
Private Well Testing

Pilot Education Project:

***Phase I: Knowledge, Attitudes, and Behaviors Associated
With Private Well Testing in Three New Jersey Communities***



***Division of Epidemiology, Environmental and Occupational Health
Consumer and Environmental Health Services
April 26, 1999***

**Private Well Testing
Pilot Education Project**

**Phase I: Knowledge, Attitudes, and Behaviors Associated With
Private Well Testing in Three New Jersey Communities**

Laurie A. Pynch, M.Ed.

April 26, 1999

**New Jersey Department of Health and Senior Services
Division of Epidemiology, Environmental and Occupational Health
Consumer and Environmental Health Services**

Acknowledgments:

Special thanks are extended to the Atlantic County Division of Public Health for their support of this project:

Ms. Tracye McArdle, Health Officer, and Ms. Patricia Diamond, Assistant Health Officer, expressed keen interest and enthusiasm for the project during our earliest discussions and a willingness to dedicate ongoing administrative and staff support.

Water sampling activities were performed by the Environmental Health Unit, under the direction of Ms. Randi DeMartini. Field work was conducted by Mr. Dan Crum, Ms. Francine DelCorpo, and Ms. Dawn Faulkner.

Environmental mapping capabilities were supplied by Mr. Mike Cicali and Mr. Stephen Hetzer of the GIS Program.

Ms. Linda Duca, Health Educator, provided assistance in identifying possible community attitudes and behaviors associated with well testing by participating in focus group activities.

Several individuals within the New Jersey Department of Health and Senior Services provided technical assistance throughout the project. Dr. Parvin Khanlou, Office of Minority Health, provided guidance with project design and implementation. Dr. Perry Cohn and Dr. Jerald Fagliano provided invaluable input on day-to-day issues and paved the way for smooth project implementation and completion. Ms. Sharon Kubiak provided expertise and ongoing review utilizing her vast knowledge and experience.

Staff from the New Jersey Department of Environmental Protection also contributed to various stages of the project. Ms. Sandra Krietzman, Bureau of Safe Drinking Water, provided ongoing suggestions and comments throughout the project. Dr. Brandon Johnson, Division of Science and Research, reviewed the project proposal as well as the final project report.

This project was supported by the New Jersey Department of Environmental Protection, Bureau of Safe Drinking Water, which provided funding as part of an Interagency Agreement on Drinking Water and Health.

Table of Contents

Introduction	1
Background	1
Project Overview	3
Project Objectives	3
Preliminary Activities	4
Partnership with a Local Health Department	5
Methods	7
Target Communities	7
Focus Group Meetings	8
Community Needs Assessment	9
Private Well Testing	11
Privacy Protection of Participants	11
Data Analysis	12
Community Education Plan	12
Results	14
Participant Information	14
Well Testing Knowledge, Attitudes, and Beliefs	15
Household Information	19
Discussion	22
Recommendations	27
Materials Development	28
Materials Distribution	29
Community Outreach Activities	30
Further Educational Research Needs	31
Appendices	32
Appendix A - Community Profile	33
Appendix B - Areas of Ground Water Concern	35
Appendix C - Focus Group Questionnaire	39
Appendix D - Community Needs Assessment	44
Appendix E - Direct Mailer	64
Appendix F - Private Well Testing Procedures and Results	67
Appendix G - Consent Form	72
Appendix H - Tables	75

Summary

The New Jersey Department of Health and Senior Services (DHSS) conducted a pilot education project designed to promote private well testing through a partnership with the Atlantic County Division of Public Health (ACDPH). The goal of this project is to increase the number of residents who test their private wells in accordance with State and local recommendations.

Several communities within Atlantic County were targeted for participation based on local well sampling data and regional groundwater quality, well susceptibility, and demographic information. During December 1996 and January 1997, a focus group meeting was held in each community with key individuals to gather information about the degree of knowledge, attitudes, and behaviors associated with private well testing. Based on these meetings, a needs assessment was developed to examine knowledge levels, attitudes, and behaviors within the targeted communities.

Between July and December 1997, forty-two residents from the three targeted communities were interviewed in their home. The overall participation rate was low, however, participation was highest in the area with higher average income and educational level. Although many participants reported that they had tested their well in the past, most said they tested only once or twice. Major obstacles to well testing included cost and inconvenience.

Most participants indicated that they were concerned about the quality of their well water and felt that it was their responsibility to test their well. The most commonly held beliefs were that it was important to test if their well had been contaminated in the past; they had a neighbor with a contaminated well; there were nearby activities occurring that might cause well contamination; and they lived near a hazardous or industrial waste site. Recommendations for the development and dissemination of educational materials, and the promotion of well testing were identified.

During Phase II of the project, needs assessment information will be used to help identify appropriate methods of educating the targeted communities and to develop an educational plan to encourage private well testing. The plan will include a community outreach strategy for the distribution and development of educational materials. Ongoing community educational programs and existing educational materials will be considered for inclusion in the plan. It is recommended that the educational plan be implemented in the target communities, in cooperation with ACDPH, and evaluated by measuring changes of well testing frequency prior to and after the implementation of the plan.

1

Introduction

Background

Private wells supply about 13 percent of New Jersey residents with potable water. While Federal and State monitoring requirements have been successful in reducing or eliminating potential contaminants from public drinking water supplies, there are currently no such statewide or local regulations that require routine monitoring of private wells. With few exceptions, private well testing is conducted at the discretion and expense of the individual homeowner.

In the past, private wells throughout the State have been vulnerable to local groundwater contamination associated with such common sources as hazardous waste sites, underground storage tanks, household septic systems, and agricultural fields. But statewide construction standards for non-public water systems have helped to protect newly constructed, altered or replaced wells from ground water contamination (N.J.A.C. 7:10-12). For example, private wells must be located at minimum distances away from certain potential sources of contamination, including sanitary sewers and septic systems, and fuel storage tanks (N.J.A.C. 7:10-12.12). Licensure requirements for well drillers have also ensured proper well design and installation (N.J.A.C. 7:10-12.4). The number of wells that remain susceptible to contamination, primarily those shallow, older

wells that are poorly constructed, sited, and/or maintained, is difficult to determine due to historically incomplete or inaccurate well records for the entire State and many individual localities.

While the potential for private well contamination continues to exist, there is limited information available about well testing activity throughout the State. For example, little is known about how often individuals monitor their wells for contamination, and for what reasons and parameters they test. The systematic collection of well water sampling data by local government agencies is limited to that required by statewide well construction standards which include only a small number of parameters (N.J.A.C. 7:10-12.30). More comprehensive local testing requirements for newly constructed wells exist in only very few areas of the State. In some instances, well testing information is obtained as a result of home financing requirements or local requirements at the time of a property transfer. Some local health departments may acquire additional well monitoring information through testing services made available to the homeowner. Local government agencies may also gather sampling data through the investigation of local groundwater contamination. State environmental and health agencies typically become involved in private well monitoring on a case by case basis during contamination episodes, often at the request of an individual homeowner or local health department.

Since the integrity and water quality of many private well systems are difficult to establish, private drinking water supplies may present a greater threat to the health of the public than regulated public water systems. Consequently, there is a need to develop strategies to educate individuals about various private well water issues, such as the importance of regular testing and maintenance, the adverse health effects of common well water contaminants, and effective water treatment options.

Project Overview

The New Jersey Department of Health and Senior Services (NJDHSS), developed a pilot education project designed to promote private well testing through a partnership with a local health department. The overall goal of this project is to increase the number of residents who test their private wells in accordance with State and local recommendations. Initially, the project was “piloted” with a focus on one area of the State, with the potential for expansion to other regions or statewide.

The education project consists of three major components. The first phase of the project is designed to examine the educational needs and common attitudes and beliefs associated with private well testing, and then to utilize that information to develop recommendations for promoting private well testing. During the second phase, a community education plan will be developed utilizing selected recommendations, as determined in cooperation with the local health department. Finally, the education plan will be gradually implemented and the effectiveness of each strategy in achieving the overall project goal will be evaluated.

Project Objectives

Educational strategies and recommendations to promote and encourage private well testing will be developed to:

- (1) increase knowledge of residents about the importance of regular testing and maintenance of private wells
- (2) identify and reduce barriers to private well testing
- (3) develop a distribution network for disseminating private well testing information, and
- (4) develop and foster ongoing community-based private well testing education efforts.

Preliminary Activities

Several activities were conducted prior to the initiation of the pilot project in order to identify and evaluate available resources and to establish a framework for the project.

Private Well Testing Educational Materials

In addition to educational materials developed by NJDHSS, other educational materials on private well testing were collected and evaluated for use in the project. These materials included those developed by local health or environmental agencies, the New Jersey Department of Environmental Protection (NJDEP), United States Environmental Protection Agency (USEPA), Rutgers Cooperative Extension, and local and state universities and colleges. While several educational materials appropriate for use were selected for inclusion in the project, there was limited private well testing information available that was specific for New Jersey.

Private Well Testing Educational Activities

Community-based educational activities that address environmental health issues were identified and evaluated for inclusion in the project. These activities include those that were conducted by local health or environmental agencies, County Offices of Rutgers Cooperative Extension, and local universities and colleges. While there were few existing environmental health education programs in the community focusing on private well testing issues, several activities that provide the opportunity for private well testing education were identified and selected for use in the project.

Community Interest and Support

Potential communication channels or means of cooperation were identified through which the local health department and other interested organizations/individuals can cooperate in the project, such as in the

dissemination of educational materials and promotion of well testing. Community profiles were developed to assist in identifying potentially interested groups and individuals (see appendix A).

Local Private Well Sampling Data

Potential sources of local private well sampling data were identified to assist in the selection of target areas for the project. Local water sampling data may be available from a variety of sources, including data collected by the local health department to meet requirements for construction of new wells, during investigations of local groundwater contamination, through their low-cost well testing services, and as required for real estate transfers. Computerized ground water contamination databases may also be available.

Partnership with a Local Health Department

Atlantic County, New Jersey was identified as an appropriate area to conduct the pilot project due to the large number of private wells in use throughout the county (U.S. Census Data), its history of localized ground water contamination, and its economically and ethnically diverse population. In addition, the Atlantic County Division of Public Health (ACDPH) reports minimal community interest in private well testing based on low response rates of about 10% for County-provided testing during ground water contamination investigations (Personal communication).

ACDPH maintains private well testing records obtained from a variety of sources and has developed a computerized ground water contamination database using Geographic Information System (GIS) mapping software. ACDPH investigates incidences of ground water contamination by conducting water surveys which include the collection of water samples from at-risk wells. ACDPH also maintains data collected through the certification of new wells, its low-cost well testing services, and as a result of real estate transfer requirements.

Due to their strong commitment towards promoting private well testing within the community, ACDPH expressed an interest in participating in this project. In addition, they had sufficient resources available to dedicate a significant amount of staff time and support, and allow the use of their building facilities for project activities. The New Jersey Department of Environmental Protection (NJDEP), Bureau of Safe Drinking Water, provided technical assistance and guidance in the selection of Atlantic County as an appropriate geographic area in which to conduct the project.

2

Methods

Target Communities

In cooperation with ACDPH, three communities (Buena Vista Township, Mullica Township, and Port Republic City) in Atlantic County were selected for involvement in the pilot project based on the following criteria:

Number and Type of Private Wells

County private well information was reviewed to identify communities with large numbers of households using well water. In conjunction with determining household well usage, communities that had different types of wells (drilled versus dug) were identified. Aggregate private well usage information was obtained from the 1990 U.S. Census.

