

## WHAT AFFECTS HOMEOWNER SATISFACTION WITH ADVANCED TREATMENT SYSTEMS?

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### Abstract

Between 1997 and 2003, the University of Rhode Island's Cooperative Extension Onsite Wastewater Training Center, under the auspices of several state and federal grant projects, installed 56 demonstration advanced wastewater treatment systems at local Rhode Island home sites to replace failed systems. Many of these systems offer pioneering technology for advanced nitrogen and bacterial removal as well as custom design for challenging site conditions. The majority of these systems are small scale systems designed to serve single family dwellings with design flows of 450 gallons per day, but several small community shared systems were also installed. URI staff regularly monitored the systems and conducted routine operation and maintenance in order to determine how well they were performing, to assess problems, and to consult with homeowners.

System performance monitoring has centered on wastewater treatment efficiency and operation and maintenance needs. Results show that advanced technologies can reduce biochemical oxygen demand (BOD) and total suspended solids (TSS) to levels as low as 10 mg/l, can significantly reduce bacteria counts, and some technologies are capable of reliably achieving 50 percent removal of total nitrogen. In addition, shallow pressurized drainfields have been shown to provide additional treatment of nitrogen and phosphorus. Treatment performance has been described in several publications (Loomis et al., 2001, 2002, 2004).

In an effort to formally evaluate the performance of the systems *from the homeowners' perspectives*, a survey was developed and distributed to the demonstration system participants in the summer of 2004. The purpose of the research was to assess the homeowners' levels of satisfaction with their systems, to understand their experience with the functioning of the system, and to determine issues that might have arisen. Fifty-six surveys were mailed, and a total of 30 surveys were returned and analyzed. Response rates vary greatly from survey to survey and are affected by nearly all aspects of the survey process. This 54 percent response rate was considered a success, and the results are statistically relevant. Those results and their implications for designers, installers, manufacturers, and regulatory bodies are discussed throughout the remainder of the paper. (Complete survey results are contained in Appendix B.) Some operation and maintenance issues are summarized for some technologies by Loomis et al. (2004).

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## **Overall Satisfaction**

The University of Rhode Island staff involved in the demonstration project has worked closely with the homeowners, from the design and installation stage to ongoing maintenance. The survey results expressed almost unanimous homeowner satisfaction with the URI team. The two respondents who were not satisfied with the URI team had significant difficulties with their systems, which were new, experimental systems. The URI team has taken those problems to manufacturers to assist in improved design, while trying to address homeowner concerns with the systems. While not the majority, those two experiences do emphasize the importance of stressing to the homeowner that an experimental system might not operate without faults. Those experiences also emphasize the importance of monitoring new, alternative systems, providing support to system owners, and making findings available to system designers and regulators. In addition, this gives the manufacturers the opportunity to respond proactively to end-user issues, implement corrective actions, and help eliminate future complaints and issues.

The survey revealed that more than 93 percent of survey respondents were satisfied or extremely satisfied with their alternative systems, compared to their previous system. The most important benefits cited include: environmental protection and reliability. In fact, about 83 percent of all respondents were satisfied or extremely satisfied with the reliability of the system. The one respondent who expressed dissatisfaction with the alternative system also expressed concern about the appearance of the system, the frequency of alarms, and odors. These were issues of concern, to varying degrees, for other respondents as well.

## **System Appearance**

Approximately 66 percent of respondents were satisfied or extremely satisfied with the appearance of the visible portion of the system. The remainder who were not satisfied cannot be linked to a particular type of system, but each expressed unhappiness with system components such as bottomless sand filters being located above ground or with access lids used.

It should be noted that all systems were designed with the goal of blending the system into the home landscape. Care was taken to minimize site disturbance and to locate above-ground components near outbuildings or existing vegetation in order to minimize visual impact. Nearly all manhole access riser covers use at-grade, green fiberglass lids to blend into lawns. To the extent possible, given space limitations, pumps, blowers and vents that might generate noise or odors were located away from high-use areas and quiet spots, and near existing utilities and service area walls. In some cases, either URI staff or the homeowner constructed decks or landscaped the system to hide or soften above-ground components.



An artistic approach: The homeowners used plantings and painting to decorate the textile filter and manhole lids.



This homeowner used landscaping to disguise the view of the peat filter lids.



This peat filter was tucked out of view under a second story deck.



Many homeowners express dissatisfaction with the look of bottomless sand filters.

This raises an important consideration for designers and installers. It is apparent that the functionality of the system is not the only characteristic that homeowners value. Efforts to blend above ground components into the landscape seem likely to improve a homeowner's overall satisfaction with a system. In fact, we strongly suggest addressing aesthetic concerns with homeowners prior to design and installation, in order to avoid surprises for all parties involved after the job is complete. However, it is important to note that regulatory setbacks and environmental issues might prevent system components from being located in the most optimal place from a homeowner's perspective.

