FOURTH ANNUAL REPORT TO THE LEGISLATURE OF THE TECHNICAL ADVISORY COMMITTEE

Established by Act 133 of the 2001 Adjourned Session

REGARDING OVERSIGHT AND IMPLEMENTATION OF THE

WASTEWATER SYSTEM AND POTABLE WATER SUPPLY RULES

January 15, 2006

Submitted by: _____

John Forcier, P.E. – Chair
(Alt.: Brad Aldrich, P.E.)

For Members of the Technical Advisory Committee:

Gail Center, VT Health Department
Bernard Chenette, P.E.
David Cotton, P.E., Hydrogeologist
Philip Dechert, Town Planner
Kim Greenwood, Water Quality Specialist
Spencer Harris, Licensed Designer B
Craig Heindel, Hydrogeologist
Alan Huizenga, P.E.
Gerald Kittle, Licensed Designer B
Allison Lowry, DEC, WWMD
Lance Phelps, P.E.
Rodney Pingree, DEC, WSD
Stephen Revell, Hydrogeologist, LD B
Roger Thompson, DEC, WWMD
Jeff Williams, Well Driller
Barbara Willis, Licensed Designer B
Alt.: Justin Willis, Licensed Designer B

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TABLE OF CONTENTS

Purpose: This report on implementation of the Wastewater and Potable Water Supply Rules is the fourth of five annual reports required by Act 133 of the 2001 Adjourned session.

Section 1978 of 10 V.S.A., as established by the Act, focused on the need for the technical standards to be updated immediately to include new technologies and for revisions to the technical standards to be routinely accomplished in order that the standards remain current with known and proven technologies regarding potable water supplies and wastewater systems. The statute established a Technical Advisory Committee (TAC) to advise the Vermont Agency of Natural Resources (ANR) regarding the technical standards and implementation of Act 133.

The annual reports of the TAC are required to include information on the following topics:

- Implementation of the statute and the rules adopted under the statute,
- Number and type of alternative/innovative systems approved for general use, approved for use as a pilot project, and approved for experimental use,
- Functional status of alternative/innovative systems previously approved for use as a pilot project or for experimental use,
- Number of permit applications received during the previous year,
- Number of permits issued during the previous year,
- Number of permit applications denied during the previous year, including a summary of the basis for denial.

TAC Members: In 2005, there were 17 regular members of the TAC and two alternates (see list on cover page, and details in Appendix D).

TAC Chairperson: The TAC agreed that it is advisory to both the ANR and the State Legislature. In that capacity, TAC members determined that the TAC should be chaired by someone who is not affiliated with ANR or the legislature. Accordingly, in 2005 John Forcier, P.E. continued his role as elected Chair of the TAC.

Meetings: Twelve (12) meetings were held by the TAC in 2005, with each meeting being approximately 3 hours in duration. Meetings were held on January 11, February 8, March 8, April 12, May 10, June 14, July 19, August 17, September 20, October 18, November 15, and December 13, 2005. Meeting attendance ranged from 6 to 12 members (generally about 10), and included guests at some of the meetings, such as DEC Commissioner Jeffrey Wennberg and Anne Whiteley (ANR attorney) on August 17; and Bruce Douglas (P.E. and Hydrogeologist) at most meetings. Also usually attending were Christine Thompson, Director of the Wastewater Management Division and Frank O'Brien, Innovative Systems Engineer for the Wastewater Management Division.

Full minutes of each meeting are contained in Appendix A, and can also be viewed on-line at http://www.anr.state.vt.us/dec/ww/EngServ.htm#tech under the heading Technical Advisory Committee (previous TAC annual reports are also available here).

Implementation of the statute and the rules adopted under the statute:

TAC RECOMMENDATIONS to ANR in 2005, regarding statute and rules:
The TAC made the following recommendations during the course of their meetings in 2005. Each item is followed by the meeting dates when related discussions were held.

1. **Annual Report to Legislature** – The TAC submitted its Third Annual Report to the Legislature to the Legislature on January 15, 2005. TAC representatives testified at the Senate Natural Resources Committee on April 12, 2005 regarding this report.

2. **Revisions to EPRs, Ch. 1, Wastewater System and Potable Water Supply Rules** – The TAC provided advice to DEC at most of its 2005 meetings regarding revisions to the current rules being considered. TAC prepared a list of subjects for possible consideration in the rule revision process, and at the 5/10 meeting these subjects were prioritized. At subsequent meetings, the TAC evaluated and provided advice on the higher-priority subjects. At the beginning of the year, this list of potential rule improvements included 13 entries (1/11), and it had expanded to approximately 30 entries by our October meeting (10/18). The TAC continued to urge DEC to move forward with the adoption of revised rules soon, even if this meant postponing until future dates some revisions that DEC felt were not yet ready to take through the adoption process (1/11,2/8, 3/8, 4/12, 5/20, 6/14, 7/19, 8/17, 9/20, 10/18, 11/15, 12/13).

3. **Information for Legislators** – The TAC considered organizing a tour for legislators of existing conventional and innovative wastewater disposal systems in Vermont, to provide information and educational materials (1/11, 2/8). TAC ultimately placed this effort at a lower priority, given other pressing duties (3/8), but TAC members continue to acknowledge the importance of providing information to the Vermont legislature. As individuals, TAC members testified at various hearings and meetings, and provided information to legislators throughout 2005.

4. **Evaluation of existing disposal systems on flat clay soils** – The TAC recommended that DEC fund a detailed evaluation of existing wastewater disposal systems located on sites with clay soils and little or no slope. However, TAC also recommended that such a study would be of little value without a substantial budget (2/8). DEC did not fund such a study in 2005.

5. **Concepts for Sites with Severely Limiting Conditions** – The TAC spent a great deal of time and effort in 2005 considering wastewater disposal concepts that are not now approved in Vermont, but which might be effective for sites with severely limiting conditions, particularly sites that are limited by soils with low permeability (clay or silt) and/or shallow depth to the seasonal water table. The TAC's consideration of this topic focused on two main areas:

   a. **Definition of "effluent"** - TAC evaluated the question: "When is wastewater effluent no longer effluent?" (2/11, 3/8, 4/12, 5/10, 6/14, 7/19), and ultimately concluded that this question would need to be resolved by ANR and the

Vermont Legislature as part of the larger subject of whether Vermont should consider allowing seasonally discharging wastewater disposal systems (see next item below).

b. Seasonally Discharging Systems (Options Paper) – The TAC was requested by DEC Commissioner Wennberg to prepare an evaluation of various options that DEC and the Legislature might consider for wastewater disposal on sites with severely limiting conditions. Substantial time was devoted to this topic at every TAC meeting beginning in February, and a sub-committee was charged with preparing initial draft documents for discussion. This sub-committee had numerous email exchanges throughout the year, and also met in person on June 30 and Sept. 15. The TAC evaluated and edited numerous drafts of this "options paper", culminating in a final document which was sent to Commissioner Wennberg, the House and Senate Natural Resources Committees and the House Fish, Wildlife and Water Resources Committee on December 20, 2005 **(*Options for Rule Revisions to Allow Seasonally Discharging Systems in Areas with Soil Limited by Slow Permeability and/or Seasonal High Water Table,* December 19, 2005; see Appendix E).**
(2/8, 3/8, 4/12, 5/20, 6/14, 7/19, 8/17, 9/20, 10/18, 11/15, 12/13).

6. **New Technologies** – The TAC provided technical reviews and informal feedback to DEC regarding Innovative or Alternative Technologies under review by DEC (2/8, 5/10, 6/14, 7/19). See page 4 and Appendix B for more details.

7. **Interior Pump Stations -** The TAC discussed design and safety details of interior pump stations, and reviewed and edited the DEC guidance on this subject (3/8, 4/12).

8. **Water Supply Design Training for Class B Designers** – The TAC advised DEC on this issue, and reviewed draft curricula for training workshops (4/12, 7/19).

9. **Surface Water Potable Water Sources** - The TAC formed a sub-committee to address this issue, which its members had identified as very important due to the large number of private water systems throughout the state which use surface water as their water source. All of these systems will come under state jurisdiction as of July 1, 2007, and the current Rules do not consider such systems as potable, due to the health risks and/or substantial treatment and management needs associated with surface water sources. The TAC sub-committee on this subject worked via email exchanges throughout the last half of 2005, and this topic will be an ongoing priority for the TAC in 2006 (7/19, 11/15).

Municipal Delegation – The Town of Colchester was authorized in December 2005 to administer Chapter 1 of the EPRs within the town's borders, including the Wastewater System and Potable Water Supply Rules.

INNOVATIVE AND ALTERNATIVE TECHNOLOGIES, Including Functional Status: The Rules allow for three categories of new technologies (innovative /alternative treatment systems and products):

1. General Use;
2. Pilot Project; and
3. Experimental Use.

1. **General Use:** In addition to the two advanced treatment systems that have been allowed in the Rules since 1996 (intermittent sand filter, and recirculating sand filter), a total of ten other advanced treatment systems and ten other devices are now approved for general use or as acceptable substitutes in Vermont. Applications from the manufacturers of five additional treatment systems, and three devices are currently under review. Appendix B includes a summary of innovative/alternative technologies that are approved or being considered for their use in Vermont, and their current status. Numerous advanced treatment systems and other devices have already been approved for general or pilot use in previous years (also listed in Appendix B).

   In 2005, the following five technologies, products or regulatory amendments were approved for the first time for general use in Vermont (listed alphabetically by manufacturer, with brief descriptions):

   - Enviro-Guard - combined process wastewater treatment system;
   - Orenco – fiberglass septic tank;
   - Polylok – septic tank effluent filter;
   - Presby Enviro-Septic – increased application rate;
   - Singulair - suspended growth / extended aeration treatment system.

Note: Use of advanced treatment systems does not change the existing minimum required site conditions. The TAC is unaware of any advanced treatment system which would overcome the requirements for minimum site conditions in the current Rules. Possible revisions to the Rules for minimum site conditions are discussed in the Options Paper (see discussion of Seasonally Discharging Systems on page 3 and the Options Paper in Appendix E)**.**

Denials for General Use: No applications for general use approval were denied in 2005, or have been denied since the revised Wastewater Disposal Rules went into effect on August 16, 2002.

Technologies currently under review for General Use:

- **Advanced Wastewater Treatment Systems:** In 2005, no manufacturers of advanced treatment systems filed a complete application for approval for

general use in Vermont, though there have been requests for information on how to apply. Five advanced treatment systems have applications pending and currently under review, although four of those applications are awaiting additional information from the applicants, or are not currently approvable under the Rules. DEC is holding these applications open pending possible rule changes.

- **Wastewater Disposal Devices:** In 2005, no manufacturers of other wastewater disposal devices applied for approval for general use or amended regulations (such as increased wastewater application rates, and so on) , though there have been requests for information on how to apply. One product and two requests that would require amended regulations are pending and currently under review, although both requests requiring amended regulations are also awaiting additional information from the applicants.

2. **Pilot Projects:** One pilot project (an aerated subsurface-flow wetland treatment system) was approved in 2005. No manufacturers of advanced treatment systems applied for approval for pilot projects in 2005. One advanced treatment system with an application pending since 2003 (a bottomless sand filter) is not currently approvable under the Rules, but DEC is holding the application open pending a possible rule change. No applications for pilot use were received prior to 2003. See Appendix B for the list of treatment systems and products currently under review for Pilot Projects.

3. **Experimental Use:** As in previous years, no manufacturers of advanced treatment systems or other products have applied for Experimental Use in 2005.

APPLICATIONS for Wastewater System and Potable Water System Permits in 2005:

1. **Permit applications received in 2005:** The number of permit applications received in 2005 was 3042, which is an increase of 7% (200 applications) over the 2,842 applications received in 2004.

2. **Permits issued in 2005:** The number of permits issued during 2005 was 2979. This number includes permits issued for projects which have been pending for more than one year. The number of permits issued in 2005 is an increase of 7% (193 permits) from the 2,786 permits issued in 2004.

3. **Denials of permit applications in 2005:** The number of permit applications denied in 2005 was 23 which is a decrease of 34% (12 denials) from the 35 denials in 2004. 91% percent of the denied permit applications (all but 2 of 23) were rejected due to a lack of sufficient information.

Note: Appendix C includes a table listing the number of permit applications and permits issued /denied for 2003, 2004 and 2005.

Appendix A

APPROVED MINUTES FOR TECHNICAL ADVISORY COMMITTEE MEETINGS (2005):

Approved Minutes of the Technical Advisory Committee Meeting
January 11, 2005

Members Present:	Roger Thompson	BarbWillis
	Spencer Harris	Alan Huizenga
	John Forcier	Allison Lowry
	Gerry Kittle	Steve Revell
	Craig Heindel	DaveCotton
	Phil Dechert	
Others Present:	Frank O'Brien	Chris Thompson

Scheduled Meetings:

February 8, 2005	1-4 PM	Appalachian Gap Room
March 8, 2005	1-4 PM	Appalachian Gap Room

Review of Agenda

The agenda was accepted as drafted.

Review of Minutes

The draft minutes of the December 7, 2004 meeting were reviewed.

John, Spencer, and Steve had comments on the Third Annual TAC report. John asked that the legislative field trip subcommittee be listed. The name will be changed to Subcommittee on Legislative Liaison. The information related to approval of innovative systems will be clarified with a "received" date. Frank and Chris should be mentioned as regular participants at TAC.

Steve noted that lake water systems are going to be an important topic in the near future as the state starts regulating all of the people using these systems. As currently written, an untreated lake water system would probably meet the definition of being failed. It is important for people to know that any new project requires a "potable water system".

First legislative report on use of systems based on performance based designs

Roger noted that the first of the two required reports was filed with the House and Senate Natural Resources Committees. The second report is due January 15, 2007. Copies of this report, and copies of the third annual TAC report were also provided to the House Fish, Wildlife, and

Water Resources Committee. Andrew Flagg, from the Agency of Commerce and Community Development, took the lead in getting the GPS data into the Vermont Geographic Information System, and then plotted on a map. Only a limited number of systems based on the performance-based approach have been approved since the designs were first available on August 16, 2002. These designs are scattered throughout the state, with a few small clusters in some towns. There are too few to draw much of a pattern, though ACCD added a brief comment, that was included in the report, that it was disappointing to see that most of the systems were installed outside of village centers. ACCD noted that they thought the point of the rule changes was to allow for infill. Phil stated that lack of infill is not primarily caused by the rules. Phil also commented that the current map has relatively little value compared to what can be done with the GIS data that has been entered into the system. There are other issues, including existing wells, and other regulations that affect the amount of infill. The Committee suggested several minor wording changes to improve the text of the report.

Legislative tour

Phil noted that only Craig had responded to his request for information. There was some discussion as to whether there is still interest in doing this project. John said it would be worthwhile to do the "virtual" tour. It was decided to give it one more try because there is value in having the legislature better understand the issues TAC is dealing with. The project should cover both "best fix" systems and the systems that can be used for new development.

Topics for TAC discussion

Steve asked that a topic on curtain drains be included. Discussion should include the effect of vertical treatment. There was general discussion that most of the topics on the list are significant and should be pursued. Roger suggested #9 and #10 might be more important than some of the others. Dave noted that #11 and #12 might wait for a bit. There was general agreement that #9, (defining when effluent is no longer wastewater) is the most critical. The Terralifting process will also be added to the topic list. Phil said that his wife is associated with the Dartmouth-Hitchcock Hospital and might be able to arrange for a virus expert to meet with the committee.

Topics list

1. Drip disposal
2. Housekeeping changes
3. Inclusion of policies and procedures
4. Up or down location of holes in pressure distribution systems
5. Mound sand requirements
6. Encourage I/A
7. Changing the 20% slope restriction to 30%
8. Replacing perc test with soil identification approach
9. Defining when effluent is no longer wastewater
10. Disinfection
11. Colorado Rule – reduction in isolation distance to wells based on construction methods

12. Certification and audit approach to permitting
13. Lake water systems

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson
Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams

Subcommittees

Hydrogeology - Allison Lowry, Craig Heindel, Dave Cotton and Steve Revell.

Training subcommittee - John Forcier, Roger Thompson, Allison Lowry, Dave Cotton, and Barbara Willis.

Licensed designers - Spencer Harris, Alan Huizenga, and Gerry Kittle.

Well driller's knowledge checklist - Jeff Williams, Rodney Pingree, Roger Thompson, Bernie Chenette, Gail Center and Steve Revell.

Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Approved Minutes of the Technical Advisory Committee Meeting
February 8, 2005

Members present:	Allison Lowry	Roger Thompson
	Alan Huizenga	Spencer Harris
	Rodney Pingree	BarbWillis
	Gerry Kittle	John Forcier
	DaveCotton	
Others present:	Chris Thompson	Frank O'Brien

Scheduled meetings:

Appendix A

March 8, 2005 1-4 PM Appalachian Gap Room

Review of agenda

The agenda was accepted as drafted.

Review of minutes

The draft minutes of the January 11, 2005 meeting were reviewed and accepted as drafted.

Letter from Arthur Krueger

Roger will write Mr. Krueger and let him know that TAC will take his comments related to replacing the percolation test method with a soil analysis method into account when TAC deals with the issue.

Dave suggested that as TAC decides which issues to work on for the next rule revision, and that the framework document, that was developed in the past, be reviewed and used as a starting point. He noted that there were "to do" items on the 2001 report from the previous sewage committee that still have not been done.

Legislative tour

There have not been any additional responses to Phil's request for information since the last meeting. While people agree this would be a good thing to do, the level of urgency is diminished since the end of 2004.

Budget and timeline for project to study existing systems on clay soils

Roger reviewed a conversation between Commissioner Wennberg and some legislators who proposed that an evaluation of systems on clay soils be done to determine if they are working. Commissioner Wennberg was supportive of this concept, with a budget of about $50,000, and has asked that TAC consider what would be needed for a budget and work plan in order to get useful information.

The committee discussed various approaches and tentatively concluded that a study of 10 systems that were working would be a place to start in trying to determine the site conditions required for a working system. These would probably need to be evaluated for more than one year to get good information. As discussion evolved on how these systems would be selected, John noted that from experience it makes a great deal of difference in how you ask the questions. A question of does your system work usually gets a "yes" answer, while a question of whether your neighbor's system works is more apt to get a "no" answer.