History of Ground Water Contamination

Local private well sampling data collected by ACDPH was utilized to identify specific areas within the county where private well contamination has occurred in the past and where wells may currently be vulnerable to ground water contamination. Computerized ground water databases have been developed to delineate "Areas of Groundwater Concern" throughout the county (see appendix B).

Demographic Information

Aggregate demographic information (such as ethnic diversity, income and education level, and the number of households receiving social security income and public assistance) was reviewed to identify communities that are economically and ethnically diverse. Demographic data was obtained from the 1990 U.S. Census.

Focus Group Meetings

During December 1996 and January 1997, a focus group meeting was held in each of the three targeted communities with key individuals who were knowledgeable about the people in their communities and private well water issues. The purpose of the meetings were to gather information about the educational needs, common attitudes and beliefs, associated with private well testing.

Identification of Key Individuals

Key community representatives were identified with the assistance of the ACDPH as well as through conversations with local government officials. A community profile (see appendix A) was developed to help identify key individuals within the targeted communities. For each community, these representatives included the mayor, one or more town council members, local environmental commission chairperson, and several other interested members of the community. In addition, a focus group meeting was held at the county level with ACDPH staff including the assistant health officer, health educator, and environmental coordinator.

Development and Administration of a Focus Group Questionnaire for Key Individuals

A focus group questionnaire was developed to identify salient reasons why people test or do not test their private well water (see appendix C). The

questionnaire was designed to solicit pertinent information about the educational needs, and common attitudes and beliefs, with respect to private well testing. During the meeting, key individuals were asked to identify the most important reasons why people in their community test or do not test their wells based on their professional and/or personal experiences. They were also asked about the educational needs of people with private wells and about effective strategies for encouraging people to test their wells.

Focus group questionnaires were provided to key individuals prior to the meetings. Responses to all questionnaire items were recorded during the meetings by the NJDHSS focus group leader. In addition, individuals were encouraged to provide their responses in writing. For community representatives who were unable to attend the meeting, questionnaires were completed via phone interviews or through self administration. About 5 to 10 key individuals from each community completed the questionnaire through participation in the focus group meeting, a phone interview, or self-administration.

Community Needs Assessment

Based on the focus group questionnaire, a community needs assessment was developed to examine educational needs, common attitudes and behaviors, associated with private well testing in each of the three targeted communities (see appendix D). In addition, household and participant information was collected.

Development of the Needs Assessment

The needs assessment consisted of three parts. Part One gathered information on household residential history; well design, testing, and repairs; water usage; and water treatment and septic system repair and maintenance. Part Two consisted of a series of descriptive statements dealing with private well testing. After each statement, participants were instructed to select the response (strongly agree, somewhat agree, somewhat disagree, or strongly disagree) that

most closely describes how they feel about that statement. Participant information, including sex, age, race, education, and yearly household income, was obtained in Part Three.

Identification and Selection of Participants

Households (block and lot information) from the targeted communities were identified for potential participation using county tax maps. Selected addresses were limited to those that were classified as residential properties and owner occupied residences. About 460 households were selected for participation.

Residents were invited to participate through direct mailings to the home (see appendix E). Between June and September 1997, mailers were sent out in several stages in order to control and closely monitor response. Mailers described the purpose of the project and included an application for participation. Residents were informed that private well water sampling would be provided to them free of charge in return for their participation. In order to be considered, residents were instructed to return the application to NJDHSS on or before the established deadline. Upon receipt of an application, a confirmation letter was sent to the resident, usually within 1 to 5 business days.

Administration of the Needs Assessment

Home visits were conducted between July and December 1997. Residents were contacted by phone to schedule a home visit, usually within 10 to 15 business days of receipt of an application. Appointments were scheduled in the order in which applications were received and were arranged with those individuals who said that they are responsible for private well testing, maintenance, and repairs in their household. Prior to scheduling an appointment, each individual was asked to confirm that he/she is the owner of the residence and currently resides there. Most home visits were confirmed by phone the day before the appointment.

The NJDHSS conducted the home visit in cooperation with the ACDPH. During the home visit, the NJDHSS interviewer was responsible for administering the needs assessment. Prior to beginning each section of the needs assessment, the interviewer provided specific instructions and examples to the participant in order to assure that standard procedures were clearly understood and followed. For Part Two, a response card (with the four possible responses) were given to the resident as a visual aid to use during the interview. Questionnaire items were read aloud and responses were recorded by the interviewer. Interviews required about 30 minutes to complete.

Private Well Testing

A detailed discussion of the private well testing methodology and sampling results is found in Appendix F.

Privacy Protection of Participants

Established NJDHSS procedures were followed to safeguard the privacy of individuals who participated in the project. NJDHSS Institutional Review Board, whose purpose it is to ensure the safety, privacy, and informed consent of participants involved in Department research projects in accordance with State and Federal law, reviewed the protocol and all other materials developed for this project.

All participants provided informed consent prior to their involvement in the project (see appendix G). Each participant was randomly assigned an identification number; all personal identifiers were separated and stored in a locked file cabinet accessible only to authorized project personnel and the confidentiality of this information will continue to be maintained. The findings of the project are released only in aggregate form in such a way that individuals cannot be identified.

Data Analysis

Data management and analysis were conducted using Foxpro database software and SPSS/PC+ 4.0 statistical software. Frequencies (of responses) were calculated for each questionnaire parameter.

Community Education Plan

Based on the needs assessment data, educational recommendations and strategies were developed for the three targeted communities (see recommendations section). These recommendations and strategies will be used to design a community education plan during Phase Two of the project.

Development of the Community Education Plan

The needs assessment data was utilized to identify the educational needs of people with private wells and potential attitudinal barriers to well testing, and to develop recommendations and strategies for encouraging people to test their wells.

Recommendations and strategies address, but are not limited to, the following areas:

- Developing and evaluating educational materials (for example, written materials, refrigerator magnets, posters, and videos) based on educational needs, attitudes and beliefs of the community;
- Establishing mechanisms for the distribution of educational materials (for example, health fairs, libraries, community organizations, environmental centers, county extension offices, the media and other appropriate resources.)

- **Establishing and reinforcing communications channels with community organizations and individuals for the dissemination of well testing information (for example, via respected community groups and leaders)**
- **Developing and fostering ongoing “channels of communication” by which the local health department and other interested organizations/groups can continue the dissemination of well testing information.**
- **Identifying further educational research needs**

3

Results

Participant Information

Participation Rates

A total of 462 addresses from the three targeted communities were selected from county tax maps and sent invitations to participate. Of these, 49 residents returned completed applications. A total of 42 interviews were completed; 7 residents declined to participate when contacted by phone. The overall participation rate was 9 percent. Participation rates varied by municipality: Buena Vista Township (6%), Mullica Township (8%) and Port Republic City (16%).

Demographics

Approximately equal numbers of males (48%) and females (52%) were interviewed. Most participants (88%) were 40 or more years of age; and more than half of them (52%) were 60 years old or more. All participants were either Caucasian (71%) or African American (29%). No participants were of Hispanic descent. Most participants (86%) had at least a high school diploma and more than half (55%) had at least some college education. Over a third of all participants (36%) had received a college or post graduate degree. Almost half of all respondents (49%) reported an annual income of more than \$50,000; and

about one-quarter (24%) said their income was \$75,000 per year or more. Table 1 (see appendix H) shows the distribution of participants according to demographic parameters.

Other Participant Information

All participants reported they owned and currently occupied the residence of interest. In addition, all participants considered themselves to be the person most responsible for well testing, maintenance, and repairs in their household.

Well Testing Knowledge, Attitudes, and Beliefs

The following discussion summarizes the responses of participants to statements concerning well testing knowledge, attitudes and beliefs. Table 2 (see appendix H) shows the distribution of responses for each statement.

Responsibility for Well Testing

Almost all participants either strongly (64%) or somewhat (33%) agreed that it was their responsibility to test their well water. Only about half of the participants (55%) said that well testing was, to some extent, the government's responsibility. Of those, about two-thirds agreed only somewhat that it was the government's responsibility to test their well.

Concern for Water Quality

Most participants (93%) said that they were concerned about the quality of their well water. Of those, about three-quarters strongly agreed that their well water quality was a concern to them. All participants either strongly (86%) or somewhat (14%) agreed that they needed to test their well if they wanted to make sure that their water is safe. Most participants (90%) said that it would be necessary for them to test their well even if their water looked, smelled, and tasted good.

Cost, Convenience, and Time

Most participants agreed that they would test their well more often if it cost less money (69%) and if it was more convenient (55%). However, most participants (76%) said either that time did not influence how often they tested their well or that they were unaware of how much time was required for testing.

Local Contamination

All participants agreed that it would be important for them to test their well if their well or their neighbor's well was found to be contaminated. Most participants said that it would be important for them to test their well if they received a public notice about local groundwater contamination (98%) or if a local water contamination problem was reported in the media (95%). Of those who agreed, most (93%) agreed strongly that a public notice was important, while only three-quarters (75%) said that they strongly agreed that media coverage was important.

Almost all participants (98%) said that it would be important for them to test their well if nearby activities were occurring that might contaminate their well, most of whom strongly agreed. Likewise, most participants (98%) agreed it would be important for them to test if they lived near a hazardous waste site or an industrial facility, with almost all of them strongly agreeing. While most participants (95%) said it was important to test if they lived on a farm or in a farming community, only about half of them strongly agreed.

Septic System Location

Most participants said that it would be important for them to test their well if their septic tank (93%) or their neighbor's septic tank (90%) was close to their well, with the majority of them agreeing strongly.

Sensitive Subpopulations

Most participants (86%) said that it would be important for them to test their well if young children, the elderly, or individuals who are ill lived in their household; however, only about three-quarters of those strongly agreed that sensitive household members would warrant the need for testing.

Real Estate Transfers

Almost all participants (95%) said that it was necessary for them to test the well if they were buying a home, with most in strong agreement. However, only 79 percent of participants said that it was necessary for them to test their well if they were selling their home. Of those, about two-thirds strongly agreed that testing was necessary prior to a home sale.

Health Risk Information

Most participants (88%) reported that they would be more likely to test their well if they had a better understanding of the health risks. Of those, about three-quarters strongly agreed that health risk information would increase the likelihood that they would test their well.

Well Vulnerability Information

Most participants (88%) said that they would be more likely to test their well if they were knowledgeable about the most common sources of well water contamination; however, only slightly more than half of those strongly agreed. Most participants (81%) reported that they would be more likely to test their well if they had a better understanding of what things place their well at risk of contamination, with more than half in strong agreement.

Well Testing Information

Most participants (86%) said that they would be more likely to test their well if they had well testing information and guidance available to them. Of those, more than two-thirds strongly agreed. Most participants (71%) reported that they would be more likely to test their well if they knew where to go to get

their water tested, with about two-thirds of those in strong agreement. Most participants said they would be more likely to test their well if they knew what contaminants to test for (81%) and had a better understanding of what the test results meant (81%). Of those, about two-thirds strongly agreed that this information would increase the likelihood that they would test their well.

Community Support

Most participants (76%) said that they would be more likely to test their well if they were able to do so with a group of their neighbors as part of a community activity although only slightly more than half of these participants strongly agreed with this statement.

Trust

Most participants (67%) reported that they would be more likely to test their well if government officials that they could trust were available to assist them, however, only slightly more than half of them strongly agreed with this statement.