### **System Alarms and Noises**

System alarms did not seem to be very frequent for most respondents. About 43 percent had never experienced an alarm, and 30 percent experienced an average of 1 per six to twelve months. The two respondents who experienced more than three alarms per month had either heavy water use or a pump failure.

Perhaps more important than alarm frequency to an evaluation of homeowner satisfaction, is the level of inconvenience experienced by homeowners when alarms sounded. Of those respondents who experienced alarms, approximately 35 percent found that they were not inconvenient, while about 40 percent found them to be a minor inconvenience. However, it is worth noting that the remaining 25 percent of respondents found the alarms inconvenient or very inconvenient.

While, the majority of the alarm inconvenience occurred for homeowners with older systems lacking remote telemetry capability, this does stress the importance of the new telemetry technology to designers and manufacturers. New telemetry products often notify the service provider before sounding an audible alarm, giving the service provider time to respond. Some products also have pre-set responses to alarm conditions and can identify and correct problems on their own.

Excluding alarms, 70 percent of respondents heard noises coming from their system. However, of those who heard noises, about 76 percent stated that they were not annoying. This leads us to conclude that system alarms pose more of a concern to homeowners than background system noises. In fact, homeowners have indicated during personal conversations that they often use the background noises as a gauge of the system actually working. However, it is still apparent from respondents' written comments that, when possible, they would prefer not to have system components located on or close to the house. Additionally, many respondents cited noise as one of the least desirable features about their system.

## **System Odors**

Odors should not be a factor in systems that are well designed, installed properly, and used under normal conditions. Odors typically occur during the first few weeks after system startup or after a system has been idle for a period of time (intermittent seasonal use). Approximately 75 percent of the residences where alternative systems were installed were full time occupied homes. Seasonal use may have been a factor in the presence of odor at some locations.

The survey revealed that 40 percent of respondents smelled septic odors. Of those who experienced odors, more than 83 percent noticed the odor only outside the house. Twenty-five percent of respondents rarely noticed the odors, while approximately 67 percent noticed them often or occasionally. More than 33 percent of these odors were reported as strong, while 50 percent were reported as moderate. The odors do not seem to be dependent upon technology type. The possible sources of odors include rooftop plumbing vents, system component vents, blowers, shallow drainfield access ports, pressurized systems, or lack of proper venting. However, it was not possible for us to identify the specific sources based on survey responses.

Our conclusions about how the odors affect homeowner satisfaction are based primarily on written comments from survey respondents. When asked to list the system feature with which the homeowner was least pleased, odor was the most common feature cited. Many of the lots selected for the system installations were quite small (5,000 square feet or less) so system component placement was limited. On such small lots, even faint septic odors may be noticeable and may become offensive and an issue to homeowners. Larger lots allowing more flexibility in placement of

components further away from socializing and recreational areas of the property, usually produces less odor issues.

### **System Costs**

All demonstration system owners received up to 50 percent of the cost of replacing a failed septic system in return for participating in the demonstration program. All system owners responded to newspaper or direct mail notices. In return, the homeowner agreed to allow URI staff access to construct, monitor, and maintain the systems for three years or longer, as well as to conduct tours of the system for training purposes. The system construction cost was therefore not a factor in this homeowner survey.

The survey results measuring homeowner satisfaction with maintenance costs are limited by the fact that about 33 percent of the respondents are still under contract with URI, and thus are not paying for maintenance. Approximately 57 percent of all respondents are satisfied or extremely satisfied with the maintenance costs. The three respondents who expressed dissatisfaction with maintenance costs have three different types of technologies.

Because of the electricity needs of specific systems, the survey also asked homeowners to evaluate electricity costs. Approximately 77 percent of respondents were satisfied or extremely satisfied with the electricity costs associated with their system. Again, the three respondents who were dissatisfied with the electricity costs of their system own three different types of technologies, so conclusions are limited. Two of these three technologies (fixed activated sludge system and recirculating trickling filter) do consume more electricity than other systems, so the homeowners' concerns seem, in large part, warranted.

In an effort to reduce noise and electrical use in fixed activated sludge systems, URI staff tested system operation with intermittent rather than continuous use of the blower, and smaller blower motor size. Intermittent blower use resulted in reduced treatment efficiency and the blower was reset to run continuously. The smaller size blower (1/4 HP) operating continuously appeared to produce adequate conditions for wastewater treatment.

The lesson that this illustrates is critical for installers or manufacturers seeking to maintain positive relationships with homeowners. Before a system is installed, the homeowner should be fully aware of the electric costs he/she is likely to incur. If only estimates are available, it should be stressed that the actual cost could vary. A table of average electrical costs based upon Rhode Island rates and other operation and maintenance costs is included in Appendix A. However, it is worth noting that the systems that use more electricity are also typically cheaper from an initial installation standpoint and have the additional advantage of a small footprint because the tank and treatment unit are combined.

