Appendix A: Program Evaluation

Environmental Risk Assessments for Drinking Water Protection in the Wildcat and Sugar Creek watersheds of Indiana: Narrative of Results

Introduction

A pilot project was developed and carried out in a small geographic area of Wildcat and Sugar Creek watersheds in central Indiana. This included mostly Clinton County, Indiana, with a few sites in Carroll County and Montgomery County. The focus of the study was to evaluate the Indiana Farm*A*Syst and Home*A*Syst program, while involving citizens in pollution prevention and water resource protection. The materials and methods used were for environmental site assessment and contaminant risk assessment of drinking water. Well testing was included as part of the study.

A two-page survey was mailed in a local newspaper and in the Clinton County Extension Newsletter. Those wishing to participate filled out the survey and returned it to us. Participants were divided into two groups, one group received on-site assistance and the other group was mailed all necessary materials in order to complete a self-assessment. These groups were divided as evenly as possibly between farm and non-farm sites.

90 farm and home sites participated in the study. Reliable data for both pre and post-testing was available from 72 of these sites for analysis. Accounting for those excluded; 14 sites were completed by volunteer assistants and accurate data was not obtained. 3 sites were completed while out in the field at the suggestion of neighboring participants. In these cases a neighbor, mother, and son had requested that I stop and perform these extra on-site assessments, which I was happy to do. However, these three sites had not previously requested to participate in the study and had not filled out a pre-survey and therefore are not included in the data analysis.

The project focused on homes and farms with private well water. However, there were ten home sites included in the study that were on public water and sewer.

Reasons for Evaluating the Program

In order to understand the effectiveness of a program like Farm*A*Syst and Home*A*Syst, evaluations are necessary. Nationwide only one evaluative study has been published on Farm*A*Syst with regard to impact on participant's activities, knowledge, and attitudes, and one to date on Home*A*Syst. Several states have carried out surveys focused on activity changes due to program participation, and the costs associated with those changes, but not with regard to knowledge or attitudinal changes. Michigan completed a baseline study for their Groundwater Stewards Program, that includes Farm and Home assessment materials, but no on-site assessments were included in the study. In Indiana we have a short survey in post card form from 36 self-assessments done in Indiana in 1997. The surveys suggested that 81% of participants thought the surveys were beneficial to them, while 14% then made changes in practices, with another 25% planning to make changes. We do not have data from assessments completed with technical assistance. We also do not know to what extent the program materials and risk assessment methods affect participants' attitudes, knowledge, and activities related to protecting water resources. In addition to these reasons, our contract with IDEM states that we must carry out before/after surveys together with on-site assessments in at least two 14-digit watersheds.

Objectives

We proposed to initiate a project that 1) Encouraged a large number of people in a small geographic area to participate in protecting their water supplies, 2) Evaluated the impact of Indiana Farmstead Assessment and Home*A*Syst on the activities, attitudes, and knowledge of Indiana residents regarding water resources, materials, and land uses that can impact water quality. 3) To use what we learn from the study to develop strategies that more effectively utilize the Indiana Farmstead Assessment System and Home Assessment System tools to meet the needs of Indiana citizens.

Materials & Methods

We used the following sources and research studies to help guide us in designing our program evaluation:

Moreau, R. J. 1996. Cost-benefit analysis of voluntary pollution prevention programs in the agricultural sector: case study of the Farm Assessment System (Farm*A*Syst). Ph.D dissertation, University of Wisconsin-Madison. This research also used specific survey instruments with farmers in Louisiana which we reviewed.

Dillman, D.A. 1978. *Mail and Telephone Surveys: The Total Design Method*. Wiley-Interscience. We closely followed the advice in this text on how to deliver the surveys and get the information we required from individual residents.

Krueger, D. and Suvedi, M. 1996. Citizens' knowledge, attitudes, and groundwater stewardship practices: a baseline study. Center for Evaluative Studies, Michigan State University.

Ricker, K.T., et. al. 1998. Water quality project evaluation: a handbook for objectives-based evaluation of water quality projects. Bulletin 868, Ohio State University Extension. This bulletin was very helpful for guiding our thoughts in what we wanted to learn, the specific kinds of questions we needed to ask, and the best way to phrase the questions.

We also worked closely with our steering committee, especially Cathy Burwell, in reviewing and improving the survey instruments prior to using them in the program evaluation.

We accomplished the above objectives by introducing the project to residents in two watersheds; Wildcat Creek and Sugar Creek within Clinton and Carroll Counties. Overall, comparisons will be able to be made between two groups of residents, 1) Those that complete pre- and post-surveys and have an on-site assessment, 2) those that complete both surveys and do a self-assessment. Wildcat Creek and Sugar Creek Watersheds were chosen for several reasons: 1) travel distance for feasibility in completing 100 on-site assessments in a short time period, 2) a current working relationship with local conservation partnership and other established contacts, 3) Wildcat Creek has been designated as a high priority area by respective Soil & Water Conservation Districts residing within the watershed, as well as by the Indiana Department of Environmental Management, 4) 95% of the land base is agricultural, yet there are urban, rural, farm, and ethnic populations that will aid in extrapolating the study results to the rest of Indiana.

Project Actions to achieve objectives

1) Encourage a large number of people in a small geographic area to participate in protecting their water supplies.

The primary method of securing participation by the watershed residents was to direct mail a packet that includes a cover letter explaining the purpose of the project, how participating will benefit the resident and how the resident will be assisting us in developing the program for Indiana. Included in the packet will be a pre-survey booklet, and a program brochure. Surveys were mailed using two sources. The first was the local Extension office Newsletter. Five hundred copies were mailed that included the pre-survey and project information. The second delivery mechanism was a local newspaper that we used a geographically focused mailing to 1,000 residents. The residents could indicate whether they preferred an on-site assessment or the materials to conduct their own assessment. The surveys were coded to correspond with an address location. This was to help insure confidentiality, yet allow us to compare pre- and post-survey results.

Incentive to participate in the project was a free and confidential water test performed by the person doing the assessment (Nitrate/Bacteria/Pesticide screening).

2) Evaluate the impact of Indiana Farmstead Assessment and Home*A*Syst on the activities, attitudes, and knowledge of Indiana residents regarding water resources, materials, and land uses that can impact water quality.

We encouraged participants to schedule an on-site assessment of their home or farm. Participants received information about their own activities and facilities, and the risk levels they imposed on water resources. Assistance was offered in developing a personal action plan for reducing high-risk activities or altering facilities. Participants also received the appropriate surveys, fact sheets, and guide books for their own reference.

A pre-survey focused on water resources gave us baseline information. This baseline was then compared with results from a post-survey that was completed by the residents four to six weeks following the assessment. Both survey instruments included questions to elucidate changes in attitudes, knowledge, activities, skills regarding water resources.