Well Water Treatment/Alternatives

Most participants said that it would be necessary for them to test their well even if they had a water treatment system (88%) or used bottled water for drinking and cooking (76%). In both instances, the same number of participants agreed strongly as agreed somewhat with these statements.

Well Repair

Most participants said they would be more likely to test their well if they knew how to fix a contamination problem that might be found (74%). Of those, more than half strongly agreed with this statement.

Most participants agreed that they would be required to fix or replace their well (74%), or stop using their well if contamination was found (74%). Of those, about three-quarters strongly agreed with these statements. Almost all

participants (95%) said that it would be expensive for them to fix or replace their well if contamination was found, most strongly agreeing with this statement.

Household Information

The following discussion summarizes the responses of participants to questions concerning general household information, including other household members, well information and usage, and other system information. Tables 3a through g (see appendix H) show the distribution of responses for each question.

Other Household Members

Most participants (88%) reported that other individuals lived in their household. At least one child under 20 years old was reported to live in 40 percent of households.

Well Characteristics

Most participants (88%) reported having a machine drilled well; only one participant (2%) reported using a hand auger to install the well. For the remainder of participants, well type was unknown. Most wells (64%) were reported to be less than 19 years old. Seven participants (17%) did not know the age of their well. Most wells (60%) were reported to be 50 or more feet deep. Sixteen participants (38%) did not know the depth of their well.

Well Testing

Most participants (64%) reported that their well water had been tested. However, many of them said that they tested their well water only once (59%) or twice (18%). The reasons individuals gave most frequently for testing were that it was important to make sure the water is safe (28%); that it was required for a real estate transfer (26%); to monitor the effectiveness of a water treatment system (10%); that they were responding to a free water testing offer (8%); and that it was necessary for the installation of a new well (8%). Of the participants who reported that they did not test their well (36%), the reasons most frequently

given were that they felt it was not important to them (18%); it was inconvenient to test (18%); and it was not necessary since they felt their water quality was good (18%).

Of those who tested their wells, participants most frequently reported that they tested for iron, acidity, total coliform, and nitrate. However, almost half (48%) of those who tested their wells reported that they were unsure for what contaminants were tested. None reported that their well was ever found to be contaminated; however, some participants did report aesthetic problems with iron, acidity, hardness, and manganese.

Well Repair

Thirteen participants (31%) reported that their well had been repaired. Of those, most repairs involved fixing or replacing the well pump (92%). Eight (62%) said they did not chlorinate the well and ten (77%) said they did not test the well for bacteria after the repair work was completed. In addition, three participants (23%) did not know if their well was chlorinated and two (15%) were unsure if their well was tested for bacteria following repair work.

Well Usage

Most participants (81%) reported that they used their well water for all purposes while some (19%) said they used their water for all or most other purposes, with the exception of drinking and/or cooking.

Seventeen participants (40%) said that they got water from somewhere other than their well. Twelve of them purchased bottled water. One of these participants said they also got water from a relative or friend's house. Alternate sources of water were used primarily for drinking and/or cooking.

Other System Information

More than half of all participants (57%) reported that they had a water treatment system. Most of these participants said their system was used for iron removal or pH control (84%) and they maintained the system according to manufacturer's instructions (92%).

All participants reported that they had a septic system. Seventeen participants (40%) said their septic system was less than 100 feet from the well; half of all participants said it was 100 feet or more away from the well. Four participants were not sure of the distance. Most participants (86%) reported they perform routine maintenance of their septic tank. Only 12 (28%) said that their septic tank had ever been repaired; the most common type of repair was the replacement or addition of a drainage field.

4

Discussion

Residents of several demographically diverse communities within Atlantic County were asked how they felt about various aspects of private well testing. Eligible participants were limited to those who reported that they owned and currently occupied their residence. Likewise, interviews were conducted with the member of the household who said that they were responsible for the care of their well, thus focusing on those who would be affected by potential drinking water contamination and typically make the decisions about well testing.

Although the overall participation rate was quite low, rates varied by municipal area. Participation was highest in the area with higher average income and educational level. While approximately equal numbers of males and females were interviewed, the majority of participants were 60 years old or more, with a large number of individuals describing themselves as “retired”, were well educated, and had moderate to high incomes. Thus, the amount of time required for participation as well as socioeconomic status may have influenced individual decisions to participate.

Participants were comprised mostly of Caucasians; African-Americans made up the remainder of participants. Language or cultural factors among minority groups may have created barriers to participation. Incentives (free water testing)

did not improve participation rates beyond the level of resident involvement typically seen during local ground water investigation activities.

Although participants recognized the importance of private well testing, testing activity among participants was found to be limited. Many individuals reported that they had previously tested their well, but most said they tested only once or twice. For the majority, well testing occurred only when it was required, such as to meet real estate sale requirements or State well construction standards, or because it was conducted free of charge. While many individuals reported that they tested their well to ensure good water quality, they did not test on a regular basis. Of those who did not test their well, most said it was because they felt it was not necessary or was inconvenient. Education strategies need to inform people about the importance of regular testing, particularly if they are concerned about water quality, and to reduce or eliminate common barriers to well testing.

Individuals need to be provided with simplified well testing information in order to accurately evaluate their water quality and make informed well testing decisions. Although most individuals knew whether their well had ever been “tested”, they were unable to provide details about the type of laboratory analyses that had been conducted on their well water supply. Likewise, they had limited knowledge about the outcome of those tests, other than reporting that “everything was OK”. In most cases where that information was available, prior well testing was limited to analyses for microbiological and nitrate contamination, and the presence of secondary (aesthetic) drinking water contaminants. Education programs should encourage the development of easy-to-understand well testing reports and provide testing guidelines based on well vulnerability.

Most individuals were able to provide adequate information about the characteristics of their well. However, some participants had limited knowledge about some aspects of their well, particularly well depth and age. There was a

general lack of awareness about need to chlorinate and test after repairing a well. Of those who said their well had been repaired, most said the well was not subsequently chlorinated and tested for microorganisms, or they were unaware if chlorination or testing had occurred. Educational efforts need to encourage better record keeping, including well design specifications, and proper repair and maintenance practices.

Participant responses identified several potential obstacles to well testing. For most individuals, cost and convenience seemed to play a role in their decision to test their well. Although some also felt that time was an issue, many said that they would test regardless of the time involved in order to ensure water quality. Other possible barriers to well testing behavior may be lack of trust in government officials and fear of losing control over well remediation decisions. Well testing education programs need to reduce or eliminate these obstacles by making well testing inexpensive and easy, building positive relationships between the community and respected community leaders, and providing residents with well remediation advice.

Almost all participants indicated that they were concerned about the quality of their well water. In fact, many individuals said they obtained drinking water for drinking and cooking from somewhere other than their well. Attitudes, such as concern for drinking water quality, can be utilized to encourage individuals to test their well. Likewise, many participants felt that it was important to test their well water to make sure it is safe even if it looked, smelled, and tasted good. Furthermore, most believed that it was their own responsibility to test their well rather than the government's responsibility. Public health education messages should target specific audiences and build upon these positive attitudes. For example, messages should reinforce the idea that well testing is the responsibility of the individual homeowner.

Many individuals were knowledgeable about potential sources of contamination and felt that it was important to test if their well was at risk of contamination. The most commonly held beliefs about well testing were that it was important to test if their well had been contaminated in the past; they had a neighbor with a contaminated well; there were nearby activities occurring that might cause well contamination; and they lived near a hazardous or industrial waste site. Most individuals also understood the contamination risks associated with nearby septic systems and believed that it was important to test their well if their septic tank or their neighbor's septic tank was close to their well. It is important to keep individuals informed about possible sources of local contamination so that they can make informed well testing decisions. Education programs should build upon these positive attitudes to motivate individuals to test their well, and should be tailored to address specific contamination risks for different areas based on factors such as land use, population density, and geologic and climatic conditions.

Many participants said they would test more often if they were more knowledgeable about various aspects of well testing, care and maintenance. Health risk information, common contamination sources, and well testing guidance were identified as the most important types of information needed to make well testing decisions. For example, most individuals did not know what contaminants they needed to test for and had difficulty interpreting test results. Also, they were often unaware of where to go to get their water tested. Providing easy access to health information and well testing guidance, including periodic testing reminders, may serve to reduce educational barriers to well testing.

Most participants were knowledgeable about certain situations when testing is necessary or required. For example, most individuals knew that it was necessary to test their well even if they had a water treatment system or drank bottled water. Public health education messages can expand upon existing knowledge to include additional concepts. For example, individuals who have

water treatment systems can be educated about different types of systems and their intended purpose, and how to make sure that the system meets their specific needs. Bottled water users can be informed about the potential for exposure to contaminants in well water through non-oral routes.

Educational strategies should include efforts to make well testing information available to interested audiences. For example, most people thought that it was necessary to test their well when they were buying a home. Well testing guidance can be distributed through real estate offices in order to encourage well testing during transfer of property.

Some attitudes were less commonly held among participants. For example, individuals were only moderately concerned about household members that may be particularly sensitive to drinking water contamination. Although most participants recognized the importance of well testing prior to purchasing a home, the need for testing when selling a home was a less commonly held belief among participants. Educational materials need to address negative attitudes about well testing. For example, public health messages can target the specific health needs of sensitive individuals due to age or illness.

Community based testing programs may positively influence individual well testing decisions. Education strategies should consider promoting well testing services and dissemination of information through local organizations.

Education programs need to utilize a variety of information sources. For example, participants felt that public notices and media coverage would be effective in communicating information about local contamination issues. Providing information through many communication channels would serve to reinforce important public health messages.

5

Recommendations

The primary purpose of this phase of the project was to examine the educational needs, and common attitudes and beliefs, about private well testing in three New Jersey communities, and to develop recommendations for promoting and encouraging well testing behavior. Some recommendations were obtained during discussions with focus group participants. During the second phase of the project, these recommendations will be used to design a community education plan for Atlantic County, which will be tailored to address the needs and build upon the existing resources in different areas within the county.

The education plan will identify who will be responsible for completing each component of the plan, describe the major tasks necessary to complete each component, and include a time line for the completion of each task. The education plan will implemented in the three targeted communities, in cooperation with the local health department, and evaluated by measuring changes in well testing behavior.

Materials Development

- **Develop educational materials to address educational needs and reinforce positive attitudes and beliefs. Design educational materials utilizing a variety of formats and reading levels. Consider translating materials into other languages, as necessary.**
- **Evaluate educational materials by surveying a representative number of the targeted population using a tool specifically designed to measure changes in well testing knowledge, attitudes, and behavior (such as an evaluation form).**
- **Develop public notices of ground water contamination that clearly state the nature of the problem, degree of health risk, and appropriate protective actions (such as shower advisories), in cooperation with the local health department. Consider several versions for different circumstances.**
- **Develop easy to understand water sampling reports, including comparison values (such as Maximum Contaminant Levels (MCLs) and Goals (MCLGs), Health Advisories (HAs), and Action Levels (ALs)) and health risk information, and effective treatment technologies, in cooperation with the New Jersey Department of Environmental Protection.**

Materials Distribution

- Establish and maintain distribution points throughout the community to facilitate easy access to educational materials, such as local health departments, local and county government offices, county office of Rutgers Cooperative Extension, water testing companies, realtor's offices, and libraries (including the South Jersey Environmental Education Center).
- Utilize private well testing materials developed by other sources, including USEPA and NJDEP materials, that were selected for use in the project.
- Conduct mailings of well testing materials to targeted audiences, such as local health officers, school health nurses, and environmental health groups.
- Make well testing information available through the Internet on the NJDHSS web site (www.state.nj.us/health) and update site, as necessary.
- Provide well testing information to residents when new wells are installed and inspected, in cooperation with the local health department. Consider proposing changes to State and local drinking water legislation that require well drillers to provide well testing information at the time of well installation.
- Provide well testing information to residents with local property tax bills, in cooperation with local government. Consider proposing changes to State drinking water legislation that require local governments to provide well testing information with property tax bills.
- Provide well testing information to residents during real estate transfers, in cooperation with the NJ Board of Realtors.