### **System Awareness**

When asked how often the homeowner thinks about the maintenance or function of their system compared to a conventional system, respondents were divided; 40 percent reported thinking about their new system “more” than a conventional, while approximately 37 percent reported thinking about the new system “less.” Thirteen percent reported thinking about the new system the “same” amount, and 10 percent did not answer. The answers could not be correlated to specific types of technologies.

The split in results raises an interesting question that was not asked in this survey: do homeowners perceive thinking about a system as a negative, neutral, or positive characteristic? Several written responses indicated that homeowners had enjoyed the learning process that accompanied being involved with the demonstration project, and others expressed an interest in learning more about their systems. Given that the significant majority of respondents (83 percent) were confident in the reliability of their systems, the increased awareness of the maintenance and function of the system may be related more to increased involvement than a concern about functionality. Since all demonstration system owners took the initiative to apply for participation in the program, this survey group is likely to include more “early adopters” willing to experiment with innovation than the general public.

However, many respondents also did not know the answer to fundamental questions about system performance, such as pump-out frequencies, alarm frequencies, and water usage changes. While this might be an issue with survey design, it is also possible that the perceived reliability of these systems has inspired a group of homeowners to be less aware of system functioning. At least one homeowner was pleased to note he did not have to think about the demonstration system because of its dependability, compared to the constant worry with his previous, failing septic system.

## **Final Conclusions**

The limited sample size for each of the types of technologies demonstrated (10 different types of technologies in total) does not allow us to make sweeping generalizations based on specific systems. We can, however, highlight the characteristics of systems that seem to affect homeowner satisfaction. Appearance, alarms and background noise, odors, and general reliability seem to be significant attributes that homeowners evaluate when acclimating to a system. Electricity costs were also negative factors for owners of energy-intensive systems. However, we were unable to draw conclusions about satisfaction with system construction or maintenance costs since these were subsidized by grant funds. While the majority of survey respondents indicated that environmental or water quality protection was the most important benefit of their alternative system, it is also clear that homeowners are not willing to sacrifice all other characteristics for that choice.

It is important that homeowners should be actively involved during the design stages of their system so that they are aware of the financial, aesthetic, noise, potential odor and other aspects of owning and operating an advanced onsite wastewater treatment system. The design or installation professional needs to appraise their client(s) of the advantages and disadvantages of the various suitable treatment technologies to minimize surprises after the system is installed. The installation professional needs to help the homeowners understand how the system depicted on a site plan or

blueprint will look on the home landscape before actual installation begins. This will help to minimize issues associated with placement of components and aesthetics.

In addition, the use of remote telemetry units makes the operation and maintenance of technologies more proactive, resulting in a more transparent process for the end-user. This very same process has been successful in the centralized wastewater treatment field and should prove beneficial to homeowners, regulatory agencies, and service providers.

### **Acknowledgements**

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**Appendix A. Annual Advanced Treatment System Operation and Maintenance Costs for Residential Applications in Rhode Island.<sup>1</sup>**

| Type of System                                                                                               | Estimated Annual Electric Cost (@ \$0.15/kwh) | Average Annual Maintenance Contract Cost <sup>2</sup>   | Maintenance Frequency (times/year) |
|--------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------|------------------------------------|
| <b>AdvanTex System</b> (RX-30) textile coupon filter with fan and pressurized drainfield option <sup>3</sup> | \$135                                         | \$225-300                                               | 2                                  |
| <b>AdvanTex System</b> (AX-20) textile hanging sheet filter and pressurized drainfield option <sup>3</sup>   | \$55                                          | \$225-300                                               | 2                                  |
| <b>FAST System</b> (1/3 HP blower) with pressurized drainfield option <sup>3</sup>                           | \$330                                         | \$250-350                                               | 2                                  |
| <b>Norweco Singulair</b> with conventional drainfield option <sup>4</sup>                                    | \$250                                         | \$175-250                                               | 2                                  |
| <b>Puraflo Peat Biofilter</b> with pressurized drainfield option <sup>3</sup>                                | \$25                                          | \$175-250                                               | 1                                  |
| <b>Recirculating Sand Filter</b> with pressurized drainfield option <sup>3</sup>                             | \$45                                          | \$225-300                                               | 2                                  |
| <b>Single Pass Sand Filter</b> with pressurized drainfield option <sup>3</sup>                               | \$25                                          | \$200-275                                               | 1                                  |
| <b>Ultraviolet Light Disinfection Unit</b>                                                                   | \$35                                          | \$70-170 (includes lamp replacement once every 2 years) | 1-3                                |

<sup>1</sup> Based in part on data obtained from the Block Island - Green Hill Pond Demonstration Project. Additionally, costs are based on up to 600 gallons/day.