To understand the level of influence that Farm*A*Syst or Home*A*Syst had on participants' attitudes and knowledge about materials and land use impacts on water quality, appropriate sections on materials and land use was included in both the pre- and post-survey instrument. The results gave us some understanding of how residents rank impacts of various contaminants on water resources. The results from material and land use impact rankings also gave us insight into how to target our program. For instance, if fuel handling and storage is ranked low, then based on available evidence we should do more to educate that fuel is a high impact material.
3. To use what we learn from the study to develop strategies that more effectively utilize the Indiana Farmstead Assessment System and Home Assessment System tools to meet the needs of Indiana citizens.

Questions on the surveys regarding the assessment materials aided in understanding how participants viewed the materials and to what degree the materials were helpful. Comparisons between the on-site assessment group with residents that did a self-assessment helped us understand the advantages of each method.

SAFE WATER FOR THE FUTURE SURVEY

The following questions concern your drinking water, activities that affect water quality, and your knowledge about groundwater and pollution. Please answer each question by circling the response of your choice or writing in your answer where appropriate. You are not expected to know all of the answers to all of the questions. Participating in a home or farm assessment will help provide the answers, and help you to protect your drinking water. The information you provide will remain anonymous.

1. Where does your current household tap water come from?
   a. Private well water
   b. Public water system
   c. Other _____

2. Do you use a water filter or other treatment for your drinking water? **Yes or No**

   If you answered Yes, what type (*not brand*) of treatment system do you use?

   _____

3. Do you purchase bottled water?

   Never Sometimes Always

4. Suppose you found out that your water supply was polluted with a high level of nitrates. If you were told that actions a, b, and c below had an equal chance of providing you with a clean water supply, and cost was not a factor, which course of action would you be **most** likely to take? (please circle **one** letter.)

   a. Find source of nitrates and correct the problem
   b. Install water-treatment equipment to remove nitrates
   c. Find a new water supply

5. Groundwater does not move, unless pumped.

   Agree Disagree Don't Know

6. Have you had your septic system inspected and cleaned out in the last three years? **Yes or No**

   ___ we are on a public sewer

7. How many years ago was your drinking water tested for contaminants? (please circle one)
   a. Less than 1 year
   b. 1-3 years
   c. More than 3 years
   d. Never

8. Which of the following do you think are considered hazardous products? (circle all that apply)
   a. Gasoline
   b. Paint thinner
   c. Oil
   d. Baking Soda
   e. Anti-freeze
   f. Batteries
   g. Household chemical cleaners
   h. Yard and garden chemicals/pesticides

9. Septic systems need starters and enzymes added to them to function properly.

   Agree Disagree Don't Know

10. Do you burn garbage or plastic containers?

    Yes or No

11. Do you ever mix, apply, or store lawn, garden, or agricultural pesticides within 100 feet of a well, stormwater drain, or tile inlet?

    Yes or No

12. Have you replaced any standard toilets and faucets with water conserving fixtures?

    Yes or No

13. If you change the oil from your car, lawnmower, tractor, or other equipment do you take it to be recycled?

    Yes or No

___*oil is changed at a service center*

14. Non-toxic products and methods for dealing with problem weeds and bugs can reduce pesticide use.

    Agree Disagree Don't Know

15. If you use fertilizers do you first test the soil for available nutrients?
    Yes or No

16. Fuel leaking in or on the ground may contaminate a drinking water well 10 years later.

    Agree Disagree Don't Know

17. If you had leftover oil-based paint what would you do with it?

18. Which of the following can harm the life of a septic system? (circle all that apply)

    a. Too much water
    b. Too little water
    c. Diapers
    d. Solvents
    e. Driving over the absorption field

19. Groundwater under clay soil is more vulnerable to contamination than groundwater under sandy soil.

    Agree Disagree Don't Know

20. What is your primary motivation to participate in this project? (circle one please)
    a. curiosity
    b. home and farm health & safety
    c. protection of water supply
    d. free water test
    e. Other
    _____

21. Of the following, which one do you feel poses the most threat to your drinking water? (please circle one letter)
    a. animal manure
    b. fertilizers
    c. gasoline and oil
    d. pesticides
    e. septic systems
    f. other _____
    g. none

22. What is your present age? (please circle letter)
    a. under 25 years old
    b. 25-44 years old
    c. 45-64 years old
    d. 65 and over

23. Are you male or female? (please circle) **M or F**

24. How many children of the following ages live in your household? (please write number in blank)

    Infants (under two years) ___
    Toddlers (3-5 years old) ___
    Older children (6-17 years old) ___

25. Do you own, operate, or participate in the operation of a farm?
    Yes or No

If yes then please continue, otherwise skip to question 28.

26. How many acres did you farm in 1999?
    a. Less than 100 acres
    b. 100 – 499 acres
    c. 500 – 899 acres
    d. 900 or more acres

27. Do you store any of the following on your farmstead? (please circle all that apply)
    a. pesticides
    b. fertilizers
    c. manure
    d. gas, diesel fuel, or fuel oil
    e. no, do not store

28. Please indicate how you would like to participate by checking the boxes below.

☐ I would like to be considered for an on-site farm ☐ or home ☐ assessment and free water screening. I have provided my daytime phone number so you can call me to set up an appointment.

☐ However, if an on-site assessment/water screening is not available I still want to receive materials so I can complete my own assessment. I have provided you my mailing address.

☐ I prefer to receive the assessment materials by mail to do my own farm ☐ or home ☐ assessment. I have provided you my mailing address.

Please mail this survey with your Name, Address, Phone information (from the cover letter) to: Brent Ladd, 1146 ABE, Purdue University, West Lafayette, IN 47907.

SAFE WATER FOR THE FUTURE EVALUATION

1. I have completed the:
   a. Farm*A*Syst program
   b. Home*A*Syst program

2. Suppose you found out that your water supply was polluted with a high level of nitrates. If you were told that actions a, b, and c below had an equal chance of providing you with a clean water supply, and costs were not a factor, which course of action would you be **most** likely to take? (please circle **one** letter.)
   d. Find source of nitrates and correct the problem
   e. Install water-treatment equipment to remove nitrates
   f. Find a new water supply

3. Septic tanks need enzymes and yeasts added to them to operate effectively

   Agree Disagree Don't Know

4. Non-toxic products and methods for dealing with problem weeds and bugs can reduce pesticide use.

   Agree Disagree Don't Know

5. If you had leftover oil-based paint what would you do with it?

6. Which of the following can harm the life of a septic system? (circle all that apply)

   f. Too much water
   g. Too little water
   h. Diapers
   i. Solvents
   j. Driving over the absorption field

7. Groundwater does not move, unless pumped.

   Agree Disagree Don't Know

8. Groundwater under clay soil is more vulnerable to contamination than groundwater under sandy soil.

   Agree Disagree Don't Know

9. When going about your daily activities, are you now more mindful of water quality issues?
   Yes or No

10. How helpful do you feel the Farm*A*Syst or Home*A*Syst program was in answering your questions and helping you to understand how activities and structures can pose a risk to drinking water contamination?

a. very helpful
b. moderately helpful
c. a little helpful
d. not helpful at all

11. How important was it to have a water quality specialist come to your farm or home to help you complete the Farm*A*Syst or Home*A*Syst program?

a. The specialist was necessary in order for me to complete the program.
b. I could have completed the program on my own, but found it helpful to have the specialist assist me.
c. I could have completed the program on my own. The specialist was not necessary.
d. I completed the program on my own, but would have preferred help from a specialist.
e. I completed the program on my own. It isn't necessary to have a specialist visit the site.

