments, the Indiana On Site Wastewater Professionals Association, as well as ISDH staff. This effort should be conducted utilizing the services of an expert in the writing of rules. Only after thoughtful study, and a legitimate negotiation process, should a rule with this much impact on the citizens of Indiana be brought forth and published for adoption. The residents of the state of Indiana deserve no less.

Thank you.

david
matthews
associates

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August 4, 2003

5CDM

Burton Garten
Office of Legal Affairs
Indiana State Department of Health
2 N. Meridian Street
Indianapolis, IN 46204

RE: Proposed Septic Tank Rule

Dear Public Servants,

I am a real estate appraiser with over 30 years of experience in appraising all types of real estate in several states with a concentration in Indiana. I have appraised many properties with septic tanks, some of which were failing. There is definitely a need for the State to monitor health issues and to promote regulations that keep a balance between health and cost. Unfortunately, your new proposed septic tank rule will be onerous and will create a definite burden on new homeowners in rural areas. It could reduce urban sprawl which may be one of the purposes of this legislation. However, it is not needed nor appropriate.

I know of no cases where the septic tank problem has caused a serious public health crisis. There are systems that do not function at all but, rather, drain into ditches which is more of a problem. Also more of a problem is the undersized sewer systems and combination storm sewer and septic sewers in urban areas. After a very heavy rainfall yesterday, I saw sewage gushing out of sewer manholes. This was flooding the front yards of several homes. This is definitely more of a problem than some seepage on the hillside in a rural area or a soft spot in the yard.

Your cure will kill the patient. Please reconsider and redesign your rules to avoid increasing the cost of new construction in rural areas through denitrification.

Respectfully submitted,

C. David Matthews, MAI CRE SRA
General Certified Real Estate Appraiser
Indiana, Illinois and Kentucky

ATTACHMENT
Q

StemTech
P.O. Box 37, Floyd Knobs, IN 47119

August 8,2003

5CS

Mr. Burton Garten
Office of Legal Affairs
Indiana State Dept. of Health
2 North Meridian Street
Indianapolis, Indiana 46204

Re: Proposed Regulation Title 410 Indiana State Dept of Health-#02-3

Dear Mr. Garten,

As an Indiana corporation and a land developer, we strongly oppose the above reference proposal as it negatively impacts our ability to sell our lots which were sized according to your present septic regulations. Our development was engineered by Jim Fischer and soil tested by Jack Coulter per present regulations.

We presently own approximately 450 Acres in Southern Indiana most of which could be beautiful home sites. Present regulations are more than adequate to protect the environment.

Best regards,

Charles Stem, President
Stemtech, Inc.

812/923-5718

ATTACHMENT
L

3 August 03

WALKER CHIROPRACTIC, P.C.

5CW

Indiana State Dept of Health

RE: 410 IAC 6-8.2

I live in a septic area and have 3-1,000 gallon tanks treat effluent. Secondary treatment by recycling does not appear to be necessary. I am opposed to secondary treatment by recycling and would like my opinion added to the hearing record. Other requirements that are unnecessary are compacted backfill around tank and requirements for seeding and soil stabilization. I seeded my own project.

Thank you

Cresley Walker

Cresley Walker

Cresley And Elizabet
105 Hackney Ln
Valparaiso IN 46385-6052

6085 CLEVELAND STREET MERRILLVILLE, INDIANA 46410 Telephone (219) 769-2500
3101 WILLOWCREEK ROAD PORTAGE, INDIANA 46368 Telephone (219) 762-4486
1954 NORTH MAIN CROWN POINT, INDIANA 46307 Telephone (219) 662-1900

ATTACHMENT
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5DB

Comments — Dan Bloodgood

LINE # the Rule on as Ammended by the WWMC

Citation #'s don't give in definitions

496 need to include the 18 digit parcel # in the TECH SPEC

769-778 I think that the operators of the Waste Treatment plant have the right to decide who connects to their WTP — shall vs. may

Comments on the TECH SPEC as ammended by the WWMC

150-151 Not all A.P.C.'s have adequate photographic information or G.I.S. let alone L.H.D's w/ G.P.S. equipment

16-219 Need to add the 18 digit parcel id # in this section see above Re: lines 496 in the proposed rule as ammended by the WWMC

395 + elsewhere SEPTIC systems need to be protected as Utilities too! — identification of the sewers + trenches w/ wire or metallic tape would be a good thing

740-742 + elsewhere The drainage issue is not addressed it cross references between 2-3 sections of the code but doesn't state how deep the system's drainage needs to be or how to Calculate this

ATTACHMENT GGG

Line #	
878	It's doubtful if most L.H.D. have the time/talent/ Resources to do this
975	As above in Line 878

5DDL

Boone County Solid Waste Management District
116 W. Washington St. Room # 104
P.O. Box 808
Lebanon, IN 46052
(765) 483-0687
Fax (765) 483-0726

February 21, 2003

Mr. Alan Dunn, Supervisor
Residential Sewage Disposal
Indiana State Dept. of Health
2 North Meridian Street
Indianapolis, IN 46204

Re: Comments on the proposed 410 IAC 6-8.2 and Technical Specification Document for On Site Sewage Systems

Dear Mr. Dunn,

We have reviewed the above referenced documents and offer the following comments:

1. After reviewing the specification requirement for "aggregate" in the Technical Specificaton Document (page 53 lines 1959-1967) we believe that properly sized and cleaned tire chips are allowed as a substitute for aggregate subject to an "approval" by the department. We recommend:
   A. On page 53 line 1960 of the Technical Specification document, after the word "stone" insert "chipped rubber tires."
   B. Or alternatively the department publish a list of "approved" substitutes that includes chipped tires in order to expedite development of markets for the use of recycled materials.
2. The use of chipped rubber tires in lieu of aggregate must not be considered an "experimental site sewage system" (ETOSS) or an "alternative on site sewage system" ATOSS as defined in 410 IAC 6-8.2. Our suggestion to use chipped tires in lieu of aggregate in no way affects the design, sizing or construction of the system.

As we have stated previously, at virtually no cost to state or local governments a viable market for reuse of a portion of the waste tires currently generated would be created. If this material was readily available and processors could store and handle chips as "material" and not "waste", we could in a small way encourage the development of a business infrastructure that could help the state meet its diversion goal.

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PP

We hope these comments are of value to you. We look forward to the implementation of an effective On Site Sewage rule.

If there are any questions, please feel free to call.

Very Truly Yours,

David D. Lamm
District Administrator

cc: C. Steven Poe, Indiana Department Environmental Management
Tiffany Sorge, Indiana Department of Commerce

5DF

From: Donald Franzmeier <dfranzme@purdue.edu>
To: "Dunn, Alan" <Adunn@isdh.state.in.us>
Date: 7/16/03 2:46PM
Subject: Onsite rule

Alan:

Some time ago a report from a subcommittee of the Wastewater Committee (sanitarians) addressed to the Indiana Association of Professional Soil Classifiers, and subsequent discussions, pointed out that when a site was examined by more than one soil scientist, the resulting reports may differ in the characteristics reported, the interpretation of the characteristics, the thoroughness of the investigation, and the format of the report. As a result, we decided that to get more accuracy, and consistency in reports, it was necessary to define terms, explain how to determine various aspects of soil morphology, specify a standard format for reports, etc. The first draft of the resulting manual was distributed to about 80 soil scientists at the IAPSC meeting last winter for their review and comments. Considering those comments we are revising that draft. We are working with the Purdue instructors who teach pedology, so that we teach from the same book that consultants use in the field.

The current draft of the Rule (lines 171-173) says that evaluation and description of soil characteristics must use terminology of the NRCS. Our manual uses essentially the same terminology as the NRCS Soil Survey Manual and Field Guide. They differ in several ways, however:

NRCS - for all of the US
Purdue - adapted to Indiana conditions

NRCS - Reports using the field guide are written mainly for other soil scientists and are difficult for non-soil scientists to understand
Purdue - Reports are written and explained so non-soil scientist can understand the material.

NRCS - Explains how to describe every minor detail of soil morphology
Purdue - Selects aspects of soil morphology important for onsites and for Indiana soils

NRCS - Defines some geomorphology terms as they apply to all of the US; has few illustrations
Purdue - Defines terms relative to Indiana conditions and has many diagrams illustrating Indiana landforms..

We expect that better quality reports will be created if state and county agencies specify that reports written for their use follow the Manual that will be published soon as a Purdue publication. Also, exams and CEU credits for Indiana Registered Soil Scientist are to be based on this Manual.

I doubt if the present working precludes the use of the Purdue Manual, but to make sure, I suggest that a phrase be added, so that item c, lines 171 to 173 will read: The evaluation and description of soil characteristics must use terminology contained in guidelines, soil manuals, technical bulletins, and handbooks of the NRCS and in manuals

ATTACHMENT
RR

published by Purdue University that are based on these guidelines and publications.

Thanks for your consideration.

Don

--
Donald P. Franzmeier
Department of Agronomy, Purdue University
915 W. State St., W. Lafayette, IN 47907-2054
Phone: 765-494-8065 Fax: 765-496-2926
E-mail: dfranzme@purdue.edu

CC: "Lee, Brad" <bdlee@purdue.edu>

5DF

From: Donald Franzmeier <dfranzme@purdue.edu>
To: "Dunn, Alan" <Adunn@isdh.state.in.us>
Date: 7/22/03 8:17AM
Subject: Proposed rule

Dear Al:

In the proposed load rate table, I suggest that this change be made:

In the Loam (L) grouping, Illinoian Till should be added to the parent

material group that contains Lacustrine and Wisconsin Till. This would be for both above ground and subsurface SLRs.

Don
--
Donald P. Franzmeier
Department of Agronomy, Purdue University
915 W. State St., W. Lafayette, IN 47907-2054
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E-mail: dfranzme@purdue.edu

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5DJ

8/5/03

Office of Legal Affairs
C/O Burton Garten
Indiana State Department of Health
2 N Meridian Street
Indianapolis, IN 46204-3003

RE: Proposed Rule 410 6-8.2

Dear Mr. Garten,

Please allow me to introduce myself. My name is Debra Jimison. I am on the Indiana Registry of Soil Scientists. My current position is staff soil scientist with a small engineering firm in northern Indiana with over 14 years of experience in soil borings and designing on-site septic systems for commercial and residential properties. Working with ISDH, local health administrators, developers, builders and property owners on these projects, I feel the need to communicate my point of view on the proposed changes to Rule 410 6-8.2.

The most pressing issues facing the state are to mandate discharging non-septic systems be updated to code, to force failing systems to be repaired, and to offer flexibility that encourages these repairs. The proposed changes to the current rule will NOT do anything to address this. The first step should have been using or having studies done to determine the extent of existing nitrate levels in the environment and identifying suspected origins. Then, instead of doing voodoo science like misusing the USDA nitrate leaching index, changes would be based on fact, not fiction! The proposed rule addresses a "problem" that is not the result of failed septic systems!

Proposed changes cause financial hardship to homeowners, workload additions to local health departments already limited by tight budgets and staffing, adds to the tax burden, and creates stress on manufacturers in an ailing economy. All so the IDSH can justify its existence. What agency mandated this? Every meeting I've attended, the vague answer changes. Staying current with technological advances is absolutely necessary. But mandating nitrate reduction with current technology that can't provide the desired results makes no sense.

When I think of the manpower that has been put into this project, and the wasted time and effort of hundreds of people in and out of the system, I feel anger and frustration over the product that has been produced. There is no one in any position of local governments or the governed, outside of ISDH, that supports this rule.

In my opinion, proposed Rule 410 6-8.2 is unworkable, a step backward, and a danger to public health. The changes proposed by IEHA Wastewater Management Committee is a starting point, and much preferred to the proposed changes by ISDH. Please reconsider this matter. Do the right thing and change this Rule. Thank you for your time and consideration in this matter.

Sincerely,

Debra Jimison

ATTACHMENT
DD

5DR

August 11, 2003

Alan,

Attached Word and Excel files contain comments for the record regarding the Preliminary Adopted Technical Specifications dated 1/8/2003. Sorry for waiting until the deadline before filing these comments.

Please respond to this email when you receive it so that I know it got through. Also, let me know if you have any questions or concerns regarding my comments.

Thanks!

Dave Ralston
Soil Tech, Inc.

ATTACHMENT
EE

Table 1 - Comparison of subsurface loading rates for the existing 410 Rule, the preliminary adopted Technical Specification, and a possible revised loading rate

Figure 3-4 - Loading Rates for Subsurface Onsite Systems

		Existing 410 Residential Rule	3 BR home Laterals L.F of 3' trench	ISDH Technical Spec. Table 3-4	3 BR home Laterals L.F of 3' trench	Net Change: Net vs. Existing Rate	Net Change: Laterals L.F of 3' trench	Net Change: Lateral Length Change	Possible Revised Rate	3 BR home Laterals L.F of 3' trench	Net Change: Net vs. Existing Rate	Net Change: Laterals L.F of 3' trench	Net Change: Lateral Length Change
		gpd/ft2	L.F.	gpd/ft2	L.F.	gpd/ft2	L.F.	%	gpd/ft2	L.F.	gpd/ft2	L.F.	%
Loess													
Silt loam	Massive friable	0.30	500	??		??	??	??	0.30	500	0.00	0	0
	Weak sbk	0.30	500	0.40	375	0.10	-125	-25%	0.40	375	0.10	-125	-25%
	Moderate sbk	0.50	300	0.60	250	0.10	-50	-17%	0.60	300	0.00	0	0
	Strong sbk	0.60	250	0.60	250	0.00	0	0	0.50	300	-0.10	50	20%
Silty clay loam	Massive friable	0.25	600	??		??	??	??	0.25	600	0.00	0	0
	Weak sbk	0.25	600	0.30	500	0.05	-100	-17%	0.30	500	0.05	-100	-17%
	Moderate sbk	0.30	500	0.40	375	0.10	-125	-25%	0.40	375	0.10	-125	-25%
	Strong sbk	0.60	250	0.40	375	-0.20	125	50%	0.40	375	-0.20	125	50%
Alluvium													
Loam	Massive friable	0.30	500	??		??	??	??	0.30	500	0.00	0	0
	Weak sbk	0.30	500	0.50	300	0.20	-200	-40%	0.40	375	0.10	-125	-25%
	Moderate sbk	0.50	300	0.60	250	0.10	-50	-17%	0.50	300	0.00	0	0
	Strong sbk	0.75	200	0.60	250	-0.15	50	25%	0.50	300	-0.25	100	50%
Silt loam	Massive friable	0.30	500	??		??	??	??	0.30	500	0.00	0	0
	Weak sbk	0.30	500	0.30	500	0.00	0	0	0.30	500	0.00	0	0
	Moderate sbk	0.50	300	0.50	300	0.00	0	0	0.50	300	0.00	0	0
	Strong sbk	0.60	250	0.50	300	-0.10	50	20%	0.50	300	-0.10	50	20%
Sandy loam	Massive friable	0.60	250	??		??	??	??	0.60	250	0.00	0	0
	Weak sbk	0.60	250	0.50	300	-0.10	50	20%	0.50	300	-0.10	50	20%
	Moderate sbk	0.60	250	0.60	250	0.00	0	0	0.60	250	0.00	0	0
Lacustrine													
Silty clay	Massive friable	0.25	600	??		??	??	??	None	None			
	Weak sbk	0.25	600	None	None				None	None			
	Moderate sbk	0.30	500	0.25	600	-0.05	100	20%	0.25	600	-0.05	100	20%
	Strong sbk	0.50	300	0.25	600	-0.25	300	100%	0.25	600	-0.25	300	100%

Notes:
1. Bold data indicate the more common soil structures
2. Underlined (red) data are proposed revisions to the current preliminary adopted rule
3. ?? - Cannot find where massive friable is addressed in preliminary adopted technical rule

Table 2 - Comparison of above ground loading rates for the existing 410 Rule, the preliminary adopted Technical Specification, and a possible revised loading rates

Figure 3-4 - Loading Rates for Above Ground Onsite Systems

		Existing 410 Residential Rule	3 BR home Laterals L.F of 3' trench	ISDH Technical Spec. Table 3-4	3 BR home Laterals L.F of 3' trench	Net Change Loading Rate	Net Change Laterals L.F of 3' trench	Net Change Laterals % Change	Possible Revised Rate	3 BR home Laterals L.F of 3' trench	Net Change Net Loading Rate	Net Change Laterals L.F of 3' trench	Net Change Laterals % Change
		gpd/ft2	S.F	gpd/ft2	S.F	gpd/ft2	L.F.	%	gpd/ft2	S.F	gpd/ft2	L.F.	%
Loess													
Silt loam	Massive friable	0.50	900	??		??	??	??	0.50	900	0.00	0	0
	Granular	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
	Weak sbk	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
	Moderate sbk	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
	Strong sbk	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
Silty clay loam	Massive friable	0.25	1800	??		??	??	??	0.25	1800	0.00	0	0
	Weak sbk	0.25	1800	0.25	1800	0.00	0	0	0.25	1800	0.00	0	0
	Moderate sbk	0.25	1800	0.25	1800	0.00	0	0	0.25	1800	0.00	0	0
	Strong sbk	0.25	1800	0.25	1800	0.00	0	0	0.25	1800	0.00	0	0
Alluvium													
Loam	Massive friable	0.50	900	??		??	??	??	0.50	900	0.00	0	0
	Granular	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
	Weak sbk	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
	Moderate sbk	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
	Strong sbk	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
Silt loam	Massive friable	0.50	900	??		??	??	??	0.50	900	0.00	0	0
	Granular	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
	Weak sbk	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
	Moderate sbk	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
	Strong sbk	0.50	900	0.50	900	0.00	0	0	0.50	900	0.00	0	0
Sandy loam	Massive friable	0.60	750	??		??	??	??	0.50	900	-0.10	150	20
	Weak sbk	0.60	750	0.60	750	0.00	0	0	0.60	750	0.00	0	0
	Moderate sbk	0.60	750	0.60	750	0.00	0	0	0.60	750	0.00	0	0
Lacustrine													
Silty clay	Massive friable	0.25	600	??		??	??	??	None	None			
	Weak sbk	0.25	600	None	None				None	None			
	Moderate sbk	0.25	600	0.25	600	0.00	0	0%	0.25	600	0.00	0	0%
	Strong sbk	0.50	300	0.25	600	-0.25	300	100%	0.25	600	-0.25	300	100%

Notes:
1. Bold data indicate the more common soil structures
2. Underlined (red) data are proposed revisions to the current preliminary adopted rule
3. ?? - Cannot see where massive friable is addressed in preliminary adopted technical rule

5DSR

Soil Tech, Inc.
5144 W. Timberwood Drive
Newburgh, Indiana 47630

Sent via email
August 11, 2003

Mr. Alan Dunn, Supervisor
Residential Sewage Disposal
Indiana State Department of Health
2 North Meridian Street, Sec. 5-E
Indianapolis, Indiana 46204

Re: Comments on Preliminary Adopted Technical Specifications (1/8/2003)

Dear Alan:

Sorry for taking so long to review the rule and to send these comments. The summer has been hectic, and I procrastinated until the deadline. My comments will primarily address the loading rate tables, with a few minor issues noted for the other rules. The focus of my comments is on the most common parent materials for soils found along the Ohio River in southwestern Indiana: 1. Loess, 2. Alluvium, and 3. Lacustine. Comparison tables have been prepared with the most common textures and structures for the specific parent materials shown in bold. Table 1 compares the existing 410 loading rate for subsurface systems with the preliminary adopted Technical Specification Table 3-4, and offers a possible compromise loading rate that will provide a less dramatic change for designing the systems. Table 2 is the same comparison for the above-ground onsite systems.

Loading Rate Tables

1. Figure Number: Figure 3-4 is used for both the subsurface and the above ground load rate tables, which is very confusing. When someone is referencing to Figure 3-4 in making a decision, they will also have to give the full title of the specific table to avoid confusion. The tables will be shown on two different pages in the rules, so they should have unique numbers. Figure 3-4a could be used for subsurface systems and Figure 3-4b could be used for above-ground onsite systems. Figure 3-4c could be used for the listing of soil materials not suitable for soil absorption fields. By the way, where are items 1 and 2 for the soils unsuitable listing?

2. Massive-friable: Proposed loading rate tables do not seem to address massive-friable soils. The current rule has loading rates that range from to 0.25 (SiCL) to 0.60 (SL),

9. Above-ground onsite systems Table 2 contains the comparison for Figure 3-4 for above-ground systems. The only changes noted are for the massive, friable textures, which do not seem to be addressed in the Technical Specification. The currently approved rates for massive, friable are proposed.

10. Nitrogen – The revised Technical Specification is an improvement over earlier versions. It will be easier to evaluate in the field and easier for the Health Departments to administer. Line 167 on page 5 still refers to the old nitrogen leaching index, so it needs to be revised. Also, Line 877 on page 28 is unclear as to what parameter the 10 mg/l limit refers to with regard to nitrogen. Is it nitrate, nitrite, or total nitrogen? From a soil leaching standpoint, the real concern is nitrate and nitrite, since the ammonia can be absorbed onto the exchange sites. This nitrogen parameter will be the most difficult standard for experimental systems to meet, especially since traditional systems probably do not comply with the nitrogen standard on a regular basis. However, compared to the amount of nitrogen that farmers add to crops, the onsite system addition of nitrogen to groundwater is insignificant.

Final comments: The new Technical Specification will certainly increase the amount of time needed to prepare an onsite soil survey and system design documents. Homeowners will need to spend more money upfront to have detailed plans prepared, but it could avoid problems with the final system. The new rules will force more mound systems, due to the limited outlet depth for the perimeter drain on many parcels with a high seasonal water table. However, the 2003 version of the Technical Specifications is certainly an improvement over previous editions.

Sincerely,
Soil Tech, Inc.

David S. Ralston
President

Cc: Don Franzmeier
Jerry Thomas

Soil Tech, Inc.

Soil & Environmental Services

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March 3, 2003

Alan Dunn, Supervisor
Residential Sewage Disposal
Indiana State Department of Health
2 North Meridian Street
Indianapolis, Indiana 46204

Re: Comments on the Proposed Technical Specifications

Dear Alan:

After two long and trying days of meetings last week, I am certain that you were glad for the weekend. I appreciated the open and frank discussion about the new rules and the willingness of your department to consider technical input. Granted, the lawyers have provided little flexibility with regard to the IDEM drinking water standard for nitrogen, but the other issues seemed to be debated with the goal to come up with the best technical solution.

Soil Scientists will play an even larger roll in determining the type of onsite system for our clients. Systems that currently range from $4,000 to $12,000 will probably range from $6,000 to $16,000 under the new rules, and soil scientists will provide key information in deciding limiting layers, textures, structures, and such that will impact the design and cost of the systems.

Secondary treatment for nitrogen on sandy soils and perimeter drain design are two of the big-ticket changes for the new rule. There will be more sand mounds will be required due to the 3-foot vertical separation for the perimeter drain because of outlet depth limitations in road ditches. Backfilling the perimeter drain with aggregate will add significant expense in some counties.

The attached comments are all that I have time for this weekend, since I need to move on to projects that help keep the lights on. Let me know if you have questions or need additional information on specific items.

Sincerely,
Soil Tech, Inc.

David S. Ralston, PhD, PSSc
President

Cc: Jerry Thomas
Don Franzmeier

DAVID S. RALSTON
REGISTERED
No. 38
STATE OF
INDIANA
PROFESSIONAL SOIL SCIENTIST

Comments on Preliminary Adopted 410 IAC 6-8.2 dated January 8, 2003

Chapter 2, Part II.C.1.c.2 Location of sampling sites.

Issue: Rule requires designer, P.E., or architect to be present when site evaluation is performed. This will generally be difficult to arrange for the initial soil survey, so it will involve a second trip for the soil scientist and considerably more expense for the landowner. The soil scientist should be required to flag the sampling sites when the investigation is conducted, and then the sites can be measured, if necessary, by the survey crew prior to submittal of the final design plan. The entire process normally takes less than two weeks, so the holes should be easily verified by the survey crew. Assuming they are not pulled out, I have located flags in woods as much as one year after I did a soil survey.

Revision: Remove the second sentence "*The designer, P.E., or registered architect must be present when the site evaluation is performed.*"

Chapter 2, Part IV.B.3.c. Cultivation to alleviate compaction.

Issue: The rule requires that compaction be loosened with a Paratill plow. While I have seen the Paratill plow used and agree that it can loosen compaction to a depth of up to 16 inches, I would be surprised if there are ten in the entire state. Texas A&M pushes them for pasture renovation, but I have not seen any used by Indiana farmers. I know contractors will have a difficult time finding a local Paratil plow. (See http://agpublications.tamu.edu/pubs/scs/l5154.pdf)

What is more commonly used by Indiana farmers is the Case ecolo-til 2500 or the ecolo-tiger (formerly the DMI TurboTiger). DMI has been the leader in tillage equipment, due primarily to Bill Dietrich. Bill worked extensively with the mining industry to develop equipment to loosen compaction up to 48" deep. DMI was purchased by Case IH, and Case was bought by New Holland. Bill has retired and now has his own consulting business. When I talked with him, he strongly recommended the ecolo-til 2500. He said a three-shank unit will effectively loosen up to 16" deep with minimal surface disruption when coulters are used. It is the leading tillage tool in the Midwest, since farmers use it to cultivate after beans. Thus it should be readily available. The ecolo-tiger chisel plow will cause more surface disruption and is normally used for fall tillage after corn. It will loosen 16", but it may not be suitable for drip irrigation because of the loss of surface vegetation.
http://www.caseih.com/products/model.asp?Reg=NA&RL=ENNA&id=453&mod=true

Revision: ***If the soils report indicates that surface compaction or platy structure is present less than 12 inches deep, the site must be cultivated to a minimum of 4" below the compacted zone using a vertical shank tillage tool that can effectively loosen the compaction. Examples of tillage tools: Paratil plow, Case ecolo-til, Case ecolo-tiger, or equal.***

Comment: Don Franzmeier stated in our meeting that he has not seen tillage pans or surface compaction identified on soils reports. Currently, identifying surface compaction such as a tillage pan or platy structure in the A horizon can result in the site being rejected by the health officer. Platy structure triggers rejection, even though it can be corrected by tillage. For a trench system, the shallow compaction is generally not a factor if the trench bottom is deeper than the compaction. For mounds, the assumption is made that surface compaction will be corrected with normal tillage required during construction. However, with drip irrigation, tillage pans and traffic compaction can be critical.

This reluctance by soil scientists to identify surface compaction will not be resolved unless it is addressed in footnote 2 for Figure 3-4. As it stands now, platy structure caused by compaction has a loading rate of <0.25 gpd/ft^2. Unless provision is made to exempt platy structure in a shallow surface layer (tillage pan, traffic pan, etc.), then the soil scientist will be eliminating potential sites that could be corrected by proper tillage. Currently, identifying any compaction means starting over to find another site on the property. According to Don, that perfect soil with no tillage pan may only exist in the fence row, a location that cannot be considered since it is typically on the property line.

Chapter 3, Part VI. Secondary Treatment for Nitrogen Reduction

Issue: Indiana home owners are obviously an easier target for enforcement than farmers, even though septic systems have far less impact on groundwater than corn production. Health departments have data to show that the nitrogen level in well water actually goes down when a subdivision is built on a corn field. ISDH has inherited a nightmare due to the IDEM groundwater rule that requires drinking water nitrogen standard, and it is obviously a hot-button issue. I cannot remember tempers flaring as much as they did at our technical meeting--and this reaction from a group of professionals who understand that ISDH must enforce the IDEM rule.

Homeowners and contractors who find out that the onsite system for their sandy soil will now cost more than $12,000 instead of $4,000 will be even more vocal toward the health department. And then the owner will also inherit expensive sampling and maintenance for a system that may or

may not even meet the 10 mg/l average nitrate standard. Meanwhile, the adjacent farmer continues to add 200 lbs/ac of nitrogen to get maximum corn yield. Indiana should do what other states have done and pass legislation to exempt farmers and home owners from meeting the drinking water standard for nitrates. This exemption would happen quickly if farmers were told that they cannot add more than a minimal amount of nitrogen fertilizer that could all be taken up rapidly by the plants. Now we are really talking hot-button issues.

To better understand how the nitrogen issue will impact the counties that I serve, I prepared the enclosed tables for Gibson, Posey, Vanderburgh, Warrick, and Spencer Counties. The assumption was made that soils with textures not listed in section C.1.b.1 within the NRCS standard series description for engineering properties would not normally require secondary treatment. The lists were compiled at the following NRCS site: http://nasis.usda.gov/cgi-bin/reportest.cgi . In addition, soils with shallow bedrock were given a moderate rating, since unless the bedrock is considered unfractured, it will exceed the 35% rock standard and require nitrogen treatment. The sandy soils are listed as having a high probability for requiring secondary treatment.

Summary Table 1 shows that if the onsite soil description is consistent with the NRCS standard series description, then about 55,000 out of 1.2 million acres have a high probability of requiring secondary treatment (4.4% of the five counties). This is still a big problem if you happen to own the sandy terrace or dune soil, but it is not as bad as the 570,000 acres, or 46% of the total county acreage listed in the rule. Of course the acres will increase significantly if health departments in the five counties are required to apply secondary treatment to soils with bedrock less than 80 inches.

Chapter 4 – Site Drainage

Issues: New perimeter drain requirements will have a significant increase in the overall cost for the system. Increasing the vertical separation from 2' to 3' will mean that more mound systems will need to be used, since it is often hard to find a suitable pipe outlet under the current 2' standard. Also, having to bed the pipe in a v-notched trench and use granular backfill will significantly increase the cost, especially for counties where aggregate is expensive. Spec. 23 sand is used for mound systems, so it should be available throughout the state. As I discussed at our meeting, I prefer clean, coarse sand for backfill, since it will be harder for soil fines to move into the aggregate and make it impermeable. No. 2's, and possibly No. 4's and 5's are way too coarse for use without a geotextile wrap, and that would be very expensive. I would

add Spec. 23 sand and washed pea gravel to the list, and take off the No. 2's for sure. Fabric wrap on the drain pipe should be required when Spec. 23 sand is utilized.

The comment was made that soil backfill of the trenches will not have the problem of the granular barrier for uniform water movement toward the pipe, but I am not convinced that soil will provide an adequate plumbing system for rapid water movement to the drainpipe during wet weather. It would be fairly easy to overcompact a soil when backfilling so that water would not move through the fill soil. Backfill soil is disturbed, and it is not allowed under the trenches because it is so unpredictable. One advantage of Spec. 23 sand is that it cannot be overcompacted during backfill.

Bedding of pipe and 'V' notches should be necessary only if the trench is more than 3" wider than the pipe and coarse gravel is being used for backfill. It is unlikely that agricultural trenchers will ever be used for installing perimeter drains, since they are too big to maneuver in backyards. Provision should be made to allow installation using laser-guided trenchers that cut the trench just wide enough to get some aggregate around the pipe as it is being backfilled. One inch on each side of the pipe should be plenty adequate for Spec. 23 sand.

We had considerable discussion about tolerance for slope deviation on the pipe. It seemed that the group was leaning toward a standard of 1" variation. If a camera test shows that the pipe varies more than 1", the drain would not be aapproved and the contractor would be forced to try to dig up the pipe and relay it or to start over in an adjacent trench. Either option will be very expensive. I would prefer that the standard be set at a maximum variation of 2" in the pipe grade. This is half the diameter of the 4" pipe and the water will get through the dip. Water can also travel along the pipe in the sand. The pipe does not carry water except in saturation conditions, so I think that the group is over designing the standard and will do more harm than good in trying to repair pipes that are not perfectly uniform in slope. I am more worried about the damage done in correcting a less-than-perfect grade on the pipe when it may make little difference in the performance of the perimeter drain.

Chapter 4 – Section II.A.5.b.1. and 2. – Residential system perimeter drain

Issue: Maintaining the required 3' vertical separation on the down-slope side of the absorption field often controls the type of onsite system that can be used. The interceptor drain on the high side of the system handles most of the load, and it can be installed at full depth with a suitable

outlet. However, the lower slope drain may only be 2' below the trenches, which is the current standard. I would prefer a trench system with a slightly less deep down-slope drain over having to install a mound system that doubles the cost and changes the surface topography. Thus, only require a perimeter drain on slopes up to 2%, and give designers the option on steeper slopes to use a down-slope drain if a suitable outlet can be achieved.

Revision: a) the slope of the soil absorption field is *two (2) percent* or less; or
b) the slope of the soil absorption field site is greater than *two (2) percent* and the upslope drain is not installed into massive clay, till, fragipan ...
2) a) The slope of the soil absorption field site is greater than *two (2) percent*; and
b) the upslope drain is installed at least two (2) inches into massive clay, till, fragipan...

Chapter 4 – Section II.B.1.2.b.
Revision: i) For trench onsite systems, the invert elevation of the drainpipe of the *upslope* subsurface perimeter drain or segment drain must be at least thirty-six (36) inches below the elevation of any adjacent soil absorption trench bottom

Chapter 4 – Section II.E.6.a. – Bedding material for perimeter drainpipes

- ***a.*** **Indiana Department of Transportation Standard Specifications 8, 9, or 11 aggregate, *washed pea gravel, or Specification 23 sand. Fabric is required on the drain pipe if Specification 23 sand is used for bedding or backfill.***

7.a. Filled to finish grade with washed INDOT Spec. 8, 9, or 11 aggregate, *washed pea gravel, or Spec. 23 sand, or equivalent; or*
b. Filled to within six (6) inches of finish grade with materials listed in 7.a **and the final six (6) inches to finish grade with cover soil material.**

Chapter 5 – Section IV.B.4.a. – Septic tank design
Issue: The new rule requires a single two-compartment septic tank or two smaller tanks in series. Currently, the tanks have only one compartment, so manufacturers will need to redesign and build new molds. I was told by an installer that this will be a problem, but nothing that more money can not solve. Ed Miller told me that the two-compartment tank or two tank arrangement is needed to extend the outlet filter maintenance interval. This could be a big issue with the tank manufacturers, but the concept sounds good. As with the other new requirements, the cost to the home owner just keeps going up and up.

Soil Map Units with Nitrate Leaching Index >10
Table 1 - Summary Data

See Table	County	County Total	ISDH Nitrate Soils	Probability for secondary treatment		
				High	Moderate	Low
		Ac.	Ac.	Ac.	Ac.	Ac.
2	Gibson County	319,456	156,428	22,270	0	134,423
	% of county		49%	7.0%	0.0%	42.1%
3	Posey County	264,960	184,152	15,265	0	168,887
	% of county		70%	5.8%	0.0%	63.7%
4	Vanderburgh County	148,539	56,445	3,885	9,340	43,220
	% of county		38%	2.6%	6.3%	29.1%
5	Warrick County	250,240	69,095	940	7,605	60,550
	% of county		28%	0.4%	3.0%	24.2%
6	Spencer County	253,440	103,062	12,582	24,845	65,635
	% of county		41%	5.0%	9.8%	25.9%
	Total - 5 counties	1,236,635	569,182	54,942	41,790	472,715
	% of 5 counties		46%	4.4%	3.4%	38.2%

Soil Map Units with Nitrate Leaching Index >10
Table 2 - Gibson County

Soil Map Unit	Nitrogen Issue	Total Acres	Probability for secondary treatment		
			High	Moderate	Low
		Ac.	Ac.	Ac.	Ac.
Adrian-Rensselaer complex	Sand	265	265		265
Alford SiL, 0 - 2%	Minimal	1,339			1339
Alford SiL, 12 - 18%, eroded	Minimal	1,097			1097
Alford SiL, 12 - 18%, severely eroded	Minimal	4,202			4202
Alford SiL, 18 - 25%	Minimal	1,040			1,040
Alford SiL, 2 - 6%, eroded	Minimal	19,536			19,536
Alford SiL, 2 - 6%, severely eroded	Minimal	1,022			1,022
Alford SiL, 6 - 12%, eroded	Minimal	2,879			2,879
Alford SiL, 6 - 12%, severely eroded	Minimal	13,594			13,594
Alford-Parke silt loams, 18 - 50%	Minimal	877			877
Alvin fine sandy loam, 12-18%, eroded	Sand	274	274		
Alvin fine sandy loam, 12-18%, severely eroded	Sand	405	405		
Alvin fine sandy loam, 2-6% slopes	Sand	2,359	2,359		
Alvin fine sandy loam, 6 - 12%, eroded	Sand	757	757		
Alvin fine sandy loam, 6-12%, severely eroded	Sand	1,024	1,024		
Armiesburg SiL, occasionally flooded	Minimal	637			637
Ayrshire variant fine sandy loam	Minimal	1,049			1,049
Bloomfield sand, 0 - 2% slopes	Sand	1,155	1,155		
Bloomfield sand, 12 - 18% slopes	Sand	653	653		
Bloomfield sand, 18 - 50% slopes	Sand	1,034	1,034		
Bloomfield sand, 2 - 6% slopes	Sand	5,126	5,126		
Bloomfield sand, 6 - 12% slopes	Sand	3,567	3,567		
Chagrin SiL, frequently flooded	Sand	1,481	1,481		
Crawleyville loam	Minimal	1,595			1,595
Elkinsville SiL, 0 - 2% slopes	Minimal	901			901
Elkinsville SiL, 2 - 6% slopes	Minimal	294			294
Evansville SiL	Minimal	4,426			4,426
Haymond SiL, frequently flooded	Minimal	1,479			1,479
Junius variant loamy sand	Sand	890	890		
Landes sandy loam, occasionally flooded	Sand	312	312		
Lyles fine sandy loam	Sand	980	980		
Lyles sandy loam, loamy substratum	Minimal	2,902			2,902
Medway loam, occasionally flooded	Minimal	612			612
Medway loam, protected	Minimal	396			396
Moundhaven fine sandy loam, freq. flooded	Sand	1,482	1,482		
Muren silt loam, 0 - 2%	Minimal	1,232			1,232
Muren silt loam, 2 - 6% slopes	Minimal	4,591			4,591
Nolin SiL, frequently flooded	Minimal	9,490			9,490
Nolin SiL, protected	Minimal	1,402			1,402
Patton silty clay loam	Minimal	1,197			1,197
Ragesdale SiL	Minimal	11,777			11,777
Ragesdale SiL, overwash	Minimal	5,011			5,011
Skelton loam, 0 - 2% slopes	Minimal	1,280			1,280
Skelton SiL, 0 - 2% slopes, freq. flooded	Minimal	500			500
Sylvan SiL, 12 - 18% slopes	Minimal	328			328
Sylvan SiL, 18 - 50% slopes	Minimal	3,840			3,840
Sylvan SiL, 2 - 6% slopes	Minimal	1,910			1,910
Sylvan SiL, 6 - 12% slopes	Minimal	4,215			4,215
Tafton SiL, 12-18%, severely eroded	Minimal	810			810
Taftown SiL, 18 - 25% slopes	Minimal	1,545			1,545
Udorthents-Sylvan complex, 12 - 18%, Sev. Erodec	Minimal	1,131			1,131
Uniontown SiL, 0 - 2% slopes	Minimal	6,104			6,104
Uniontown SiL, 2 - 6% slopes, eroded	Minimal	12,384			12,384
Uniontown SiL, 2 - 6% slopes, severely eroded	Minimal	2,072			2,072
Uniontown SiL, 6 - 12% slopes, severely eroded	Minimal	557			557
Wilber SiL, 6 - 12% soipes, severely eroded	Minimal	2,905			2,905
Wirt SiL, sandy substratum frequently flooded	Sand	506	506		
Total	319,456	156,428	22,270	0	134,423
Percent of County		49%	7.0%	0.0%	42.1%

Soil Map Units with Nitrate Leaching Index >10
Table 3 - Posey County

Soil Map Unit	Nitrogen Issue	Total Acres	Probability for secondary treatment		
			High	Moderate	Low
		Ac.	Ac.	Ac.	Ac.
Alford SiL, 0 - 2%	Minimal	606			606
Alford SiL, 12 - 18% slopes	Minimal	970			970
Alford SiL, 12 - 18%, severely eroded	Minimal	7,119			7,119
Alford SiL, 18 - 25% slopes	Minimal	2,513			2,513
Alford SiL, 2 - 6%, eroded	Minimal	23,706			23,706
Alford SiL, 2 - 6%, severely eroded	Minimal	2,904			2,904
Alford SiL, 6 - 12%, eroded	Minimal	1,623			1,623
Alford SiL, 6 - 12%, severely eroded	Minimal	18,755			18,755
Armiesburg silt loam	Minimal	892			892
Armiesburg variant silt loam	Minimal	532			532
Bloomfield loamy fine sand, 12 - 18% slopes	Sand	465	465		
Bloomfield sand, 18 - 35% slopes	Sand	1,219	1,219		
Bloomfield sand, 2 - 6% slopes	Sand	854	854		
Bloomfield sand, 6 - 12% slopes	Sand	698	698		
Elkinsville SiL, 0 - 2% slopes	Minimal	6,985			6,985
Elkinsville SiL, 2 - 6% slopes	Minimal	1,993			1,993
Evansville SiL	Minimal	14,781			14,781
Genesee loam	Minimal	2,071			2,071
Haymond SiL	Minimal	1,695			1,695
Iona SiL, 0 - 2% slopes	Minimal	1,548			1,548
Iona SiL, 2 - 6% slopes, eroded	Minimal	13,563			13,563
Iona SiL, 2 - 6% slopes, severely eroded	Minimal	3,549			3,549
Landes sandy loam	Sand	1,307	1,307		
Lyles sandy loam	Sand	819	819		
Nolin SiL	Minimal	16,309			16,309
Onarga fine sandy loam, 0 - 2%, rarely flooded	Sand	919	919		
Patton silty clay loam	Minimal	5,844			5,844
Plainfield variant loamy fine sand, 0 - 6%	Sand	918	918		
Princeton loam, 2 - 6% slopes, eroded	Sand	788	788		
Princeton sandy loam, 6 - 12%, eroded	Sand	473	473		
Psamments	Sand	485	485		
Ragesdale SiL	Minimal	3,866			3,866
Stonelick fine sandy loam	Minimal	2,122			2,122
Sylvan SiL, 12 - 18% slopes, severely eroded	Minimal	3,793			3,793
Sylvan SiL, 18 - 40% slopes	Minimal	5,506			5,506
Sylvan SiL, 2 - 6% slopes, severely eroded	Minimal	470			470
Sylvan SiL, 6 - 12% slopes, severely eroded	Minimal	7,245			7,245
Uniontown SiL, 0 - 2% slopes	Minimal	2,477			2,477
Uniontown SiL, 2 - 6% slopes, eroded	Minimal	4,464			4,464
Uniontown SiL, 2 - 6% slopes, severely eroded	Minimal	2,282			2,282
Uniontown SiL, 6 - 12% slopes, severely eroded	Minimal	3,315			3,315
Wellston SiL, 12 - 18% slopes, severely eroded	Minimal	1,133			1,133
Wellston SiL,, 18 - 25% slopes	Minimal	3,003			3,003
Wellston SiL, 25 - 35% slopes	Minimal	753			753
Wheeling loam, 0 - 2% slopes	Sand	3,159	3,159		
Wheeling loam, 2 - 6% slopes	Sand	2,589	2,589		
Wheeling loam, 6 - 12% slopes, eroded	Sand	572	572		
Woodmere SiL	Minimal	500			500
Total	264,960	184,152	15,265	0	168,887
Percent of County		70%	5.8%	0.0%	63.7%

Soil Map Units with Nitrate Leaching Index >10

Table 4 - Vanderburgh County

Soil Map Unit	Nitrogen Issue	Total Acres	Probability for secondary treatment		
			High	Moderate	Low
		Ac.	Ac.	Ac.	Ac.
Alford SiL, 12 - 18%, severely eroded	Minimal	1,100			1,100
Alford SiL, 2 - 6%, eroded	Minimal	5,600			5,600
Alford SiL, 6 - 12%, eroded	Minimal	610			610
Alford SiL, 6 - 12%, severely eroded	Minimal	3,150			3,150
Evansville SiL	Minimal	3,350			3,350
Huntington fine sandy loam, sandy variant	Minimal	560			560
Huntington silty clay loam	Minimal	13,300	—		13,300
Iona SiL, 0 - 2% slopes	Minimal	670			670
Iona SiL, 2 - 6% slopes, eroded	Minimal	1,400			1,400
Muren SiL, 0 - 2% slopes	Minimal	640			640
Muren SiL, 2 - 6% slopes, eroded	Minimal	2,500			2,500
Patton silty clay loam	Minimal	2,950			2,950
Princeton loam, 2 - 6% slopes, eroded	Sand	345	345		
Ragesdale SiL	Minimal	1,500			1,500
Uniontown SiL, 2 - 6% slopes, eroded	Minimal	740			740
Wellston SiL, 12 - 18% slopes, eroded	Bedrock	1,200		1,200	
Wellston SiL, 12 - 18% slopes, severely eroded	Bedrock	2,950		2,950	
Wellston SiL,, 18 - 25% slopes, eroded	Bedrock	4,280		4,280	
Wellston SiL, 25 - 50% slopes	Bedrock	910		910	
Wheeling loam, 0 - 2% slopes	Sand	1,770	1,770		
Wheeling loam, 2 - 6% slopes, eroded	Sand	1,770	1,770		
Wilber silt loam	Minimal	3,300			3,300
Woodmere silty clay loam	Minimal	1,850			1,850
Total	148,539	56,445	3,885	9,340	43,220
Percent of County		38%	2.6%	6.3%	29.1%

Soil Map Units with Nitrate Leaching Index >10
Table 5 - Warrick County

Soil Map Unit	Nitrogen Issue	Total Acres	Probability for secondary treatment		
			High	Moderate	Low
		Ac.	Ac.	Ac.	Ac.
Alford SiL, 12 - 18% slopes	Minimal	445			445
Alford SiL, 12 - 18%, severely eroded	Minimal	1,165			1,165
Alford SiL, 18 - 25% slopes	Minimal	410			410
Alford SiL, 2 - 6%, eroded	Minimal	3,695			3,695
Alford SiL, 6 - 12%	Minimal	725			725
Alford SiL, 6 - 12%, severely eroded	Minimal	3,295			3,295
Evansville SiL	Minimal	3,905			3,905
Huntington SiL	Minimal	1,160			1,160
Muren SiL, 0 - 2% slopes	Minimal	325			325
Muren SiL, 2 - 6% slopes	Minimal	1,030			1,030
Orthents stony, 33 - 90% slopes	Minimal	10,420			10,420
Orthents stony, 8 - 33% slopes	Minimal	4,835			4,835
Orthents, 0 - 8% slopes	Minimal	665			665
Orthents, 33 - 90% slopes	Minimal	13,740			13,740
Orthents, 8 - 25% slopes	Minimal	8,145			8,145
Patton silty clay loam	Minimal	780			780
Uniontown SiL, 12 - 18% slopes	Minimal	345			345
Uniontown SiL, 2 - 6% slopes, eroded	Minimal	1,100			1,100
Uniontown SiL, 6 -12% slopes	Minimal	320			320
Uniontown SiCL, 6 - 12% slopes, severely eroded	Minimal	865			865
Wellston SiL, 12 - 18% slopes	Bedrock	1,835		1,835	
Wellston SiL, 12 - 18% slopes, severely eroded	Bedrock	2,545		2,545	
Wellston SiL,, 18 - 25% slopes, eroded	Bedrock	3,225		3,225	
Wheeling loam, 0 - 2% slopes	Sand	545	545		
Wheeling loam, 2 - 6% slopes, eroded	Sand	395	395		
Wilber SiL	Minimal	2,700			2,700
Woodmere SiCL	Minimal	480			480
Total	250,240	69,095	940	7,605	60,550
Percent of County		28%	0.4%	3.0%	24.2%

