Indiana Onsite Wastewater Professionals Association

We recently received word of an association specifically for on-site professionals in Indiana. The Indiana Onsite Wastewater Professionals Association (IOWPA) is a not-for-profit trade organization whose mission is:

“To educate, to promote a high standard of workmanship and to encourage a code of ethics among our members who are committed to protecting the waters of Indiana. To provide the onsite wastewater industry in Indiana with a strong, unified voice that represents the common interests and concerns of its members on a statewide level and on a national level through our affiliation with NAWT, NOWRA and others.”

IOWPA hopes to work as a team to set industry standards and increase public education. Benefits of joining the organization of onsite contractors, maintenance professionals, manufacturers, engineers, regulators, scientists, and educators include a quarterly newsletter, member discounts to training seminars, and discounted business services. One function of their newsletter, OnPro, is to keep members updated on regulations, products and equipment. It will also be a platform to share experience, tips, and information related to alternative technologies.

Current topics of discussion include the need for standardization among maintenance professionals and installers, and the need for education of the public, Realtors, and onsite professionals. IOWPA has area directors (north, south and central) available to address and relay issues and concerns and hold area meetings.

For more information, contact Paula Davis at: IOWPA, PO Box 1592, Elkhart, IN 46515 Fax: 219-293-3356, email: gold@mvillage.com

Technically Speaking: Nitrogen

Nitrogen is a necessary component for living organisms. But, too much nitrogen in drinking water can be detrimental to both environmental and public health. How much nitrogen is too much? That is under debate, but one convenient cut off from a public health perspective is 10 milligrams per liter. Concentrations greater than this are considered a potential health hazard to infants. Concentrations lower than this may be hazardous to environmentally sensitive areas. Groundwater usually does not contain sufficient concentrations of nitrates (NO3) to warrant concern over human health. However, if a groundwater aquifer is susceptible to contamination, excess nitrate may accumulate and become a problem.

Household wastewater usually contains both nitrogen and phosphorous. These nutrients can contribute to a process known as eutrophication. In eutrophication there’s too much of a critical nutrient in the ecosystem. This results in an overgrowth of algae, weeds, and other aquatic...
plants; shifting the population from the more stable resident plant species to “opportunist species.” When the residents or opportunists die, it results in organic matter that will be broken down by microorganisms. The majority of the microorganisms involved in degradation of organic matter are aerobic, meaning they require oxygen to respire. As the microbial population increases in response to added food, the dissolved oxygen concentration in the water can be depleted, creating anaerobic conditions. Aquatic organisms, such as fish, that require oxygen in the water to “breathe” may then be injured or killed by a lack of oxygen. Nitrogen is more often the limiting nutrient in salt water, while phosphorous is more often limiting in fresh water.

Ammonia (NH₃) is formed from the decomposition of organic matter and is also the primary soluble nitrogenous contaminant in untreated domestic wastewater. Most ammonia removal occurs through a series of nitrification and denitrification reactions. Ammonia is in a pH dependent equilibrium with ammonium (NH₄⁺).

\[ \text{NH}_3 + \text{H}_2\text{O} \rightleftharpoons \text{NH}_4^+ + \text{OH}^- \]

In nitrification, ammonia is oxidized to nitrate in a reaction mediated by Nitrosomonas and Nitrobacter bacteria. Note the increase in oxygen attached to the nitrogen atom.

\[ \text{NH}_4^+ + \text{O}_2 \rightarrow \text{NO}_2^- + \text{H}_2\text{O} \]

This oxidation requires aerobic, or oxygen rich, conditions and allows bacteria to assimilate carbon, the foundational atom for their life-supporting biochemical reactions.

Nitrate can contaminate ground and surface waters because it is mobile in soils. Denitrification, or the conversion of NO₃⁻ to N₂(gas), is therefore the desired endpoint of the nitrogenous reactions, because air is already 78% nitrogen gas.

\[ \text{organic carbon} + \text{NO}_3^- \rightarrow \text{CO}_2^- + \text{H}_2\text{O} + \text{N}_2(gas) \]

Denitrification is performed by facultative anaerobic bacteria and requires an organic carbon source, which is readily available in wastewater.

What do these reactions mean? In general, to reduce nitrogen levels, wastewater must first pass through an aerobic environment, and then an anaerobic environment. This is just the opposite of the conditions found in a conventional septic tank soil absorption system.

**Typical Municipal Wastewater Characteristics (mg/L)**

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<tr>
<th></th>
<th>weak</th>
<th>medium</th>
<th>strong</th>
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<tr>
<td>BOD₅</td>
<td>110</td>
<td>220</td>
<td>400</td>
</tr>
<tr>
<td>TSS (total suspended solids)</td>
<td>100</td>
<td>220</td>
<td>350</td>
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<tr>
<td>Nitrogen (N)</td>
<td>20</td>
<td>40</td>
<td>85</td>
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<tr>
<td>Phosphorous (P)</td>
<td>4</td>
<td>8</td>
<td>15</td>
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**Frequently Asked Questions...**

**What computer software is needed to run the On-Site Wastewater Disposal database?**

Windows 95 or Windows NT and Microsoft Access 95 or 97.