12. Has participation in the Farm*A*Syst or Home*A*Syst program improved your ability to protect your drinking water?

a. Greatly improved my ability
b. Moderately improved my ability
c. Improved my ability a little
d. Did not improve my ability at all

13. How much time did you spend completing your environmental site assessment?

_____ hours on the farm or home

_____ hours doing additional research, travel, time at Extension office, phone, etc.

=_____ total hours spent

14. What value (in dollars per hour) do you put on the time that you spent in completing the assessment?
   $_____/hour

15. Would you recommend either Home*A*Syst or Farm*A*Syst to others? **Yes or No**

16. Please indicate below **any** changes you **have** made in your activities or management that prevent pollution, due to your participation in Farm*A*Syst or Home*A*Syst. (use additional sheets if needed)

Changes Already Made	Out-of-pocket cost	Time you spent making changes	Approximate date of change
Examples: Had septic system inspected and pumped Changed to non-toxic cleaners	$150.00 $ none	1 hour 1 hour researching	July 8, 2000 July 18, 2000
#1)	$		
#2)	$		
#3)	$		
#4)	$		
#5)	$		

17. Please indicate below **any** changes you **plan** to make in your activities or management to prevent pollution, due to your participation in Farm*A*Syst or Home*A*Syst. (use additional sheets if needed)

Changes Planned	Out-of-pocket cost (Estimate)	Time you estimate to make change	Planned date of change
Examples: Install secondary containment for fuel tanks Recycle plastics rather than burn them	$500 $none	6 hours 2 hours per month	October, 2000 October, 2000
#1)	$		
#2)	$		
#3)	$		
	$		
#5)	$		

18. What recommendations do you have to make the Farm*A*Syst or Home*A*Syst program better?

19. In thinking about pollution and preventing pollution, how do you feel about your farm or home place?

20. Again, in thinking about your farm or home and preventing pollution to water, if you could have anything you want for your farm or home place that would help you reduce or prevent pollution what would it be?

    How would you make it happen?

21. Did you find doing your own water testing was (circle one): **easy** **difficult** **did not perform a water test**

22. Please indicate water test results: **Bacteria**: Positive or Negative **Pesticides**: Positive or Negative

Thank you for your assistance.
If you would like to receive a final report of the results please check this box ☐ and provide your name and mailing address below.

Name:_____
Address: _____

_____

Please mail this survey with your comments in the addressed and stamped envelope provided to:
Brent Ladd, Farm*A*Syst /Home*A*Syst Project, 1146 ABE Building, Purdue University, West Lafayette, IN 47907

ADDITIONAL COMMENTS ON BACK OF THIS PAGE PLEASE:

Obtaining Survey Information

The pre-survey was easy for us to obtain, since only residents that returned a completed pre-survey were selected for participation. Getting residents to fill out the post-survey evaluation and return it to use was more difficult. We followed the advice found in Dillman's *Total Design Method* and mailed an SASE along with a short cover letter and post-survey to each participant. This generated a good response, but we received only about half of the post-surveys. We used two more follow-up letters, SASE and post-surveys and was able to raise the response rate. In an effort to include as many participants in the post-survey evaluation as possible we phoned those participants we had not heard from. This resulted in a small increase in obtaining post-survey data.

Statistical Analysis

All survey data was coded and entered into a database for analysis. We used SPSS, version 10.0.5, to organize the data and run analyses. The paired T-test was used to evaluate differences between pre-survey and post-survey responses for each participant. Chi-square test was used to evaluate significant differences within survey questions and One-Way ANOVA was utilized to compare differences between and within categories of on-site vs. self-assessed, and farm vs. non-farm.

Results

Results are organized below by survey and by question, if relevant.

Pre-survey results

(Questions 4, 5, 9, 14, 17, 18, 19 corresponded with questions 2, 3, 4, 5, 6, 7, 8 on post-survey respectively. Changes in answers from presurvey to postsurvey are given here in the pre-survey results for these questions).

Q1: *Where does your current household tap water come from?*

86.1% said private well water
13.9% said public water supply

Q2: *Do you use a filter or other treatment for your drinking water?*

43.6% said they used no water treatment at all.
23.9% indicated they used only a water softener due to iron problems
32.4% indicated that they used some type of filtration system over and above a water softener.

Q3: *Do you purchase bottled water?*

Over half of participants never purchase bottled water for drinking (51.4%), while 40.0% said they sometimes purchase bottled water and 8.6% indicated they always purchase bottled water for drinking.

Q4: *Suppose you found out that your water supply was polluted with a high level of nitrates. If you were told that actions a, b, and c below had an equal chance of providing you with a clean water supply, and cost was not a factor, which course of action would you be* ***most*** *likely to take? (please circle* ***one*** *letter.)*

g. Find source of nitrates and correct the problem
h. Install water-treatment equipment to remove nitrates
i. Find a new water supply

This question is taken from the Louisiana Farm*A*Syst study that was used as an indicator of "prevention mindedness". The question revolves around what type of action the participant would choose to take in correcting a nitrate problem, if money were not a consideration. The best answer is "the most prevention directed". On the pre-survey 53.0% of participants chose the best answer, "Find and correct the source of the nitrate problem". This increased to 72.7% of participants choosing the best answer on the post-survey. A Paired T-test was performed for pre and post-survey comparisons and was not significant at the 95% level ($p = .090$)

Q5: *Groundwater does not move, unless pumped.*

74.3% understood the fact that groundwater moves through the soil. After participants had completed the assessment, 87.2% answered correctly on the post survey about groundwater movement. A Paired T-test was performed for pre and post-survey comparisons and was not significant at the 95% level ($p = .210$)

Q6: *Have you had your septic system inspected and cleaned out in the last three years?*

38.7% of participants with a septic tank said they had their septic tank inspected or pumped out within the past three years.

Q7: *How many years ago was your drinking water tested for contaminants? (please circle one)*

A large percentage of participants said they have never had their drinking water tested for contaminants (46.2%). 4.5% have had water tested within the past year, 7.5% within the last three years, and 41.8% have had it tested once, but not in the last three years.