Appendix A

The committee discussed what an appropriate testing/monitoring program would include as the basis of writing a Request for Proposal (RFP). John suggested it would be better to create a budget and to define the question and then let the bidders propose how they would do the work.

Dave said that we should be trying to determine how many systems on Vergennes clay are working.

John and Dave noted that the budget would be pretty tight, with little money for monitoring of the systems. Dave suggested that an ideal approach would be to do actual loading tests with clean water for the site evaluation, and could envision testing systems with drip application and underdrains that would surface discharge.

Roger asked how, once working systems were identified, the sites could be evaluated so those sites that work can be separated from those that don't.

Roger also said that Steve Revell had suggested that there should be an automatic credit of 6" when subsurface drainage is installed and that the topic has been added to the list for future review.

Gerry suggested that some experimental systems be tried, with the installations then monitored carefully to determine if they work. The issue of how to deal with sites that do not work remains an issue, unless a complying replacement site is available.

While the committee is supportive of doing a study, there is a feeling that with the limited budget such a study might not result in a clear path to rule revisions that would dramatically increase the number of sites that can be approved.

When is effluent no longer wastewater

Roger handed out copies of some pages from the current EPA Onsite Wastewater Treatment Systems Manual. The manual suggests that there might be several classes of systems that provide different levels of treatment, that could be selected based on the risk to public health. The manual proposes systems ranging from those with only primary treatment to those that achieve near drinking water quality. Alan reviewed the e-mail he circulated to the committee which suggested using the spray disposal criteria already in the rules as the starting point. Dave noted that the treatment systems now commonly available can reach the near drinking water standard suggested in the EPA manual which is significantly better that what is required in the spray rules. Roger noted that the spray rules require that the wastewater be infiltrated into the naturally occurring ground and allow for storage of the wastewater during periods when the SHWT is less than 12" from the surface. The rules are also based on use of chlorine which might be an issue for subsurface discharge, and required fairly large separation distances from the area of application to houses, property lines, and areas accessible to the public. Some of the concepts have now been incorporated into the two year time of travel and into the store and dose concepts

included in the January 1, 2005 rules.

Dave noted that there are already a lot of requirements in the rules, such as 50' to surface water, 25' to drainage ditches, 3 feet of soil to SHWT, etc and suggested that we assume it is no longer wastewater at that point.

Roger also noted that the Commissioner had discussed the need for a management entity, such as a town, or fire district. This would depend on what degree of operation and oversight is needed. A town could contract with a private company to perform the work.

The use of discharging systems by other states was discussed briefly. Chris asked about systems in Wisconsin and Dave said that he thought that for failed systems they allowed replacement mound systems that they expected to surface at least in the springtime.

Dave noted that the Monkton School had been approved many years ago with a system with a 50' sand wick.

Dave asked if the standard for determination of when effluent is no longer considered wastewater had to be numeric, or could it be time based, such as the two year time of travel, or could it be based on distance of travel through the soil.

Spencer suggested that legislators should be invited to the TAC meetings so they can understand the issues that TAC is trying to deal with.

Gerry suggested that some systems should be installed and tested on sites that do not comply, or maybe monitor some systems such as the Monkton School.

Innovative systems

Frank said he had issued draft permits for an advanced aerated constructed wetland project, and for the Singulair system. He had also responded to a proposal for a general use approval of the Elgin In-Drain system with an outline of the information required in order to grant a reduction in leachfield size.

Topics list

14. Drip disposal
15. Housekeeping changes
16. Inclusion of policies and procedures
17. Up or down location of holes in pressure distribution systems
18. Mound sand requirements
19. Encourage I/A
20. Changing the 20% slope restriction to 30%
21. Replacing perc test with soil identification approach
22. Defining when effluent is no longer wastewater

23. Disinfection
24. Colorado Rule – reduction in isolation distance to wells based on construction methods
25. Certification and audit approach to permitting
26. Lake water systems
27. Curtain drains
28. Terra-Lift System

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson
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Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Approved Minutes of the Technical Advisory Committee Meeting
March 8, 2005

Members present:	Roger Thompson	Kim Kendall
	John Forcier	Rodney Pingree
	Spencer Harris	Craig Heindel
Others present:	Chris Thompson	Frank O'Brien

Scheduled meetings:

April 12, 2005	1-4 PM	Secretary's Conference Room Human Services Building (upstairs in building connected to Osgood)
May 10, 2005	1-4 PM	Secretary' Conference Room
June 7, 2005	1-4 PM	Mad Tom Room

Review of agenda

The agenda was accepted as drafted.

Review of minutes

The draft minutes of the February 8, 2005 meeting were reviewed and accepted as drafted. Lance Phelps noted in an e-mail that he would accept a contract for $50K to study systems in Addison County and would start with the Stan Corneille report. Spencer asked that the completion certification language be added to the topic list for future discussion.

Legislative Update

Roger gave a brief overview of H.492 which is another bill related to design of wastewater systems. H.492 allows the effluent to surface after passage through 50' of natural or imported material downslope of the system provided that advanced wastewater treatment and disinfection are used. John noted that he did not know of anyone involved in drafting the bill.

The question of a joint meeting with interested legislators was raised again. John will find out if there is a desire on the part of legislators and make arrangements for a meeting. It may be best to have this meeting at the Statehouse if it will be when the Legislature is in session.

Subdivision requirement for a minimum 3 bedroom residence

Roger said that the existing rules require that any subdivision that results in a new single family residence requires the lot to have wastewater disposal capacity for at least a 3 bedroom house. The question has been raised as to whether it is acceptable to show room for a wastewater disposal system sized for at least 3 bedrooms, but actually construct a one bedroom house and only enough of the system for one bedroom. The question was particularly aimed at a situation that requires a mound-type wastewater system and issues related to expanding such a system, such as how the pressure distribution system would be upgraded and whether the contractor would have destroyed the naturally occurring soil conditions at the sides of the 1 bedroom portion of the wastewater system. Craig said this was old history, having been discussed before and that the 3 bedroom requirement should be retained. Spencer said that allowing for less than 3 bedrooms would help people who want to have a subdivision with a guest house on it because some towns don't allow a second detached living unit. Rodney had concerns about enforcement ensuring full construction of the mound at a later date if more bedrooms are added to the house.

Various options were discussed on how to protect the area needed for expansion. Craig suggested one approach would be to require enough room to build a free standing mound that would provide the needed increase in capacity. Other possibilities include requiring that the initial inspection report state that the area needed for expansion remains available and that the area be permanently staked out as a reminder of the need to preserve it.

Interior pump stations

Roger reviewed a request that the Agency revise its longstanding prohibition against interior pump stations and outlined the responses from the Department of Labor and Industry and the manufacturer. The original decision was based on a 1971 letter from the Health Department. The committee discussed various options such as whether a solenoid valve should be included for when the power was off, that portable toilets are available on short notice for when the pump malfunctioned for slightly longer periods, that use should be limited to those situations where a pump is required to be inside, and the components should be readily available. Roger will work up a draft guidance and circulate for comments.

When is wastewater no longer wastewater

Frank presented information gathered in a poll of other states (this information is summarized in the table included with these minutes). 17 states replied, with 12 stating explicitly that no surfacing is allowed. Only Alaska and Iowa indicated that permits for surface discharge are issued on a regular basis. North Carolina allows surface application but the wastewater must infiltrate the soil. Three other states indicated that their statutory language allowed a surface discharge but the requirements to obtain the permit were so difficult that none had been approved. The state of Iowa issues NPDES permits with direct surface water discharges.

John suggested that any use of a discharging system should rely on remote monitoring and that Dave Cotton might work up an outline of the equipment required and the cost of the system.

Innovative systems

Frank said he had issued the permit for general use of the Singulair system.

Feedback

John asked about the proposed UIC rules and wondered if TAC would review these in the same manner as the wastewater rules. Chris indicated that the rules would not be handled the same, but that any comments from engineers or others could be incorporated, and of course there would be the usual public process with public meetings, time for comment, and the LCAR process at the end.

Appendix A

Topics list

29. Drip disposal
30. Housekeeping changes
31. Inclusion of policies and procedures
32. Up or down location of holes in pressure distribution systems
33. Mound sand requirements
34. Encourage I/A
35. Changing the 20% slope restriction to 30%
36. Replacing perc test with soil identification approach
37. Defining when effluent is no longer wastewater
38. Disinfection
39. Colorado Rule – reduction in isolation distance to wells based on construction methods
40. Certification and audit approach to permitting
41. Lake water systems
42. Curtain drains
43. Terra-Lift System
44. Installation certification language

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson
Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams

Subcommittees

Hydrogeology - Allison Lowry, Craig Heindel, Dave Cotton and Steve Revell.

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Well driller's knowledge checklist - Jeff Williams, Rodney Pingree, Roger Thompson, Bernie Chenette, Gail Center and Steve Revell.

Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Appendix A

Discharging to Surface Water or the Ground, Surfacing Discharges From Individual Homes
February-March, 2005

State	Allow Surface Water or Groundwater Discharge	Allow Wet Toes	Monitoring Required or Management Entity	Notes
Delaware	Not Mentioned	No, Considered a Failure	Proposed Management Entity	Looking for help with setting up program
Montana	MPDES, Costly, None Issued	No, Considered a Failure	Monitoring Required for MPDES Systems	Included Websites for Rules, Guidelines
New York	Not Allowed	Allowed With Multiple Barriers	Not Mentioned	Concept "sounds difficult at best"
Nebraska	Only NPDES, No State Permit	No, Considered a Failure	None	Believes Surface Discharge would require management entity
Alaska	Yes, Must treat to Secondary Standards	No, Considered a Failure	Not Mentioned	Approval to Operate with conditions
Minnesota	Placing mounds on soils not meeting minimum criteria are labeled Experimental	No, Considered a Failure	Not Mentioned	Personal Opinion: No longer sewage when it meets treatment standards and completely mixes with natural waters
Florida	Stated they were similar to MN with different minimum site standards	No, Considered a Failure	Not Mentioned	Mounds on slopes >10% can be problematic
Maine	Not Allowed	No, Considered a Failure	Not Mentioned	Some in State have argued for deminimus level below which surfacing is allowed

North Carolina	Division of Water Quality permits surface irrigation with treatment, disinfection and 5-days of storage	No, Considered a Failure (Squish Test)	Not Mentioned	Discharging during rain events is prohibited though difficult to assure

North Dakota	No General NPDES for individual homes	No, Considered a Failure	Not Mentioned	Respondent would like a performance code
Utah	No prescriptive standards for treatment	Follow the Wisconsin Mound Manual for design	Not Mentioned	Considering packed-bed media filters which would have treatment standards
Washington	NPDES Permit required from Department of Ecology (None issued to date)	Any surfacing of effluent must be remedied	Not Mentioned	Many discussions but no definition for no longer wastewater
South Dakota	Not Mentioned	Try to avoid with design requiring "system storage" (8"-12" bed sidewall)	Not Mentioned	Average annual rainfall under 26 in/yr
Iowa	EPA NPDES general permit	Not Mentioned	Not Mentioned	Effluent monitoring program has been a struggle; Creating a sampler training program in attempt at uniformity
Tennessee	Surface discharge would need permit from Division of Water Pollution Control	No, Considered a Failure	Not Mentioned	Generally Water Pollution Control does not "permit" individual homeowners
Maryland	Has no such standards	Not Mentioned	Not Mentioned	
Georgia	Not Allowed	No, Considered a Failure	Not Mentioned	

Appendix A

Approved Minutes of the Technical Advisory Committee Meeting
April 12, 2005

Members present:	Roger Thompson	John Forcier
	Barb Willis	Steve Revell
	Spencer Harris	Jeff Williams
	Allison Lowry	Kim Kendall
	Alan Huizenga	Phil Dechert
Others present:	Bruce Douglas	Frank O'Brien

Scheduled meetings:

May 10, 2005	1-4 PM	Secretary' Conference Room Human Services Building (upstairs in building connected to Osgood)
June 7, 2005	1-4 PM	Mad Tom Room

Review of agenda

The agenda was amended to include an update of the legislative actions. It was also requested that the committee try to work on some of the items on the topic list so that at least some of the items can be included in the next rule revision. Steve asked that review of the advanced hydro chart be added to the topic list.

Review of minutes

The draft minutes of the March 8, 2005 meeting were reviewed and accepted as drafted.

Legislative Update

Roger stated that there had been no legislative activity since the last meeting but that Senate Natural Resources had scheduled a meeting for April 14, 2005. John noted that Rep. Jewett had talked to him about TAC and that he had run into Sen. Snelling a month ago and had encouraged her to have a hearing. Phil asked if there was a particular topic that SNR wanted to cover. John said the committee is looking for a cross section of the issues, what are the problems with the current rules. John noted that Addison County legislators are still anxious to deal with the difficulty in getting permits in clay soils.

Steve asked if the Agency will move forward with new rules this year. Roger said that he expected the Agency would start working on the next revision soon after the legislature adjourns. There is a draft set of rules that was prepared last fall that Anne worked on that will be the basis of the next revision. That draft includes lots of housekeeping changes including the addition of

new procedures and guidance adopted since the 2002 rule adoption that were not included in the 2005 version.

John gave a short review of the meeting he and a few representatives of the engineering community had with Sec. Torti, Commissioner Wennberg, and Anne Whiteley. Several topics were covered including stormwater designs by non-engineers, maintaining the monthly meetings between DEC and the engineering community, and the need to move the onsite rules forward.

John asked if more items could be added to the topic list with a hope of getting some of them included in the next set of rules. Roger noted that this was possible with the understanding that the commissioner could choose to limit what is included.

Water supply training for Class B Designers

The outline prepared by Rodney Pingree, Gail Center, and Roger was reviewed and edited. Allison stated that this would not count for continuing education. John asked if this would all be inside training and it will be. Steve mentioned how hard it will be to stay on time with all of the topics that need to be covered and that this should be included in the planning. Jeff asked that the training include what features of the water supply installation should be certified by the well driller and which by the designer. The topics list will be updated and circulated for review.

Interior pump stations

The draft guidance that Roger circulated by e-mail was discussed. E-mails received from Lance Phelps, Jeff Padgett, and Henry Albro were reviewed. The main issue for discussion was the amount of emergency storage that should be required. The existing guidance for exterior pump stations is for one day's design flow for stations with only a single pump. The TAC decided by majority decision that this should not be reduced to less than 25% of the design flow. Roger said that he would be contacting the Department of Labor and Industry as they had not replied to the original e-mail of the draft guidance and would also contact Mr. Albro to learn how expensive it would be to use a larger pump chamber.

When is wastewater no longer wastewater

Roger read a list of questions that Chris Thompson had prepared that would need to be addressed as part of writing any rules for systems that would discharge to the ground surface. The topics included: whether there would be numerical standards for effluent quality; whether discharging systems can be used if a non-discharging system could be designed and permitted in accordance with the rules; whether continuous remote monitoring should be required; whether a protocol for when failures occur must be developed; isolation distances; and oversight requirements. Spencer wondered if the legislature would pass any legislation authorizing surface discharge systems. Several other members of the committee shared this concern. John noted that any such system would need advanced treatment and disinfection. Phil suggested creating a 10 year test study limited to systems in Addison County. The question of whether a discharging system can be used if a non-discharging system could be designed and permitted in accordance with the rules was

discussed in more detail. The main issue is the definition of "could be constructed", as in some cases very long and expensive systems are theoretically possible, though not financially practical.

When the issue was raised of whether any states had numerical standards for discharging systems, Bruce outlined the California regulations. California has a category, called unrestricted contact, that allows wastewater meeting the standards to be used in ways that will result in human contact. This is not drinking water quality but does assume direct contact with the wastewater. The standard requires that turbidity be 2 NTU or less, total coliforms 2.2 per 100ml or less, and with inactivation of polio virus of at least 4 logs. Bruce noted this required secondary treatment, slow sand or membrane filtration, and UV disinfection with a cost of $50K-$100K for a SFR.

Phil said that any consideration of these types of systems, particularly for multiple house systems would require a strong operating permit.

Other potential sources of numerical standards include Israel and World Health Organization

Topics list

45. Drip disposal
46. Housekeeping changes
47. Inclusion of policies and procedures
48. Up or down location of holes in pressure distribution systems
49. Mound sand requirements
50. Encourage I/A
51. Changing the 20% slope restriction to 30%
52. Replacing perc test with soil identification approach
53. Defining when effluent is no longer wastewater
54. Disinfection
55. Colorado Rule – reduction in isolation distance to wells based on construction methods
56. Certification and audit approach to permitting
57. Lake water systems
58. Curtain drains
59. Terra-Lift System
60. Installation certification language
61. Advanced hydro chart

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson
Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams

Subcommittees

Hydrogeology - Allison Lowry, Craig Heindel, Dave Cotton and Steve Revell.

Appendix A

Training subcommittee - John Forcier, Roger Thompson, Allison Lowry, Dave Cotton, and Barbara Willis.

Licensed designers - Spencer Harris, Alan Huizenga, and Gerry Kittle.

Well driller's knowledge checklist - Jeff Williams, Rodney Pingree, Roger Thompson, Bernie Chenette, Gail Center and Steve Revell.

Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Approved Minutes of the Technical Advisory Committee Meeting
May 10, 2005

Members present:	Roger Thompson	Spencer Harris
	Bernie Chenette	Steve Revell
	Lance Phelps	Allison Lowry
	Gail Center	Phil Dechert
	Rodney Pingree	Craig Heindel
Others present:	Chris Thompson	Frank O'Brien

Scheduled meetings:

June 7, 2005 1-4 PM Mad Tom Room

Review of agenda

The agenda was reviewed. Spencer asked if some of the items on the topics list could be included further up in the agenda and it was decided to add an agenda item related to prioritizing and selecting topics. An item was also added for review of the meeting with Senate NR on April 14th.

Gail asked about the status of the interior pump station review and Roger said he had not completed the work. He still wants to contact Labor and Industry as there has been no response to the draft guidance sent prior to the April TAC meeting.

Appendix A

Review of minutes

The draft minutes of the April 12, 2005 meeting were reviewed and accepted as drafted.