Community Outreach Activities

- **Conduct well testing presentations for residents utilizing State and local government personnel, in partnership with local community groups, government agencies, and other organizations.**
- **Conduct well testing presentations for health care providers within the community utilizing State and local government personnel, in partnership with local and State health organizations.**
- **Participate in community-based public health activities designed to raise awareness about environmental health and promote healthy behaviors and lifestyles, including health fairs, that were selected for use in the project.**
- **Integrate drinking water quality issues into local school-based education programs.**
- **Encourage easy access to well testing services via community-based programs. Explore funding options for providing free or reduced cost testing services. Maintain a current listing of programs providing these services.**
- **Coordinate educational outreach activities with federal, State and local government agencies activities, such as the release of research findings or the initiation of groundwater investigations.**

Further Educational Research Needs

- Expand project activities, as resources permit, to target other areas with large numbers of private wells throughout the State, with attention to assessing educational needs, attitudes and beliefs about private well testing.
- Conduct additional needs assessments possibly over the phone , in order to include more varied populations. Consider targeting neighborhoods in locations that are identified by ACDPH as areas of ground water concern.
- Propose changes to State and local drinking water legislation that promote well testing.

6

Appendices

Appendix A - Community Profile

Appendix B - Areas of Groundwater Concern

Appendix C - Focus Group Questionnaire

Appendix D - Community Needs Assessment

Appendix E - Direct Mailer

Appendix F - Private Well Testing Procedures and Results

Appendix G - Consent Form

Appendix H - Tables

Appendix A: Community Profile

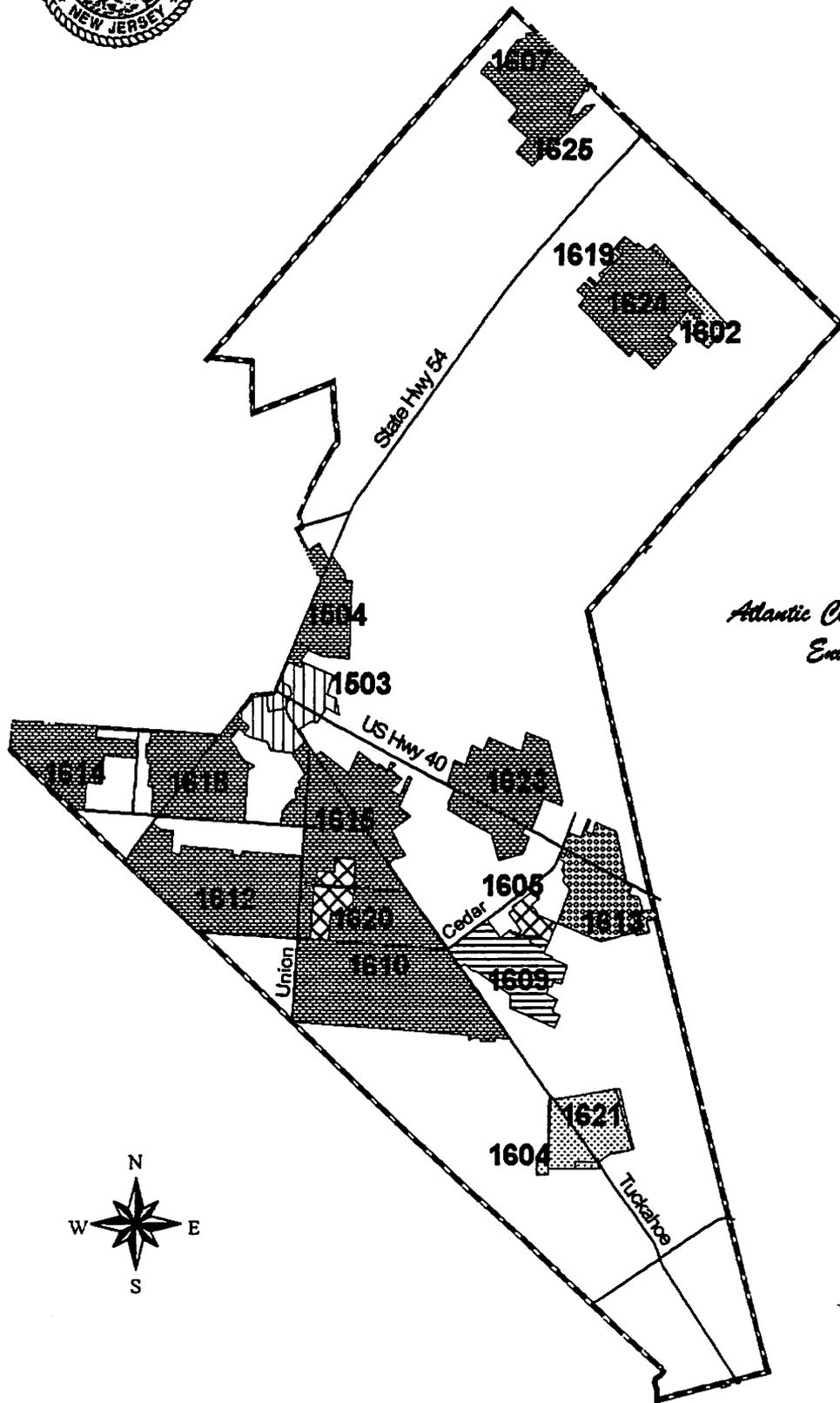
Community Profile		
Municipality:		
Overall Profile:		
PART 1 - DEMOGRAPHICS		
Population Density (per square mile):		
Racial Mix (% of total population):		
White	Asian, Pacific Islander	
Black	Other	
American Indian, Eskimo, Aleutian		
Hispanic (% of total population):		
Household Income (median):		
Age Distribution (% of total population):		
0 - 5 years	19 - 24 years	65 years or more
6 - 11 years	25 - 39 years	
12 - 18 years	40 - 64 years	
Gender Distribution (% of total population):		
Female		
Male		
Education (% of population > 24 years):		
< 9th grade	Associates Degree	
9th - 12th grade	Bachelors Degree	
High School Graduate	Graduate Degree	
Some college		
PART II - OTHER INFORMATION		
Languages Spoken:		
Environmental Commission (ANJEC):		
Community Organizations/Leaders:		
Local Government Offices/Officials:		

Community Profile
Libraries/Librarians:
Environmental Education Center:
Schools/Educators, Parents:
County Office of Rutgers Cooperative Extension/Agent:
Local Media/Reporters: Newspapers/Newsletters: Cable TV: Radio:
Nursing Homes/Hospitals:
Transient Communities: Farms/Migrant Farms:
Real Estate/Realtors:
Senior Citizen Housing Communities:
Day Care Centers:
WIC Clinics:
Local Health Departments:
Community Water Systems:

Appendix B: Areas of Groundwater Concern



Buena Vista Township Areas of Groundwater Concern



*Atlantic County Division of Public Health
Environmental Health Unit
GIS Program*

Legend

	HG*
	HG,NO*
	NO*
	VO*
	VO,HG*
	VO,NO*
	Municipal boundary
	Roads

*Numbers indicate case numbers of areas

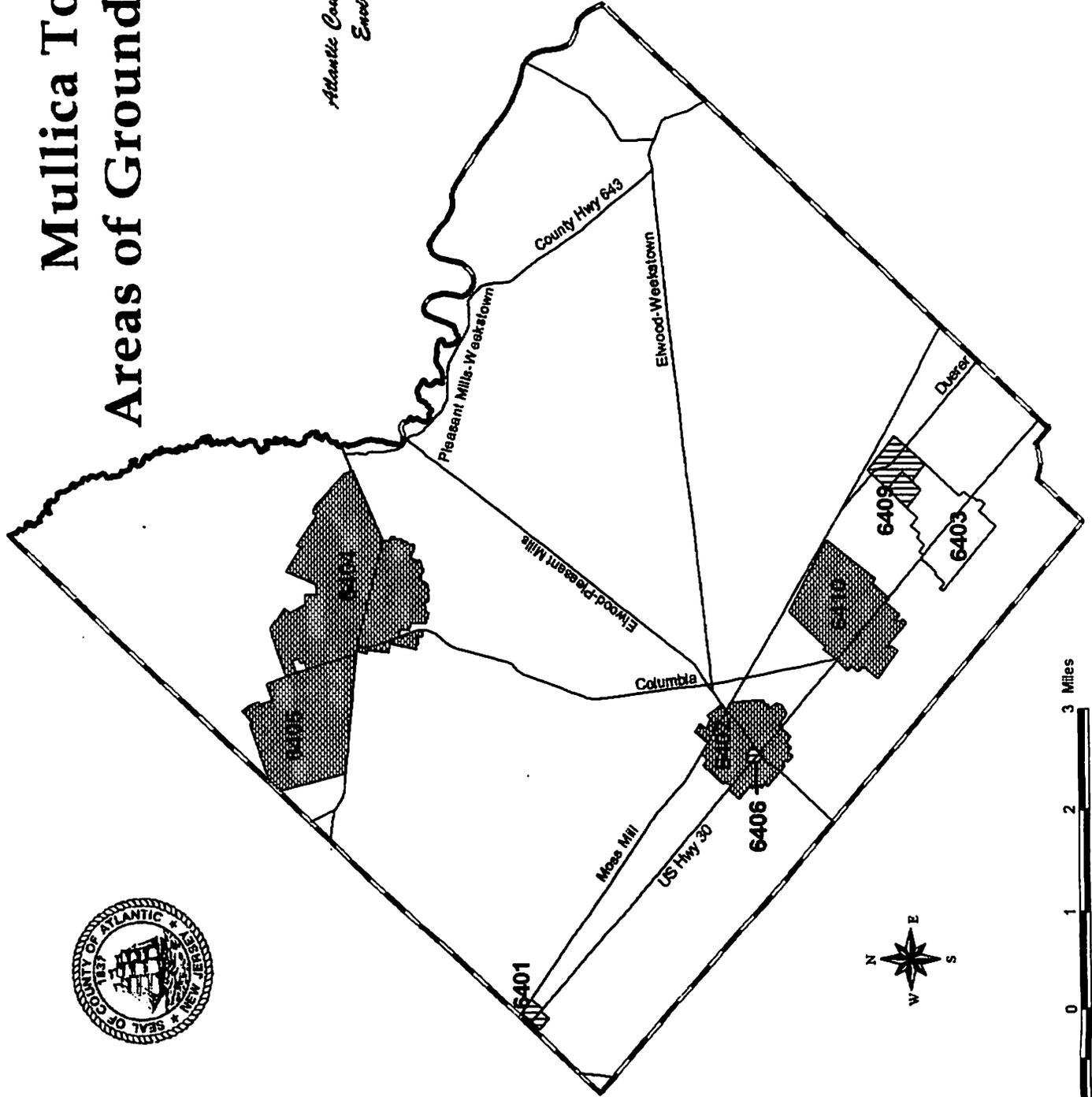


This map is for descriptive purposes only and was not developed in accordance with National Map Accuracy Standards. Any use of this product with respect to liability and precision shall be the sole responsibility of the user. The map was developed, in part, by the New Jersey Department of Environmental Protection Geographic Information System (GIS) data, under a contract with the Atlantic County Environmental Health Unit's staff. This secondary product has not been verified by users and is not state-sanctioned. The geographic accuracy and precision of the GIS data contained on this map has not been verified by a professional land surveying firm and shall not be, nor is intended to be, used in matters requiring determination of location of true geographic points and/or vertical control.