Q8: *Which of the following do you think are considered hazardous products? (circle all that apply)*

i. Gasoline
j. Paint thinner
k. Oil
l. Baking Soda
m. Anti-freeze
n. Batteries
o. Household chemical cleaners
p. Yard and garden chemicals/pesticides

The majority of participants understand what products are considered hazardous (77.8%). The correct answer was all except d.

Q9: *Septic systems need starters and enzymes added to them to function properly.*

Only 39.1% correctly indicated that they are not necessary. This improved to 58.7% on the post survey, indicating that more people understood that natural bacteria populations in the septic tank will perform best if no additives are used. A Paired T-test was performed for pre and post-survey comparisons and was not significant at the 95% level (p = .090)

Q10: *Do you burn garbage or plastic containers?*

Two thirds of participants stated that they do not burn garbage (66.2%), whereas about one third continue to burn garbage and plastics and other materials (33.3%).

Q11: *Do you ever mix, apply, or store lawn, garden, or agricultural pesticides within 100 feet of a well, storm water drain, or tile inlet?*

69.6% of respondents said they do not mix or apply chemicals within 100 feet of a well, storm water drain, or tile inlet. Nearly one third (30.4%) indicated they do mix chemicals within 100 feet of these sensitive areas.

Q12: *Have you replaced any standard toilets and faucets with water conserving fixtures?*

About half of the participants have installed water-conserving fixtures in their homes (48.6%)

Q13: *If you change the oil from your car, lawnmower, tractor, or other equipment do you take it to be recycled?*

The majority of participants said they make sure that oil from cars, tractors, lawn mowers, etc. gets recycled (88.9%).

Q14: *Non-toxic products and methods for dealing with problem weeds and bugs can reduce pesticide use.*

Most people agreed that non-toxic methods and products for pest control are available and would reduce pesticide use (83.1%). This increased slightly to 87.2% on the post survey. A Paired T-test was performed for pre and post-survey comparisons and this increase was not significant at the 95% level (p = .660)

Q15: *If you use fertilizers do you first test the soil for available nutrients?*

About half of participants test for soil nutrients prior to applying fertilizer (50.7%).

Q16: *Fuel leaking in or on the ground may contaminate a drinking water well 10 years later.*

The majority of people understood that fuels are mobile in groundwater and a fuel leak in a storage tank could eventually contaminate a water well (83.3%).

Q17: *If you had leftover oil-based paint what would you do with it?*

Most people knew what to do with unused/unwanted hazardous products by taking them to a hazmat day or other acceptable disposal site (72.3%). This increased to 83.7% on the post

survey evaluation. This increased slightly to 87.2% on the post survey. A Paired T-test was performed for pre and post-survey comparisons and this increase was not significant at the 95% level (p = .254)

Q18: Which of the following can harm the life of a septic system? (circle all that apply)

k. Too much water
l. Too little water
m. Diapers
n. Solvents
o. Driving over the absorption field

Although this question may have been difficult to answer correctly, the large percentage of incorrect answers (94.2% of respondents) indicates a lack of specific knowledge about septic systems. The correct answer was all except for b. Unfortunately, efforts to thoroughly educate participants about septic systems did not improve the response on this particular question for the post survey. The number of incorrect answers decreased slightly to 87.2% on the post survey. A Paired T-test was performed for pre and post-survey comparisons and this decrease was not significant at the 95% level (p = .570)

Q19: *Groundwater under clay soil is more vulnerable to contamination than groundwater under sandy soil.*

A small majority of people were correct (65.2%) in understanding level of risk that different soil types present for ground water. This improved to 74.5% of respondents on the post survey. A Paired T-test was performed for pre and post-survey comparisons and this increase was not significant at the 95% level (p = .570)

Q20: *What is your primary motivation to participate in this project? (circle one please)*

f. curiosity
g. home and farm health & safety
h. protection of water supply
i. free water test
j. Other

Nearly half (45.2%) indicated they wanted to preserve their health and safety, 33.9% said protecting the water supply was most important, 11.3% participated because of the free water test, and 9.7% were simply curious. However, during the on-site assessments many participants said they were most interested in participating due to the free water test. This suggests that people will "tell you what you want to hear", rather than being totally honest. Never the less, participating because of concern for drinking water quality is still a very good reason. The Chi-Square test indicated a significant difference in the motivation to participate (X^2= 22.516, p < 0.001). There was no difference in response between farm and non-farm participants (F=.344, p=.560)

Q21: *Of the following, which one do you feel poses the most threat to your drinking water? (please circle one letter)*

h. animal manure
i. fertilizers
j. gasoline and oil
k. pesticides
l. septic systems
m. other _____
g. none

Nearly half (45.3%) of residents indicated that pesticides were their top concern, 21.9 % stated fertilizers, septics came in at 10.9%, animal manure at 9.4%, and Gasoline/Oil was 6.3%. 3.1% indicated other types of contaminants and 3.1% said they believe there is no threat to their drinking water. The Chi-Square test indicated a significant difference in the motivation to participate ($X^2 = 61.344$, $p < 0.001$) and interestingly the ranking of the potential contaminants was identical for both farmers and non-farmers ($F=1.303$, $p=.258$).

Demographics of participants

Q22, Q23, Q24, Q25, Q26, Q27

Age of Participant	Percentage of Total Participants
Under 25	0.0
25-44	16.7
45-64	55.6
65 and Older	27.8

Participant Gender.

Male	Female
79.2%	20.8%

Sites with Children Living in the Home.

Children in the Home	No Children in the Home
29.5%	70.5%

Farm and Non-farm Participants.

Farm Owner/Operator	Non-Farm Resident
46.5%	53.5%

Farms and Acreage owned/managed.

Acres Owned or Managed	Percent of Total Farm Sites
Fewer than 100	21.6
100-499	40.5
500-899	13.5
900 or More	24.3

Potential Contaminants Stored on Participating Farm Sites

Potential Contaminant Type	Percentage of Farms Storing
Fuel	86.8
Pesticides	42.1
Animal Manure	36.8
Fertilizer	21.1
None of the Above	10.5

Post survey evaluations

(Questions 1-8 results are given within the corresponding pre-survey questions above)

Q9: *When going about your daily activities, are you now more mindful of water quality issues?*

Of participants responding, 94.3% said yes (X^2=41.679, $p < 0.001$).

Q10: *How helpful do you feel the Farm*A*Syst or Home*A*Syst program was in answering your questions and helping you to understand how activities and structures can pose a risk to drinking water contamination?*

e. very helpful
f. moderately helpful
g. a little helpful
h. not helpful at all

Just over half (50.9%) of all participants said the Farm*A*Syst or Home*A*Syst program was *very helpful* to them in answering questions and understanding the risk level of activities to drinking water. 47.2% indicated that the program was *moderately helpful* and 1.9% said it was *a little helpful*. No one said the program was of no help in this regard. (X^2=23.698, $p < 0.001$). ANOVA test indicates that there was no significant difference in response between OS and SA participants (F=.195, p=.661) showing that the program can be helpful even for those that do not receive technical assistance.