<sup>2</sup> These estimates do not cover septage pumpouts. FAST and Norweco Singulair systems have less trash storage capacity and may require pumpouts every 2 years. Also, maintenance contract costs for any technology will be approximately \$100 higher for island locations.

<sup>3</sup> Pressurized drainfield option = Bottomless Sand Filter (BSF) or Shallow-Narrow Drainfield (SNDF).

<sup>4</sup> Typical conventional trench or chamber drainfield technology. Pressurized drainfield options would add approximately \$100 to annual maintenance costs.

## Appendix B1

All percentages contained in this appendix are based on 30 returned surveys. Therefore, 3.3 percent represents one respondent. Responses to open-ended questions are contained in Appendix B2.

The questions below will help us better understand your septic system's performance.

1. How long have you lived where the Alternative System was installed?

(average) 12 **Years**

2. Do you live there year round? **Yes** 76.7% **No** 23.3%

If no, how many months is the house used in one year? (average) 8.3 **Months**

3. What is the total number of residents who live in the house in one year?

(average) 3 **Residents**

4. Given the septic system that was originally at your site, what is your satisfaction with the new one? (Please check one.)

**Extremely Satisfied** 53.3% **Satisfied** 40% **Unsatisfied** 0%

**Extremely Unsatisfied** 3.3% **Don't Know** 0% **Non-Respondent(s)** 3.3%

5. What is the most important benefit to you?

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6. Compared to a conventional septic system (or public sewer) in good working order, how would you rate your satisfaction with your system?

**Extremely Satisfied** 56.7% **Satisfied** 30% **Unsatisfied** 6.7%

**Extremely Unsatisfied** 3.3% **Don't Know** 0% **Non-Respondent(s)** 3.3%

Please circle your response to the following questions.

| How satisfied are you with:                                                          | Extremely Satisfied | Satisfied | Unsatisfied | Extremely Unsatisfied * | Don't Know | Non-Respondent(s) |
|--------------------------------------------------------------------------------------|---------------------|-----------|-------------|-------------------------|------------|-------------------|
| 7. The overall construction and installation costs?                                  | 50%                 | 43.3%     | 3.3%        | 0.0%                    | 3.3%       | 0.0%              |
| 8. The maintenance costs?                                                            | 30%                 | 26.7%     | 10%         | 0.0%                    | 33.3%      | 0.0%              |
| 9. The electricity costs?                                                            | 20%                 | 56.7%     | 10%         | 0.0%                    | 13.3%      | 0.0%              |
| 10. The frequency of pump outs?                                                      | 16.7%               | 36.7%     | 6.7%        | 0.0%                    | 36.7%      | 3.3%              |
| 11. The pump out costs?                                                              | 10%                 | 33.3%     | 6.7%        | 0%                      | 46.7%      | 3.3%              |
| 12. The reliability of your septic system?                                           | 43.3%               | 40%       | 13.3%       | 0%                      | 3.3%       | 0.0%              |
| 13. The appearance of the visible portions of the system?                            | 23.3%               | 43.3%     | 20%         | 10%                     | 3.3%       | 0.0%              |
| 14. The time it takes for your maintenance provider(s) to respond to a service call? | 20%                 | 56.7%     | 10%         | 0.0%                    | 13.3%      | 0.0%              |
| 15. The quality of the work by your maintenance provider(s)?                         | 30%                 | 33.3%     | 0.0%        | 3.3%                    | 33.3%      | 0.0%              |
| 16. The knowledge of your maintenance provider(s)?                                   | 26.7%               | 33.3%     | 3.3%        | 0.0%                    | 36.7%      | 0.0%              |
| 17. The URI team?                                                                    | 66.7%               | 26.7%     | 6.7%        | 0.0%                    | 0.0%       | 0.0%              |

|                                                                 |       |       |      |      |      |      |
|-----------------------------------------------------------------|-------|-------|------|------|------|------|
| 18. Your decision to have a URI demonstration system installed? | 66.7% | 23.3% | 0.0% | 3.3% | 3.3% | 3.3% |
| 19. Your septic system overall?                                 | 56.7% | 36.7% | 3.3% | 0.0% | 3.3% | 0.0% |

**Please Note: The next 4 questions apply only to those people who live in houses that share a wastewater system with other houses.**

| How satisfied are you with:                                                              | Extremely Satisfied | Satisfied | Unsatisfied | Extremely Unsatisfied* | Don't Know | Non-Respondent(s) |
|------------------------------------------------------------------------------------------|---------------------|-----------|-------------|------------------------|------------|-------------------|
| 20. The fact that you share a septic system/drainfield?                                  | 0.0%                | 0.0%      | 0.0%        | 0.0%                   | 3.3%       | 96.7%             |
| 21. The agreement you have with other neighbors who share the septic system /drainfield? | 0.0%                | 0.0%      | 0.0%        | 0.0%                   | 3.3%       | 96.7%             |
| 22. The manner by which neighbors have upheld the agreement?                             | 0.0%                | 0.0%      | 0.0%        | 0.0%                   | 3.3%       | 96.7%             |
| 23. The manner by which neighbors have treated/maintained the shared property?           | 0.0%                | 0.0%      | 0.0%        | 0.0%                   | 3.3%       | 96.7%             |

**\*Please Note:** If you answer **Extremely Unsatisfied** for any questions, it would be most helpful if you indicate your reasons in **Question #47, "Other Comments,"** at the end of the survey.

