ALTERNATIVE/EXPERIMENTAL WASTEWATER TREATMENT TECHNOLOGIES TECHNICAL REVIEW COMMITTEE (TRC)

The meeting was held at the South Kingstown Town Hall

April 30, 2009

Draft

Present: Noel Berg, Dave Burnham, Russ Chateauneuf, Joe Frisella, George Loomis, Susan Licardi, Tim Stasiunas and Dennis Vinhateiro

Absent: Ken Anderson

Others Present: John Gates (Gates Insurance Agency, Inc.) and Deb Knauss (DEM)

Call to Order: 8:50 AM

Materials Distributed:

- Draft Agenda for this meeting
- Draft Minutes of 4/2/09 meeting
- Draft memo from New England Onsite Wastewater Training Center at URI with two attachments, addressing PSND sizing as addendum to the 2000 Sand Filter Guidance Document
- Spreadsheets of various leachfield footprints

Minutes of April 2, 2009

Necessary edit noted below:
Page 3, beneath "PSND Sizing" in the second paragraph, edit the fourth sentence as follows: "…precipitate phosphorus, therefore ~~the~~ delivering…".

Motion: Dennis made a motion to accept the minutes with the noted correction.
Second: Dave seconded the motion.
Discussion: There was no discussion.
Vote: All who were present at the April 2nd meeting voted in favor of the motion; Noel abstained.

Errors and Omissions (E&O) Insurance

Russ explained to John Gates, the OWTS installer and designer licensing programs, neither of which has a requirement in statute or in DEM's OWTS Rules for insurance or bonding, although there is a requirement in state law that DEM-registered well drillers have insurance. In response to recent exploration of limited expansion of eligible Class I designers to design repairs incorporating advanced treatment systems, Class II and III licensees have stated that the public would be better served if all classes of licensees were required to hold E&O insurance. Since this statement has been made, DEM and the TRC need to understand the distinctions between the different types of insurance coverage for business activities related to design of septic systems.

It was reported that the RI Board of Professional Registration for Professional Engineers does not require E&O insurance.

John explained that a general liability insurance policy can be written for any business; coverage includes slip and fall claims. Products and Completed Operations are two other categories of insurance a business may hold. E&O coverage is divided into three stages, explained as:

1) Category 1, the least "exposure" or risk, includes wetland delineation, impact studies and fish studies;
2) Category 2, septic specialist, which includes inspectors who would make an assessment regarding whether a system requires repair, but excludes installers of septic systems;
3) Category 3 includes asbestos abatement and environmental site assessment.

It was explained that E &O specifically excludes "design", and that design is also not classified as a "product" under "Products" or "Completed Operations". John explained that insurance companies and underwriters have different "appetites' for the risk associated with E&O policies and that this is a highly specialized niche market. He noted that "exclusions" are common and that there is no off-the-shelf version of what an E&O policy covers. He also explained that the legal system influences determinations of what is covered: a policy may read as though it provides a specific coverage, but involvement of an attorney if the insured is named in a suit may result in a determination that the policy does not provide coverage as it was understood by the policy holder.

John explained that E&O could cover a survey error and cited such a situation where E&O insurance paid to have a feature moved and built in the correct location after a survey error that was made several decades earlier was discovered.

Regarding eligibility for E&O, Dave explained that each license class has an exam which must be passed, seeking clarification of whether all classes of designer are eligible for the coverage. John explained that underwriters will look at credentials, qualifications, years of experience, whether an individual has any claims against him and what kind of revenue the business has, as an indicator of "exposure" and therefore potential risk.

Tim created a scenario where a repair is designed on a 5,000 square-foot lot, with a wetland 20' off the property line. Five years later, effluent is found in the wetland: who is at fault, the designer or the DEM which approved the design plan? Russ stated that there are situations that are thought to be permit-related problems or issues, and the parties involved do approach DEM requesting that something be done to resolve it.

In a case where the contractor designs and installs a system correctly, but it later is discovered to not work properly, due to design error would completed operations cover this? John explained that it would be a function of the "classification".

Seeking to establish whether the statistics support a statement that every designer should carry E&O, Dennis asked Russ how many claims of faulty design of IA systems there have been in the last 10 years. It was stated that even in the instances where a situation is brought to the attention of the designer licensing review panel, the designers do not reject personal effort to resolve problems in favor of leaving their insurance to pay the complainant.

The group agreed that with consideration of the influence of what a person discloses to an insurance underwriter and the underwriter's handling of the information, that the range of coverage from individual to individual is significant and that it does not sound like E&O translates to protection of the public or the environment. Russ stated that based today's discussion, DEM may not use this issue of E&O insurance as the basis of decision making regarding the limited expansion of eligible Class I designers to design repairs incorporating IA systems. He further stated that there has been no communication from the legislature on this issue and the Director was clear that DEM would not advance this measure independent of action by the legislature.