Q11: *How important was it to have a water quality specialist come to your farm or home to help you complete the Farm*A*Syst or Home*A*Syst program?*

f. The specialist was necessary in order for me to complete the program.
g. I could have completed the program on my own, but found it helpful to have the specialist assist me.
h. I could have completed the program on my own. The specialist was not necessary.
i. I completed the program on my own, but would have preferred help from a specialist.
j. I completed the program on my own. It isn't necessary to have a specialist visit the site.

Answers to this question seemed to depend on whether or not the participants received help during the program. 50.0% of those receiving on-site help said that a specialist was necessary in order for them to have completed the program. The other 50.0% said they could have completed the program on their own, but found it helpful to have the specialist assist them. Of those who completed the program on their own, 65% said a specialist is not necessary for the program to be

completed and 35% said they completed the program on their own, but would have preferred help from a specialist.

These results indicate that about half the people need assistance if they are to complete Farm*A*Syst or Home*A*Syst and the other half feel they can do it on their own. However, when one looks at how many people actually followed through with completing the final survey (post survey), less than half of those who did self-assessments returned the post survey (48.6%) compared to 85.7% of participants who received on-site assistance. This was after we mailed two additional surveys with cover letters. A third attempt to solicit a response included a direct phone call and we were able to include a few more participant answers. The fact that many of the people who were mailed the materials failed to respond indicates that the self-assessed method is less successful in getting people to complete the program. I believe most people had the good intentions of doing the assessment and water tests, and I received a few calls well after the study had finished with people saying they were sorry they had not responded or done anything with the materials, but they fully intended to "when they had a chance".

We can conclude that a more successful method than self-assessed is to have an appointment with the home or farm owner and to have a technician or specialist help them complete the assessment and make recommendations during the assessment.

Q12: *Has participation in the Farm*A*Syst or Home*A*Syst program improved your ability to protect your drinking water?*

e. Greatly improved my ability
f. Moderately improved my ability
g. Improved my ability a little
d. Did not improve my ability at all

Of all respondants, 31.4% said it greatly improved their ability, 43.1% said it moderately improved their ability, 11.7% said it improved their ability a little, and 13.7% said the program did not improve their ability at all. (X^2=13.706, $p < 0.01$). An ANOVA test was run comparing on-site assessment and self-assessed in their response on this question. Those receiving help were more likely to indicate that their ability to protect their drinking water had been greatly improved (39.4%) compared with those completing assessments on their own (16.7%), (F=3.973, p=.052). Some answers to this question had some "hidden meaning" in that some respondents actually wrote out to the side that the reason the program did not improve their ability was that they felt they were at the mercy of neighbors "upstream". However, most participants understood the question to mean "protect my drinking water by improving what I do around my home or farm".

Q13: *How much time did you spend completing your environmental site assessment?*

Participants spent an average of 1.95 hours of their time in completing an assessment. Those receiving on-site assistance spent less time compared with those doing self-assessments (1.7 hours vs. 2.4 hours), F=3.045, p=.088. All of these results make sense in that when given help the process is more efficient.

Those on farms spent more time doing assessments compared with non-farm home owners (2.4 hours vs. 1.7 hours), but this difference was not statistically significant (F=2.271, $p <$ .140), yet validates that farm sites usually have more potential risks than non-farm home sites and thus will need more time to complete an assessment.

Q14: *What value (in dollars per hour) do you put on the time that you spent in completing the assessment?*

Participants placed an average dollar value of $19.60 per hour on the time they devoted to doing an assessment. Farm owners placed a higher value on their time at $21.43 per hour compared with non-farm home owners at $17.27 per hour. Those who did the assessment on their own placed a slightly higher value on their time than those who received on-site assistance ($22.50/hr vs. $18.24/hr, respectively).

Q15: *Would you recommend either Home*A*Syst or Farm*A*Syst to others?*

Nearly every participant who responded said they would recommend either Farm*A*Syst or Home*A*Syst to others (98.1%). This shows that they felt doing their own assessment was helpful to them and could be helpful for others in their community.

Q16: *Please indicate below **any** changes you **have** made in your activities or management that prevent pollution, due to your participation in Farm*A*Syst or Home*A*Syst.*

Overall, 35.9% of participants responding indicated that they had already made at least one activity change due to the program. Most participants responded on the post survey 4 to 6 weeks after doing their assessments. Comparing those who received on-site assistance (OS) with those who did not (SA), 42.9% of those receiving on-site assessments made at least one activity change compared with only 22.2% of those doing self assessments, but this difference was not significantly significant (F=1.751, p=.192). However, this difference does show that when a specialist guides the land owner through an assessment and makes recommendations for management changes that participants are more likely to make a change than if they received no assistance. Overall, farmers were slightly more likely to make at least one activity change than their non-farm counterparts (41.6% vs. 30.8%).

Onsite Post Surveys

- Put farm chemicals in secondary containment. (102)
- Had septic tank pumped. (103)
- Changed water filter that was on too long (118)
- Test for bacteria again. (118)
- Put less solids down the disposal (120a)
- Recycle cans and bottles (120a)
- Put in new filter bed (134)
- Limit laundry to 2 or 3 loads per day to lessen load on septic (135)
- Eliminate use of weed killer in well area (135)
- Had new septic system put in. (138)
- Septic tank pumped (157) (124)
- Stopped using lawn sprays around well. (173)
- Pumped septic system (124)

Self Assessed Post Surveys

- Recycle trash (107)
- Discontinue disposing of motor oil on farm (158)
- Discontinue filling herbicide sprayer near well site. (158)
- Have septic tank pumped (156)
- Clean spills on concrete (156)

Q17: *Please indicate below **any** changes you **plan** to make in your activities or management to prevent pollution, due to your participation in Farm*A*Syst or Home*A*Syst.*

35.8% of all participants indicated that they planned on making at least one change in the future. There was no appreciable difference between on-site and self assessed groups here (F=.044, p=.834). More non-farm home owners indicated they intended to make at least one activity change in the future compared with farm owners (42.5% vs. 33.3%).

Onsite Post Surveys

- Keep looking for changes to make. (111)
- Test for bacteria again. (118)
- Change water filter more frequently. (118)
- Label fuel tanks (120a)
- Be more aware when filling sprayer tanks (120a)
- Check for fuel leaks from underground tanks (123)
- Recycle herbicide containers (127)
- Test well (132)
- Recycle cans and paper (134) (135) (173)
- Have water checked every year (140)
- Pump and inspect septic system (151) (157)

Self Assessed Post Surveys

- More careful in handling used oils for recycling. (107)
- More careful when mixing chemicals and rinsing containers. (107)
- Fill in old unused well (119)
- Put in new septic system (165) (115)
- Recycle plastics and paper products (156)
- Decrease pesticide use (156)

*Question 18 What recommendations do you have to make the Farm*A*Syst or Home*A*Syst program better?*

Onsite Post Surveys

- Test all well premises (111)
- More publicity (118)
- Guarantee a non-threatening situation (127)
- Video whole family could watch (135)
- Update home water testing method-kitchen not good sample source; run water before. (137)
- Extend program to Clinton City (138)
- Water should be tested annually. (154)

Self Assessed Post Surveys

- Explain the water sample test more thoroughly. (152)
- Make it available to more people. (107)
- Questionnaire too long. (158)
- Advertise more. (159)
- Follow up phone call as a reminder to complete tests. (163)

Question 19 In thinking about pollution and preventing pollution, how do you feel about your farm or home place?