Soil Map Units with Nitrate Leaching Index >10

Table 6 - Spencer County

Soil Map Unit	Nitrogen Issue	Total Acres	Probability for secondary treatment		
			High	Moderate	Low
		Ac.	Ac.	Ac.	Ac.
Alford SiL, 0 - 2%	Minimal	381			381
Alford SiL, 12 - 18% slopes, eroded	Minimal	282			282
Alford SiL, 12 - 18%, severely eroded	Minimal	3,836			3,836
Alford SiL, 18 - 25% slopes	Minimal	546			546
Alford SiL, 2 - 6%, eroded	Minimal	6,345			6,345
Alford SiL, 2 - 6%, severely eroded	Minimal	1,025			1,025
Alford SiL, 25 - 35% slopes	Minimal	570			570
Alford SiL, 6 - 12%, eroded	Minimal	1,033			1,033
Alford SiL, 6 - 12%, severely eroded	Minimal	8,127			8,127
Cuba SiL	Minimal	1,537			1,537
Gilpin-Wellston SiL, 25 - 35% slopes	Bedrock	2,731		2,731	
Gullied Land, loess	Minimal	801			801
Haymond SiL	Minimal	1,002			1,002
Huntington fine sandy loam, sandy variant	Sand	311	311		
Huntington silt loam	Minimal	8,849			8,849
Iona SiL, 0 - 2% slopes	Minimal	956			956
Iona SiL, 2 - 6% slopes, eroded	Minimal	408			408
Philo SiL	Minimal	14,137			14,137
Princeton loam, 2 - 6% slopes, eroded	Sand	319	319		
Princeton sandy loam, 6 - 18%, eroded	Sand	289	289		
Ragesdale SiL	Minimal	3,577			3,577
Uniontown SiL, 0 - 2% slopes	Minimal	460			460
Uniontown SiL, 12 - 25% slopes, eroded	Minimal	999			999
Uniontown SiL, 2 - 6% slopes, eroded	Minimal	2,511			2,511
Uniontown SiL, 2 - 6% slopes, severely eroded	Minimal	306			306
Uniontown SiL, 6 - 12% slopes, eroded		267			267
Uniontown SiL, 6 - 12% slopes, severely eroded	Minimal	939			939
Wellston SiL, 12 - 18% slopes, eroded	Bedrock	4,844		4,844	
Wellston SiL, 12 - 18% slopes, severely eroded	Bedrock	8,657		8,657	
Wellston SiL,, 18 - 25% slopes, eroded	Bedrock	5,843		5,843	
Wellston SiL,, 18 - 25% slopes, severely eroded	Bedrock	1,459		1,459	
Wellston SiL, 2 - 6% slopes	Bedrock	564		564	
Wellston SiL, 6 - 12% slopes, eroded	Bedrock	303		303	
Wellston SiL, 6 - 12% slopes, severely eroded	Bedrock	444		444	
Wheeling loam, 0 - 2% slopes	Sand	4,902	4,902		
Wheeling loam, 2 - 6% slopes	Sand	2,759	2,759		
Wheeling loam, 2 - 6% slopes, severely eroded	Sand	760	760		
Wheeling loam, 6 - 12% slopes, eroded	Sand	266	266		
Wheeling loam, 6 - 12% slopes, severely eroded	Sand	750	750		
Wheeling SiL, 0 - 2% slopes	Sand	2,226	2,226		
Wilber SiL	Minimal	5,547			5,547
Woodmere SiL	Minimal	1,194			1,194
Total	253,440	103,062	12,582	24,845	65,635
Percent of County		41%	5.0%	9.8%	25.9%

Figure 3-4
Soil Loading Rates for OSS[1,2]

Texture	Structure/Consistence: without densic material or fragic soil properties						Structure/Consistence: densic material or fragic soil properties
	sg	gr, pl[2]	strong abk sbk pr	moderate abk sbk pr	weak abk sbk pr	structureless massive	
Gravel (GR) Very Coarse Sand (VCOS) Loamy Very Coarse Sand (LVCOS) Coarse Sand (COS)	> 1.20 > 1.20						< 0.25 < 0.25
Medium Sand[3] (S) Loamy Coarse Sand (LCOS)	1.20 1.20	1.20 1.20			1.20 1.20		< 0.25 < 0.25
Fine Sand (FS) Very Fine Sand (VFS) Loamy Sand (LS) Loamy Fine Sand (LFS) Loamy Very Fine Sand (LVFS)	0.60 0.75	0.60 0.60		0.60 0.75	0.60 0.75	0.60 0.75	< 0.25 < 0.25
Coarse Sandy Loam (COSL) Sandy Loam (SL) Fine Sandy Loam (FSL) Very Fine Sandy Loam (VFSL)		0.60 0.75		0.60 0.60	0.60 0.60	0.60 0.60	< 0.25 < 0.25
Loam (L)		0.50 0.75	0.50 0.75	0.50 0.50	0.50 0.50	0.50 0.50	< 0.25 < 0.25
Silt Loam (SIL) Silt (SI)		0.50 0.75	0.50 0.75	0.50 0.50	0.50 0.30	0.50 0.30	< 0.25 < 0.25
Sandy Clay Loam (SCL)		0.50 0.60	0.50 0.50	0.50 0.50	0.50 0.30	0.50 0.30	< 0.25 < 0.25
Clay Loam (CL) Silty Clay Loam (SICL) Sandy Clay (SC)		0.25 0.60	0.25 0.60	0.25 0.30	0.25 0.25	0.25 0.25	< 0.25 < 0.25
Silty Clay (SIC) Clay (C)		0.25 0.60	0.25 0.50	0.25 0.30	0.25 0.25	0.25 0.25	< 0.25 < 0.25
Bedrock, Marl, Muck, Ortstein, and Peat	SLR of < 0.25 or SLR > 1.2, whichever is applicable SLR of < 0.25 or SLR > 1.2, whichever is applicable						

N

Legend for Determining SLRs:

- Above Ground OSDS
- Subsurface OSDS
- Not Applicable

Shape of Structure:

sg: single grained
gr: granular
pl: platy
abk: angular blocky
sbk: subangular blocky
pr: prismatic

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Gibson County, Indiana
Table H.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Perc si 4
	In				Pct	Pct	
Ad:							
Adrian----------	0-34	Muck	PT	A-8	0	0	100
	34-60	Sand, loamy sand, fine sand	SM, SP	A-1, A-2, A-3	0	0	80-100
Rensselaer----------	0-9	Mucky loam	CL, CL-ML, SC	A-2, A-4, A-6	0	0	100
	9-24	Clay loam, loam	CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0	100
	24-48	Sandy clay loam	CL, SC, SM	A-2-4, A-4, A-6	0	0	100
	48-60	Stratified fine sand to silt loam	CL, SC, SM	A-2, A-3, A-4	0	0	95-100
AlA:							
Alford----------	0-12	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	12-76	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	76-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AlB2:							
Alford----------	0-12	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	12-76	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	76-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AlB3:							
Alford----------	0-7	Silt loam	CL, CL-ML	A-4, A-6	0	0	100
	7-52	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	52-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AlC2:							
Alford----------	0-12	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	12-76	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100

	76-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
AlC3:								
Alford----------	0-7	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	7-52	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	52-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	
AlD2:								
Alford----------	0-12	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	12-76	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	76-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	
AlD3:								
Alford----------	0-7	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	7-52	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	52-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	
AlE:								
Alford----------	0-12	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	12-76	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	76-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	
AmF:								
Alford----------	0-12	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	12-76	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	76-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	
Parke----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	8-27	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	27-80	Sandy clay loam, loam, sandy loam	CL, CL-ML, SC, SM	A-2, A-4, A-6	0	0-3	95-100	9

Table H.--Engineering Index Properties--Continued

Map symbol	Depth	USDA texture	Classification	Fragments	Perc si

and soil name			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
AnB:								
Alvin	0-9	Fine sandy loam	SC	A-4	0	0	100	
	9-38	Very fine sandy loam, sandy loam, loam	SC	A-4	0	0	100	
	38-60	Very fine sand, fine sandy loam, loamy fine sand	SM, SP, SP-SM	A-2, A-3	0	0	95-100	9
AnC2:								
Alvin	0-9	Fine sandy loam	SC	A-2, A-4	0	0	100	
	9-38	Very fine sandy loam, sandy loam, loam	SC	A-2, A-4	0	0	100	
	38-60	Very fine sand, fine sandy loam, loamy fine sand	SC, SM, SP, SP-SM	A-2, A-3	0	0	100	
AnC3:								
Alvin	0-8	Fine sandy loam	SC	A-2, A-4	0	0	100	
	8-36	Very fine sandy loam, sandy loam, loam	SC	A-2, A-4	0	0	100	
	36-60	Very fine sand, fine sandy loam, loamy fine sand	SC, SM, SP, SP-SM	A-2, A-3	0	0	100	
AnD2:								
Alvin	0-6	Fine sandy loam	SC	A-2, A-4	0	0	100	
	6-41	Very fine sandy loam, sandy loam, loam	SC	A-2, A-4	0	0	100	
	41-60	Very fine sand, fine sandy loam, loamy fine sand	SC, SM, SP, SP-SM	A-2, A-3	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
AnD3:								
Alvin	0-4	Fine sandy loam	SC	A-2, A-4	0	0	100	
	4-36	Very fine sandy loam, sandy	SC	A-2, A-4	0	0	100	

		loam, loam						
	36-60	Very fine sand, fine sandy loam, loamy fine sand	SM, SP, SP-SM	A-2, A-3	0	0	100	
Ar:								
Armiesburg------	0-18	Silt loam	CL, ML	A-6, A-7	0	0	100	
	18-60	Silty clay loam, silt loam	CL, ML	A-6, A-7	0	0	100	
As:								
Armiesburg------	0-18	Silt loam	CL, ML	A-6, A-7	0	0	100	
	18-60	Silty clay loam, silt loam	CL, ML	A-6, A-7	0	0	100	
Ay:								
Ayrshire variant	0-8	Fine sandy loam	SC	A-4	0	0	100	
	8-14	Fine sandy loam	SC	A-4	0	0	100	
	14-54	Loam, fine sandy loam	CL, SM	A-4, A-6	0	0	100	
	54-80	Fine sandy loam	SM, SP, SP-SM	A-2, A-4	0	0	100	
BlA:								
Bloomfield----	0-8	Sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	8-30	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	30-80	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
BlB:								
Bloomfield----	0-8	Sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	8-30	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	30-80	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
BlC:							
Bloomfield----	0-8	Sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100
	8-30	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100
	30-80	Fine sand,	SM, SP, SP-SM	A-2-4, A-3	0	0	100

		loamy fine sand, sand						
BlD:								
Bloomfield----	0-8	Sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	8-30	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	30-80	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
BlF:								
Bloomfield----	0-8	Sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	8-30	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	30-80	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
Cg:								
Chagrin----	0-6	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	6-46	Silt loam, loam, clay loam	CL, ML	A-4, A-6	0	0	100	
	46-60	Stratified silt loam to fine sand	ML, SC, SM	A-2, A-4	0	0	100	
Cr:								
Crawleyville----	0-9	Loam	CL, CL-ML, SC	A-4, A-6	0	0	100	
	9-37	Sandy clay loam, loam	CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0	100	
	37-50	Fine sandy loam, sandy loam	SM, CL, SC	A-2-4, A-3, A-4	0	0	100	
	50-60	Fine sandy loam, sandy loam	CL, SC, SM	A-2-4, A-3, A-4	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
EkA:							
Elkinsville----	0-10	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	10-26	Silty clay loam, silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	26-80	Clay loam, sandy loam, loam	CL, ML	A-4, A-6	0	0	100

EkB:								
Elkinsville-----	0-10	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	10-26	Silty clay loam, silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	26-80	Clay loam, sandy loam, loam	CL, ML	A-4, A-6	0	0	100	
Ev:								
Evansville------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	9-40	Silty clay loam, silt loam	CH, CL, ML	A-7	0	0	100	
	40-65	Stratified silt loam to silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
Hd:								
Haymond---------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	8-45	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	45-60	Silt loam, loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
Ju:								
Junius variant--	0-8	Loamy sand	SC	A-2-4, A-4	0	0	100	
	8-19	Loamy fine sand, loamy sand	SC	A-2-4, A-4	0	0	100	
	19-46	Sandy loam, fine sandy loam	SP-SM	A-2-4, A-4	0	0	100	
	46-80	Fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
La:								
Landes----------	0-16	Fine sandy loam	ML, SC-SM, SM	A-4	0	0	100	
	16-40	Loam, very fine sandy loam, loamy fine sand	ML, SC-SM, SM	A-2-4, A-4	0	0	100	
	40-70	Stratified sand to silt loam	SP-SM	A-2-4, A-3, A-4	0	0	100	
Ly:								
Lyles----------	0-24	Fine sandy loam	SC	A-2-4, A-4	0	0	100	
	24-51	Sandy loam, loam, fine sandy loam	SC, SC-SM	A-2, A-4	0	0	100	
	51-60	Fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	

Lz:								
Lyles----------	0-11	Sandy loam	SC	A-2-4, A-4	0	0	100	
	11-34	Sandy loam	SC, SC-SM	A-2-4, A-4	0	0	100	
	34-62	Sandy loam	SC	A-2-4, A-4	0	0	100	
	62-70	Sandy clay loam	SC, SM	A-2-6, A-6	0	0	100	
Me:								
Medway----------	0-19	Loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	19-57	Loam, silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	100	
	57-70	Stratified sandy loam to silty clay loam	SC, SM	A-2, A-4	0	0	100	
Mh:								
Moundhaven------	0-9	Fine sandy loam	SP-SM, SM	A-2-4	0	0	100	
	9-70	Stratified sand to silt loam	SM, SP-SM	A-2-4, A-3	0	0	100	9
MuB2:								
Muren----------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	9-54	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	54-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
Nn:							
Nolin----------	0-10	Silt loam	CL, ML	A-6, A-7	0	0	100
	10-61	Silt loam, silty clay loam	CL, ML	A-6, A-7	0	0	100
	61-80	Loam, silt loam	CL, ML	A-6, A-7	0	0-10	100
No:							
Nolin----------	0-10	Silt loam	CL, ML	A-6, A-7	0	0	100
	10-61	Silt loam, silty clay loam	CL, ML	A-6, A-7	0	0	100
	61-80	Loam, silt loam	CL, ML	A-6, A-7	0	0-10	100
Pn:							
Patton----------	0-23	Silty clay loam	CL, ML	A-4, A-6	0	0	100
	23-57	Silty clay loam	CH, CL, ML	A-7	0	0	100
	57-70	Stratified silt loam to silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100

Ra:								
Ragsdale--------	0-20	Silt loam	CL, ML	A-4, A-6	0	0	100	
	20-56	Silty clay loam, silt loam	CH, CL, ML	A-7	0	0	100	
	56-60	Silt loam	CL, CL-ML, ML	A-6, A-7	0	0	100	
Rb:								
Ragsdale--------	0-14	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	14-30	Silt loam	CL, ML	A-6, A-7	0	0	100	
	30-50	Silt loam, silty clay loam	CH, CL, ML	A-6, A-7	0	0	100	
	50-60	Silt loam	CL, CL-ML, ML	A-6, A-7	0	0	100	
SbA:								
Skelton---------	0-11	Loam	CL, CL-ML, SC	A-2, A-4, A-6	0	0	100	
	11-60	Clay loam, sandy clay loam	CL-ML, SC, SC-SM	A-4, A-6	0	0	100	
	60-70	Clay loam, sandy clay loam	CL, SC	A-2, A-2-6, A-4, A-6	0	0	100	9

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
ScA:								
Skelton---------	0-9	Silt loam	CL, CL-ML, SC	A-2, A-4, A-6	0	0	100	
	9-53	Clay loam, sandy clay loam	CL-ML, SC, SC-SM	A-4, A-6	0	0	100	
	53-60	Clay loam, sandy clay loam	CL, SC, SM	A-2, A-2-6, A-4, A-6	0	0	100	9
SyB2:								
Sylvan----------	0-6	Silt loam	CL-ML, ML	A-4, A-6	0	0	100	
	6-17	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	17-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	
SyC3:								
Sylvan----------	0-6	Silt loam	CL-ML, ML	A-4, A-6	0	0	100	
	6-17	Silty clay loam, silt loam	CL	A-4, A-6	0	0	100	
	17-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	
SyD:								

Sylvan----------	0-3	Silt loam	CL-ML, ML	A-4, A-6	0	0	100	
	3-7	Silt loam	CL-ML, ML	A-4, A-6	0	0	100	
	7-22	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	22-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	
SyF:								
Sylvan----------	0-3	Silt loam	CL-ML, ML	A-4, A-6	0	0	100	
	3-7	Silt loam	CL, ML	A-4, A-6	0	0	100	
	7-22	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	22-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	
TaD3:								
Taftown---------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	8-31	Silt loam	CL, ML	A-4, A-6	0	0	100	
	31-41	Loam, silt loam	CL, ML	A-4, A-6	0	0-3	90-100	7
	41-45	Unweathered bedrock			---	---	---	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
TaE:								
Taftown---------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	9-29	Silt loam	CL, ML	A-4, A-6	0	0	100	
	29-49	Loam, silt loam	CL, ML	A-4, A-6	0	0-3	90-100	7
	49-64	Silt loam, loam	CL, ML	A-4, A-6	0	0-3	95-100	9
	64-68	Unweathered bedrock			---	---	---	
UmD3:								
Udorthents------	0-60	Silty clay loam			0	---	100	
Sylvan----------	0-4	Silt loam	CL-ML, ML	A-4	0	0	100	
	4-24	Silty clay loam, silt loam	ML	A-4	0	0	100	
	24-60	Silt loam, silt	ML	A-4	0	0	100	
UnA:								
Uniontown-------	0-11	Silt loam	CL, ML	A-4, A-6	0	0	100	
	11-42	Silty clay, silty clay loam	CL, ML, CH	A-7	0	0	100	
	42-60	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	
UnB2:								
Uniontown-------	0-9	Silt loam	ML	A-4, A-6	0	0	100	
	9-39	Silt loam,	CH, CL, ML	A-7	0	0	100	

		silty clay loam						
	39-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
UnB3:								
Uniontown-------	0-8	Silty clay loam	CL, ML	A-4, A-6	0	0	100	
	8-35	Silt loam, silty clay loam	CH, CL, ML	A-7	0	0	100	
	35-60	Silt loam, silty clay loam	CL-ML, ML	A-4, A-6	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
UnC3:								
Uniontown-------	0-8	Silty clay loam	CL, ML	A-4, A-6	0	0	100	
	8-35	Silt loam, silty clay loam	CH, CL	A-7	0	0	100	
	35-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
Wk:								
Wilbur----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	8-60	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
Wr:								
Wirt----------	0-16	Silt loam	ML, SC-SM, SM	A-4	0	0	100	
	16-24	Loam, sandy loam, fine sandy loam	ML, SC-SM, SM	A-2, A-4	0	0	100	
	24-60	Stratified sand to loamy fine sand	SM, SP-SM	A-3, A-4, A-2-4	0	0	100	

USDA-NRCS **NASIS Reports** **Soil Survey Division**

Posey County, Indiana
Table H.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
A1A:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-47	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	47-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
A1B2:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-47	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	47-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
A1B3:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-47	Silty clay loam, silt loam	ML, CL	A-4, A-6	0	0	100
	47-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
A1C2:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-47	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	47-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
A1C3:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-47	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	47-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
A1D:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-47	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	47-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Perc si 4
	In				Pct	Pct	
AlD3:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-47	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	47-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AlE:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-47	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	47-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
Ar:							
Armiesburg------	0-17	Silt loam	CL, ML	A-6, A-7	0	0	100
	17-60	Silty clay loam, silt loam	CL, ML	A-6, A-7	0	0	100
s:							
Armiesburg variant--------	0-19	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	19-70	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
BlB:							
Bloomfield------	0-15	Loamy fine sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100
	15-36	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100
	36-80	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100
BlC:							
Bloomfield------	0-15	Loamy fine sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100
	15-36	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100
	36-80	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification	Fragments: >10	Fragments: 3-10	Perc si

			Unified	AASHTO	inches	inches	4	
	In				Pct	Pct		
BlD:								
Bloomfield----	0-15	Loamy fine sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	15-36	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	36-80	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
BlF:								
Bloomfield----	0-15	Loamy fine sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	15-36	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	36-80	Fine sand, loamy fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
EkA:								
Elkinsville-----	0-16	Silt loam	ML, CL-ML	A-4, A-6	0	0	100	
	16-65	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	65-80	Sandy loam, loam, silt loam	CL, ML	A-4, A-6	0	0	100	
EkB2:								
Elkinsville-----	0-16	Silt loam	CL-ML, ML	A-4, A-6	0	0	100	
	16-65	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	65-80	Sandy loam, loam, silt loam	CL, ML	A-4, A-6	0	0	100	9
Ev:								
Evansville------	0-9	Silt loam	CL, ML	A-4, A-6	0	0	100	
	9-35	Silty clay loam, silt loam	CH, CL, ML	A-7-6	0	0	100	
	35-60	Stratified silt loam to silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	

Ge:								
Genesee---------	0-9	Loam	CL, CL-ML	A-4, A-6	0	0	100	
	9-60	Silt loam, loam	CL, CL-ML	A-4, A-6	0	0	100	
	60-64	Stratified sandy loam to silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
Ha:								
Haymond---------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	9-33	Silt loam	CL, ML	A-4, A-6	0	0	100	
	33-60	Silt loam, loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
IoA:								
Iona----------	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	
	8-39	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	39-60	Silt loam, silt	CL, CL-ML	A-4, A-6	0	0	100	
IoB2:								
Iona----------	0-8	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	
	8-39	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	39-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	
IoB3:								
Iona----------	0-8	Silt loam	CL, ML	A-4, A-6	0	0	100	
	8-39	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	39-60	Silt loam, silt	ML, CL	A-4, A-6	0	0	100	
Ld:								
Landes----------	0-19	Sandy loam	ML, SC-SM, SM	A-4	0	0	100	
	19-36	Loam, very fine sandy loam, loamy fine sand	ML, SC-SM, SM	A-2-4, A-4	0	0	100	
	36-60	Stratified sand to silt loam	SM, SP-SM	A-2-4, A-3, A-4	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
Ly:							
Lyles----------	0-20	Sandy loam	SC	A-4, A-2-4	0	0	100
	20-44	Sandy loam, loam, fine sandy loam	SC	A-2-4, A-4	0	0	100
	44-55	Stratified loamy fine	SC, SC-SM, SM	A-2, A-4	0	0	100

		sand to loam						
	55-60	Fine sand, sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
No:								
Nolin----------	0-10	Silt loam	CL, CL-ML	A-6, A-7-5	0	0	100	
	10-48	Silt loam, silty clay loam	CL, CL-ML	A-6, A-7-5	0	0	100	
	48-60	Loam, silt loam	CL, ML	A-6, A-7-5	0	0	100	
OnA:								
Onarga----------	0-15	Fine sandy loam	ML, SC-SM, SM	A-4	0	0	100	9
	15-44	Sandy clay loam, fine sandy loam	SC-SM, SM	A-2-4, A-3, A-4	0	0	100	9
	44-60	Loamy fine sand	SM, SP-SM	A-2, A-2-4	0	0	95-100	9
Pa:								
Patton----------	0-16	Silty clay loam	CL, ML	A-4, A-6	0	0	100	
	16-38	Silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	38-60	Stratified silt loam to silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
PnB:								
Plainfield variant----------	0-12	Loamy fine sand	SM, SP, SP-SM	A-6, A-7-5	0	0	100	
	12-30	Sand	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
	30-65	Sand, fine sand	SP	A-3	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
PrB2:							
Princeton----------	0-12	Loam	SC	A-2-4, A-4	0	0	100
	12-26	Sandy clay loam, fine sandy loam, loam	CL, SC	A-2, A-4	0	0	100
	26-50	Stratified loamy fine sand to loam	SM, SP, SP-SM	A-2-4, A-3	0	0	100
	50-80	Stratified fine sand to silt	SP-SM, SP	A-2-4, A-3	0	0	100
PrC2:							
Princeton----------	0-12	Loam	SC	A-2-4, A-4	0	0	100
	12-26	Sandy clay loam, fine sandy loam, loam	CL, SC	A-2, A-4	0	0	100
	26-50	Stratified	SM, SP, SP-SM	A-2-4, A-3	0	0	100

		loamy fine sand to loam						
	50-80	Stratified fine sand to silt	SP, SP-SM	A-2-4, A-3	0	0	100	
Ps:								
Psamments--------	---	---	---	---	---	---	---	
Ra:								
Ragsdale--------	0-19	Silt loam	CL, ML	A-4, A-6	0	0	100	
	19-43	Silty clay loam, silt loam	CH, CL, ML	A-7-6	0	0	100	
	43-65	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
St:								
Stonelick--------	0-35	Fine sandy loam	ML, SC-SM, SM	A-4	0	0	100	
	35-60	Stratified loam to loamy sand	SM, SP-SM	A-2, A-3, A-4	0	0	100	
SyB3:								
Sylvan----------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	9-25	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100	
	25-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
SyC3:							
Sylvan----------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	9-25	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	25-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
SyD3:							
Sylvan----------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	9-25	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	25-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
SyF:							
Sylvan----------	0-4	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	4-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	9-25	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	25-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100

UnA:								
Uniontown-------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	8-37	Silt loam, silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	37-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
UnB2:								
Uniontown-------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	8-37	Silt loam, silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	37-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
UnB3:								
Uniontown-------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	8-37	Silt loam, silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	37-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
UnC3:								
Uniontown-------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	8-37	Silt loam, silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	37-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
WeD3:								
Wellston--------	0-8	Silt loam	ML	A-4	0	0	100	
	8-30	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0-5	90-100	9
	30-60	Silt loam, loam	CL, CL-ML, SC, SC-SM	A-4, A-6	0	0-10	60-80	4
WeE:								
Wellston--------	0-12	Silt loam	ML	A-4	0	0	100	
	12-34	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	9

	34-60	Silt loam, loam	CL, CL-ML, SC	A-4, A-6	0	0-10	60-80	4!
'eF:								
Wellston--------	0-12	Silt loam	ML	A-4	0	0	100	:
	12-34	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	9(
	34-48	Silt loam, loam	CL, CL-ML, SC	A-4, A-6	0	0-10	60-80	4!
	48-60	Loam	CL, SC, SC-SM	A-4, A-6	0	0-15	60-80	4!

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
WhA:								
Wheeling---	0-10	Loam	CL, CL-ML, SC	A-2-4, A-4, A-6	0	0	100	9(
	10-56	Sandy clay loam, loam, sandy loam	CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0-5	100	7(
	56-65	Stratified loam to sandy loam to loamy sand	CL, SC, SM	A-2, A-3, A-4	0	0-5	100	9!
WhB:								
Wheeling-	0-10	Loam	CL, CL-ML, SC	A-2-4, A-4, A-6	0	0	100	9(
	10-56	Sandy clay loam, loam, sandy loam	CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0-5	100	7(
	56-65	Loam, sandy loam, loamy sand	CL, SC, SM	A-2, A-3, A-4	0	10-20	100	9!
WhC2:								
Wheeling--	0-10	Loam	CL, CL-ML, SC, SM	A-2, A-4, A-6	0	0	100	9(
	10-56	Sandy clay loam, loam, sandy loam	SC-SM, CL-ML, SC	A-2, A-4, A-6	0	0-5	100	7(
	56-65	Loam, sandy loam, loamy sand	CL, CL-ML, SC	A-2, A-3, A-4	0	0-5	100	7!
Wz:								
Woodmere--------	0-8	Silt loam	CL, ML	A-6, A-7-5	0	0	100	:
	8-23	Silty clay loam, silt loam	CL, ML	A-6, A-7-5	0	0	100	:
	23-80	Silty clay, silty clay loam	CL, ML	A-7-5	0	0	100	:

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Vanderburgh County, Indiana
Table H.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Perc si 4
	In				Pct	Pct	
AlB2:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-52	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	52-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AlC2:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-52	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	52-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AlC3:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-46	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	46-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AlD3:							
Alford----------	0-8	Silt loam	CL, ML	A-4, A-6	0	0	100
	8-46	Silty clay loam, silt loam	ML, CL	A-4, A-6	0	0	100
	46-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
Ev:							
Evansville------	0-9	Silt loam	CL, ML	A-4, A-6	0	0	100
	9-44	Silty clay loam, silt loam	CH, CL, ML	A-7-6	0	0	100
	44-60	Stratified silt loam to silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100

Table H.--Engineering Index Properties--Continued

Map symbol	Depth	USDA texture	Classification	Fragments	Perc si

and soil name			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
Ht:							
Huntington------	0-10	Silty clay loam	CL, ML	A-6, A-7-5	0	0	100
	10-43	Silt loam, silty clay loam	CL, ML	A-6, A-7-5	0	0	100
	43-60	Silt loam, very fine sandy loam	CL, ML	A-6, A-7-5	0	0	100
Hu:							
Huntington variant--------	0-10	Fine sandy loam	ML, SC-SM, SM	A-4	0	0	100
	10-40	Fine sandy loam	ML, SC-SM, SM, SP-SM	A-2, A-3, A-4	0	0	100
	40-70	Silt loam, fine sandy loam			0	0	100
IoA:							
Iona----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-42	Silty clay loam, silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	42-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
IoB2:							
Iona----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-42	Silty clay loam, silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	42-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
MuA:							
Muren----------	0-10	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	10-50	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	50-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
MuB2:							
Muren----------	0-10	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	10-50	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	50-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Perc si 4
	In				Pct	Pct	

Pa:								
Patton----------	0-11	Silty clay loam	CL, ML	A-4, A-6	0	0	100	
	11-60	Silty clay loam	CH, CL, ML	A-6, A-7-6	0	0	100	
PrB:								
Princeton--------	0-11	Fine sandy loam	SC	A-2-4, A-4	0	0	100	
	11-46	Sandy clay loam, fine sandy loam, loam	SC	A-2-4, A-4	0	0	100	
	46-60	Stratified loamy fine sand to loam	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
Ra:								
Ragsdale--------	0-16	Silt loam	CL, ML	A-4, A-6	0	0	100	
	16-45	Silty clay loam, silt loam	CH, CL, ML	A-7-6	0	0	100	
	45-60	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
UnB2:								
Uniontown--------	0-8	Silt loam	CL, ML	A-4, A-6	0	0	100	
	8-40	Silt loam, silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	40-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
WeD2:								
Wellston--------	0-7	Silt loam	ML	A-4	0	0	100	
	7-25	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0-5	90-100	9
	25-48	Silt loam, loam, clay loam	CL, CL-ML, SC	A-4, A-6	0-1	0-10	60-80	4
	48-52	Unweathered bedrock			0	---	0	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
WeD3:								
Wellston--------	0-6	Silt loam	ML	A-4	0	0	100	
	6-29	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0-5	90-100	9
	29-42	Silt loam, loam, clay	CL, CL-ML, SC	A-4, A-6	0-1	0-10	60-80	4

		loam						
	42-46	Unweathered bedrock			0	---	0	-
WeE2:								
Wellston----------	0-7	Silt loam	ML	A-4	0	0	100	:
	7-25	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0-5	90-100	9(
	25-48	Silt loam, loam, clay loam	CL, CL-ML, SC	A-4, A-6	0-1	0-10	60-80	4!
	48-52	Unweathered bedrock			0	---	0	-
WeF:								
Wellston----------	0-7	Silt loam	ML	A-4	0	0	100	:
	7-25	Silt loam, silty clay loam	CL-ML, CL	A-4, A-6	0	0	90-100	9(
	25-48	Silt loam, loam, clay loam	CL, CL-ML, SC	A-4, A-6	0-1	0-10	60-80	4!
	48-52	Unweathered bedrock			0	---	0	-
WhA:								
Wheeling----------	0-13	Loam	CL, CL-ML, SC	A-2-4, A-4, A-6	0	0	100	:
	13-50	Silty clay loam, loam, sandy loam	CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0	100	:
	50-70	Stratified loam to sandy loam to loamy sand	CL, SC, SM	A-2, A-3, A-4	0	0-5	100	9!

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
WhB2:								
Wheeling----------	0-13	Loam	CL, CL-ML, SC	A-2-4, A-4, A-6	0	0	100	:
	13-50	Silty clay loam, loam	CL-ML, SC	A-2, A-4, A-6	0	0	100	:
	50-70	Stratified loam to sandy loam to loamy sand	CL, SC, SM	A-2, A-3, A-4	0	0-5	100	9!
Wm:								
Wilbur----------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	:
	9-60	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	:

Wo: Woodmere---------	0-10	Silty clay loam	CL, ML	A-6, A-7-5	0	0	100	
	10-30	Silty clay loam, silt loam	CL, ML	A-6, A-7-5	0	0	100	
	30-80	Silty clay, silty clay loam	CL, ML	A-6, A-7-5	0	0	100	

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Warrick County, Indiana
Table H.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Perc si 4
	In				Pct	Pct	
AfB2:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-60	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	60-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AfC:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-60	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	60-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AfC3:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-60	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	60-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AfD:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-60	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	60-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AfD3:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-60	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	60-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AfE:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-60	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	60-80	Silt loam, silt	CL, ML	A-4, A-6	0	0	100

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
Ev:							
Evansville------	0-10	Silt loam	CL, ML	A-4, A-6	0	0	100
	10-42	Silty clay loam, silt loam	CH, CL	A-7-6	0	0	100
	42-60	Stratified silt loam to silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100
Hu:							
Huntington------	0-11	Silt loam	CL, ML	A-6, A-7-5	0	0	100
	11-44	Silt loam, silty clay loam	CL, ML	A-6, A-7-5	0	0	100
	44-60	Stratified silty clay loam	CL, ML	A-6, A-7-5	0	0	100
MuA:							
Muren----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-42	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	42-66	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
MuB2:							
Muren----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-42	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	42-66	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
OrB:							
Orthents--------	0-60	Silt loam	CL, CL-ML	A-4, A-6	0-3	5-15	55-90
OrD:							
Orthents--------	0-60	Silt loam	CL, CL-ML	A-4, A-6	0-3	15-30	55-75
OrG:							
Orthents--------	0-60	Silt loam	CL, CL-ML	A-4, A-6	0-3	5-15	55-90
OsF:							
Orthents--------	0-60	Silt loam	CL, CL-ML	A-4, A-6	0-3	15-30	55-75

Table H.--Engineering Index Properties--Continued

Map symbol	Depth	USDA texture	Classification	Fragments	Perc si

and soil name			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
Pa:								
Patton----------	0-10	Silty clay loam	CL, ML	A-4, A-6	0	0	100	
	10-42	Silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	42-60	Stratified silt loam to silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
UnB2:								
Uniontown-------	0-9	Silt loam	CL, ML	A-4, A-6	0	0	100	
	9-40	Silt loam, silty clay loam	CH, CL, ML	A-6, A-7-6	0	0	100	
	40-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
UnC:								
Uniontown-------	0-9	Silt loam	CL, ML	A-4, A-6	0	0	100	
	9-40	Silt loam, silty clay loam	CH, CL, ML	A-6, A-7-6	0	0	100	
	40-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
nD:								
Uniontown-------	0-9	Silt loam	CL, ML	A-4, A-6	0	0	100	
	9-40	Silt loam, silty clay loam	CH, CL, ML	A-6, A-7-6	0	0	100	
	40-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
WeD:								
Wellston--------	0-10	Silt loam	CL, CL-ML, ML	A-4	0	0	100	
	10-36	Silt loam, silty clay loam	CL, ML	A-4, A-6	0	0	90-100	9
	36-44	Loam, clay loam, channery loam	CL, SC, SC-SM	A-4, A-6	0-1	0-15	60-80	4
	44-46	Unweathered bedrock			0	---	0	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Perc si: 4	
	In				Pct	Pct		

WeD3:								
Wellston--------	0-10	Silt loam	ML	A-4	0	0	100	
	10-36	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0-5	90-100	9
	36-44	Loam, clay loam, channery loam	CL, SC, SC-SM	A-4, A-6	0-1	0-15	60-80	4
	44-46	Unweathered bedrock			0	---	0	
WeE2:								
Wellston--------	0-10	Silt loam	ML	A-4	0	0	100	
	10-36	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0-5	90-100	9
	36-44	Loam, clay loam, channery loam	CL, SC, SC-SM	A-4, A-6	0	0-15	60-80	4
	44-46	Unweathered bedrock			0	---	0	
WhA:								
Wheeling--------	0-12	Silt loam	CL, CL-ML, SC	A-2-4, A-4, A-6	0	0	100	
	12-50	Silty clay loam, loam	CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0	100	
	50-60	Stratified sandy loam to loam to loamy sand	CL, SC, SM	A-2, A-3, A-4	0	0-5	95-100	9
WhB2:								
Wheeling--------	0-12	Silt loam	CL, CL-ML, SC	A-2-4, A-4, A-6	0	0	100	
	12-50	Silty clay loam, loam	CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0	100	
	50-60	Stratified sandy loam to loam to loamy sand	SM, CL, SC	A-2, A-3, A-4	0	0-5	100	9
Wm:								
Wilbur----------	0-10	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	10-60	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
'o:							
Woodmore--------	0-10	Silty clay loam	CL, ML	A-6, A-7-5	0	0	100

	10-24	Silty clay loam, silt loam	CL, ML	A-6, A-7-5	0	0	100	
	24-84	Silty clay, silty clay loam	CL, ML	A-6, A-7-5	0	0	100	

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Spencer County, Indiana
Table H.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Perc si 4
	In				Pct	Pct	
AfA:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-57	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	57-70	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AfB2:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-57	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	57-70	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
.fB3:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-51	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	51-70	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AfC2:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-57	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	57-70	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AfC3:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-51	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	51-70	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AfD2:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-57	Silty clay loam, silt loam	CL, ML	A-6, A-4	0	0	100
	57-70	Silt loam, silt	CL, ML	A-4, A-6	0	0	100

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
AfD3:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-51	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	51-70	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AfE:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-57	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	57-70	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
AfF:							
Alford----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-57	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	57-70	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
Cu:							
Cuba----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-60	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
GmF:							
Gilpin----------	0-10	Silt loam	CL, ML	A-4, A-6	0-3	0-5	80-95
	10-28	Channery loam, silt loam, channery silty clay loam	CL, GC, SC	A-2, A-4, A-6	0-3	0-30	50-95
	28-32	Unweathered bedrock			---	---	---
Wellston--------	0-11	Silt loam	ML	A-4	0	0	95-100
	11-21	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	80-100
	21-40	Silt loam, loam, clay loam	CL, CL-ML, SC	A-4, A-6	0	0-10	65-90
	40-44	Unweathered bedrock			---	---	---
Go:							
Gullied land----	---	---	---	---	---	---	---

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
Ha:							
Haymond---------	0-9	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	9-50	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	50-60	Silt loam, loam	CL, CL-ML, ML	A-4, A-6	0	0	100
Ht:							
Huntington variant----------	0-10	Fine sandy loam	ML, SC-SM, SM	A-4	0	0	100
	10-48	Fine sandy loam, loamy fine sand	ML, SC-SM, SM	A-2, A-4	0	0	100
	48-60	Silt loam	CL, CL-ML	A-4, A-6	0	0	100
Hu:							
Huntington------	0-19	Silt loam, silty clay loam	CL, CL-ML	A-6, A-7-5	0	0	100
	19-60	Silt loam, silty clay loam	CL, CL-ML	A-6, A-7-5	0	0	100
IoA:							
Iona----------	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100
	8-38	Silty clay loam, silt loam	CL, ML	A-4, A-6	0	0	100
	38-60	Silt loam, silt	CL, ML	A-4, A-6	0	0	100
IoB2:							
Iona----------	0-8	Silt loam	CL, ML	A-4, A-6	0	0	100
	8-38	Silty clay loam, silt loam	CL, ML	A-6, A-7	0	0	100
	38-60	Silt loam, silt	CL, CL-ML, ML	A-4, A-6	0	0	100
Ph:							
Philo----------	0-8	Silt loam	ML, SC-SM, SM	A-4	0	0	100
	8-60	Silt loam, loam, sandy loam	SM, SP-SM	A-2, A-4	0	0	100

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	

PrB2:								
Princeton	0-9	Fine sandy loam	SC	A-2-4, A-4	0	0	100	
	9-40	Sandy clay loam, fine sandy loam, loam	CL, SC	A-2, A-4	0	0	100	
	40-80	Stratified loamy fine sand to loam	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
PrD2:								
Princeton	0-9	Fine sandy loam	SC	A-2-4, A-4	0	0	100	
	9-40	Sandy clay loam, fine sandy loam, loam	CL, SC	A-2, A-4	0	0	100	
	40-80	Stratified loamy fine sand to loam	SM, SP, SP-SM	A-2-4, A-3	0	0	100	
Ra:								
Ragsdale	0-13	Silt loam	CL, ML	A-4, A-6	0	0	100	
	13-52	Silty clay loam, silt loam	CH, CL, ML	A-7-6	0	0	100	
	52-60	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
UnA:								
Uniontown	0-8	Silt loam	CL, ML	A-4, A-6	0	0	100	
	8-41	Silt loam, silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	41-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
UnB2:								
Uniontown	0-8	Silt loam	CL, ML	A-4, A-6	0	0	100	
	8-41	Silt loam, silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	41-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
UnB3:							
Uniontown	0-8	Silt loam	CL, ML	A-4, A-6	0	0	100
	8-35	Silt loam, silty clay	CH, CL, ML	A-4, A-6, A-7-6	0	0	100

		loam						
	35-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
UnC2:								
Uniontown--------	0-8	Silt loam	CL, ML	A-4, A-6	0	0	100	
	8-41	Silt loam, silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	41-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
UnC3:								
Uniontown--------	0-8	Silt loam	CL, ML	A-4, A-6	0	0	100	
	8-35	Silt loam, silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	35-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
UnE2:								
Uniontown--------	0-8	Silt loam	CL, ML	A-4, A-6	0	0	100	
	8-41	Silt loam, silty clay loam	CH, CL, ML	A-7-6	0	0	100	
	41-60	Silt loam, silty clay loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
WeC2:								
Wellston---------	0-11	Silt loam	ML	A-4	0	0	100	
	11-21	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	9
	21-40	Silt loam, loam, silty clay loam	CL, CL-ML, SC	A-4, A-6	0-1	0-10	60-90	4
	40-44	Unweathered bedrock			---	---	---	

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
WeC3:								
Wellston---------	0-8	Silt loam	ML	A-4	0	0	100	
	8-15	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	9
	15-33	Silt loam,	CL, CL-ML, SC	A-4, A-6	0-1	0-10	60-80	4

		loam, silty clay loam						
	33-37	Unweathered bedrock			---	---	---	-
WeD2:								
Wellston--------	0-11	Silt loam	ML	A-4	0	0	100	:
	11-21	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	9
	21-40	Silt loam, loam, silty clay	CL, CL-ML, SC	A-4, A-6	0-1	0-10	60-90	4
	40-44	Unweathered bedrock			---	---	---	-
WeD3:								
Wellston--------	0-8	Silt loam	ML	A-4	0	0	100	:
	8-15	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	9
	15-33	Silt loam, loam, silty clay loam	CL, CL-ML, SC	A-4, A-6	0-1	0-10	60-90	4
	33-37	Unweathered bedrock			---	---	---	-
WeE2:								
Wellston--------	0-11	Silt loam	ML	A-4	0	0	100	:
	11-21	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100	9
	21-40	Silt loam, loam, silty clay	CL, CL-ML, SC	A-4, A-6	0-1	0-10	60-90	4
	40-44	Unweathered bedrock			---	---	---	-

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si
			Unified	AASHTO	>10 inches	3-10 inches	4
	In				Pct	Pct	
WeE3:							
Wellston--------	0-8	Silt loam	ML	A-4	0	0	100
	8-15	Silt loam, silty clay loam	CL, CL-ML	A-4, A-6	0	0	90-100
	15-33	Silt loam, loam, silty clay loam	CL, CL-ML, SC	A-4, A-6	0-1	0-10	60-90
	33-37	Unweathered bedrock			---	---	---

WhA: Wheeling	0-17	Loam	CL, CL-ML, SC	A-2-4, A-4, A-6	0	0	100	:
	17-68	Silty clay loam, loam, sandy clay loam	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0-5	100	9!
	68-80	Loam, sandy loam, loamy sand	CL, SC, SM	A-2, A-3, A-4	0	0-5	100	9!
WhB2: Wheeling	0-17	Loam	CL, CL-ML, SC	A-4, A-6, A-2-4	0	0	100	:
	17-68	Silty clay loam, loam, sandy clay loam	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0	100	9!
	68-80	Sandy loam, loam, loamy sand	CL, SC, SM	A-2, A-3, A-4	0	0-5	100	9!
WhB3: Wheeling	0-10	Loam	CL, CL-ML, SC	A-2-4, A-4, A-6	0	0	100	:
	10-61	Silty clay loam, loam, sandy clay loam	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0	100	9!
	61-80	Sandy loam, loam, loamy sand	CL, SC, SM	A-2, A-3, A-4	0	0-5	100	9!