April 14, 2005 meeting with Senate NR

Steve gave an overview of the meeting which seemed to be organized by Sen. Ayers who did a good job of moving the meeting along so that several people testified in a short period of time. John Forcier did a short presentation of the TAC report and summary comments of his concerns. A banker and a property appraiser raised issues related to the cost of replacement systems and the effect on property values caused by the closing of the ten acre exemption. Richard Czaplinski, East Montpelier sewage officer, testified that systems should be "fool proof" rather than systems requiring lots of operation and maintenance. Commissioner Wennberg was the final witness and asked for support by the legislature for rule revisions to deal with difficult soils, including rules that would allow systems that might surface, at least during the wettest part of the year.

The general sense of those TAC members who were in attendance at the meeting is that most senators are not eager to approve surfacing systems, but are concerned about the impact on people who cannot get permits to develop their property.

Well grouting demonstration

Roger passed along Jeff Williams request for notification of interested parties of the scheduled presentation on June 3rd with a request for a rough number of attendees.

Prioritizing the topics list

The committee first reviewed the list of topics for the next rule revision and determined that house keeping changes, inclusion of policies and procedures, whether holes in pressure distribution systems shall be up or down, and the revised language for installation certifications have been agreed on. The Agency will draft language for all of these that will be reviewed by TAC.

Item #17, the advanced hydro chart was removed from the topics list. The committee then added the following items to the list of topics: how to deal with field changes, revision of the existing desktop hydro chart, review of the requirement for a minimum of 12" of sand under a mound system, conversion of use policies, and design flows.

Items ready for drafting:

1. Housekeeping changes
2. Inclusion of policies and procedures
3. Holes allowed up or down
4. Revised design and inspection certification language to reflect statutory changes

Items for subcommittee work

Appendix A

1. Drip disposal – alternative application method – draft language should be prepared by a subcommittee

Items prioritized for discussion with high, low, and medium ranking

1. Mound sand specifications **high**
2. Encourage I/A **low**
3. Soil identification vs. perc test **medium**
4. Colorado rule **low**
5. Permit by certification **low**
6. Lake water potable water supplies **high**
7. Curtain drain with presumption of effectiveness **high**
8. Terralift system **low**
9. Field change policy **high**
10. Revisions to desktop hydro chart **medium**
11. Minimum amount of sand under a mound **high**
12. Grandfathered design flow and conversion of use policy **high**
13. Updating of design flow chart **high**

Items requiring statutory change

1. Increasing maximum slopes from 20% to 30%.

The question of how many of these items could be included in the next rule revision was discussed. Roger said his best guess was that as soon as the legislature adjourned for the year, the Commissioner would want to move forward with some rule revisions, maybe by August. The Commissioner might decide that the rule revisions should be limited to certain topics, as he did in the last revision, but otherwise anything that TAC could complete and the Agency accepted could be included. Based on this the committee decided that #1,#7, #9, #11, #12, and #13 are candidates for inclusion in the next revision. ANR should draft language for #9 and #12 and the other topics should be pursued by TAC subcommittees. #6 is a high priority that will be critical as of July 1, 2007, when pre-existing SFRs, become subject to the rules. Roger suggested this should be done ASAP because some non-SFR projects that are already regulated use lake water systems. Roger also reminded the committee of the need for a designer category for licensed well drillers so they can design replacement well sites for pre-existing SFRs after July 1, 2007.

When is wastewater no longer wastewater

Roger provided several handouts related to the reuse of treated wastewater and mentioned that John Akielaszek had provided a copy of a recent EPA publication dealing with reuse. Frank will get the address to the committee members so they can order copies (Frank noted that EPA generally sends only one copy per request) and get copies for ANR. Roger stated that as he had reviewed the topic he was becoming more confident that there are recognized treatment standards that would allow for safe surface application of wastewater, though use of these treatment

standards appeared to be primarily by municipal wastewater treatment facilities, and that use by individuals would be difficult and extremely expensive.

The committee discussed the topic and wondered, particularly in light of apparent lack of legislative eagerness, if it was worth pursuing further. It was decided that ANR would write a summary of what had been discussed in the past, with an outline of what other states are doing. This would be a "white paper" approach with the pros and cons of various approaches.

Innovative approvals update

Frank informed the committee that the agency web site information on innovative systems has been recently updated. Frank also noted that several people he had met at a recent conference in Connecticut had made contact relative to getting their products approved for use in Vermont. Several applications for approval are expected.

Frank also noted that he has received many phone calls from landowners, designers, and regional office staff about the proper use of the Presby Enviro-Septic Pipe. Apparently there is some confusion coming out of the training sessions conducted by Mr. Presby that we are getting clarified.

Feedback

Spencer likes the work done on the topics list

Topics list - items not ready for drafting for inclusion in rule revisions

62. Drip disposal
63. Mound sand requirements
64. Encourage I/A
65. Changing the 20% slope restriction to 30%
66. Replacing perc test with soil identification approach
67. Defining when effluent is no longer wastewater
68. Disinfection
69. Colorado Rule – reduction in isolation distance to wells based on construction methods
70. Certification and audit approach to permitting
71. Lake water systems
72. Curtain drains
73. Terra-Lift System
74. Installation certification language
75. Field change policy
76. Revise existing desktop hydro chart
77. Conversion of use policy, including grandfathered flows
78. Revise design flows

Appendix A

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson
Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams

Subcommittees

Hydrogeology - Allison Lowry, Craig Heindel, Dave Cotton and Steve Revell.

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Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Approved Minutes of the Technical Advisory Committee Meeting
June 14 , 2005

Members present:	Roger Thompson	Alan Huizenga
	Spencer Harris	Steve Revell
	Barb Willis	Gail Center
	Jeff Wennberg	Craig Heindel
	Jeff Williams	Kim Kendall
	Rodney Pingree	John Forcier
	Phil Dechert	
Others present:	Bruce Douglas	Frank O'Brien
	Chris Thompson	

Scheduled meetings:

Appendix A

July 19, 2005	1-4 PM	Room 100 Stanley Hall
August 9, 2005	1-4 PM	Room 107 Stanley Hall
September 20, 2005	1-4 PM	Room 107 Stanley Hall

Review of agenda

The agenda was reviewed. Added topics for a brief interior pump station discussion and for the training for water supply and continuing education needed by designers who are not professional engineers.

Review of minutes

The draft minutes of the May 10, 2005 meeting were reviewed and accepted as drafted.

April 14, 2005 meeting with Senate NR

Steve gave an overview of the meeting which seemed to be organized by Sen. Ayers who did a good job of moving the meeting along so that several people testified in a short period of time. John Forcier did a short presentation of the TAC report and summary comments of his concerns. A banker and a property appraiser raised issues related to the cost of replacement systems and the effect on property values caused by the closing of the ten acre exemption. Richard Czaplinski, East Montpelier sewage officer, testified that systems should be "fool proof" rather than systems requiring lots of operation and maintenance. Commissioner Wennberg was the final witness and asked for support by the legislature for rule revisions to deal with difficult soils, including rules that would allow systems that might surface, at least during the wettest part of the year.

The general sense of those TAC members who were in attendance at the meeting is that most senators are not eager to approve surfacing systems, but are concerned about the impact on people who cannot get permits to develop their property.

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mound system, conversion of use policies, and design flows.

Items ready for drafting:

1. Housekeeping changes
2. Inclusion of policies and procedures
3. Holes allowed up or down
4. Revised design and inspection certification language to reflect statutory changes

Items for subcommittee work

1. Drip disposal – alternative application method – draft language should be prepared by a subcommittee

Items prioritized for discussion with high, low, and medium ranking

1. Mound sand specifications **high**
2. Encourage I/A **low**
3. Soil identification vs. perc test **medium**
4. Colorado rule **low**
5. Permit by certification **low**
6. Lake water potable water supplies **high**
7. Curtain drain with presumption of effectiveness **high**
8. Terralift system **low**
9. Field change policy **high**
10. Revisions to desktop hydro chart **medium**
11. Minimum amount of sand under a mound **high**
12. Grandfathered design flow and conversion of use policy **high**
13. Updating of design flow chart **high**

Items requiring statutory change

1. Increasing maximum slopes from 20% to 30%.

The question of how many of these items could be included in the next rule revision was discussed. Roger said his best guess was that as soon as the legislature adjourned for the year, the Commissioner would want to move forward with some rule revisions, maybe by August. The Commissioner might decide that the rule revisions should be limited to certain topics, as he did in the last revision, but otherwise anything that TAC could complete and the Agency accepted could be included. Based on this the committee decided that #1,#7, #9, #11, #12, and #13 are candidates for inclusion in the next revision. ANR should draft language for #9 and #12 and the other topics should be pursued by TAC subcommittees. #6 is a high priority that will be critical as of July 1, 2007, when pre-existing SFRs, become subject to the rules. Roger suggested this should be done ASAP because some non-SFR projects that are already regulated use lake water systems. Roger also reminded the committee of the need for a designer category for licensed well drillers so they

can design replacement well sites for pre-existing SFRs after July 1, 2007.

When is wastewater no longer wastewater

Roger provided several handouts related to the reuse of treated wastewater and mentioned that John Akielaszek had provided a copy of a recent EPA publication dealing with reuse. Frank will get the address to the committee members so they can order copies (Frank noted that EPA generally sends only one copy per request) and get copies for ANR. Roger stated that as he had reviewed the topic he was becoming more confident that there are recognized treatment standards that would allow for safe surface application of wastewater, though use of these treatment standards appeared to be primarily by municipal wastewater treatment facilities, and that use by individuals would be difficult and extremely expensive.

The committee discussed the topic and wondered, particularly in light of apparent lack of legislative eagerness, if it was worth pursuing further. It was decided that ANR would write a summary of what had been discussed in the past, with an outline of what other states are doing. This would be a "white paper" approach with the pros and cons of various approaches.

Innovative approvals update

Frank informed the committee that the agency web site information on innovative systems has been recently updated. Frank also noted that several people he had met at a recent conference in Connecticut had made contact relative to getting their products approved for use in Vermont. Several applications for approval are expected.

Frank also noted that he has received many phone calls from landowners, designers, and regional office staff about the proper use of the Presby Enviro-Septic Pipe. Apparently there is some confusion coming out of the training sessions conducted by Mr. Presby that we are getting clarified.

Feedback

Spencer likes the work done on the topics list

Topics list - items not ready for drafting for inclusion in rule revisions

79. Drip disposal
80. Mound sand requirements
81. Encourage I/A
82. Changing the 20% slope restriction to 30%

83. Replacing perc test with soil identification approach
84. Defining when effluent is no longer wastewater
85. Disinfection
86. Colorado Rule – reduction in isolation distance to wells based on construction methods
87. Certification and audit approach to permitting
88. Lake water systems
89. Curtain drains
90. Terra-Lift System
91. Installation certification language
92. Field change policy
93. Revise existing desktop hydro chart
94. Conversion of use policy, including grandfathered flows
95. Revise design flows

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson
Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams

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Well driller's knowledge checklist - Jeff Williams, Rodney Pingree, Roger Thompson, Bernie Chenette, Gail Center and Steve Revell.

Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Approved Minutes of the Technical Advisory Committee Meeting
July 19, 2005

Members present: Roger Thompson Steve Revell

	Spencer Harris	Craig Heindel
	Alan Huizenga	Lance Phelps
	Phil Dechert	Gail Center
Others present:	Bruce Douglas	Frank O'Brien
	Chris Thompson	

Scheduled meetings:

August 9, 2005	1-4 PM	Room 107 Stanley Hall
September 20, 2005	1-4 PM	Room 107 Stanley Hall

Review of agenda

The agenda was reviewed and accepted as proposed.

Review of minutes

Roger did not bring extra copies of the draft minutes of the June 14, 2005 meeting, and as most members present had not reviewed the minutes, it was decided to take this up at the August meeting.

Class B Designer training for water systems

Roger gave an update on the proposed training. Five training sessions, one test run of the training, and two test dates have been established. There are about 140 Class B designers and they have received a written notice of the training. The training is based on the outline that was reviewed by TAC at an earlier meeting.

Roger also noted that a soils workshop will be arranged for the fall. It would need to run for several days in order to meet the expected demand. Spencer suggested it would be good to have the year's schedule established so people could plan on what to attend. Steve said he would like to have some sessions of training for I/A systems with regional staff present.

Presby Enviro-Septic Pipe

Steve said that he had been working with the system but did not find the Presby handbook to be intuitive. Frank agreed, but noted that the handbook is a tool that Mr. Presby designed and works with in New Hampshire that has been modified to include the Vermont design parameters. Frank said that he had found some misinformation being shared with designers, and some confusion about how to use the system, and that he was keeping Mr. Presby informed of everything that he hears about.

Surface discharge subcommittee

Appendix A

Craig reviewed the minutes of the June 30, 2005 subcommittee meeting and the recommendations that were arranged as responses to the list of questions that Chris had created.

1. The first issue was whether numerical standards for effluent quality should be required. The subcommittee decided that because there are already standards for direct discharges of wastewater they should apply to any system based on surfacing of the effluent. Roger asked if the phosphorus standard would be applied. Craig noted that some stormwater is treated as a direct discharge which might be guidance for phosphorus and other constituents.

2. The subcommittee proposed that if it was possible to build a subsurface system, that system must be used rather than one with a surfacing component. Lance asked if this was true even if the disposal area might be a mile away, such as on a large farm and the answer was yes. Roger noted that for a new project, one choice would be to locate the building near the good soils. Lance asked about whether someone else's land across the road had to be considered and the answer was no. Spencer said that the cost differential should be included as part of the answer. Craig said the subcommittee wanted to stick with the science which indicates subsurface disposal is a better choice when possible. Steve said that his sense of the subcommittee was that subsurface disposal would have to be thoroughly investigated first, before looking at surfacing, but that cost and being practical would need to be factors. Phil asked if this concept will work better for 10 houses with one system versus 10 houses each with their own system. Spencer asked if a lot has soil for one house, can they build two houses with one using a surfacing system, and the answer was yes.

3. Remote monitoring was discussed and the subcommittee felt strongly that remote monitoring should be required. This need not be continuous monitoring. The level of monitoring would be determined based on the particular system being proposed, but there should be at least one monitoring cycle per 24 hours and the failure notification should be direct to the designated operator, not just an audio-visual alarm on the system. The monitoring should include parameters specific to the method of disinfection and needs to demonstrate that the system is both functional and effective.

4. Each approval should include an emergency protocol to follow if (when) the disinfection system fails. The protocol would include ANR notification within 24 hours and would require the discharge to be stopped until the system is functional. Roger suggested that notification of neighbors might need to be part of the protocol.

5. Isolation distances were discussed. The isolation distances for standard systems would be acceptable as the extra treatment and disinfection would make the effluent safer than that from conventional systems. Roger said that he would be concerned about rapid flow across the surface of the ground from a leachfield with a failed disinfection system to a drinking water source. This issue needs further consideration.

6. The treated wastewater could flow across property lines only if there is a permanent, legal

easement on the neighboring property. The subcommittee did not resolve how to deal with road ROWs.

7. The NPDES issues were reviewed and it appears that discharge to surface waters through a conveyance such as a pipe or ditch, or discharge via overland flow during storm events would require a NPDES permit, that would likely not be possible to obtain. This issue will need further discussion with the O+M section. Chris will follow up on this.

8. The subcommittee recommends that all systems include a dispersal mechanism, such as a trench on contour, drip disposal, or other approach that would place as much of the wastewater into the soil as possible, and which would reduce the amount of time when there would be defined flow of effluent away from the disposal area.

9. The subcommittee looked at four options for operations oversight, including the homeowner, homeowners contracting with an operations provider, a responsible management entity, or municipal oversight. Roger said he had some concerns with a homeowner being the sole oversight as there is a lot of self interest involved. A homeowner might perform some or all of the maintenance, but at least the remote monitoring needed to be done by some other entity.

There was general discussion of the report and Spencer suggested one way to start would be to use this approach just for failed systems. They already present risks, and almost anything would be an improvement. It was noted that Massachusetts uses this approach to test new systems. Bruce indicated that the level of performance required should be defined as a starting point. Craig noted that the existing rules have numbers that have been adopted without having a performance basis.

The question of whether towns can prohibit well shields from extending onto other lots was discussed. Roger said he would have to check with Anne, but that Anne had determined that after July 1, 2007 towns could not prohibit off-lot systems so probably could not prohibit off-lot well shields.

Craig wondered if small treatment plants could reach a level of treatment that would not require a discharge permit. This led to a discussion of what level of treatment would be required before the effluent could cross a property line without an easement or other requirements. Spencer suggested just requiring a long mound of 150-200’ with a prescriptive setback from the property line without creating any performance standard for effluent quality rather than requiring easements.

Lake water systems

Alan gave a short review of this subcommittee’s work. The subcommittee had not met, but had exchanged information on several topics. Alan had reviewed the history with Ernie

Christianson and learned that in the 1970s and 1980s filtration systems with coagulation and disinfection had been approved. It was then determined that these systems were no longer acceptable for new projects and routine approval was not granted, though a limited number of systems were approved using the innovative system rules. These were mostly systems for projects other than single family residences. The federal regulations were later changed and all surface water systems that are classified as public became subject to strict rules that made small surface water systems impractical. The subcommittee is looking at systems that might be approved for regulated projects where the water system is not classified as public, including for newly created lots with single family residences. Gail noted that standard Health Department recommendations for SFR include filtration to the 1 micron level followed by UV or chlorination. The subcommittee will work further to develop a recommendation that will include operation and maintenance requirements.

Innovative system update

Frank said that he had received applications for use of the Aqua Safe and Aqua Aire systems.