Onsite Post Surveys

- Fairly safe (102) (144) (124)
- Doing best to keep quality of water safe (103)(112)
- I don't pollute (106)
- Good (118) (135) (200) (153)
- In good shape (123) (128) (138)
- Finding source of a coliform which giving positive bacteria reading (133)
- Polluted by town of Jefferson—anything they can do? (134)
- Wish septic tank was further from well. (140)
- Concerned due to close proximity of golf course and their use of pesticides (154)
- Worried about drinking water (157)
- Feel more aware (173)

Self Assessed Post Surveys

- Good. (152) (107) (119) (158) (143) (115)
- More alert to potential pollution. (146)
- Doing all can. (159)
- More care with drained oil and recycling products would help (156)

Water Testing Data

Well Sampling Methods:

The following products were used to test well water: AccuCheck Nitrate-Nitrite Strips, LaMotte Bacteria 5-Tube Test Kits, and Silver Lake Research Pesticide Screen Kits. Well water was collected for the testing either from an outside hydrant or from an inside faucet. In each case the water was allowed to run for five minutes prior to taking a sample. Previous to taking a sample the faucet or hydrant was disinfected with rubbing alcohol. Any faucet tap screen were removed first and then the faucet was disinfected.

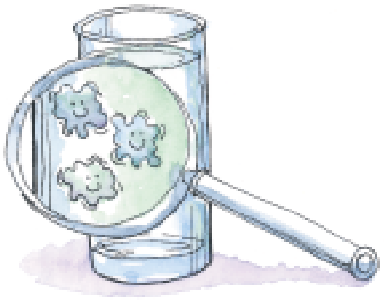
In the case of the nitrate test strips, these were held under a stream of water for one second and removed. The strip then made a color change within one minute if nitrate was present. The strips could indicate nitrate levels from 0-50 ppm.

The pesticide screening required four droplets of water from a pipette (included with each kit) into a test well on the screening kit. Results were available ten minutes later. The screening indicated level above 3 ppb for atrazine and simazine.

The bacteria samples involved filling a sterile sample bag and then individually filling each of five glass viles. The viles were then taken back to the lab and incubated at room temperature for

48 hours. After 48 hours a reading was taken. A tablet containing material that allow bacteria to feed and reproduce was contained in each vile. The vile and tablet turn to a dark yellow gel with accompanying gas bubbles if bacteria was present. Otherwise the vile remained a red color.

Well Age:
23.7% had newer wells (<= 20 yrs old) with the majority of sites having wells between 21-50 years old (57.9%) and 18.4% having wells over 50 years in age.

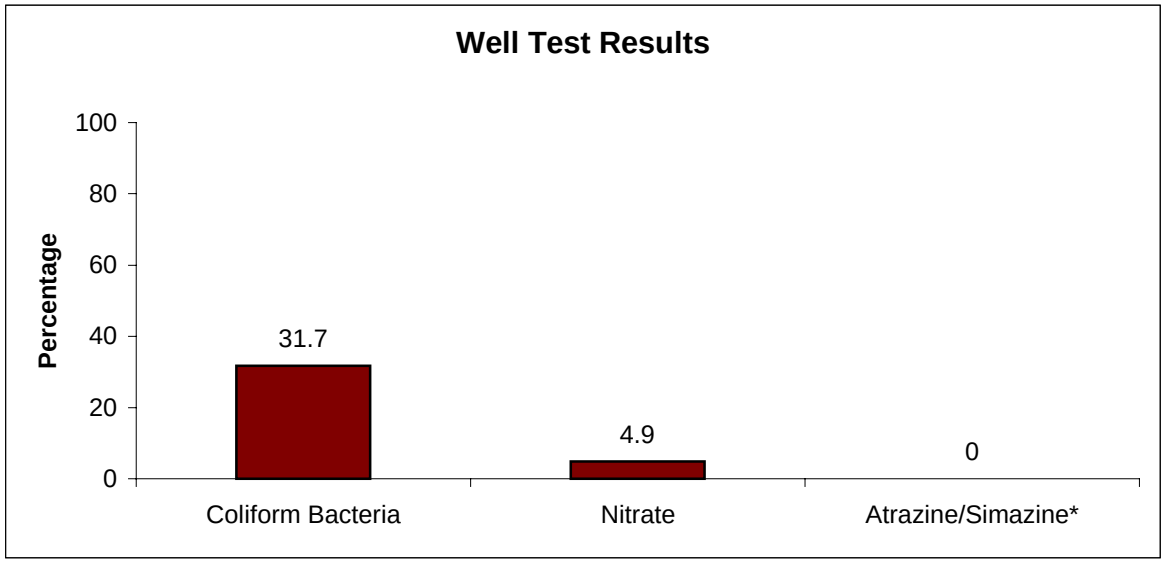


Well Depth:
Most wells were over 100 feet in depth (51.5%) with 27.3% being 50 to 100 feet deep and 21.2% were less than 50 feet.

Well Type:
Most of the wells in the study were of the drilled type (86.8%) with driven and dug wells being 7.9% and 5.3% respectively.

Well Test Results:
Almost one third of the wells tested positive for bacteria (31.7%) with no wells testing positive over the drinking water standard for either nitrate or atrazine/simazine. 4.9% of wells tested positive for the presence of nitrate. There were no differences between farm and non-farm sites with respect to test results. Participants whose wells tested positive for bacteria were strongly encouraged to send a water sample to the State Department of Health water quality lab to have fecal and *E. coli* tests. We attempted to follow up with as many participants as were willing to work with us. Follow up tests in all cases we could review did not indicate presence of fecal or *E. coli* organisms. Shock chlorination was recommended for all sites that tested positive for bacteria.

