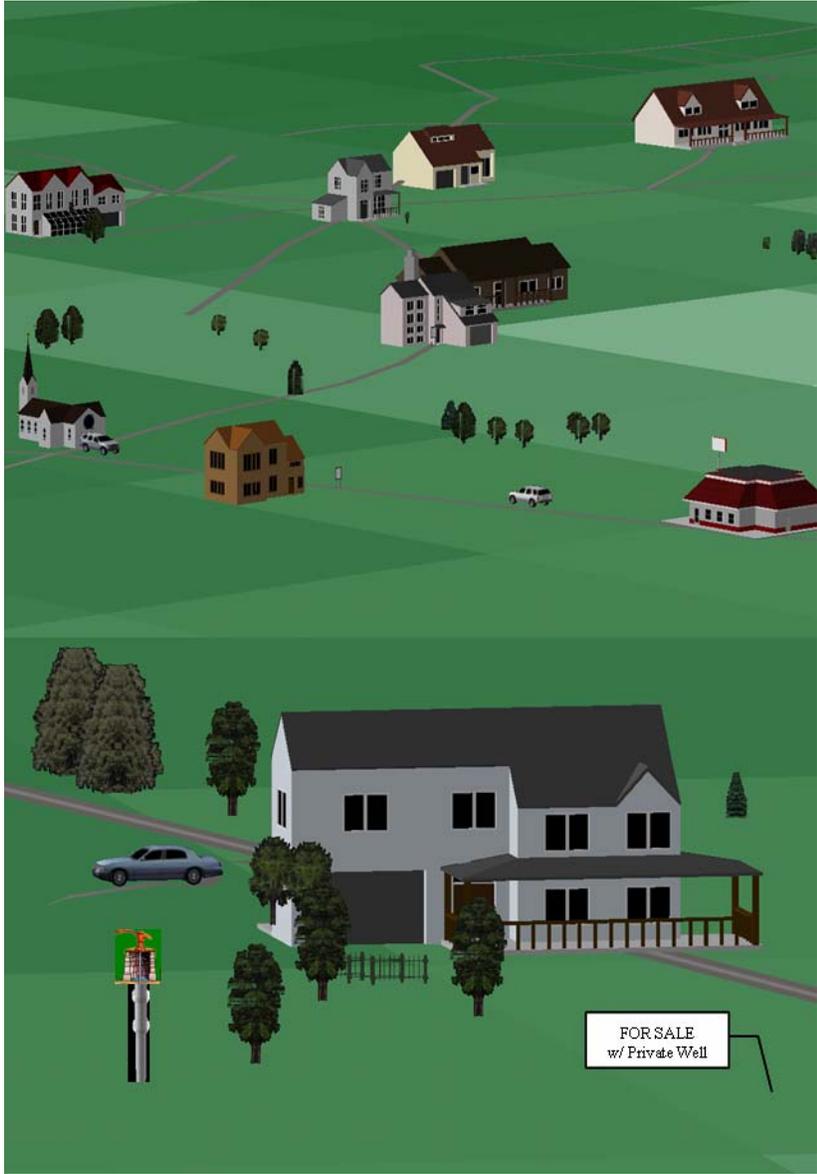


PRIVATE WELL TESTING ACT PROGRAM

WELL TEST RESULTS FOR SEPTEMBER 2002 – APRIL 2007



July 2008

**Written and prepared by
NJ Department of Environmental Protection
Division of Water Supply / Bureau of Safe Drinking Water
And
Division of Science, Research and Technology**

July 2008

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Executive Summary

The goal of the Private Well Testing Act (PWTA or Act) is to ensure that purchasers and lessees of properties served by private potable wells are fully aware of the quality of the drinking water source prior to sale or lease of a home or business.

The New Jersey Private Well Testing Act, as set forth at N.J.S.A. 58:12A-26 *et seq.*, was signed into law in March of 2001 and became effective in September 2002. State lawmakers were prompted to pass the PWTA because of private well contamination discovered throughout the State. To address this concern, the PWTA requires the buyer or the seller of real property to test the well water prior to sale and review the results prior to closing of title. It also requires landlords to test the private well water supplied to their tenants and provide their tenants with a written copy of the results. The data generated by this program are provided to the homeowners by the laboratory performing the analyses and then sent to the New Jersey Department of Environmental Protection (NJDEP), Bureau of Safe Drinking Water. The NJDEP notifies local health agencies when a well within their jurisdiction is tested under the PWTA. The data from the PWTA are used by NJDEP to assess the quality of the water from private wells throughout the state.