Items prioritized for discussion with high, low, and medium ranking

1. Mound sand specifications **high**
2. Encourage I/A **low**
3. Soil identification vs. perc test **medium**
4. Colorado rule **low**
5. Permit by certification **low**
6. Lake water potable water supplies **high**
7. Curtain drain with presumption of effectiveness **high**
8. Terralift system **low**
9. Field change policy **high**
10. Revisions to desktop hydro chart **medium**
11. Minimum amount of sand under a mound **high**
12. Grandfathered design flow and conversion of use policy **high**
13. Updating of design flow chart **high**

Topics list - items not ready for drafting for inclusion in rule revisions

96. Drip disposal
97. Mound sand requirements
98. Encourage I/A

99. Changing the 20% slope restriction to 30%
100. Replacing perc test with soil identification approach
101. Defining when effluent is no longer wastewater
102. Disinfection
103. Colorado Rule – reduction in isolation distance to wells based on construction methods
104. Certification and audit approach to permitting
105. Lake water systems
106. Curtain drains
107. Terra-Lift System
108. Installation certification language
109. Field change policy
110. Revise existing desktop hydro chart
111. Conversion of use policy, including grandfathered flows
112. Revise design flows

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson
Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams

Subcommittees

Hydrogeology - Allison Lowry, Craig Heindel, Dave Cotton and Steve Revell.

Training subcommittee - John Forcier, Roger Thompson, Allison Lowry, Dave Cotton, and Barbara Willis.

Licensed designers - Spencer Harris, Alan Huizenga, and Gerry Kittle.

Well driller's knowledge checklist - Jeff Williams, Rodney Pingree, Roger Thompson, Bernie Chenette, Gail Center and Steve Revell.

Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Lake water – Alan Huizenga, Gail Center, Rodney Pingree

Surfacing systems – Craig Heindel, Steve Revell, Frank O'Brien, Roger Thompson, Bruce Douglas, Kim Kendall, and Brian Kooiker.

Appendix A

Approved Minutes of the Technical Advisory Committee Meeting
August 17, 2005

Members present:	Roger Thompson	Lance Phelps
	Allison Lowry	Alan Huizenga
	Steve Revell	Craig Heindel
	John Forcier	Bernie Chenette
	Phil Dechert	
Others present:	Chris Thompson	Anne Whiteley
	Frank O'Brien	Bruce Douglas
	Jeff Wennberg	

Scheduled meetings:

September 20, 2005 1-4 PM Room 107 Stanley Hall

Review of agenda

The agenda was reviewed and accepted as proposed.

Review of minutes

The draft minutes of the June 14, 2005 meeting were reviewed and accepted as drafted.

The draft minutes of the July 19, 2005 meeting were reviewed and accepted as drafted.

Surface discharge subcommittee

Craig was asked to provide an overview of the subcommittee's work. Craig thanked Jeff for attending and indicated that the committee wanted to get some direction before proceeding further as there are significant policy issues to be decided.

Jeff noted that he had reviewed the summary of the subcommittee's recommendations and that the strong recommendation to require an operating permit had caught his eye. Jeff noted that he had been opposed to the use of operating permits but now sees the rationale and is coming around to the concepts, particularly if it could be part of a general permit approach.

Anne noted that a general permit might be acceptable if it was not a NPDES permit. Anne stated that many of our existing permits include permit conditions controlling the operation of

systems. Roger noted that operating permits have ongoing fees used to support the regulatory oversight of the projects with operating permits. Anne said that theoretically these could be included in the fee bill. Craig suggested that a need for the money should be determined first.

Direct discharge issues

Anne said the first hurdle is statutory language that says you cannot issue permits for systems that discharge to surface waters or to the ground surface. There is also federal jurisdiction over direct discharge that is incredibly more expansive than in the past. Any swale or ditch discharging to surface water is regulated. Federal law requires permits with 5 year terms. State law would require a waste management zone for individual homes, presumptively at least one mile long. The legislature could change the statute but would find it hard to justify. (The one mile requirement is an operating procedure number). The application process for a direct discharge requires analysis of the impact on the receiving stream.

Anne will talk to Brian Kooiker about categorizing surface discharge systems as outside of the NPDES requirements. Anne also noted that discharges to ground water are regulated. Anne noted that no level of treatment will avoid the NPDES requirements as any waste that was originally pathogenic is included. Anne noted that recent court decisions related to CAFO (concentrated animal feeding operations) and other topics have left the whole direct discharge area in limbo relative to what is regulated and to what degree.

Committee discussion

Craig noted that there are two trains of thought that need to be pursued- science and regulatory framework.

John stated that if any statutory changes are required, ANR needs to get started soon in order to be ready for the legislative session.

Anne noted that there is no indirect discharge component in the Federal rules. Anne reviewed the origin of the indirect discharge concept as coming from a decision by Act 250 related to a Hawk Mt. project. Act 250 said that the effect of large leachfields on streams must be addressed in the Act 250 process and that the existing environmental permit rules were not sufficient. This led to the Indirect Discharge Rules.

Jeff said that there are some legislators who intend to “fix” the problem. Anne noted that there are also some legislators who might not support radical changes. Jeff said that the mission is to fairly and seriously examine the issues and obstacles. Anne suggested that TAC not take a pro or con stance, but rather list all of the options with their associated pro and con aspects. Jeff asked for a write-up of the science and the legal issues.

Anne asked the members who design systems if they can certify designs for surfacing systems as not reaching ground water.

Appendix A

Anne reviewed the difference between point discharges and sheet flow. Under federal law sheet flow is not regulated, though sheet flow is captured under state law.

Anne also noted that there are surface water quality standards for E. coli. Craig and Roger replied that with disinfection, or even common sand filter technology the required treatment level can easily be achieved.

John expressed concerns about focusing on a statutory change unless it would be significant. It would not be worthwhile if after making the change only 5% more lots could be developed.

The concept of providing a layer of imported soil for 50' or so downslope of the leachfield was also discussed. A 6" layer of sand would ensure that there would not be surfaced effluent at the toe of the leachfield. There are issues as to whether effluent appearing at the end of the sand layer would be considered a discharge or not. Roger stated that conversations with Brian Kooiker made it clear that a "wick" or "wedge" of sand leading to the edge of surface water would be considered to be a direct discharge and therefore it is not clear whether or not adding a sand layer would result in the surfacing effluent not being considered to be a discharge when further from a surface water.

Anne asked about when designers would be able to certify that effluent would not reach surface water. John said that if the site was a mile from the brook it would be easy, but at 52' it could not be done. John indicated that there should not be a "magic" number. Roger suggested that a number is needed in order to ensure some certainty in the process. If there is no number, the decision is subject to review where a current regional engineer would find a situation acceptable but when a new reviewer appears it might be determined to not be compliant. Any concept of relying on certification by the designer without a concurring opinion by a reviewer leaves the certification open to question in the future unless there is an objective standard for comparison.

Steve suggested the answer is to define what is and what is not a discharging system for the purposes of the rules. Anne noted that a system designed to discharge to surface water would not be a failed system under the rules. Steve noted that in actual operation the effluent surfaces in the same location where the SHWT surfaces because the effluent is mixed with the SHWT.

Bruce suggested a concept based on giving up the 6" design factor and depending on disinfection and an operating permit concept. Anne asked if this was useful. Craig noted that the 6" number was a consensus decision for non-discharging systems.

Jeff asked that TAC assemble a document with the list of issues. Anne suggested an options paper concept – 1, 2, 3 etc, - with each outlined in context with its use and requirements. John said that TAC could do the technical parts but that legal issues should be by the Agency. Bernie said that the amount of relief and the cost of the systems should be included.

As a separate issue, John said that he is finding that towns do not understand the significance of the changes that will occur on July 1, 2007.

It was decided to have another subcommittee meeting on September 15, 2005 to work on the draft document before the next TAC meeting. Lance suggested that there be a list of the changes already made to the minimum site conditions. He also asked that the list of subcommittees show his membership on the lake water subcommittee.

Innovative systems

Frank said that he had received a proposal by New England Biofilter to use a concrete tank that would contain both the Ecoflo Biofilter and a pumping unit. Frank stated that based on his preliminary review, he would be issuing an approval letter shortly.

Items prioritized for discussion with high, low, and medium ranking

1. Mound sand specifications **high**
2. Encourage I/A **low**
3. Soil identification vs. perc test **medium**
4. Colorado rule **low**
5. Permit by certification **low**
6. Lake water potable water supplies **high**
7. Curtain drain with presumption of effectiveness **high**
8. Terralift system **low**
9. Field change policy **high**
10. Revisions to desktop hydro chart **medium**
11. Minimum amount of sand under a mound **high**
12. Grandfathered design flow and conversion of use policy **high**
13. Updating of design flow chart **high**

Topics list - items not ready for drafting for inclusion in rule revisions

113. Drip disposal
114. Mound sand requirements
115. Encourage I/A
116. Changing the 20% slope restriction to 30%
117. Replacing perc test with soil identification approach
118. Defining when effluent is no longer wastewater
119. Disinfection
120. Colorado Rule – reduction in isolation distance to wells based on construction methods
121. Certification and audit approach to permitting

122. Lake water systems
123. Curtain drains
124. Terra-Lift System
125. Installation certification language
126. Field change policy
127. Revise existing desktop hydro chart
128. Conversion of use policy, including grandfathered flows
129. Revise design flows

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson
Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams

Subcommittees

Hydrogeology - Allison Lowry, Craig Heindel, Dave Cotton and Steve Revell.

Training subcommittee - John Forcier, Roger Thompson, Allison Lowry, Dave Cotton, and Barbara Willis.

Licensed designers - Spencer Harris, Alan Huizenga, and Gerry Kittle.

Well driller's knowledge checklist - Jeff Williams, Rodney Pingree, Roger Thompson, Bernie Chenette, Gail Center and Steve Revell.

Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Lake water – Alan Huizenga, Gail Center, Rodney Pingree, Lance Phelps

Surfacing systems – Craig Heindel, Steve Revell, Frank O'Brien, Roger Thompson, Bruce Douglas, Kim Kendall, Gail Center, and Brian Kooiker.

Approved Minutes of the Technical Advisory Committee Meeting
September 20, 2005

Members present: Roger Thompson Spencer Harris

Appendix A

	Kim Kendall	Barb Willis
	Gail Center	Allison Lowry
	Phil Dechert	Bernie Chenette
	Steve Revell	John Forcier
Others present:	Bruce Douglas	Frank O'Brien
	Chris Thompson	

Scheduled meetings:

October 18, 2005	1-4 PM	Room 100 Stanley Hall
November 15, 2005	1-4 PM	Room 107 Stanley Hall
December 13, 2005	1-4 PM	Mad Tom Notch Rm.

Review of agenda

The agenda was reviewed and accepted as proposed.

Review of minutes

The draft minutes of the August 17, 2005 meeting were reviewed and accepted as drafted.

Discussion of options paper

The third draft of the options paper was discussed. One area of discussion was related to the definition of failure based on treated effluent eventually reaching the ground surface. Different jurisdictions have different approaches. Bruce noted that Nova Scotia has a design for sites that are shallow to bedrock that indicates seepage at the interface between the fill and the naturally occurring ground should be expected. Vermont does not have an explicit statement indicating that surfacing, after sufficient treatment based on flow through the soil or by other methods, is not a failure. Some states relate this to time of travel with a range of weeks or months.

Roger asked if option #2, surfacing systems that are not a direct discharge to surface waters, would allow for a system to surface 365 days per year. The committee did not support this approach. The site should have some minimum requirements, including some amount of permeable (<120 min/inch percolation rate) soil and a minimum slope. Something on the order of 12" of permeable soil and a minimum of 3% slope might be suitable. Details would need to be worked out to exclude sites that have permanently high water tables.

Allison asked whether public notice should be issued to the neighbors if a discharging

system is proposed and whether an objection by the neighbor should determine whether the permit should be issued.

Kim asked what the risk would be, and what the response would be, for a system that failed to operate properly and was discharging incompletely treated effluent. Roger noted that any permit should have an operator's manual with specific instructions on the steps to take. If the effluent reached the ground surface, fencing, disinfection, and notice to the neighbors would all be options.

To try and put option #2 in context, Bruce reviewed the existing situation. A currently approvable system includes a septic tank, with a discharge into a leachfield that provides 36" of dry soil under the system followed by horizontal travel of 25'-50' through naturally occurring soil. In some cases, the effluent from a conventional system reaches the ground surface after 25' of travel in the soil and then travels overland, usually mixed with an existing groundwater discharge or rainfall.

After considering the proposed list of components for a treatment system, it was decided that an intermittent sand filter operating at 1 gallon/sqft/day should be included as a mandatory part of any system. Bruce discussed the advantages of an intermittent sand filter in comparison to other advanced treatment systems. Based on the available research, the intermittent sand filter, using a low rate of application, is the most effective system at removing viruses. Because a higher rate of virus removal reduces the dependence on the disinfection system, it makes sense to require this system. The committee then considered the question of whether a sand filter by itself would be adequate, and decided that it would not provide a sufficient level of protection. Use of ultraviolet light disinfection systems requires an extremely high level removal of BOD_5 and TSS to ensure that the turbidity in the effluent is low. A sand filter working at design efficiencies just achieves this level of treatment and does not allow for a safety margin. Because the effluent will in some cases be on the ground surface, there should be a safety factor which will exist if an additional level of advanced treatment occurs prior to flow into the sand filter. John polled the committee on this topic and there was a strong consensus that a second level of advanced treatment should be required. John noted that this was good engineering and that only the cost of this approach was at question.

Kim noted that attorneys at VNRC will probably not agree that surfacing effluent does not require and NPDES permit.

Feedback

There was a continuing concern by some committee members that the issue of surfacing systems was consuming all of the committee's efforts and might not be too productive in the end. Steve urged the committee to start work on some of the many other topics where progress could be made without requiring any legislative action. Roger suggested that with some e-mail review of the next revision to the options paper it should be possible to have a final TAC decision at the

next meeting.

Items prioritized for discussion with high, low, and medium ranking

1. Mound sand specifications **high**
2. Encourage I/A **low**
3. Soil identification vs. perc test **medium**
4. Colorado rule **low**
5. Permit by certification **low**
6. Lake water potable water supplies **high**
7. Curtain drain with presumption of effectiveness **high**
8. Terralift system **low**
9. Field change policy **high**
10. Revisions to desktop hydro chart **medium**
11. Minimum amount of sand under a mound **high**
12. Grandfathered design flow and conversion of use policy **high**
13. Updating of design flow chart **high**

Topics list - items not ready for drafting for inclusion in rule revisions

130. Drip disposal
131. Mound sand requirements
132. Encourage I/A
133. Changing the 20% slope restriction to 30%
134. Replacing perc test with soil identification approach
135. Defining when effluent is no longer wastewater
136. Disinfection
137. Colorado Rule – reduction in isolation distance to wells based on construction methods
138. Certification and audit approach to permitting
139. Lake water systems
140. Curtain drains
141. Terra-Lift System
142. Installation certification language
143. Field change policy
144. Revise existing desktop hydro chart
145. Conversion of use policy, including grandfathered flows
146. Revise design flows

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson

Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams

Subcommittees

Hydrogeology - Allison Lowry, Craig Heindel, Dave Cotton and Steve Revell.

Training subcommittee - John Forcier, Roger Thompson, Allison Lowry, Dave Cotton, and Barbara Willis.

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Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Lake water – Alan Huizenga, Gail Center, Rodney Pingree, Lance Phelps

Surfacing systems – Craig Heindel, Steve Revell, Frank O'Brien, Roger Thompson, Bruce Douglas, Kim Kendall, Gail Center, and Brian Kooiker.

Approved Minutes of the Technical Advisory Committee Meeting
October 18, 2005

Members present:	Roger Thompson	Gail Center
	John Forcier	Lance Phelps
	Allison Lowry	Steve Revell
	Barb Willis	Phil Dechert
	Gerry Kittle	Rodney Pingree
	Craig Heindel	Bernie Chenette
Others present:	Chris Thompson	Frank O'Brien
	Bruce Douglas	

Scheduled meetings:

November 15, 2005 1-4 PM Room 107 Stanley Hall

Appendix A

December 13, 2005 1-4 PM Mad Tom Notch Rm.

Review of agenda

The agenda was reviewed and John noted that an item for the annual report due in January should be added.

Review of minutes

The draft minutes of the September 20, 2005 meeting were reviewed and accepted as drafted.

Results of water supply designer's test and upcoming soils training

The test for Class B designers wishing to design water systems was administered twice with a total of 31 people passing and 17 not. Scores ranged from 35% to 94%.

The Department will offer soils training that can be used towards the continuing education requirements for Class A and B designers in October.

Rule making update

Alex Elliott has been assigned as the Agency attorney to work on the next rule update. We will start from the portion of the draft that was prepared in 2004 that was not included in the 2005 adoption. As soon as there is a good working draft available it will be circulated to the committee for review. Roger noted that there are quite a few items that have been identified since the 2004 draft that will need to be included. John noted that Secretary Torti had attended a recent ACEC meeting and was interested in this topic. Work on the rules can continue without waiting for any resolution of the options paper but if there is a determination to revise the rules based on the options paper that would be a key piece of the next update. It was agreed to add Alex Elliott to the distribution list and to ask if Secretary Torti wished to be included as well.

Annual report

Craig agreed to be the principle author again on this report. Roger will provide the 2005 numbers on permits, etc. and make sure all of the minutes are available electronically.

Membership

It was decided to ask VNRC if they wanted to suggest a replacement for Kim Kendall who is leaving. Roger will also check with Karen Horn to see if VLCT wants to suggest a replacement for Kim Crosby. Roger will also check with Dave Cotton to see if he wants to remain on the committee. Craig suggested that there should be an expectation that members attend at least 50% of the meetings.

Discussion of options paper

There was discussion of what to include in the range of options. Craig suggested the range could be from no change to reopening the 10 acre exemption. Lance and Phil suggested that we should not include reopening the 10 acre exemption. John suggested that the Committee emphasize that when the proposed treatment process that would allow for seasonal discharges was created that the main concern of the committee was that a safe and effective system be developed, with cost not being the dominant factor.

Craig and Steve said that it is important to offer to meet with legislators prior to going into a round of public informational meetings with other attendees in agreement. This would inform legislators so they would be prepared to speak with constituents and allow the committee to hear the legislator's initial impression of the various options. Lance said it was important to have an appropriate name for these types of systems, rather than just calling them "discharging systems." He suggested "seasonally discharging advanced treatment systems."

Bruce said that there should be some information that outlines what the current rules allow and that Section 1-502 of the rules could be included as an appendix.