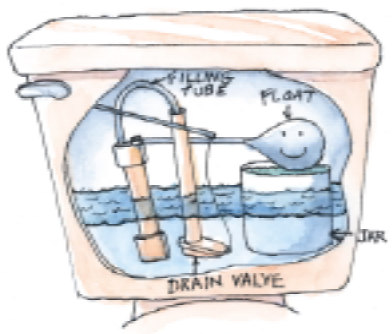
Source for water samples was divided nearly equally between inside and outside water source,



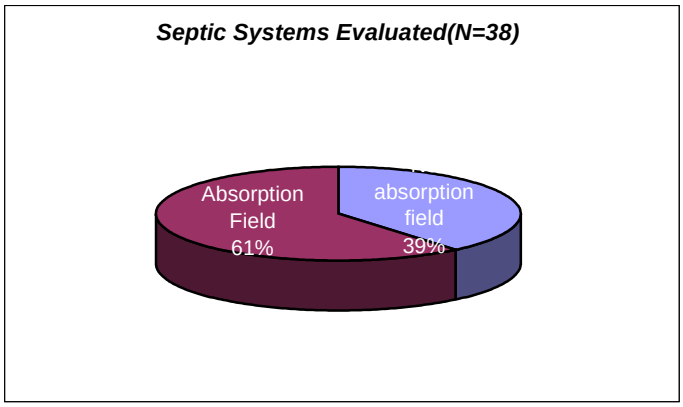
*This result shows only that no well tested above the EPA standard of 3ppb for these contaminants. The test could only provide screening values at or above this level

and had no statistical influence on water test results. Health Department recommended sampling procedures were followed.

Septic absorption fields



We asked participants about their septic systems and whether or not they had a proper absorption field installed. 39% said they did not have an absorption field, while 61% said they did. Most people were quite open about this. As mentioned in the results above, the absence of an absorption field does not seem to influence the presence of bacteria in wells, but almost certainly influences its presence in streams, rivers, and ditches where "tiled" septics eventually reach.



Location:
Well test sites were equally divided between home and farm sites (51.2% and 48.8%).

Program Evaluation Conclusions

This project demonstrated that both the Farm*A*Syst and Home*A*Syst materials were effective in increasing citzens' water quality and pollution prevention knowledge. Participants that received help in completing their assessments felt they had an increased ability to protect their water, and were more likely to make at least one activity change to protect water quality than participants not receiving assistance. Thus, the more effective approach is to have on-site technical assistance provided. Most of these participants seemed genuinely happy to be receiving help, with someone to provide answers to their questions during the assessment. However, when assistance cannot be provided, the project results show that self-assessments can be effective in raising awareness about water quality and pollution prevention, though management changes may not be as likely to occur.

Farmers and non-farmers responded very similarly and had identical concerns about their well water. The major difference was seen in the quantities of fuel, fertilizer, pesticide, and livestock on-site between farms and non-farms. This difference still necessitates the use of the different formats found in Farm*A*Syst and Home*A*Syst, especially in the case of self-assessments. Never the less, pollution prevention strategies with rural residents do not need to differ sharply between farm and non-farm, as the attitudes, concerns, knowledge, and actions taken will be similar.

We found that offering a free well water test for bacteria, nitrate, and pesticides was an effective motivator to get people to participate. This is a cost effective way to get private well owners involved in water quality issues.

Although confidentiality was emphasized throughout the project, some participants still asked where the data would be reported. Letting participants know that all the information found during the assessment would remain with them seemed to ease any concerns.

The voluntary and confidential nature of both Farm*A*Syst and Home*A*Syst, along with an emphasis on drinking water issues, provides an excellent format for involving rural citizens in pollution prevention in their own back yards.

General notes and comments for on-site visits.

Positive Things I Witnessed:	Things That Need Improvement:
1. No synthetic pesticide or fertilizer use	1. Direct tile to creek from septic-100 feet from middle fork of wildcat creek
2. No hazardous products of any kind stored	2. Neighbor's septic also a direct tile to creek, 50 feet from house and six people on system, raw sewage coming out. Participant afraid to do anything for fear that neighbor will retaliate against him.
3. Had septic inspected and pumped once	3. Tree growing into and around well casing.
4. Landscaping to prevent runoff	4. well too close to septic –35 feet
5. Does not pour hazardous substances down drains	5. Open cistern is a safety and pollution hazard
6. Reads all labels before using products	6. Old outhouse pit still exposed
7. Very knowledgeable about wells and septics	7. Never had septic pumped-big family using
8. Well is located such that runoff flows away from the casing.	8. Burn pile with plastics, glass, metals, rubber. Also within 20 feet of an LP gas tank.
9. landscaping prevents runoff	9. Open pipe aboveground to underground fuel tank.
10. Fence guard around well casing (in pasture)	10. Abandoned well not plugged.
9. Landscaping to prevent runoff 11. Runoff tiled away from well.	11. Pours grease down the kitchen sink drain.
12. Grey water and grease is diverted to holding tub outside to prevent from entering septic.	12. Septic system too close to well (30 ft)
13. Use of buffer areas of grass, native plants between ag area and river. Also between horse farm uphill and small lake.	13. Well casing does not extend above grade 12" (6")
14. Uses pesticides sparingly or not at all near river.	14. Pesticides being field applied 100 feet from home with wife working and 15-20 mph wind in our direction. I have seen this driving around all day!
15.Use of clover cover crop and mulch around growing trees on tree farm. Reduces need for fertilizer and pesticides	15.Damaged well cap. Hole allows for bird droppings to enter well.
16. Hazardous chemical storage is well organized and labeled.	16. Septic system location is unknown.
17. Is certified in hazardous materials handling.	17. Bird droppings are causing a health hazard on patio (large volume) Needs to change pattern of bird flight away from house. Perhaps remove small fountain/pond on patio.
18. Outhouse used on site is well constructed, but is uphill from a nearby pond.	18. Septic is a tile to field and ditch.
19. Pond is well managed.	19. Well is 75 year old driven well.
20. No erosion or exposed soil anywhere.	20. Open pipe leads to tile 8 feet below grade and this is 10 feet from the water well. Needs to be capped.
21. Had soil test approved prior to installing septic	21. Water well is only 10 feet from pond.