Table H.--Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Perc si	
			Unified	AASHTO	>10 inches	3-10 inches	4	
	In				Pct	Pct		
WhC2: Wheeling	0-17	Loam	CL, CL-ML, SC	A-2-4, A-4, A-6	0	0	100	:
	17-68	Silty clay loam, loam, sandy clay loam	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0-1	100	9!
	68-80	Sandy loam, loam, loamy sand	CL, SC, SM	A-2, A-3, A-4	0	0-5	100	9!
WhC3: Wheeling	0-10	Loam	SC, CL, CL-ML	A-2-4, A-4, A-6	0	0	100	:
	10-61	Silty clay loam, loam,	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0	100	9!

		sandy clay loam						
	61-80	Sandy loam, loam, loamy sand	CL, SC, SM	A-2, A-3, A-4	0	0-5	100	9
W1A:								
Wheeling	0-17	Silt loam	CL, CL-ML, SC	A-2-4, A-4, A-6	0	0	100	
	17-68	Silty clay loam, loam, sandy clay loam	CL, CL-ML, SC, SC-SM	A-2, A-4, A-6	0	0	100	9
	68-80	Sandy loam, loam, loamy sand	CL, SC	A-2, A-3, A-4	0	0-5	100	9
Wr:								
Wilbur	0-8	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
	8-60	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	
Ws:								
Woodmere	0-8	Silt loam	CL, ML	A-6, A-7-5	0	0	100	
	8-22	Silty clay loam, silt loam	CL, ML	A-6, A-7-5	0	0	100	
	22-60	Silty clay, silty clay loam	CH, CL	A-6, A-7-5	0	0	100	

ecolo-til 2500

No-till offers many important soil conservation benefits, but often at the expense of yields. Case IH No-till tillage gives farmers the best of both the primary tillage and No-till worlds. An ecolo-til 2500 outfitted with Case IH No-till points and No-till shanks shatters compaction while leaving the surface residue virtually disturbance free.

Texas Agricultural Extension Service
The Texas A&M University System

L-5154

Paratill® Renovations of Pastures and Hayfields

S. D. Livingston and D. H. Bade*

A number of plows perform deep tillage, but few achieve acceptable results in re-establishing pastures without destroying major portions of the stand or creating considerable roughness.

One possible exception is the Paratill® Plow, which has been studied at several locations in Central and South Texas. This deep-tillage tool is equipped with coulters that slice through tight sod and plant residues. Following close behind are pairs of "legs" or stationary bottoms that are adjustable along a rigid toolbar.

The Paratill® Plow can:

- Loosen tight or compacted soils from 12 to 18 inches to increase root penetration and growth (select as needed).
- Leave the surface virtually undisturbed (established grasses and surface residues).
- Increase soil moisture storage (which translates into additional forage production).
- Improve internal drainage through the destruction of clay pans or compacted zones.

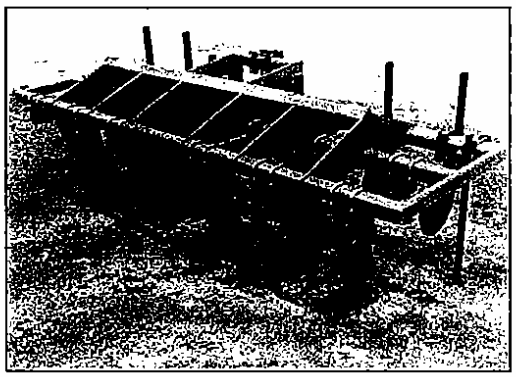

Figure 1. This six-leg Bigham Bros. Paratill plow illustrates pairs of legs facing in opposite directions on the tool bar. Fluted coulters slice the sod ahead of each plow leg. Gauge wheels provide assistance in determining depth of tillage.

In addition, the plow does not:

- Mix the topsoil with unfavorable subsoil.
- Bury surface residues important in protecting the soil.
- Create clods and roughness.
- Require additional trips for selected operations.

A fertilizer attachment to the back of the plow legs can be used to inject liquid fertilizer (such as deep phosphorous placement), instead of leaving it on the soil surface.

Principles of Action

The Paratill® Plow leaves a smoother soil surface than a chisel plow, parabolic subsoiler, or V-ripper. While roughness is less, the result may nevertheless be unsatisfactory without a light disking. Soils that are deep-plowed when they are too wet or too dry will tend to gape or produce too many clods. To make it easier to work heavy soils that are not at optimum moisture, some units have been equipped with rear cultipacker attachments that will resettle the soil and breakup clods. If the results are unacceptable, field operations should be stopped until the soil is more suited to tillage.

The Paratill® lifts the soil instead of pushing it. It is best used when there is some soil moisture. This would be at 50 percent or less of field capacity, when the soil is well drained, but not too dry. If the correct conditions are present, the soil is lifted "in-place" and falls, leaving the sod fairly intact. The soil is under-cut about 50 percent of the linear surface and is shattered along many natural cleavage planes. When these conditions are present, there will be few, if any, clods produced that are larger than your fist. The drier the conditions existing at time of renovation, the larger the clods that will result. When conditions are too wet, plant residues (bermuda grass roots) cling to the cutting edges of the plow and soil begins to collect on the surfaces. This may also create gaping, smearing, and damage to the soil structure.

*Professors and Extension Specialists, Agronomy and Forage, respectively, Texas A&M University

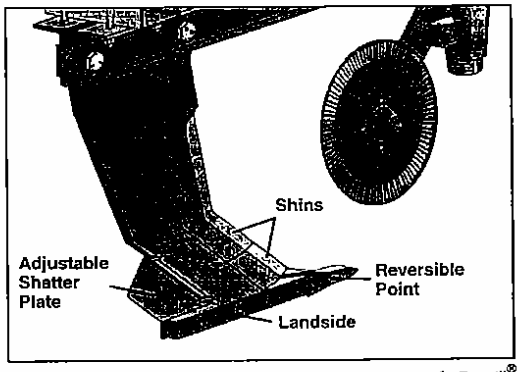

Figure 2. Schematic diagram illustrating primary components of a Paratill® plow.

Timing of Renovation

Selecting the best time to renovate has a tremendous effect on the user's degree of satisfaction. The best time for deep tillage is just before a rain. Ideally, the coastal bermudagrass would be winter-dormant at the time of renovation (December through March). If the outlook is for dry conditions, then renovation could have some risks. While bermudagrass has deep rhizomes and roots, it is possible that an extended drought immediately following deep tillage could seriously injure stands of any type of grass. Legs should be placed on the toolbar to undercut only 50 percent of the subsurface profile, leaving other roots disturbed but connective.

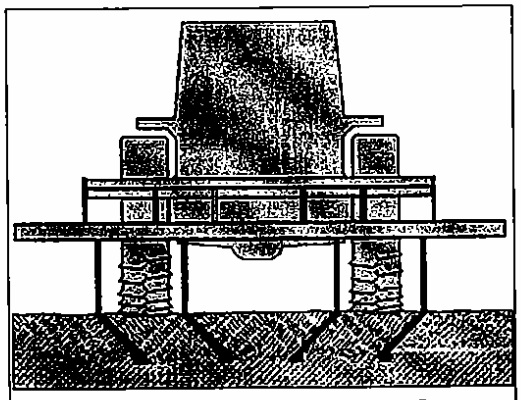

Figure 3. Spacing the legs on the tool bar can create either zone loosening of sod (renovation) or total loosening (reestablishment) of broken land.

Benefits of Deep Tillage

Why invest $15 to $18 per acre in deep tillage? If you are noticing declining forage yields and weed encroachment, compaction has reduced the water storage and accessible nutrients in your soil. While substantial yield increases have been observed in renovated coastal bermudagrass, klein, and buffel-grass pastures, coastal bermudagrass has perhaps been studied the most, with these results:

- Forage nutrient values are higher in deep-tilled fields in all values except crude protein. This increase is due to a larger root zone from which the forage plants may extract nutrients and the additional water storage capacity to retain them as soluble nutrients.
- Treated fields remained green and growing 2 to 3 weeks after non-tilled fields had gone summer-dormant. At the beginning of a drought, this additional production is critical.
- Cattle are able to obtain more usable forage because there are fewer weeds and competing plant species. Forage is more palatable and intake increases.
- More applied fertilizer is used in years with declining rainfall.

Forage Quality

Coastal bermudagrass often grows erect following renovation. Tillering and thickening of the stand with runners may be delayed until the soil has resettled with rain and hoof traffic. Forage testing of grass from renovated and non-renovated test strips has demonstrated higher TDN, protein, carbohydrate, and nutrient content in renovated plots. Not only is tonnage increased, the content of all desirable nutrients was increased as well. Such hay or forage is of much higher value to the livestock producer who produces hay for his or her own use. Premium hay reduces the amount of cottonseed meal or cubes required to overwinter herds and improves the performance of most cow-calf operations.

Positioning Depth. If a compacted layer is present, find it using a smooth rod. This works best when the soil is moist enough to permit probing. After finding the layer, push the rod harder until it passes just through the compacted zone. Mark the rod at this point and measure it with a ruler or tape. Adjust the depth of the plow point to be just one inch below the bottom of the compacted layer. Plowing to any greater depth is unnecessary, resulting in wasted fuel and additional power requirements.

Power Requirement

All deep-tillage tools are power-intensive. Depending on the number of legs on a Paratill®, figure 30 to 35 HP for each leg. In addition, the tires should be in good condition (adequate tread) for traction. Plows have only CIII capabilities for hitching.

Adjustments For Renovation

Once the depth has been established, the plow should be pulled into the sod to determine if it is level. The bottom of the plow should be parallel to the soil surface. If no hitch links require adjustment, set the gauge wheels to the desired height. If there is no plow pan or compacted zone, this can be 12 to 18 inches, depending on what is desired. After you ensure that all hardware is tight, the plow is ready for use.

Plow Safety

Plowing deeper than normal can cause some surprises. Watch out for buried water lines, electrical conduits, oil lines, rocks, tree stumps, fence posts, and similar objects. If you encounter bedrock or caliche, you will want to reduce depth. In very stony fields that are used as hayfields, you may pull up more stones than can be easily removed. These fields should probably not be deep-tilled in preference for a shallow-tillage method.

Plow Care and Maintenance

Coarse soils and very dry clay soils may cause greater equipment wear. It is not practical to estimate how many acres can be deep-tilled before point rotation is required, without relating such variables as soil texture and soil moisture. Points should be replaced when less than 4 to 5 inches in length. The rule of thumb is to rotate plow points every 350 acres when plowing loamy soil types. Points seldom last more than 500 to 700 acres.

Leg shins are fabricated as heat-treated forgings, while plow points are constructed from cast chromium carbide and will chip easily if stone or steel is struck in tillage operations. Cracked shins need not be replaced unless they become insecure. Most parts are lost through wear rather than breakage. Shatter-plate wear can be extended by "hard-facing." Plow damage can result if soft shear bolts are not used to set the plow legs.

The total plow weight varies depending on the number of legs positioned on the toolbar. A 4-leg unit weighs 3,530 pounds; a 6-leg unit weighs 4,650 pounds; and an 8-leg unit weighs 6,310 pounds. The most feasible method of moving the plow over large distances is with a Donahue- or Binkley-type equipment trailer. The plow should always be positioned just forward of the center of gravity of the trailer to prevent fish-tailing. Good hydraulics are required to lift the plow from the lowered equipment trailer.

Field Management after Deep Tillage

The extent of additional forage obtained from renovated fields depends on the amount and type of rainfall received. If it is a year with abundant rainfall, then it is possible that no differences in forage production would be observed. If rainfall is intermittent, then there is greater storage capacity in the renovated field to collect and conserve the rain that is received. When a hoof pan or clay pan is limiting production, deep tillage could double forage yields for the first new production year. Subsequent years will show less of an advantage as compaction returns. Usually, after 4 years, an additional tillage operation is required to maintain favorable production.

Two 4-year pasture renovation studies were used to evaluate dryland and irrigated production with the Paratill. Under dryland conditions (Table 1), forage production usually resulted in more than 1 ton of additional yield with deep renovation, providing some rainfall occurred during seasonal production. Increases were greater in years when annual rainfall was below normal and showers were received for soil water storage early during the forage production season.

Table 1. Yields of Coastal Bermudagrass Obtained over 4-Year Study at Luling Foundation, Caldwell County, Texas, 1990-93.

	Forage Weight (lb./A.), by year				
Treatment	90	91	92	93	Avg
Tilled	3165	12202	11167	9230	8941
Untrd Ck	2088	9654	9232	7800	7193
Change	1077	2548	1935	1430	1747
% Inc	51.6	26.4	21.0	18.3	29.3

When rainfall was plentiful and irrigation was managed to perfection, forage production was not dramatically different between the tilled and untilled plots (Table 2, page 4). Even so, only a few growers are capable of perfecting irrigation timing and fertilization, and water quality is often poor in South Texas (salt). Therefore, only timely and optimum rainfall will perfectly offset the impact of tillage.

Rainfall was favorable in 1991 and 1993 at the Hidalgo County test site (Table 2), and only small differences were realized. However, 1990 and 1992 were less uniform years and flood irrigation was not sufficient. Nevertheless, from 1 to 2 additional tons of forage were harvested. The maximum amount of additional forage that could be realized with tillage and good management was not fully tested in these two studies. Forage increase could be more than 2 tons under certain growing conditions.

Table 2. Yields of Coastal Bermudagrass Obtained over 4-Year Study on 4M Cotton, Cattle, and Grain Farm, Hidalgo County, Texas, 1990-93.

	Forage Weight (lb./A.), by year				
Treatment	90	91	92	93	Avg.
Tilled	11037	111761	1862	9888	10991
Untrd Ck	7072	10496	9222	9793	9146
Change	3965	681	2640	95	1845
% Inc	56.1	6.5	28.6	1.0	23.05

When stocking rates are very dense and pastures are heavily used during wet weather, yield curves may decline sooner than the typical 4 years. For best results, a generous fertility program should always accompany pasture renovations.

Other Options Possible

Horsepower requirements are large for deep-tillage equipment. Because ranchers and hay producers usually don't own large tractors and because it is difficult to justify the purchase of equipment that is used only once in 4 years, equipment leasing or custom operator services might be more cost-effective. Leasing rates vary widely across regions. Dealers report Paratill® leases for zone loosening at $6 per acre, if the customer supplies the wear parts or $8 per acre if the dealer replaces them. Rates for total loosening are higher. In general, rates of $7 to $10 for a 4-leg machine and $9 to $15 for a 6-leg machine (per acre) cover both types of renovation operations.

Acres per hour is calculated by taking the implement width times the ground speed divided by 10. Assuming 5 mph ground speed, a 6-leg Paratill® would cover 6.5 acres per hour, and a 4-leg machine would cover 4.25 acres per hour (widths 13.5 and 8.5 feet, respectively). Normal diesel consumption is about 12 gallons per hour.

Frequency of Renovation

Both forage production and quality will be extended further with rotational grazing for shorter periods. This will reduce compaction over time and will permit faster regrowth. Renovation is not an excuse to bump up stocking rates or to overgraze the more palatable forage. It may require 1 to 2 months to receive enough rainfall to settle the soil after renovation. It is usually best to obtain 4 to 6 inches of new growth before turning animals back onto renovated grassland.

The Paratill® is built by The Tye Company of Lockney, Texas, and Bigham Brothers Inc. of Lubbock, Texas, and is patented. These plows have a place in renovating improved pastures and hayfields where there are deep soils and sufficient grass density to preclude a reestablishment.

For shallow soils, or soils recently reclaimed from brush or forest, the more acceptable method of breaking a hoof pan would include equipment that works a more shallow profile. Units like the Hay King and Airway have demonstrated acceptable results with more frequent tillage cycles. The lower power requirements of these units make moderate or shallow tillage accessible and practical, where deep tillage might be limited to only those producers with clean fields and large equipment.

References

"Renovation Practices to Improve Rainfall Effectiveness on Rangeland and Pastures," C. Wayne Hanselka, S. D. Livingston, and David Bade, Texas Agricultural Extension Service publication L-5077, 1993.

"An Evaluation of the Tye Paratill for Renovation of Pastures," S. D. Livingston, Texas Agricultural Extension Service, TCB Special Report 661, 1993.

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Elizabeth Gregory, Editor

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Indiana Association of REALTORS®, Inc. and Indiana Builders Association
Position on Indiana State Department of Health
Proposed Revisions to Onsite Sewage Systems
410 I.A.C. 6-8.2

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The Indiana State Department of Health ("Department") published a proposed rule concerning onsite sewage systems in the June 1, 2003 Indiana Register. Proposed 410 I.A.C. 6-8.2, 26 IR 3116. This proposed rule would consolidate and replace the existing rules on residential sewage disposal systems (410 I.A.C. 6-8.1) and commercial onsite sewage systems (410 I.A.C. 6-10). It would also incorporate by reference a new set of Technical Specifications to govern the planning, installation and testing of onsite systems. The Indiana Association of REALTORS®, Inc. and the Indiana Builders Association offer the following comments on the proposed rule. We urge the Department to consider these comments prior to consideration of final adoption by the Department's Executive Board. Questions and requests for additional information concerning these comments should be directed to Ellen Holland, Director of Political Affairs, Indiana Association of REALTORS®, Inc., (317/266-9579, eholland@indianarealtors.com) or Marlys Pedtke, Code and Technical Specialist, Indiana Builders Association (317/236-6334, mpedtke@aol.com).

The Indiana Association of REALTORS®, Inc. ("IAR") has 15,000 member realtors statewide. The mission of IAR, in cooperation with national and local REALTOR® associations, is to sustain a healthy real estate market in Indiana. Key objectives of the IAR concern protection of property values and promotion of the role of housing in the economy. The Indiana Builders Association ("IBA") is a professional statewide association of over 5,300 members focusing on environmentally compatible, safe and affordable housing of all types. IBA works to educate its members, the general public, and all legislators and regulatory agencies to maintain and develop workable and affordable regulations and law that protect the rights of citizens to own a home.

Members of the IAR and IBA build and sell residential and commercial facilities and property served by onsite sewage systems, and will be directly affected by revisions to the regulatory and technical requirements for these systems. It is for this reason that we are submitting these comments. We oppose this regulation for the following key reasons, which are explained in greater detail below:

- It would place a significant economic hardship on individual homeowners at a time when Indiana's economy is floundering.
- It requires the installation of excessive and extremely expensive equipment without any scientific rationale for its use.
- It sets unrealistic standards for nitrate levels that even the equipment manufacturers are not willing to say can be met.

ATTACHMENT
M

THE FISCAL BURDEN OF THE PROPOSED RULE CANNOT BE SUPPORTED DURING THIS TIME OF ECONOMIC HARDSHIP

The proposed rule will impose substantial new regulatory and technical requirements on the installation and use of onsite sewage systems. These new requirements will be costly, and will have a significant negative affect on the affordability of housing in Indiana. In accordance with Ind. Code § 4-22-2-28, the Department requested a fiscal analysis by the Legislative Services Agency ("LSA"). This statutory provision requires agencies to submit proposed rules with an estimated fiscal impact greater than $500,000 on regulated entities to LSA. The Department must consider the LSA fiscal analysis as part of the rulemaking process.

We understand the Department originally estimated an annual cost of $8.7 million for the proposed requirements for all onsite systems. However, the LSA fiscal analysis prepared on March 11, 2003 provides a total estimate initial cost to regulated entities in the range of $19.3 million to $28.1 million. We have studied the LSA fiscal analysis, and find it difficult to determine how LSA calculated its total costs. In fact, we believe the costs will be far greater than the LSA fiscal analysis – $41.8 million a year just for new residential systems. This figure does not include any commercial systems or repairs to existing residential systems that fail. A cost analysis of the proposed rule as it concerns new residential systems, prepared by the IBA Septic Committee, is attached to this document.

However, even accepting as true the LSA fiscal analysis, it is easy to determine that many homeowners in Indiana will be faced with significant new financial burdens. For example, LSA obtained an estimate from one company concerning the cost to install a secondary treatment system to meet the proposed new denitrification requirements. An Earthtek system for a three-bedroom home would cost between $6,500 to $11,500 installed. As recognized by LSA, it is certain that this cost would be passed along to the home buyer. The average cost of a new home in Indiana is $94,300 (2000 U.S. census data). Installation of a secondary treatment system alone would increase that cost between 7 and 12 percent. And that does not include the cost of annual monitoring and maintenance, or any other costs associated with the proposed new rule, such as dual compartment septic tanks.

The single biggest asset of the average American is a home. Using a conservative estimate, the proposed regulation would add an average of $10,000 to the cost of a new home. The financial impact of this additional cost means that a person would have to earn and additional $2851.00 a year (which is $237 a month and approximately $1.50 an hour) to absorb the cost of complying with this proposed rule. If we take the additional $10,000 and assume an interest rate of 7 percent over a 30 year term, it would mean an additional $66.53 a month, which totals $23,951 over the life of the loan. The failure of existing systems presents its own problems. If a septic were to fail, the added cost of this regulation would potentially force people to give up their homes at a loss or to completely walk away from their homes because nobody would be willing to take on the liability. As a result, many homes in the State would be rendered worthless.

The fiscal impact of the proposed rule is a special concern during this period of economic hardship. Read any news publication or tune into a news program on the television or radio – it is evident that the national economy has been in decline for several years. Indiana in particular

has experienced difficult times. A March 23, 2003 article in the *Indianapolis Star* lists 25 statistics that show Indiana is falling behind most of the country in terms of jobs, personal income, economic development, education and housing prices. A copy of that article can be found at the following website: http://www.indystar.com/print/articles/0/030897-7890-120.html.

Housing has been a leading economic force in the State and nation, with sustained performance even as the stock market and other economic indicators have declined in recent years. In fact, a June 18, 2003 article in the *Indianapolis Star* reports that housing construction has rebounded, increasing 6.1 percent in May 2003. "Economy showing progress in 3 areas," Indianapolis Star, p. C-1 (June 18, 2003). Yet, even the housing market is not entirely positive. Mortgage foreclosure rates in Indiana are higher than any other State, and more than twice the national average. An increase of thousands of dollars on the cost of homes will affect new housing starts and existing home sales, and will price many Hoosiers out of the market for a home. Simply put, the economic burden of the proposed rule cannot be supported at this time.

THE PROPOSED RULE IS NOT TECHNICALLY NECESSARY AT THIS TIME; RATHER, THE DEPARTMENT SHOULD FOCUS ON BETTER IMPLEMENTATION AND ENFORCEMENT OF THE EXISTING RULES

The proposed rule and Technical Specifications appear to try to cover every conceivable situation by the use of prescriptive rather than performance-based language. Some examples of over-regulation include:

- A requirement to run a bush-hog over an ungraded soil absorption field site at a 3 inch height is impractical and dangerous. It would be quite sufficient to say that the site should be closely mowed.

- A requirement to place compacted backfill around a tank is unnecessary and costly. Slight settling of earth around the tank has no effect on system performance.

- Requirements for seeding and soil stabilization are unnecessary for most systems and cause extra expense for inspection and seeding out of sequence with the rest of the project.

This prescriptive approach provides little flexibility to local health departments to use common sense in addressing site-specific circumstances. Furthermore, many requirements of the proposed rule are not technically necessary to protect public health and water resources. A recent study by Purdue University showed an onsite system failure rate of less than 3 percent since 1991 and less than 1 percent since 1970 in a county that vigorously enforces the current rules. *See* Soil and Septic System Performance within Elkhart County, Indiana, Stout, Heidi M. and Lee, Brad D., Purdue University Agronomy Department, October 10, 2002. It is evident that significant revisions to the current rules are not needed. Rather, improvements can and should occur simply through proper implementation and enforcement of the current requirements. In fact, those areas of the State that have not properly implemented the current rules are likely to not implement any new rules. As a result, the current disparity between areas of the State will only increase. One of our primary concerns with the proposed rule is that it does nothing to address the current problems. Thus, in addition to all of the new prescriptive requirements, current problems with the program will remain. Instead of advocating a dramatic overhaul of the

current requirements, ISHD instead should audit local programs to put all areas of the State on a level playing field. It would be an easy task to amend the current rule to include solutions for the lack of current enforcement in counties with no resources, and to better address onsite system failures.

THE PROPOSED RULE INAPPROPRIATELY APPLIES THE INDIANA GROUND WATER QUALITY STANDARDS TO ONSITE SYSTEMS

In 2002, the Water Pollution Control Board adopted ground water quality standards for the State of Indiana. This rule, 327 I.A.C. 2-11, is authorized by Indiana's ground water protection statute, Ind. Code 13-18-17, and provides that several State agencies, including the Department, shall adopt rules to apply the standards to the facilities, practices and activities they regulate. 327 I.A.C. 2-11-2(a). In section 55 of the proposed rule, the Department attempts to do just that concerning onsite systems. This provision references the Department's Technical Specifications for Onsite Sewage Systems, 2003 Edition, which establishes procedures for determining whether secondary treatment is required to meet the nitrate (as N) criteria in the ground water quality standards. The Technical Specifications require secondary treatment of sewage for systems located in certain types of soil prior to discharge to the soil absorption field to protect ground water. If secondary treatment is required, the effluent must average no more than 10 milligrams per liter of nitrogen.

Upon review of these requirements, it is clear that the Department has inappropriately applied the ground water quality standards. The default criterion for nitrate (as N) is 10 milligrams per liter. 327 I.A.C. 2-11-6(a)(1). However, this criterion does not apply at the end of the system. Rather, 327 I.A.C. 2-11-2(b) provides that the Department (and other covered agencies) shall adopt rules to ensure the criteria in the ground water quality standards rule will not be exceeded in ground water <u>at or beyond the boundary of a ground water management zone</u>. Ground water management zones are established in 327 I.A.C. 2-11-9. This provision allows flexibility for agencies to establish program or site specific zones. However, it also establishes a default zone that agencies must apply in the absence of program or site specific zone:

> The boundary of the default ground water management zone shall be located in accordance with one (1) of the following:
>
> (1) At each drinking water well that is:
>
> (A) within three hundred (300) feet from the edge of a potential or existing contaminant source when the property boundary is greater than three hundred (300) feet from the edge of a potential or existing contaminant source; or
>
> (B) within the property boundary when the property boundary is less than three hundred (300) feet from the edge of a potential or existing contaminant source.
>
> (2) The property boundary, when the property boundary is less than three hundred (300) feet from the edge of a potential or existing contaminant source, and there is no drinking water well within the property boundary.

> (3) Three hundred (300) feet from the edge of a potential or existing contaminant source when the property boundary is greater than three hundred (300) feet from the edge of a potential or existing contaminant source and there is no drinking water well within three hundred (300) feet from the edge of a potential or existing contaminant source.

327 I.A.C. 2-11-9(d). The Technical Specifications make absolutely no provision for a ground water management zone, whether default, program specific or site specific. If secondary treatment is required, the nitrate limit applies as effluent is discharged from the treatment system, before it reaches the soil absorption field. The Technical Specifications do specify a certain situation in which secondary treatment is not necessary: if the property is greater than 10 acres, and the soil absorption field is at least 300 feet from the property line and any water supply wells. However, this is not a ground water management zone. The Department has improperly applied the ground water quality standards.

327 I.A.C. 2-11-2(b) provides that agencies should consider the technological and economic reasonableness of and other appropriate factors in determining a feasible approach to applying the ground water quality standards. There is no scientific evidence that nitrates from onsite systems are reaching ground water in excess of the applicable ground water quality standards. Also, the manufacturers of secondary treatment equipment cannot guarantee that their systems will even meet the denitrification requirements. Further, the Technical Specifications rely on Natural Resource Conservation Service ("NRCS") soil maps and the Nitrate Leaching Index. But according to NRCS, the soil maps are out of date, and were never designed to evaluate small areas such as home sites. Rather, the maps were meant for large scale applications. Further, the Nitrate Leaching Index was developed to guide agricultural fertilizer application at the ground surface, and was not meant to be used for purposes of evaluating soil types with regard to onsite systems.

The equipment that is required to meet the denitrification requirements is excessively expensive, and easily represents the most costly aspect of the proposed regulation. LSA estimated that compliance with the secondary treatment requirement would cost between $10.4 million and $15 million in capital and between $345,000 to $430,000 in annual maintenance and monitoring for residential systems. We think the actual cost is far greater – over $21 million a year for Indiana home owners. The legal and technical basis of the secondary treatment requirement is suspect, and the associated expense to homeowners is substantial. Thus, the Department must reconsider how it applies the Indiana ground water quality standards to onsite sewage systems.

THE PROPOSED REQUIREMENTS CONCERNING OPERATING PERMITS SHOULD BE DELETED FROM THE RULE

Section 48 of the proposed rule would establish a new requirement to obtain operating permits. It is entirely unclear why the Department seeks to establish this new permitting program for onsite systems. Further, this section is quite vague. For both residential and commercial systems, it provides that operating permits may be required. However, the provision does not clearly state who determines whether an operating permit is necessary, and the circumstances under which a operating permit shall be required. The proposed rule also does not

explain how such a permit would be obtained, nor the process or timing for obtaining an operating permit. It is not apparent what conditions would be imposed by an operating permit. Of particular concern is subsection 48(f), which simply provides that the Department may require the owner of a commercial system to obtain an operating permit pursuant to Ind. Code 13-15-1-2. That citation is part of the environmental statutes, and provides the Indiana Water Pollution Control Board with the authority to establish requirements concerning the issuance of permits to control water pollution. These permits are issued and enforced by the Indiana Department of Environmental Management ("IDEM"). It is inappropriate and quite likely unlawful for the Department to determine that the owner of an onsite system must obtain a permit from IDEM. The operating permit requirement should be deleted from the proposed rule.

THE TIMING OF CERTAIN ACTIONS BY THE REGULATING AUTHORITY NEEDS TO BE CLEARLY SPECIFIED AND AS SHORT AS POSSIBLE

Section 51 of the proposed rule provides that when a system fails and replacement of the soil absorption system is required, the permitting or approval requirements of the rule must be followed. Likewise, section 52 requires permit or approvals for use of temporary sewage holding tanks. The standard allowable time for local health departments to issue permits is 45 days. The Department has at least 90 days to issue approvals. When a system fails, the owner of the system needs to be able to respond and rectify the problem as soon as possible to protect human health and the environment. Pump and haul is expensive and should only be a very short term remedy. Therefore, the rule should specify a much shorter timeframe – no more than 5 business days – for issuance of permits and approvals needed to address system failures. At the very least, the rule must provide priority for issuance of permits and approvals in these situations.

CONCLUSION

The proposed rule would impose significant new requirements concerning the design, installation and operation of onsite sewage systems in Indiana. These new requirements will cost Indiana homeowners and businesses many millions of dollars each year. We urge the Department to fully consider these and other comments received concerning the scope of the rule. The proposed rule should not be presented to the Executive Board for final adoption. We encourage to Department to focus on implementation and enforcement of the current rules before it proposes any further revisions.

Cost Analysis of Rule 410 IAC 6-8.2 - IBA Septic Committee

The following is an attempt quantify additional costs for construction of various types of septic systems as required by the proposed new rule.

These costs do not represent possible increases in cost of permits or other costs which may accrue to local government for enforcement of this rule.

These costs reflect typical installations. There are numerous requirements contained in the rule that are too difficult to quantify and may apply only in specific situations. Some of those costs may be substantial.

These costs do not reflect interest costs for delayed starts due to 45 day turnaround time on permits and for delays due to requirement that construction activities may not take place until the permit is issued.

Cost of septic systems vary widely across the state due to local soil conditions, availability of aggregate and other materials, labor costs and level of enforcement of current septic rule.

INCLUDES INFO FROM ISDH ON DISTRIBUTION OF TYPES OF SEPTICS INSTALLED ANNUALLY IN INDIANA, UPDATED COSTS FOR STABILIZATION AND SEEDING AND UPDATED COSTS FOR WATERTIGHT FITTINGS 3/19/03

All costs shown below are additional costs due to new regulations.

Rule reference	Description	Additonal cost
	Conventional system	
Chapter 2. II. & III.	Submittal costs for borings and design documentation 1 Additional boring (3 required, currently rule requires 2) Additional documentation not presently required Utility location	$200.00
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Tanks to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$730.00**

Rule reference	Description	Additonal cost
	Conventional system with perimeter drain	
Chapter 2. II. & III.	Submittal costs for borings and design documentation 1 Additional boring (3 required, currently rule requires 2) Additional documentation not presently required Utility location	$200.00
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Tanks to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 4.II.E.7.	Trench to be backfilled with aggregate, cost of stone, hauling, placing, removal of trench spoils. Perimeter drain length 300' x 4' deep x 1.5' wide	$1,800.00
Chapter 4.II.E.5.c.3.	Cost of rigid pipe and placement of pipe	unknown
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$2,530.00**

Rule reference	Description	Additonal cost
	Flood-dosed system	
Chapter 2. II. & III.	Submittal costs for borings and design documentation 1 Additional boring (3 required, currently rule requires 2) Additional documentation not presently required Utility location	$200.00
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Septic tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Septic tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VI.E.2.	Dose tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Dose tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VIII.D.8.c.	Lock-on alarm	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at dosing tank	$25.00
Chapter 5.VIII.D.11.	NEMA 4X junction box required	$25.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$965.00**

Rule reference	Description	Additonal cost
	Conventional system with secondary treatment for nitrate reduction	
Chapter 2. II. & III.	Submittal costs for borings and design documentation 1 Additional boring (3 required, currently rule requires 2) Additional documentation not presently required Utility location	$200.00
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Septic tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Septic tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 3.VI.	Secondary treatment device cost estimates from manufacturers range from $7600.00 to $10,600.00 additional	$9,100.00
Chapter 8.II.4.	Operation and maintence costs range from $250.00 TO $400.00 per year for 20 year life cycle, say $325.00 average x 20 years	$6,500.00
Chapter 8.II.5.	Monitoring costs for local government range from $50.00 to $80.00 per year for 20 year life cycle, say $65.00 average x 20 years	$1,300.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$17,630.00**

Rule reference	Description	Additonal cost
	Sand mound system	
Chapter 2. II. & III.	Submittal costs for borings and design documentation 1 Additional boring (3 required, currently rule requires 2) Additional documentation not presently required Utility location	$200.00
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.E.2.	Septic tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Septic tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VI.E.2.	Dose tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Dose tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VIII.D.8.c.	Lock-on alarm	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at dosing tank	$70.00
Chapter 5.VIII.D.11.	NEMA 4X junction box required	$25.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	IBA has not yet reviewed all of the requirements for this type of systen	unknown
	Additional cost per system	**$965.00**

Forecast of systems installed in Indiana

Indiana builds approximately 14,000 new homes on septic systems per year.

Based on information on system distribution from ISDH, a conservative projection is as follows:

3,156	Conventional systems		$2,303,880.00
5,861	Conventional systems with perimeter drains		$14,828,330.00
2,921	Flood-dosed systems		$2,818,765.00
1,200	Conventional systems with secondary treatment for nitrate reduction		$21,156,000.00
762	Sand mound systems		$735,330.00
100	Other system types		unknown
14,000	**Total**	**Additional cost of new rule per year**	**$41,842,305.00**

This represents installed costs, only where those costs are readily identifiable. Conservative estimates have been used. There will be additional costs for delayed starts, other items in the rule and costs for enforcement and monitoring.

Another view of sites requiring secondary treatment for nitrate reduction.

According to Earth-Tek's literature, their Enviro-Filter unit will reduce total nitrates to 17mg/l.

Orenco states that their AdvanTex unit will reduce nitrates by 75%. Since nitrates in household effluent range from 37 to 60 mg/l, the finished effluent from the Orenco unit will have range of 9.25 to 15 mg/l.

Since the rule mandates a standard of 10 mg/l, it is unlikely that either of these units will be approved for use on a widespread basis. ISDH has not committed to approve any system for this purpose.

This creates a situation where lots valued at $22,000.00 or more apiece will become nearly worthless. 20% of Indiana's soils are of the type requiring denitrification. While we do not know exactly how many homesites will be affected, we can safely assume a bare minimum of 1500 lots losing $17,000.00 in value each for a total of $25.5 million.

Additionally, there will be an immediate drop in housing production due to the loss of equity in those lots, resulting in lost sales and lost jobs.

"Y"

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5GC

July 30, 2003

Public comment regarding 410 IAC 6-8.2 and the Technical Specification:

I would like to go on record in support of the changes submitted July 1, 2003 by the Indiana Environmental Health Association Wastewater Management Committee, as well as the changes submitted July 30, 2003. In addition, I have the following comments to submit:

1. Chapter 5 Section IV.B. Standards, Septic Tank Capacity; after capacity requirements for two (2) compartment tanks and tanks in series add, **Two (2) compartment septic tanks may be used in series, provided the overall liquid capacity of the first septic tank is at least two (2) times the daily design flow.**

2. Chapter 6 Section IV.B.1.b.1. (WMC version) strike **to the dose tank**

3. Chapter 6 Section IV.B.1.c.1. (WMC version) add **except the lateral at the distal end of the manifold.**

4. Chapter 6 Section IV.B.1.c.2. (WMC version) add **except the lateral at the distal end of the manifold.**

Thank you for your consideration of this matter. If you have any questions or need clarification, please contact me at 260-449-7695.

Sincerely,

Gary Chapple, REHS
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ATTACHMENT
HH

From: "Gary Chapple" <gary.chapple@co.allen.in.us>
To: Chris Bourke <Cbourke@isdh.state.in.us>
Date: 7/18/03 4:27PM
Subject: Rule and tech spec

Chris:

I realize not all the references have to be perfect in our document, but if others are looking at it the details may help them see what we had in mind. So here is a list of formatting/corrections that I see. Line numbers are from Tracker mode version (hopefully the latest).

Rule - definition of exp and alt systems to match changes in tech spec glossary.

Tech spec:

582 - footnote numbers off in table 3-1

751 - ref ch6sec1.D.2.d.4

931 - Strike "for residential" since this now applies to all.

951 - sec II.A.5.a.1

953 - sec II.A.5.a.2

1824 - make alarm float language consistent with 1533 changes

2944 - Figure 8-1 does not address .4 SLR for the reduction factor. This one may take a vote on which column to put it in.

I have a few others that the committee will need to look at (six small items, don't panic). Thanks for all of your work keeping track of the proposed changes throughout this process.

Gary

Gary Chapple, REHS
Pollution Control Director
Fort Wayne - Allen County Department of Health
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5GL

Indiana Environmental Health Association
Waste Water Management Committee

The definition of alternative technology onsite system and experimental soil absorption field technology must reflect the changes in the Tech Spec.
Alternative technology onsite system: A component, equipment, secondary treatment device, or high strength waste device not described in Technical Specification for Onsite Sewage Systems, 2003 Edition, ***Chapters 1 through*** 7 for which sufficient research documentation, field performance documentation, or data for use in Indiana has been documented demonstrating that it meets the requirements of 410 IAC 6-8.2-43 and 54.

Experimental technology onsite system: A component, equipment, secondary treatment device, or high strength waste device not described in Technical Specification for Onsite Sewage Systems, 2003 Edition, ***Chapters 1 through*** 7 for which sufficient research, field performance, or data for use in Indiana has not been documented demonstrating that it meets the requirements of 410 IAC 6-8.2-43 and 53.

Line 582 Figure 3-1 Footnote numbers need to be adjusted.

Line 709 strike are ***unsuited for other types of trench onsite systems*** and add ***may be constructed in soils with a soil load rate of 1.20 gpd/ft^2.***

Line 751 Incorrect reference. The site must be suitable for the installation of trench bottoms no more than thirty-six (36) inches below final grade [see Chapter 6, Section I. D. 2. ***d.*** 4.

Line 931 Strike ***for residential*** since this is a requirement for all onsite systems.

Line 951 Incorrect reference: A perimeter drain provided the requirements of Section II A. 5 ***a.*** 1. of this chapter are met.

Line 953 Incorrect reference: An interceptor drain provided the requirements of Section II A.5.***a.***2. are met.

Line 965 Incorrect reference: Perimeter and segment drains required in Section II. A. 5. ***a*** 1. of this chapter must be installed sufficiently deep to lower the seasonal high water table to the depth required in Chapter 3, Section IV. A.6 and Chapter 3, Section V. A. 6.

Line 999 Incorrect reference: When a subsurface perimeter drain or segment drain is installed solely to reduce the size of the dispersal area required in Figure 3-2, Dispersal Area Width for Soil Absorption Fields in Soils with an SLR < 0.5 gpd/ft2, it must meet the depth requirements of Section II. B. 1. ***a*** or ***Section II. B. 2.b.*** of this chapter.

ATTACHMENT
B

Line 1337 Incorrect reference removed: **Section I. G. 3. a.** All onsite systems must have a septic tank except as provided for in Chapter 8.

Line 1792 Strike ***commercial facility***: For onsite systems with a DDF of greater than seven-hundred and fifty (750) gallons per day (gpd), and when breakaway flanges and unions are not accessible without having to enter the dose tank, guide rails must be used.

Line 1824 Change float language to be consistent with line 1533 changes. The high water alarm ***switch*** must be set at least four (4) inches below the invert elevation of the tank inlet and at least ***three (3)*** inches above the on-float position.

Line 2590 Strike ***Prepare the surface of the Spec 23 sand before the placement of the soil material cover*** to eliminate redundancy.

Line 2944 figure 8-1 Reduction factor changed to ***<.50*** to be consistent with the soil loading rate table.

Line 497 in the Rule: correct the reference.

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Gerald R. Phipps, PE
1526 Cedar Street
South Bend, Indiana 46617

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August 11, 2003

Office of Legal Affairs
c/o Burton Garten
Indiana State Department of Health
2 North Meridian Street
Indianapolis, Indiana 46204-2003

RE: Comments on Proposed Rule 410 IAC 6-8.2
Technical Specifications for Onsite Sewage Systems

Dear Mr. Garten:

I am a practicing civil engineer and Vice-President of the Area Plan Commission of St, Joseph County. As a member of the Plan Commission I have been actively involved in recent efforts to establish policies for determining the required method of wastewater disposal for new subdivisions in St. Joseph County.

The current subdivision ordinance for our county allows the Area Plan Commission to approve subdivisions with wastewater disposal by individual onsite septic systems if the Commission determines that connection to a municipal sanitary sewer system is not economically feasible and that the individual septic systems will not endanger public health. For years those decisions have been made on a case by case manner but we are now trying to establish written policies for making those decisions.

My comments are regarding the proposed rule and the changes to the specifications proposed by the IEHA Wastewater Management Committee. The first comment concerns the proposed deletion of a paragraph in Chapter 1, Section I of the proposed specifications as adopted January 8, 2003. The paragraph that is proposed to be deleted states that in moderate to high density land development "consideration should first be given to other sewage treatment methods". Unless the Department of Health is now taking the position that individual, onsite septic systems, designed and constructed in accordance with the revised specifications, are in all respects, and in all situations, fully equivalent to municipal collection and treatment systems, I believe that the proposed specifications should address the question of applicability. It will be difficult for our Plan Commission to require sewers when it appears that individual, onsite septic systems have approval, without reservation, of the Indiana Department of Health, and that septic systems are an appropriate method of wastewater disposal as long as the technical specifications are followed.

ATTACHMENT
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Actually, I believe that the specifications should be more specific in setting maximum densities for septic systems. When the Department of Health has been consulted concerning specific subdivision approvals we have sometimes been cautioned that the density of systems should be a consideration in determining if sewers should be required. If density of systems is important, it should at least be mentioned as it is so briefly and indirectly in the January 8 draft specifications.

410 IAC 6-8.2-50(b)(1) does allow local authorities to deny a septic system permit if a sewer is within 300 feet of the property line of the affected property, or if the cost of a sewer connection does not exceed 150 percent of the cost of the septic system. That is at least an indication that there is reason for a preference for sewers and municipal treatment, but it is also indirect and well hidden. Those criteria for possible requirement of a sewer connection seem to be taken from the current rule for commercial systems. They do not now apply to residential systems. A problem with these criteria is that they can be interpreted to be a State determination of the maximum relative value of sewers in comparison with septic systems. Reacting to our attempt to define the economic feasibility of sewer service for subdivisions, our local builders organization has argued that we should not require sewers if the cost of sewers exceeds 150 percent of the cost of onsite systems because the State has determined that 150 percent is the maximum value of a sewer connection. Some clarification of the applicability of those standards would also be helpful.

I am certainly in favor of regulations concerning design and construction of individual wastewater systems, and I appreciate the efforts of the Department of Health in periodically updating the rule and specifications to keep them consistent with current scientific knowledge, but I believe that for a rule to be effective it should have defined applicability. How to build a septic system is important, but equally important is the question of where it should and should not be used. The proposed rule seems to be thorough on the question of how, but particularly with the IEHA Wastewater Management Committee proposed applicability deletion, very silent on the where. I believe local government should have more guidance from the Department of Health on where individual, onsite septic systems are appropriate.

Sincerely,

Gerald R. Phipps, PE

INDIANA BUILDERS ASSOCIATION

5IBA

August 13, 2003
Proposed Rule for Onsite Septic Systems
LSA Document #02-321

Final Written Testimony of the Indiana Builders Association (IBA)
To the Executive Board of the Indiana State Department of Health
Submitted in Writing to the Hearing Officer
During the Public Comment Period

Ladies and Gentlemen of the Board,

Thank you for providing three public hearings for the proposed septic rule. IBA members from different regions of the State attended and participated by making comments at all three hearings. At the first hearing in Indianapolis, we listed the major economic and technological reasons for our lack of support for this proposed rule. At the second hearing in LaPorte we identified our legal reasons and provided our detailed list of technical problems with the rule. At the third hearing in Seymour, we summed up our concerns with a list of repercussions of this rule if it is adopted (with or without revisions suggested by the Waste Water Management Committee). We appreciate the opportunity to present our views on this rule and present this summary for your consideration.

IBA continues to ask the Board to recall the rule. Testimony presented at the public hearings is in itself evidence of the broad lack of support for the proposed rule. The regulated community; i.e. installers, builders, equipment manufacturers and soil scientists alike, have asked for this rule to be withdrawn, or at least radically revised. The enforcement community, that is, local health departments, have requested recall of the rule or have expressed tepid support for the rule only if major changes are made. ISDH staff who wrote the rule, floated a revised version that bears only a passing resemblance to the version posted on the ISDH website for the last eight months.

Why is this? There are several reasons but the root cause is this: all stakeholders have not been brought to the table to write a workable, updated rule.

Over the past three years, we have been invited by ISDH staff to discuss the proposed rule. While we appreciate staff's willingness to discuss the proposed rule, talking is not a good enough return for the thousands of hours invested by our members and many, many other interested parties. We have received and responded to multiple drafts, but have received no commitment to make even the smallest of changes from ISDH staff.

It is our desire to sit down together with a "blank page" and specific, agreed upon goals from all involved parties. In 1990, the current rule was written in this manner, everyone participated fully, resulting in a progressive and workable rule that has a proven track record. There are many well-educated, highly experienced people who are willing to work with ISDH staff, if ISDH staff is willing to work with them.

It is also important for ISDH to understand that whatever rule is adopted must stand-alone without the need for subsequent protocols, memos of clarification, etc. The rule, including the technical specifications and any other adopted-by-reference document, is going to be used to make economic decisions, and cannot be in a constant state of flux. In other words, if there is no uniformity in enforcement, no standard of application, there is no credibility for the rule or the department. We might say there is no rule.