Bruce also noted that he did not believe that two levels of advanced treatment should always be required. He said that a low rate (1gallon/sqft/day) intermittent sand filter, with a minimum of 36" of sand below the application layer, would be sufficient by itself for low strength domestic wastewater. If there was a desire to use the sand filter with a thinner layer of sand, a layer of sand at least 18" thick below the application layer could be coupled with a preceding advanced treatment system. Lance said that he would be satisfied with this approach as long as waste strength is not high.

The committee discussed the level of treatment needed to have good disinfection. Roger said that he had been working from an understanding that 5/5 BOD and TSS was the required level. John and others said that 10/10 is sufficient and intermittent sand filters can reliably meet this standard.

At this point the committee was polled about using just an intermittent sand filter, with a loading rate of 1 gallon/sqft/day or less, and with at least 36" sand, for domestic waste of normal strength. This would be in lieu of the approach considered at the previous meeting where two levels of advanced treatment were proposed for all systems.

Craig, Bruce, Bernie, John, and Steve indicated they support this approach. The committee then amended the list of components and their estimated costs to reflect this change. There was discussion about the availability of small UV disinfection systems that can monitor transmission effectiveness. This capability can be used with small systems.

The committee discussed the cost of the proposed list of components. The cost is too large

for many single family homes, even though it reflects the committee's thoughts of what a complete system that is safe and effective should include. Phil noted that shared systems should be less expensive per housing unit.

Lance asked if this type of system could be proposed as the replacement system for new construction. Craig thought they should be approved for this use.

John said that because Kim Kendall was not present that VNRC should be updated on the committee's proposal to require only one advanced treatment unit under certain conditions.

Gail asked about protocols for discharging arsenic or uranium/radium backwash residuals from home drinking water treatment units. There may be a concern if overland flow containing these contaminants crossed property lines. DEC/Wastewater Management is still operating under an interim practice for the disposal of waste containing naturally occurring radionuclides. NEIWPCC is currently coordinating a pilot project in NH researching the fate of backwash contaminants, but its results are not yet known.

There was a question about whether sampling would be required and it was decided that an annual sample should be required.

There was a discussion about the need for replacement systems. Craig said one should not be required for mound systems. This is a topic that should be discussed in more detail.

Allison asked about reports of Advantex systems freezing. Steve noted that some systems are now being insulated. Gerry said one system in Colchester did freeze because of an installation problem and the system was repaired and is functioning properly.

It was decided to work on mound sand specifications, lake water systems, and a presumption of effectiveness for curtain drains at the next meeting.

Items prioritized for discussion with high, low, and medium ranking

1. Mound sand specifications **high**
2. Encourage I/A **low**
3. Soil identification vs. perc test **medium**
4. Colorado rule **low**
5. Permit by certification **low**
6. Lake water potable water supplies **high**
7. Curtain drain with presumption of effectiveness **high**
8. Terralift system **low**
9. Field change policy **high**
10. Revisions to desktop hydro chart **medium**

11. Minimum amount of sand under a mound **high**
12. Grandfathered design flow and conversion of use policy **high**
13. Updating of design flow chart **high**

Topics list - items not ready for drafting for inclusion in rule revisions

147. Drip disposal
148. Mound sand requirements
149. Encourage I/A
150. Changing the 20% slope restriction to 30%
151. Replacing perc test with soil identification approach
152. Defining when effluent is no longer wastewater
153. Disinfection
154. Colorado Rule – reduction in isolation distance to wells based on construction methods
155. Certification and audit approach to permitting
156. Lake water systems
157. Curtain drains
158. Terra-Lift System
159. Installation certification language
160. Field change policy
161. Revise existing desktop hydro chart
162. Conversion of use policy, including grandfathered flows
163. Revise design flows

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson
Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams

Subcommittees

Hydrogeology - Allison Lowry, Craig Heindel, Dave Cotton and Steve Revell.

Training subcommittee - John Forcier, Roger Thompson, Allison Lowry, Dave Cotton, and Barbara Willis.

Licensed designers - Spencer Harris, Alan Huizenga, and Gerry Kittle.

Well driller's knowledge checklist - Jeff Williams, Rodney Pingree, Roger Thompson, Bernie Chenette, Gail Center and Steve Revell.

Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Appendix A

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Lake water – Alan Huizenga, Gail Center, Rodney Pingree, Lance Phelps

Surfacing systems – Craig Heindel, Steve Revell, Frank O'Brien, Roger Thompson, Bruce Douglas, Kim Kendall, Gail Center, and Brian Kooiker.

Approved Minutes of the Technical Advisory Committee Meeting
November 15, 2005

Members present:	Roger Thompson	Rodney Pingree
	Barb Willis	Gerry Kittle
	John Forcier	
Others present:	Chris Thompson	Frank O'Brien
	Kim Greenwood	

Scheduled meetings:

December 13, 2005 1-4 PM Mad Tom Notch Rm.

New Member:

Kim Greenwood attended her first meeting as a representative of the Vermont Natural Resources Council.

Review of agenda

The agenda was reviewed it was noted that it was mis-dated, indicating a meeting date of November 20th rather than the actual November 15th.

Review of minutes

The draft minutes of the October 18, 2005 meeting were reviewed. Roger will contact Gail Center for clarification of her comments about arsenic and uranium and garden soil. Otherwise, the minutes are accepted.

Field visit report

Roger said that, in response to a legislator's request, the Rutland office would submit a brief statement of the results of every site visit they made. This information will be assembled into a monthly report and forwarded to the legislator. This will be done until the end of December and then it will be decided if there is sufficient value to continue doing this work. John asked that TAC get a copy of the report.

Annual Report

John asked Roger to check with Craig and see if a draft might be available for the next meeting.

Options paper

Roger reviewed the current draft (sixth draft, A version, 11-7-2005). The main changes are in redrafting the list of the required components to allow for a single level of advanced treatment when using an intermittent sand filter with at least 36" of sand under the application surface. This is appropriate for low and moderate strength wastewater when application rates of 1 gallon/sqft/day or less are used in the design. John suggested that the last sentence in the Neighbors section be restated in the positive. There was some wordsmithing done which Roger will complete. The statement will be circulated by e-mail and the TAC members polled to determine if there is sufficient support for the statement. Once this is done, Roger and Chris will review with Jeff Wennberg.

Roger will contact the legislative committees, Senate and House Natural Resources, and House Fish, Wildlife, and Water Resources, to see if there is interest in a briefing on the options paper. Addison County legislators would also be notified of any meeting and all would be invited.

Lake water subcommittee

Rodney indicated that the subcommittee had exchanged some ideas. The water would need to meet the potable water supply contaminant standards. The subcommittee will propose a list of components for a minimum system. A decision must also be made about whether a pre-existing system that was never subject to state regulation prior to July 1, 2007, but which does not meet all of the contaminant standards, will automatically be considered to be a failed system after that date.

Mound sand specifications

It was agreed to poll other states to see what they require for mound sand specifications.

Appendix A

Presumptive approach for curtain drains

The committee attempted to discuss this issue but it was decided that Steve Revell needed to be present for this.

Items prioritized for discussion with high, low, and medium ranking

1. Mound sand specifications **high**
2. Encourage I/A **low**
3. Soil identification vs. perc test **medium**
4. Colorado rule **low**
5. Permit by certification **low**
6. Lake water potable water supplies **high**
7. Curtain drain with presumption of effectiveness **high**
8. Terralift system **low**
9. Field change policy **high**
10. Revisions to desktop hydro chart **medium**
11. Minimum amount of sand under a mound **high**
12. Grandfathered design flow and conversion of use policy **high**
13. Updating of design flow chart **high**

Topics list - items not ready for drafting for inclusion in rule revisions

164. Drip disposal
165. Mound sand requirements
166. Encourage I/A
167. Changing the 20% slope restriction to 30%
168. Replacing perc test with soil identification approach
169. Defining when effluent is no longer wastewater
170. Disinfection
171. Colorado Rule – reduction in isolation distance to wells based on construction methods
172. Certification and audit approach to permitting
173. Lake water systems
174. Curtain drains
175. Terra-Lift System
176. Installation certification language
177. Field change policy
178. Revise existing desktop hydro chart
179. Conversion of use policy, including grandfathered flows
180. Revise design flows

Appendix A

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson
Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams

Subcommittees

Hydrogeology - Allison Lowry, Craig Heindel, Dave Cotton and Steve Revell.

Training subcommittee - John Forcier, Roger Thompson, Allison Lowry, Dave Cotton, and Barbara Willis.

Licensed designers - Spencer Harris, Alan Huizenga, and Gerry Kittle.

Well driller's knowledge checklist - Jeff Williams, Rodney Pingree, Roger Thompson, Bernie Chenette, Gail Center and Steve Revell.

Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Lake water – Alan Huizenga, Gail Center, Rodney Pingree, Lance Phelps

Surfacing systems – Craig Heindel, Steve Revell, Frank O'Brien, Roger Thompson, Bruce Douglas, Gail Center, and Brian Kooiker.

Approved Minutes of the Technical Advisory Committee Meeting
December 13, 2005

Members present:	Roger Thompson	Bernie Chenette
	Kim Greenwood	Barb Willis
	Gerry Kittle	Spencer Harris
	Craig Heindel	Steve Revell
	Gail Center	Rodney Pingree
	John Forcier	Allison Lowry

Appendix A

Others present: Chris Thompson Frank O'Brien

Scheduled meetings:

January 10, 2006	1-4 PM	Room 107 Stanley Hall
February 7, 2006	1-4 PM	Room 107 Stanley Hall
March 14, 2006	1-4 PM	Room 107 Stanley Hall

Review of agenda

The agenda was accepted as drafted.

Review of minutes

The draft minutes of the November 15, 2005 meeting were accepted as drafted.

Field visit report

Roger indicated that the first report from the end of October had been sent to Sen. Ayre. Steve noted that the report only indicated the sites that were approved or denied when the regional office staff was involved, and that often times a designer will deem a site not approvable during his/her initial site visit and these sites therefore never reach state review. Steve also noted that some site visits are not done pre-application because of the regional offices are booked too far ahead.

Annual Report

Craig will try to get a first draft out for review between Christmas and New Year's. Frank will provide the information for the innovative systems. Roger will run the permit and denial numbers the first week in January.

Options Paper

Roger gave a short update on the most recent draft of the paper. The commissioner had not yet been able to review it but a meeting is scheduled. Roger said that several people had responded to his request to state whether they supported the following statement:

TAC believes that a system designed, constructed, operated, and maintained with oversight as discussed in option #2 above, and that uses the components included in the list on page 7 of this document, would reliably produce effluent that has an acceptable low public health risk.

John Forcier, Barb Willis, Alan Huizenga, Craig Heindel, Lance Phelps, Gerry Kittle, Steve Revell, Phil Dechert, Gail Center, David Cotton, Bernie Chenette, and Rodney Pingree supported the statement. Spencer Harris did not. Gail indicated that her approval was related to protection against pathogens and that there could be concerns if the wastewater contained other contaminants such as those from filter backwash related to potable water supply treatment systems used to abate arsenic or radionuclides. Spencer said that his concern was that it would be difficult to ensure that systems are operated properly over the long term. Kim Greenwood said that because she had just started working with VNRC she was not prepared to take a position.

Craig asked if the report should include a stronger statement on the need to properly operate and maintain the systems.

There was discussion about how much regulatory time would be involved in ensuring compliance with the permit conditions. TAC estimates that one FTE could track 250-300 systems.

Lake water subcommittee

The subcommittee has exchanged e-mails outlining some basic combination of equipment that might be suitable for individual treatment systems. Steve asked how the potable water standards would be applied. Three additional areas of concern were identified:

A. Will there be need for a water withdrawal permit? Is there a quantity below which there is an exemption or is there an exemption for a single house?

B. Surface water may contain toxins not normally found in ground water. Blue-green algae is one example.

C. There needs to be some sort of exemption for existing lake water systems so that the passage of the July 1, 2007 date does not instantly create a large population of water systems that are considered failed systems.

Mound sand specifications

Roger provided information related to how other states regulate mound sand. There was not much support for removing a numerical specification in lieu of a more general description such as medium sand. The changes made in the 1996 rules which allowed for the use of three different numerical specifications resulted in more pits being acceptable and this seems to have reduced the number of complaints about availability and cost. AGC should be contacted at the Montpelier

office to see if they have any information about this.

Presumptive effectiveness of curtain drains

Steve said that drains seem to be very effective when there is a more permeable soil overlying a less permeable soil, with the drains able to lower the water table to the level of the density change. In some cases the texture may not be greatly different, but the structure would significantly change the capacity to move water. The clay soils often have good structure in the shallow soils that disappears with depth. There might be a case for a presumption that a drain would lower the water table by 6". Allison asked what has the past monitoring shown. Past monitoring has shown different levels of effectiveness. This topic will be discussed further with an attempt to define the site requirements that could support a presumption that a drain would be effective.

Items prioritized for discussion with high, low, and medium ranking

1. Mound sand specifications **high**
2. Encourage I/A **low**
3. Soil identification vs. perc test **medium**
4. Colorado rule **low**
5. Permit by certification **low**
6. Lake water potable water supplies **high**
7. Curtain drain with presumption of effectiveness **high**
8. Terralift system **low**
9. Field change policy **high**
10. Revisions to desktop hydro chart **medium**
11. Minimum amount of sand under a mound **high**
12. Grandfathered design flow and conversion of use policy **high**
13. Updating of design flow chart **high**

Topics list - items not ready for drafting for inclusion in rule revisions

181. Drip disposal
182. Mound sand requirements
183. Encourage I/A
184. Changing the 20% slope restriction to 30%
185. Replacing perc test with soil identification approach
186. Defining when effluent is no longer wastewater
187. Disinfection

188. Colorado Rule – reduction in isolation distance to wells based on construction methods
189. Certification and audit approach to permitting
190. Lake water systems
191. Curtain drains
192. Terra-Lift System
193. Installation certification language
194. Field change policy
195. Revise existing desktop hydro chart
196. Conversion of use policy, including grandfathered flows
197. Revise design flows

Executive Committee

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, and Roger Thompson
Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams

Subcommittees

Hydrogeology - Allison Lowry, Craig Heindel, Dave Cotton and Steve Revell.

Training subcommittee - John Forcier, Roger Thompson, Allison Lowry, Dave Cotton, and Barbara Willis.

Licensed designers - Spencer Harris, Alan Huizenga, and Gerry Kittle.

Well driller's knowledge checklist - Jeff Williams, Rodney Pingree, Roger Thompson, Bernie Chenette, Gail Center and Steve Revell.

Interested in the delegation rules - Spencer Harris, Gerry Kittle, Phil Dechert, and Alan Huizenga

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga

Legislative field trip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson

Lake water – Alan Huizenga, Gail Center, Rodney Pingree, Lance Phelps

Surfacing systems – Craig Heindel, Steve Revell, Frank O'Brien, Roger Thompson, Bruce Douglas, Gail Center, and Brian Kooiker.

Appendix B

SUMMARY TABLES OF ALTERNATIVE AND INNOVATIVE SYSTEMS AND PRODUCTS

Approval letters and contact information for each technology are available at the Agency web site: http://www.anr.state.vt.us/dec/ww/innovative.htm

Note: Use of advanced treatment systems does not change the existing minimum required site conditions. The TAC is unaware of any advanced treatment system which would overcome the requirements for minimum site conditions in the current Rules. Possible revisions to the Rules for minimum site conditions are discussed in the Options Paper (see discussion of Seasonally Discharging Systems on page 3 and the Options Paper in Appendix E)**.**

SUMMARY TABLE: INNOVATIVE/ALTERNATIVE SYSTEMS AND PRODUCTS STATUS AS OF DECEMBER 31, 2005

Product	Description	Status
Advanced Treatment Systems		
Intermittent sand filter	attached growth aerobic process	Allowed in the Rules
Recirculating sand filter	attached growth aerobic process	Allowed in the Rules
Advantex	textile treatment system	Approved for General Use
Ecoflo Biofilter	peat treatment system	Approved for General Use
SeptiTech	recirculating fixed film treatment system	Approved for General Use
Bioclere	fixed film trickling treatment system	Approved for General Use
Puraflo	peat fiber biofilter treatment system	Approved for General Use
SpecAIRR	reactor treatment system	Approved for General Use
Bio-Microbics FAST	fixed film aerated treatment system	Approved for General Use
Singulair	suspended growth extended aeration	Approved for General Use
Advanced Wetland Treatment System	aerated subsurface-flow wetland	Approved for Pilot Use
Enviro-Guard	combined process wastewater treatment	Approved for General Use
Other Devices		
Flout	floating outlet distribution box	Approved as substitute
Orenco Hydro-splitter	mechanical distribution	Approved as substitute
Juggler	septic tank pumping truck	Determined not subject to Rules
Miller septic tank liner	septic tank liner	Determined not subject to Rules
Enviro-Septic (Presby)	request for increase in application rate	Approved for General Use
FRALO SEPTECH polyethylene tanks	polyethylene septic tanks	Approved for General Use
Polylok Effluent Filter PL-122	effluent filter	Approved for General Use
Polylok Effluent Filter PL-68	effluent filter	Approved for General Use
Orenco Fiberglass Septic Tanks	fiberglass septic tanks	Approved for General Use
Polylok Effluent Filter PL-525	effluent filter	Approved for General Use
Zoeller Filters	effluent filters	Approved for General Use
Bio-Microbics SaniTEE	effluent wastewater screen	Approved for General Use

Appendix B

SUMMARY TABLE: INNOVATIVE/ALTERNATIVE SYSTEMS AND PRODUCTS CHRONOLOGY OF REVIEWS AND APPROVALS		
Prior to 2002		
Advanced Treatment Systems		
Product	**Description**	**Status**
Intermittent sand filter	attached growth aerobic process	Allowed in the Rules
Recirculating sand filter	attached growth aerobic process	Allowed in the Rules
Advantex	textile treatment system	Approved for General Use
Other Devices		
EnviroSeptic (Presby)	gravelless distribution pipe	Approved as substitute
Flout	floating outlet distribution box	Approved as substitute
Orenco Hydro-splitter	mechanical distribution	Approved as substitute
Juggler	septic tank pumping truck	Determined not subject to Rules
Miller septic tank liner	septic tank liner	Determined not subject to Rules