Renewal of OSI Nitrogen Removal Approval/Conventional Leachfield following Nitrogen Removal Systems

George expressed dismay and frustration with DEM for including in the recently issued renewal of the nitrogen removal approval for the AdvanTex AX, the allowance for conventional leachfields in the critical resource areas. Lacking a discharge pump, there is no forward flow data available with which to calculate the recirculation ratio for the system, to optimize nitrogen removal. Advanced treatment systems produce effluent of low waste strength which will not result in development of biomat in the leachfield, thus point loading the first holes in the pipe to which it is delivered, resulting in saturated flow beneath that small footprint. This, as he stated in the last meeting, is poor wastewater management. A very serious problem is that for OSI to be responsible and maintain ability to calculate recirculation ratios, they would have to require a discharge pump, which places them at a competitive disadvantage in the marketplace, as another competitor does not require use of the discharge pump.

Russ requested that George explain the relationship of forward flow to calculation of the recirculation ratio and how this relates to nitrogen removal performance. George explained that with greater forward flow, the recirculation needs to be increased. Consider forward flow "X", to determine proper recirculation ratio multiply "X" (forward flow) by 3 and add "X". This is the flow that is recirculated to the top of the filter. If there is too much flow recirculated to the top of the filter, for example, 250 gpd system that is using only 100 gpd, the dissolved oxygen in the processing tank will be too high. The availability of free oxygen to the microorganisms will result in their use of this free-oxygen (O_2) rather than the bound oxygen in the NO_3 form, which is harder for them to utilize. If the proper amount of effluent is recirculated the dissolved oxygen concentration will not sustain the facultative aerobe population and they will have to use the oxygen in the NO_3 form, which is where we get the gassing-off of N_2 gas. It is impossible to get this right without the number of pump cycles and the gpm for the pump, subtracting drain-back volume for each dose.

Some AX20 installations will not be able to incorporate conventional drainfields because of lot size or watertable elevation, but there will be some where this option will be used, because it is available and for these systems we will not know if their performance is meeting the treatment objective. The O&M provider will use dissolved oxygen but will not be able to calculate an exact amount to increase or decrease the recirculation ratio to improve treatment and achieve the bet possible nitrogen removal for that system. We will end up with more and more AX20 systems being improperly managed. Tim recalled that the conventional leachfield issue was a cost issue. Russ agreed that it was, but he did not recall the forward flow element of George's objection to the policy. Russ stated that DEM will address this AX certification renewal issue.

It was asked it there was a way to determine forward flow based on water meter readings. George explained that there are many water uses that do not deliver water to the treatment system and this diverted volume cannot be quantified. The use of a tipping d-box with a counter was suggested, but George explained that these units are six-inches deeper than the others in use and that in the locations where these systems are being used, the additional six inches might not be available.

Following any IA system with a conventional drainfield from a scientific perspective, does not make sense. Following even conventional systems with conventional leachfields is a problem because the effluent will leave the pipe through the first few holes, until biomat develops resulting in the effluent travelling down the pipe to the next set of holes and so forth.

George described the design of a low pressure pipe (LPP) leachfield, in which 2-inch diameter pipe is inserted within a 6-inch pipe, resting directly on the bottom of this pipe; no distribution box is required in these pressurized leachfields. The 6-inch diameter pipe may be sleeved in a sock to prevent the entry of soil into the pipe. A modification of this could be to pressurize larger diameter pipe as a leachfield option for IA systems. George explained the North Carolina LPP field design: a pump/vault/floats and pressurized manifold to laterals in crushed stone or gravel. The elevation of the laterals could be adjusted closer to the elevation of finished grade, if that is preferred. 1-1/4 or 1-1/2-inch diameter pipe could be used with septic tank effluent. Russ asked if LPP is required for all systems in NC; George did not think that it is. Cost of such a field relative to that of PSND materials was discussed. Tim said that the 1/2 pipe used in PSNDs is expensive, although it can be cut by the installer saving some money. LPP field materials are not expensive.

George noted that originally FAST was required to be followed by a pressurized drainfield and both the blower and the pump were required to be wired to the same circuit to prevent the blower from being turned off. However, it was noted that even with that requirement FAST systems were approved with conventional leachfields. George saw these applications come before the Conservation Commission in South Kingstown and would question the designer who would show him the approved DEM plan. To ensure maximum protection for the environment and for the consumer all IA technologies should discharge to a pressurized drainfield. The additional pump increases cost but it gives us better results. The trough in FAST units provides the recirculation with every lift of the effluent to the splash plate, but we do not rely on that for a recirculation rate. The FAST approval is based on knowledge of variation of flow in a home: morning and evening surges associated with activities in the home. There is no requirement to control or even consider flow (other than remaining within the design flow for which the system was approved). Russ noted that many years ago Peter O'Rourke went to twenty homes at which FAST systems had been installed to check on whether the blowers were running. All twenty of the systems' blowers were running. It would be helpful for us now to look at FAST systems and see if the blowers are on. If so, would there be a need to require a pump on FAST systems? George replied that pumps provide information on flow and if the leachfield can handle the flow it is receiving.