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ATTACHMENT
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The rule must address the use of septic systems as an alternative to municipal sewers while protecting public health. One of the most important goals should be to expedite the testing, approval and dissemination of new technology. Failing septic systems pose a health risk and water contamination risk for both small rural communities and remote lake communities. New technologies could well provide an affordable and safe alternative for these situations as well as for individual residences on difficult sites.

ISDH must recognize affordability as a legitimate factor in drafting regulations. It is not acceptable to change the rule because somebody "thinks" it is a "good idea". The cost of changes and benefits must be weighed. A case in point is the requirement for two compartment tanks, a "good idea" that has a minimal benefit, costs over a million dollars per year and could put several small manufacturers out of business due to re-tooling costs.

On a broader scale, the economic impact of this rule combined with rising mortgage interest rates and re-assessment/property tax impacts could amount to a "perfect storm" scenario for housing. This could be particularly devastating in the northern tier of counties, but would have serious negative impact throughout the State.

IBA has said from the beginning that we do not want to be part of a nitrate pollution problem. ISDH has been unable to demonstrate that septics are a meaningful contributor to nitrate pollution of the ground water of Indiana. We have partnered with the Elkhart County Health Department and Purdue University to fund a pilot study to see how real; functioning septic systems transfer nitrates in the specific types of soils addressed in this rule. We are in search of science-based data that may be of use in regulating this contaminant in a way that has a positive benefit to the people of our state.

Our goal has been and continues to be safe, affordable housing. We want to work with ISDH and others to develop a rule that achieves our goals and theirs as well. Please recall this rule.

Thank you.

Sincerely,

David Kovich

David Kovich, President
Indiana Builders Association

Terry Herschberger

Terry Herschberger, Chair
IBA Septic Committee

Cc: Governor Frank O'Bannon
Attorney General Steve Carter
State Senator Marvin Riegsecker

NA 11

INDIANA BUILDERS ASSOCIATION

Proposed Septic Rule Issues
Given in Testimony at the Public Hearing
For LSA Document #02-321
July 30, 2003
LaPorte, Indiana

GENERAL ISSUES

The rule will impact the design costs of septic systems, doubling them, by asking for more information on the plans and requiring the designer to be on site. The rule shows a lack of knowledge regarding the properties of soil, specifically the unsaturated soil surrounding a septic system and its functionality. Note that EPA is not mandating these measures: EPA is calling for a maintenance program (O&M).

The rule's reference of the Nitrate Leaching Index, and its real purpose, is to measure the quality of soil in relation to agricultural purposes. The use of this tool for a different goal, that of measuring for septic design, is inappropriate, the science behind each purpose being different.

The IDEM rule, Rule 11, allows for technical and economic reasonableness; this rule does not provide for either.

A problem with the rule is that it identifies one contaminant, nitrates, unconscionably without basis, while ignoring other equally ominous contaminants potentially in the soil, such as phosphates, chlorides, and bacteria. Why choose nitrates? The Technical Specifications of the rule will encourage types of development that will lead to larger problems for soils in the future.

We turn to the rule's position with regard to drains and soil loading rates. No one has researched the effects of the drain requirements (of any drain requirements), so there is no idea whether or not the required numbers are correct. There are many instances where developments are causing no problems in these areas. Moreover, research information under this rule will not be forthcoming any time soon, due to the rigid oversight required of the state in this rule, which will render experimental systems unattractive by being cumbersome. In effect, the rule prevents any science from taking place in Indiana outside the laboratory.

Many locations in the southern part of the state are already on municipal or regional systems due to the quality of ground water, so why would this rule be enforced in those locations, to protect dirty ground water?

In answer to the question, what other technology could we use to mitigate nitrates, we suggest using a performance standard with gravity systems, single mound, shallow systems, flooded systems. Our consensus is that this needs to be a site-dependent determination. From a public health perspective, these would meet the goal of clean effluent, with FAR less expense.

This entire subject should be taken from the front end: new homes need to be planned for, and area inputs, golf courses, etc., identified as risks for the water supply, and designed for, with a model properly designed for surface runoff and nitrate assessment to these needs, and usable by county planners.

The rule is overwhelmingly prescriptive, in the face of EPA's desire for performance standards. Regarding our lack of certainty that we have a problem, and why can't we obtain data in a controlled environment, by which we would then measure our projects? Such a model would provide the basis for requiring certain technologies. The first step would be Indiana-specific assessment. Right now we are using the data from other states, which renders our knowledge about water quality from our septic systems ineffective. In fact, the need for this is imperative, given that what very little research is available for Indiana shows inconclusive results. We can provide specifics for this research.

given as an example of over regulation for a local authority to provide. The subcommittee's conclusion was that all of these prescriptive subsections need to be deleted and performance language provided, so that the latitude required for each site can be utilized for best treatment.

I.D.2.a. The subcommittee discussed the problems with requiring the trench to be parallel to the contour of the site. Site contours are potentially complex. The design includes the responsibility of dealing with the contours. Discussion affirmed that if a slope is equal to or greater than 2%, the design needs to follow the contours, to avoid downslope dispersal issues. Some questioned the 2%, and then agreed to ½%, because ½% is referenced in the definition of a mound, thereby also defining a level surface.

During a working lunch, subcommittee members talked about the rule's erosion of local authority, and interpreted that as an attempt on the part of the rule writers to "idiot proof" the installations, a futile attempt at over control. They also mentioned that a national septic code is being written, and expressed concern that no southern Indiana representatives are at these meetings. Such reps would be helpful because the southern terrains and soils have their own issues, which may not be being considered sufficiently.

II.A.1. There was total confusion expressed over this paragraph, regarding electricity and commercial application. Also, it should not say 500 feet. If the trench is long, it may need to be pump assisted. The rule ignores the germane point, which is, is there a reason for this provision from a public health, engineering, or soils point of view?

IV. General discussion regarding this entire section centered on the need for design parameters, which would be checked against the plans. Technical discussion included that the rule's prescription shows a lack of understanding regarding this technology and the proper treatment of the aerobic mat, which needs to have water more frequently to keep it workable. Also mentioned here was the lack of specifically-stated state turn-around time. This is one area where it is sorely needed.

Chapter Seven Sand Mound Onsite Systems
I.C.3.b.3)b). This provision disturbed the subcommittee, who called it an unworkable requirement. Much discussion centered on the proper method(s) of preparing sites, and how site-specific such work is, requiring various machines and techniques. The field technicians do this all of the time, and need to be able to use their judgment on appropriate methods and tools.

I.D.5. Wheels should not be allowed.

I.D. Figure 7-2. The subcommittee questioned the appropriateness of the reference to Spec. 23. .

I.F.1.a. This provision does not provide a width measurement. At 2), this is not a sentence.

II.A. Figure 7-3. The table, together with the footnotes, make no sense i.e., the footnotes nullify the table's values. Discussion stated that if the pump is under-sized, the distribution system gets clogged. The rule is demonstrating a lack of understanding of how sand mound systems function. If properly constructed, they work very well, and ought not be considered a risk. Also, when a quick mathematical check was applied to the table, the proposed values were found to be in error. The subcommittee was going to re-check those values.

Chapter Eight Experimental and Alternative Technologies
The subcommittee in general felt that such regulations, if knowledgeably written, could provide a structured enforceablility, a good thing. Discussion included general questions about the statutory creation and authority of local health departments. No conclusions were forthcoming.

Appendix C. Figure 3-4. The subcommittee agreed that the column for "structureless massive" is questionable. Densic material is less than .25, because is very, very slight, but not 0. The subcommittee did not have a solution to this column's problems.

Our final comments regarding the technologies required by the rule emphasize that there are other means to reach the goal of clean ground water: real protection in wellhead protection zones, treating nitrates near the ground surface, drip systems, filters (ion exchange columns). We reiterate that the Index is not designed for the purpose of this rule.

We turn briefly to the authority in statute for local health departments, its limits, and interface with the state's authority. In conjunction with this point, experimental systems under the rule have untenable parameters. And we question the scope of the rule: does it properly cover existing systems?

LINE-SPECIFIC ISSUES

Proposed Rule
Secs. 2 and 3: What are "department standards" and do they need to be identified, in order to be adopted?
Sec. 4: Better definition of "bedroom", add closet.
Sec. 6: What is a "regulated facility"?
Sec. 8: Definition of "construction" ought not to include "earth-moving operations", nor "delivery of construction materials".
Sec. 11: Add size to the tree root balls.
Sec. 12: What is "sufficient"?
Sec. 22: How much "failure" is ok? Any?
Secs. 25 and 38, in conjunction: These are overlapping, and require permits for repairs that are too minor for the permit fees.
Sec. 27: "Any unit of government", does this include the state?
Sec. 42 (d): This greatly impacts repairs and existing systems, as well as time sensitive problems for home owners.
Sec. 43 (s) and (t): Are these adoptable language, given that they are undefined and totally discretionary.
Sec. 44 (b): Include number of bedrooms?
Sec. 46 (i): 45 days is unacceptable.
Sec. 46 (j) and (k): These sections create an impossible standard for utilizing vacant lots in developed areas; the reference is inappropriate to NRCS ag materials, and too vague.
Sec. 47 (e)(1): The state's turn-around time is implied, but needs to be stated; and 90 days is too long.
Sec/ 49(b): If a local department issues a permit, they need to perform an inspection on the matter.
Sec. 49(h): Add "and" or "or"?
Sec. 50(e): Add the state's IC cite for appeal procedure.
Sec. 51(d): This constitutes great curtailment of local authority of "best practice". Not ok.
Sec. 52(b)(6): "Shall" not "may" require a high water alarm.
Sec. 52(d)(5): "Two years", is this a little too long?
Sec. 52(e)(6): Should this time frame be as established by the local department?
Sec. 53(e): What is "sufficient"?
Sec. 54: What does this do to repairs, existing systems? Does it apply?
Sec. 56(f): What is the need for this data? It will be burdensome to provide.

Technical Specifications
Chapter 1 Introduction
I. Applicability: Not good code language. Should be deleted.

Chapter 2 Administrative Authority & Plan Submittal
II. Plan Submittal: Written Site Evaluation Report:
A and B too vague; C too prescriptive, also in C.2.c.: Materials listed from NRCS. What does this mean?
D.3.: Discussion about discrepancies. Why is this necessary?

III. Plan Submittal: Site Plan & Design Specifications:
D.1.a.12)b): "Acceptable to DNR". What does this mean? Too vague.
D.2.b.4)b): Same as above.

IV. Plan Submittal: Site Preparation, Cover, Finish Grading & Soil Stabilization:

A.2.a.: "Require the verification of the location...." What does this mean?
B.1.b.: Vegetation and bush hog requirements: impossible to do.
B.3.c.: "Paratill". This is a brand name, ok to be in a rule?

V. Plan Submittal: Additional Requirements for Experimental & Alternative Technology Onsite Systems:
A.3. "Manufacturer agent". What does this mean?

Chapter 3 Site & Onsite System Requirements
I. Minimum Separation Distances, Figure 3-1: "Road Right-of-Ways" not properly understood. Maybe the rule means easements? Till is now a component. Not ok.

II. Dispersal Area Requirements:
B.5.: "For soil absorption fields with a slope of greater than one-half percent, no part of the dispersal area may slope toward the soil absorption field." What does this mean?

IV. Trench Onsite System Selection Criteria:
B.: "30 inches". Current says 24.

VI. Requirements, Secondary Treatment for Nitrogen Reduction:
B.3.: The reference to the Index is not ok. Needs to be resolved.
C.2.b. Typo: needs to read Section VI, C. 1. b., not VI, B. 1. b.

Chapter 4 Site Drainage
I. Surface Diversions: This wording does not work. It needs to be performance oriented and site-specific, something like "look at the topography, if there exists a problem, so elsewhere".

II. Onsite Subsurface Drainage Systems:
A: Number 5. is out of place, should not be a component of the system. Should be "B".
A. 5. a.: This requirement for a perimeter drain around commercial facilities is adding point source pollution, makes the commercial system look good, but by moving sewage out away from the drain. Not acceptable.
A. 5. b.: Perimeter drain for residential systems required whether in sand or not. May be misplaced requirement. Is this meant for all systems?
A. 5. c.: Typos in 1) and 2).
B. 3.: Question was raised about the 60 inches. Safety precaution?
C. 3. No confidence in origin of numbers, 65 feet. What is the basis for this?
E. 5. c. 3): Requiring rigid drainpipe in this configuration, with these spaces, is not feasible.
E. 6. b.: Why is the maximum value deleted?

Chapter 5 General Onsite System Components
II. Pipes
Figure 5-2
IV. Drainpipe.; The listing for PVC ASTM D 3034 SDR 35, caused some concern, and was the genesis of the McKean report, due to the requirement in Chapter 4 for rigid drainpipe. The subcommittee was not aware of such material being available under this specification.

B.1.c.1): Reads "...movement of effluent along the outside of the pipe...", should read "water".
B.2.b.1): Typo: two (0.2) percent, should read two-tenths.

IV. Septic Tanks
A. General Requirements 5.; Question was made, the prohibition of having pumps, pumps vaults and pump pits not be installed in a septic tank, is a situation that occurs during repairs. Is this "best judgment" or experimental? The group concurred that under repairs the best judgment of the officer carries.

B. Standards, Septic Tank Capacity 4. and 5.; The question was raised, is this acceptable? Why does the rule stipulate no more than three tanks? What is at issue here? What is the science that requires the 1/3rd and ½ volumes?

Figure 5-7
Some of the subcommittees' texts contained a typo of 900 gallons, while others correctly contained 9,000. The group was concerned that the final rule would contain the correct number, and what did the rule say that the Board preliminarily adopted?

C. Construction Requirements, All Septic Tanks 2.; Concern was raised by the secondary reference to IAPMO's Standard, and how the rule removes reference to it by saying "...except when it deviates from...". Is this allowable? Who decides whether the standard is referenced or not? In general, secondary references are a problem throughout the rule.

E. Access Opening Requirements, All Septic Tanks a.: Considerable discussion was spent identifying the location for inner baffles. It was the consensus of the group that this rule identifies them incorrectly, that they are required to be in the wrong location.

F. Riser Requirements, All Septic Tanks: This section was seen to be a strange, inconsistent mix of prescriptive and performance language. There was some discussion of the untenability of the requirements for the manufacturer of the risers in the field. The subcommittee felt the requirements showed a lack of field experience on the part of the rule writer.

V. Dose Tanks
A. General Requirements 5.: Several members of the subcommittee disagreed with the requirement for the dose tank inlet to be within 12 inches of the tank bottom.

C. Construction Requirements, All Dose Tanks 1.: Typo was found "cast-in-place", and question was made, why are cast in place concrete dose tanks not allowed?

VI. Structural Integrity, Connectors, Quality Control, Product Marking & Standards for Tank Installation
A.1.a.2): "...vacuum to two (2) inches mercury." Why is this vacuum requirement necessary? Are a lot of tanks not holding up? Leaking?

B. Connectors in Septic Tanks, Dose Tanks, and Distribution Boxes 1., 2., and 3.: Do these requirements go beyond the Board's authority? The requirements seem overly detailed and restrictive, anti-industry.

C. Testing Requirements, Septic Tanks and Dose Tanks 1. and 2.: These requirements were thought to be confusing. Some parts of the sections seem to say every single tank must be tested. Others seem not to require that. The subcommittee thought the language was unclear.

E. Standards for Installation, Septic Tanks and Dose Tanks 2.: The words "at least four (4) inches of" need to be deleted. This matter was discussed with ISDH earlier and agreed to that it would not be included.

E.9. This entire item needs to be deleted. The soil treatment requirements are unrealistic and overly restrictive. What is this responding to?

VII. Abandonment or Removal of Septic Tanks and Dose Tanks
B. Abandoned-in-Place 3. This item should reference collapsing the top and one side, not the tank cover.

VIII. Pumps
"Static" head: The subcommittee thought the definition for static head is misplaced. Also, the reference to the dose tank pump in off position is incorrect, and should reference the pump inlet, in order to provide a margin of safety.

D. Installation 4.a.: Reference to breakaway flanges was objected to. These are considered under serviceable and do not perform adequately. Why are they allowed in a rule that is generally punitive?

8.c. The reference to lock-on high water alarms was objected to. These are expensive and cannot be shut off when the homeowners are not present.

11: The reference to NEMA's 4X rating, or corrosive environment, was considered too strict. This is not necessarily such an environment.

IX. Distribution of Effluent
A. Manufactured Distribution Boxes 5.a.: The requirement for four (4) inches, again needs to be deleted. See item E.2. above.

A.5.d.2)a): What is "closed cell neoprene gasket material"?

A.5.g. This requirement makes no sense. Since it is another attempt at performance language, why not simply state the goal? To prevent ponding. "The final grade around distribution boxes must prevent ponding."

D. Pressure Distribution Networks 1.e.: The word "sealed" needs to be deleted and the word "installed" substituted.

D.1.f.1) and 2): What causes the reference to 750 gallons per day or less? Why is the standard for this requirement 750 gallons? This is over-designed. Practical installations in the field need more flexibility than this, making this an inappropriate requirement.

E. Holes in Pressure Distribution Networks 4.: This language is obtuse at best. It makes no clear sense. It is not readily understandable rule writing.

X. Barrier Material
A. Specifications: All three of these parameters were seen as being overly detailed.

XI. Soil Absorption Fields
A.Size of Soil Infiltrative Surface 4.b.: This formula was identified by the subcommittee as a justification for downsizing a system. Using a pump is not feasible in some counties, and available area may be a problem. Some on the subcommittee did not value this method, and thought it should not be included in the rule.

Chapter Six Trench Onsite Systems
I.A. Protection of Soil Absorption Field – The subcommittee discussed how the rule requires "protection," but does not state how to protect. Protection is relative from site to site, and it would be helpful if the rule provided some parameters, so that field judgment can be used appropriately.

I.A.2.c. Discussion regarding work that can or cannot be done when the ground is frozen raised questions that the rule is too strict. Some work is best done with a few inches of frost.

I.A.4.a. Alteration from existing plans is not a good thing in theory, but sometimes an alteration is best for the site. How can this kind of circumstance be easily embraced by the rule, to utilize the practitioner's expertise?

I.B.2.b. The size of rootballs that are allowed was discussed. The rule implies the size by stating "trees present within the…trench," but it would be better if said.

A long discussion ensued regarding the compacting of soils from various causes, and how those causes are significantly different in their effect, given the weather, terrain, and other variables. The subcommittee discussed deleting I.A.2.c, then discussed deleting all of the sub-sections under 2. Subsection I.B.3.d. was

given as an example of over regulation for a local authority to provide. The subcommittee's conclusion was that all of these prescriptive subsections need to be deleted and performance language provided, so that the latitude required for each site can be utilized for best treatment.

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Indiana Builders Association

Detailed List of Proposed Septic Rule Issues used in Discussion with ISDH Staff
May 13, 2003
Housing Center, Indianapolis

Synopsis of IBA Septic Committee Minutes

GENERAL ISSUES

The rule will impact the design costs, doubling them, by asking for more information on the plans and requiring the designer to be on site. Discussion turned to the lack of knowledge shown in the rule regarding the properties of soil, specifically the unsaturated soil surrounding a septic system and its functionality. The distinction was noted that EPA is not mandating these measures: EPA is calling for a maintenance program (O&M).

Attention turned to the rule's reference of the Nitrate Leaching Index, and its real purpose, which is to measure the quality of soil in relation to agricultural purposes. The use of this tool for a different goal, that of measuring for septic design, is inappropriate, the science behind each purpose being different.

The group discussed the IDEM rule that allows for technical and economic reasonableness, stating that this rule does not provide for either.

A problem with the rule was described as identifying one contaminant, nitrates, unconscionably without basis, while ignoring other equally ominous contaminants potentially in the soil, such as phosphates, chlorides, and bacteria. Why choose nitrates? It was predicted that the Technical Specifications of the rule will encourage types of development that will lead to larger problems for soils in the future.

Discussion turned to the rule's position with regard to drains and soil loading rates. The committee worried that no one has researched the effects of the drain requirements (of any drain requirements), so there is no idea whether or not the required numbers are correct. Many instances were listed where developments are causing no problems in these areas. And it was pointed out that research information under this rule will not be forthcoming any time soon, due to the rigid oversight required of the state, which will render experimental systems unattractive by being cumbersome. In effect, the rule prevents any science from taking place in Indiana outside the laboratory.

The question was raised, that many locations in the southern part of the state are already on municipal or regional systems due to the quality of ground water, so why would this rule be enforced in those locations, to protect dirty ground water?

In answer to the question, what other technology could we use to mitigate nitrates, suggestions included use a performance standard with gravity systems, single mound, shallow systems, flooded systems. The consensus was that this needs to be a site-dependent determination. It was pointed out that, from a public health perspective, these would meet the goal of clean effluent, with FAR less expense.

The discussion continued that this entire subject should be taken from the front end: new homes need to be planned for, and area inputs, golf courses, etc., identified as risks for the water supply, and designed for, with a model properly designed for surface runoff and nitrate assessment to these needs, and usable by county planners.

The rule was described as being totally prescriptive, in the face of EPA's desire for performance standards. Discussion ensured regarding our lack of certainty that we have a problem, and why can't we obtain data in a controlled environment, by which we would then measure our projects. Such a model would provide the basis for requiring certain technologies. The first step would be Indiana-specific assessment. Right now we are using the data from other states, which renders our knowledge about water quality from our septic

systems ineffective. In fact, the need for this is imperative, given that what very little research is available for Indiana, shows inconclusive conclusions. Specifics were given for this research.

Final comments regarding the technologies required by the rule emphasized that there are other means to reach the goal of clean ground water: real protection in wellhead protection zones, treating nitrates near the ground surface, drip systems, filters (ion exchange columns). It was reiterated that the Index is not designed for the purpose of this rule.

Discussion briefly turned to the authority in statute for local health departments, and its limits. Also discussed was the interface of the state's authority. In conjunction with this point, it was repeated that experimental systems have untenable parameters. Question was asked regarding the scope of the rule, does it properly cover existing systems?

LINE-SPECIFIC ISSUES

Proposed Rule
Secs. 2 and 3: What are "department standards" and do they need to be identified, in order to be adopted?
Sec. 4: Better definition of "bedroom", add closet.
Sec. 6: What is a "regulated facility"?
Sec. 8: Definition of "construction" ought not to include "earth-moving operations", nor "delivery of construction materials".
Sec. 11: Add size to the tree root balls.
Sec. 12: What is "sufficient'?
Sec. 22: How much "failure" is ok? Any?
Secs. 25 and 38, in conjunction: These are overlapping, and require permits for repairs that are too minor for the permit fees.
Sec. 27: "Any unit of government", does this include the state?
Sec. 42 (d): This greatly impacts repairs and existing systems, as well as time sensitive problems for home owners.
Sec. 43 (s) and (t): Are these adoptable language, given that they are undefined and totally discretionary.
Sec. 44 (b): Include number of bedrooms?
Sec. 46 (i): 45 days is unacceptable.
Sec. 46 (j) and (k): These sections create an impossible standard for utilizing vacant lots in developed areas; the reference is inappropriate to NRCS ag materials, and too vague.
Sec. 47 (e)(1): The state's turn-around time is implied, but needs to be stated; and 90 days is too long.
Sec/ 49(b): If a local department issues a permit, they need to perform an inspection on the matter.
Sec. 49(h): Add "and" or "or"?
Sec. 50(e): Add the state's IC cite for appeal procedure.
Sec. 51(d): This constitutes great curtailment of local authority of "best practice". Not ok.
Sec. 52(b)(6): "Shall" not "may" require a high water alarm.
Sec. 52(d)(5): "Two years", is this a little too long?
Sec. 52(e)(6): Should this time frame be as established by the local department?
Sec. 53(e): What is "sufficient"?
Sec. 54: What does this do to repairs, existing systems? Does it apply?
Sec. 56(f): What is the need for this data? It will be burdensome to provide.

Technical Specifications
Chapter 1 Introduction
I. Applicability: Not good code language. Should be deleted.

Chapter 2 Administrative Authority & Plan Submittal
II. Plan Submittal: Written Site Evaluation Report:
A and B too vague; C too prescriptive, also in C.2.c.: Materials listed from NRCS. What does this mean?
D.3.: Discussion about discrepancies. Why is this necessary?

III. Plan Submittal: Site Plan & Design Specifications:

D.1.a.12)b): "Acceptable to DNR". What does this mean? Too vague.
D.2.b.4)b): Same as above.

IV. Plan Submittal: Site Preparation, Cover, Finish Grading & Soil Stabilization:
A.2.a.: "Require the verification of the location...." What does this mean?
B.1.b.: Vegetation and bush hog requirements: impossible to do.
B.3.c.: "Paratill". This is a brand name, ok to be in a rule?

V. Plan Submittal: Additional Requirements for Experimental & Alternative Technology Onsite Systems:
A.3. "Manufacturer agent". What does this mean?

Chapter 3 Site & Onsite System Requirements
I. Minimum Separation Distances, Figure 3-1: "Road Right-of-Ways" not properly understood. Maybe the rule means easements? Till is now a component. Not ok.

II. Dispersal Area Requirements:
B.5.: "For soil absorption fields with a slope of greater than one-half percent, no part of the dispersal area may slope toward the soil absorption field." What does this mean?

IV. Trench Onsite System Selection Criteria:
B.: "30 inches". Current says 24.

VI. Requirements, Secondary Treatment for Nitrogen Reduction:
B.3.: The reference to the Index is not ok. Needs to be resolved.
C.2.b. Typo: needs to read Section VI, C. 1. b., not VI, B. 1. b.

Chapter 4 Site Drainage
I. Surface Diversions: This wording does not work. It needs to be performance oriented and site-specific, something like "look at the topography, if there exists a problem, so elsewhere".

II. Onsite Subsurface Drainage Systems:
A: Number 5. is out of place, should not be a component of the system. Should be "B".
A. 5. a.: This requirement for a perimeter drain around commercial facilities is adding point source pollution, makes the commercial system look good, but by moving sewage out away from the drain. Not acceptable.
A. 5. b.: Perimeter drain for residential systems required whether in sand or not. May be misplaced requirement. Is this meant for all systems?
A. 5. c.: Typos in 1) and 2).
B. 3.: Question was raised about the 60 inches. Safety precaution?
C. 3. No confidence in origin of numbers, 65 feet. What is the basis for this?
E. 5. c. 3): Requiring rigid drainpipe in this configuration, with these spaces, is not feasible.
E. 6. b.: Why is the maximum value deleted?

Chapter 5 General Onsite System Components
II. Pipes
Figure 5-2
IV. Drainpipe.; The listing for PVC ASTM D 3034 SDR 35, caused some concern, and was the genesis of the McKean report, due to the requirement in Chapter 4 for rigid drainpipe. The subcommittee was not aware of such material being available under this specification.

B.1.c.1): Reads "...movement of effluent along the outside of the pipe...", should read "water".
B.2.b.1): Typo: two (0.2) percent, should read two-tenths.

IV. Septic Tanks

A. General Requirements 5.; Question was made, the prohibition of having pumps, pumps vaults and pump pits not be installed in a septic tank, is a situation that occurs during repairs. Is this "best judgment" or experimental? The group concurred that under repairs the best judgment of the officer carries.

B. Standards, Septic Tank Capacity 4. and 5.; The question was raised, is this acceptable? Why does the rule stipulate no more than three tanks? What is at issue here? What is the science that requires the 1/3rd and ½ volumes?

Figure 5-7
Some of the subcommittees' texts contained a typo of 900 gallons, while others correctly contained 9,000. The group was concerned that the final rule would contain the correct number, and what did the rule say that the Board preliminarily adopted?

C. Construction Requirements, All Septic Tanks 2.; Concern was raised by the secondary reference to IAPMO's Standard, and how the rule removes reference to it by saying "...except when it deviates from...". Is this allowable? Who decides whether the standard is referenced or not? In general, secondary references are a problem throughout the rule.

E. Access Opening Requirements, All Septic Tanks a.: Considerable discussion was spent identifying the location for inner baffles. It was the consensus of the group that this rule identifies them incorrectly, that they are required to be in the wrong location.

F. Riser Requirements, All Septic Tanks: This section was seen to be a strange, inconsistent mix of prescriptive and performance language. There was some discussion of the untenability of the requirements for the manufacturer of the risers in the field. The subcommittee felt the requirements showed a lack of field experience on the part of the rule writer.

V. Dose Tanks
A. General Requirements 5.: Several members of the subcommittee disagreed with the requirement for the dose tank inlet to be within 12 inches of the tank bottom.

C. Construction Requirements, All Dose Tanks 1.: Typo was found "cast-in-place", and question was made, why are cast in place concrete dose tanks not allowed?

VI. Structural Integrity, Connectors, Quality Control, Product Marking & Standards for Tank Installation A.1.a.2): "...vacuum to two (2) inches mercury." Why is this vacuum requirement necessary? Are a lot of tanks not holding up? Leaking?

B. Connectors in Septic Tanks, Dose Tanks, and Distribution Boxes 1., 2., and 3.: Do these requirements go beyond the Board's authority? The requirements seem overly detailed and restrictive, anti-industry.

C. Testing Requirements, Septic Tanks and Dose Tanks 1. and 2.: These requirements were thought to be confusing. Some parts of the sections seem to say every single tank must be tested. Others seem not to require that. The subcommittee thought the language was unclear.

E. Standards for Installation, Septic Tanks and Dose Tanks 2.: The words "at least four (4) inches of" need to be deleted. This matter was discussed with ISDH earlier and agreed to that it would not be included.

E.9. This entire item needs to be deleted. The soil treatment requirements are unrealistic and overly restrictive. What is this responding to?

VII. Abandonment or Removal of Septic Tanks and Dose Tanks
B. Abandoned-in-Place 3. This item should reference collapsing the top and one side, not the tank cover.

VIII. Pumps

"Static" head: The subcommittee thought the definition for static head is misplaced. Also, the reference to the dose tank pump in off position is incorrect, and should reference the pump inlet, in order to provide a margin of safety.

D. Installation 4.a.: Reference to breakaway flanges was objected to. These are considered under serviceable and do not perform adequately. Why are they allowed in a rule that is generally punitive?

8.c. The reference to lock-on high water alarms was objected to. These are expensive and cannot be shut off when the homeowners are not present.

11: The reference to NEMA's 4X rating, or corrosive environment, was considered too strict. This is not necessarily such an environment.

IX. Distribution of Effluent
A. Manufactured Distribution Boxes 5.a.: The requirement for four (4) inches, again needs to be deleted. See item E.2. above.

A.5.d.2)a): What is "closed cell neoprene gasket material"?

A.5.g. This requirement makes no sense. Since it is another attempt at performance language, why not simply state the goal? To prevent ponding. "The final grade around distribution boxes must prevent ponding."

D. Pressure Distribution Networks 1.e.: The word "sealed" needs to be deleted and the word "installed" substituted.

D.1.f.1) and 2): What causes the reference to 750 gallons per day or less? Why is the standard for this requirement 750 gallons? This is over-designed. Practical installations in the field need more flexibility than this, making this an inappropriate requirement.

E. Holes in Pressure Distribution Networks 4.: This language is obtuse at best. It makes no clear sense. It is not readily understandable rule writing.

X. Barrier Material
A. Specifications: All three of these parameters were seen as being overly detailed.

XI. Soil Absorption Fields
A.Size of Soil Infiltrative Surface 4.b.: This formula was identified by the subcommittee as a justification for downsizing a system. Using a pump is not feasible in some counties, and available area may be a problem. Some on the subcommittee did not value this method, and thought it should not be included in the rule.

Chapter Six Trench Onsite Systems
I.A. Protection of Soil Absorption Field – The subcommittee discussed how the rule requires "protection," but does not state how to protect. Protection is relative from site to site, and it would be helpful if the rule provided some parameters, so that field judgment can be used appropriately.

I.A.2.c. Discussion regarding work that can or cannot be done when the ground is frozen raised questions that the rule is too strict. Some work is best done with a few inches of frost.

I.A.4.a. Alteration from existing plans is not a good thing in theory, but sometimes an alteration is best for the site. How can this kind of circumstance be easily embraced by the rule, to utilize the practitioner's expertise?

I.B.2.b. The size of rootballs that are allowed was discussed. The rule implies the size by stating "trees present within the...trench," but it would be better if said.

A long discussion ensued regarding the compacting of soils from various causes, and how those causes are significantly different in their effect, given the weather, terrain, and other variables. The subcommittee discussed deleting I.A.2.c, then discussed deleting all of the sub-sections under 2. Subsection I.B.3.d. was given as an example of over regulation for a local authority to provide. The subcommittee's conclusion was that all of these prescriptive subsections need to be deleted and performance language provided, so that the latitude required for each site can be utilized for best treatment.

I.D.2.a. The subcommittee discussed the problems with requiring the trench to be parallel to the contour of the site. Site contours are potentially complex. The design includes the responsibility of dealing with the contours. Discussion affirmed that if a slope is equal to or greater than 2%, the design needs to follow the contours, to avoid downslope dispersal issues. Some questioned the 2%, and then agreed to ½%, because ½% is referenced in the definition of a mound, thereby also defining a level surface.

During a working lunch, subcommittee members talked about the rule's erosion of local authority, and interpreted that as an attempt on the part of the rule writers to "idiot proof" the installations, a futile attempt at over control. They also mentioned that a national septic code is being written, and expressed concern that no southern Indiana representatives are at these meetings. Such reps would be helpful because the southern terrains and soils have their own issues, which may not be being considered sufficiently.

II.A.1. There was total confusion expressed over this paragraph, regarding electricity and commercial application. Also, it should not say 500 feet. If the trench is long, it may need to be pump assisted. The rule ignores the germane point, which is, is there a reason for this provision from a public health, engineering, or soils point of view?

IV. General discussion regarding this entire section centered on the need for design parameters, which would be checked against the plans. Technical discussion included that the rule's prescription shows a lack of understanding regarding this technology and the proper treatment of the aerobic mat, which needs to have water more frequently to keep it workable. Also mentioned here was the lack of specifically-stated state turn-around time. This is one area where it is sorely needed.

Chapter Seven Sand Mound Onsite Systems
I.C.3.b.3)b). This provision disturbed the subcommittee, who called it an unworkable requirement. Much discussion centered on the proper method(s) of preparing sites, and how site-specific such work is, requiring various machines and techniques. The field technicians do this all of the time, and need to be able to use their judgment on appropriate methods and tools.

I.D.5. Wheels should not be allowed.

I.D. Figure 7-2. The subcommittee questioned the appropriateness of the reference to Spec. 23. .

I.F.1.a. This provision does not provide a width measurement. At 2), this is not a sentence.

II.A. Figure 7-3. The table, together with the footnotes, make no sense i.e., the footnotes nullify the table's values. Discussion stated that if the pump is under-sized, the distribution system gets clogged. The rule is demonstrating a lack of understanding of how sand mound systems function. If properly constructed, they work very well, and ought not be considered a risk. Also, when a quick mathematical check was applied to the table, the proposed values were found to be in error. The subcommittee was going to re-check those values.

Chapter Eight Experimental and Alternative Technologies
The subcommittee in general felt that such regulations, if knowledgeably written, could provide a structured enforceablility, a good thing. Discussion included general questions about the statutory creation and authority of local health departments. No conclusions were forthcoming.

Appendix C. Figure 3-4. The subcommittee agreed that the column for "structureless massive" is questionable. Densic material is less than .25, because is very, very slight, but not 0. The subcommittee did not have a solution to this column's problems.

Cost Analysis of Rule 410 IAC 6-8.2 - IBA Septic Commit

5IBA-CA

The following is an attempt quantify additional costs for construction of various types of septic systems as required by the proposed new rule.

These costs do not represent possible increases in cost of permits or other costs which may accrue to local government for enforcement of this rule.

These costs reflect typical installations. There are numerous requirements contained in the rule that are too difficult to quantify and may apply only in specific situations. Some of those costs may be substantial.

These costs do not reflect interest costs for delayed starts due to 45 day turnaround time on permits and for delays due to requirement that construction activities may not take place until the permit is issued.

Cost of septic systems vary widely across the state due to local soil conditions, availability of aggregate and other materials, labor costs and level of enforcement of current septic rule.

INCLUDES INFO FROM ISDH ON DISTRIBUTION OF TYPES OF SEPTICS INSTALLED ANNUALLY IN INDIANA, UPDATED COSTS FOR STABILIZATION AND SEEDING AND UPDATED COSTS FOR WATERTIGHT FITTINGS 3/19/03

All costs shown below are additional costs due to new regulations.

Rule reference	Description	Additonal cost
	Conventional system	
Chapter 2. II. & III.	Submittal costs for borings and design documentation	$200.00
	1 Additional boring (3 required, currently rule requires 2)	
	Additional documentation not presently required	
	Utility location	
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Tanks to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$730.00**

Rule reference	Description	Additonal cost
	Conventional system with perimeter drain	
Chapter 2. II. & III.	Submittal costs for borings and design documentation	$200.00
	1 Additional boring (3 required, currently rule requires 2)	
	Additional documentation not presently required	
	Utility location	
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Tanks to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 4.II.E.7.	Trench to be backfilled with aggregate, cost of stone, hauling, placing, removal of trench spoils. Perimeter drain length 300' x 4' deep x 1.5' wide	$1,800.00
Chapter 4.II.E.5.c.3.	Cost of rigid pipe and placement of pipe	unknown
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$2,530.00**

Rule reference	Description	Additonal cost
	Flood-dosed system	
Chapter 2. II. & III.	Submittal costs for borings and design documentation	$200.00
	1 Additional boring (3 required, currently rule requires 2)	
	Additional documentation not presently required	
	Utility location	
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Septic tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Septic tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VI.E.2.	Dose tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Dose tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VIII.D.8.c.	Lock-on alarm	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at dosing tank	$25.00
Chapter 5.VIII.D.11.	NEMA 4X junction box required	$25.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$965.00**

Rule reference	Description	Additonal cost
	Conventional system with secondary treatment for nitrate reduction	
Chapter 2. II. & III.	Submittal costs for borings and design documentation 1 Additional boring (3 required, currently rule requires 2) Additional documentation not presently required Utility location	$200.00
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Septic tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Septic tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 3.VI.	Secondary treatment device cost estimates from manufacturers range from $7600.00 to $10,600.00 additional	$9,100.00
Chapter 8.II.4.	Operation and maintence costs range from $250.00 TO $400.00 per year for 20 year life cycle, say $325.00 average x 20 years	$6,500.00
Chapter 8.II.5.	Monitoring costs for local government range from $50.00 to $80.00 per year for 20 year life cycle, say $65.00 average x 20 years	$1,300.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$17,630.00**

Rule reference	Description	Additonal cost
	Sand mound system	
Chapter 2. II. & III.	Submittal costs for borings and design documentation 1 Additional boring (3 required, currently rule requires 2) Additional documentation not presently required Utility location	$200.00
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.E.2.	Septic tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Septic tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VI.E.2.	Dose tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Dose tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VIII.D.8.c.	Lock-on alarm	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at dosing tank	$70.00
Chapter 5.VIII.D.11.	NEMA 4X junction box required	$25.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	IBA has not yet reviewed all of the requirements for this type of system	unknown
	Additional cost per system	**$965.00**

Forecast of systems installed in Indiana

Indiana builds approximately 14,000 new homes on septic systems per year.

Based on information on system distribution from ISDH, a conservative projection is as follows:

3,156	Conventional systems		$2,303,880.00
5,861	Conventional systems with perimeter drains		$14,828,330.00
2,921	Flood-dosed systems		$2,818,765.00
1,200	Conventional systems with secondary treatment for nitrate reduction		$21,156,000.00
762	Sand mound systems		$735,330.00
100	Other system types		unknown
14,000	**Total**	**Additional cost of new rule per year**	**$41,842,305.00**

This represents installed costs, only where those costs are readily identifiable. Conservative estimates have been used. There will be additional costs for delayed starts, other items in the rule and costs for enforcement and monitoring.

Another view of sites requiring secondary treatment for nitrate reduction.

According to Earth-Tek's literature, their Enviro-Filter unit will reduce total nitrates to 17mg/l.

Orenco states that their AdvanTex unit will reduce nitrates by 75%. Since nitrates in household effluent range from 37 to 60 mg/l, the finished effluent from the Orenco unit will have range of 9.25 to 15 mg/l.

Since the rule mandates a standard of 10 mg/l, it is unlikely that either of these units will be approved for use on a widespread basis. ISDH has not committed to approve any system for this purpose.

This creates a situation where lots valued at $22,000.00 or more apiece will become nearly worthless. 20% of Indiana's soils are of the type requiring denitrification. While we do not know exactly how many homesites will be affected, we can safely assume a bare minimum of 1500 lots losing $17,000.00 in value each for a total of $25.5 million. This however is only a guess.

More importantly, there will be an immediate drop in housing production due to the loss of equity in those lots, resulting in lost sales and lost jobs. This is no way to promote economic recovery in Indiana

Cost Analysis of Rule 410 IAC 6-8.2 - IBA Septic Committee

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Rule reference	Description	Additonal cost
	Conventional system	
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Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
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Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Tanks to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$730.00**

Rule reference	Description	Additonal cost
	Conventional system with perimeter drain	
Chapter 2. II. & III.	Submittal costs for borings and design documentation 1 Additional boring (3 required, currently rule requires 2) Additional documentation not presently required Utility location	$200.00
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Tanks to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 4.II.E.7.	Trench to be backfilled with aggregate, cost of stone, hauling, placing, removal of trench spoils. Perimeter drain length 300' x 4' deep x 1.5' wide	$1,800.00
Chapter 4.II.E.5.c.3.	Cost of rigid pipe and placement of pipe	unknown
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$2,530.00**

Rule reference	Description	Additonal cost
	Flood-dosed system	
Chapter 2. II. & III.	Submittal costs for borings and design documentation 1 Additional boring (3 required, currently rule requires 2) Additional documentation not presently required Utility location	$200.00
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Septic tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Septic tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VI.E.2.	Dose tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Dose tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VIII.D.8.c.	Lock-on alarm	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at dosing tank	$25.00
Chapter 5.VIII.D.11.	NEMA 4X junction box required	$25.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$965.00**

Rule reference	Description	Additonal cost
	Conventional system with secondary treatment for nitrate reduction	
Chapter 2. II. & III.	Submittal costs for borings and design documentation 1 Additional boring (3 required, currently rule requires 2) Additional documentation not presently required Utility location	$200.00
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.B.3.	6 watertight fittings for inlet and outlets of distribution boxes	$45.00
Chapter 5.VI.E.2.	Septic tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Septic tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 3.VI.	Secondary treatment device cost estimates from manufacturers range from $7600.00 to $10,600.00 additional	$9,100.00
Chapter 8.II.4.	Operation and maintence costs range from $250.00 TO $400.00 per year for 20 year life cycle, say $325.00 average x 20 years	$6,500.00
Chapter 8.II.5.	Monitoring costs for local government range from $50.00 to $80.00 per year for 20 year life cycle, say $65.00 average x 20 years	$1,300.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	Additional cost per system	**$17,630.00**

Rule reference	Description	Additonal cost
	Sand mound system	
Chapter 2. II. & III.	Submittal costs for borings and design documentation 1 Additional boring (3 required, currently rule requires 2) Additional documentation not presently required Utility location	$200.00
Chapter 5.IV.B.4.	Dual compartment septic tank required on all systems	$75.00
Chapter 5.IV.G.1.A.	Outflow filter required on all systems	$100.00
Chapter 5.IV.F.4.A.	An additional riser for maintenance access to septic tank	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at septic tank	$25.00
Chapter 5.VI.E.2.	Septic tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Septic tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VI.E.2.	Dose tank to be set on 4" of sand or aggregate	
Chapter 5.VI.E.9.	Dose tank to be backfilled in 12-24" lifts and compacted	$150.00
Chapter 5.VIII.D.8.c.	Lock-on alarm	$35.00
Chapter 5.VI.B.2.	2 watertight clamp fittings for inlet and outlet at dosing tank	$70.00
Chapter 5.VIII.D.11.	NEMA 4X junction box required	$25.00
Chapter 6.I.B.d.	Soil absorption field to be seeded and stabilized	$100.00
	IBA has not yet reviewed all of the requirements for this type of systen	unknown
	Additional cost per system	**$965.00**

Forecast of systems installed in Indiana

Indiana builds approximately 14,000 new homes on septic systems per year.

Based on information on system distribution from ISDH, a conservative projection is as follows:

3,156	Conventional systems		$2,303,880.00
5,861	Conventional systems with perimeter drains		$14,828,330.00
2,921	Flood-dosed systems		$2,818,765.00
1,200	Conventional systems with secondary treatment for nitrate reduction		$21,156,000.00
762	Sand mound systems		$735,330.00
100	Other system types		unknown
14,000	**Total**	**Additional cost of new rule per year**	**$41,842,305.00**

This represents installed costs, only where those costs are readily identifiable. Conservative estimates have been used. There will be additional costs for delayed starts, other items in the rule and costs for enforcement and monitoring.

Another view of sites requiring secondary treatment for nitrate reduction.

According to Earth-Tek's literature, their Enviro-Filter unit will reduce total nitrates to 17mg/l.

Orenco states that their AdvanTex unit will reduce nitrates by 75%. Since nitrates in household effluent range from 37 to 60 mg/l, the finished effluent from the Orenco unit will have range of 9.25 to 15 mg/l.

Since the rule mandates a standard of 10 mg/l, it is unlikely that either of these units will be approved for use on a widespread basis. ISDH has not committed to approve any system for this purpose.

This creates a situation where lots valued at $22,000.00 or more apiece will become nearly worthless. 20% of Indiana's soils are of the type requiring denitrification. While we do not know exactly how many homesites will be affected, we can safely assume a bare minimum of 1500 lots losing $17,000.00 in value each for a total of $25.5 million.

Additionally, there will be an immediate drop in housing production due to the loss of equity in those lots, resulting in lost sales and lost jobs.

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Indiana Builders Association

Issues regarding Legality and Form
for
Proposed Rule 410 IAC 6-8.2
LSA Document #02-321
On-site Sewage Systems

PART A: 410 IAC 6-8.2

The concerns listed below are with respect to the document published as a Proposed Rule in the June 1, 2003 Indiana Register by the Indiana State Department of Health. The proposed rule contains some changes from that which was preliminarily adopted by the ISDH Executive Board at their regularly scheduled meeting on January 8, 2003.

1. Authority: a) In several conversations, it has been stated by ISDH staff, that IC 13-18-17-5, and subsequently 327 IAC 2-11, require the Executive Board of the ISDH to adopt this rule, and in particular the nitrate mitigation requirements. (See rule sec. 55.) Why does this IC cite not need to be included as an authority cite throughout this rule?

b) IBA is not aware of a method being established, as set forth by IC 13-18-17-5(a), of determining where groundwater quality standards must apply. Is this contained in 327 IAC 2-11, and is Sec. 55 of this rule an appropriate requirement based on 327 IAC 2-11?