New in 2002		
Advanced Treatment Systems		
Product	**Description**	**Status**
Ecoflo Biofilter	peat treatment system	Approved for General Use
SeptiTech	recirculating fixed film treatment system	Approved for General Use

New in 2003		
Advanced Treatment Systems		
Product	**Description**	**Status**
Bioclere	fixed film trickling treatment system	Approved for General Use
Puraflo	peat fiber biofilter treatment system	Approved for General Use
SpecAIRR	reactor treatment system	Approved for General Use
Other Devices		
FRALO SEPTECH polyethylene tanks	polyethylene septic tanks	Approved for General Use
Polylok Effluent Filter PL-122	effluent filter	Approved for General Use

SUMMARY TABLE: INNOVATIVE/ALTERNATIVE SYSTEMS AND PRODUCTS CHRONOLOGY OF REVIEWS AND APPROVALS		
New in 2004		
Advanced Treatment Systems		
Product	**Description**	**Status**
Bio-Microbics FAST	fixed film aerated treatment system	Approved for General Use
Other Devices		
Enviro-Septic (Presby)	request for increase in application rate	Approved for General Use
Polylok Effluent Filter PL-68	effluent filter	Approved for General Use
Orenco Fiberglass Septic Tanks	fiberglass septic tanks	Approved for General Use

New in 2005		
Advanced Treatment Systems		
Product	**Description**	**Status**
Singulair	suspended growth extended aeration	Approved for General Use
Advanced Wetland Treatment System	aerated subsurface-flow wetland	Approved for Pilot Use
Enviro-Guard	combined process wastewater treatment	Approved for General Use
Other Devices		
Enviro-Septic (Presby)	request for increase in application rate	Approved for General Use
Polylok Effluent Filter PL-68	effluent filter	Approved for General Use
Orenco Fiberglass Septic Tanks	fiberglass septic tanks	Approved for General Use

SUMMARY TABLE: INNOVATIVE/ALTERNATIVE SYSTEMS AND PRODUCTS CHRONOLOGY OF REVIEWS AND APPROVALS

Appendix B

Under Review as of December 31, 2005		
Applications for General Use: Advanced Treatment Systems		
Product	**Description**	**Status – date of appl.**
ROTORDISK	rotating biological contactor system	Under review[3] (2/12/02)
SeptiTech	revision to G.U. for seasonal drip disposal	Under review[2] (10/17/03)
Rocky Mountain Pure XL5	modular wastewater treatment plant	Under review[1,3] (01/12/04)
Open Bottom Ecoflo Biofilter	peat filter with horizontal discharge	Under review[2] (no formal appl.)
Clean Solution	fixed film aerated treatment system	Under review[1] (12/14/04)
Applications for General Use: Other Devices, or Amended Regulations		
Infiltrator	request for increase in application rate	Under review[1] (12/02/02)
Eljen In-drain	request for increase in application rate	Under review[1] (06/18/04)
EnvironEdge fiberglass septic tanks	fiberglass septic tanks	Under review (01/05/04)
Applications for Pilot Use		
Bottomless sand filter	filtrate disposal system	Under review[2] (09/16/03)
Applications for Experimental Use		
None		

1. Awaiting additional information from applicant
2. Not currently approvable under the Rules, but held open pending possible rule changes
3. No data provided by the applicant for systems under 6500 gallons per day

Appendix C

Summary Tables of Permits: 2003, 204, 2005
(DEC Wastewater System and Potable Water Supply Permits only)

DEC Office	Applications Received			Permits Issued		
	2003	2004	2005	2003	2004	2005
Barre	725	850	864	713	807	851
Essex	640	674	692	633	698	693
Rutland	493	471	534	576	457	525
Springfield	512	553	590	583	517	569
St. Johnsbury	258	294	344	236	307	341
Totals	2628	2842	3042	2741	2786	2979

Note: Many older projects were closed out in 2003 which results in more projects completed.

Note: Closing of old projects is often done with a denial of the application. These usually appear as denied for insufficient information.

Note: Information for 2004 and 2005 is for January 1 to December 31 of each year.

DEC Office	Permits Denied								
	Denials Issued			Reasons for Denial					
				Insufficient Information			Non-compliance with standards		
	2003	2004	2005	2003	2004	2005	2003	2004	2005
Barre	2	2	18	1	1	17	1	1	1
Essex	4	26	1	4	26	1	0	0	0
Rutland	17	3	0	17	3	0	0	0	0
Springfield	20	4	4	19	4	3	1	0	1
St. Johnsbury	0	0	0	0	0	0	0	0	0
Totals	43	35	23	41	34	21	2	1	2

DEC Office	Enforcement Cases		
	2003	2004	2005
Barre	0	0	1
Essex	0	1	0
Rutland	0	0	0
Springfield	0	0	1
St. Johnsbury	0	0	0
Totals	0	1	2

Appendix D

Technical Advisory Committee:
Members as of December 2005, Executive Committee, Sub-Committees
and
Statutory Charge

Technical Advisory Committee to the Secretary of the Agency of Natural Resources regarding Environmental Protection Rules (Wastewater System and Potable Water Supply Rules)

Members and statutory charge (Updated January 6, 2006)

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Appendix D

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Allison Lowry, Wastewater Mgmt 802-241-4455 allison.lowry@state.vt.us
Rodney Pingree, Water Supply 802-241-3418 rodney.pingree@state.vt.us

Health Department technical staff

Gail Center
gcenter@vdh.state.vt.us

TAC Executive Committee
And Sub-Committees as of December 2005:

Executive Committee:

John Forcier, Steve Revell, Lance Phelps, Phil Dechert, Roger Thompson.
Alternates – Chris Thompson, Bernie Chenette, Spencer Harris, Jeff Williams.

Sub-Committees:

Hydrogeology - Allison Lowry, Craig Heindel, Dave Cotton, Steve Revell.

Training - John Forcier, Roger Thompson, Allison Lowry, Dave Cotton, Barbara Willis.

Licensed Designers - Spencer Harris, Alan Huizenga, Gerry Kittle.

Well driller's Knowledge Checklist - Jeff Williams, Rodney Pingree, Roger Thompson, Bernie Chenette, Gail Center, Steve Revell.

Interested in the Delegation Rules - Spencer Harris, Gerry Kittle, Phil Dechert, Alan Huizenga.

Drip Disposal – Frank O'Brien, Roger Thompson, Dave Cotton, Steve Revell, Alan Huizenga.

Legislative Fieldtrip – Phil Dechert, Gerry Kittle, Dave Cotton, Roger Thompson.

Surface Water Potable Water Sources – Alan Huizenga, Gail Center, Rodney Pingree, Lance Phelps.

Seasonally Discharging Systems – Craig Heindel, Steve Revell, Frank O'Brien, Roger Thompson, Bruce Douglas, Kim Kendall, Gail Center, Brian Kooiker.

Appendix D

Statutory composition of the Technical Advisory Committee and the charge to the committee:

Section 1978 of 10 V.S.A., as established by Act 133 of the 2001 Adjourned Session, established a Technical Advisory Committee (TAC) to advise the Vermont Agency of Natural Resources regarding the technical standards and implementation of Act 133. The TAC's charge is:

The secretary shall periodically review and, if necessary revise the rules adopted under this chapter to ensure that the technical standards remain current with the known and proven technologies regarding potable water supplies and wastewater systems.

The secretary shall seek advice from a technical advisory committee in carrying out the mandate of this subdivision. The governor shall appoint the members of the committee and ensure that there is at least one representative of the following entities on the committee: professional engineers, site technicians, well drillers, hydrogeologists, town officials with jurisdiction over potable water supplies and wastewater systems, water quality specialists, technical staff of the agency of natural resources, and technical staff of the department of health. Administrative support for the advisory committee shall be provided by the agency of natural resources.

The technical advisory committee shall provide annual reports, starting January 15, 2003, to the chairs of the house and senate committees on natural resources and energy. The reports shall include information on the following topics: the implementation of this chapter and the rules adopted under this chapter; the number and type of alternative or innovative systems approved for general use, approved for use as a pilot project, and approved for experimental use; the functional status of alternative or innovative systems approved for use as a pilot project or approved for experimental use; the number of permit applications received during the preceding calendar year; the number of permits issued during the previous calendar year; and the number of permit applications denied during the preceding calendar year, together with a summary of the basis for denial.

The annual reporting shall end as of January 15, 2007.

Appendix E

Options for Rule Revisions to Allow Seasonally Discharging Systems in Areas with Soil Limited by Slow Permeability and/or Seasonal High Water Table

Dec. 19, 2005

By:
Technical Advisory Committee,
Wastewater Management Division,
Department of Environmental Conservation,
Vermont Agency of Natural Resources

Options for Rule Revisions to Allow Seasonally Discharging Systems in Areas with Soil Limited by Slow Permeability and/or Seasonal High Water Table

12-19-2005

The Technical Advisory Committee (TAC), and a subcommittee of the TAC, has discussed several options related to revising the rules in a way that would allow for development on sites that currently cannot be permitted. In many cases these sites are severely limited because of a high seasonal water table, which may be at less than 6" from the surface of the naturally occurring ground and which may reach the ground surface for a brief period during the wet times of the year.

The range of changes includes:

A. making no changes whatever,

B. using large property line setbacks as a presumptive approach,

C. creating a prescriptive design for use that does not require a determination of whether the system will discharge or not,

D. trying to refine site evaluation techniques,

E. allowing direct discharge to a roadside ditch,

F. discharge to a wetland, or

G. direct discharge to surface waters.

The members of TAC believe that any option must include an analysis of the hydraulic capacity of the site and that the potential for, and the safety of, any discharge must be discussed. Items B and C do not meet this standard. Item D is discussed as option #1 below. TAC does not

support a direct discharge from a treatment system directly to the ground surface and so modified E as discussed in option #2. Items F and G are related and discussed as option #3.

Option #1 (Item D)

Revise the 6" design standard for the performance based approach in §1-502(d) of the Wastewater System and Potable Water Supply Rules

The rules currently require that a sewage treatment and disposal design, prepared using the performance based approach, be designed to maintain at least 6" of naturally occurring soil above the calculated level of the effluent plume during all portions of the year. This standard was developed based on an expectation that systems using this approach have a good chance of not becoming failed systems, i.e. will not discharge to the surface of the ground. A site developed using this approach on fine grained soils can be expected to have free water at 6" below the surface of the naturally occurring ground in an open hole, with the soil above the free water level being saturated to or near to the ground surface, and to feel soft underfoot during the wet time of year.

The question is whether the 6" design standard could be revised to a lesser amount while maintaining a position that such systems will reliably function without surfacing. The TAC has considered this question in the past and the consensus has been that any reduction in the design standard would result in more systems that surface at least periodically during the wet times of the year. Assuming that a reduction in the 6" design standard could lead to more regular surfacing of effluent in the wet time of the year, this approach should be considered in conjunction with option #2.

Option #2 (Item E)

Approve systems that may discharge to the surface of the ground but which do not discharge to surface waters.

The TAC reviewed the question of whether the use of systems, that by their design may result in periodic discharges to the surface of the ground, are appropriate for use in Vermont. TAC considered three questions:

1. What level of treatment is required to ensure that any increase in risk to the public health is both the minimum necessary and acceptable in relation to the benefit that would result?

The TAC decided that advanced treatment of the wastewater would be required followed by a disinfection process. The level of treatment required would be that needed to make the disinfection process effective.

2. Are there currently available treatment and disinfection systems that can provide the required level of treatment and disinfection?

The TAC determined that there are several currently approved advanced treatment systems that can be designed to provide the level of treatment needed to ensure proper disinfection. The TAC also believes that commonly available U.V. (ultra- violet light) and chlorination systems can achieve the required level of disinfection.

The TAC also decided that some passive treatment should be incorporated to provide additional protection. This passive treatment would be by flow through soil, either naturally occurring or placed as part of the system construction.

3. What is required in the way of maintenance, operation, and oversight to ensure the systems maintain the designed level of performance?

The TAC determined that each system would need to be subject to an operating permit, a maintenance contract, remote monitoring, and some form of organized regulatory oversight. The operating permit would periodically expire, requiring a review of each system to ensure that it was operating successfully. The operating permit concept would also provide a source of funds to pay for the continuing regulatory oversight that is essential to minimize any public health risk. The remote monitoring makes it practical for at least daily checks of basic parameters of each system. The regulatory oversight could be done at the state level or delegated to the local or fire district level. The TAC estimates that each system constructed based on this option would require about 8 hours per year of regulatory oversight. One FTE of regulatory oversight could oversee about 250 systems. To be effective, one or more people would need to be hired and have this assigned as their principal function. An action plan would be required that would be implemented in the event the system fails to operate properly.

Note: The TAC believes that a discharging system should only be used on sites that cannot comply with the current rules.

Option #3 (Items F + G)

Approve systems that discharge to surface waters

The TAC has not discussed this concept extensively. Any direct discharge to surface waters is subject to both federal and state regulation. Portions of the federal Clean Water Act are

delegated to Vermont for administration. Under Vermont implementation of the National Pollution Discharge Elimination System (NPDES) any direct discharge must first establish a waste management zone, with current procedures based on a zone at least one mile long. Any decision to allow the establishment of such a zone must consider existing uses of the proposed zone including activities such as fishing, swimming, and boating. Many of the issues that make establishing a waste management zone difficult are related to Vermont's statutory language and could theoretically be changed. This would likely be difficult, but would ensure that there is legislative support for allowing the discharges from this type of on-site systems to eventually reach surface waters.

Any approval for a new discharge to surface waters would also depend on nutrient effects on the surface water. Some watersheds are already limited by elevated levels of one or more nutrients such as phosphorus and nitrogen under the TMDL's. Any widespread use of direct discharging systems would likely require additional levels of advanced treatment to remove specific nutrients.

Sheet flow to surface water is currently considered a discharge under Vermont rules but not under federal NPDES standards. The federal rules may change and include such discharges. The federal rules are already extensive and include any swale, ditch, or other surface feature carrying waste to surface waters.

Related Issues

Surfacing and the definition of failure

One key issue is whether a system has failed by virtue of effluent being exposed to the open air or by pooling on the ground surface. Once the effluent has been discharged from the leachfield there are limited pathways for it to follow. Some amount is dispersed through evapo-transpiration by plant uptake, though this occurs only during the growing season, and in Vermont is very limited. Some of the effluent travels downward until it reaches the groundwater table. And some of it flows through naturally occurring soil for a distance and then emerges on the ground surface to flow overland to surface waters.

This surfacing effect can occur because the rules only require that complying soil conditions exist under and for 25' downslope of the system. The rules also require 25' setbacks to road ditches and to slopes greater than 30%. If the site conditions do not extend beyond the specified distances it is possible that surfacing will occur. These soil conditions and isolation distances were not established based on a decision that after flowing through this amount of soil the effluent would be sufficiently renovated as to be safe for human contact, nor with an expectation that effluent would surface. These isolation distances were likely established based on existing practices from other states. In practice, evidence of surfacing at one of these points would be considered to be a failure when it is clear that the surfacing is primarily caused by effluent from

a wastewater system. However, in most cases, surfacing only occurs during SHWT periods when the SHWT intersects the ground surface, such as at a road ditch or slope break. Because these wet areas seldom have the appearance of wastewater effluent, having no color or odor, they are generally ignored. Determining that the surfacing is at least in part caused by wastewater would require some laboratory analysis, something that is rarely done. However, if testing is done and the results indicate the presence of effluent at the point of surfacing, this would constitute a failed system.

The one portion of the rules where it is likely that a conscious decision was made that surfacing is acceptable is the requirements related to subsurface drains installed downslope of leachfields. This isolation distance was first established at 100' in the 1979 rules and revised to 75' in the 1982 revision. In this case, the expectation is that surfacing would only occur during the portion of the year when the SHWT intersected the drain and any effluent would be mixed with the naturally occurring ground water. There is no apparent decision on what the response would be if effluent was discharging through a subsurface drain when SHWT was not present.

The Agency should address this issue and decide if there is a point at which an outbreak of effluent on the ground surface is considered to not be a failed system. The follow-on decision would then be whether this distance must be naturally occurring soil or whether it could be part of the system construction. It seems clear from discussions related to NPDES, that a 50' wick of sand, crushed stone, or other media leading to a surface water, would be considered to be a direct discharge conduit that is not different in effect from a pipe. It might, however, be possible to determine that a discharge from the end of a 50' layer of sand does not constitute a failed system, and if the subsequent flow from the system only reached the surface waters in the form of sheet flow, that it would not be a discharge under federal regulations. Vermont regulations would still need revision.

One additional reason to address this issue is that with more sophisticated water quality testing becoming available over the years, there will be the increasing chance that effluent will be determined to be present in water samples collected from surface runoff. A determination that certain discharges are in fact acceptable under Vermont and federal statutes would address the issues head-on as opposed to just ignoring them. With a determination that a particular discharge is acceptable, the permitting program would be on a sound basis, which would benefit landowners, designers, and regulators.

Public notice

Any decision as to the use of systems, where by design there will be surfacing of treated effluent to the ground surface, needs to include a consideration as to whether some form of notice to the neighboring landowners and/or the general public should be required. The Agency has opposed requiring a public notice process for routine issuance of subdivision permits or permits for wastewater disposal systems of less than 6500 GPD. The vast majority of small wastewater systems involve routine application of rules that have been developed in a public process. With 3000+ permits per year, a public notice and comment period for each permit is not a cost effective approach. In the rare situation where important information was not considered, there is a permit

revocation process that can be used to correct the situation.

However, use of systems that include one or more treatment and/or disposal components that require active management, and which depend on disinfection processes that will in at least some cases breakdown, may include an obligation to notify neighboring property owners of the proposed use of a such a system. This notice would ensure that neighbors would know that a permitted system was not expected to operate in the conventional fashion and the neighbors might serve as an additional party of interest that would ensure proper operation and maintenance of the system.