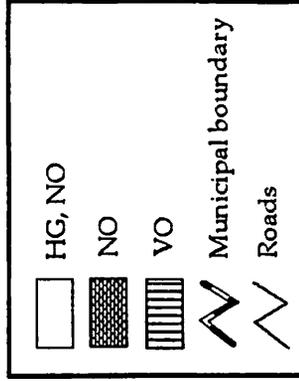
Mullica Township Areas of Groundwater Concern



Atlantic County Division of Public Health
Environmental Health Unit
GIS Program

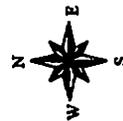


Legend

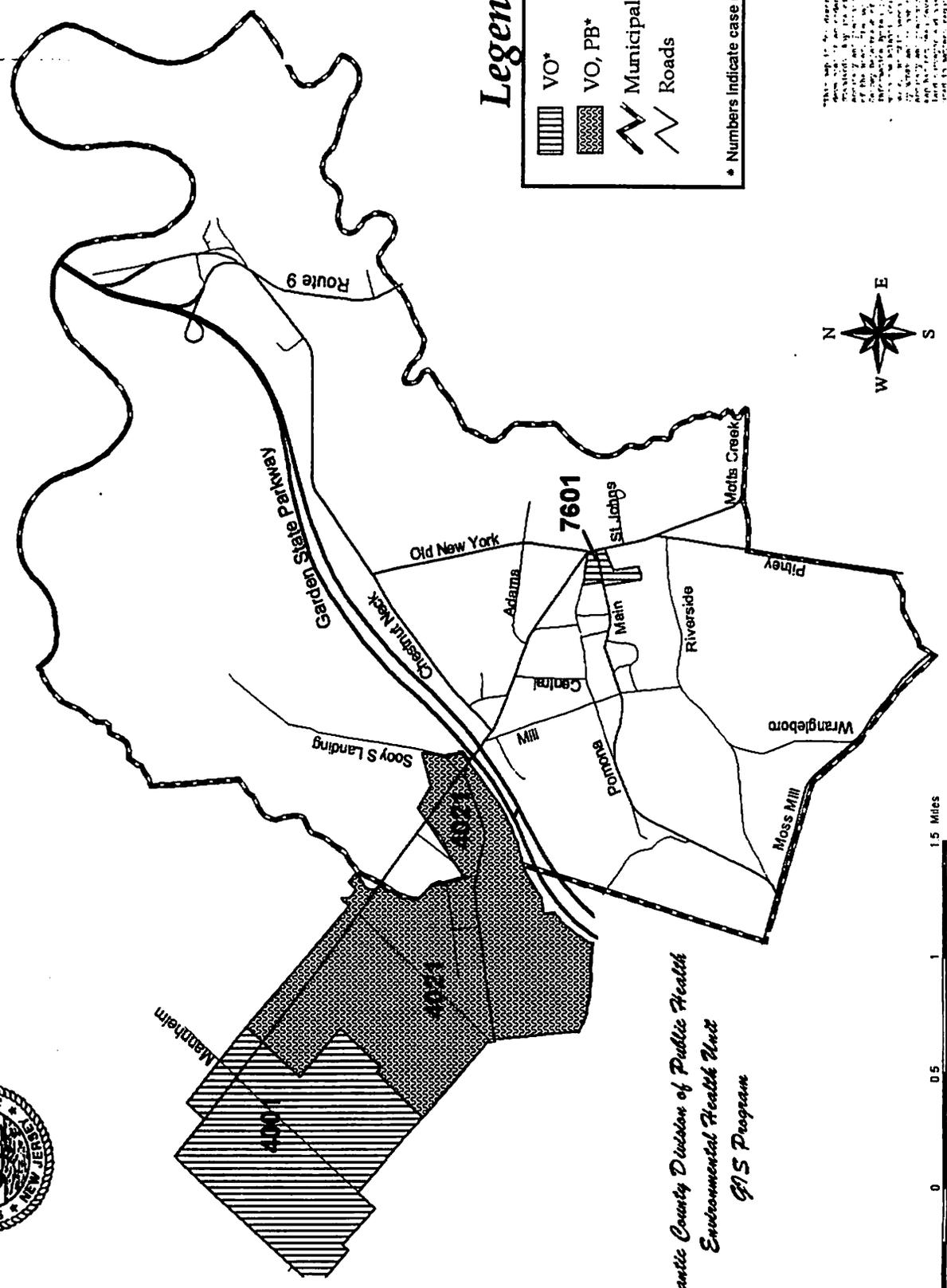


* Numbers indicate case number of area

This map is for informational purposes only and does not constitute a warranty of any kind. The information on this map was derived from various sources and is subject to change without notice. The user of this map should verify the accuracy of the data before using it for any purpose. The user of this map should also be aware that the information on this map is not intended to be used for any purpose other than that for which it was intended. The user of this map should also be aware that the information on this map is not intended to be used for any purpose other than that for which it was intended. The user of this map should also be aware that the information on this map is not intended to be used for any purpose other than that for which it was intended.



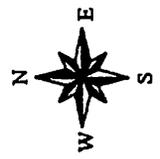
Port Republic Areas of Groundwater Concern



Legend

	VO*
	VO, PB*
	Municipal boundary
	Roads

* Numbers indicate case number of area



*Atlantic County Division of Public Health
Environmental Health Unit
GIS Program*

This map is an illustration of the areas of concern and is not intended to be used as a legal document. It is a general representation of the areas of concern and is not intended to be used as a legal document. It is a general representation of the areas of concern and is not intended to be used as a legal document. It is a general representation of the areas of concern and is not intended to be used as a legal document.

Appendix C: Focus Group Questionnaire

**- PRIVATE WELL TESTING -
PILOT EDUCATION PROJECT
FOCUS GROUP QUESTIONNAIRE**

**New Jersey Department of Health and Senior Services
Consumer and Environmental Health Services**

and

Atlantic County Division of Public Health

c) What are the *most effective* methods of educating people in your community about the importance of testing their wells? (Check as many as apply.)

- Detailed written information (factsheets, booklets)
- Brief, generalized written information (brochures, pamphlets)
- Focused written messages (posters, magnets)
- Direct mailings
- Videos
- Public service announcements
- Local newspaper/magazine articles
- Local cable TV coverage
- Community newsletters
- Community meetings
- Other (Be as specific as possible.)

d) What are the *most effective* channels for communicating with people in your community about the importance of testing their wells? (Check as many as apply.)

- Community organizations/leaders Specify: _____
- Local government offices/officials Specify: _____
- Libraries/librarians Specify: _____
- Schools/educators, parents Specify: _____
- Agricultural extension offices/agents Specify: _____
- Local media/reporters Specify: _____
- Other Specify: _____

Continued on next page

e) What types of information are *most needed* by the people in your community about their wells? (Check as many as apply.)

- Common sources of well water contamination
- Health effects of well water contamination
- Factors that make a well susceptible to contamination
- Testing guidance and requirements
- List of certified testing laboratories
- Cost of testing
- Understanding test results
- Correcting contamination problems
- Preventing contamination problems
- Other (Be as specific as possible.)

f) What strategies would you use to encourage people in your community to test their wells? (Be as specific as possible.)

PLEASE RETURN THIS COMPLETED FORM BY JANUARY 24, 1997 TO:



**New Jersey Dept of Health and Senior Services
Consumer and Environmental Health Services
210 South Broad Street - CN 360; Trenton, NJ 08625**

Appendix D: Community Needs Assessment

**- PRIVATE WELL TESTING -
PILOT EDUCATION PROJECT
COMMUNITY NEEDS ASSESSMENT**

**New Jersey Department of Health and Senior Services
Consumer and Environmental Health Services**

and

Atlantic County Division of Public Health

July, 1997

INTERVIEWER INSTRUCTIONS

The interviewer will:

- obtain a signed consent form from the participant before the interview is conducted.
- assure that the interview is initiated before water sampling is conducted.
- conduct the interview with the individual who is most responsible for private well testing and repairs at the residence of interest. (Every attempt will be made to identify such individual at the time the interview is scheduled.)
- read the information on page 3 to the participant prior to beginning the interview and the specific directions (in bold and caps) at the beginning of each section.
- assure that the participant provides a response (or responses where indicated) for each item on the questionnaire.
- (PART 1 ONLY) arrange to obtain information that the participant is unsure about at a later date, wherever possible.
- (PART 2 ONLY) prompt the participant to select the response that BEST describes how they feel if the participant is unsure about how they feel towards a specific statement (i.e., "I don't know", "I'm not sure").
- explain to the participant that their water sampling results will be mailed to them as soon as they are available.

**- PRIVATE WELL TESTING -
PILOT EDUCATION PROJECT
COMMUNITY NEEDS ASSESSMENT**

DATE: _____

ID# _____

HELLO, MY NAME IS _____ . THANK YOU FOR VOLUNTEERING TO PARTICIPATE IN THIS PROJECT. YOUR PARTICIPATION WILL PROVIDE US WITH VALUABLE INFORMATION THAT WILL BE USED TO DEVELOP EDUCATIONAL PROGRAMS TO ENCOURAGE PEOPLE IN YOUR COMMUNITY TO TEST THEIR WELLS.

- Let me tell you a little about the interview. First, I am going to ask you some questions about your private well itself, including questions about the type of well you have and its location, any testing or repair work you may have had done, and your well use. Then, I would like you to provide me with some of your thoughts and opinions about testing your private well. Finally, I will be asking you a few questions about yourself.
- As I mentioned on the phone, it will be helpful for you to have information available on your well, septic system, and any water treatment devices that you may have.
- It should take about 30 to 45 minutes to complete the interview.

Please turn to the next page

PART I

FIRST, I AM GOING TO ASK YOU SOME QUESTIONS ABOUT YOUR WELL. YOU SHOULD CHOOSE ONLY ONE RESPONSE, EXCEPT WHERE I INDICATE OTHERWISE.

1) Are you usually responsible for well testing and repairs at this residence?

- YES
 NO

IF NO, who is responsible for well testing and repairs at this residence?

2) Are you the owner of this residence?

- YES
 NO

IF YES, about how many years have you owned this residence ?

IF NO, who is the owner of this residence?

3) Do you currently live at this residence?

- YES
 NO

IF YES, ANSWER A AND B:

a) About how many years have you lived at this residence?

b) Do other people currently live at this residence with you? If so, how many people, including yourself, currently live here and what are their ages?

- YES _____ children (<20 years)
_____ adults (20 - 65 years)
_____ adults (> 65 years)
 NO

Please turn to the next page

PART I (CONTINUED)

IF NO, ANSWER C:

c) Does someone else currently live at this residence? If so, who lives at this residence?

YES _____

NO

4) What type of well do you have?

MACHINE DRILLED

HAND DUG

OTHER _____

NOT SURE _____

5) About how many years old is your well?

< 5 years

5-9 years

10-19 years

20-39 years

40-59 years

60-80 years

> 80 years

NOT SURE _____

6) About how many feet deep is your well?