2. Authority and "reasonable": a) ISDH, in response to IBA statements that this rule is required to be "reasonable" based on language in 327 IAC 2-11, states that this is not necessary because the term "reasonable" does not appear in IC 13-18-17-5, which takes precedence over the IAC cite. Is this correct?

b) The unreasonableness of this rule is a major issue for IBA. IC 16-19-3-4 is listed as an authority cite for every section throughout this rule, and reads in part, "The executive board may, by an affirmative vote of a majority of its members, adopt reasonable rules on behalf of the state department...." Does the extreme cost of this rule (see attached Cost Analysis), together with the generally accepted premise (agreed to orally by the Executive Board at their January 8th meeting) that no scientifically established cause and effect relationship exists between the presence of nitrates in septic effluent and the quality of groundwater, plus the designation of the remediation techniques for denitrification being defined as "experimental" by the rule, constitute "reasonable rule"? Is it reasonable for a rule to require a homeowner to install a very expensive, not-proven-to-be-necessary, experiment in his or her backyard?

3. Sec. 2, the definition for "alternative technology onsite system,"
   Sec. 3, the definition for "alternative technology soil absorption field,"
   Sec. 12, the definition for "experimental technology onsite system," and
   Sec. 13, the definition for "experimental technology soil absorption field."

All of these definitions contain the word "sufficient" and the phrase "that it meets department standards," neither of which are defined in the rule and have no precise definition within themselves. How are these meanings to be known?

4. Sec. 4, the definition for "bedroom," contains the word "approved". Approved by whom? Approved is not defined in this rule, but is defined in 675 IAC 14, a building rule as established by IC 22-12-1, and will be confusing to the persons regulated by this rule and 675 IAC 14.

5. Sec. 6 (3) and Sec. 30, definitions that lack meaning without a definition of "family." Also, does Sec. 6 (6) need clarification, or a reference to Sec. 29?

6. Sec. 8, this definition for "construction" exceeds the definition set forth at IC 22-12-1 by a significant amount. Is this ok?

7. Sec. 12 and Sec. 13 define objects only by what they are <u>not</u>. (Sec. 12 contains two "not"s.) Combined with the issues raised in #1 above, this opens indefinitely the possibility of what they are, making what they are indeterminable. Can a definition do this?

8. Sec. 19 includes the word "proper." Is this ok?

9. Sec. 24 uses the word "renewable." The meaning ascertained by later provisions in the rule seems to be "must be renewed." Is "renewable" the correct word?

Sec. 24 language is confusing, "approved by a local health department or department…"

10. Sec. 27. Question has arisen whether or not "any unit of government" includes state government. Should this be made clear? Does this conflict with statute?

11. Sec. 36. Is this definition clear? Does it use terms out of context ("parent material")?

12. Sec. 40. Should the word "approved" be defined or the approving authority be referenced?

13. Before Sec. 42, should there be a scope provision? Sec. 41 is the end of the definitions. The rule has no scope provision.

14. Sec. 42 (a) and (b), both (1)'s and (2)'s and (4) do not state WHAT the authority is for, so the reader assumes that the authority is for everything that the rule regulates: design, installation, construction, maintenance, and operation. Does this need to be stated, or is the assumption ok?

Sec. 42 (c) is confusing in stating "approval, and permit issuance." The issuance of a permit is the method of approval by a local health department. Also, since "permit

issuance" is not specified, is it assumed to be all permits, such as construction and operating. Is this ok?

Sec. 42 (c)(2)(A) and (3). What does "...to satisfaction of the department..." mean? Also, should the (2)(A) sentence read, "...and operation of the experimental or alternative technology onsite system."?

Sec. 42 (c). Based on the language at Sec. 42 (b)(3) and (5), should (c) read, "The department shall delegate..."?

15. Sec. 43 (e)(1) is awkward language.

Sec. 43 (f). May a state agency rule require compliance with local ordinances? This happens frequently throughout this rule.

Sec. 43 (o). Was the referenced document also referenced in the Notice of Intent? Did it need to be?

16. Sec. 44 (c)(3): same question as Sec. 43 (f) above.

17. Sec. 45 (c)(2). The rule provides no definition of "proficient".

18. Sec. 46 (j)(2) and (k)(2). Does this constitute a secondary reference that needs to be promulgated and reviewed for suitability for adoption in Indiana? Was it referenced in the Notice of Intent? The USDA is on record as saying these materials do not provide appropriate guidance for application to septic system design. Is this important?

Sec. 46 (k), first sentence: should read, "shall be granted..."?

19. Sec. 46 (b) and Sec. 47 (b). Same issue as at Sec. 44 (c)(3). Also, at Sec. 49 (a), and others throughout the rule.

Sec. 47 (e)(2) is it unclear that the professional engineer is also registered?

Sec. 46 (f) and Sec. 47 (g): is it appropriate for the rule to state what does not constitute approval?

20. Sec. 48 (a). From reading the rule, including the cross-reference, it is unclear why the first sentence does not read. "The owner shall be required to obtain a written operating permit...".

Sec. 48 (e)(2) Is it allowable to require a copy of a contract such as this?

21. Sec. 49 (a). Based on the definitions, the first sentence should read, "...the approval letter or permit." Having it read "and" is confusing.

Sec. 49 (d), is this prohibition appropriate?

Sec. 49 (h). Should (1) and (2) be conjoined with an "and" or "or"?

22. Sec. 50 (a)(4). This 45 day requirement comes as a surprise to the reader. Shouldn't it be included in the plan submittal requirements section? If it is mentioned in another section, should that be cross-referenced here? The only references to time found earlier are at Sec. 46 (i) and Sec. 47 (e)(1), neither of which seem to be exactly related to this matter.

Sec. 50 (c) and (e). Is it allowable for these provisions not to specify the appeal rights, nor reference IC 4-21.5?

Sec. 50 (g) (2). Based on the text of Sec. 50 regarding all of the possible errors or failures of application, the requirement for compliance for experimental or alternative onsite systems is not logical.

23. Sec. 51(c) and (d). Subsection (c) contains the backbone of applying this rule on a local level, with the reference to "best judgment of the local health department… ." However, subsection (d) implies conflict with (c), or at least renders it ineffective. Question arises, what is the scope of this rule? Does it include systems already in use? What is a repair? Where is the scope stated? Does it need to be stated?

24. Sec. 52 (b)(4): Same issue as at Sec. 48 (e)(2).

Sec. 52 (b)(6). There is no stated standard for requiring a high water alarm. If there is a standard provided in the Technical Specifications, should it be cross-referenced here?

Sec. 52 (d)(2)(B) and (e)(3). These sections reference effluent limitations from the National Pollutant Discharge Elimination System (NPDES). Does this constitute a secondary reference?

25. Sec. 53 (a). Is it appropriate for the rule to include the words, "…to permit development of new or more efficient sewage treatment or soil dispersal processes."? More efficient than what? Doesn't this imply that the rule is not sufficient?

(b)(2). Is it appropriate for a rule to require someone to file a restriction on the deed of their property?

Sec. 53 (e) is unclear with the word "sufficient". There is no standard provided for that word, nor does the rule ever state a standard by which an experimental system can be declared no longer experimental. Without such standards, is it appropriate for a rule to provide authority to ISDH to approve an unspecific number of systems, but no more? Is this an allowable curtailing of an industry?

26. Sec. 54 (b)(2): Same issue as at Sec. 53 (b)(2) regarding deed restrictions.

27. Sec. 55. IC 13-18-17-5 is not listed as an Authority cite for this rule. This section is a major problem regarding very expensive treatment requirements for nitrate reduction on the basis of requirements for groundwater quality in IC 13-18-17-5. However, there is no scientific evidence that the quality of groundwater is affected by nitrates in septic effluent. This is a commonly known matter, which even the Executive Board agreed with while in session at their January 8th meeting.

28. Sec. 56 (e) The word "satisfied" is without a stated standard.

Sec. 56 (f) After a long discussion recently between local health officals and department officials regarding the requirements of this section, and an inability on the part of the department to substantiate a need for the proposed required data to the satisfaction of the questioners, combined with the expense that gathering the data would incur for the local departments, the decision was made by the locals to lobby against subsections (2), (3), and (4) in their entirety. Does a lack of substantiation create an inappropriateness for these subsections?

29. Sec. 57 (a) and (b) do not provide appeal rights, etc.

Sec. 57 (d). Given the text, is the first sentence required to read, "...shall issue..."?

30. Sec. 58 (3). Adoption by reference of the National Soil Survey Handbook, 1993. This document is out of print. Is this allowed to be adopted when users cannot obtain a copy of it?

31. Special problem over multiple sections: Inconsistent authority provided by the rule to local health departments regarding experimental and alternative technology. Sec. 42 (a)(3)(B), (b)(3), (c)(2), (d), and Sec. 46 (h) versus Sec. 49 (b). As one local health official stated, "Anything I inspect, I must issue a permit for." Does the rule create an unauthorized responsibility for local officials? Also, Sec. 51 (c) and (d) seem to create a conflict for the local official, that may go back to the question of scope. What is a repair, and is the scope of the rule limited to new construction?

PART B: Technical Specification for On-Site Sewage Systems, 2003 Edition.

The concerns listed below are with respect to the document preliminarily adopted by reference on January 8, 2003 by the Executive Board of the ISDH. In the meantime, changes to the text have been provided by staff as "WWMC Comments, May 2, 2003." These reflect ongoing discussions between staff and user groups.

The first general concern is regarding what the Technical Specifications will be. Throughout discussion between ISDH staff and various user groups, the specifications have changed repeatedly. Is the document to be adopted by reference required to be the same as that now available for public review (see Sec. 58), with possible amendments?

1. The Technical Specifications of this rule contain eight chapters, and several appendices. Generally, at the beginning of each chapter, there is language that is not enforceable, but rather editorial in nature. This is the case at Chapter 1, I. Applicability.

2. Frequently throughout the rule, materials are cited that are written by an entity other than the Department of Health. These materials are not adopted by this rule, nor is the referenced part provided in this rule. The cites frequently do not give specific editions, etc., and in one case the rule says use the current edition! This begins at Chapter 2, II. Plan Submittal: Written Site Evaluation Report, A.Written Site Evaluation Report, 3.b "guidelines, soil manuals, technical bulletins, and handbooks of the NRCS".; at B. Soil Absorption Field Site Characteristics, 1 "Name of the soil map unit listed on the soil survey atlas sheet..."; and at C. Soil Profile Report, 2.c "guidelines," etc. same as above.

3. At Chapter 2, II Plan Submittal: Written Site Evaluation Report, D. 1. c. Munsell notation is cited as a registered trademark. Is this allowable? Also, is it sufficiently identified and incorporated into the rule in the Glossary at Appendix A. under "soil munsell notation"?

4. Chapter 2, D.3. soil map units and soil survey atlas sheet referenced again.

5. Chapter 2, III. Plan Submittal: Site Plan & Design Specifications, D.1.a.12. and 13, and D 2.b 3. and 4. Four references to IDNR determinations. Is this ok?

6. Chapter 2. IV. Plan Submittal: Site Preparation, Cover, Finish Grading & Soil Stabilization, B.2. References "requirements of the department." Should these be cross-referenced so that the reader can find them?

7. Chapter 2. V. Plan Submittal: Additional Requirements...A.2.b. Several times throughout the rule these persons are required, but this is the only time the P.E. is required to be registered in Indiana. Is this one time sufficient for the whole rule?

8. Chapter 2. V. E.3.c. Is it appropriate for the rule to require information regarding costs?

9. Chapter 3. Figure 3-1, Footnote 2 references Spec 23. This is a Department of Highways publication. Is it referenced appropriately?

10. Chapter 3. I. Minimum Separation Distance. E.4. and F.2.a. Is it ok for the rule to have "as far as possible" as a standard?

11. Chapter 3. V. Sand Mound Onsite System Selection Criteria. Notice the editorial comments at the beginning.

12. Chapter 3, VI. Requirements, Secondary Treatment for Nitrogen Reduction, B.3. Finally we get more information about the Soil Map Units, but they are not adopted by this rule, and they are "published periodically." Is this allowable for enforcement?

13. Chapter 4. I. Surface Diversions A. "...if drainage from an adjoining upslope landscape affects the soil absorption field site." The rule does not say who determines this.

14. Chapter 4. II. Onsite Subsurface Drainage Systems, B.1.b. 1) and 2) is the rule allowed to make a distinction between systems for lots platted before the rule, and up to one year after?

15. Chapter 4. II. B.1.b.2)a). Is the reference to "accepted engineering methods or models" ok?

16. Chapter 4. II.C. Location of Onsite Subsurface Drainage System, 2. Reference to INDOT Spec. 23.

17. Chapter 4. II. E. Requirements for Onsite Subsurface Drainage System Trenches & Drainpipes, 1., 6., and 7. Unadopted references.

18. Chapter 5. I. Design Daily Flow of Sewage, B.1.b., unadopted reference; B.2. should "will" be "shall"? And B.2.a. Does "evidence" need to be defined?

19. Chapter 5. Figure 5-2. The whole figure references unadopted standards. Is this ok?

20. Chapter 5. III. Grease Traps or Grease Interceptors. Editorial comments.

21. Chapter 5. III B 4. Unadopted reference.

22. Chapter 5. IV Septic Tanks, C.2; F 6. and 8.; and G.2. Unadopted references.

23. Chapter 5. V. Dose Tanks, A.3. and 4. Should "approved by the department" be accompanied by a standard for the department, or a cross-reference to the standard (if one exists)?

24. Chapter 5. V.C. Unadopted reference.

25. Chapter 5. VI. Structural Integrity, Connectors, Quality Control, Product Marking & Standards for Tank Installation, A.1.b.; B.1.b. and 2.a.; C.1.a. and b., C.2.a. and c.; E.1. and 4. Unadopted references.

26. Chapter 5. VII. Abandonment or Removal of Septic Tanks and Dose Tanks, B.2. and C.2. Is it appropriate for the rule to require a receipt?

27. Chapter 5. VIII. Pumps, A. 3. c. Unadopted reference.

28. Chapter 5. VIII. D. 11. Unadopted reference.

29. Chapter 5. IX. Distribution of Effluent, A.5.d.2)a). Unadopted reference.

Short digression: Chapter 5, IX. E. 4. Throughout this rule, the reader may notice wide divergence between extremely detailed prescriptive requirements on one hand and much simpler performance standards on the other. Why one type of regulation is required in one place, and the other in another place, has been a source of confusion for the IBA. However, the provision here regarding the definition for the "second to last hole" represents perhaps the most bizarre of the prescriptive requirements, all of which are seen as an insult to the industry, and seem to be a vane attempt to control a potential lack of quality in workmanship. Is the rule over-extended with respect to its authority?

30. Chapter 5. XI. Soil Absorption Fields, B.1.b. "LA Abrasion scale" is an unidentified and unadopted reference.

31. Chapter 6. IV. Trench Pressure Onsite Systems, D.1.b. "Where individual staff of local health departments demonstrate proficiency..." is not defined.

32. Chapter 7. Note the editorial comments at the beginning, and at I. Installation and Construction of Sand Mound Onsite Systems.

33. Chapter 7. I.C.3. Unadopted reference, and "may" is without a standard. Should there be a standard provided, or a cross-reference to the standard for when this might happen?

34. Chapter 7. I.D.1. Unadopted reference.

35. Chapter 7. II. Design of a Sand Mound Onsite System, A.2. "...be as long and narrow as possible..." Is this language ok?

36. Chapter 7. II. B. Editorial.

37. Chapter 8. I. General Requirements, F.5. and G.1. Unadopted references.

38.Chapter 8. II. Operation & Maintenance, B. Please review this in its entirety. Is it ok?

39. Chapter 8. IV. Performance Monitoring, E.1. "...within a timeframe set up by the department." Does this need a cross-reference to the standard?

40. Chapter 8. IV,D.3. and 4.; and V.C.2.d.2),4),5), and 9); and V.D.1.b.2)b); and E.5.a. and b. Unadopted references.

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5IOWPA

August 13th, 2003

Burton Garten
Office of Legal Affairs
Indiana State Department of Health
2 North Meridian
Indianapolis, IN 46204

The Officers and Directors of the Indiana Onsite Wastewater Professional Association are strongly opposed to proposed rule 410 IAC 6-8.2 for Onsite Sewage Systems as published in the Indiana Register.

1. IOWPA Officers, Directors, and Members have participated in and support the changes recommended by the Indiana Environmental Health Association Wastewater Management Committee (IEHA WWMC). WWMC made recommended changes based on the best available input from local and national experts . Nonetheless the recommended changes need to be verified by gathering sufficient local data. We assert that there is an urgent need for empirical data to be collected in Indiana soils. Indiana needs a permanent research and demonstration program. Funding for scientific research is paramount. The Technical Specification that is to be adopted as part of the Rule 410 IAC 6-8.2 should allow for flexibility to make data supported changes as they are revealed.

2. IOWPA asserts that regulations without training and accountability will produce uneven results that are often not protective enough of the environment and public health.

3. The most critical need for Onsite Sewage Systems in Indiana is a certification program and periodic continuing education for onsite wastewater professionals. This program should include designers, installers, operators, maintenance providers, inspectors, cleaners & haulers as well as county and state regulators.

Respectfully Submitted,

Ronald E. Rose
Vice President, IOWPA

For more information contact: http://www.iowpa.org/

ATTACHMENT
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Comments contributed at the July 30, 2003 public hearing by Ian Steele

My name is Ian Steele and I represent myself as a citizen of LaPorte County, I represent the Town of Michiana Shores in my position as Town Council President, and also bring expertise as a practicing Geologist at the University of Chicago who deals with similar problems as addressed in this hearing.

I wish to discuss the proposal from a statewide, small town and lastly personal point of view. The source of nitrates is usually attributed to agricultural fertilizers, septic systems, and recreational fertilizers (parks, lawns and golf courses).

Indiana is an agricultural state and as such agricultural fertilizer is common. While it is difficult to assign amounts, I refer you to a study done in Portage Co., Wisconsin where research (www.uwsp.edu/water/portage/undrstnd/landuse.htm) indicates that 89% of nitrates in groundwater are due to agriculture and only 9% to septic systems with 1% to recreational. Similar results have been published for studies in Iowa and Long Island
(www.alphausasystems.com/nitrateinfo.html)
(www.pbisotopes.ess.sunysb.edu/reports/bleisuss) .
Certainly such numbers can not strictly apply to Indiana, but strongly suggest that regulations on septic systems will not solve the apparent problem because on a regional or county wide scale they represent a small fraction of the problem.

On a small town or residential scale, septic systems must become more significant in contributing nitrates especially in the absence of public sewer systems. While each town will differ, I suggest a few potential problems based on the small town I represent. Within this town is a small stream that drains approximately 5 square miles. Groundwater contributions must include groundwater from our individual septic systems but in addition a mobile home park is licensed to dump 20,000 gallons of treated water/day into the stream. I understand that one particular trailer park conducts their own testing procedures for water quality; my enquiries at the County Health Department shows that this park is delinquent in filing reports. Likewise, this stream drains an area which includes a golf course; to my knowledge there is no control of applied fertilizer which most certainly is used to maintain the lush grass. The proposed controls on individual septic systems may have little effect in nitrates unless controls are placed on these other nitrate contributors.

On an individual basis, the timescale for nitrate reduction will be maybe 20 years as existing septic systems come into compliance. There is also the question of maintenance. How will the yearly required maintenance be monitored? Studies have shown in Arlington, Texas that a large number of systems are not maintained and any upgrades soon do not have the desired effect.

A much better solution that would most certainly solve nitrate problems in residential areas in the shortest timescale, eliminate septic contributions, and benefit all involved would be for the State of Indiana to take the lead in the installation of public sewer systems by matching the cost on a dollar for dollar basis. Any nitrate problem contributed by individual septic systems would be eliminated in maybe 5 years, private maintenance would not be a problem, and compliance would not be delayed.

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ATTACHMENT
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August 11, 2003

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Office of Legal Affairs
Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204-3003

Attention: Burton Garten

Subject: Technical specifications concerning concrete septic tanks.

My comments, which I also expressed at the public hearing held in Seymour, IN on Aug. 5, are not intended to be matters of complaint but rather areas of concern for myself and other manufacturers of concrete septic tanks Even more importantly, these matters directly affect the integrity of the product and the end user. The subject by which I am mostly concerned is the method of using flexible connectors with external compression take-up clamps as the only way of attaching the inlet and outlet pipes to the septic tank.

The reason for my concern is not an objection of the connecting seals, but the dilemma this creates in securing and mounting effluent filters, baffles etc. As it is stated in the specifications, pipe installed in connectors must extend into the tank and be restrained from movement during backfill operations.

Using this method not only allows for possible shifting of the pipe which the filter is attached to, therefore causing a misalignment of the filter, but also causing the filter to be too high or too low and no longer centered under the service port. And to add to this potential problem the manufacturer of the septic tank is held accountable for a possible failure to his product which was not installed by his company, but by a second party.

For many years our company has been casting in place, or pressing in place, a four-inch sch 40 pressure coupling into the outlet end of our septic tanks. From that fitting we glue and attach a pre-cut 17" sch 40 pipe on the inside of the tank and mount the outlet baffle or Zabel A-100 filter to that pipe which permanently locates it level and directly below the service riser. This method also allows the installer to be able to attach the outlet pipe beyond the septic tank in a reliable, water tight fitting with out interfering with the internal plumbing of the tank.

I discussed this situation with Chris Bourke after the hearing and also Steve Kale and Debbie Barnheizer came to our manufacturing plant to take pictures of this alternative method.

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I am also concerned about the recommendation by Waste Water Management Committee that the minimum liquid capacity of tanks for a daily design flow of 450 gallon be increased from 900 gallon to 1250 gallon. Although this represents a logical improvement it also presents an extremely expensive hardship on the concrete septic tank manufactures.

Most manufactures have many 1000 gallon septic tank forms and only a few 1250, 1500, 1800 and larger forms. This may also be true with delivery trucks and manufacturing facilities. By raising this minimum, my concern is that this would snowball the need for new forms, larger fleet of delivery vehicles and changes in manufacturing buildings, taxes etc. This cost can not be absorbed totally by the manufacturer which can cause a significant increase in the cost of a septic system.

I have been in the concrete pre-cast business since 1967 and I realize the difficult task that you are undertaking. Change never comes easily.

I sincerely hope you consider my comments helpful and not critical. Believe me that is my intention.

Respectfully submitted,

John Hudson

John Hudson

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Livingshouse "H"

Indiana Association of REALTORS®, Inc. and Indiana Builders Association
Position on Indiana State Department of Health
Proposed Revisions to Onsite Sewage Systems
410 I.A.C. 6-8.2

The Indiana State Department of Health ("Department") published a proposed rule concerning onsite sewage systems in the June 1, 2003 Indiana Register. Proposed 410 I.A.C. 6-8.2, 26 IR 3116. This proposed rule would consolidate and replace the existing rules on residential sewage disposal systems (410 I.A.C. 6-8.1) and commercial onsite sewage systems (410 I.A.C. 6-10). It would also incorporate by reference a new set of Technical Specifications to govern the planning, installation and testing of onsite systems. The Indiana Association of REALTORS®, Inc. and the Indiana Builders Association offer the following comments on the proposed rule. We urge the Department to consider these comments prior to consideration of final adoption by the Department's Executive Board. Questions and requests for additional information concerning these comments should be directed to Ellen Holland, Director of Political Affairs, Indiana Association of REALTORS®, Inc., (317/266-9579, eholland@indianarealtors.com) or Marlys Pedtke, Code and Technical Specialist, Indiana Builders Association (317/236-6334, mpedtke@aol.com).

The Indiana Association of REALTORS®, Inc. ("IAR") has 15,000 member realtors statewide. The mission of IAR, in cooperation with national and local REALTOR® associations, is to sustain a healthy real estate market in Indiana. Key objectives of the IAR concern protection of property values and promotion of the role of housing in the economy. The Indiana Builders Association ("IBA") is a professional statewide association of over 5,300 members focusing on environmentally compatible, safe and affordable housing of all types. IBA works to educate its members, the general public, and all legislators and regulatory agencies to maintain and develop workable and affordable regulations and law that protect the rights of citizens to own a home.

Members of the IAR and IBA build and sell residential and commercial facilities and property served by onsite sewage systems, and will be directly affected by revisions to the regulatory and technical requirements for these systems. It is for this reason that we are submitting these comments. We oppose this regulation for the following key reasons, which are explained in greater detail below:

- It would place a significant economic hardship on individual homeowners at a time when Indiana's economy is floundering.
- It requires the installation of excessive and extremely expensive equipment without any scientific rationale for its use.
- It sets unrealistic standards for nitrate levels that even the equipment manufacturers are not willing to say can be met.

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THE FISCAL BURDEN OF THE PROPOSED RULE CANNOT BE SUPPORTED DURING THIS TIME OF ECONOMIC HARDSHIP

The proposed rule will impose substantial new regulatory and technical requirements on the installation and use of onsite sewage systems. These new requirements will be costly, and will have a significant negative affect on the affordability of housing in Indiana. In accordance with Ind. Code § 4-22-2-28, the Department requested a fiscal analysis by the Legislative Services Agency ("LSA"). This statutory provision requires agencies to submit proposed rules with an estimated fiscal impact greater than $500,000 on regulated entities to LSA. The Department must consider the LSA fiscal analysis as part of the rulemaking process.

We understand the Department originally estimated an annual cost of $8.7 million for the proposed requirements for all onsite systems. However, the LSA fiscal analysis prepared on March 11, 2003 provides a total estimate initial cost to regulated entities in the range of $19.3 million to $28.1 million. We have studied the LSA fiscal analysis, and find it difficult to determine how LSA calculated its total costs. In fact, we believe the costs will be far greater than the LSA fiscal analysis – $41.8 million a year just for new residential systems. This figure does not include any commercial systems or repairs to existing residential systems that fail. A cost analysis of the proposed rule as it concerns new residential systems, prepared by the IBA Septic Committee, is attached to this document.

However, even accepting as true the LSA fiscal analysis, it is easy to determine that many homeowners in Indiana will be faced with significant new financial burdens. For example, LSA obtained an estimate from one company concerning the cost to install a secondary treatment system to meet the proposed new denitrification requirements. An Earthtek system for a three-bedroom home would cost between $6,500 to $11,500 installed. As recognized by LSA, it is certain that this cost would be passed along to the home buyer. The average cost of a new home in Indiana is $94,300 (2000 U.S. census data). Installation of a secondary treatment system alone would increase that cost between 7 and 12 percent. And that does not include the cost of annual monitoring and maintenance, or any other costs associated with the proposed new rule, such as dual compartment septic tanks.

The single biggest asset of the average American is a home. Using a conservative estimate, the proposed regulation would add an average of $10,000 to the cost of a new home. The financial impact of this additional cost means that a person would have to earn and additional $2851.00 a year (which is $237 a month and approximately $1.50 an hour) to absorb the cost of complying with this proposed rule. If we take the additional $10,000 and assume an interest rate of 7 percent over a 30 year term, it would mean an additional $66.53 a month, which totals $23,951 over the life of the loan. The failure of existing systems presents its own problems. If a septic were to fail, the added cost of this regulation would potentially force people to give up their homes at a loss or to completely walk away from their homes because nobody would be willing to take on the liability. As a result, many homes in the State would be rendered worthless.

The fiscal impact of the proposed rule is a special concern during this period of economic hardship. Read any news publication or tune into a news program on the television or radio – it is evident that the national economy has been in decline for several years. Indiana in particular

has experienced difficult times. A March 23, 2003 article in the *Indianapolis Star* lists 25 statistics that show Indiana is falling behind most of the country in terms of jobs, personal income, economic development, education and housing prices. A copy of that article can be found at the following website: http://www.indystar.com/print/articles/0/030897-7890-120.html.

Housing has been a leading economic force in the State and nation, with sustained performance even as the stock market and other economic indicators have declined in recent years. In fact, a June 18, 2003 article in the *Indianapolis Star* reports that housing construction has rebounded, increasing 6.1 percent in May 2003. "Economy showing progress in 3 areas," Indianapolis Star, p. C-1 (June 18, 2003). Yet, even the housing market is not entirely positive. Mortgage foreclosure rates in Indiana are higher than any other State, and more than twice the national average. An increase of thousands of dollars on the cost of homes will affect new housing starts and existing home sales, and will price many Hoosiers out of the market for a home. Simply put, the economic burden of the proposed rule cannot be supported at this time.

THE PROPOSED RULE IS NOT TECHNICALLY NECESSARY AT THIS TIME; RATHER, THE DEPARTMENT SHOULD FOCUS ON BETTER IMPLEMENTATION AND ENFORCEMENT OF THE EXISTING RULES

The proposed rule and Technical Specifications appear to try to cover every conceivable situation by the use of prescriptive rather than performance-based language. Some examples of over-regulation include:

- A requirement to run a bush-hog over an ungraded soil absorption field site at a 3 inch height is impractical and dangerous. It would be quite sufficient to say that the site should be closely mowed.

- A requirement to place compacted backfill around a tank is unnecessary and costly. Slight settling of earth around the tank has no effect on system performance.

- Requirements for seeding and soil stabilization are unnecessary for most systems and cause extra expense for inspection and seeding out of sequence with the rest of the project.

This prescriptive approach provides little flexibility to local health departments to use common sense in addressing site-specific circumstances. Furthermore, many requirements of the proposed rule are not technically necessary to protect public health and water resources. A recent study by Purdue University showed an onsite system failure rate of less than 3 percent since 1991 and less than 1 percent since 1970 in a county that vigorously enforces the current rules. *See* Soil and Septic System Performance within Elkhart County, Indiana, Stout, Heidi M. and Lee, Brad D., Purdue University Agronomy Department, October 10, 2002. It is evident that significant revisions to the current rules are not needed. Rather, improvements can and should occur simply through proper implementation and enforcement of the current requirements. In fact, those areas of the State that have not properly implemented the current rules are likely to not implement any new rules. As a result, the current disparity between areas of the State will only increase. One of our primary concerns with the proposed rule is that it does nothing to address the current problems. Thus, in addition to all of the new prescriptive requirements, current problems with the program will remain. Instead of advocating a dramatic overhaul of the

current requirements, ISHD instead should audit local programs to put all areas of the State on a level playing field. It would be an easy task to amend the current rule to include solutions for the lack of current enforcement in counties with no resources, and to better address onsite system failures.

THE PROPOSED RULE INAPPROPRIATELY APPLIES THE INDIANA GROUND WATER QUALITY STANDARDS TO ONSITE SYSTEMS

In 2002, the Water Pollution Control Board adopted ground water quality standards for the State of Indiana. This rule, 327 I.A.C. 2-11, is authorized by Indiana's ground water protection statute, Ind. Code 13-18-17, and provides that several State agencies, including the Department, shall adopt rules to apply the standards to the facilities, practices and activities they regulate. 327 I.A.C. 2-11-2(a). In section 55 of the proposed rule, the Department attempts to do just that concerning onsite systems. This provision references the Department's Technical Specifications for Onsite Sewage Systems, 2003 Edition, which establishes procedures for determining whether secondary treatment is required to meet the nitrate (as N) criteria in the ground water quality standards. The Technical Specifications require secondary treatment of sewage for systems located in certain types of soil prior to discharge to the soil absorption field to protect ground water. If secondary treatment is required, the effluent must average no more than 10 milligrams per liter of nitrogen.

Upon review of these requirements, it is clear that the Department has inappropriately applied the ground water quality standards. The default criterion for nitrate (as N) is 10 milligrams per liter. 327 I.A.C. 2-11-6(a)(1). However, this criterion does not apply at the end of the system. Rather, 327 I.A.C. 2-11-2(b) provides that the Department (and other covered agencies) shall adopt rules to ensure the criteria in the ground water quality standards rule will not be exceeded in ground water <u>at or beyond the boundary of a ground water management zone</u>. Ground water management zones are established in 327 I.A.C. 2-11-9. This provision allows flexibility for agencies to establish program or site specific zones. However, it also establishes a default zone that agencies must apply in the absence of program or site specific zone:

> The boundary of the default ground water management zone shall be located in accordance with one (1) of the following:
>
> (1) At each drinking water well that is:
>
> (A) within three hundred (300) feet from the edge of a potential or existing contaminant source when the property boundary is greater than three hundred (300) feet from the edge of a potential or existing contaminant source; or
>
> (B) within the property boundary when the property boundary is less than three hundred (300) feet from the edge of a potential or existing contaminant source.
>
> (2) The property boundary, when the property boundary is less than three hundred (300) feet from the edge of a potential or existing contaminant source, and there is no drinking water well within the property boundary.

> (3) Three hundred (300) feet from the edge of a potential or existing contaminant source when the property boundary is greater than three hundred (300) feet from the edge of a potential or existing contaminant source and there is no drinking water well within three hundred (300) feet from the edge of a potential or existing contaminant source.

327 I.A.C. 2-11-9(d). The Technical Specifications make absolutely no provision for a ground water management zone, whether default, program specific or site specific. If secondary treatment is required, the nitrate limit applies as effluent is discharged from the treatment system, before it reaches the soil absorption field. The Technical Specifications do specify a certain situation in which secondary treatment is not necessary: if the property is greater than 10 acres, and the soil absorption field is at least 300 feet from the property line and any water supply wells. However, this is not a ground water management zone. The Department has improperly applied the ground water quality standards.

327 I.A.C. 2-11-2(b) provides that agencies should consider the technological and economic reasonableness of and other appropriate factors in determining a feasible approach to applying the ground water quality standards. There is no scientific evidence that nitrates from onsite systems are reaching ground water in excess of the applicable ground water quality standards. Also, the manufacturers of secondary treatment equipment cannot guarantee that their systems will even meet the denitrification requirements. Further, the Technical Specifications rely on Natural Resource Conservation Service ("NRCS") soil maps and the Nitrate Leaching Index. But according to NRCS, the soil maps are out of date, and were never designed to evaluate small areas such as home sites. Rather, the maps were meant for large scale applications. Further, the Nitrate Leaching Index was developed to guide agricultural fertilizer application at the ground surface, and was not meant to be used for purposes of evaluating soil types with regard to onsite systems.

The equipment that is required to meet the denitrification requirements is excessively expensive, and easily represents the most costly aspect of the proposed regulation. LSA estimated that compliance with the secondary treatment requirement would cost between $10.4 million and $15 million in capital and between $345,000 to $430,000 in annual maintenance and monitoring for residential systems. We think the actual cost is far greater -- over $21 million a year for Indiana home owners. The legal and technical basis of the secondary treatment requirement is suspect, and the associated expense to homeowners is substantial. Thus, the Department must reconsider how it applies the Indiana ground water quality standards to onsite sewage systems.

THE PROPOSED REQUIREMENTS CONCERNING OPERATING PERMITS SHOULD BE DELETED FROM THE RULE

Section 48 of the proposed rule would establish a new requirement to obtain operating permits. It is entirely unclear why the Department seeks to establish this new permitting program for onsite systems. Further, this section is quite vague. For both residential and commercial systems, it provides that operating permits may be required. However, the provision does not clearly state who determines whether an operating permit is necessary, and the circumstances under which a operating permit shall be required. The proposed rule also does not

explain how such a permit would be obtained, nor the process or timing for obtaining an operating permit. It is not apparent what conditions would be imposed by an operating permit. Of particular concern is subsection 48(f), which simply provides that the Department may require the owner of a commercial system to obtain an operating permit pursuant to Ind. Code 13-15-1-2. That citation is part of the environmental statutes, and provides the Indiana Water Pollution Control Board with the authority to establish requirements concerning the issuance of permits to control water pollution. These permits are issued and enforced by the Indiana Department of Environmental Management ("IDEM"). It is inappropriate and quite likely unlawful for the Department to determine that the owner of an onsite system must obtain a permit from IDEM. The operating permit requirement should be deleted from the proposed rule.

THE TIMING OF CERTAIN ACTIONS BY THE REGULATING AUTHORITY NEEDS TO BE CLEARLY SPECIFIED AND AS SHORT AS POSSIBLE

Section 51 of the proposed rule provides that when a system fails and replacement of the soil absorption system is required, the permitting or approval requirements of the rule must be followed. Likewise, section 52 requires permit or approvals for use of temporary sewage holding tanks. The standard allowable time for local health departments to issue permits is 45 days. The Department has at least 90 days to issue approvals. When a system fails, the owner of the system needs to be able to respond and rectify the problem as soon as possible to protect human health and the environment. Pump and haul is expensive and should only be a very short term remedy. Therefore, the rule should specify a much shorter timeframe – no more than 5 business days – for issuance of permits and approvals needed to address system failures. At the very least, the rule must provide priority for issuance of permits and approvals in these situations.

CONCLUSION

The proposed rule would impose significant new requirements concerning the design, installation and operation of onsite sewage systems in Indiana. These new requirements will cost Indiana homeowners and businesses many millions of dollars each year. We urge the Department to fully consider these and other comments received concerning the scope of the rule. The proposed rule should not be presented to the Executive Board for final adoption. We encourage to Department to focus on implementation and enforcement of the current rules before it proposes any further revisions.

HARTFORD CONCRETE PRODUCTS, INC.
An Employee Owned Corporation

03 AUG 14 AM 9:04

August 12, 2003

5JWC

Indiana State Department of Health
Office of Legal Affairs
2 North Meridian Street
Indianapolis, IN 46204-3003
c/o Burton Garten

Re: *Proposed Rule 410 IAC 6-8.2 for Onsite Sewage Systems*

To Whom It May Concern:

Hartford Concrete Products, Inc., an Indiana State Department of Health approved septic tank manufacturer, respectfully submits the following "written comment(s)" for your consideration with regard to the aforementioned rule.

HCP agrees with and endorses the revisions made and proposed by the Indiana Environmental Health Association's Wastewater Management Committee to the 410 IAC 6-8.2 Technical Specification, submitted in the first public hearing held in Indianapolis on July 1st, 2003 with the following exceptions:

- Chapter 5, Section IV, Paragraph B.4 (Line 1363) -
  "For two (2) compartment septic tanks, the minimum liquid capacity of the first compartment must be at least two (2) times the daily design flow."
  HCP adamantly requests the deletion of this sentence for the following reason:
  Mathematically, line 1363 will require 2-compartment septic tank liquid capacities of 1350, 1800 & 2250 gallons for 3, 4 & 5 bedroom homes respectfully.
  Compliance with the IAPMO standard cited in paragraph C.2 (Line 1375) requires 2-compartment tanks with liquid capacities greater than 1500 gallons to have a second compartment not less than 5' in length. This same IAPMO standard requires the second compartment to have a maximum liquid capacity of 1/3 the total tank capacity.
  Collectively, lines 1363 and 1375 would require 2-compartment septic tanks that are larger than 1500 gallons to be at least 16' in length (4" walls). Compare this with current tanks of ~9.5' in length. This will cause all septic tank manufacturers to retool thus increasing the cost to every customer in an exorbitant amount. This also may close many small manufacturers and will not benefit the industry, buyers or the state.

- Chapter 5, Section VI, Paragraph D.4 (Line 1648) -
  Though the IEHA WWMC has already proposed to delete D.4 in it's entirety, HCP understands the need for product marking and requests the deletion of line 1651, "Model number of the distribution box" at minimum. The model/size of any d-box is apparent upon inspection.

Thank you in advance for considering our comments.

Respectfully,

John W. Crist
Assistant Sales Manager
800-662-8788
jcrist@hartfordconcrete.com

5KC

From: "Kevin R. Chaffee" <kchaffee@earthtekonline.com>
To: "'Alan Dunn'" <Adunn@isdh.state.in.us>
Date: 7/21/03 11:30AM
Subject: RE: Sewage Systems Rule

Alan:

I have not had a chance to thoroughly review these documents, but I have had a chance to troubleshoot several of our problem systems. We have found leaking septic tanks on each of these systems, specifically leaking inlet and outlet connections to the tanks. The tanks were supplied by different manufacturers, or were existing tanks we reused, and none were supplied with gasketed pipe openings. Based on our experience, we do not plan to install any more septic tanks without gasketed inlet and outlet pipe connections. I would highly recommend the ISDH make this a requirement in the new rule if you want to prevent future problems with overloaded systems due to groundwater infiltration. We also feel that two compartment tanks are much better at solids separation then single compartment tanks.

Kevin Chaffee

-----Original Message-----
From: Alan Dunn [mailto:Adunn@isdh.state.in.us]
Sent: Thursday, July 10, 2003 10:39 AM
To: kchaffee@earthtekonline.com; rborromeo@earthtekonline.com
Subject: Attn: Onsite sewage staff

As you are aware, the Indiana State Department of Health is in the public hearing phase of the revisions to our onsite sewage systems rule. The information concerning the public hearings and the process for making official comment has been previously sent to you. The contents of the memo is attached for your convenience.

At the first public hearing, on July 1, 2003, the IEHA Wastewater Management Committee provided numerous recommended changes to the draft that was preliminarily adopted. Two .pdf documents encompassing those changes are attached. The proposed changes are done in the "tracker" mode: proposed deletions are text with a line drawn through it, and proposed additions are underlined.

I would especially like to bring your attention to the changes proposed in the following portions of the Technical Specification: Chapter 3, Section VI, Requirements, Secondary Treatment for Nitrogen Reduction; Chapter 4, Site Drainage; Chapter 5, Section IV, Septic Tanks; Chapter 8, Section V, Requirements for Individually Designed Secondary Treatment

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LaGrange County Health Department

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114 W. Michigan Street
LaGrange, IN. 46761
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Phone 260-499-6341
Fax 260-463-7835
E-mail: lchda@hotmail.com

TO: ISDH Executive Board

FROM: LaGrange County Commissioners
LaGrange County Council
LaGrange County Board of Health

5LCC

SUBJECT: Rule 410 IAC 6-8.2

DATE: 3/28/03

A review of the proposed rule 410 IAC 6-8.2 reveals some details which, if enacted, will result in a further deterioration of sewage treatment in rural areas and cause hardship on the citizens of LaGrange County. Implementation of this Rule will also impact economic development in the county and frustrate our efforts to develop a new comprehensive plan and update our zoning regulations. The following briefly summarizes some of our concerns.

A major concern is the high cost and complexity imposed by the Rule's requirements. The complexity and amount of paper work for Plan Submittal will require professional help since few of our citizens will be able to complete the additional detailed, permit-application paperwork required. Our best analyses indicate that the rule will cost homeowners an additional $1,000 to $1,500 to apply for a permit. If a permit is granted, the homeowner will be able to install the same septic system that is allowed under the current rule.

In addition to Plan Submittal costs, installation costs will also increase because of the prescriptive nature of this rule. Examples are perimeter drains, Nitrate Leaching Index limits of soils and vacuum testing of septic tanks. In addition, manufacturers of equipment will likely need to redesign some of their manufacturing procedures to narrow specifications for equipment. There are a number of instances where additional requirements are cross-referenced to various other standards making it extremely difficult to determine exact requirements or costs associated with these other standards. These additional demands and uncertainties will likely increase homeowner costs as installers attempt to meet rule requirements. According to installers and some members of an ISDH advisory board, the cost of the conventional, gravity septic system will double to $8,000 to $10,000.

The proposed Rule imposes several requirements without supportive evidence and there are a number of inconsistencies in the requirements for different systems. The following illustrates a few of these issues:

1. If a conventional septic system is installed, the rule credits the soil absorption field with removal of contaminates before they create problems for the environment and the public health. But if a homeowner or business desires to provide additional protection by installing a treatment system to remove much of the contamination <u>before</u> it is discharged into the absorption field, the soil is given no credit at all. The person wanting to install an improved system is actually penalized for doing so in terms of increased regulatory and installation costs plus required maintenance and performance monitoring costs – none of which are required for a "less-effective" conventional septic system. It is counterproductive to discourage "well-meaning citizens" from installing alternative onsite systems which are more protective of the environment and the public health.

2. Many of the Rule requirements for pretreatment systems do little to improve system performance. Examples of typical requirements are listed below. Wetlands are discussed here to illustrate the general tone of the Rule because our county has been installing them for 11 years, and the county has extensive hands-on experience in their installation and performance.

    A. Rule states: Multiple cells must be equal in size – this requirement has nothing to do with flow (gpd) and limits flexibility for treatment for large, phased construction projects. Cell design should be based on flow delivered to that cell, not on the arbitrary, permanent conditions dictated by regulation. An arbitrary requirement such as "equal size" may

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stone instead of two which are used now in Lagrange). The requirement for the larger stone is arbitrary and seems to be just another "sounds good" requirement

I. Rule states: consideration must be given to the permeability and hydraulic conductivity of the central aggregate in determining the appropriate length of this layer of aggregate into the wetland – This seems vague and arbitrary. No one seems to know just what this means - perhaps something to do with the installation of the large stone.

J. Rule states: the wetland must be insulated with a 2-6 inch layer of mulch and covered with woven biodegradable netting or jute – again, this will increase costs with no appreciable improvement in the system (Is there any data showing improved performance of a mulched wetland vs. a wetland without mulch?). Seems like another "sounds good" requirement.

K. Rules states: Examples of plants to be used (among others) are cattails and sedges – Lagrange County has not recommended cattails or sedges for several years. Cattails have a root system that does not grow to the bottom of the wetland cell, and sedges typically die off about 2-3 years after they are planted. In our view, neither should be recommended by this Rule.

L. Rule states: Plants of the same species must be grouped together and planted perpendicular to the direction of flow – in our experience, there is no value in grouping or placing plants at a specific angle to the flow. This is another "sounds good" requirement that will have no impact on performance.

M. Rule states: shallower root plants must be planted near the inlet and deeper root plants near the outlet – why? What is a shallower root plant – cattails? Paper could be conserved if all these rules for planting the wetland were included in an educational brochure provided to the homeowner. Purdue University Extension, as well as several other nearby state universities, has publications that cover the principles of wetland design. Why is this level of information in a regulation?

Summary of wetland requirements: These items in the list above (A - M) illustrate only the problems with the Rule concerning wetlands, which represents less than six pages of a 191 page document. This section of the Rule (Chapter 8, V-E) not only dramatically increases the cost of a wetland without any corresponding benefit, but may eliminate their use in Indiana. In addition, there is some concern that this portion of the Rule may actually degrade the ability of a wetland to treat wastewater. The remaining 185 pages of the Rule are rife with similar problems.

3. A dispersal area that is ½ the width of the absorption field (to assure sufficient space for subsurface wastewater to flow away from the soil absorption area) is required. If the absorption field is 40 foot wide, for example, nothing can be built within 20 feet of the field that will interfere with the flow of wastewater away from the field. This implies that wastewater flows laterally from the field. This is a valid assumption in some soils, but not in others. Meanwhile, a perimeter drain which discharges to a ditch can be installed within 10 feet of the field. These requirements seem to be a contradiction.