Notice of system failure

Any system approved for use that includes a surfacing concept as part of the design should be required to have an approved operations manual. The manual should include specific instructions of the actions that are required if there is any failure of the system. If there is any possibility that effluent that has not been fully disinfected can reach the surface of the ground, specific actions related to preventing contact between the effluent and humans and their pets should be required. If the effluent will, or may, pass onto neighboring property, the neighboring property owner should be notified. If
ANR pursues these systems, it should consider what the permittee should be required to do relative to work on the neighboring property in the event of a failure. This could include fencing, posting written notice, disinfecting with lime, etc.

Appendix E

List of components for a seasonally discharging system and their estimated costs

Note: The site must have at least a 3% slope and at least 9" of naturally occurring soil with a percolation rate of 120 minutes per inch or less and at least 18" of naturally occurring soil above bedrock.

Cost

The subcommittee prepared the following list of components that should be considered to be part of a low and moderate strength wastewater treatment and disposal system with a surfacing component:

	Component	Estimated cost installed
1.	Septic tank	$1,000
2.	Intermittent sand filter Low application rate (1 gallon/sqft.day) with 36" of sand below the application level	$12,000 - $15,000
3.	Disinfection unit (ultraviolet light process)	$5,000
4.	Sand blanket and surface preparation extends 50' downslope of leachfield	$10,000- $12,000
5.	Remote monitoring equipment capable of testing UV effectiveness	$5,000
6.	Disposal system installed on sand blanket (drip disposal or shallow mound)	$5,000
	Total cost	$38,000 - $41,000

There would also be design costs and operational costs. Design costs might be in the range of $3,000 - $7,500, because in most cases, these systems will require more effort to conduct site evaluations, design, and provide construction inspections than systems currently permitted, for which consulting fees are in the $2,000 - $5,000 range. Operational costs are likely to be

approximately $1,000 per year. There would be additional costs for regulatory oversight.

Note: The system outlined above is for low and moderate strength wastewater, such as for average domestic sources. High strength wastewater requires modifications to the design, including an advanced treatment system installed in series prior to the low rate intermittent sand filter.

Note: An acceptable alternative design would include an advanced treatment system followed by the low rate intermittent sand filter with a minimum of 18" of sand below the application level.

Note: The committee discussed whether other treatment systems could be substituted for the low rate intermittent sand filter. It was decided that no other currently permitted system provides an equivalent level of treatment and stability with as few possible modes of failure. This is likely to be a point of contention with various manufacturers and vendors of treatment systems.

Expected levels of treatment and possible modes of failure

The proposed system includes 2 treatment components with estimated levels of treatment. Each component also has the potential to fail. TAC has considered the potential modes of failure and has estimated their effect on the potential that there will be a significant health risk associated with that failure.

The Onsite Wastewater Treatment Systems Manual, February, 2002, published by EPA (**OWTSM, 2002)** contains estimates of fecal coliform and viral concentrations and removals. A copy of Table 3-19 is attached. Initial concentrations of fecal coliform are estimated at $10^6 – 10^8$ organisms/100 ml. Initial concentrations of virus are estimated at $0\text{-}10^5$ pfu (plaque forming unit)/ml. Viruses are episodically present at high levels only when being shed by the users of the wastewater system.

1. The intermittent sand filter –

   An intermittent sand filter with an application rate of 1 gallon/sqft/day is an extremely stable system. Assuming that the design incorporates a pump station to provide the pressure distribution of the effluent, a power failure would stop the flow of effluent into the sand filter under most circumstances. The pump station could be designed to prevent such a discharge under all circumstances. An organic overload would clog the surface of the sand thereby reducing the flow through the filter, which if anything, would enhance the treatment. If the organic overload was large, the clogging would cause the sand filter to backup to the point where the alarm system would be triggered. Careful design would prevent untreated effluent from moving beyond the sand filter to the disinfection system. A short term hydraulic overload is the main area of concern. With a high loading rate, the effectiveness of the sand filter at removing fecal coliform and viruses would be reduced, with viral removal being more sensitive to high flow rates.

A 1997 article in the Small Flows Journal, entitled Shallow Intermittent Sand Filtration: Microorganisim Removal, by Emerick, Test, Tchobanoglous, and Darby reports the results of viral removal at different loading rates in intermittent sand filters. They found about 2.8 log removal when loaded at 1 gallon/sqft/day and 0.9 log removal when loaded at 4 gallons/sqft/day.

Of particular concern is the level of TSS removal because low effectiveness at removal could result in the disinfection process being less effective. Carefully designed, 1 gallon/sqft/day, intermittent sand filters appear to be capable of removing both BOD_5 and TSS to less than 5 mg/l which is considered the level needed for proper disinfection. The systems are sensitive to loading rates and hydraulic overloading could lead to increased levels of BOD_5 and TSS passing through the filter.

It is possible, and should be required, to design a pump based dosing system that will preclude hydraulic overloading of the system that is not easily bypassed.

2. The disinfection system –

Disinfection for small wastewater treatment systems is usually based on chlorination or the use of ultraviolet (UV) light. There are concerns with either approach. Chlorination is effective, including when the level of BOD_5 and TSS is too high for use of UV disinfection. Chlorination systems require maintenance to ensure that the supply of chlorine is adequate and there are concerns about
by-products entering the ground or surface water. UV does not have by-products that are of concern but the wastewater must be extremely clean in order for the system to be effective. Either system is effective at inactivating bacteria and viruses. Attached is fact sheet #4 from the **OWTSM, 2002.**

The TAC has primarily focused on UV disinfection methods because of the concerns related to chlorine by-products, and because automatic monitoring of the effectiveness of UV disinfection is more readily available than for disinfection by chlorination. The **OWTSM, 2002** indicates that effluent clarity is a critical factor. Any system serving single family residences, or other buildings with small design flows, will not have daily on-site inspections by a licensed operator and will not routinely have the effluent tested for presence of pathogens. The system must therefore be designed to remotely monitor UV transmittance and must automatically prevent release of effluent into the environment whenever the UV is not operating as designed, without an easy “manual over-ride” that would allow an owner to circumvent the automatic shutdown mechanism.

The treatment processes used prior to disinfection must be stable and effective; otherwise the remote monitoring will frequently indicate a failure to maintain the required level of transmittance. This requirement is the main reason the TAC proposes to require use of a low rate, intermittent flow sand filter in all systems.

3. Failure modes -

A. Power failure - If the water supply is powered by the same electrical system as the wastewater system only a small amount of effluent will be discharged to the system. Assuming relatively brief outages of a few hours, the system would function properly as soon as power was restored. The system should be designed so that in situations where the water system remains functional, the wastewater will not be discharged to the intermittent sand filter. Health risks with either situation are expected to be low.

B. Organic overload - Short term organic overloads could exceed the sand filter's capacity to treat the wastewater to the level required for full disinfection. However, this should cause the measured transmittance level in the UV disinfection system to fall below its required level which would cause the system to cease discharge to the environment and to send a notification of the failure through the remote monitoring system. Long term organic overloads would result in a clogging layer on the application surface of the sand filter. This layer would eventually result in a high water condition in the sand filter that would also stop the discharge to the environment and trigger the remote monitoring system.

C. Hydraulic overload - The most likely scenario is intentional or unintentional continuous water flow from the house. It is possible to design the systems so that any hydraulic overload would be detected. The system could be designed to both trigger the alarm systems and to cease pumping effluent to the disinfection system. A specific plan in the operations manual would be required with directions on how to restore the system to use. A determination that the effluent quality and quantity allows for proper disinfection would be required by a licensed operator familiar with the system.

D. Summary –

With proper design, and assurance that operational requirements are met, there is a low risk of untreated effluent being discharged to the disposal portion of the system. The operations manual, and the permit for the system, should address the actions required for the rare situation when untreated effluent is discharged; including any overflows from pump stations or storage tanks.

Year-round surfacing is not acceptable –

The TAC considered the question of whether it would be acceptable to build a system with an expectation that the system would have a surface discharge on a year-round basis and concluded that the risk associated with this concept is too great. While a final recommendation of the parameters has not been developed, something along the line of requiring at least 9" of soil with a percolation rate of 120 min/inch or less and a minimum slope of 3% are being considered. Some areas otherwise meeting these requirements would be wetlands and therefore unacceptable for new development. Some factor may be required for the rare situation when the slope and soil requirements are met, the site is not a wetland, but there is a permanent water table such that year-round surfacing would occur.

The neighbors –

Unless the designs are restricted to sites where the effluent will not leave the property, or do so only subject to a permanent easement granted by the neighbor/s, the quality of the effluent reaching the neighbors must be explicitly addressed.

TAC believes that a system designed, constructed, operated, and maintained with oversight as discussed in option #2 above, and that uses the components included in the list on page 7 of this document, would reliably produce effluent that has an acceptable low public health risk.

Excerpt from: The Onsite Wastewater Treatment Systems Manual, February, 2002

Table 3-19. Wastewater constituents of concern and representative concentrations in the effluent of various treatment units

Constituents of concern	Example direct or indirect measures (Units)	Tank-based treatment unit effluent concentration					SWIS percolate into ground water at 3 to 5 ft depth (%
		Domestic STE[1]	Domestic STE with N-removal recycle[2]	Aerobic unit effluent	Sand filter effluent	Foam or textile filter effluent	

							removal
Oxygen demand	BOD_5 (mg/L)	140-200	80-120	5-50	2-15	5-15	>90%
Particulate solids	TSS (mg/L)	50-100	50-80	50-100	5-20	5-10	>90%
Nitrogen	Total N (mg N/L)	40-100	10-30	25-60	10-50	30-60	10-20%
Phosphorus	Total P (mg P/L)	5-15	5-15	4-10	<1-10[4]	5-15[4]	0-100%
Bacteria (e.g., Clostridium perfringens, Salmonella, Shigella)	Fecal coliform (organisms per 100 mL)	10^6-10^8	10^6-10^8	10^3-10^4	10^1-10^3	10^1-10^3	>99.99%
Virus (e.g., hepatitis, polio, echo, coxsackie, coliphage)	Specific virus (pfu/mL)	0-10^5 episodically present at high levels)	0-10^5 episodically present at high levels)	0-10^5 episodically present at high levels)	0-10^5 episodically present at high levels)	0-10^5 episodically present at high levels)	>99.9%
Organic chemicals (e.g., solvents, petro-chemicals, pesticides)	Specific organics or totals (µg/L)	0 to trace levels (?)	0 to trace levels (?)	0 to trace levels (?)	0 to trace levels (?)	0 to trace levels (?)	>99%
Heavy metals (e.g., Pb, Cu, Ag, Hg)	Individual metals (µg/L)	0 to trace levels	0 to trace levels	0 to trace levels	0 to trace levels	0 to trace levels	>99%

[1]Septic tank effluent (STE) concentrations given are for domestic wastewater. However, restaurant STE is markedly higher particularly in BOD_5, COD, and suspended solids while concentrations in graywater STE are noticeably lower in total nitrogen.
[2]N-removal accomplished by recycling STE through a packed bed for nitrification with discharge into the influent end of the septic tank for denitrification.
[3]P-removal by adsorption/precipitation is highly dependent on media capacity, P loading, and system operation.

Source: Siegrist, 2001 (after Siegrist et al., 2000)

Appendix E

Excerpt from: The Onsite Wastewater Treatment Systems Manual, February, 2002

U.S. Environmental Protection Agency

National Risk Management Research Laboratory

EPA 625/R-00/008

Appendix E

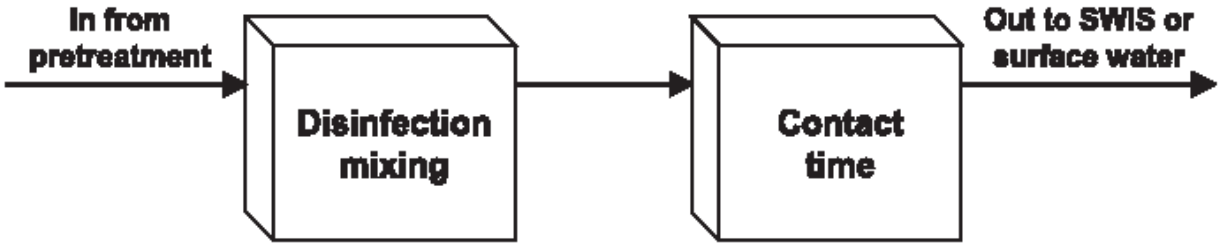
Onsite Wastewater Treatment Systems Technology Fact Sheet 4

Effluent Disinfection Processes

Description

The process of disinfection destroys pathogenic and other microorganisms in wastewater. A number of important waterborne pathogens are found in the United States, including some bacteria species, protozoan cysts, and viruses. All pretreatment processes used in onsite wastewater management remove some pathogens, but data are scant on the magnitude of this destruction. The two methods described in this section, chlorination and ultraviolet irradiation, are the most commonly used (figure 1). Currently, the effectiveness of disinfection is measured by the use of indicator bacteria, usually fecal coliform. These organisms are excreted by all warm-blooded animals, are present in wastewater in high numbers, tend to survive in the natural environment as long as or longer than many pathogenic bacteria, and are easy to detect and quantify.

Figure 1. Generic disinfection diagram



A number of methods can be used to disinfect wastewater. These include chemical agents, physical agents, and irradiation. For onsite applications, only a few of these methods have proven to be practical (i.e., simple, safe, reliable, and cost-effective). Although ozone and iodine can be and have been used for disinfection, they are less likely to be employed because of economic and engineering difficulties.

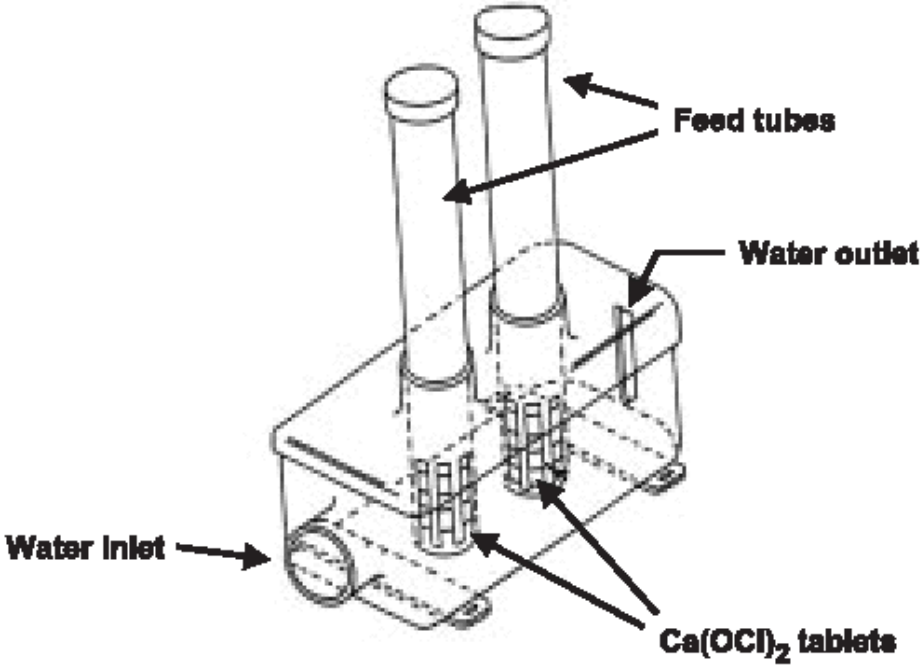
Chlorine

Chlorine is a powerful oxidizing agent and has been used as an effective disinfectant in water and wastewater treatment for a century. Chlorine may be added to water as a gas (Cl_2) or as a liquid or solid in the form of sodium or calcium hypochlorite, respectively. Because the gas can present a significant safety hazard and is highly corrosive, it is not recommended for onsite applications. Currently, the solid form (calcium hypochlorite) is most favored for onsite applications. When added to water, calcium hypochlorite forms hypochlorous acid (HOCl) and calcium hydroxide (hydrated lime, $Ca(OH)_2$). The resulting pH increase promotes the formation of the anion, OCl-, which is a free form of chlorine. Because of its reactive nature, free chlorine will react with a number of reduced compounds in wastewater, including sulfide, ferrous iron, organic matter, and ammonia. These nonspecific side reactions result in the formation of combined chlorine (chloramines), chloro-organics, and chloride, the last two of which are not effective as

difference between the chlorine residual in the wastewater after some time interval (free and combined chlorine) and the initial dose of chlorine is referred to as chlorine demand. The 15-minute chlorine demand of septic tank effluent may range from 30 to 45 mg/L as Cl; for biological treatment effluents, such as systems in Technology Fact Sheets 1, 2, and 3, it may range from 10 to 25 mg/L; and for sand filtered effluent, it may be 1 to 5 mg/L (Technology Fact Sheets 10 and 11).

Calcium hypochlorite is typically dosed to wastewater in an onsite treatment system using a simple tablet feeder device (figure 2). Wastewater passes through the feeder and then flows to a contact tank for the appropriate reaction. The product of the contact time and disinfectant residual concentration (Ct) is often used as a parameter for design of the system. The contact basin should be baffled to ensure that short-circuiting does not occur. Chlorine and combined chlorine residuals are highly toxic to living organisms in the receiving water. Because overdosing (ecological risk) and underdosing (human health risk) are quite common with the use of tablets, long swales/ditches are recommended prior to direct discharge to sensitive waters.