< 10

10 - 19

20 - 49

50 - 99

100 - 149

150 - 200

> 200

NOT SURE _____

Please turn to the next page

PART I (CONTINUED)

7) Has your well water been tested?

- YES
- NO
- NOT SURE _____

IF YES, ANSWER A THROUGH D:

a) Why do you test your well water?
(Check as many as apply.)

- IMPORTANT
- INEXPENSIVE
- NOT TIME CONSUMING
- CONVENIENT
- OTHER _____
- _____
- _____

b) About how often do you test your well water?

- ONLY ONCE
- EVERY 6 MONTHS
- ONCE A YEAR
- EVERY 2-3 YEARS
- OTHER _____
- _____
- NOT SURE _____

c) What do you usually test for?
(Check as many as apply.)

- BACTERIA (COLIFORM)
- NITRATES
- METALS
- VOLATILE ORGANIC COMPOUNDS
- OTHER _____
- _____
- NOT SURE _____

Please turn to the next page

PART I (CONTINUED)

d) Was your well ever found to be contaminated? If so, indicate what was found?

- YES _____
- NO
- NOT SURE

IF NO, ANSWER E:

e) Why don't you test your well water? (Check as many as apply.)

- NOT IMPORTANT
 - TOO EXPENSIVE
 - TOO TIME CONSUMING
 - TOO INCONVENIENT
 - OTHER _____
-
-

8) Has your well ever been repaired?

- YES
- NO
- NOT SURE

IF YES, ANSWER A THROUGH C:

a) Why was your well repaired?

b) Did you chlorinate your well after it was repaired?

- YES
- NO
- NOT SURE

c) Was your well tested for bacteria after it was repaired?

- YES
- NO
- NOT SURE

Please turn to the next page

PART I (CONTINUED)

9) What do you use your well water for?
(Check as many as apply.)

- DRINKING
 - COOKING
 - BATHING/SHOWERING
 - WASHING DISHES/CLOTHES
 - WASHING CAR
 - WATERING GARDEN/LAWN
 - OTHER _____
-

10) For about how many years have you been using your well water?

11) Do you get water from anywhere else?

- YES
- NO

IF YES, ANSWER A AND B:

a) What other sources of water do you use?

b) What do you use this water for?

- DRINKING
 - COOKING
 - BATHING/SHOWERING
 - WASHING DISHES/CLOTHES
 - WASHING CAR
 - WATERING GARDEN/LAWN
 - OTHER _____
-

12) Do you have a water treatment system?

- YES
- NO
- NOT SURE

Please turn to the next page

PART I (CONTINUED)

IF YES, ANSWER A AND B:

a) What type of system do you have?
(Check as many as apply.)

- WATER SOFTENER
- GRANULATED ACTIVATED CARBON
- REVERSE OSMOSIS
- OTHER _____

NOT SURE

b) Do you maintain the system
according to the manufacturer's
instructions?

- YES
- NO
- NOT SURE

13) Do you have a septic tank?

- YES
- NO
- NOT SURE

IF YES, ANSWER A THROUGH C

a) About how close is your well to the
septic tank?

b) Do you perform routine maintenance
of your septic tank?

- YES
- NO
- NOT SURE

c) Has your septic tank ever been
repaired? If so, indicate type of
repair.

- YES _____
- NO
- NOT SURE

Please turn to the next page

PART 2

NOW, I AM GOING TO ASK YOU FOR YOUR GENERAL THOUGHTS ABOUT TESTING YOUR PRIVATE WELL. SINCE YOU ARE DESCRIBING YOUR FEELINGS AND BELIEFS, THERE ARE NO RIGHT OR WRONG ANSWERS TO THESE STATEMENTS. SELECT THE RESPONSE THAT MOST CLOSELY DESCRIBES HOW YOU FEEL OR WHAT YOU BELIEVE. CHOOSE ONLY ONE RESPONSE FOR EACH STATEMENT. LET'S TRY A FEW EXAMPLES BEFORE WE GET STARTED.

Example 1:

Private well testing is important to protect your health and the health of your family.

- | | | | |
|-------------------|-------------------|----------------------|----------------------|
| ① | ② | ③ | ④ |
| Strongly
Agree | Somewhat
Agree | Somewhat
Disagree | Strongly
Disagree |

If you agree very much with this statement, choose Choice #1.

Example 2:

Private well testing is expensive.

- | | | | |
|-------------------|-------------------|----------------------|----------------------|
| ① | ② | ③ | ④ |
| Strongly
Agree | Somewhat
Agree | Somewhat
Disagree | Strongly
Disagree |

If you disagree somewhat with this statement, choose Choice #3

Please turn to the next page

PART 2 (CONTINUED)

1) I am concerned about *the quality of my well water*.

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

2) It is *my responsibility* to make sure that my well water is safe.

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

3) It is *the government's responsibility* to make sure that my well water is safe.

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

4) I would test my well MORE OFTEN if *it cost less money*.

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

5) I would test my well MORE OFTEN if *it was more convenient*.

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

6) I would test my well MORE OFTEN if *it took less time*.

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

7) It would be **IMPORTANT** for me to test my well if *my neighbor's well was found to be contaminated*.

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

Please turn to the next page

PART 2 (CONTINUED)

8) It would be **IMPORTANT** for me to test my well if *my well was found to be contaminated in the past.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

9) It would be **IMPORTANT** for me to test my well if *I received a public notice from the county/State about water contamination in my neighborhood.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

10) It would be **IMPORTANT** for me to test my well if *nearby activities were occurring that might contaminate my well.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

11) It would be **IMPORTANT** for me to test my well if *I lived near a hazardous waste site or an industrial facility.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

12) It would be **IMPORTANT** for me to test my well if *I lived on a farm or in a farming community.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

13) It would be **IMPORTANT** for me to test my well if *my septic tank was close to my well.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

14) It would be **IMPORTANT** for me to test my well if *my neighbor's septic tank was close to my well.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

Please turn to the next page

PART 2 (CONTINUED)

15) It would be **IMPORTANT** for me to test my well if *a local water contamination problem was reported in the media (such as the newspaper, TV, or radio).*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

16) It would be **IMPORTANT** for me to test my well if *young children, the elderly, or individuals who are ill lived in my household.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

17) It would be **NECESSARY** for me to test my well if *I was selling my home.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

18) It would be **NECESSARY** for me to test the well if *I was buying a home.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

19) It would be **NECESSARY** for me to test my well if *I wanted to make sure that my water is safe.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

20) I would be **MORE LIKELY** to test my well if *I had well testing information and guidance available to me.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

21) I would be **MORE LIKELY** to test my well if *I was able to do so with a group of my neighbors as part of a community activity.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

Please turn to the next page

PART 2 (CONTINUED)

22) I would be MORE LIKELY to test my well if *I had a better understanding of what things place my well at risk of contamination.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
----------------	----------------	-------------------	-------------------

23) I would be MORE LIKELY to test my well if *I was knowledgeable about of the most likely sources of well water contamination.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
----------------	----------------	-------------------	-------------------

24) I would be MORE LIKELY to test my well if *I had a better understanding of the health risks.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
----------------	----------------	-------------------	-------------------

25) I would be MORE LIKELY to test my well if *I knew where to go to get my water tested.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
----------------	----------------	-------------------	-------------------

26) I would be MORE LIKELY to test my well if *I knew what contaminants to test for.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
----------------	----------------	-------------------	-------------------

27) I would be MORE LIKELY to test my well if *I had a better understanding of what the test results meant.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
----------------	----------------	-------------------	-------------------

28) I would be MORE LIKELY to test my well if *I knew how to fix a contamination problem that might be found.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
----------------	----------------	-------------------	-------------------

Please turn to the next page

PART 2 (CONTINUED)

28) I would test my well MORE OFTEN if *government officials that I could trust were available to assist me.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

29) It would NOT be NECESSARY for me to test my well if I *had a water treatment system.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

30) It would NOT be NECESSARY for me to test my well if *my well water looked, smelled, and tasted good.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

31) It would NOT be NECESSARY for me to test my well if *I used bottled water for drinking and cooking.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

32) I would be required to *fix or replace my well if contamination was found.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

33) I would be required to *stop using my well if contamination was found.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

34) It would be expensive for me to *fix or replace my well if contamination was found.*

Strongly Agree	Somewhat Agree	Somewhat Disagree	Strongly Disagree
-------------------	-------------------	----------------------	----------------------

Please turn to the next page

35) Is there anything else you would like to tell me about testing your private well?

Please turn to the next page

PART 3

NOW, I WILL BE ASKING YOU SOME QUESTIONS ABOUT YOURSELF. THIS INFORMATION WILL BE VERY HELPFUL IN UNDERSTANDING THE RESPONSES WE GET FROM ALL PARTICIPANTS AS A GROUP. THESE QUESTIONS ARE OPTIONAL. YOU MAY CHOOSE NOT TO ANSWER ANY OR ALL OF THESE QUESTIONS.

- 1) Sex of participant: MALE
 FEMALE
- 2) What is your age? LESS THAN 20 YRS
 20 -39 YRS
 40 - 59 YRS
 60 YRS OR MORE
 REFUSED
- 3) Which of the following best describes your racial background? WHITE
 BLACK
 ASIAN OR PACIFIC ISLANDER
 NATIVE AMERICAN, ESKIMO, OR ALEUTIAN
 OTHER _____
 UNKNOWN
 REFUSED
- 4) What best describes your ethnic group or ancestry? _____
 UNKNOWN
 REFUSED
- 5) Are you of Hispanic descent? YES
 NO
 UNKNOWN
 REFUSED
- If YES, what is your country of origin? _____

Please turn to the next page

PART 3

6) What is the highest grade of school that you completed?

- NONE
- GRADES 1-6
- GRADES 7-8
- GRADES 9-12
- HIGH SCHOOL GRADUATE
- SOME COLLEGE
- ASSOCIATES DEGREE
- BACHELORS DEGREE
- POST GRADUATE DEGREE
- OTHER _____
- REFUSED

7) What is your total yearly household income?

- < \$10,000
- \$10,000-24,999
- \$25,000-49,999
- \$50,000-74,999
- \$75,000-99,999
- \$100,000-150,000
- > \$150,000
- UNKNOWN
- REFUSED

8) In what language would you most like to receive educational materials about private well testing?

9) Would you be interested in giving us your opinion on some educational materials that we are developing for people in your community?

- YES
- NO

THANK YOU VERY MUCH FOR YOUR HELP.

PARTICIPANT INFORMATION FORM

DATE _____ ID # _____

MUNICIPALITY _____ BLOCK _____ LOT _____

OWNER'S NAME _____

ADDRESS _____

PHONE _____

SELECTION CRITERIA:

DID YOU RECEIVE A LETTER FROM US?

ARE YOU THE OWNER OF THIS RESIDENCE?

DO YOU CURRENTLY LIVE AT THIS RESIDENCE?

ARE YOU USUALLY RESPONSIBLE FOR WELL TESTING AND REPAIRS AT THIS RESIDENCE? IF NOT, WHO IS?

(FOR SPANISH SPEAKERS ONLY) IS THERE SOMEONE IN YOUR HOUSEHOLD WHO SPEAKS ENGLISH?