4. Perimeter drains have not been shown to lower water tables below an absorption field in all soils. ISDH has no evidence, or data they are willing to share, that demonstrates a lowering of the water table beneath the absorption field, especially when additional water is being added daily from the home. In addition, there are extensive requirements in the Rule to calculate the draw down for a perimeter drain or if you are not capable of the calculations, the drain can be installed at 4 feet, even though there is no evidence that 4 feet will work. Why not just install all perimeter drains at 4 feet? This would eliminate the complicated calculations, and since there is no data supporting the use of perimeter drains, a 4 foot deep drain is a reasonable guess. Of course, why allow perimeter drains at all without sufficient data? In certain soils, a perimeter drain is needed to assure wastewater does not surface in the yard, and since the drain outlets to a ditch, the wastewater from the absorption field may be discharging to the ditch. If this is the reason for the drain, it should be stated as such instead of using drains to lower a water table without proof.

One must question the rationale behind this proposed Rule revision. Specifically, what problem with the existing rule is the proposed rule trying to fix? If the goal is to reduce sewage treatment problems, the increased cost and complexity of this Rule may make the problem worse with some homeowners forced into noncompliance. In addition, this Rule will be difficult and expensive to enforce at the local level, and

some counties are likely to default on enforcing the Rule at all. Lagrange would most likely require additional staff, office space, benefits and the daily expenses required to enforce this Rule. These additional costs would most likely not be supported by the local government.

Adoption of the proposed Rule in its present form must be reconsidered. The complexity of the Rule makes it impossible for most to decipher, costly for the homeowner and will make enforcement difficult. While present methods of treating residential wastewater can certainly be improved, this rule should focus on weaknesses in the current rule and on proven, rather than arbitrary, requirements. Over the years, Indiana has largely ignored the septic system problem, and now that the problem has been made public, we seem to be reacting with a crisis management mentality. The solutions need not be complex or costly as required under the proposed Rule – we simply need to develop solutions in a reasoned manner with any costly or unproven requirements backed by documented experiences and research.

CC: Governor O'Bannon
Alan Dunn
Howard Cundiff

"E"

LaGrange County Health Department

114 W. Michigan Street
LaGrange, IN. 46761

Phone 260-499-6341
Fax 260-463-7835
E-mail: lchda@hotmail.com

TO: ISDH Executive Board

FROM: LaGrange County Commissioners
LaGrange County Council
LaGrange County Board of Health

SUBJECT: Rule 410 IAC 6-8.2

DATE: 7/30/03

A review of the proposed rule 410 IAC 6-8.2 reveals some details which, if enacted, will result in a further deterioration of sewage treatment in rural areas and cause hardship on the citizens of LaGrange County. Implementation of this Rule will also impact economic development in the county and frustrate our efforts to develop a new comprehensive plan and update our zoning regulations. The following briefly summarizes some of our concerns.

A major concern is the high cost and complexity imposed by the Rule's requirements. The complexity and amount of paper work for Plan Submittal will require professional help since few of our citizens will be able to complete the additional detailed, permit-application paperwork required. Our best analyses indicate that the rule will cost homeowners an additional $1,000 to $1,500 to apply for a permit. If a permit is granted, the homeowner will be able to install the same septic system that is allowed under the current rule.

In addition to Plan Submittal costs, installation costs will also increase because of the prescriptive nature of this rule. Examples are perimeter drains, Nitrate Leaching Index limits of soils and vacuum testing of septic tanks. In addition, manufacturers of equipment will likely need to redesign some of their manufacturing procedures to narrow specifications for equipment. There are a number of instances where additional requirements are cross-referenced to various other standards making it extremely difficult to determine exact requirements or costs associated with these other standards. These additional demands and uncertainties will likely increase homeowner costs as installers attempt to meet rule requirements. According to installers and some members of an ISDH advisory board, the cost of the conventional, gravity septic system will double to $8,000 to $10,000.

The proposed Rule imposes several requirements without supportive evidence and there are a number of inconsistencies in the requirements for different systems. The following illustrates a few of these issues:

1. If a conventional septic system is installed, the rule credits the soil absorption field with removal of contaminates before they create problems for the environment and the public health. But if a homeowner or business desires to provide additional protection by installing a treatment system to remove much of the contamination <u>before</u> it is discharged into the absorption field, the soil is given no credit at all. The person wanting to install an improved system is actually penalized for doing so in terms of increased regulatory and installation costs plus required maintenance and performance monitoring costs – none of which are required for a "less-effective" conventional septic system. It is counterproductive to discourage "well-meaning citizens" from installing alternative onsite systems which are more protective of the environment and the public health.

2. Many of the Rule requirements for pretreatment systems do little to improve system performance. Examples of typical requirements are listed below. Wetlands are discussed here to illustrate the general tone of the Rule because our county has been installing them for 11 years, and the county has extensive hands-on experience in their installation and performance.

    A. Rule states: Multiple cells must be equal in size – this requirement has nothing to do with flow (gpd) and limits flexibility for treatment for large, phased construction projects. Cell design should be based on flow delivered to that cell, not on the arbitrary, permanent conditions dictated by regulation. An arbitrary requirement such as "equal size" may

increase not only engineering and construction costs but land costs because a property owner or a subdivision will not be able to efficiently design a system to fit the land available for the treatment system.

B. Rule states: Wetland must be located in full sun – a number of wetlands have been installed in woods which continue to function well. These systems could not have been installed under the new rule. In reality, shade vs. sun is a minimal consideration in determining system size and type of plants placed in the wetland.

C. Rule states: If wastewater is pumped to a wetland, the wastewater must be pumped in 10 equal doses based on daily flow. This seems very arbitrary. To accomplish this requires additional mechanical and control equipment and there is no evidence, in our experience that it serves any useful purpose. Lagrange has a seven year old wetland without this requirement that continues to perform very well.

D. Rule states: the outlet of the wetland must be a ½ to 1½-inch outlet – The approximately 100 wetlands in Lagrange county, some of which are over 10 years old now, continue to perform very well with a four-inch outlet. Restricting the outlet size may negatively impact treatment by restricting the hydraulic flow within the wetland and should not be required by the Rule, at least not without data demonstrating that it improves current treatment performance.

E. Rule states: a wall must be constructed between multiple-celled wetlands or a large distance maintained between cells - the first commercial wetland in the state (1993), sized for 5,000 gpd, does not have a wall between the cells. The distance between cells is about 2 feet, and this has caused no problems. This distance made construction fairly simple. This wall or distance requirement is an example of a "sounds good" requirement, but in actuality does nothing to improve treatment and will increase costs. Again, ISDH has provided no evidence that this seemingly arbitrary requirement will improve system performance.

F. Rule states: Gusty winds must be avoided during liner placement – This seems obvious and trivial, and while wind may complicate life for the installer, it has nothing to do with system performance.

G. Rule states: Testing the liner for leaks by filling the wetland with water for 24 hours or an air lance test - seems like overkill, especially for smaller systems. The manufacturer of the PVC liner used for our wetlands already tests any seams for leaks before the liner is shipped. This liner is simply unfolded into the wetland – it does not require seams to be created in the field because the liner is shipped on order at the proper size for the system. These liners are very strong, and according to the manufacturer that we use in Lagrange, very large installations covering several acres may have 50 or more installers walking on the liner or driving all terrain vehicles across the liner without the problems assumed by this requirement. The most likely place for a leak to occur would be the installation of the boots used to seal the inlet and outlet pipes. From our actual hands-on experience however, these boots are easy to install and should not be a problem if minimal care is taken. The cost of a 24 hour water tight test will be expensive for the homeowner since the contractor must idle his equipment and haul water to a new construction site (many construction sites do not have water available when the wetland is installed). When added to the other costs created by this Rule, a wetland that we can presently install for $4,000 will at least double – perhaps more - because of the extreme complexity of the proposed Rule.

H. Rule states: three inch stone (INDOT spec 1) must be installed in the first four foot at the front and three foot at the rear of the wetland cell (a residential wetland is 33 feet long and the remaining space of the cell is filled with ½ to ¾ inch stone or INDOT spec 8). The stone must be at a 45 degree angle on the side facing the center of the cell or where the INDOT spec 8 stone is. (This means the large stone must be stacked by hand). – according to ISDH the large three inch stone will compensate for surges of wastewater coming into the wetland. In Lagrange County, we have never used this large stone for any residential system, including the first installation in 1992 and have had no problems. Again, this seemingly arbitrary requirement will increase costs because a partial load of more expensive stone must be ordered (the proposed Rule will require three different sizes of

some counties are likely to default on enforcing the Rule at all. Lagrange would most likely require additional staff, office space, benefits and the daily expenses required to enforce this Rule. These additional costs would most likely not be supported by the local government.

Adoption of the proposed Rule in its present form must be reconsidered. The complexity of the Rule makes it impossible for most to decipher, costly for the homeowner and will make enforcement difficult. While present methods of treating residential wastewater can certainly be improved, this rule should focus on weaknesses in the current rule and on proven, rather than arbitrary, requirements. Over the years, Indiana has largely ignored the septic system problem, and now that the problem has been made public, we seem to be reacting with a crisis management mentality. The solutions need not be complex or costly as required under the proposed Rule – we simply need to develop solutions in a reasoned manner with any costly or unproven requirements backed by documented experiences and research.

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Lang, Feeney & Associates
715 South Michigan Street
South Bend, IN 46601

Prepared by Tim Monaghan CPSSc and
Bernie Feeney PLS

Questions / Concerns regarding Proposed Rule 410 IAC 6-8.2
Indiana State Department of Health.
We have also performed a preliminary review of the new document sent by electronic mail by Alan Dunn on July 10, 2003.
The comments on the new document are referenced within our comments in regards to the proposed rule (in bold italicized print).
We feel that 20 days to review this document fully is inadequate.

First question, Why is this needed? Answer was to clarify the existing rule: this is not a clarification, but a new rule. This rule seems to be too proscriptive, most jurisdictions are changing to a performance based system, which is used generally as a guideline instead of a document which attempts to anticipate every possible permutation of problems that can be encountered within the on-site septic industry. Mistakes will always be made but if the document is flexible enough, these mistakes can be remedied locally. Local control of as many sites as possible will be more useful than the addition of another layer of bureaucracy which will be needed to enforce this new rule.

Rule 8.2
Page 3 section 8. Defines construction as DELIVERY of material to site.
Appears to have been addressed in new document.
Page 6 section 22. Defines system failure as discharge of effluent to ground or surface water or effluent backing up into the house; we see many system which are in failure but do not at the present time exhibit these symptoms.
Page 10 & 11 section 42 (general). Are repair systems, which do not meet the standards of this document considered experimental? And thus do they need State Approval?
Page 13, section 43 (s) & (t). What are the procedures for these changes? What is to stop the State Health Department from arbitrary changes?
Page 15 section 46 (g). What is the turnover time of these reviews?
Page 16 section 46 (i). 45 days seems like a long time for review of failed septic systems.
Page 16 section 46 (k). Why is this needed, County Soil Atlases are not to be used for site-specific uses.
Page 17 section 47 (e) (1). Does this mean that the State Health Department shall review and approve a commercial septic system in 90 days? ***(f) & (h) new document adds a 45 day limit on approval, this seem like to much time.***
Page 17 section 47 (e) (2). Why can't surveyors certify gravity septics?
Page 19 section 49 (b). How can local health departments inspect onsite systems that they are unqualified to review?
Page 19 section 49 (c). Having designers review the installation of a septic system is not a good idea the Health Department should have the responsibility for this. ***Appears to have been addressed in new document.***
Page 21 section 50 (d) (6). What is the penalty for this?
Page 22 section 51 (c). Why shouldn't repair systems comply with the new construction rules?
Page 25-27 section 53. These items seem too restrictive, why would this be done? The system is experimental, therefore a limited amount of risk should be allowed for these types of systems.
Page 28 section 56 (d). What if the County Health Department does not comply with this new rule? There are County Health Departments that are still not complying with the existing septic code and what support will be provided to each Local Health Department so that all Counties will apply the rule uniformly?

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Nitrate Leaching Section

General Comments, there is no evidence that nitrate levels within the subsurface are tied to septic systems. There is evidence that nitrate levels within the subsurface are tied to agricultural application of manure and fertilizers. The *Nitrate Leaching Index, Field Office Technical Guide*, is for general planning purposes NOT for site-specific uses, and is also to be used only to compare nutrient leaching between different soil series within a county. According to presentation by Alan Dunn to the Indiana Association of Professional Soil Classifiers, soils with index numbers from 2 to 10 MAY contribute to nutrient leaching below the root zone and index numbers greater than 10 WILL contribute to nutrient leaching below the root zone. Therefore, if the State Health Department considers nitrates from septic tank effluent a concern for the environment, all soils with a nitrate-leaching index of 2 or more should be reviewed.

According to the Soil Survey of Fulton County Indiana (1987), page 4 under the Map Unit Composition, the County Soil Survey recommends that that a detailed site investigation is required for intensive use in small areas. So, using the map unit for an indicator for the nitrate leaching indexes is an improper use of the County Soil Atlas.

Is this section to be removed? Was not included in the new document.

Technical Specifications (comments based on January 8, 2003 document)

Page 3, Chapter 2, I, D, 2. It does not seem to be a good idea to have designers inspect the installation of a new septic system instead of the local health department.

Appears to have been addressed in new document.

Page 4, Chapter 2, II, B, 2. Does this mean that there shall be a formal wetland delineation? If so what credentials are needed and what process is to be used for the wetland delineation? Furthermore, what is the authority for this requirement?

Page 4, Chapter 2, II, B, 3, c, 1. Does this mean that a topographic survey is required to definitively locate localized areas that will focus water? If so what credentials are needed and what process is to be used for the topographic survey?

Page 4, Chapter 2, II, C, 1, b. What are the criteria for determining how many borings are required for larger commercial systems?

Page 5, Chapter 2, II, C, 2, a. If ALL differences need to be described why not require that all profiles have full descriptions? So the health department can see the actual variability of the site.

Page 6, Chapter 2, II, D, 2, e. Hydric soil is not defined within this document.

Page 6, Chapter 2, II, D, 3. No soils exactly match the type description in the local NRCS Soil Atlas and the local NRCS Soil Atlas is only to be used for general planning not for site-specific purposes. What is the purpose of this requirement.

Page 7, Chapter 2, III, D, 1, a, 2. Shouldn't this topographic survey information be required to be preformed by a certified professional?

Page 7, Chapter 2, III, D, 1, a, 8. What is the definition of a tree or shrub that will effect the construction of a septic system?

Page 7, Chapter 2, III, D, 1, a, 12 & 13. Does this flood elevation information need to be certified? If so by whom?

Page 8, Chapter 2, III, D, 1, b. General question about this section, do the elevations need to be certified? A certified professional should perform elevations to meet specified criteria.

Page 8, Chapter 2, III, D, 1, b, 3, c. Why does this percent slope need to be calculated if a topographic survey is performed to a 1 foot interval?

Page 8, Chapter 2, III, D, 2. General comment on this section, if the purpose of this rule is to provide better design and installation, then wouldn't III, D, 1, be the only way to design a septic system of any variety?

Page 11, Chapter 2, IV, A, 2, a. What type of verification? Does this need to be located on the design? And does this need to be performed before the soil investigation?

Appears to have been addressed in new document, but needs to be clarified.

Page 11, Chapter 2, IV, A, 3, a. How many samples are sufficient for the plastic limit test?

Page 11, Chapter 2, IV, A, 4. Why can't soil be worked when the soil is frozen?

Page 11, Chapter 2, IV, B. General, what difference does it make what TYPE of equipment is used, as long as the process is completed correctly?
Appears to have been addressed in new document.
Page 11, Chapter 2, IV, B, 2. What requirements are we to comply with?
Page 11, Chapter 2, IV, C, 2. What are the criteria for this section? In regard to cover, grading, seeding?
Page 13, Chapter 2, V, E, 1. If the department MAY require a set-aside area, what are the criteria for this set-aside area? Shouldn't this read SHALL not MAY?
Page 13, Chapter 2, V, E, 3, c. Why do cost estimated need to be submitted for a plan submittal?
Page 18, Chapter 3, II, B, 4. Why can't a dispersal area be located on a slope that is greater than 15%?
Appears to have been addressed in new document.
Page 18, Chapter 3, II, B, 5. Isn't this redundant?
Page 18, Chapter 3, III, F. Shouldn't this read, "department SHALL require" not MAY?
Page 19, Chapter 3, IV. If we are trying to improve septic systems isn't an alternating field onsite system a poor substitute for a flood dose system?
Page 19, Chapter 3, IV, A, 2, b. Couldn't this place a septic system within a flood plain?
Appears to have been addressed in new document.

Page 19, Chapter 3, IV, A, 3. What is the significance of 15%? Other states, such as Wisconsin, will allow systems to be placed on greater slope, including mound systems.
Page 21, Chapter 3, V, A, 3. What is the significance of 6%? Other states, such as Wisconsin will allow mound systems to be placed on greater slope.
Page 22, Chapter 3, VI, A. Are there any secondary treatment units that will meet this criterion? If so what units meet this 10 mg/l requirement? What are the costs of any unit that can meet this criterion?
Appears to have been addressed in new document.
Page 22, Chapter 3, VI, B. This is not the proper use for the County Soil Atlas, it is to be used for general planning purposes, not site specific items.
Appears to have been addressed in new document.
Page 22, Chapter 3, VI, C, 2, a. At what depth below the septic field is this layer to be before no nitrate reduction to be needed?
Appears to have been addressed in new document.
Page 22, Chapter 3, VI, C, 2, c. What is the reason for this? If we assume that this soil will leach nitrates, then these requirements will not limit nitrate pollution in the groundwater.
Appears to have been addressed in new document, but there is no evidence that septic systems effect nitrate loading to groundwater.
Page 27, Chapter 4, II, E. General comment, specifies agricultural processes, this does not seem to be applicable to this application. What is the citation for figure 4-1? Does this apply to septic applications?
Appears to have been addressed in new document.
Page 29, Chapter 4, II, F. Why must the outlet be solid? ***Appears to have been addressed in new document.***
Why can't aggregate be used on the outlet?
Page 35, Chapter 5, II, B, 6, c, 2, a. Why must the lateral holes be placed facing down?
Page 40, Chapter 5, IV, G, 9. How will service mandate be enforced?
Page 45, Chapter 5, VIII, C, 4, e. What is the justification for this 20 GPM variance for the pump curve.
Page 54, Chapter 5, XI, D, 4. What is the definition of intensive?
Page 55, Chapter 6, I, A, 2, c. Why can't site preparation be performed while the soil is frozen?
Appears to have been addressed in new document.
Page 57, Chapter 6, II, A, 1. Why shouldn't the same standard apply to all systems? What is the difference between commercial system and sites with no electricity?
Appears to have been addressed in new document.

Page 77, Chapter 8. General comment, can a secondary treatment unit be used with an outflow concentration or between 30 and 250 mg/l without downsizing? It seems to read that a pretreatment unit MUST have an outflow concentration of 30 mg/l. What is the basis for the 30 mg/l level?

Appendix A: Glossary.

On-site System Failure – A system with trenches completely full of effluent, but with enough infiltration or deep enough to allow effluent to infiltrate into the subsoil above the trenches, would not be failed according to this definition. #1 should read only: *Soil Absorption field refuses to accept sewage at the rate of application.* Strike the portion interfering with the normal use of plumbing fixtures.....And discharging is covered in definition #3.

Comments on proposed revisions to the draft document.

The addition of the new loading rate table will dramatically increase the cost of a septic system in the sandier soils of the state. The loamy sand loading rate change from 0.75 to 0.60 gpd/ft^2 will increase a system by 25%, a sandy loam loading rate change from 0.60 to 0.50 gpd/ft^2 will increase a system by 20% and a sandy clay loam loading rate change from 0.50 to 0.30 gpd/ft^2 will increase a system by 67%. This change, while admirable, was not figured into the fiscal impact of the new rule. This should be done to provide an up to date assessment of the total cost.

August 8, 2003

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Office of Legal Affairs
Indiana State Department of Health
2 North Meridian
Indianapolis, IN 46204-3003

To whom it may concern:

I would like to voice my opposition to proposed Rule 410 IAC 6-8.2. I currently reside in LaPorte County where more than 89% of the homes would fall under this new rule. Since it has not been proven that septic systems are the major cause of the nitrate problems, it seems unfair to lay the burden on property owners. Most research supports the facts that nitrates in the soil come from fertilizers and lawn care products, not from septic systems. It is also my understanding that it is not even certain that the newly proposed denitrification systems will reduce the nitrate problem. Long-term solutions to this problem should concern ridding the use of the major causes of nitrates. In other words, nitrate based fertilizers and lawn care products, should be eliminated first, to see if the problem does subside.

In addition, I hope that if the new rule is adopted, that the rule clearly states that it only applies to new home construction and **not** the replacement of existing septic systems. LaPorte County has told me that they will institute this rule for replacement septic systems as well as new construction. It seems unfair that the jurisdiction of this rule will not be uniform throughout the state, but will be left up to each County's Board of Health Department. If the rule does indeed go into affect in its current form and all replacement septic systems in LaPorte County must conform to the new rules, while such is not the case in other counties, it seems that the only recourse for citizens will be to file a class action lawsuit.

Before the burden is placed on property owners, the research should prove conclusively that the problem is caused from septic systems and not from fertilizers, lawn care products, or other ground water run-off. The cost prohibitive nature of the new system would be a financial burden for many. I, for one, would have to put in a mound system when my current septic system needs to be replaced. To also put in the nitrate filter system would mean that I would spend $14,000-$15,000, roughly one-third the cost of the purchase price of my house

Sincerely,

Lorri Kovitz

Lorri Kovitz
3821 Hiawatha Drive
Michiana Shores, IN 46360
219-873-1776

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GREATER LA PORTE CHAMBER OF COMMERCE

LA PORTE ECONOMIC ADVANCEMENT FOUNDATION

Resolution of the Board of Directors of the Greater LaPorte Chamber of Commerce

WHEREAS, the Indiana State Department of Health (ISDH) is proposing new septic rules for the State of Indiana and;

WHEREAS, this secondary system is designed to reduce nitrogen leaching through the soil from on site sewage systems to insure ground water quality standards in areas that contain very course sand to loamy fine sand and;

WHEREAS, 89% of LaPorte County's soil would require the use of this secondary septic system and;

WHEREAS, it is estimated that these proposed rules under 410 IAC 6-8 2, if adopted by the State of Indiana would cost LaPorte County builders between $8,000 and $10,000 per septic system to install and;

WHEREAS, these proposed rules would cost the residents of LaPorte County up to $2,000 annually to maintain the system and;

WHEREAS, the Indiana State Department of Health's mandate to reduce nitrates comes from 327 IAC 2-11 Rule 11 Ground Water Standards which state that technical and economic reasonableness be considered when adopting rules and;

WHEREAS, the ISDH is required to consider technical and economic impact and has not done so;

NOW THEREFORE BE IT RESOLVED, that the Board of Directors of the Greater LaPorte Chamber of Commerce is against the adoption of the proposes Rules 410 ICA 6-8 2, without a technical and economic impact assessment being completed by the Indiana State Department of Health.

Submitted this 30th day of July 2003, by the Greater LaPorte Chamber of Commerce Board of Directors.

Michael B. Seitz, President

Michael T. Arnett, Chairman

414 LINCOLNWAY • P.O. BOX 486 • LA PORTE, IN 46352-0486
PHONE (219) 362-3178 • FAX (219) 324-7349 • www.lpchamber.com

ACCREDITED

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Indiana Statewide Association of Rural Electric Cooperatives, Inc.

A Touchstone Energy® Cooperative

P.O. Box 24517
Indianapolis, IN 46224
Telephone: (317) 487-2220
Fax: (317) 247-5220

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August 13, 2003

COMMENTS OF THE INDIANA STATEWIDE ASSOCIATION OF RURAL ELECTRIC COOPERATIVES, INC. ON PROPOSED RULE 410 I.A.C.6-8.2

The Indiana Statewide Association of Rural Electric Cooperatives, Inc. (hereafter "Indiana Statewide") respectfully submits the following comments concerning the proposed rule revising 410 A.I.C.6-8.2, 26 IR 3116.

Indiana Statewide is the statewide association representing 39 rural electric cooperatives across 80 counties in Indiana. The rural electric cooperatives serve over 500,000 households in the most rural segments of Indiana. The rural electrics know first-hand how the rural areas are struggling under the weight of job losses, closures, economic downturn and inability to attract new business ventures. With these economic pressures, rural residents are particularly sensitive to additional financial pressures.

While Indiana Statewide supports protection of public health and water resources, it also strongly urges the Indiana State Board of Health to ensure that any new requirements are technically necessary, strongly supported by scientific evidence and available to the rural residents at a reasonable cost.

The proposed rule is not technically necessary, scientifically supported, cost-effective, nor is it a reasonable rule as required by IC 16-19-3-4.

Indiana Statewide agrees with the comments submitted by the Indiana Association of Realtors, Inc. and the Indiana Builder's Association. Indiana Statewide is alarmed at the potential effect of the proposed rule on rural economic development. Rural areas are much more dependant on septic systems than most urban areas. The economic burden of the rule would fall disproportionately on rural areas in Indiana.

1. **THE FISCAL BURDEN OF THE PORPOSED RULE CANNOT BE SUPPORTED**

   The proposed rule will impose substantial new regulatory and technical requirements on the installation and use of onsite sewage systems. These new requirements will be costly, and will have a significant negative affect on the affordability of housing in Indiana. In accordance with Ind. Code 4-22-2-28, the Department requested a fiscal analysis by the Legislative Services Agency ("LSA").

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Indiana Statewide believes that LSA's analysis indicating $41.8 million per year underestimates the cost of the proposal, but if LSA's analysis is true many homeowners in Indiana will be faced with significant new financial burdens. For example, LSA obtained an estimate from one company concerning the cost to install a secondary treatment system to meet the proposed new denitrification requirements. An Earthtek system for a three-bedroom home would cost between $6,500 to $11,500 installed. As recognized by LSA, it is certain that this cost would be passed along to the homebuyer. As a percent of home value, the effect on Indiana's rural areas would be staggering. An increase of thousands of dollars on the cost of homes will affect new housing starts and existing home sales, and will price many Hoosiers out of the market for a home.

2. THE PROPOSED RULE IS NOT TECHNICALLY NECESSARY; THE DEPARTMENT SHOULD FOCUS ON BETTER IMPLEMENTATION AND ENFORCEMENT OF THE EXISITNG RULES

The proposed rule and Technical Specifications appear to try to cover every conceivable situation by the use of prescriptive rather than performance-based language. Some examples of over-regulation include:

- A requirement to run a bush-hog over an ungraded soil absorption field site at a 2-inch height is impractical and dangerous. It would be quite sufficient to say that the site should be closely mowed.
- A requirement to place compacted backfill around a tank is unnecessary and costly. Slight settling of earth around the tank has no effect on system performance.
- Requirements for seeding and soil stabilization are unnecessary for most systems and cause extra expense for inspection and seeding out of sequence with the rest of the project.

This prescriptive approach provides little flexibility to local health departments to use common sense in addressing site-specific circumstances. Furthermore, many requirements of the proposed rule are not technically necessary to protect public health and water resources. A recent study by Purdue University showed on onsite system failure rate of less than 3 percent since 1991 and less than 1 percent since 1970 in a county that vigorously enforces the current rules.

Improvements can and should occur simply through proper implementation and enforcement of the current requirements. In fact, those areas of the State that have not been properly implemented the current rules are likely to not implement any new rules. As a result, the current disparity between areas of the state will only increase. One of our primary concerns with the proposed rule is that it does nothing to address the current problems. Thus, in addition to all the new prescriptive requirements, current problems with the program will remain. Instead of advocating a dramatic overhaul of the current requirements, ISHD instead should audit local programs to put all areas of the State on a level playing field.

3. **THE PROPOSED RULE INAPPROPRIATELY APPLIES THE INDIANA GROUND WATER QUALITY STANDARDS TO ONSITE SYSTEMS**

327 I.A.C 2-11-2(b) provides that agencies should consider the technological and economic reasonableness of and other appropriate factors in determining a feasible approach to applying the ground water standards. There is no scientific evidence that nitrates from onsite systems are reaching ground water in excess of the applicable ground water quality standards. Also, the manufacturers of secondary treatment equipment cannot guarantee that their systems will even meet the denitrification requirements. Further, the Technical Specifications rely on Natural Resource Conservation ("NRCS") soil maps and the Nitrate Leaching Index. But according to NRCS, the soil maps are out of date, and were never designed to evaluate small areas such as home sites. Rather, the maps were meant for large-scale applications. Further, the Nitrate Leaching Index was developed to guide agricultural fertilizer application at the ground surface, and was not meant to be used for purposes of evaluation soil types with regard to onsite systems.

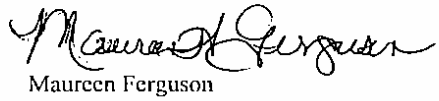
The legal and technical basis of the secondary treatment requirement is suspect, and the associated expense to homeowners is substantial. Thus, the Department must reconsider how it applies the Indiana ground water quality standards to onsite sewage systems.

4. **CONCLUSION**

The proposed rule would impose significant new requirements concerning the design, installation and operation of onsite sewage systems in Indiana. These new regulations will cost Indiana homeowners and businesses many millions of dollars each year. Indiana Statewide urges the Department to fully consider these and other comments received concerning the scope of the rule. Indiana Statewide opposes the proposed rule and requests that it not be presented to the Executive Board for final adoption. Indiana Statewide encourages the Department to focus on implementation and enforcement of the current rules before it proposes any further revisions.

Thank you for the opportunity to comment on the proposal. Please feel free to contact me with any questions at 317-487-2228.

Sincerely,



Maureen Ferguson
Director of Government Relations

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August 6, 2003, Seymour, Indiana

Good morning, Madam Hearing Officer, Ladies and Gentlemen. Thank you for conducting three hearings around the State on this proposed rule for onsite septic systems. I am Marlys Pedtke of Indianapolis (spell name), staff for the Indiana Builders Association (IBA), and I am presenting the comments for IBA membership today. I respectfully request that these comments I am making today be provided to the Executive Board of the State Department of Health.

The Indiana Builders Association respectfully requests that the Board **recall** LSA Document #02-321, Proposed Rule for Onsite Septic Systems.

IBA wants to be a part of the team that provides Indiana with regulation for onsite septic systems. We studied the then-to-be-proposed rule last year. We testified before you in January that this rule was not ready for preliminary adoption. We worked throughout the spring with ISDH staff and others, notably WWMC, to better understand the proposed rule, and to rephrase many technical sections, so that those sections could provide the regulation that was intended. More recently, we met with ISDH and Board leadership and staff to discuss and better understand the legal basis, as well as the need, for the rule. And most recently, we have itemized our concerns with the proposed rule, over one hundred suggested changes, at the first two public hearings. (WWMC has submitted a greater amount of changes, and all testimony to date has asked for additional changes.)

IBA requests the proposed rule be recalled, because of numerous technical concerns still present within the proposed rule, and the rule's significant fiscal impact to the state's economy and to local government. Others have asked that the rule be withdrawn.

If you adopt this rule, you will:

*not protect or improve the State's quality of groundwater,
*cause an enormous financial impact on the public and local governments,
*require technology that is very expensive and cannot guarantee compliance,
*be in conflict with the State's groundwater quality standard,
*strike a serious blow to housing affordability in Indiana,
*render local health departments legally vulnerable,
*circumvent due process with nonspecific future requirements,
*de-value Indiana soil through the misuse of agricultural evaluation tools,
*make it impossible to comply with the state's septic rule,
*discourage new technology,
*require the use of specific brand names, and
*break your own enabling law, which requires that you adopt reasonable rules.

Do not do this. Recall this proposed rule, and insist that all stakeholders work together to resolve these issues. What is to prevent us from trying? We succeeded before.

Thank you.

ATTACHMENT
J

June 14, 1999

5MS

Seymour City Council
City Hall
309 N. Chestnut St.
Seymour, IN 47274

The reason I'm here tonight is to ask that you, the City Council, deny your sewer department its request to reduce testing that checks for cadmium and nickel and its inflow. The reason I am asking for this is because I wear three hats. I'm a member of the SCS School Board, I am a county, state, and federal taxpayer, and I am a Jackson County farmer.

As a board member, I have sat and been told how the storm sewer that our High School and all of the residences west of Van Fang ditch is a good system. Later I find that it is totally plugged and has not worked for years. No wonder, after spending $17 million on remodeling our high school, we have today extensive damage from water that cannot flow out of that very sewer that I was told was working. Even today, a year later, there is work to be done that will eliminate this from ever happening again. This work is simple and not complicated. As a taxpayer I have watched as we wasted our tax dollars to sod a ditch that simply needed a good cleaning and a little seed sown. But wait, as a farmer, I know that we should always start at the mouth of our ditches and work our way upstream. This brings me to the next point; I farm soil types that are very similar to the soils that Seymour has built on. There are two things that you always have to remember.

First, surface drain, then subdrain. Your town has three main surface drainage waterways. You should first create a budget that allows you to finance the cleaning and maintenance of these waterways. This would include soil removal, reshaping the banks, and removal of all brush and trees. Keep them smooth, straight, and clean. Always start at the lowest point and work upgrade; do this every 10 – 15 years.

Second, make sure that all elected and appointed officials understand the concept that subdrainage is a fact of life. When these types of soils are farmed or built on, and the City of Seymour is built on the soil types that I am talking about subdrains have to be installed and allowed to flow freely. For this reason, as a taxpayer, I am concerned. As you approve money to seal your sewer lines you are decreasing your subdrainage. I know that this is more water to treat, but because it is clear, clean water it makes sewage easier and quicker to process. There are times during heavy, long lasting rains that our sewer department becomes the largest polluter that we have in Jackson County to White River.

As a school official, I am forced to be concerned because we have school children here in Jackson County who like to fish out of that river and they drink the water that comes from that river in their homes and in our schools. The solution is the following suggestion: we need to install an electric 30" valve on the east bank of Von Fang ditch and reconnect the old 30" line that comes from the rock sewer and currently is connected to our 60" sanitary sewer system. Then connect it to the 30" line that is on the west bank of Von Fang ditch. Once this is done, give the sewer department control of that valve so that during periods of heavy rain they can divert the water that is coming from the roofs of our city buildings and the city streets and send this water directly to the river through the 30" storm sewer line. Because of the manner in which it is currently connected all of the water from our city streets and buildings goes directly into our 60" sanitary line. As this fills up, we start backing sewage into homes and businesses and this creates unnecessary health hazards. I realize this is not the perfect fix, but it will greatly reduce the total amount of raw untreated sewage that is being bypassed and put into White River during periods of heavy rain. This increased flow rate in the 30" line that goes past our high school will keep this line clean and free of debris. This is the line that for several years has become completely blocked at its mouth. I have discussed several problems and solutions and hope that you understand that I am not pointing a finger at anyone. I am saying this as a friend and only ask that you allow some of us who sit on different boards throughout Jackson County to help you solve your drainage problems. Those people you will find sit on boards such as the Board of Health, the Drainage Board, County Commissioners, County Council, County Highway

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Department, County Sewer Board, Water Board, Department of Natural Resources, School Boards, professionals who are contractors, builders, plumbers, industry and business professionals, and farmers. The small price that it cost to check for these two metals is worth a lot when it comes to protecting our neighbors and their environment.

Why, because we all live downstream.

Thank You,

Mark Spurgeon

Cc: Board of Health
Jackson Co. Drainage Board
Department of Natural Resources

5NK

Shelby County Solid Waste Management District

1110 Amos Road • Suite C • Shelbyville, IN 46176 - 2806
Ph. 317-392-1394, Ext. 131 • Fax 317-392-0739

March 17, 2003

Mr. Alan Dunn, Supervisor
Residential Sewage Disposal
Indiana State Dept. of Health
2 North Meridian Street
Indianapolis, IN 46204

Re: Comment on proposed 410 IAC 6.8.2 and
Technical Specification Document for On Site Sewage Systems

Dear Mr. Dunn:

After reviewing the specification requirement for "aggregate" in the Technical Specification Document (page 53 lines 1959-1967) we believe that properly sized and cleaned tire chips are allowed as a substitute for aggregate subject to an approval by the department. We recommend:

1. On page 53 line 1960 of the Technical Specification document, after the word "stone" insert "chipped rubber tires."
2. The department publishes a list of approved substitutes that includes chipped tires.

The use of chipped rubber tires in lieu of aggregate should not be considered an "experimental site sewage system" or an "alternative on site sewage system" as defined in 410 IAC 6.8.2. Our suggestion to use chipped tires in lieu of aggregate in no way affects the design, sizing or construction of the system.

By including chipped rubber tires in the specifications, another viable market for reuse of waste tires is created. The increased demand for chipped tire rubber will stimulate new business and help the state meet its waste diversion goals.

Thank you for considering our comments.

Sincerely,

Noell Krughoff, Director
Shelby County Solid Waste Management District

ATTACHMENT
NN

5PMC

Soil Investigations
RR #1, Box 252A
Bloomfield, In 47424
February 22, 2003

Howard W. Cundiff, P.E., Director
Consumer Protection
Indiana State Department of Health
2 North Meridian Street
Indianapolis, In 46204

RECEIVED
FEB 2 0 2003
INDIANA STATE DEPARTMENT OF HEALTH
BUREAU OF CONSUMER PROTECTION

Dear Mr. Cundiff:

I have reviewed the preliminary adopted 410 IAC 6-8.2 documents dated January 8, 2003. The following are some comments that should be considered:

Chapter 2, II, D, 3 line198- Regarding discrepancies between the soil description and the characteristics of the map unit as listed on the soil survey. Soil survey map units are named after the main components. But, the delineations also include variable amounts of included soils as are listed in the map unit description. Some of these inclusions are similar and some are highly contrasting. Therefore, if the soil at the proposed site for the absorption field is one of the included soils listed in the map unit, a discrepancy does not exist. If you wish for the soil evaluation to point out that the soil series identified in the soil evaluation differs in certain ways from the name of the map unit, then the item in the rule should just say so. Otherwise, it is inferred that the soil survey map unit or the soil evaluation is in error, when in fact both may be 100 percent correct.

Chapter 3, VI, C, b, 2- line 820- Regarding secondary treatment for nitrogen reduction if a horizon within a depth of 80 inches contains 35 percent or more coarse fragments. Sandstone and shale bedrock is a limiting layer (has a loading layer of less than 0.25). Therefore, secondary treatment for nitrogen reduction would not be required at a site with a soil that has bedrock within a depth of 80 inches regardless of the percent of coarse fragments in horizons above the bedrock. Any horizon with a loading rate of less than 0.25 will make the site qualify for not needing secondary treatment for nitrogen reduction under Chapter 3, VI, C, 2, a -lines 823-825.

Chapter 3,VI, C, 1,b,1- lines 816-821- Regarding the need for secondary treatment for reduction of nitrogen in soils with sand and loamy sand horizons. The rule that secondary treatment is required if any B or C horizon above a depth of 80 inches is arbitrary and unrealistic. This rule is reasonable for soils that do not have extensive finer textured horizons between sand and loamy sand upper horizons and sand lower horizons. But, the rule is not logical for a soil such as Princeton which frequently has thick horizons of sandy loam, silt loam or silt above a depth of 80 inches. These loamy or silty horizons will slow down the movement of water in the soil regardless of the presence of a loamy sand horizon higher in the profile.

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Chapter 6, I, A, 4- The effect of tillage pans and compaction caused by prior farming practices and by clearing and grading of the site before and during construction of the septic filter field needs to be clarified. It is my opinion that for trench type systems compaction that does not extend down into the lower 12 inches of the trench will not adversely impact the permeability of the soil. For sand mound systems compaction is more serious but it can be overcome by tillage performed when the soil is dry.

I have observed that as much compaction occurs during the construction process as would result from clearing and scraping of the soil. Backhoes are usually used to dig trenches and to carry crushed stone to the trenches and then after inspection of the system to fill the trenches. I do not believe that systems can be built without some soil compaction caused by the necessary equipment traffic. Therefore, common sense should be used when determining what is the practical effect of tillage pans or of compaction caused by clearing, scraping or light grading of the site.

Thank you for considering my views regarding these issues. I believe that the proposed 2003 Rule is an improvement in many ways over the old Rule. It will be an improvement to have the commercial and residential rules combined and coordinated. I have reservations about the need for nitrogen reduction in the uplands of southern Indiana. We all recognize that ground water polution is a problem on gravelly and sandy terraces. Those of us in soil surveys have jokingly discussed the water recycling in subdivisions on these terraces. It is a relief to see registered soil scientists being recognized as professionals in their field.

Sincerely,

Paul McCarter, Jr.

Paul McCarter, Jr.

5RB

Robert Bowsman, Owner
Bowsman Tank Co.
115 W. Spencer Street
Columbia City, IN 46725
(260) 244-7129

August 10, 2003

Office of Legal Affairs
c/o Burton Garten
Indiana Department of Health
2 North Meridian Street
Indianapolis, IN 46204

Subject: Rule & Technical Specification Revisions

I urge you to make the following changes to 2003 Edition (Revised June 2003):

Chapter 5

Page 38 & 39 Return to January 8, 2003 Edition wording for lines 1352 – 1362 & 1365 – 1369.

I have over 30 years experience manufacturing and installing septic tanks, and I know that the 2 septic tanks in series are almost always (depending on tank dimensions) better than 1 bigger tank (single or 2-compartments).

In recent years several area counties have used 1 bigger tank or a 2-compartment tank versus installing 2 tanks in series as we have in the past. The results have not been as good.

The revised rules would allow two 1000-gallon tanks for only a 3 bedroom home, while a 2-compartment 2000-gallon tank would be allowed for up to a 5 bedroom home. Yet two 1000-gallon tanks would provide for a much better system than a 2-compartment 1500 or 2000-gallon tank.

Two of my 1000-gallon tanks versus typical 2-compartment 2000-gallon tanks:

- Provides 75% to 80% more surface area inside of tank
- Over twice the distance from first inlet to outlet filter
- Versus a 1500-gallon 2-compartment tank adds 33% more liquid capacity
- Versus a 1250-gallon 2-compartment tank adds 66% more liquid capacity

Page 41 Delete line 1454 (No more than 2 riser sections)

Page 44 Delete lines 1589 – 1595 (Requirements of ASTM C-923 can be met without use of an external compression take-up clamp seal).
The items mentioned above are the most egregious of the rules as it affects my operation.

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In my opinion, the problem the ISDH has had with the rule revisions probably will not change until certain if not all personnel changes or at least they have a change in attitude. Public hearings seem useless if none of the personnel or those responsible for making the rule changes is present to answer questions or explain why they think many of these rules are necessary. Most are not, they only add to the public's cost.

Any rules that come from the ISDH will be suspect as long as certain people are involved in the rule revisions.

Thank you,

Robert Bowsman

Robert Bowsman

State of Indiana

Senate

Senator Harold (Potch) H. Wheeler
Majority Caucus Chairman
6370 North State Road 5
Larwill, Indiana 46764
Business (219) 799-5511
Residence (219) 327-3332

Committees:
Appointments & Claims, Chairman
Natural Resources, R.M.
Rules & Legislative Procedure
Governmental Affairs & Transportation
Interstate Cooperation

February 26, 1991

Mr. Robert Bowsman
Bowsman Tank Co.
115 W. Spencer
Columbia City, IN 46725

Dear Robert:

In reference to your inquiry about your existing inventory not meeting new State Board of Health regulations, I contacted Allen Dunn. We talked at length about this matter and I now have a better understanding of the situation.

According to Mr. Dunn, new regulations went into effect on December 20, 1990 outlining specifications for septic tanks. This new residential rule has been in the works for the past three years and he indicated that it was the responsibility of the County Health Department to notify and keep you notified of the rules and regulations affecting your business. There is no way for the Board of Health to contact every manufacturer in the state of Indiana and they are dependent upon the county agencies to publicize any new information.

NOT True

Mr. Dunn suggested two ways to deplete your existing inventory: (1) it may be used for septic systems for which permits were issued prior to December 20, 1990, or (2) inventory may be used for repairs and replacement of existing septic tanks.

He also indicated an interest to speak with you once again should you have any questions or need further information. His telephone number is (317) 633-0169. Also, if I may be of further assistance, you may contact my office toll-free at 1-800-382-9467.

I hope this information has been helpful.

Kindest regards,

Harold "Potch" H. Wheeler
Majority Caucus Chairman

HHW/kw

5RLH

TIPPECANOE COUNTY BUILDING COMMISSION

RONALD L. HIGHLAND
BUILDING COMMISSIONER
PHONE: (765) 423-9225
FAX: (765) 423-9203

COUNTY OFFICE BUILDING
20 NORTH 3RD STREET
LAFAYETTE, IN 47901

January 6, 2003

Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204

To whom it may concerni

My name is Ronald Highland, Building Commissioner of Tippecanoe County, Lafayette, Indiana, and it has been brought to my attention the State Board of Health has a definition of a bedroom in which you reference the Indiana One and Two Family Dwelling Code. However, the definition that you propose, limits the building inspector on what can be called a bedroom.

I would like to take this opportunity to ask for a few changes in your

definition of bedroom, so as to give us, as inspectors, more latitude in defining what is a bedroom.

***"Bedroom"*, means any room in a residence that is 70 square feet or more, contains a closet and a bathroom in or adjacent to that room. As required by 675 IAC 14-4-30 (Indiana One & Two Family Dwelling Code) states an operable window or exterior door approved for emergency egress or rescue must be installed.**

ATTACHMENT
JJ

In closing, I would submit the following that a bedroom is *none* of the following:

a. BATHROOM
b. KITCHEN
c. CLOSET
d. FOYER

e. PANTRY
f. LAUNDRY ROOM
g. FURNACE ROOM
h. UTILITY ROOM

Thank you for allowing me to express this concern. I look forward to your response.

Sincerely,

Ronald L. Highland, Building Commissioner

RLH/jb

REED 5RR
EXCAVATING & SEPTIC SERVICE, INC.
Ernie Reed, *President* Ralph Reed, *Vice President*
7688 Ogle Drive • Freetown, IN 47235 • Phone 812-988-7863 • Fax 812-988-7142

AUGUST 5, 2003

SUBJECT: PUBLIC HEARING
RURAL & TECHNICAL SPECIFICATION & REVISIONS
RESIDENTIAL & COMMERCIAL ONSITE SEWAGE SYSTEMS

REED EXCAVATING & SEPTIC SERVICE, INC .IS ONE OF THE MOST RESPECTED SEPTIC CONTRACTORS IN THE STATE OF INDIANA. WE BELIEVE IN RULES AND REGULATIONS THAT MAKE GOOD SENSE AND HELP CLEAN UP THE ENVIRONMENT, BUT THE NEW PRELIMINARY ADOPTED TECHNICAL SPEC. FOR ONSITE SEWAGE SYSTEMS (2003 EDITION) ISDH DATED JANUARY 8, 2003 WILL PUT REED EXCAVATING AND MANY OTHER GOOD INSTALLERS OUT OF BUSINESS, IF THE RULES ARE ACCEPTED AND BECOME LAW.