**Where can I get information on alternative technologies, maintenance and management options, community options, and the affect of wastewater on public health?**

One of the easiest ways to get information is to visit our web site. We have linked over 100 articles, factsheets, and brochures from a variety of sources around the country. Categories include general information, maintenance, alternative technologies, wells and drinking water, groundwater, community information, and sludge. County Extension offices are linked to the Internet, so your local educator can help you acquire educational materials if you do not have web access.

Purdue has extension publications on conventional and mound system construction and maintenance, uses of soils, and bacterial contamination of household water systems. These can be obtained by calling the extension service (888) 398-4636. While Purdue has not yet developed publications on alternative technologies, the National Small Flows Clearinghouse provides free or low cost, up-to-date educational and technical information on all aspects of wastewater disposal. They can be reached at (800) 624-8301.

**What is RWASTE IV and where can I get it?**

RWASTE is a computer program designed to assist in designing and loading on-site systems in Indiana. It is set up for the current regulation, Rule 410 IAC 608.1. When you enter site and soil characteristics, it will determine:

- Which systems can be used on the site
- How many feet of absorptive area are needed
- What volume of sand and gravel are needed
- What range of trench depths would be acceptable

It also provides a diagram and sample dimensions of a system that would fit the requirements. For example, if a mound is suitable for your site, it would compute the length, width, and height of the gravel bed, sand bed, and dispersal area. The program does not replace site specific system design, but it is a good place to start. The latest version of the program was finished in 1992, so it runs on MS DOS. If used on a Windows 95 PC, it should run, but may not print correctly. It can be obtained from Purdue Extension at (888) 398-4636 for $15.
News From ISDH...

As many of you are aware, the State Department of Health has undertaken the task of revising the residential and commercial on-site sewage disposal codes.

These revisions are to 1) combine the residential and commercial rules and technical standards; 2) eliminate discrepancies between the residential and commercial on-site standards; 3) clarify certain issues and procedures in the current residential rule; 4) address issues raised by local health departments; 5) remove the technical standards from the rule by development of a new technical specification bulletin; and, 6) formalize the ability for ISDH to delegate plan review for small commercial systems to local health departments that have demonstrated the ability to conduct the review.

The purposes of this revision do not include major changes in the use of existing technologies or the addition of new technologies. We are, however, attempting to strengthen the permit process for local health departments. We are also working with Purdue University to develop a new soil loading rate chart to permit more accuracy and efficiency with the description of soils for on-site sewage disposal.

ISDH staff is preparing drafts of the new rule and technical specifications. These drafts should be available for external review by the end of January 1998. They will be sent to all local health departments, certified soil scientists, septic tank manufacturers, and other interested parties for review and input prior to the start of the official promulgation process.

If you have any questions or comments, please contact me at 317-233-7177 or by e-mail at adunn@isdh.state.in.us.

Alan M. Dunn, Supervisor
Residential Sewage Disposal, ISDH

We want to hear from you

Is there something you have questions about? Maybe an experience or issue you would like others to know about? Thoughts on the rule revision? We would like to publish and/or address selected letters in upcoming newsletters. If this sounds like you, send a letter along.

It’s going to cost how much!

Discharging and failing on-site “systems” are illegal in Indiana, and most other places for that matter. This fact is not readily apparent if you were to spend a day identifying pipes carrying raw sewage from houses to ditches, streams, woods, and other people’s backyards. Most sanitarians could do this; however, many have no way to enforce this rule unless someone complains, so the activity is generally fruitless.

Realty agencies and lending institutions in some parts of the state are voluntarily beginning to require that a functioning on-site system be verified at the time of property transfer to protect the homebuyer and themselves. After all, a failing system that cannot be fixed can drop home equity to zero. This results in homes that cannot be sold, the possibility of condemnation, and the continued presence of a public health hazard.

Massachusetts is one of many states that have recently decided they have had enough. In short, they instituted a law requiring that existing on-site systems be inspected by trained, certified industry or health department inspectors within three years, and then at the time of property transfer. Initial data indicated that roughly 25% of the systems needed some kind of repair. Average repair cost was $6,200. Massachusetts is providing low interest loans to assist low-income homeowners with repairing their systems within a two-year deadline.

Here are a few cost calculations for Indiana based on the Massachusetts figures and the number of homes served by on-site systems according to the 1990 census (~700,000). If 25% need repairs, it would cost $1.09 billion to fix our existing systems. If we then hypothesize that the typical system lasts an average of 25-30 years, approximately 3-4% of the systems would need to be replaced or repaired every year giving the state's homeowners a yearly repair bill of between $130–$174 million. These numbers are rapidly rising due to the amount of new home construction utilizing on-site systems. These are interesting numbers when you consider that approximately 80% of Indiana’s soils are rated as having severe limitations for on-site systems. Maybe planning and community systems aren’t such a bad idea after all.

Reminder: If you haven’t sent us a list of contractors in your county, please do. We would like to send them the newsletter. Thank you!
Considerations…

- Sprawl, which decreases housing density, is only possible with septic and wells. The current trend is to increase lot sizes to accommodate two or more absorption field sites. This may result in two plus acre lots. A quote from National Association of Homebuilders: “How do you increase density? This is a ‘no brainer,’ smaller lot sizes!”

- In one Indiana county the sanitarian estimated that 70% of on-site systems are in failure and/or discharging to a ditch. For that county, this would result in ~5,000 failing septic systems or 1,500,000 gallons of raw or minimally treated sewage per day.