24. With what system feature(s) or function(s) are you most pleased?

25. With what system feature(s) or function(s) are you least pleased?

26. Compared to a functioning conventional septic system or sewer, how often do you think about the maintenance or function your septic system? (Check one.)

**More** 40%    **About the Same** 13.3%    **Less** 36.7%    **Non-Respondent(s)** 10%

27. If applicable, has it been a problem or inconvenient to make your system available for inspection and tours?

**Yes** 0%    **No** 93.3%    **Non-Respondent(s)** 6.7%

28. Has your alternative septic system affected your water use? (Check One)

**Yes** 13.3%    **No** 63.3%

**Don't know** 16.7%    **Non-Respondent(s)** 6.7%

If so, how? \_\_\_\_\_

If so, how inconvenient was it to switch to your new water use habits? (Check one)

**Not at all inconvenient** 50%    **Minor inconvenience** 50%

**Inconvenient** 0.0%    **Very inconvenient** 0.0%

29. Approximately how often do you have a system alarm? (Check one.)

**Never** 40%    **1 per 6-12 mos.** 36.7%    **1 per 3-6 mos.** 13.3%

**1 per 1-3 mos.** 0.0%    **1-3 per month** 0.0%

**More than 3 per month** 6.7%    **Non-Respondent(s)** 6.7%

30. How inconvenient are these alarms? (Check one.)

**Not at all inconvenient** 40%    **Minor inconvenience** 60%

**Inconvenient** 0.0%    **Very inconvenient** 0.0%    **Non-Respondent(s)** 0.0%

31. Approximately how often do you have your system pumped?

(average) **Once every 2.4 year(s)**

32. Excluding pump outs, how often is your routine maintenance scheduled?  
(Check one.)

**Never 3.3%      1 per 6-12 mos. 46.7%**

**1 per 3-6 mos. 3.3%      1 per 1-3 mos. 3.3%**

**1-3 per month 0.0%      More than 3 per month 0.0%      Non-Respondent(s) 43.3%**

33. Excluding routine maintenance, how often do you need to schedule a service call? (Check one.)

**Never 16.7%      1 per 6-12 mos. 40%**

**1 per 3-6 mos. 3.3%      1 per 1-3 mos. 3.3%**

**1-3 per month 0.0%      More than 3 per month 0.0%      Non-Respondent(s) 43.3%**

34. Excluding routine maintenance, approximately how many service calls do you think you have made since your system was installed, (or if applicable, since you have been living where the alternative system was installed)?

(average) **4.2 Calls**

35. Has your system needed emergency service since its installation?

**Yes 36.7%      No 43.3%**

**Don't Know 16.7%      Non-Respondent(s) 3.3%**

**Questions 36 and 37 are only for people who have required emergency service.**

36. Did you have an active maintenance plan at the time of the emergency?

**Yes 16.7%      No 6.7%      Don't know 13.3%      Non-Respondent(s) 63.3%**

37. Can you describe the problem(s)? \_\_\_\_\_

\_\_\_\_\_

38. Has a power failure occurred since your alternative system was installed?

**Yes** 63.3%      **No** 13.3%      **Don't know** 20%      **Non-Respondent(s)** 3.3%

If so, did this affect the system function? Please describe.

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39. Do you trust your system to function properly through power failures?

**Yes** 46.7%      **No** 10%      **Don't know** 43.3%

40. Do you trust your system to function properly through freezing temperatures?

**Yes** 63.3%      **No** 13.3%      **Don't know** 23.3%

41. Are there other times when you do not trust your system to function properly? Please elaborate.

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42. Do you ever smell septic odors?    **Yes** 40%      **No** 60%

If so, where is the odor located? (Check one.)

**Inside the house** 0.0%      **Outside the house** 83.3%      **Both** 16.7%

If so, how often do you smell the odors? (Check one.)

**Always** 8.3%      **Often** 33.3%      **Occasionally** 33.3%      **Rarely** 25%      **Never** 0.0%

Can you describe the strength of the odors? (Check one.)

**Overwhelming** 8.3%      **Strong** 33.3%      **Moderate** 50%      **Slight** 8.3%

Do you have any other comments about the odors (for example, odors present throughout yard, only near the system components, sporadic events, etc.) ?