Positive Things I Witnessed:	**Things That Need Improvement:**
22. well is in pit, but has wired an above ground light bulb to turn on is well pit becomes water logged.	22. Septic field is within 50 feet of well.
23. Fuel storage has a concrete containment area with high curbs, including fire protected wiring and couplings. Padlocks are on all hoses.	23. Septic is uphill from well and within 50 feet of the well.
24. All pesticides and fertilizers are stored in one area of farm in a barn.	24. Landscaping nearly covers over the well casing.
25. Hog manure kept in pits under buildings until land applied. Have extra emergency lagoon for overflow.	25. Burns garbage, cans, plastics.
26. Available land is rotated each year for manure applications	26. Burns plastics, treated lumber.
27. All fuel tanks are labeled and have gages for tracking fuel use.	27. Three gas tanks are located right next to an old pit well.
28. Very meticulous fuel type and usage records for all activities and vehicles.	28. Status of well casing in pit well unknown. Is underwater most of the time.
29. Good pesticide applications set-up using a v-cone with in-line water tanks and mini-bulk tank. All lines have check valves to prevent backflow.	29. Septic tank is too small for family size.
30. Very knowledgeable about history of the land and placement of old wells, septics, current drainage.	30. Hog building and lagoon is less than 50 feet from nearby stream.
31. Chemical storage area is defined with sign indicating so on the building.	31. Septic effluent dumps directly into creek less than 100 feet away.
32. Fuel tank is in a concrete dike (used old horse tank that can capture the fuel if any leak occurs)	32. 2,4,D Sprayer tank is leaking and runoff get to a water storage area that is near the creek.
33. Always mixes chemicals in the field and not near buildings or wells.	33. Septic is tiled to the ditch
34. Follows a manure management plan.	34. Septic is tiled to the ditch.
35. Had abandoned well plugged.	35. Burns garbage and burn pile is 10 feet from well.
36. Really wanted his water tested. Had cancer two years ago and is very concerned.	36. Water well is only 20 feet from confinement hog building.
37. Has plans to move fuel tanks currently w/o secondary containment to abandoned concrete hog pit.	37. Septic effluent drains to ditch
38. Proper septic and well sited too.	38. 8,000 gallon fuel tank without any secondary containment. Had a 100 gallon spill last fall. Will look into getting containment structure.
39. Has proper septic system.	39. 2-300 gallon UST's within 100 feet of a dug well used for drinking water. This are also uphill from well. NO padlocks on hoses. Keeps no fuel records at all. Says will improve

	on this.
Positive Things I Witnessed:	**Things That Need Improvement:**
40. Had septic inspected in spring and was in good shape.	40. Septic has clay tile out of tank that is 60 feet from well.
41. Replaced old plumbing with new copper and lead free solder.	41. Septic is tiled to field and then to ditch 100 yards down.
42. Had septic changed so that a pumping station delivers effluent to absorption field far from the well.	42. Abandoned dug well still open. Is uphill from current dug well used as drinking water.
43. Sealed off surface to pit well.	43. Said is using a very strong pesticide to kill weeds in lawn and the drift ended up killing off his beans up to 100 yards away. He applied this even close to his dug well.
44. Had septic tank pumped.	44. Fuel UST within 100 feet of well.
45. Had new absorption field put in last year.	45. Septic within 100 feet of well and uphill.
46. Brought pit well above ground with new casing and cap.	46. Septic within 50 feet of well.
47. Only uses pesticides after all other methods have been tried.	47. Flow of manure from hog lots into field behind house. Said State came and closed his holding lagoon and can't do anything about runoff now. Sounded strange to me.
48. Landscaping reduces runoff.	48. Pesticide containers with pesticide still in them laying all over the ground.
49. Artesian well developed to capture overflow and prevent erosion to creek bank.	49. Burns garbage.
50. Brought pit well above ground with extended casing and cap. And then filled in old pit well.	50. Open cistern located in cattle feedlot. Looks like manure and runoff accumulates around this. Hazard to groundwater.
51. Had a proper septic system installed	51. Abandoned diesel tank.
52. Has legal septic system.	52. Pesticide containers laying about.
53. Had alarm on septic tank installed.	53. 1,000 gallon fuel tank without secondary containment.
54. Has proper septic system.	54.Abandoned well next to newly drilled well
	55. Says diarrhea is normal for his family
	56. Septic has tile to field tile that then dumps into creek.
	57. Participant said neighbors came down sick from drinking their well water.
	58. Lets cattle have full access to creek. Has had fish kills he thinks due to manure in creek. Was reported by Neighbors but he says the geese are more of a problem than his cattle. I explain that the geese may be contributing but that a cow deposits a great deal more manure than a goose. Says he will make changes if cost-share monies become available for doing so.
	59. Septic is tiled to ditch, but goes through about one mile of field tile first.
	60. Open hole on top of well casing.

Positive Things I Witnessed:	**Things That Need Improvement:**
	61. Septic with tile to field tiles and then to ditch over a 100 feet away.
	62. Open abandoned dug well is next to old hog lots. Runoff fills into the well. Says he will plug the well.
	63. Fuel tank located next to dug well.
	64. Loose top to dug well-not vermin proof.
	65. Lead paint on house is exposed and chipping. Also inside on window sills. Grandchildren do visit the house. Recommended having painter professional look at and remedy.
	66. Improper septic. Tiled to ditch.
	67. Fuel tanks over legal limit and no dike or secondary containment.
	68. Septic tank 10 feet from pit well.
	69. Septic is tiled to ditch.
	70. Old UST removed, but probably was leaking before. 30 feet from drinking water well.
	71. Septic tank 40 feet from pit well.
	72. Lawn chemicals are used next to pit well.
	73. Pit well being used but top is concreted over and sealed off. Cannot inspect.
	74. Container of 2-4, D left near the well.
	75. Septic tank is 20 feet from well. Absorption field is 50 feet.
	76. Absorption field is in depression in yard-standing water during rains.
	77. Septic has a tile to ditch and then creek.
	78. Nearby spring flows through chicken/duck pens and the excess flows over into creek nearby.
	79. Septic was worked on recently but workers only replaced the clay tile with a concrete one-still out of compliance and empties into the ditch nearby.

Participant comments during site visits:

Farmer: “I used to rotate my pigs and cows through a pasture rotation with corn, beans, and alfalfa hay. This way the manure was a positive part of the system. Now with all the corporate farms taking over manure is a problem and they are driving the family farm out of business.”

General from me: Several participants have remarked that they would not want to have their septics inspected because they are out of compliance and the health department would make them put in an absorption field.

Farmer: “The real reason I did this [Farm*A*Syst project] was for the free water testing. I don’t trust the health department to come out here.” This echoes what many others have said about agency or lab testing. They simple do not trust them.

Me: Many people ask if I am doing this project as part of my thesis. I say no, but they seem to have been motivated in part to help out a “student”.

Homeowner of dugwell: “This well has never gone dry even from back when I was a kid. We filled this large swimming pool in 2 days with it. It has good water. My cousin from the city was real sick once and her parents brought her out here. Doctors said she had kidney problems. She would come here in the summer months and would be back to good health when school started. We all thought the water was helping her.”

Farmer: “I believe much of the cancer deaths in this county (Clinton) have been caused by pesticide use such as atrazine and 2,4-D”

Farmer: [about rinsate or leftover pesticide]. “I hate to tell you where some of this stuff goes. I have been guilty of it like most other farmers. Just back up to the nearest creek or ditch and let it go…”

Farmer: “we really try our utmost but to be sure we are doing all we can to safeguard against accident or groundwater contamination. Even then, it doesn’t mean it can’t happen. So we always feel there is room for improvement.”

Homeowner: “I think the neighboring farmers around me are conscientious and careful. They seem to keep up-to-date with things.”

Homeowner: “I like this service [the assessment and well test]. I think probably everyone should do this.”

Farmer: “Must remember that you are getting the better farms and homes to participate. So you probably have a biased sample toward folks who are more aware of water quality. Your results should say, “ this is what the more concerned people are doing…”