The October policy does not make a lot of sense for wastewater management. Many communities have wastewater management programs and RIWIS is being used with some good success. South Kingstown and Charlestown requested a meeting with the URI Cooperative Extension to discuss Rule 39. Communities are requesting information from service providers, who do not want to provide it to them; if there were a State requirement the service providers would be required to provide the information to the management programs.

Draft memo from New England Onsite Wastewater Training Center at URI with two attachments, addressing PSND sizing as addendum to the 2000 Sand Filter Guidance Document

Pressurized drainfield document development is stalled because necessary grant funding can not flow. DEM had objected to the overhead in the proposal and the State recently issued a no-spending directive. CWFA may have some additional options that can be explored, as development of this guidance would make available more affordable leachfield options. The Conservation District may be an option with a clause that overhead is not to exceed 10%.

George explained the diagrams distributed with his memo: on the 8-1/2 by14-inch sheet, at the top of the sheet, the numbers inside the boxes are the foot print in square-feet for BSFs. The top row depicts BSFs sized for Category 1 systems and the second row depicts BSFs sized for Category 2 systems. The soil categories for which each is sized, are listed across the top of the sheet. All the leachfield examples are sized on a three-bedroom design flow. George reminded the group that in BSF design, the laterals can be spaced between 14 and 24-inches.

George explained that installation of PSNDS is completed one trench at a time, with no disturbance of the soil between the trenches. He is skeptical about removing the native soil between the trenches because there could be a change in the oxygen diffusion among other properties of the soil. This is important because of the issue of soil structure, as he explained earlier when he related the demonstration project experience with matching soil texture but not structure. This installation technique can successfully be performed for fields with two-foot spacing. He wants the TRC to talk about basing the loading rate on BSF Category 1, if a Category 1 system is used and all the other conditions remain the same: does it make sense? URI's thought process is to consider an AX20 before a PSND, *and a* BSF, the soils are the same, both are time and pressure dosed: all variables are the same. The only difference is the sand bed beneath the

BSF versus the PSND discharging to the natural soil. Some people say the sand provides storage, but there is not really a storage advantage over the soil storage provided by a PSND. Additionally, with consideration of treatment, research has documented no additional nitrogen and phosphorus removal and one order of magnitude reduction in fecal coliform in one foot of sand. In two-feet of native soil there would be quite a bit more fecal removal. Russ asked about oxygen diffusion into a BSF. George noted that although the top of the BSF is peastone interface with the atmosphere, the rest of the installation is a lined sandbox in an above-grade design and an at-grade design is a 2-1/2-foot lined excavation. He also noted that the grass growing over a PSND provides good oxygen diffusion down into the rhizosphere of the grass. There is still the stipulation of ¼ gallon/orifice/dose and the same orifice spacing as the PSND guidance currently stipulates, therefore he is not concerned about seasonal loading when evapotranspiration is less in the winter months. If the loading rate works for BSFs and BSF effluent is delivered to deeper native soil than an at-grade BSF it should perform at least as well. Recall that 5-foot-spaced PSNDs produce a green-striped lawn.

There are still provisions for sand-lining PSNDs in specified soils in the draft; George and David Kalen worked more on this design consideration. In the memo dated March 30, 2009 from George to the TRC, on Page 5, paragraph 1, discusses a recommendation that spacing remain as current guidance stipulates for soil categories 6-9; based on further consideration of this, George requested that this paragraph be deleted; the PSNDs in these soil could be made larger.

If we are using BSFs in category 6 soils with category 2 systems successfully, PSNDs with BSF sizing should work, BSF sand media is relatively inert and it receives clean effluent lacking a robust population of microbes. In native soils "it is all about carbon" – the native soil's biota beneath a PSND should be able to manage the organics. George has never observed a biomat in a PSND and the only failures of which he is aware were early ones installed on filled sites where the invert was above grade and the top soil structure was not matched, as described earlier today. He reminded the group that SPSFs receive a lot of BOD and handle the loading successfully.

Dave noted that even at the demonstration project sites where the lines were installed more closely together (because of site constraints) than current design parameters require, he does not think there is less treatment than if the lines had been spaced as required by guidance.