DIRECTIONS TO RESIDENCE _____

INTERVIEW SCHEDULED FOR _____ TIME _____

PARTICIPANT'S NAME _____

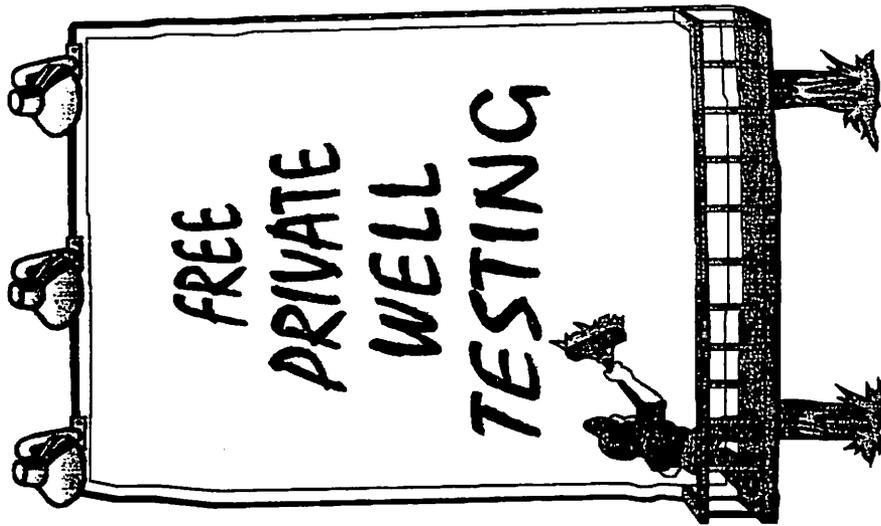
INTERVIEW CONFIRMATION LETTER SENT ON _____

INTERVIEW CONFIRMED BY PHONE ON _____

INTERVIEW COMPLETED ON _____

WATER SAMPLING COMPLETED ON _____

Appendix E: Direct Mailer



Division of Environmental and Occupational Health Services



Atlantic County Division of Public Health



Division of Environmental and Occupational Health Services
 Consumer and Environmental Health Services
 PO Box 360
 Trenton, NJ 08625-0360

APPLICATION FORM*

Please complete the application form and mail to:

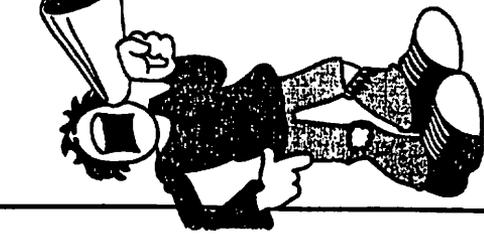
Laurie Pynch
 Consumer and Environmental Health Services
 PO Box 360
 Trenton, NJ 08625-0360



Name:	
Address:	
Town:	
State:	Zip Code:
Telephone: ()	
Block:	Lot:
Indicate the best time to call you:	

*Since only a limited number of water samples will be collected, all applications will be accepted in the order in which they are received. Upon receipt, all applicants will be notified in writing of the status of their application. No applications will be accepted by telephone. Applications must be received by October 14, 1997 in order to be considered.

ATTENTION



*Free
private
well
testing is
available to
you in return
for a few
moments of
your
time...*



Dear Resident:

We are looking for a *limited number* of volunteers to participate in an educational research project conducted by the

New Jersey Dept. of Health and Senior Services, in cooperation with the Atlantic County Division of Public

Health. Private well testing will be made available to you free of charge as our way of saying "Thank you".



First, you will be asked to provide us with your thoughts about the importance of testing your private well. Your participation will provide us with valuable information that can be used to develop educational programs to encourage people in your community to test their wells.



Then, water samples will be collected from your home and analyzed for bacteria, nitrates, mercury, and volatile organic compounds.

For more information...

*Laurie Pynch
New Jersey Dept. of
Health and Senior
Services
(609) 984-2193
- or -
Randi DeMartini
Atlantic County Division
of Public Health
(609) 645-5971, Ext. 4273*



We will provide you with your test results along with important health information and any guidance that you may need. It will be your decision and responsibility to take corrective measures that may be needed as a result of testing.

Appendix F: Private Well Testing Procedures and Results

Water sampling procedures

Private well water sampling was conducted by ACDPH field staff. Whenever possible, sampling occurred concurrently with the interview (usually after the interview had begun). In those instances when concurrent sampling was not possible, sampling was scheduled at another time but usually during the same day as the interview.

Water collection, preservation, and handling occurred in accordance with all State and local sampling procedures. In most cases, well water samples were collected from the kitchen faucet. For those households with water treatment systems, arrangements were made with the homeowner to bypass the system prior to sampling. In all cases, water samples were collected after the system was flushed for about 10 minutes.

Water quality parameters were selected for analysis based on ACDPH recommendations and local contamination history. Water samples were analyzed for the following parameters using U.S. Environmental Protection Agency (USEPA) protocols: total coliform (USEPA method 303), nitrate (USEPA method 353.2), mercury (USEPA method 245) and volatile organic compounds (USEPA method 502.2). Laboratory analyses were performed by Atlantic County Utilities Authority under a contract with ACDPH.

Water sampling results

A total of 42 water samples were collected and analyzed. For most water samples, contaminants were either not detected or were present at levels below New Jersey Maximum Contaminant Levels (MCLs). In one water sample, total coliform bacteria (17 coliform present) were found at a level that exceeded the MCL (absence of coliform). Nitrate-nitrogen (13 mg/l) was found in another sample at a level above the MCL (10 mg/l). Mercury (1.99 ug/l) was detected in one sample at a

level that was close to, but did not exceed, the MCL (2 ug/l). Volatile organic compounds were not detected at levels above the MCLs. Nitrate was the most common contaminant, detected in 78% of samples, although primarily at levels below the MCL. Table A summarizes the private well sampling results.

Table A. Private Well Water Sampling Results			
	<i>Frequency</i>	<i>Mean</i>	<i>Range</i>
<i>Total coliform:</i>			
not detected (< 1)	41	---	---
≥ 1	1	17 *	---
<i>Nitrate (in ppm):</i>			
not detected (< 0.2)	9	---	---
0.2 - ≤ 10	32	2.29	0.203 - 8.174
≥ 10	1	13	---
<i>Mercury (in ppb):</i>			
not detected (< 0.1)	35	---	---
0.1 - < 2	7	0.45	0.10 - 1.99
≥ 2	0	---	---
<i>Volatile Organic Compounds (in ppb):**</i>			
Chloroform	12	3.85	0.47 - 8.22
1,1-Dichloroethane	1	0.71	---
1,2-Dichloropropane	2	2.18	0.72 - 3.65
1,1,1-Trichloroethane	2	0.54	0.42 - 0.65
*Confirmatory testing did not detect the presence of coliform bacteria			
**Only those compounds that were detected (as part of EPA method 502.2) are listed.			

Water sampling reports and follow-up activities

ACDPH provided water sampling results to participants usually within 3 weeks of sample collection. In addition to their sampling results, participants received a letter that summarized their results and provided water testing

recommendations (see attachment A). Recommended testing frequency increased if residences were located in designed “contaminated groundwater advisory areas” (see attachment B).

ACDPH provided sampling results to DHSS. Both ACDPH and DHSS reviewed sampling results based on Federal and State MCLs and consulted on appropriate follow-up activities, where necessary. Follow-up activities, including confirmatory testing, and water treatment and testing recommendations, were provided to three participants.

Confirmatory testing

ACDPH conducted confirmatory testing for one private well where the MCL for total coliform was exceeded. Additional testing did not confirm the presence of the contaminant at a level above the MCL and no further action was recommended.

Water treatment and testing recommendations

In one instance, nitrate (13 mg/l) was detected at levels above the MCL (10 mg/l). ACDPH provided assistance to the participant with interpreting these results and guidance on appropriate actions including effective water treatment options. ACDPH recommended that another participant perform repeat sampling when mercury levels (1.99 ug/l) were close to, but did not exceed, the MCL (2 ug/l).



Atlantic County
Department of Human Services

Richard E. Squires
County Executive

Samuel Stetzer, M.D.
Department Head
Medical Director

609/645-5930 FAX: 645-5904
TDD: 348-5551

Division of Public Health
609/645-5935 FAX: 645-5931

Out Patient Clinics
609/645-5933

Environmental Health
609/645-5971 FAX: 645-5923

Alcoholism/Drug Abuse
609/645-5932 FAX: 645-5907

January 14, 1998

Name
address

P#

Dear :

Results from the water samples collected from your well were found to be within the limits for all chemicals for which there are established State drinking water standards.

Copies of your laboratory analyses are enclosed.

Because groundwater moves continually and conditions can change over time, no predictions can be made about the future quality of your well water. You are advised to repeat this testing once a year, or sooner if you notice a sudden change in the taste or odor of your water.

Please feel free to call me at (609) 645-5971, extension 4273, if you have any further questions.

Very truly yours,

Randi DeMartini
Program Coordinator
Water Pollution Control

Encl.
rad

Offices at:

- 235 Dolphin Avenue • Northfield, New Jersey 08225-2074
- 201 So. Shore Road • Northfield, New Jersey 08225-2370
- 101 So. Shore Road • Northfield, New Jersey 08225-2359

Visit our web site at <http://www.aclink.org>
Atlantic County is an Equal Opportunity Employer





Atlantic County

Department of Human Services

Richard E. Squires
County Executive

Samuel Stetzer, M.D.
Department Head
Medical Director

609/645-5930 FAX: 645-5904
TDD: 348-5551

Division of Public Health
609/645-5935 FAX: 645-5931

Out Patient Clinics
609/645-5933

Environmental Health
609/645-5971 FAX: 645-5923

Alcoholism/Drug Abuse
609/645-5932 FAX: 645-5907

December 22, 1997

Name
Address

Ref. #P

Dear :

Results from the water samples collected from your well were found to be within the limits for all chemicals for which there are established State Drinking Water Standards.

Copies of your laboratory analyses are enclosed.

Because groundwater moves continually and conditions can change over time, no predictions can be made about the future quality of your well water. You are advised to repeat this testing every four to six months, or sooner if you notice a sudden change in the taste or odor of your water.

Please feel free to call me at (609) 645-5971, extension 4273, if you have any further questions.

Sincerely,

Randi DeMartini
Program Coordinator
Water Pollution Control

RD
40
enclosure

Offices at:

- 235 Dolphin Avenue • Northfield, New Jersey 08225-2074
- 201 So. Shore Road • Northfield, New Jersey 08225-2370
- 101 So. Shore Road • Northfield, New Jersey 08225-2359

Visit our web site at <http://www.aclink.org>
Atlantic County is an Equal Opportunity Employer



Appendix G: Consent Form



State of New Jersey
DEPARTMENT OF HEALTH AND SENIOR SERVICES
CN 360
TRENTON, N.J. 08625-0360

CHRISTINE TODD WHITMAN
Governor

LEN FISHMAN
Commissioner

PRIVATE WELL TESTING
EDUCATIONAL RESEARCH PROJECT
-CONSENT FORM-

The New Jersey Department of Health and Senior Services (NJDHSS) is inviting you to participate in an education project dealing with private well testing. Your participation in this project will provide us with valuable information that will be used to develop educational programs to encourage people in your community to test their wells. This project is being conducted in cooperation with the Atlantic County Division of Public Health (ACDPH).

We will ask you to provide us with your thoughts about the importance of testing your private well. We will also ask you questions about yourself and your family, and about things that might affect your well. If you agree to participate, we will test your tap water at no cost to you. We will provide you with the test results as soon as they are available, along with important health information and any guidance that you may need. *It will be your decision and responsibility to fix any problems that may be found as a result of testing.*

Your participation in this project is completely voluntary. You may refuse to answer any question that you prefer not to answer and you may discontinue participating at any time. You may choose to participate only in the interview, without having your tap water tested.