I RALPH REED, V.P. OF REED EXCAVATING, WORKED WITH THE WASTEWATER MANAGEMENT COMMITTEE THINKING THAT THE CHANGES WE MADE IN THE NEW RULES WAS FOR THE BETTER BUT WE DID NOT KNOW THE RULES WERE GOING TO BE SUBMITTED AS ORIGINALLY WRITTEN. I CAN LIVE WITH THE CHANGES THAT THE WASTEWATER MANAGEMENT COMMITTEE MADE.

HERE ARE A FEW ITEMS THAT I FEEL I MUST ADDRESS

1. TITLE 410 ISDH PROPOSED RULE LSA DOCUMENT # 02-321 DIGEST PAGE 26 LINE 964 THRU 971. THIS RULE STATES THAT CERTIFIED LABORATORIES MUST BE USED BY ALL, IT ALSO STATES THAT, THERE WILL BE NO CONFLICT OF INTEREST, BUT ISDH USES THE ZOELLER COMPANY AND EARTH TECH COMPANY LAB RESULTS FOR THEIR OWN SYSTEMS. IT IS MY UNDERSTANDING THAT THEY OWN THEIR OWN LABS. IS THAT NOT A CONFLICT OF INTEREST?

2 PAGE # 85 IV. PERFORMANCE MONITORING. LINE 3059 LINE 3060 A. I DON'T THINK THE DEPT. SHOULD USE THE WORD MAY AS IT COULD ALSO MEAN MAYBE NOT. IF THE DEPT. LIKED ONE CONTRACTOR AND NOT ANOTHER, WHAT COULD HAPPEN USING THE WORD MAY?

LINE 3061 AND 3062. WE HAVE 2 MODELS OF THE ASHCO RECIRCULATING MEDIA FILTER, SO I MUST SAMPLE THE EFFLUENT ON 20 UNITS. ON LINE 3083 & 3084 IT STATES THAT I MUST TAKE SAMPLES FROM THE SEPTIC TANK AND THE SECONDARY TREATMENT DEVICE, NOW THIS MAKES 40 SAMPLES. LINE 3069 SAYS THE FIRST YEAR, I MUST DO MONTHLY SAMPLING, EACH SAMPLE COST ME $150.00 AT SHERRY LABORATORIES IN COLUMBUS, IN. SO 40 SAMPLES TIMES 12 MONTHS TIMES $150.00 WHICH WOULD COST $72,000.00.

Line 3070 STATES 2nd & 3rd YEAR WE DO QUARTERLY SAMPLING SO THIS IS 40 SAMPLES TIMES 8 TIMES $150.00 WHICH IS $48,000.00 AND THAT IS A TOTAL OF $120,000.00 TO GET THE ASHCO OR ANY OTHER EXPERIMENTAL SYSTEM

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APPROVED BY ISDH.

THERE ARE MANY VERY COSTLY RULES IN THIS NEW TECHNICAL SPEC. RULE BOOK . IN THE BEST INTEREST OF INSTALLERS, HOME BUILDERS, MANUFACTURES, HOME OWNERS AND ANY OTHER INDIVIDUALS OR COMPANIES THAT HAS ANY INTEREST IN WASTEWATER, I BELIEVE THIS MANUAL SHOULD BE DESTROYED AND A NEW MANUAL WRITTEN BY ENVIRONMENTALIST, INSTALLERS, REGULATORS, CLEANERS AND MANUFACTURERS.

SINCERELY

Ralph Reed

RALPH REED

Jan Berg

5RW

"B"

7/30/2003
Hearing Comments on Proposed rule 410 IAC 6-8.2

Name: Robert Watkins
Manager Environmental Health Services for Elkhart County
30 years in Public Health, 17 in management positions
Degree in Environmental Health
Masters in Earth Science, Specialty in Contaminant Hydrogeology
Registered Professional Soil Scientist in Indiana

Elkhart County has one of if not the largest onsite septic programs in the state issuing over 12,000 permits under the current rule and averaging over 1000 permits per year over the last 9 years with a failure rate of less than 3 percent over the last 11 years. We therefore have a significant stake in this rule and its impact on our county.

Each time I began to consider my comments for this hearing I first had a problem deciding where to start and which sections are most objectionable, and then became hesitant to present any oral comments at all. Because in considering the process, the work, and enormous amount of money that has gone into the rule under consideration, I find myself getting more and more angry. To be honest I feel the decisions have been made and I don't have a sense that what I say will matter anyway.

Two items are of major concern. First, it is inconceivable that a State agency would forward a rule for adoption that has as little support in either the regulating or the regulated

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community. This is a rule riddled with errors and is ripe for legal challenge. Second, I am concerned that we have been told, since the beginning of this debate over 5 years ago, that both the rule and the technical specifications would be considered for adoption. The concerns should be obvious, that if the technical specifications are not included in the public hearing and approved as a part of the rule making process then it will be far to easy to change the requirements of the rule. Only recently we learned that only the rule would be heard and the tech specs would be considered only as a reference to the Rule. This is a major blow to the creditability of the agency and is unfortunate since the bulk of the concerns regarding the rule, as proposed, are found in the Technical Specifications. Since this was a concern from the beginning it also speaks volumes about the growing lack of trust that exists between ISDH, the counties and the regulated industry.

When considering what would be best for me to discuss I considered the process.
We have been at this for over 5 years. Each time there seemed to be consensus on the rule -- changes were made which made the rule unacceptable. Twice before, we were ready for the public comment period and did not see fit to respond. Our silence was not because we considered the proposal to be a good document and certainly not proposals that would do much to solve any problems on on-site systems in Indiana. They were none the less documents that we could live with and were not impediments to county programs committed to public health and doing their best to assure compliance with the 1990 rule.

I considered addressing the short comings of the rule, the errors that occur throughout, and the reference to equipment of questionable value by trade name but decided that you had already received a good deal of that material from the IEHA Waste Water Management Committee. In their presentation of changes to the proposal we heard them indicate that the current proposal could not be supported with out the changes they proposed. I believe they went on to say that even their proposal was made under duress due to the limited time they had to work on the document.

I considered discussing the cost of the proposal and the audacity of the ISDH in adding millions of dollars of cost to tax payers in a very poor economy and with government running a deficit. Their "your guilty until proven innocent attitude" and lack of flexibility in considering how to meet the requirements of the denitrification issue are very near sited and based on a regional planning tool for irrigation, not easily adapted to an onsite septic rule. Their attitude, in addressing the nitrate issue, of it's their way or no way only serves to build larger barriers to making improvements to a public health issue. I considered the feeble attempt by the ISDH to estimate the costs and the significant underestimation of cost based on a clearly flawed process. A process that could have been improved by minimal discussions with local departments, but not discussed at least with our department, and that was kept from those wanting to know how the estimates were being made until after the estimates had been forwarded to LSA. A modest

estimate of the costs to the residents of Elkhart County alone based on soils outlined by the proposal and the percentage of systems issued in those soils under the proposal will be 4 to 6 million dollars per year plus the cost of maintenance program. This assumes that the rule does not completely destroy residential construction in the county.

I am amazed that the ISDH proposal indicates that there will be no additional cost to local government and yet dictates responsibilities to local department while accepting very little responsibility for ISDH. Just one example in the proposal will mandate, systems in a large portion of in our county, that if installed, will require secondary treatment. A technology, which under the rule, will be considered experimental in Indiana and will require a maintenance program. The rule mandates that the local health department establish a program to assure the maintenance programs stay in place. This will be a daunting task for us considering that under the rule will have the potential for between 500 and 600 of these systems annually. If there is to be no cost to us then perhaps the state will be providing the additional staff necessary to meet this additional mandate to counties and assure that these maintenance programs stay in place. Perhaps they will tell us how that is to be done should a homeowner defy the requirement. For those counties not being required to install secondary or experimental technology the rule has several requirements that will require additional time and therefore additional staffing by local departments if they are to comply with the rule. Perhaps the most frustrating part of

this process has been the lack of concern expressed by ISDH staff over the manpower requirements to fully implement this rule and the lack of a provision to ever remove a technology from the experimental list. It is even more frustrating and a widely accepted belief that those departments already in compliance will continue to try to meet all requirement while those not meeting the current requirements will have not incentive to meet the proposed rule.

In regard to the maintenance programs, if the goal of the proposal is the incorporation of a maintenance program for septic systems in Indiana then say so, don't base the requirement on a dubious premise that requires equipment that cannot continuously meet the requirements of the rule or that will be of questionable benefit in meeting the expressed purpose for the requirement.

I considered discussing the liberal reference to Department Policy and Protocols in the proposal. As of yet, I am not sure what those are, how they are adopted, how feely they can be changed or how enforceable they are. I also considered discussing the disparity that exists between the "can do" and "can't do" counties. It seems that the "can do" counties are held to a higher standard and to higher cost in these protocols and policies than the "can't do" counties. Under the existing protocols for experimental technologies, which seems to change at the whim and wishes of ISDH, we in Elkhart County and in this region of the state are required to submit very detailed drawings and are held to a very high standard of performance and we can

appreciate and encourage that. Yet we are aware other areas where the "can't do" attitude seems to prevail and that experimental technology is being installed without even basics of a to-scale plan and in some cases installed against the recommendations of the manufacturers, and with some routine installations are changing on the run without reapplication or re-submittal of drawings to meet the protocol. This is not acceptable.

The Tech Specs only perpetuate this by establishing requirements for site plans and drainage calculations and then giving an alternative to those counties who "Can't get that in my county". A decision should be made for the rule based upon good practice and what is best for public health, not we can't do that in my county.

For the record, given the very prescriptive nature of the proposal, I want to join the "can't do" counties and state that the current proposal "can't' be implemented and cannot be enforced in Elkhart County".

I considered discussing the 5 to 6 years that this rule has been under consideration and the lack of support or consensus or perhaps I should say the out right opposition that I have heard to date. If I felt that the rule set forth a requirement that had sound scientific backing, was supported by evidence rather that some staffers desires, and was in the best interest of public health then it would be easy to support. I cannot support this proposal.

Through out this process it has been difficult to determine what the actual goals of the proposed changes were meant to accomplish. Those goals seemed to have changed markedly since the original proposals in 1998. The goals as stated late in the process, and as I understand them are to:

1. Incorporate the Commercial Rule and the Residential Rule into the same document. This proposal certainly seems to put the commercial rule within the same cover but the requirements remain different and separate.
2. Clarify the language and requirements of the rule.

   This rule is so prescriptive that it actually makes a comprehensive understanding of the rule very difficult. When one considers that we are going from a 45-page document to a nearly 200-page rule and technical specification plus the protocols and the ISDH policies then one has to consider how clarification is accomplished especially when one considers that during the review with IEHA the interpretation of sections of the rule were often very different between ISDH staffers. In a couple of areas the detail is then lost by allowing for an alternatives that does not include the detail of the previous and probably the more desirable sections of the proposal.

3. Facilitate the use of Experimental and Alternative Technology.

The rule does discuss experimental and alternative technology and then makes the acceptance of that technology dependent upon a protocol that seems to be a frequently changing target based on limited information or discussion. We have experienced several projects over the last year in which the protocols, which are described as a method of assuring uniformity through out the state, have been change several times during a single project requiring the change and redrafting of plans all at the expense of the homeowner. The proposal, department policy and the protocols go further in dissuading the use of experimental or alternative technology by setting themselves us as the judge of technology that has been tested repeatedly by other states, by nationally and internationally recognized testing agencies and by public universities. This not only puts the department at risk for litigation for failure to accept designs and equipment that have a long track record but also is driving good technology away from the state. Perhaps the one of the most overlooked aspects of the rule is the failure rate in soils not impacted by the requirement of the proposed rule and the benefits that would be received from applying secondary technology in soils prone to failure thus potentially reducing failure rates in these soils. Guess I forgot many of those soils are in the, "I can't do that here" counties.

I find it unfortunate that the expressed goals of the rule do not include the following:

Foster a better understanding of on-site wastewater disposal.

Foster improved working relationships with Local Health Departments, Manufacturers and Installers.

Foster consistency in the application and enforcement of wastewater treatment through out Indiana.

Provide a program of continuing education, especially for those departments where training opportunities are limited.

Allow for the enforcement of the rule with strong support from ISDH rather than the current attitude "you cannot do that with out our approval or we will be called to testify against you.

By rule, mandate that the ISDH assume responsibility or the implementation, support, interpretation and enforcement of this rule. Currently the only enforcement in this proposal is by ISDH against a local health department. Even that seems a shallow threat in that the ability of ISDH to take over even one program is in question

Perhaps, the most important goal and the one most obvious in its absence is the reduction of failing septic systems in Indiana. The rule as drafted requires more paper work, the hiring of consultants and the application of technology but

does very little to resolve the problem of under funded departments, well meaning but untrained staff or installers, the lack of support for local health departments or correcting failing septic systems in Indiana.

I have a long history of excellence in public health programs and sound public health practice. As written, however, I cannot support the proposed rule or the application of a technical specification, department policies or department protocols in this proposal.

It is also my sincere opinion that as written this rule is not enforceable but where implementation is attempted the economic impact on the communities involved will be far greater that any benefit received from this rule.

Professionally, I feel the rule should be withdrawn form consideration.

5SB

AK Industries, Inc.
P.O. Box 640
Plymouth, IN. 46563-0640
Phone (574)-936-6022
Fax (574)-936-5811

August 13, 2003

Mr. Burton Garten
Office of Legal Affairs
Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204-3003

RE: Comments for Rule 410 IAC 6-8.2

Dear Mr. Garten,

I am opposed to the new rule 410 IAC 6-8.2 as presented.

I do support the changes the Environmental Health Association's Wastewater Management Committee presented with the following comments.

IV. Septic Tanks
B. Standards, Septic Tank Capacity
The Wastewater Committee recommended larger tanks instead of two compartment tanks. I feel both should be allowed. A 1000-gallon two-compartment tank or a 1250-gallon single compartment tank.

VI. Structural Integrity, Connectors, Quality Control, Product marking
The best way to insure quality watertight tanks is to water test every tank installed. We (the onsite industry) must police ourselves. Establishing testing and standards that will not be enforced is an injustice.

VIII. Experimental and Alternative Technologies.
We support the need for pre-tanks before aerobic units. The sizing should be 45 or 50% of design (500GPD). I also support following the NSF 40 proto-call for maintenance and sampling.

Sincerely

Sam Baker

Sam Baker

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Randolph County Solid Waste Management District
215 South Main Street
P. O. Box 443
Winchester, IN 47394
(765) 584-9816

August 21, 2002

Mr. Alan Dunn, Supervisor
Residential Sewage Disposal
Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204

RE: Use of chipped rubber in construction of on-site sewage systems.

Dear Mr. Dunn:

It is my firm belief that chipped rubber from waste tires should be permitted for use in design and construction of on-site sewage systems. Acceptance and use of this alternative material would significantly help in addressing the waste tire generation problem in Indiana.

As you well know, abandoned tires provide breeding sites for mosquitoes. With recent reports of disease spread by mosquitoes, anything that ISDH can do which may help in reducing mosquito population should be enthusiastically encouraged.

Using waste tires for construction of on-site sewage systems will also serve to help the state of Indiana meet its solid waste diversion goals as found in IC 13-19-1-2.

In short, I strongly support the development of markets for waste tire chipped rubber in design and construction of on-site sewage systems.

Respectfully,

Steve Longnecker
Director

Cc: C. Steven Poe, Indiana Department Environmental Management

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From: "Stuart Meade" <stuart@septicdesign.com>
To: "'Alan Dunn'" <Adunn@isdh.state.in.us>
Date: 5/22/03 8:55AM
Subject: Line 225 and 226

Hello Alan:

Some time ago, I made comments to you about concerns that I had concerning lines 225 and 226 in the Technical Specification. This portion of the proposed code reads, "The local health Department may require the site plan be certified by a professional engineer (P.E.) registered in Indiana."

Why limit the counties choice to that of an engineer's stamp?

If a county wants to start requiring certification of residential plans (as is done for commercial projects), will the county only be allowed to accept an engineer's certification and not an architect's?

How about if a county also wants to accept a surveyor's stamp? Why not leave the choice up to the county?

I believe that line 225 and 226 needs to be deleted entirely. Or, perhaps less restrictive wording could be used that would allow the county to require a certification that fits their needs.

Please let me know what you think.

Sincerely,

Stuart J. Meade
Meade Septic Design, Inc.
stuart@septicdesign.com
Phone: 574/533-1470
Fax: 574/534-8687 or 425/871-0783
<http://www.septicdesign.com/> www.septicdesign.com
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CC: "'Bill Hartsuff (E-mail)'" <thehartsuffs@hotmail.com>, "'Brad Boyer (E-mail)'" <bboyer@p-massoc.com>, "'Brad Lee (E-mail)'" <bdlee@purdue.edu>, "'Charlie Ray (E-mail)'" <Charlieray@midwesttile.net>, "'Chris Bourke (E-mail)'" <cbourke@isdh.state.in.us>, "'Christopher Ulsas (E-mail)'" <culsas@isdh.state.in.us>, "'Dan Bloodgood (E-mail)'" <danb@clintonco.com>, "'David Ortel (E-mail)'" <dortel@isdh.state.in.us>, "'David Tuszynski (E-mail)'" <dtuszyns@isdh.state.in.us>, "'Debbie Barnhizer (E-mail)'" <dbarnhiz@isdh.state.in.us>, "'Denise Wright (E-mail)'" <dhwright@isdh.state.in.us>, "'Don Franzmeier (E-mail)'" <dfranzme@purdue.edu>, "'Don Jones (E-mail)'" <jonesd@ecn.purdue.edu>, "'Don Schnoebelen (E-mail)'" <dschnoebelen@elkhartcounty.com>, "'Ernie Reed (E-mail)'" <ereed@iowpa.org>, "'Gary Chapple (E-mail)'" <gary.chapple@co.allen.in.us>, "'Gary Hudson (E-mail)'" <garylhudson@yahoo.com>, "'Greg Lake (E-mail)'" <gregory.lake@co.howard.in.us>, "'Greg Miller (E-mail)'" <gmiller@infiltratorsystems.net>, "'Howard Cundiff (E-mail)'" <hcundiff@isdh.state.in.us>, "'Jack Roetker (E-mail)'" <vigo@isdh.state.in.us>, "'Jackie Waggoner (E-mail)'" <jaw@co.hamilton.in.us>, "'Jason LeMaster (E-mail)'" <jtl@co.hamilton.in.us>, "'Jerry Thomas (E-mail)'" <jthomas@isdh.state.in.us>, "'Joe Quackenbush (E-mail)'" <josephquacken@yahoo.com>, "'John Crist (E-mail)'" <jcrist@hartfordconcrete.com>, "'Julie Haan'" <jhaan@co.hendricks.in.us>, "'La Brown (E-mail)'" <labrowninc@onlyinternet.net>, "'Lee Wirthwein (E-mail)'" <Lee157@evansville.net>, "'Linda Mauller

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>>> "Stuart Meade" <stuart@septicdesign.com> 8:25:56 AM 4/24/03 >>>
Alan:

I have concerns about line 726 (and any other that is similar in the proposed rule).

It states, "Trench Bottoms must be above the regulatory (base) flood elevation".

I think that it is good to say that the trench bottoms need to be above the flood elevation but the rule needs to specify how far from the flood zone we talking about.

For instance. Elkhart County has some prairie soils in the middle of the county (where the airport is located). This area is an extremely flat and well drained area. There has been lots of construction in this area over the years. On the Eastern most portion of this prairie is a ditch that has a flood known flood zone/elevation.

I would bet that the septic trenches that belong to the homes a few miles west of this ditch are below this ditch's known flood elevation (as are all the homes basements).

How about if one wants to construct a septic system between two known flood zones. Lets say that the flood zones are 4,000 feet apart and the septic construction will happen mid-way. Which flood elevation is used, if any?

I obviously could go on and on but I think you get my point.
This line needs to be expanded to include something like "when within 500 feet of a known flood zone".

Please forward me you thoughts on this matter.

Thanks,
Stuart J. Meade
Meade Septic Design, Inc.
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W

Paul Semonin
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5SS

August 7,2003

Garten
Office of Legal Affairs
Indiana State Dept. of Health
2 North Meridian Street
Indianapolis, Indiana 46204

Re: Proposed Regulation Title 410 Indiana State Dept of Health-#02-3

Dear Mr. Garten,

As a Realtor and home-owner in Indiana, I strongly oppose the above referenced proposal as it negatively impacts my ability to sell lots and homes-- which affects my family's livelihood. I have been a realtor for over 16 years and prior to that I taught school (I have no benefits from either occupation beyond commission earned).

I strongly believe that present regulations are more than adequate to protect the environment.

Best regards,

Sherry Stem

Sherry Stem, Assistant V.P.
Semonin Realtors

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5TH

Testimony – ISDH Hearing on proposed rule 410 IAC 6-8.2
LaPorte, In July 30,2003

Hello and good morning. My name is Terry Herschberger. I am a homebuilder and small businessman and today I gave myself the day off to attend this hearing. I am speaking on behalf of 5550 members of the Indiana Builders Assn. as chairman of the IBA Septic Committee.

Our committee has met many, many times over the last 5 years as this rule has moved through the promulgation process. Since the preliminary adoption of the rule in January we have had several day-long sessions to review it in detail. We have called on soils scientists, academics, local health department personnel, builders, developers, equipment manufacturers and installers in the course of this review and these are our findings.

The process of developing the rule as it has been carried out by the Indiana Department of Health has been extremely frustrating. Our committee has met with ISDH staff several times. This has been at their request. As we relayed our concerns, we were told that the rule has been updated and we needed to have the "new" copy. This has happened several times. "New" versions of the rule abound, they pop up like dandelions and then disappear in the wind. There were so many versions floating around last fall that on.the same day that one of our committee members was repeatedly told that chapter 4 was not written yet, another committee member attended a meeting where a group of installers was reviewing it.

On Dec. 6, 2002, I attended a meeting to review Chapter 8. As I began make remarks it became apparent that there was a "new" version that I (and others in the room) did not have. We were given a copy of the "new" version which eliminated two thirds of the text. As most of my concerns no longer applied, I declined further comment as did others. I chalked up the 6 hours of driving, 5 hours of meeting and 2 hours of preparation to poor communication. A few weeks later the technical spec was officially posted on ISDH website and it included Chapter 8 in its original form with all the original text in place. I do not know if this was a result of incompetence or intention, but either way it is unacceptable.

In January IBA requested the Executive Board delay Preliminary Adoption. They declined, saying it was time to move forward and the rule would no longer be a "moving target". Unfortunately, the target is still moving. On July 3rd, shortly after the first hearing on this rule, ISDH staff distributed by email a copy of the rule and technical specification with changes proposed by the Indiana Environmental Health Association's Waste Water Management Committee and asking for people to attend the hearings in support of the proposed changes.

This action raises several questions;

- Which document does ISDH intend to put forward? The one referenced in the published rule or the "new" one distributed by email?
- How is the general public to know about the "new" version? It is not referenced in the published rule nor is it available on the ISDH website or any other public forum.
- After spending 6 months reviewing the January 8 document, are we to begin again with less than 25 working days to the last hearing date? These are substantial changes that affect 100 pages of the technical specs.

IBA does in fact support the changes contained in that document to the extent that we have seen them. Those changes are quite extensive, indicating the many problems with the rule as

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it was written. The WWMC is a group comprised of ISDH staff, local health department personnel, and various other individuals. The changes that they were able to agree on are a great improvement but, further work is needed in several areas.

The IBA Septic committee has determined that the technical spec has numerous flaws, including technical errors, incorrect data in tables, overly prescriptive requirements, vague, unclear and poorly worded text, specification of proprietary products and reference to out of print publications. Many new requirements have been added without justification for cost or benefit. We have a written list of these items which we will submit at the conclusion of our remarks.

We have also determined that the tech spec is deficient in the way it addresses 3 key areas; Nitrates, drainage and new technology. The Dept. of Health has chosen to deal with nitrates in a manner that is unjustified by science, economically and technologically unsound and not mandated by law.

The fact that there are nitrates in septic effluent is not in dispute. Whether they reach the ground water in significant quantity however is a question that no one seems to be able to answer. When high levels of nitrates are found in the ground water, where are they coming from? According to the EPA, agricultural fertilizers, golf course fertilizers and residential lawn fertilizers are the primary sources of nitrates in ground water. They also mention failing septic systems and leaking septic tanks as contributors.

What is the scope of the nitrate problem in Indiana? ISDH staff has cited a Farm Bureau study of private wells in its economic analysis and justification. In ISDH text it would appear that 4.5% of Indiana's private wells have nitrate levels greater than 10 mg/l. However the study cited was not a random sampling, it was voluntary and therefore influenced by those who already suspected their wells were polluted. Additionally, some counties initiated subsequent rounds of testing in areas where high nitrate levels were found, further skewing the results. These facts are noted in the section of the Farm Bureau study entitled *Interpreting Results – Cautionary Notes*.

How much do septic systems contribute to the overall nitrate problem? This same Farm Bureau study also looked at proximity and depth of wells in relation to human activity such as cropland, septic systems, feed lots, chemical storage, holding tanks and hazardous waste sites. The highest percentages, by a large margin, were wells less than 50 feet deep and located within 20' of cropland or feedlots. Although location of septic system was included in the same data set, the results were apparently inconclusive or inconsequential and not included in the analysis.

A report for the state of Idaho estimates the nitrate contributions to ground water as follows;

- "agricultural sources - legumes, manure and commercial fertilizer" 93%,
- "atmospheric sources including combustion of gasoline in automobiles and lightning" 5%,
- "septage, sludge disposal and other sources" contribute about 2%.

Other sources have put the percentage for failing septic systems at 4%. It is sufficient to say that failing or leaking systems account for a very small proportion of nitrates in ground water as a whole. It is ironic that while failing systems are not addressed in this rule, properly installed and functioning systems which are not a significant source of nitrates are heavily regulated.

Rule 11, the Ground Water Quality Standards, sets a limit of 10mg/l for nitrates in drinking water. The proposed rule would apply that drinking water standard to septic effluent before it is even completely through the septic system. The rule fails to recognize the role of soil in reducing nitrogen. Even those soils with a high nitrate leaching index will leach some nitrates. We are aware of no other state where this stringent standard is being used for septic effluent.

The use of the Nitrate Leaching Index to determine whether secondary treatment is required is a misapplication of methodology designed for planning the surface application of agricultural fertilizer. The Soil Maps and the Nitrate Leaching Index referenced in the rule are out of date and out of print. ISDH staff has been aware of this for at least a year. The new edition differs substantially from the old one and its application will drastically effect the implementation of this portion of the rule. Because they were not referenced, the public has had no opportunity to review and comment as to their effects.

IBA has estimated the cost of secondary treatment at $21.1 million per year and will submit a copy of this analysis for the record. ISDH staff has estimated the cost of denitrification at $6.9 million per year. According to ISDH staff, secondary treatment will "only" cost the home owner $6,000 more than a conventional system. In fact, the cost for secondary treatment ranges from $6500 to $12,000 more than a conventional system which typically costs $3500 to $4500. These are costs as quoted by manufacturers and dealers to our committee. Annual operating and maintenance will add $300 to $400 per year for life to the homeowner's costs. This will have serious ramifications for the affordability of housing adding 10% to the average cost of a new home.

That is all irrelevant since the technology proposed is unable to meet the standards set forth in the rule. This has been an area of contention since denitrification was first proposed in 2000 and was the reason that ISDH withdrew the rule at that time. To quote ISDH staff in their May 12, 2000 letter to IBA;

"This limitation concerns the ability of available on-site secondary treatment technology to reduce total nitrogen (TN) from sewage to the groundwater standard required by IDEM. We have determined the best course of action is to address this limitation prior to preliminary adoption."

Here we are 3 years down the road, you are about vote on to Final Adoption of the rule and this issue still has not been resolved.

We have asked ISDH staff in virtually every meeting we have had with them, whose product or system will do the job? They have told us at various times that Orenco, Whitewater, Zabel and Earth-Tek systems would be suitable. These are the systems we have investigated and based our cost analysis on and according to these manufacturers, are unable to meet the standard of 10mg/l.

One week ago we asked ISDH staff the question again; are there any products that will meet this requirement? They answered that they could not name a specific product or system. When pressed on the issue, they said that there were products that were on "the ragged edge" of meeting these criteria.

As builders and installers of these systems, we cannot sell new and unproven products for such a critical function as sewage disposal. It is too great a liability. The ISDH staff, in fact,

has relied too heavily on technology that is simply not designed to meet such a stringent standard for nitrate removal.

If there are no systems available to us, what are our options in soils requiring secondary treatment? ISDH staff has told us that our options are to hook up to municipal sewers or simply not to build. Municipal sewer is not and will not be available to many of the affected areas. State-wide this affects 20% of Indiana land possibly much more if the current soils maps are used. In Elkhart County 32% of land is affected, land where 400 to 600 homes will be built this year. St. Joseph County has 31% of it its land impacted while LaPorte County is at 89%. This rule will have devastating impacts on people trying to buy their first home, on the builders who would build them, on jobs and on local economies.

No matter what ISDH staff says, they are not required to adopt new rules. Rule 11 Ground Water Quality Standards say that ISDH must consider nitrates if and when adopting rules. It also states that economic and technological reasonableness may be considered when drafting these rules. ISDH has the authority, by statute, to adopt reasonable rules to protect the public health. However this portion of the rule is not reasonable by any measure.

ISDH staff has suggested that implementation of the nitrate requirements could be waived for a certain period of time, to give technology a chance to develop. Our position is that until the technology exists and until the costs become far more reasonable and until the health benefit can be quantified, the nitrate issue should be left alone.

The second area of deficiency is drainage. Perimeter drains, which are installed on over 9000 systems across the state each year, have not had a high incidence of failure, yet this rule substantially changes the way drains are installed for no apparent reason.

The requirements of Chapter 4 as have been shown in field testing to be impractical and unworkable. The equipment specified is unwieldy and not widely available. Some of the materials specified are unavailable or inappropriate for use as shown in the specs. The requirement for aggregate backfill in the trenches makes the issue of installing pipe to the extremely tight tolerances demanded, unnecessary and redundant.

This portion of the rule is controversial and has not been resolved to anyone's satisfaction. ISDH staff, as late as the end of May, was intending to adopt the rule and re-write that section as a memo after the bugs were finally worked out. This is unacceptable in that it sidesteps the process of public review and comment.

The third area of deficiency is experimental systems. One of ISDH's stated goals is to promote the use of new technology. This rule adopts only one new technology, gravel-less trenches, which have been in use for years in other parts of the country. The rule in many ways discourages the use of new technology.

The Technical Spec has 3 classes of systems; conventional, alternative and experimental. Chapter 8 which deals with Experimental Systems only serves to define conditions under which new technology might be tried.

It requires extensive, but not necessarily meaningful field testing through "grab samples" but does not recognize field testing and lab testing done by manufacturers, the National Sanitary Foundation or other states.

The rule cites "department standards" but does not include them or adopt them by reference, once again subverting public review and comment. This makes it very difficult for manufacturers to bring proven products to Indiana. Each experimental system is approved one at a time creating a bottleneck at the State level.

There is no means of transition from "Experimental" to "Alternative" class of systems. This means that no matter how successful a technology may be in the field, it is always "experimental" under this rule. This is a huge deterrent to adopting new technology because most builders and their customers are not interested in having "experiments" installed in their back yard, and mortgage lenders will be very nervous about financing a home whose resale value is dependent on an "experimental" system.

This is also a major problem with denitrification. If and when technology is developed to meet the standard, the process to bring it to the field in meaningful quantities would take years.

Our conclusions are simple. The rule needs far more input from all stakeholders and ISDH staff needs to engage in this process instead of posturing. The rule, with the changes proposed by IEHA/WWMC and endorsed by our committee is a good starting point. We respectfully request that the Indiana State Board of Health recall this rule.

HEC
Harrington Engineering & Construction, Inc.

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August 6, 2003

Office of Legal Affairs
c/o Burton Garten
Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204-3003

Comments
Proposed Rule 410 IAC 6-8.2
And
Attached Technical Specifications

Dear Mr. Garten:

I am a practicing civil engineer with a master's degree in civil engineering (geotechnical engineering specialty) from Michigan State University and nearly 30-years of practice in determining the characteristics of soils that control ground water movement. I am also experienced with nitrate contamination issues in ground water and the causes and resolution of nitrate problems. I am commenting on the proposed regulation out of two personal experiences in obtaining residential on-site sewage system permits. In both cases the inaccuracies and technical errors in the existing rule 410 IAC 6-8.1 have caused misunderstandings on the part of the local county health department that is magnified by inaccurate guidance from the State of Indiana.

I am requesting that the Indiana State Department of Health not adopted the proposed rules and attached technical specifications until the documents have been corrected to remove serious technical omissions in the documents. The procedures contained in the technical specifications are continuing more than one problem inherent in the existing rule and are adding additional rules and conditions unsupported by technical data.

The general technical problems include:

1. The use of the term "seasonal high water table" to define what is purported to be the top of the partially saturated suction zone (vadose zone) (as defined by the Indiana State Department of Health's Staff) is incorrect and leads to the incorrect conclusion that "Onsite Subsurface Drainage Systems, Chapter 4 (II) will lower the vadose zone. The term "seasonal high water table" distinctly means the level that water seeks in a well casing that is open to the atmosphere at the time of year or season when the ground

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water is at its highest level. This seasonal water table may be reduced by the use of Onsite Subsurface Drainage and is not the same as the top of the vadose zone. An Onsite Subsurface Drainage System installed in the vadose zone above the actual water table as specified in both the existing and proposed rule will not change the location of the vadose zone. This rule causes many sites in Northern Indiana to be found unsuitable when they are actually suitable sites and leads to the erroneous installation of Onsite Subsurface Drainage systems that cause no change to the top of the vadose zone.

2. The proposal of new secondary treatment standards for soils in Northern Indiana to limit the introduction of nitrogen, as nitrate should not be included in the final rule. The potential impact of septic tank waste on ground water in sandy soils is pure speculation. Studies by universities and other parties have focused on the benefits of secondary treatment to reduce nitrogen in septic waste without ever doing research to decide if untreated waste is really a threat to ground water. Until such time as the problem is actually assessed it is hard to find any logic for proposing these standards. The "bogeyman" for nitrate problems in surface waters of the State of Indiana and thus in the interstate waters of the Mississippi river and Great Lakes watersheds is not septic tanks. There is no reason for an unsupported change in the septic tank rules for the State of Indiana only to please politically motivated federal bureaucracies and purveyors of secondary treatment systems.
3. The new regulation continues to have the same ill-defined logic for "soil infiltrative surface". The local county health boards use the concept that the water flows only vertically downward from the bottom of the trench and thus only the bottom surface of the trench is the "soil infiltrative surface". However, other parts of the rule (i.e., the Onsite Subsurface Drainage Section and the caution not to smear the sides of the trench) recognize that infiltrating water flows from or to the trench in three dimensions. The actual infiltrative surface is the entire area of the drain trench field provided the trenches are spaced at approximately seven feet on center or less. Spacing trenches further apart than seven feet reduces the efficiency for using the entire drain field area.
4. The new proposed rule continues to depend upon qualitative measures of the soil permeability in the area of the drain field. These measures completely neglect soil density as a controlling parameter in determining the drainage rate. Using an assumed permeability based on a qualitative soil determination generally leads to estimating a lower permeability than the actual soil permeability. The rule should be changed to require a quantitative test of soil permeability or if the rule is really estimating some future biomat clogged permeability; the need for soil reports by certified soil scientists could be greatly reduced to the point of only identifying sites that are unsuitable and not worrying about the soil drainage rate.

In general the technical specification is much too voluminous and confusing for use by the staff of the local county health departments. The rules need to be simplified and corrected. I would suggest the following:

1. Have a civil engineer with a specialty in geotechnical engineering work with the Indiana State Department of Health staff to correct the issues related to ground water drainage/seasonal high water table that now exist in the proposed rule.
2. If soil drainage rate is indeed a critical parameter consider adopting ASTM D 3385 (the double ring infiltrometer test) as the test for drain field sites. The double-ring

infiltrometer procedure is applicable at sites with drainage rates of 0.25gpd/ft^2 and higher. The test also avoids the problems inherent in a "perk" test.

3. Revise the rules to use actual measurement of the seasonal high water table combined with grain size determinations of the soils in the infiltration bed area to determine the top of the vadose zone. A quantitative measurement of these important parameters would avoid the mistaken identification of a top of vadose zone as occurs under the present rule where only unreliable color and visual measures are used.
4. Change IAC 6-8.2-45 to allow for a qualified registered civil engineer practicing in the specialty of geotechnical engineering to provide written site evaluation reports.

I believe input from an engineer(s) experienced with the principals of ground water flow in a porous media (soil) is required prior to finalizing the rule. I would also suggest that the rule may need review from a panel of local sanitarians in an attempt to make the rule more user friendly for the local health departments.

If you have any questions or someone on staff would like to discuss my thoughts with me further, please call me.

Very truly yours,

Timothy J. Harrington, P.E.
Indiana PE 19646

cc: Lauralee Sikorski, Builders Association of LaPorte County

HEC

LAW OFFICE OF TERRY K. HIESTAND
117 Broadway
Chesterton IN 46304
(219) 926-2188
Fax: (219) 926-4773

July 31, 2003

5TKH

Jan Berg, Hearing Officer
1010 North High School
Indianapolis, Indiana 46224

Re: Proposed change in septic system regulations requiring a denitrification system

Dear Ms. Berg:

From what I understand of the proposal for change in the statewide septic system rule to require denitrification systems for a substantial number of new systems, I have to rank the proposal with a classic Indiana Department of Health boondoggle from years past. That was when the rules where change to eliminate the use of dry wells and to require field systems in every type of installation. The dry well elimination was based on speculation about the potential impact of those systems on ground water quality. Later, after the rule was implemented, ground water quality studies were done in areas where the systems were prevalent, such as Beverly Shores in Porter County, Indiana and it was determined that the use of dry wells properly installed and maintained had almost no impact on water quality. The State Department of Health, of course, did not propose a change back to the old rules when the empirical evidence failed to support the conjecture upon which the rules were based.

The largest sources of nitrate pollution are agricultural fertilizer and fertilizers used to maintain golf courses and home lawns. Instead of addressing these areas which ought to be addressed, the Indiana State Department of Health is proposing to address septic systems which exhibit minimal impact on drinking water, nitrates or otherwise, when properly installed and maintained. The proposed rules represent a unfair tax people attempting to build new homes or to improve their current systems with no appreciable benefit to the public health, safety and welfare, which is the only basis for the limitations on the property rights of individual property owners. I would much prefer that the Indiana State Department of Health concern itself with the application of fertilizers, including animal waste such as chicken manure in excess of the capacity of the soil, on which they are being applied, to absorb and utilize the components of those applications. It is the runoff of excess nutrients from those applications that is responsible for compromising the availability of ground water with sufficient purity for public use.

Should you have any questions concerning these comments, please do not hesitate to contact me.

Very truly yours,

Terry K. Hiestand

Terry K. Hiestand

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OFFICE
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TUF-TITE®

Drainage and Septic Products

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August 12, 2003

Burton Garten
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Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204-3003

Re: Public Hearing
Rule & Technical Specification Revisions
Residential and Commercial Onsite Sewage Systems

Gentlemen:

Please accept my comments on the proposed changes of the Waste Water Management Committee.

CHAPTER 5 SECTION 4 SEPTIC TANKS LINE 1454 READS: " EXTENDED TO OR ABOVE FINAL GRADE USING NO MORE THAN TWO (2) RISER SECTIONS", but makes no mention of riser water tightness. Since many commercially available riser systems are manufactured in 6 to 12 inch increments limiting the number of risers to two (2) sections would exclude the use of these systems in Indiana. I don't think it should be the number of riser sections, but the water tightness of the riser joints that should be of concern. Riser to riser connections should be made with stainless steel fasteners and joints sealed with butyl sealant meeting ASTM C990.

The latest IAPMO standard (PS1-2003A) requires the riser manufacturer to provide independent third party testing that the riser assembly (riser and lid) will hold 7.5 inches of mercury for 10 minutes with no riser or lid deformity.

CHAPTER 5 SECTION 6 LINE 1582 B. CONNECTORS IN SEPTIC TANKS AND DOSE TANKS:

1) Connector openings must be watertight and incorporate a rubber gasket that meets or exceeds the requirements of ASTM C-923.

Tuf-Tite® Inc., 500 Capital Drive, Lake Zurich, Illinois 60047 Phone 847-550-1011 Fax 847-550-8004
Toll-Free 800-382-7009

ATTACHMENT
AA

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Drainage and Septic Products

2) For septic tanks and dose tanks the seal between the connector and pipe must be made by using an external compression take-up clamp. The clamp must:

a) Be constructed of series 304 or series 305 non-magnetic stainless steel

b) Use no welds in its construction and be adjusted using a series 304 or series 305 non-magnetic stainless steel screw

It would be enough to require the connector to meet or exceed ASTM C-923. C-923 allows the manufacturer to meet the specification with or without a take-up Clamp. Requiring a take-up clamp would exclude seals that can meet ASTM C-923 without the use of a take-up clamp. Whether the manufacturer chooses to use a take-up clamp or not does not change the fact that the seal must meet the C-923 specification. A take-up clamp is not a requirement of meeting ASTM C-923.

Thank you for allowing me to express my comments. I truly understand how much time and effort it takes to put together this type of document, and would like to see the proposed changes of the Waste Water Committee adopted.

Very truly yours,

Ted Meyers

Ted Meyers
President

TM/ssr

Tuf-Tite® Inc., 500 Capital Drive, Lake Zurich, Illinois 60047 Phone 847-550-1011 Fax 847-550-8004
Toll-Free 800-382-7009

5TRL

RE/MAX TOWNE & COUNTRY

Thomas R. Larson

1601 Lincolnway, LaPorte, IN 46350

219-362-9400

July 31, 2003

Office of Legal Affairs
c/o Burton Garten
Indiana State Department of Health
2 North Meridian
Indianapolis, IN 46204-3003

RE: Proposed Rule 410 IAC 6-8.2

Having listened to the public testimony in LaPorte, it is very frightening that this proposed rule has gotten this far and in two public hearings, no one has spoken in favor of the rule as presently proposed. From everything I have been able to read and hear on this subject, it appears that the following is true:

1. Lack of communication has made it difficult for those trying to have input on this to have current information in a timely fashion.

2. Those realizing the minimal impact these costly requirements will have on nitrate levels are wondering what the real reason for this rule is and some have even wondered who in a dicision making position is going to profit.

3. Since most of the nitrates in the gound come from sources besides septic systems, the State Department of Health has not met its obligation to consider the cost effectiveness of new regulations.

As a REALTOR invloved in the sale of houses and land, this would obviously have an impact on my business. As a resident of LaPorte County with children that I hope will return to LaPorte to live and work, I believe we should do what it takes to protect our health and natural resources. However, you are proposing to spend considerable money that will not address the main source of the problem and require the use of unproven technology.

Not only will this rule not noticably improve the nitrate levels, with many valuble dollars being wasted, it is the kind of short sighted government that will not entice my children to return here after graduation. Why should they look forward to living where the government does not use common sense and in the process costs them unnecessary dollars. is it any wonder our economy is in trouble.

Please recall this ruling and work with those knowledgable and willing to help in drafting rules that will truly make a difference as compared to throwing away our hard earned money.

Respectfully submitted,

Thomas R. Larson

Thomas R. Larson, GRI

ATTACHMENT
O

5WCT

Thorn-Orwick

a division of Oldcastle Precast, Inc.

www.oldcastle-precast.com

200 Quality Place NW • Corydon, IN 47112

Phone (812) 738-8201
Fax (812) 738-3845
dorothy.shepherd@oldcastleprecast.com

RECEIVED
AUG 0 1 2003
INDIANA STATE DEPARTMENT OF HEALTH
BUREAU OF CONSUMER PROTECTION

July 22, 2003

Howard Cundiff, P.E., Director
Consumer Protection
Indiana State Department of Health
2 North Meridian Street
Indianapolis, IN 46204

Dear Mr. Cundiff:

I appreciate the notice of the State's meetings concerning "Rule 410/AC 6-8.2, Onsite Sewage Systems".

After review and study, I wish to support this amended rule 100%. Since I will be unable to be present at any of the meetings, I am requesting that my support and endorsement be entered into the minutes.

It is a great pleasure to see such cooperation and effort by a diverse group of people trying to improve on the State's on-site technology. You are to be commended for providing this opportunity.

Sincerely,

Willard C, Thorn
Consultant/Product Dev./Sales

ATTACHMENT
W W

5WDB

03 AUG 12 AM 11:16

August 8, 2003

Indiana State Department of Health
Office of Legal Affairs
2 North Meridian Street
Indianapolis, IN 46204-7177
Attn Burton Garten

Dear Mr. Garten:

Re: Rule 410 IAC 6-8.2

I am the Environmentalist for the Fulton County Health Department; I am the one that deals with private sewage disposal systems in this county. I have worked in this area for over twenty years and these are *my views* on Rule 410 IAC 6-8.2. While I agree the current rule is outdated, a new rule must be scientifically and technologically current and address public health concerns in a reasonable manner. I also feel it should not put an undo hardship on the public or on local health departments that are to enforce the rule. I do not feel the proposed rule achieves that goal. I do not support passage of rule 410 IAC 6-8.2 in its current form.

Being in a small county I do not have the resources, expertise or time to present a more detailed or scientific argument about the proposed rule. My concerns are on the general tone and cost. In a nut shell I feel this rule will increase the time and cost of getting a septic system installed for the homeowners. It will increase the time and work load on Local Health Department (LHD). I feel that the rule is trying to micromanage septic approvals and fails to take into account that soils, staffing, local expertise, and local laws vary dramatically from county to county.

At the LaPorte meeting, I was very surprised to hear that a fiscal study had been done on this rule and that the local health departments (LHD) would NOT be impacted. I have not seen or heard of this study; I have major concerns about the time this rule will require for this department. I wonder if the fiscal study was done on what the current rule requires as opposed to the new rule, or was it based on a local program that exceeds the current rule requirements.