Russ stated that a two-foot separation to the seasonal high water table is allowed for PSNDs and compared this to the BSFs with a four-foot separation between the point at which effluent is applied to media and the seasonal high watertable (two-feet of media and two-feet of soil). The effluent is traveling through greater vertical space and he thinks that we may be discounting the flow through the two-feet of media. Mounding in larger systems requires consideration: in larger systems with closer line spacing would indicate higher mounding.

George does not think that there is significant evaporation from a BSF, but evapotranspiration in a PSND is appreciable. The grass over a PSND grows twice as fast during the growing season as grass that is not over the PSND and its growing season begins sooner and ends later. The same observations have been made of grass over SPSFs; the roots are not growing into the effluent, but the soil is warmer.

PSNDs have a one-foot groundwater table separation benefit, so in a three-foot separation zone, they have to be two-feet above the watertable. In a critical resource area where the separation to the water table is four-feet, they have to meet three-foot separation to groundwater. Holden and Stolt found no additional phosphorus or nitrogen removal by BSFs. There is better moisture management provided by PSNDs and placement in the upper fourteen inches of soil, which delivers the effluent into soil that is more reactive chemically than an at-grade BSF.

Russ suggested to George if the TRC is in agreement the DEM could issue an addendum to the sand filter guidance document as was done with the freezing situation, specifying the new stipulations for PSNDs. This could be used on an interim basis until the pressurized leachfield guidance document can be written.

Dave stated that if the same requirements would be maintained for Category 1 and 2 systems he would favor the measure.

George asked the group if they thought it necessary to prepare graphic depictions of PSNDs with a 2-foot line separation for category 1 systems, or if they feel better about the 2-1/2 foot line spacing; they were comfortable with 2-1/2 foot spacing.

Motion: Joe made a motion to accept for PSND design parameters, 2-1/2 line foot spacing, as shown on the diagrams with BSF loading and recommending that DEM issue an interim addendum to the Sand Filter Guidance Document (SFGD).

Discussion:
5-foot spacing would be allowed, if a designer wished to specify it, but the interim addendum would *allow* 2-1/2 foot line spacing.

BSF s have a 900 gpd design flow limit unless specific technical studies and calculations are submitted to DEM, this should be incorporated into the addendum, as a 900 gpd design flow limit on PSNDs with 1-1/2 foot line spacing, unless technical studies ensuring that the soil will accept and transmit the effluent at the proposed loading rate, without excessive mounding of groundwater; seepage outbreak, such as at nearby cut slopes, toe slopes or property boundaries; adverse effects on the operation of the BSF; or adverse effects on nearby groundwater and surface water resources, are submitted to DEM.

The SFGD currently has a stipulation for sand-lining trenches in very coarse soils. This stipulation should be incorporated into the addendum. Table 3 in the SFGD specifies in a foot note that for the coarsest possible soils, sand lined, pressure-dosed trenches shall be used.

With the knowledge that after 2-feet of sand in BSF there is no nitrogen and phosphorus removal and 1-log reduction of fecals, does it make sense to use sand lined trenches? Dave stated that he would like the opportunity to use sand if a rock is removed from a trench or if one end of a trench is a little lower than the other. He has had to use ASTM C-33 sand on repair sites if a rock has to be removed and there is no where else to move the system.

At a repair site where the original loam has been filled, the sand interlayer should be brought down to the elevation of the original loam. Russ suggested that we could require that there must always be a minimum of two-feet of native soil. For a filled PSND, an additional 1-foot separation from the bottom of the sand interlayer to the seasonal high watertable could be required.

Revised Motion: Joe revised the motion to request that DEM issue an interim addendum to the Sand Filter Guidance Document (SFGD) allowing 2-1/2 foot line spacing for PSNDs with BSF loading (from Table 1 in the Guidelines for the Design and Use of Bottomless Sand Filters), as shown on the diagrams attached to the memo from George to the TRC. Greater spacing would be allowed at the discretion of the designer. PSNDs with 2-1/2 foot line spacing will be limited to a design flow of 900 gpd, unless technical studies ensuring that the soil will accept and transmit the effluent at the proposed loading rate, without excessive mounding of groundwater; seepage outbreak, such as at nearby cut slopes, toe slopes or property boundaries; adverse effects on the operation of the PSND; or adverse effects on nearby groundwater and surface water resources, are submitted to DEM. The addendum should maintain the benefit of the one-foot reduction to the seasonal high water table for PSNDs with 2-1/2 foot spacing.

Second: Dave seconded the motion.

Russ noted that the DEM will consider direction for installation in very coarse soils and separation to seasonal high watertable where sand interlayer is directed, whether to be measured from the interface of the ASTM C-33 sand.

Vote: All present voted in favor of the motion.

Next Meeting

The group agreed on June 10, 2009 at 8:30 in the SKTH Council Chambers.

The meeting adjourned at 12:45 PM.