43. Excluding alarms, do you ever hear any noises coming from the septic system component?

**Yes** 70%    **No** 26.7%    **Non-Respondent(s)** 3.3%

If so, are the noises annoying?    **Yes** 23.8%    **No** 76.2%

Do you have any comments about the noises?

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44. Have you had any difficulty finding a maintenance provider?

**Yes** 6.7%    **No** 40%    **Not Applicable** 53.3%

If so, please describe.

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45. Do you have any comments (positive or negative) about the maintenance that these systems require?

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46. Would you have done anything differently had you known then what you know now?

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47. Other comments? (Please note that your comments are **GREATLY** appreciated.)

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## Appendix B2

Written responses to the open-ended questions are contained in this section.

### Question 5. What is the most important benefit to you?

1. Not to smell the system or hear it
2. Our house is right on Ninigret Pond, with high water table, so we feel good about not polluting the pond
3. It doesn't leak!
4. That it is better for the environment/ URI personnel look after it
5. Capacity as well as environmental safety to barrier ponds
6. Having an up to date system on a very small lot
7. Not being worried about a system failure
8. I don't have to have it cleaned every six months
9. I am able to have five bedrooms on my lot
10. Septic system that works.
11. Knowing it is environmentally sound!
12. Reliability and up-to-date code requirements
13. Reliability
14. Knowing I have a new system
15. Modern, reliable system, clean operating
16. Reduction of groundwater pollution
17. A system we feel secure with
18. Peace of mind (not polluting the pond)
19. Environmentally sound
20. The team of professionals who installed it.
21. Ecological
22. It's not adding to the problems on the cove. My grass is the best over the leach field!!
23. Environmentally sound
24. Minimizing the effects of septic system effluent on Green Hill Pond.
25. Environmental
26. It is reliable, we feel that we are doing the right thing for the environment
27. Addition of a washing machine
28. Knowing that the system has minimal environmental impact on the saltwater cove on which we live
29. More environmentally friendly

### Question 24. With what system feature(s) or function(s) are you most pleased?

1. I am pleased the toilets flush
2. Don't know enough about the system yet to answer
3. Doesn't leak, environmentally healthy
4. Quite pump, greener grass

5. The quality of the effluent
6. Only have to have it cleaned once a year
7. Efficiency
8. Being monitored by URI team / reliability so far
9. Low maintenance-Reliability
10. All function that produce a clean result
11. Purity of effluent
12. Fertilization of backyard
13. Apparent reliability of the system
14. Regulated pumping-environmental
15. That it works! And we have had no problems!
16. It's totally enclosed and accessibility to the tanks and lines are very handy
17. It's Working!
18. Reduction of coliforms in effluent
19. Knowing that we are not harming the environment
20. Compact- Fits in a small area (backyard)
21. Environmentally sound
22. Increased environmental friendliness

**Question 25. With what system feature(s) or function(s) are you least pleased?**

1. You can smell the system in the driveway and also hear the system at night, when I use to hear the ocean in bed
2. Noise (thumps can be heard in dining room)
3. Wish there was somehow to have less manholes, bit it's a necessity
4. The steps are specialized tools for routine answered maintenance
5. Smells most of the time
6. There is nothing about the system that doesn't please us!
7. Space it takes in the yard – though I've gotten used to it! (And less intrusive than other systems I've seen)
8. No problems as of this date with the system
9. Odor problem
10. The physical appearance – sand filter
11. Float activated pumping system appears difficult to fine tune (frequent, unpredictable alarms)
12. None
13. Noticeable odor, at times
14. Look and odor of area around system (esp. when pump runs)
15. Frequency of the pump. The “knock” on the wall when the system engages. Our light tends to dim also upon engaging.
16. We find if we have guests for a long period of time or a party that the septic will alarm a lot and we are not very sure why
17. When things go wrong –Oh! Boy! It requires a pump out,(\$300+) the technician(\$50/hr) parts(\$?) - put the alarm in the house with a shut off switch!!!
18. Peat Filter- Have had some odor problems-minor

19. The noise of the timer for pump-very loud
20. Number of parts that may have to be replaced. Lack of adequate electrical protection for the MVP Avantex Panel (Replaced in 200 due to lightning storm)!
21. Use of electricity, electro/mechanical devices
22. The yard is small and the ground grates are very ugly and intrusive (beyond what we were expecting)

**Q28. Has your alternative system affected your water use? If so, how?**

1. We feel free to use the system and less worried about failure
2. I spread laundry loads over the week
3. Very conservative with water use, have installed low water usage toilets, appliances
4. We think it should be about the same as before this install
5. Washing machine, flush more frequency-increased usage

**Q37. Did you have an active maintenance plan at the time of the emergency? Can you describe the problem?**

1. The system smells terrible. Not all the time, but every other day!
2. Twice wasn't pumping water out- floaters weren't working also froze up
3. Water overflow
4. Odor problem
5. Pump failure
6. Lightning hit micro switch
7. No
8. tank floated out of ground / system in need of pumping and alarm kept going off
9. Alarming
10. Frozen pipes, needed a new timer, pump problems
11. Fuse holder/fuse was damaged