I do not have time studies; however, the current approval process is in section 6-8.1-33 and is about two pages. The proposed rule has about a page of requirements and approximately 7 pages of additional requirements in the technical specification. The technical specification then goes into additional detail in Chapter 2 section IV which is not mentioned in the code as part of the plan review (*at least the version I have*).

From what I am reading this will require a considerable increase in the time required just to approve a conventional system. I do some soil borings and this rule will increase the time and complexity of the soil evaluations; it will increase my time. I have also been told by a soil scientist that this rule will increase his time which will be passed on as an increased cost to the public.

The new rule will require a much more detailed plan to get a septic approved. This will increase the time (cost) of a contactor just to present the plan to the LHD. It will take more time for the LHD to review and approve a plan. With the steady drip of extra duties from the state, I do not have this extra time. I find it ironic that the State Health Commissioner has stated that public health in Indiana is understaffed and under funded while we keep getting more and more to do from the state!

ATTACHMENT
AAA

While this is probably not part of your consideration, I feel that getting LHD input and support was not considered, or was not to be important part of this process. However, LHDs will have a significant role in the implementation of this rule.

While I do not fault the waste water management committees work. I also do not feel that a few months effort by the committee on a rule that has been around for years is a shining example of the state working with the counties. A report by a committee member at LaPorte was not an endorsement of the proposed rule. I have not had time to read their proposal to determine if I support their changes or not.

I feel I have wasted my time by reading the proposed rule and submitting written comments to the state. The state department has never responded to my comments! The state department has never put the effort into putting all the comments it received together and address why or why not these comments were accepted, rejected, or modified. I do not feel they have adequately explained the code or reasons behind it to the LHD. My feeling is that all the state wanted was the LHD's to be proof readers.

While my request for better response to comments submitted would take a considerable amount of time and manpower that is in short supply at the state department. Has the state department's time been well spent when LHDs stand up in public meetings and refuse to support the rule? At LaPorte three LHDs stood up refusing to support it, and these appear to be counties that are actually trying to enforce the current rule.

Sincerely,

Wesley D Burden

Wesley D. Burden
FCHD Environmentalist

I can be contacted at:

Fulton County Health Department
125 E 9th St.
Rochester, IN 46975
(574) 223-7730 Fax (574) 223-2335

6RR THRU 6SS

I am a tax payer and a voter and I am OPPOSED to the preliminarily adopted Septic Rules 410IAC6-8.2 Please review IN. Builders Assoc. reported point of contention. THankyou.

FROM:

D - GARAGE DOORS INC.
Rio Risner
502 WASHINGTON ST
LAPORTE IN 46350

FROM:

THE FLOOR STORE
JIM ROY
401 BOYD BLVD
LAPORTE IN 46350-3967

I AM OPPOSED TO THE PRELIMINARILY
ADOPTED SEPTIC RULES!!!!!
THIS WILL NOT SOLVE THE PROBLEM
THIS WILL BE A HUGE BURDEN
PLEASE STOP THESE NEW CHANGES!

Trout Glass
Shawn Solner
1579 S. Calumet Rd
Chesterton, IN 46304

I AM OPPOSED TO THE PRELIMINARILY
ADOPTED SEPTIC RULES!!!!!
THIS WILL NOT SOLVE THE PROBLEM
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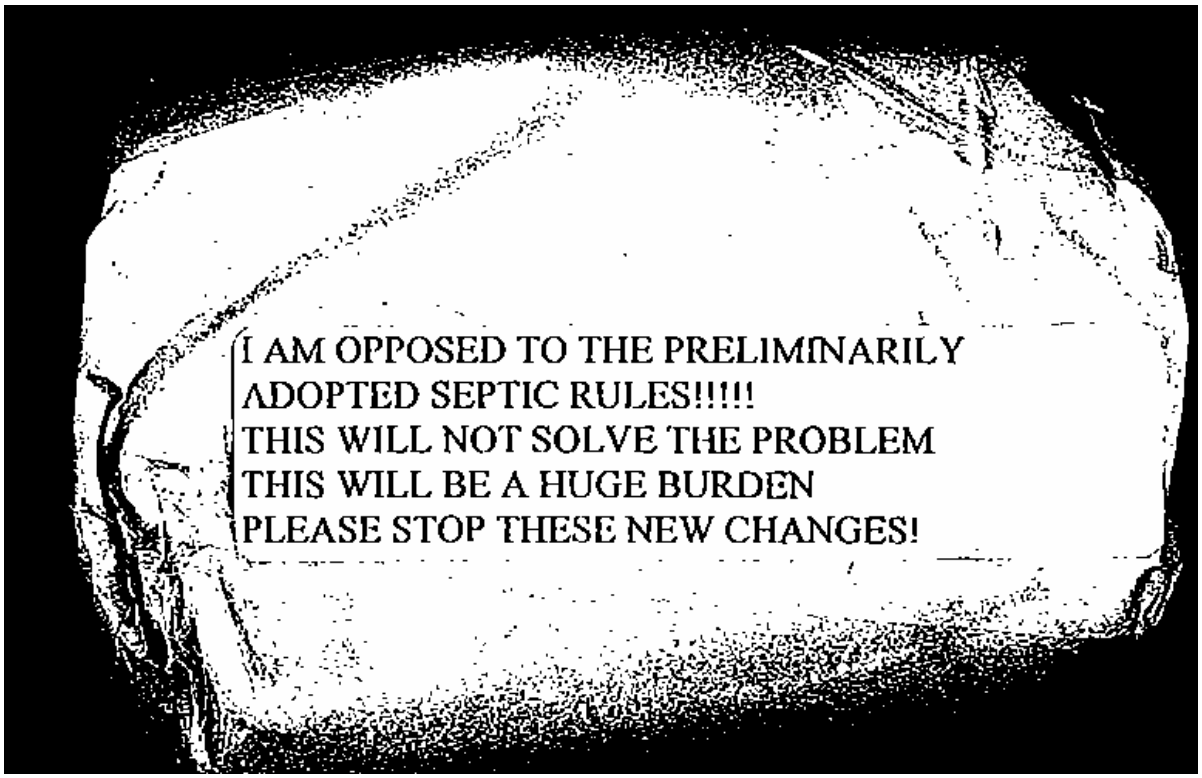
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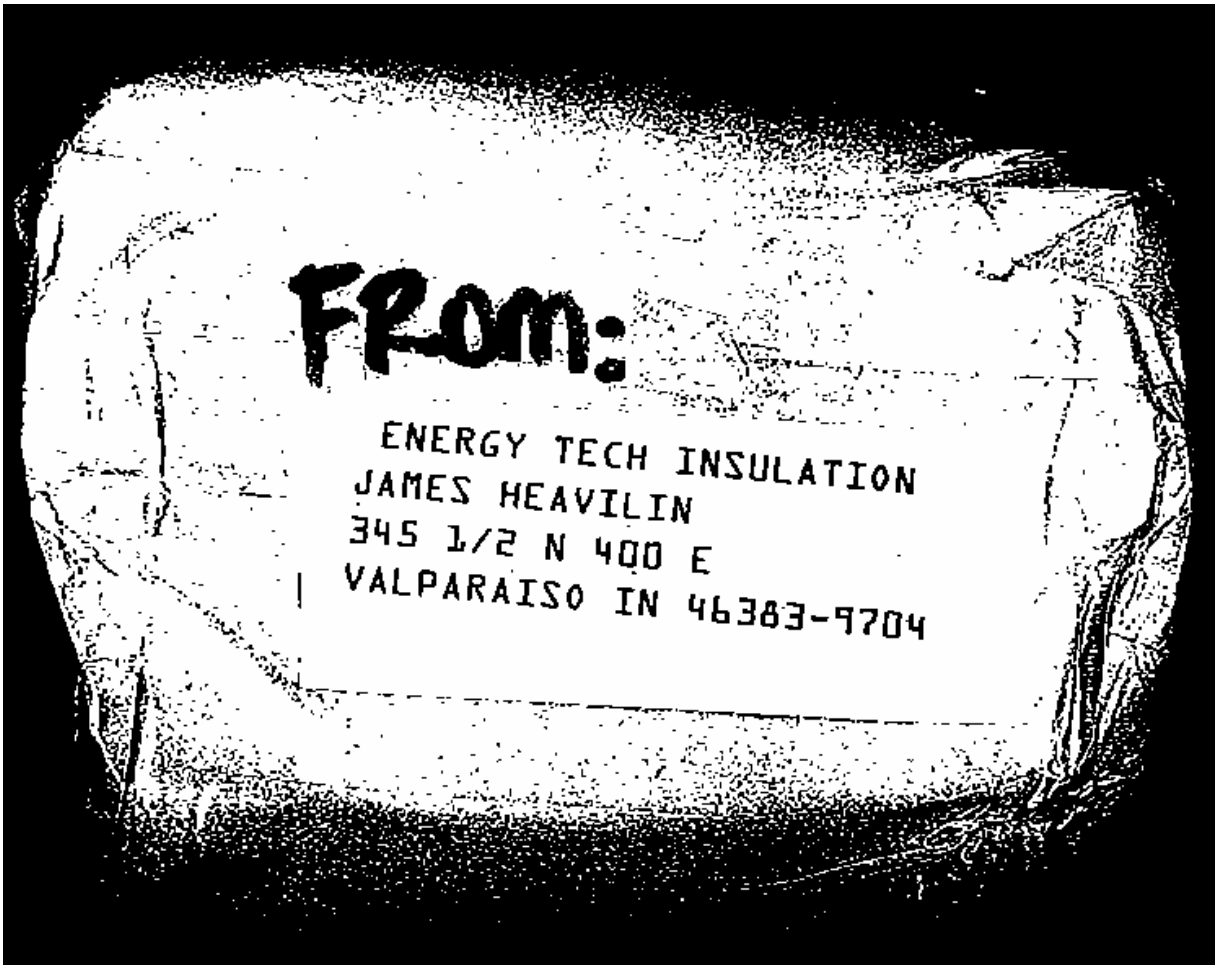
FROM:
ENERGY TECH INSULATION
JAMES HEAVILIN
345 1/2 N 400 E
VALPARAISO IN 46383-9704

I AM OPPOSED TO THE PRELIMINARILY
ADOPTED SEPTIC RULES!!!!!
THIS WILL NOT SOLVE THE PROBLEM
THIS WILL BE A HUGE BURDEN
PLEASE STOP THESE NEW CHANGES!

FROM:

FLOORING CENTER
Warren O.
2055 E. US Hiwy 20 (EGP)
Michigan City, IN 46360

OPPOSED
T SEPTIC
RULES-

FROM:
Ray Butts
4228 North US 33
Laporte, I

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FROM:

Chemical Bank Shoreline
Joann Burns-Atchtmann
6 West Buffalo Street
New Buffalo MI 49117

FROM: OPPOSED To Septic RULES

PRESSEL Enterprises
Jim PRESSEL
1772 N. LOFGREN Road
Rolling Prairie, IN
46371-9521

ATTN: OPPOSED TO NEW Septic RULES!

To:

I AM OPPOSED TO THE PRELIMINARILY
ADOPTED SEPTIC RULES!!!!!
THIS WILL NOT SOLVE THE PROBLEM
THIS WILL BE A HUGE BURDEN
PLEASE STOP THESE NEW CHANGES!

KANKAKEE VALLEY REMC
STEVE VANDERWERF
P.O. BOX 157
WANATAH IN 46350

First American Title Company
Yolanda Kolbert/ cc: K.Genovese
5265 Commerce Drive
Crown Point, IN 46307

I AM OPPOSED TO THE PRELIMINARY
ADOPTED SEPTIC RULES!!!!!
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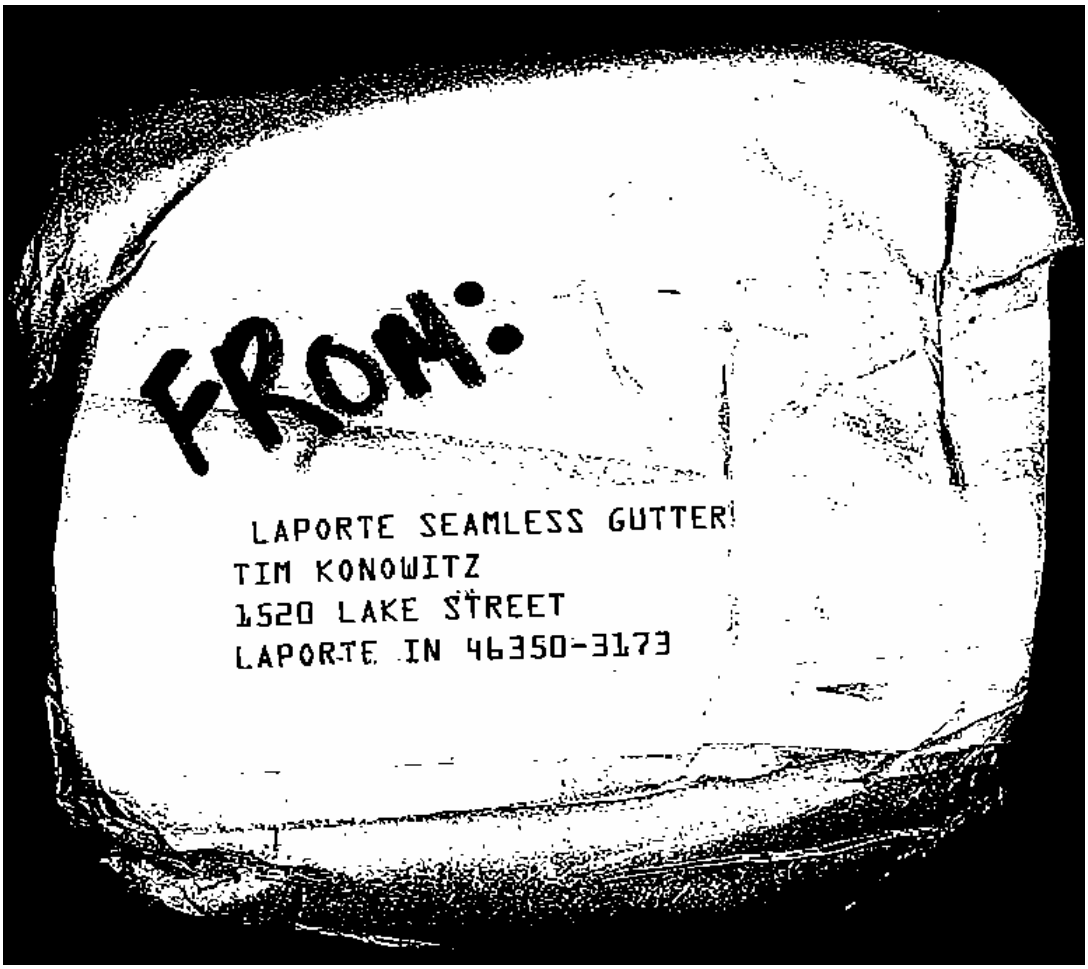
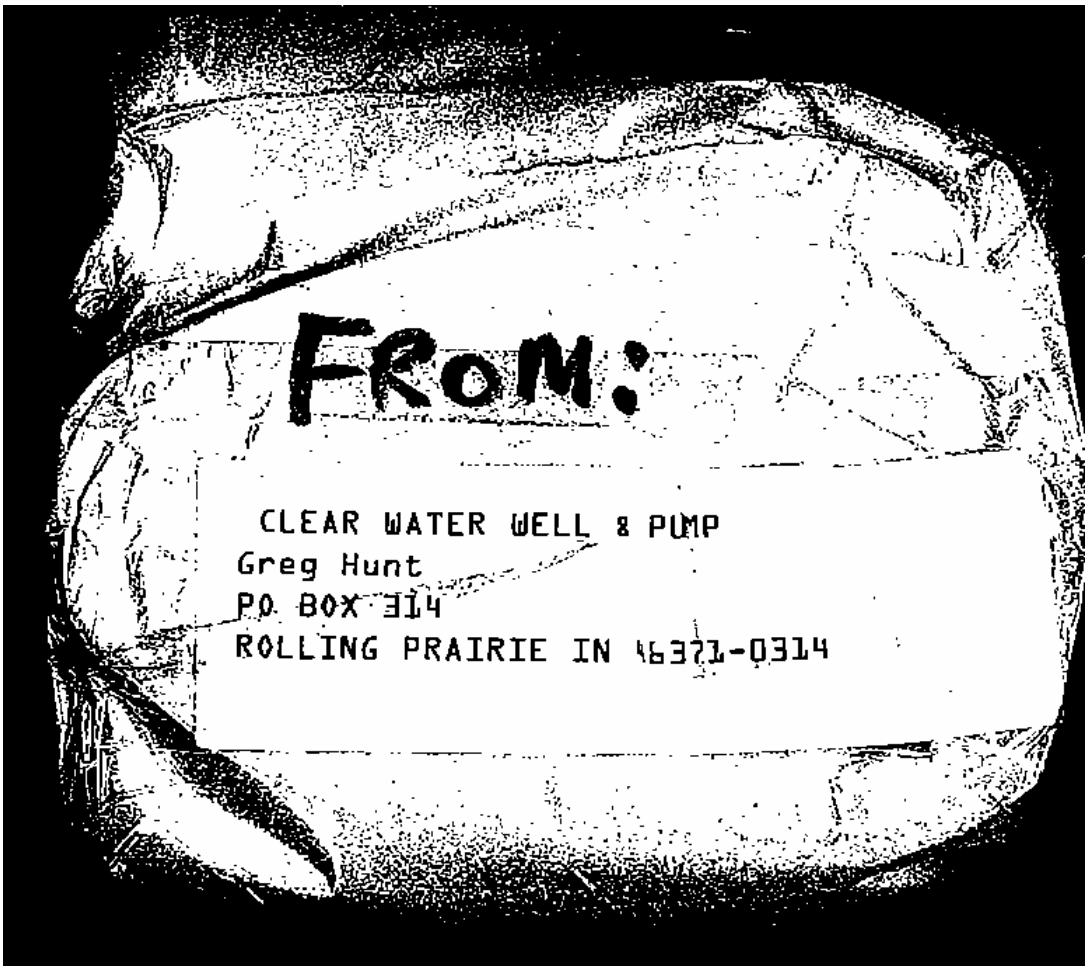
I am opposed to the proposed septic rules
410IAC6-8.2 !!!
I am in agreement with the IN. Builders Assoc.
reported points of discontent.


FROM:
LAPORTE SEAMLESS GUTTER
TIM KONOWITZ
1520 LAKE STREET
LAPORTE IN 46350-3173

I am opposed to the proposed septic rules
410IAC6-8.2 !!!
I am in agreement with the IN. Builders Assoc.
reported points of discontent.

FROM:

METROPOLITAN TITLE
Linda Wirchnak
2360N US Hwy 35
LaPporte, IN 46350


FROM:
CLEAR WATER WELL & PUMP
Greg Hunt
PO BOX 314
ROLLING PRAIRIE IN 46371-0314

FROM:

PAVEY EXCAVATING COMPANY
GENE PAVEY
2020 OHIO ST
LAPORTE IN 46350-8053

I AM
ADOPTEDSED TO THE PRELIMINARILY
THIS WILL NOT SOLVE THE PROBLEM
THIS WILL BE A HUGE BURDEN
PLEASE STOP THESE NEW CHANGES!

OPPOSED TO
From : SEPTIC RULES.
Grey Szybala
1074 N. Halstead
LaPorte, IN
46350

THIS WILL NOT SOLVE

THIS WILL BE A HUGE BURDEN
PLEASE STOP THESE NEW CHANGES!

FROM:

City Savings
Jim Dradir
2000 Franklin Street
Michigan ity IN 46360

I am opposed to the proposed septic rules
410IAC6-8.2 !!!
I am in agreement with the IN. Builders Assoc.
reported points of discontent.

FROM:

MICHIANA INSULATION
JOHN GRUBER
4616 S. Burnette Drive
SOUTH BEND IN 46614-3822

*I AM OPPOSED
TO Septic
Rules
410IAC6-8.2

FROM:

Chemical Bank Shoreline
Joann Burns-Atchtmann
6 West Buffalo Street
New Buffalo, MI 49117

OPPOSED TO Sepn

RULES!

PLEASE REVIEW IBA

STANCE.

I AM OPPOSED TO

SEPTIC RULES

FROM:

FROM'S SUPPLY COMPANY
1501 E 2ND ST
MICHIGAN CITY IN 46360

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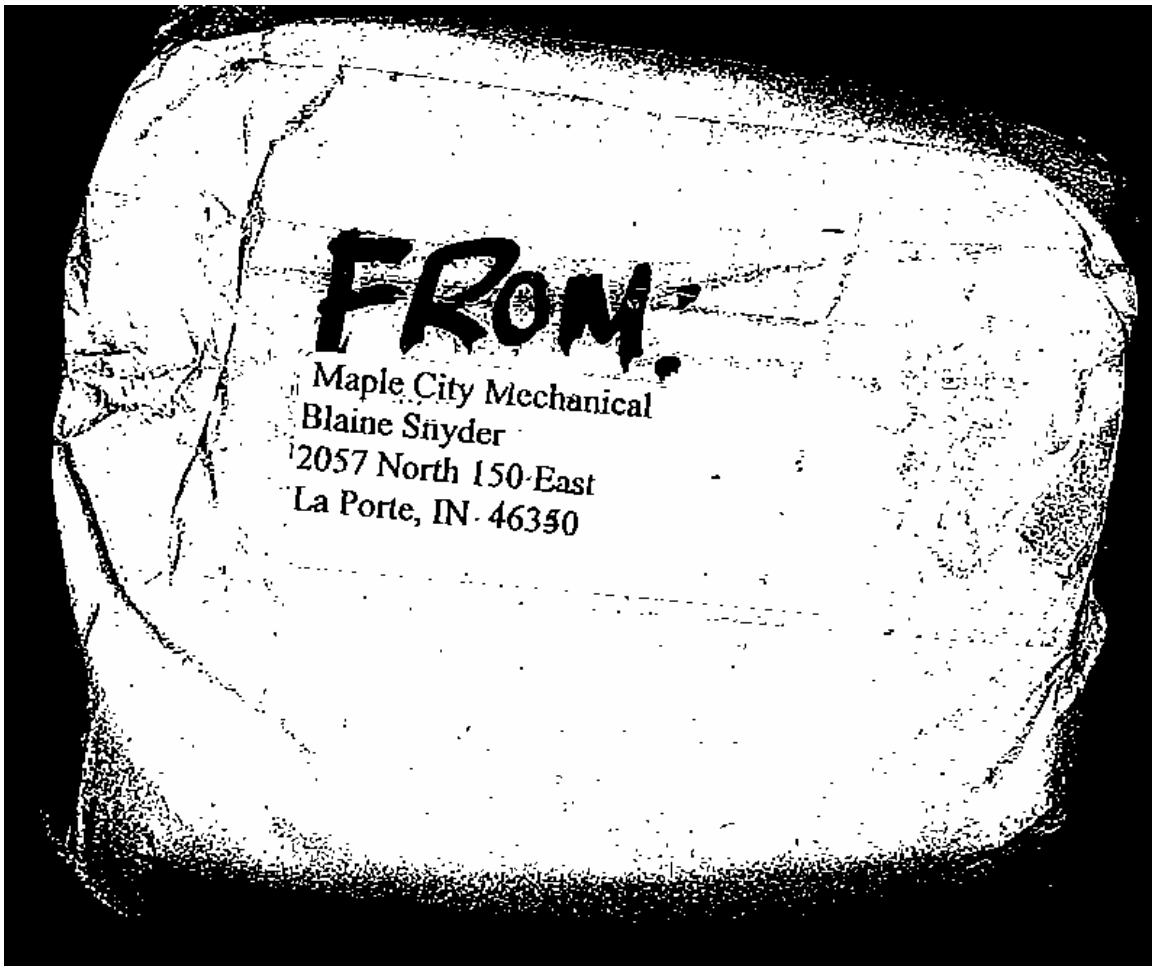
FROM:
Maple City Mechanical
Blaine Snyder
2057 North 150 East
La Porte, IN 46350

I am opposed to the proposed septic rules
410IAC6-8.2 !!!
I am in agreement with the IN. Builders Assoc.
reported points of discontent.

FROM:

FICKEL'S ELECTRIC SERVICES
MARK FICKEL
7711 N RD 200 E
LAPORTE IN 46350

...sed to the proposed septic rules
...IAC6-8.2 !!!
I am in agreement with the IN. Builders Assoc.
reported points of discontent.

FROM:

Cermak's Decks
Ray Cermak
6711 W 450 North
Michigan City , IN 46360

FROM:

TRI-CORP WIRELESS "NEXTEL"
RHONDA MC CONNILL
1237 NORTH STATE RD 39
LAPORTE IN 4350

I am opposed to the proposed septic rules
410IAC6.8.2 !!!
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reported points of discontent.

FROM:

D C GARAGE DOORS INC.
Rio Risner
502 WASHINGTON ST
LAPORTE IN 46350-3334

Cut and send to your legislator

New Septic Rule Is No "Home Improvement"

Written by Terry Herschberger, Chairman of the IBA Septic Subcommittee, and Marlya Padke, IBA Code and Technical Specialist.

The Indiana Builders Association's (IBA's) Septic Sub-Committee has nearly completed their review of the proposed rule 410 IAC 6-8.2 for On-site Sewage Systems. The committee gathered builders, septic installers, soil scientists and academic experts from around the state for the purpose of evaluating the rule which will affect 14,000 new home owners every year.

As members of IBA you need to be aware of the rule's impact on the homes you will build.

Although we are not asking them to do anything at this time, we want our legislators to be aware of this issue as well. If you know a County Commissioner, State Representative or Senator, clip this article, fax it to them and follow it up with a phone call. Better yet, see them in person.

History: Members of the IBA met with officials from the Indiana State Department of Health (ISDH) several times beginning in 1998 to relay our concerns with the new proposed septic rule. As our concerns were not addressed and the rule was being put forward for preliminary adoption, we met in December of 2002 with the Governor's office to raise these issues again. In January 2003, IBA testified before the ISDH Executive Board that the rule was flawed and should not be preliminarily adopted until major issues were settled with all stakeholders. The Board proceeded with preliminary adoption on the recommendation of ISDH staff, moving the rule toward the public comment and hearing phase of the adopting process.

IBA intends to testify in writing and at the public hearing along with several other groups who have concerns of their own. A hearing officer has not yet been appointed, pending official publication of the rule in the Indiana Register. The proposed rule is slated to go into effect in January of 2004, replacing the rule adopted in 1990.

What Does This Rule Do? 410 IAC 6-8.2 combines the commercial and residential rules into one document, defining categories of residential and commercial septic systems and prescribing their design and installation. It prescribes the procedures for plan submittal and the issuance of construction permits, operating permits, approval letters, and orders of violation. It prescribes inspections for construction, operation, maintenance and repair of the systems. It addresses the special regulation of systems that it defines as experimental or alternative. The proposed rule also defines state and local administrative and enforcement responsibilities.

Some of IBA's Specific Concerns:

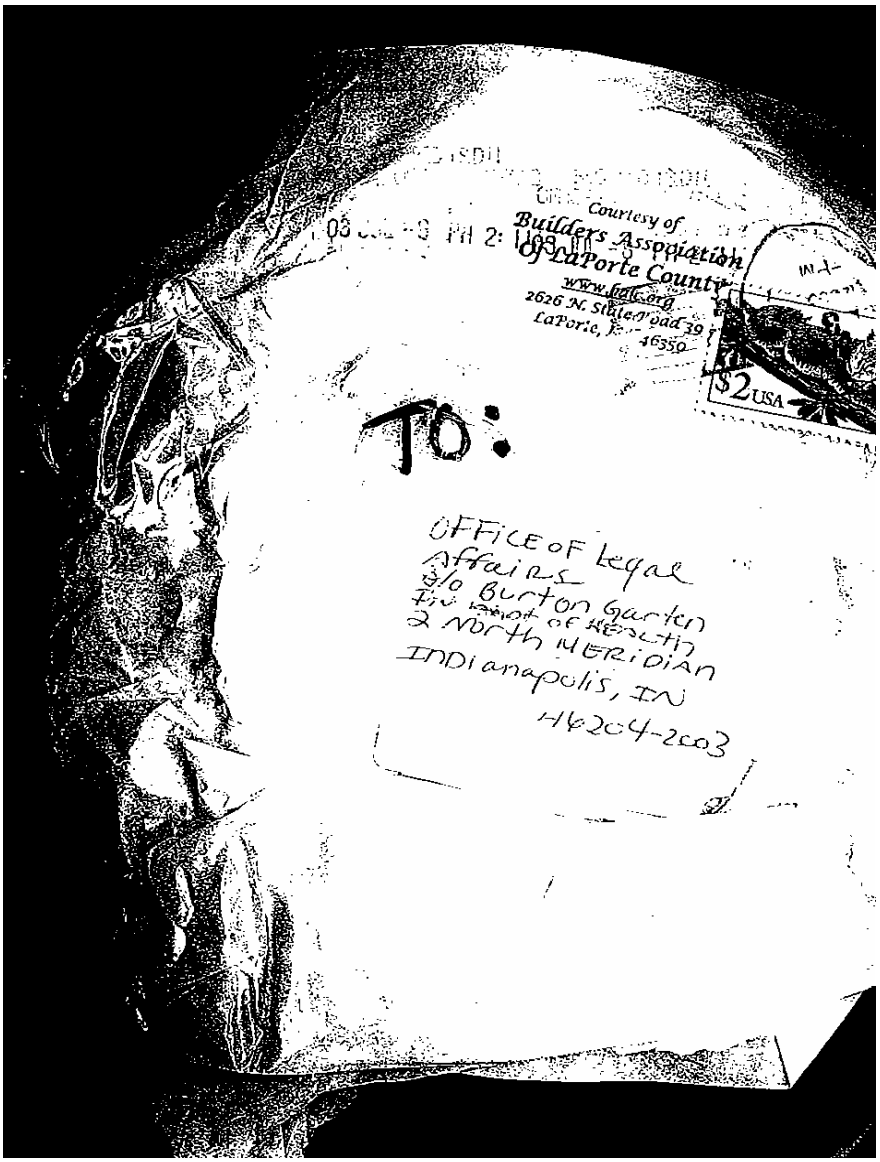
* The rule is difficult to understand and confusing for designers, installers and enforcement personnel, contains several inaccurate (and unnecessary) cross references and contains erroneous information in critical tables used for system design.
* The current rule, adopted in 1990, has resulted in high quality design and installation. Two counties where the rule is vigorously enforced were found to have failure rates less than 3% in a recent Purdue University study.
* Lack of enforcement of the existing rules in certain jurisdictions is not addressed. These jurisdictions will continue to ignore the new rule, while those that properly enforce the rule will be saddled with more requirements and higher costs.
* The rule appears to try to cover every conceivable situation by the use of prescriptive rather than performance based language. This allows local health departments little, if any latitude to apply common sense to specific situations.
* Some examples of over-regulation found throughout the rule: A requirement to run a bush-hog over an un-graded soil absorption field site at a 3" height is impractical and dangerous. To say that the site should be closely mowed would be sufficient. A requirement for compacted backfill around a tank is unnecessary and costly. Slight settling of earth around the tank has no effect on system performance. Requirements for seeding and soil stabilization are unnecessary for most systems and cause extra expense for inspection and seeding out of sequence with the rest of the project.
* The rule requires expensive and complex secondary treatment for nitrate reduction, purportedly to comply with Indiana's Ground Water Protection Rule (Rule 11). This requirement alone will cost Indiana home buyers over $21 million dollars per year. There is no scientific evidence that nitrates from septic systems are reaching Indiana's ground water in meaningful quantities. The benefit of this requirement is likely to be minimal at best and certainly will not attain the goals of Rule 11.
* The rule uses NRCS soil maps and Nitrate Leaching Index to identify soils requiring nitrate reduction. Not only are the maps and list of soils cited by the rule outdated, but the NRCS has indicated that the maps are not designed for evaluating single home sites but for larger scale planning purposes. They have also stated that the Nitrate Leaching Index *should not be used* for the purposes of this rule as it was developed to guide agricultural fertilizer application in the ground surface.
* It changes the way perimeter drains are installed, requiring stone backfill in drain trenches and requiring expensive and impractical installation methods. In a recent demonstration of the techniques mandated by the rule, only 1 of the 13 drains installed met the rule's requirements. It was installed with a tiling machine that cannot be used on most home sites due to its size and lack of maneuverability. Several thousand systems installed statewide require perimeter drainage each year.
* Requires two-compartment septic tanks (or tanks in series) on all conventional systems - better system, added cost.
* Requires outflow filters on all systems, which is good for systems, but requires extra cost and extra maintenance.
* Requires manufacturers to re-design and re-tool tanks and distribution boxes and mandates extensive testing of tanks.
* Does not allow system installation when ground is frozen, significantly shortening the construction season. Often a few inches of frost are ideal for septic equipment will not tear up the site, however the rule precludes this due to its highly prescriptive nature.
* Allows the state health commissioner to deny permits and implies 90 days for construction permits. The time period should be reduced to a flat 10 working days for both.
* Allows the use of new technology only as "experimental" systems with numerous restrictions. Little new technology has been added to the category of "alternative" systems. There is no provision to move systems from the "experimental" to "alternative" category no matter how well they work over a period of time.
* ISDH estimates a figure of $8.7 million per year as the total impact of the rule for residential systems, commercial systems and enforcement. IBA has estimated a cost increase of $41.8 million per year for *new residential systems only*, not including commercial systems, enforcement costs (which will be substantial) or repairs of failed systems.
* The rule will have a substantial, negative effect on housing affordability in the state of Indiana at a time when housing is a leading economic force.

In Conclusion: According to ISDH, the rule is being revised to clarify gray areas in the existing rule, incorporate new technologies and to combine the commercial and residential rules into one document. IBA supports updating the existing rule to clarify areas that are unclear. We also support provisions to add proven, newer technologies, some of which are in widespread use in other states, to the category of "alternative" systems. We want to see improvements in the way that septic systems are designed, built and maintained in a way that protects public health *and* housing affordability. Sadly, after 5 years in the making, the proposed rule fails to accomplish these goals.

For further information, please contact Marlya Padke, Code and Technical Specialist for the Indiana Builder's Association, at (800)777-6512, ext. 102.

PLEASE READ.
I am sending this in opposition of these septic RULES.

Thank you for listening - We are counting on your help.


Courtesy of
Builders Association
Of LaPorte County
www.bac.org
2626 N. State Road 39
LaPorte, IN 46350
$2 USA
TO:
OFFICE OF Legal
Affairs
c/o Burton Garten
2 North MERIDIAN
INDIANAPOLIS, IN
46204-2003

Cut and send to your legislator

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* The rule requires expensive and complex secondary treatment for nitrate reduction, purportedly to comply with Indiana's Ground Water Protection Rule (Rule 11). This requirement alone will cost Indiana home buyers over $21 million dollars per year. There is no scientific evidence that nitrates from septic systems are reaching Indiana's ground water in meaningful quantity. The impact of this requirement is likely to be minimal at best and certainly will not attain the goals of Rule 11.
* The rule uses NRCS soil maps and Nitrate Leaching Index to identify soils requiring nitrate reduction. Not only are the maps and list of soils cited by the rule outdated, but the NRCS has indicated that the maps are not designed for evaluating single home sites but for larger scale planning purposes. They have also stated that the Nitrate Leaching Index *should not be used* for the purposes of this rule as it was developed to guide agricultural fertilizer application at the ground surface.
* It changes the way perimeter drains are installed, requiring stone backfill in drain trenches and requiring expensive and impractical installation methods. In a recent demonstration of the techniques mandated by the rule, only 1 of the 13 drains installed met the rule's requirements. It was installed with a tiling machine that cannot be used on most home sites due to its size and lack of maneuverability. Several thousand systems installed statewide require perimeter drainage each year.
* Requires two-compartment septic tanks (or tanks in series) on all conventional systems - better system, added cost.
* Requires outflow filters on all systems, which is good for systems, but requires extra cost and extra maintenance.
* Requires manufacturers to re-design and re-tool tanks and distribution boxes and mandates extensive testing of tanks.
* Does not allow system installation when ground is frozen, significantly shortening the construction season. Often a few inches of frost are ideal because equipment will not tear up the site, however the rule precludes this due to its highly prescriptive nature.
* Allows 45 days for approval of residential permits and implies 90 days for commercial permits. The time period should be reduced to a flat 10 working days for both.
* Allows the use of new technology only as "experimental" systems with numerous restrictions. Little new technology has been added to the category of "alternative" systems. There is no provision to move systems from the "experimental" to "alternative" category no matter how well they work over a period of time.
* ISDH estimates a figure of $8.7 million per year as the total impact of the rule for residential systems, commercial systems and enforcement. IBA has estimated a cost increase of $41.8 million per year for *new residential systems only*, not including commercial systems, enforcement costs (which will be substantial) or repairs of failed systems.
* The rule will have a substantial, negative effect on lowering affordability in the state of Indiana at a time when housing is a leading economic force.

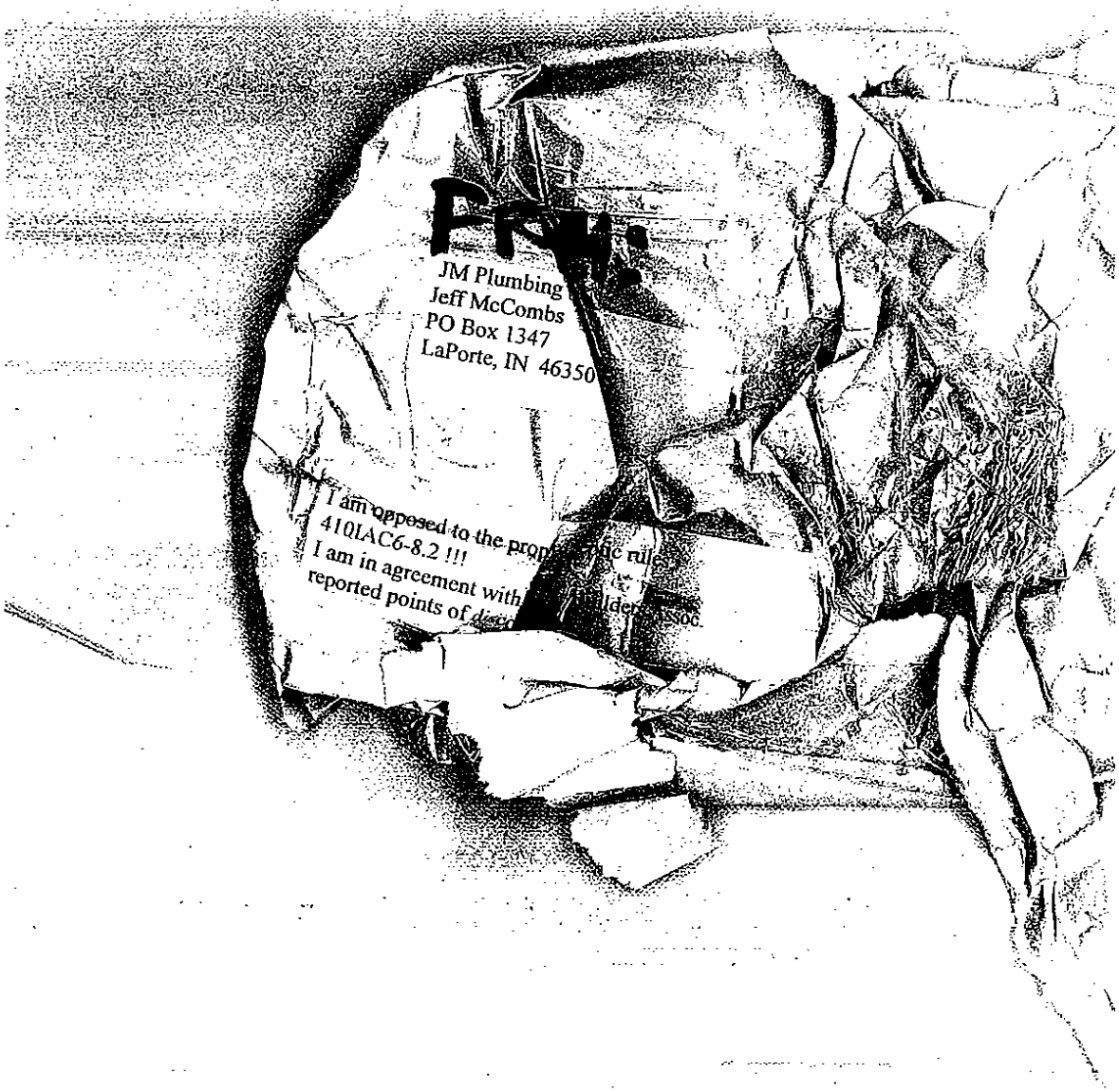
In Conclusion: According to ISDH, the rule is being revised to clarify gray areas in the existing rule, incorporate new technologies and to combine the commercial and residential rules into one document. IBA supports updating the existing rule to clarify areas that are unclear. We also support provisions to add proven, newer technologies, some of which are in widespread use in other states, to the category of "alternative" systems. We want to see improvements in the way that septic systems are designed, built and maintained in a way that protects public health *and* housing affordability. Sadly, after 5 years in the making, the proposed rule fails to accomplish these goals.

For further information, please contact Marlys Pedite, Code and Technical Specialist for the Indiana Builder's Association, at (800)377-6334, ext. 102.

PLEASE READ.
I am sending this
in opposition of
these Septic RULES.

Thank you for
listening - We are
counting on your help.

FROM:
BRUCE YOUNG
P.O. BOX 125
LaPorte, IN
46350


FROM:
JM Plumbing
Jeff McCombs
PO Box 1347
LaPorte, IN 46350
I am opposed to the prop
410IAC6-8.2 !!!
I am in agreement with
reported points of disc

Cut and send to your legislator

New Septic Rule Is No "Home Improvement"

Written by Terry Herschberger, Chairman of the IBA Septic Subcommittee, and Marlys Peddie, IBA Code and Technical Specialist.

The Indiana Builders Association's (IBA's) Septic Sub-Committee has nearly completed their review of the proposed rule 410 IAC 6-8.2 for On-site Sewage Systems. The committee gathered builders, septic installers, soil scientists and academic experts from around the state for the purpose of evaluating the rule which will affect 14,000 new home owners every year.

As members of IBA you need to be aware of the rule's impact on the homes you will build.

Although we are not asking them to do anything at this time, we want our legislators to be aware of this issue as well. If you know a County Commissioner, State Representative or Senator, clip this article, fax it to them and follow it up with a phone call. Better yet, see them in person.

History: Members of the IBA met with officials from the Indiana State Department of Health (ISDH) several times beginning in 1998 to relay our concerns with the new proposed septic rule. As our concerns were not addressed and the rule was being put forward for preliminary adoption, we met in December of 2002 with the Governor's office to raise those issues again. In January 2003, IBA testified before the ISDH Executive Board that the rule was flawed and should not be preliminarily adopted until major issues were settled with all stakeholders. The Board proceeded with preliminary adoption on the recommendation of ISDH staff, moving the rule toward the public comment and hearing phase of the adopting process.

IBA intends to testify in writing and at the public hearings along with several other groups who have concerns of their own. A hearing officer has not yet been appointed, pending official publication of the rule in the Indiana Register. The proposed rule is slated to go into effect in January of 2004, replacing the rule adopted in 1990.

What Does This Rule Do? 410 IAC 6-8.2 combines the commercial and residential rules into one document, defining categories of residential and commercial septic systems and prescribing their design and installation. It prescribes the procedures for plan submittal and the issuance of construction permits, operating permits, approval letters, and orders of violation. It prescribes inspections for construction, operation, maintenance and repair of the systems. It addresses the special regulation of systems that it defines as experimental or alternative. The proposed rule also defines state and local administrative and enforcement responsibilities.

Some of IBA's Specific Concerns:

* The rule is difficult to understand and confusing for designers, installers and enforcement personnel, contains several inaccurate (and unnecessary) cross references and contains erroneous information in critical tables used for system design.
* The current rule, adopted in 1990, has resulted in high quality design and installation. Two counties where the rule is vigorously enforced were found to have failure rates less than 3% in a recent Purdue University study.
* Lack of enforcement of the existing rules in certain jurisdictions is not addressed. These jurisdictions will continue to ignore the new rule, while those that properly enforce the rule will be saddled with more requirements and higher costs.
* The rule appears to try to cover every conceivable situation by the use of prescriptive rather than performance based language. This allows local health departments little, if any latitude to apply common sense to specific situations.
* Some examples of over-regulation found throughout the rule: A requirement to run a bush-hog over an un-graded soil absorption field site at a 3" height is impractical and dangerous. To say that the site should be closely mowed would be sufficient. A requirement for compacted backfill around a tank is unnecessary and costly. Slight settling of earth around the tank has no effect on system performance. Requirements for seeding and soil stabilization are unnecessary for most systems and cause extra expense for inspection and seeding out of sequence with the rest of the project.
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For further information, please contact Marlys Peddie, Code and Technical Specialist for the Indiana Builder's Association, at (800)377-6332, ext 102.

PLEASE READ.
I am sending this in opposition of these Septic RULES.

Thank you for listening - We are counting on your help.

FROM: Bret
Benefiel
1901 Kingsbury AVE
LaPorte, IN
46350-6713

FROM:

FARMCREDIT SERVICES
PO BOX 2589
SOUTH BEND IN 46680-2589

I am a tax payer and a voter and I am OPPOSED to the preliminarily adopted Septic Rules 410IAC6-8.2 Please review IN. Builders Assoc. reported point of contention. THankyou

FROM:
BOB PINDA
4528 W. 150 North
LaPorte, IN
46350

OPPOSED TO
SEPTIC RULES

TO:

FROM: OPPOSED TO SEPTIC RULES

BRUCE SMUCK

30677 OLD US. 20

ELKHART, IN

OPPOSED TO SEPTIC RULES

From: ED Ludwig

5441 North Darcy Lane

Laporte, IN

46350

I am opposed to the proposed septic rules
410IAC6-8.2 !!!
I am in agreement with the IN. Builders Assoc.
reported points of discontent.

From:
DYE PLUMBING & HEATING
CHARLES DYE
712 MADISON ST
LAPORTE IN 46350-3414

OPPOSED TO NEW SEPTIC RULES.

FROM:

GREG DEUTSCHER
122 W. Garfield
Michigan City, IN
46360

OPPOSED TO
SEPTIC RULES

FROM: CLARENCE SPEAR
5879 EIDSON
St. Joseph, MI
49085

OPPOSED SEPTIC RULE
410 IAC 6-8.2

FROM:

Trout Glass
Shawn Solner
1579 S. Calumet Rd
Chesterton, IN 46304

I am opposed to the proposed septic rules 410IAC6-8.2 !!!
I am in agreement with the IN. Builders Assoc. reported points of discontent.