All interview information will be kept in a locked file cabinet and only project staff will be able to access this information. No interview information that identifies you or your family will be released to the public or included in any reports.

All water test results will be provided to the ACDPH. These sampling results will enable local health officials to better understand drinking water quality in Atlantic County and to protect the health of the public. ACDPH water test files are accessible to the public.

If you have any questions about this project, you may contact Laurie Pynch at (609) 984-2193.

- Continued on back -

Your signature below indicates that you have read, understood, and had the opportunity to discuss the information on this consent form with a NJDHSS representative, and that you agree to participate in this project.

I agree to be interviewed by a NJDHSS representative.

Signature of Participant

Date

I agree to have my tap water sampled by an ACDPH representative.

Signature of Participant

Date

Appendix H: Tables

Table 1. Distribution of Participants by Demographic Factors		
	Frequency	Percent
Sex:		
Male	20	47.6
Female	22	52.4
Age:		
20 - 39 years	5	11.9
40 - 59 years	15	35.7
60 years or older	22	52.4
Race:		
White	30	71.4
Black	12	28.6
Education:		
7th - 8th grade	1	2.4
9th - 12th grade	5	11.9
High School Graduate/GED	13	31.0
Some College/Trade School	8	19.0
Associates or Bachelors Degree	9	21.4
Post Graduate Degree	6	14.3
Income^a:		
\$10,000 or less	3	8.1
\$10,000 - 24,999	5	13.5
\$25,000 - 49,999	11	29.7
\$50,000 - 74,999	9	24.3
\$75,000 - 99,999	5	13.5
\$100,000 or more	4	10.8
^a Data excludes participant's who declined to provide the information.		

Table 2. Frequencies of Participant Responses to Well Testing Knowledge, Attitude, And Belief Statements^a

	- Agree -			- Disagree -		
	- Strongly - Frequency (%)	- Somewhat - Frequency (%)	Total (%)	- Somewhat - Frequency (%)	- Strongly - Frequency (%)	Total (%)
<i>I am concerned about the quality of my well water.</i>						
	29 (69)	10 (24)	93	2 (5)	1 (2)	7
<i>It would be important for me to test my well if I wanted to make sure that my water is safe.</i>						
	36 (86)	6 (14)	100	0	0	0
<i>It would not be necessary for me to test my well if my well water looked, smelled, and tasted good.</i>						
	1 (3)	3 (7)	10	18 (43)	20 (48)	90
<i>It is my responsibility to make sure that my well water is safe.</i>						
	27 (64)	14 (33)	98	0	0	0
<i>It is the government's responsibility to make sure that my well water is safe.</i>						
	8 (19)	15 (36)	55	10 (24)	9 (21)	45
<i>I would test my well more often if it...</i>						
<i>cost less money.</i>	19 (45)	10 (24)	69	11 (26)	2 (5)	31
<i>was more convenient.</i>	10 (24)	13 (31)	55	14 (33)	5 (12)	45
<i>took less time.</i>	1 (2)	9 (21)	24	23 (55)	9 (21)	76
<i>It would be important for me to test my well if...</i>						
<i>my neighbor's well was found to be contaminated.</i>	39 (93)	3 (7)	100	0	0	0
<i>my well was found to be contaminated in the past.</i>	40 (95)	2 (5)	100	0	0	0
<i>I received a public notice from the county/State about water contamination in my neighborhood.</i>	38 (91)	3 (7)	98	1 (2)	0	2
<i>nearby activities were occurring that might contaminate my well.</i>	36 (86)	5 (12)	98	0	0	0
<i>I lived near a hazardous waste site or an industrial facility.</i>	40 (95)	1 (2)	97	0	0	0
<i>I lived on a farm or in a farming community.</i>	21 (50)	19 (45)	95	1 (2)	0	0

Table 2. Frequencies of Participant Responses to Well Testing Knowledge, Attitude, And Belief Statements^a

	- Agree -			- Disagree -		
	- Strongly - Frequency (%)	- Somewhat - Frequency (%)	Total (%)	- Somewhat - Frequency (%)	- Strongly - Frequency (%)	Total (%)
<i>my septic tank was close to my well.</i>	36 (86)	3 (7)	93	2 (5)	0	5
<i>my neighbor's septic tank was close to my well.</i>	35 (83)	3 (7)	90	2 (5)	0	5
<i>a local water contamination problem was reported in the media.</i>	30 (71)	10 (24)	95	2 (5)	0	5
<i>young children, the elderly, or individuals who are ill lived in my household.</i>	27 (64)	9 (22)	86	4 (10)	1 (2)	12
<i>It would be necessary for me to test the (my) well if...</i>						
<i>I was selling my home.</i>	21 (50)	12 (29)	79	3 (7)	4 (10)	17
<i>I was buying a home.</i>	34 (81)	6 (14)	95	0	1 (2)	2
<i>I would be more likely to test my well if...</i>						
<i>I had well testing information and guidance available to me.</i>	25 (60)	11 (26)	86	5 (12)	1 (2)	14
<i>I was able to do so with a group of my neighbors as part of a community activity.</i>	19 (45)	13 (31)	76	7 (17)	3 (7)	24
<i>I had a better understanding of what things place my well at risk of contamination.</i>	21 (50)	13 (31)	81	6 (14)	2 (5)	19
<i>I was knowledgeable about the most likely sources of well water contamination.</i>	22 (52)	15 (36)	88	3 (7)	2 (5)	12
<i>I had a better understanding of the health risks.</i>	28 (67)	9 (21)	88	4 (10)	1 (2)	12
<i>I knew where to go to get my water tested.</i>	23 (55)	7 (16)	71	7 (17)	4 (10)	27
<i>I knew what contaminants to test for.</i>	24 (57)	10 (24)	81	7 (17)	1 (2)	19
<i>I had a better understanding of what the test results meant.</i>	23 (55)	11 (26)	81	6 (14)	2 (5)	19

Table 2. Frequencies of Participant Responses to Well Testing Knowledge, Attitude, And Belief Statements^a

	- Agree -			- Disagree -		
	- Strongly - Frequency (%)	- Somewhat - Frequency (%)	Total (%)	- Somewhat - Frequency (%)	- Strongly - Frequency (%)	Total (%)
<i>I knew how to fix a contamination problem that might be found.</i>	19 (45)	12 (29)	74	7 (17)	3 (7)	24
<i>I would test my well more often if government officials that I could trust were available to assist me.</i>						
	16 (38)	12 (29)	66	7 (17)	7 (17)	34
<i>I would not be necessary for me to test my well if...</i>						
<i>I had a water treatment system.</i>	0	4 (10)	10	20 (48)	17 (40)	88
<i>I used bottled water for drinking and cooking.</i>	2 (5)	6 (14)	19	16 (38)	16 (38)	76
<i>I would be required to...</i>						
<i>fix or replace my well if contamination was found.</i>	23 (55)	8 (19)	74	5 (12)	4 (9)	21
<i>stop using my well if contamination was found.</i>	23 (55)	8 (19)	74	4 (10)	6 (14)	24
<i>It would be expensive for me to fix or replace my well if contamination was found.</i>						
	32 (76)	8 (19)	95	1 (2)	0	2

^a Response categories may not equal 100%. Data excludes participants who refused to answer or said they were unsure of how they felt.

Table 3a. Frequencies of Responses by Household Information- Household Members		
	<i>Frequency</i>	<i>Percent</i>
<i>Number of household members:</i>		
1 (participant only)	5	11.9
>1	37	88.1
<i>Number of children in households:</i>		
none	25	59.5
1-2	13	31.0
3 or more	4	9.5

Table 3b: Frequencies of Responses by Household Information-Well Characteristics		
	<i>Frequency</i>	<i>Percent</i>
<i>Type of Wells:</i>		
Machine drilled	37	88.1
Hand dug	1	2.4
Not sure	4	9.5
<i>Age of wells (in years):</i>		
<19	27	64.3
20 or more	8	19.0
Not sure	7	16.7
<i>Depth of wells (in feet):</i>		
<50	1	2.4
50 or more	25	59.5
Not sure	16	38.1

Table 3c: Frequencies of Responses by Household Information-Well Testing		
	Frequency	Percent
Prior well testing:		
No/unsure	15	35.7
Yes	27	64.3
Frequency of prior testing^a :		
Once	16	59.3
Twice	5	18.5
3-4 times	1	3.7
>4 times	5	18.5
Reasons for not testing^b:		
Not important	3	17.6
Inconvenient	3	17.6
Have good water quality	3	17.6
Not sure	2	11.8
Other	6	35.3
Reasons for testing^b:		
Water safety	11	28.2
Real estate requirements	10	25.6
Treatment system check	4	10.3
New well installation	3	7.7
Free water test	3	7.7
Other	8	20.5
Type of water sampling^b:		
Iron	13	25.0
Total coliform bacteria	11	21.2
Acidity (pH)	11	21.2
Nitrate	8	15.4
Other	9	17.3

Table 3c: Frequencies of Responses by Household Information-Well Testing		
	<i>Frequency</i>	<i>Percent</i>
<i>Prior well contamination^a:</i>		
No	27	100
Yes	0	----
^a includes only those participants who reported prior well testing ^b may include multiple responses for each participant		

Table 3d: Frequencies of Responses by Household Information-Well Repair		
	<i>Frequency</i>	<i>Percent</i>
<i>Prior well repair:</i>		
No	29	69.0
Yes	13	31.0
<i>Type of well repair^a:</i>		
Pump repaired or replaced	12	92.3
Other	1	7.7
<i>Well disinfection following repairs^a:</i>		
No	8	61.5
Yes	2	15.4
Not sure	3	23.1
<i>Well testing following repairs^a:</i>		
No	10	76.9
Yes	1	7.7
Not sure	2	15.4
^a includes only those participants who reported prior well repairs		

Table 3e: Frequencies of Responses by Household Information-Well Usage		
	Frequency	Percent
Well usage:		
All purposes	34	81.0
All purposes, except drinking and cooking	8	19.0
Alternative water supplies:		
No	25	59.5
Yes	17	40.5
Types of alternative water supplies^a:		
Bottled water	12	70.6
Agricultural (non-potable) well	5	29.4
Alternative water usage^b:		
Drinking and cooking	20	80.0
Lawn/garden	5	20.0
^a includes only those participants who reported using alternative water supplies ^b may include multiple responses for each participant		

Table 3f: Frequencies of Responses by Household Information- Other Systems Information		
	Frequency	Percent
Water treatment systems:		
No	18	42.9
Yes	24	57.1
Type of treatment systems ^{a,b}:		
Iron/pH	21	84.0
Not sure	1	4.0
Other	3	12.0
Maintenance of treatment systems^a:		
No	1	4.2
Yes	22	91.7
Not sure	1	4.2
^a includes only those participants who reported having a water treatment system ^b may include multiple responses for each participant		

Table 3g: Frequencies of Responses by Household Information- Other Systems Information		
	<i>Frequency</i>	<i>Percent</i>
<i>Septic systems:</i>		
No	0	----
Yes	42	100.0
<i>Distance from wells (in feet):</i>		
<100	17	40.5
100 or more	21	50.0
Not sure	4	9.5
<i>Maintenance of septic systems:</i>		
No	6	14.3
Yes	36	85.7
<i>Septic system repairs:</i>		
No	28	66.7
Yes	12	28.6
Not sure	2	4.8
<i>Type of repairs^a:</i>		
Add or replace drainage field	5	41.7
Other	7	58.3
^a includes only those participants who reported having their water treatment system repaired		