**Q38. Has a power failure occurred since your alternative system was installed? If so, did this affect the system function? Please describe.**

1. Don't know
2. No
3. System alarm rang and was simply dealt with
4. Yes, it didn't work had to have a electrician put new breaker in
5. Did not affect
6. Did not affect the system
7. No
8. It continued to hold waste water for length of power failure
9. Did not affect system
10. No
11. No- power not out long enough total

12. Never
13. No
14. Sets off alarms shortly after restoration-even lightning within the area affects the system's power supply
15. No
16. Not to my knowledge
17. No
18. MVP Advance panel had to be replaced in 2000 (lightning hit)
19. No, not to my knowledge

**Q41. Are there other times when you did not trust your septic system to function properly? Please elaborate?**

1. No
2. No
3. No- I expected it to function properly all the time
4. None
5. No
6. No
7. No
8. During parties
9. It seems to like to react to non-use (vacation times)
10. No
11. No
12. Power outage for extended period of time
13. No

**Q42. Do you have any other comments about the odors (for example, odors present throughout yard, only near the system components, sporadic events, etc.)?**

1. The original odor was overwhelming but after 3 complaints to septic-tech they fixed
2. Throughout yard
3. Only seems to occur when fluid is entering the system
4. Only near the system
5. Is strongest when pump is running
6. Seems to be near sand trap-have had it checked by J.D.Riser
7. Odors occur near peat filters, but disseminate into a larger area in damp weather so it just smells moderate to strong now!!!
8. Near vent
9. Odor present throughout yard, but yard is very small, smell dissipates quickly
10. Appears to be coming from the burner near the textile filter

**Q43. Do you have any comments about the noises?**

1. It sounds like flushing water outside of my bedroom. I use to be able to hear the ocean now I hear the septic system. Very Unsatisfied!
2. I can live with them!
3. No
4. Pump sounds are very minor and heard only when I listened closely over the chamber to steps but isn't a problem check functioning after power failure.
5. Had to turn off alarms, now only lights go on
6. None
7. Thanks! Control box should be located away from house
8. Hear pond start
9. Because system is so close to house, the noise is noticeable
10. Every time pump comes on there is a loud clunk sound (sounds a bit like a car door slamming)
11. Just the flushing of the system
12. The click of the box drives my daughter nuts-but that's ok! The pump vibrates the porch
13. Noise is usually either a gurgling sound over the leach field inspection cover or electrical switch noise in control panel
14. Thump against the house when timer activates
15. If near the Advantex Panel, occasionally hear a popping sound just before blower activates
16. "Thump" when system cycles, sound of pumping liquid, front lawn
17. We heard noises after system was installed but no longer hear them. They were loud and annoying. We have repeatedly attempted to find out why we no longer hear the noises but no one returned our phone or email inquiry. Very frustrating!!!

**Q44. Have you had any difficulty finding a maintenance provider? If so, please describe.**

1. Septic-Tech takes too long to get to the problem. Complaints go unresolved.
2. The system still under demonstration provide maintenance
3. We will need to line one up
4. Would like information as to specific maintenance procedures for this type of system. Septic tank with recirculating trickling filter.

**Q45. Do you have any comments (positive or negative) about the maintenance that these systems require?**

1. Have not incurred any bills as of yet but bas in the system have broken twice in a year "manufactures defect"
2. The maintenance has not been explained to me yet
3. Love the system-little maintenance required
4. I would like to obtain a set of standardized maintenance tools
5. When it was put in I was told the electric would run about ten to fifteen it ended up running about forty dollars a month
6. Very good

7. No
8. The system seems to work fine
9. No
10. Very moderate maintenance
11. It could be a financial burden
12. URI Crew has been GREAT!
13. No problems
14. I don't recall what the maintenance schedule is. Would love another copy of the maintenance schedule
15. Don't know yet
16. These systems require more thoughts, work, time and costs than the conventional one. The owner should have been taught the basics of maintenance instead of learning it by trial and error.
17. Good
18. System appears to be almost MTCE free, URI still monitors and does MTCE, should peat need changing frequency, it could become costly
19. Cost is great for electricity
20. We need more information about what to do when alarm goes off and where/hoe to arrange for service after initial phase of the program
21. Would like information as to specific maintenance procedures that will be required and frequency