Figure 2. Example of a stack-feed chlorinator



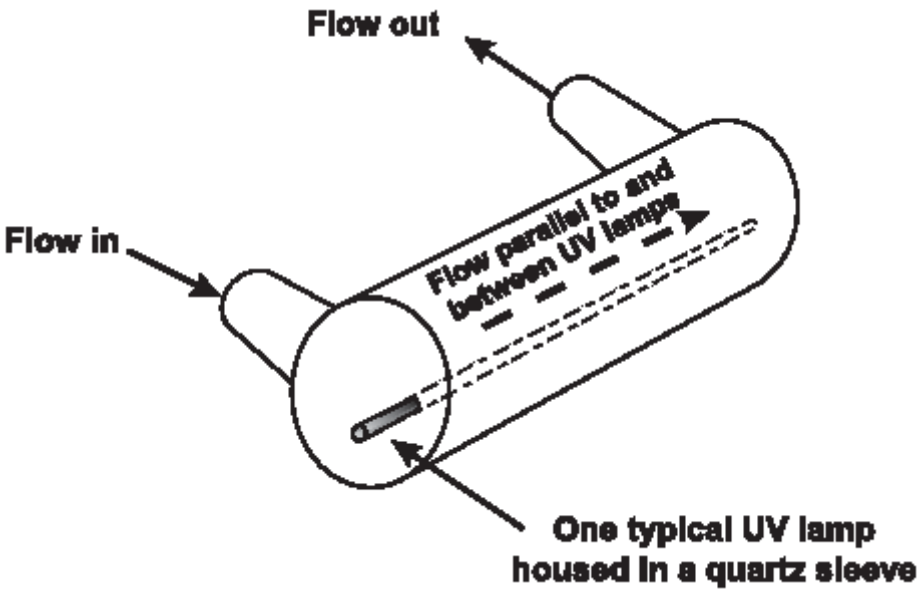
Use of simple liquid sodium hypochlorite (bleach) feeders is more reliable but requires more frequent site visits by operators. These systems employ aspirator or suction feeders that can be part of the pressurization of the wastewater, causing both the pump and the feeder to require inspection and calibration. These operational needs should be met by centralized management or contracted professional management.

Ultraviolet irradiation

The germicidal properties of ultraviolet (UV) irradiation have been recognized for many years. UV is germicidal in the wavelength range of 250 to 270 nm. The radiation penetrates the cell wall of the organism and is absorbed by cellular materials, which either prevents replication or causes the death of the cell. Because the only UV radiation effective in destroying the organism is that which reaches it, the water must be relatively free of turbidity. Because the distance over which UV light is effective is very limited, the most effective disinfection occurs when a thin film of the water to be treated is exposed to the radiation. The quantity of UV irradiation required for a given application is measured as the radiation intensity in microWatt-seconds per square centimeter ($mW\text{-}s/cm^2$). For each application, wastewater transmittance, organisms present, bulb and sleeve condition, and a variety of other factors will have an impact on the $mW\text{-}s/cm^2$ required to attain a specific effluent microorganism count per 100 mL. The most useful variable that can be readily controlled and monitored is Total Suspended Solids. TSS has a direct impact on UV disinfection, which is related to the level of pretreatment provided.

Many commercial UV disinfection systems (figure 3) are available in the marketplace. Each has its own approach to how the wastewater contacts UV irradiation, such as the type of bulb (medium or low pressure; medium, low, or high intensity), the type of contact chamber configuration (horizontal or vertical), or the sleeve material separating the bulb from the liquid (quartz or teflon). All can be effective, and the choice will usually be driven by economics.

Figure 3. Wastewater flow in a quartz UV unit



Typical applications

Disinfection is generally required in three onsite-system circumstances. The first is after any process that is to be surface discharged. The second is before a SWIS where there is inadequate soil (depth to ground water or structure too porous) to meet ground water quality standards. The third is prior to some other immediate reuse (onsite recycling) of effluent that stipulates some specific pathogen requirement (e.g., toilet flushing or vegetation watering).

Design assumptions

Chlorination units must ensure that sufficient chlorine release occurs (depending on pretreatment) from the tablet chlorinator. These units have a history of erratic dosage, so frequent attention is required. Performance is dependent on pretreatment, which the designer must consider. At the point of chlorine addition, mixing is highly desirable and a contact chamber is necessary to ensure maximum disinfection. Working with chlorinator suppliers, designers should try to ensure consistent dosage capability, maximize mixing usually by chamber or head loss, and provide some type of pipe of sufficient length to attain effective contact time before release. Tablets are usually suspended in open tubes that are housed in a plastic assembly designed to increase flow depth (and tablet exposure) in proportion to effluent flow. Without specific external mixing capability, the contact pipe (large-diameter Schedule 40 PVC) is the primary means of accomplishing disinfection. Contact time in these pipes (often with added baffles) is on the order of 4 to 10 hours, while dosage levels are in excess of those stated in table 1 for different pretreatment qualities and pH values. The commercial chlorination unit is generally located in a concrete vault with access hatch to the surface. The contact pipe usually runs from the vault toward the next step in the process or discharge location. Surface discharges to open swales or ditches will also allow for dechlorination prior to release to a sensitive receiving water.

Table 1. Chlorine disinfection dose (in mg/L) design guidelines for onsite applications

Calcium hypochlorite	Septic tank effluent	Biological treatment effluent	Sand filter effluent
pH 6	35 - 50	15 - 30	2 - 10
pH 7	40 - 55	20 - 35	10 - 20
pH 8	50 - 65	30 - 45	20 - 35
Note: Contact time = 1 hour at average flow and temperature 20ºC. Increase contact time to 2 hours at 10ºC and 8 hours at 5ºC for comparable efficiency. Dose = mg/L as Cl. Doses assume typical chlorine demand and are conservative estimates based on fecal coliform data.			

The effectiveness of UV disinfection is dependent upon UV power (table 2), contact time, liquid film thickness, wastewater absorbance, wastewater turbidity, system configuration, and temperature. Empirical relationships are used to relate UV power (intensity at the organism boundary) and contact time. Table 2 gives a general indication of the dose requirements for selected pathogens. Since effective disinfection is dependent on wastewater quality as measured by turbidity, it is important that pretreatment provide a high degree of suspended and colloidal solids removal.

Table 2. Typical ultraviolet (UV) system design parameters

Design parameter	Typical design value
UV dosage	20 - 140 mW/-s/cm^2
Contact time	6 - 40 seconds
UV intensity	3 - 12 mW/-s/cm^2
Wastewater UV transmittance	50 - 70%
Wastewater velocity	2 - 15 inches per second

Commercially available UV units that permit internal contact times of 30 seconds at peak design flows for the onsite system can be located in insulated outdoor structures or in heated spaces of the structure served, both of which must protect the unit from dust, excessive heat, freezing, and vandals. Ideally, the unit should also provide the necessary UV intensity (e.g., 35,000 to 70,000 mW-s/cm^2) for achieving fecal coliform concentrations of about 200 CFU/100 mL. The actual dosage that reaches the microbes will be reduced by the transmittance of the wastewater (e.g., continuous-flow suspended-growth aerobic systems [CFSGAS] or fixed-film systems [FFS] transmittance of 60 to 65 percent). Practically, septic tank effluents cannot be effectively

cfu/100 mL with UV. High-quality reuse standards will require more effective pretreatment to be met by UV disinfection. No additional contact time is required. Continuous UV bulb operation is recommended for maximum bulb service life. Frequent on/off sequences in response to flow variability will shorten bulb life. Other typical design parameters are presented in table 2.

Performance

There are few field studies of tablet chlorinators, but those that exist for post-sand-filter applications show fecal coliform reductions of 2 to 3 logs/100 mL. Another field study of tablet chlorinators following biological treatment units exceeded a standard of 200 FC/100 mL 93 percent of the time. No chlorine residual was present in 68 percent of the samples. Newer units managed by the biological unit manufacturer fared only slightly better. Problems were related to TSS accumulation in the chlorinator, tablet caking, failure of the tablet to drop into the sleeve, and failure to maintain the tablet supply. Sodium hypochlorite liquid feed systems can provide consistent disinfection of sand filter effluents (and biological system effluents) if the systems are managed by a utility.

Data for UV disinfection for onsite systems are also inadequate to perform a proper analysis. However, typical units treating sand filter effluents have provided more than 3 logs of FC removal and more than 4 logs of poliovirus removal. Since this level of pretreatment results in a very low final FC concentration (<100 CFU/100 mL), removals depend more on the influent concentration than inherent removal capability. This is consistent with several large-scale water reuse studies that show that filtered effluent can reach essentially FC-free levels (<1 CFU/100 mL) with UV dosage of about 100 mW-s/cm^2, while higher (but attainable) effluent FC levels require less dosage to filtered effluent (about 48 mW-s/cm^2) than is required by aerobic unit effluent (about 60 mW-s/cm^2). This can be attributed to TSS, turbidity, and transmittance (table 3). Average quartz tube transmittance is about 75 to 80 percent.

Table 3. Typical (UV) transmittance values for water

Wastewater treatment level	Percent transmittance
Primary	45 - 67
Secondary	60 - 74
Tertiary	67 - 82
Source: USEPA, 1986.	

Management needs

Chlorine addition by tablet feeders is likely to be the most practical method for chlorine addition for onsite applications. Tablet feeders are constructed of durable, corrosion-free plastics and are designed for in-line installation. Tablet chlorinators come as a unit similar to figure 2. If liquid bleach chlorinators are used, they would be similarly constructed. That unit is placed inside a vault that exits to the contact basin. The contact basin may be plastic, fiberglass, or a length of concrete pipe placed vertically and outfitted with a concrete base. Baffles should be provided to prevent short-circuiting of

the flow. The contact basin should be covered to protect against the elements, but it should be readily accessible for maintenance and inspection.

The disinfection system should be designed to minimize operation and maintenance requirements, yet ensure reliable treatment. For chlorination systems, routine operation and maintenance would include servicing the tablet or solution feeder equipment, adding tablets or premixed solution, adjusting flow rates, cleaning the contact tank, and collecting and analyzing effluent samples for chlorine residuals. Caking of tablet feeders may occur and will require appropriate maintenance. Bleach feeders must be periodically refilled and checked for performance. Semiskilled technical support should be sufficient, and estimates of time are about 6 to 10 hours per year. There are no power requirements for gravity-fed systems. Chemical requirements are estimated to be about 5 to 15 pounds of available chlorine per year for a family of four. During the four or more inspections required per year, the contact basin may need cleaning if no filter is located ahead of the unit. Energy requirements for a gravity-fed system are nil. If positively fed by aspirator/suction with pumping, the disinfection unit and alarms for pump malfunctions will use energy and require inspection. Essentially unskilled (but trained) labor may be employed. Safety issues are minimal and include wearing of proper gloves and clothing during inspection and tablet/feeder work.

Commercially available package UV units are available for onsite applications. Most are self-contained and provide low-pressure mercury arc lamps encased by quartz glass tubes. The unit should be installed downstream of the final treatment process and protected from the elements. UV units must be located near a power source and should be readily accessible for maintenance and inspection. Appropriate controls for the unit must be corrosion-resistant and enclosed in accordance with electrical codes.

Routine operation and maintenance for UV systems involves semiskilled technician support. Tasks include cleaning and replacing the UV lamps and sleeves, checking and maintaining mechanical equipment and controls, and monitoring the UV intensity. Monitoring would require routine indicator organism analysis. Lamp replacement (usually annually) will depend upon the equipment selected, but lamp life may range from 7,500 to 13,000 hours. Based on limited operational experience, it is estimated that 10 to 12 hours per year would be required for routine operation and maintenance. Power requirements may be approximately 1 to 1.5 kWh/d. Quartz sleeves will require alcohol or other mildly acidic solution at each (usually four per year) inspection.

Whenever disinfection is required, careful attention to system operation and maintenance is necessary. Long-term management, through homeowner-service contracts or local management programs, is an important component of the operation and maintenance program. Homeowners do not possess the skills needed to perform proper servicing of these units, and homeowner neglect, ignorance, or interference may contribute to malfunctions.

Risk management issues

With proper management, the disinfection processes cited above are reliable and should pose little risk to the homeowner. As mentioned above, a potentially toxic chlorine

residual may have an important environmental impact if it persists at high concentrations in surface waters. By-products of chlorine reactions with wastewater constituents may also be toxic to aquatic species. If dechlorination is required prior to surface discharge, reactors containing sulfur dioxide, sodium bisulfate, sodium metabisulfate, or activated carbon can be employed. If the disinfection processes described above are improperly managed, the processes may not deliver the level of pathogen destruction that is anticipated and may result in some risk to downstream users of the receiving waters. The systems described are compact and require modest attention. Chlorination does not inherently require energy input; UV irradiation and dosage pumps do consume some energy (>1kWh/day). Both processes will require skilled technical support for the monitoring of indicator organisms in the process effluents.

Chlorination systems respond to flow variability if the tablets are feeding correctly. UV does not do so and is designed for the highest flow scenario, thus overdosing at lower flows since there is no danger in doing so. Toxic loads are unlikely to affect either system, but TSS can affect both. Inspections must include all pretreatment steps. UV is more sensitive to extreme temperatures than chlorination, and must be housed appropriate to the climate. In extremely cold climates, the UV system can be housed inside the home with minimal danger to the inhabitants. Power outages will terminate UV disinfection and pressurized pumps for both systems, while causing few problems for gravity-fed chlorination units. There should be no odor problems during these outages.

Costs

Installed costs of a complete tablet chlorination unit are about $400 to $500 for the commercial chlorinator unit and associated materials and $800 to $1,200 for installation and housing. Operation and maintenance would consist of tablets ($30 to $50 per year), labor ($75 to $100 per year), and miscellaneous repairs and replacements ($15 to $25 per year), in addition to any analytical support required.

Installed costs of UV units and associated facilities are $1,000 to $2,000. O/M costs include power ($35 to $40 per year), semiskilled labor ($50 to $100 per year), and lamp replacement ($70 to $80 per year), plus any analytical support.

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EXCERPT FROM WASTEWATER SYSTEM AND POTABLE WATER SUPPLY RULES, EFFECTIVE JANUARY 1, 2005

§1-502 Minimum Site Conditions

(a) No site may be improved by the construction of wastewater system unless the site meets one of the following three sets of requirements regarding the minimum requirements for the site. Please note that these are only the requirements for the site and that requirements related to any specific type of leachfield must also be met. Also note that if a site meets these minimum requirements, non-naturally occurring soils may be used in certain types of wastewater system designs in order to meet the requirements for separation distance to bedrock or the seasonal high water table.

(b) Prescriptive Approach

(1) Sites that meet the following requirements can be improved using a prescriptive approach.

(A) There shall be at least 24" of naturally occurring soil with a percolation rate of 120 min/inch or less over bedrock.

(B) There shall be at least 24" of naturally occurring soil with a percolation rate of 120 min/inch or less above the seasonal high water table.

(C) The maximum ground slope shall not exceed 30% for wastewater systems on subdivided lots in existence before June 14, 2002. The maximum ground slope shall not exceed 20% for wastewater systems on lots that are subdivided on or after June 14, 2002. The maximum ground slope shall not exceed 30% for replacement wastewater systems no matter when the lot was created.

(c) Enhanced Prescriptive Approach

(1) Sites that meet the following requirements can be improved using the enhanced prescriptive approach.

(A) There shall be at least 18" of naturally occurring soil with a percolation rate of 120 min/inch or less over bedrock.

(B) The site must have at least 12", or the thickness of the "A" soil horizon plus 4", whichever is greater, of naturally occurring soil above the seasonal high water table. Sites with less than 18" of naturally occurring soil above the seasonal high water table must lower the water table as described below:

(i) A site may be approved without pre-testing of the drain when a designer prepares a plan incorporating drainage of the site and asserts that the drainage will lower the seasonal high water table to provide at least 18" of permeable soil below the

surface of the naturally occurring soil, and the Secretary agrees with the designer's assertion; or

(ii) if the Secretary does not agree, the designer may demonstrate through construction of a drainage system and the performance of groundwater monitoring in accordance with §1-506 below, that the seasonal high water table is lowered to at least 18" below the surface of the naturally occurring soil.

(C) The ground slope is at least 3% but does not exceed either 30% (for wastewater systems on subdivided lots in existence before June 14, 2002 and replacement systems on lots created at any point in time) or 20% (for wastewater systems on lots that are subdivided on or after June 14, 2002).

(D) The linear loading rate is not more than 2 gal/day/ft.

(E) The approvable site conditions must continue at least 25' downhill from the system or the toe of any fill used as part of a system.

(d) Performance Based Approach

(1) Sites that meet the following requirements may be improved using the performance-based approach.

(A) There shall be at least 18" of naturally occurring soil above bedrock.

(B) Sites that do not meet the above requirements for prescriptive designs or enhanced prescriptive designs for depth to seasonal high water table may demonstrate compliance with the rules, based on a detailed and site specific analysis. The analysis must demonstrate that the system will function during all portions of the year while maintaining at least 6" of naturally occurring unsaturated soil above the calculated level of the effluent plume. The analysis may be based on site specific hydraulic conductivity testing or on a desktop hydrogeologic analysis. All desktop hydrogeologic analyses shall be based on conservative assumptions. The level of information required in order to determine compliance with the rules will be related to site specific conditions with more "limited" sites requiring more detailed information.

(C) The maximum ground slope shall not exceed 20% for wastewater systems that are on lots subdivided on or after June 14, 2002. For systems built on other lots, including replacement systems, the

§1-502(d)(1)(C) Minimum Site Conditions

maximum ground slope shall not exceed 30%, unless the Secretary has granted a specific approval to exceed 30%.

(D) A site specific approval to construct a wastewater system on a subdivided lot in existence before June 14, 2002 with a ground slope exceeding 30% in the area of the wastewater system may be granted by the Secretary upon a request from a designer that:

(i) provides specific instructions on the method of construction;

(ii) Explains how the stability of the site will be maintained during and after construction with specific attention to erosion control; and

(iii) Provides site-specific guidance as needed for safe construction.

(e) Erosion control

An erosion control plan shall be submitted with each application involving construction of a wastewater system when the ground slope exceeds 20%. The plan shall address site stability in the area of the wastewater system before, during, and after construction. The plan shall include specifications for construction, surface water diversions if needed, and re-vegetation to prevent soil erosion.

(f) Restrictions

(1) Notwithstanding the requirements of any other subsection of this section, until July 1, 2007 the enhanced prescriptive and performance based approaches may not be used for wastewater systems on lots that are subdivided on or after June 14, 2002, unless the project is located in a municipality that has:

(A) a planning process confirmed under 24 V.S.A. §4350; and

(B) zoning bylaws.

(2) The enhanced prescriptive and performance based approaches may be used for wastewater systems on lots created after June 13, 2002 but before November 1, 2002 that are ten acres or greater in size without meeting the planning and zoning prerequisites listed above.

(3) The Agency of Commerce and Community Development shall maintain a list of all municipalities that meet the criteria of subdivision (f)(1) of this section. Once a municipality has been listed, it shall only be removed from the list if it has repealed its zoning bylaws or the bylaws have otherwise become invalid.