**Q46. Would you have done anything differently had you known then what you know now?**

1. Yes, I would have installed a different system
2. Yes, I would have paid attention in school like my parents told me
3. No
4. It is still unclear if my outdoor shower drain is connected to the system
5. Since the technology is constantly changing, improvements have been made in each component of the system I have and I would like to have had prior knowledge that you could upgrade each component
6. No, it was great trying something that would help the environment
7. Get to know more about it
8. No! It has been great! WE especially like being part of the demonstration aspect of the project.
9. No
10. No
11. No
12. No
13. No
14. I would not have allowed the system to be built 18" above the ground with a misplaced deck over it. The deck was appreciated, but looks out of place where it was built and odors come form beneath it making it not very pleasant to sit at.
15. Asked for more education for maintenance, installed an inside alarm not an outside one with a shutoff switch-saves on freezing or getting wet or having to go out in the middle of the night to shut it off

16. No
17. No
18. Put a muffler on the timer switch
19. No
20. Would have strongly insisted that system be rewired so that lights in house don't dim when system cycles. URI never explained why this happens. David Dow claimed no funds were available to correct this, at that time
21. Yes! WE would have made sure there would be someone who responds to our questions in an efficient and timely way. We would have not signed off before thorough examination of the yard.

**Q47. Other comments? (Please note that your comments are GREATLY appreciated.)**

1. My wife and I are very upset over the decision of having the system.
  - a. It smells
  - b. It is loud at night (flushing water sound)
  - c. The covers" black ones" are terrible and my 2 year old daughter can lift them off exposing" dangerous gases" They need to be changed out with the "green covers"
  - d. The whole system takes up my entire front yard and looks terrible. (black covers are unattractive) and gravel pit does not help my property value.
2. We are pleased with the system. The URI staff as well as the system installer did a very professional job.
3. Am thrilled with the system. URI, the DEM and David Dow worked a miracle to install it on my lot. Sure it "thumps" periodically, but each thump reminds me that if not for that system, my house would have been condemned! Thank You!!
4. The URI personnel have been great and do an exceptional service to this community by providing these systems. David Dow and George Loomis have been a pleasure to work with. My husband and I had many questions and they were very helpful
5. We very much appreciate the opportunity to participate in this program. Mr. Dow was wonderful to work with and we have peace of mind knowing that we have done all we could to protect the barrier ponds.
6. So far so good! System is new- but we are very pleased with it. We don't even know it is there and so glad it was done by URI-a load off our minds
7. See # 46 above. Also: Filter bed material has changed since my installation and I would like information on the life span of my components eq. Pumps, fans, filter material. Otherwise these systems are spectacular in their function and efficiency in producing a practically clean effluent that provides soil nutrients and ostensibly protects the aquifer from contamination.
8. It was great the first four years but now it has to be updated would love to get into another program
9. I need to understand what will happen now that URI is finished with the 2 year maintenance (I can be reached at 401-466-3180)
10. David's team are great people!
11. We would recommend this system as we know it at this time.
12. The overall response time from URI and SeptiTech have been very good.

13. When we approved the type of system installed we were told all components would be installed and surfaces would be at ground level. The peat tanks are 1' – 1'6 above ground level. The tops are corrugated vinyl and unsightly. We were forced to build a 3 section deck to cover – I have asked if the tank maintenance could prove light weight rigid (aluminum) covers that would permit foot traffic and blend with the surrounding lawn areas. This seems like a reasonable request as the systems are located in the front of homes.
14. Very good system. Very reliable. URI has been very cooperative
15. The system was trouble-free until the pump failed. Since then we have had problems with stuck floats and timing adjustments. The system appears to be functioning since the last adjustment this week. I waited to complete this survey until the problem was resolved. My apologies for its lateness.
16. We feel very secure with the professional installation and handling and maintenance of our system
17. If I could be guided through the cleaning process again!
18. Many times when the alarm activates it is not heard inside the house. But the neighbors certainly get an earful whom in turn give an earful to the homeowner! More homeowner education for simple maintenance is needed without it costing to take a class more realistic maintenance costs needed to be used when convincing a homeowner to take on these systems. I was told it would cost approx. \$60. a year and its \$250 per year with 2 check-ups and \$50/hour plus mileage if an emergency arises. Thankfully J.D.Riser will also attempt to reset dial by phone to save costs! After the pipes froze one winter- I am concerned each year. The problem cost me a pump out(\$300), stress because alarm kept activating and I had to go out in the cold and snow to shut it off during the night.
19. System is working well-very pleased
20. It has been a pleasure being a participant in this program. URI and maintenance staff have been very responsive to questions and have responded in a timely manner to the few minor difficulties experienced with the system.
21. Pump rains continuously 24/7, I would like that reduced
22. Very pleased with the way installation was handled-URI folks were great to work with
23. We have been extremely satisfied with the construction, installation, maintenance and performance of our septic system. Construction/installation and URI representatives have always been professional in all their contacts. As mentioned in 44 &45, we would like information pertaining to qualified maintenance providers and procedures prior to our taking over maintenance. Also, a list of suppliers for system components would be helpful in the event that replacements are required.
24. None other than ones provided. With the return of this questionnaire do you think you can get back to me?