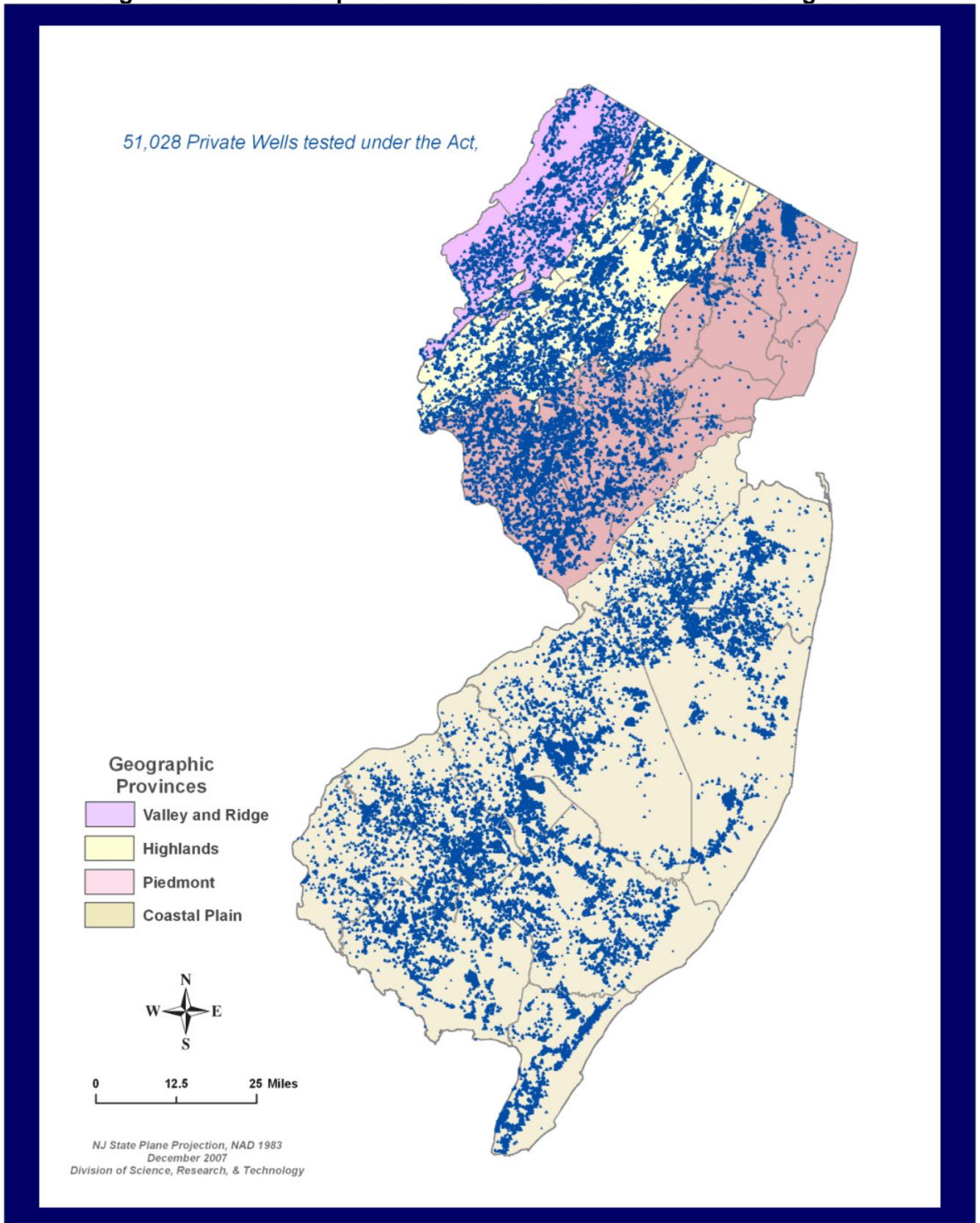
The information in this report meets the confidentiality requirements of the Act; the Act allows the release of PWTA information as a compilation of water test results by state, region and county and municipality. The names of specific property owners, their addresses or locations are not included. The report is also required to be made available free of charge to the public.

Summary of Well Test Results for September 2002 – April 2007

This is the second report summarizing the results from the Private Well Testing Act. It follows the release of the initial PWTA report in March 2004, entitled Initial Well Test Results for September 2002 – March 2003. This report provides a summary of the water test results submitted to the NJDEP in the first four and half years of the PWTA Program, over the period of September 2002 to April 2007, and confirms many of the findings identified in the initial report.

A total of 55,749 well water samples were analyzed from 51,028 separate wells during the period of September 2002 to April 2007. The samples results are biased using the highest test result value when more than one sample was collected at the same property. The 51,028 wells sampled represents about 13% of the estimated 400,000 private wells used for drinking water in New Jersey.

Figure E1: Wells Sampled and Submitted Data to the PWTA Program



As required by law, the PWTA test results represent untreated (raw) water quality. The samples for the PWTA are collected prior to any water treatment system. In some cases, treatment systems may already be in place to remove or lessen the degree of contamination. The NJDEP's new database accepts information regarding on site treatment, if applicable. If the homeowner treats the water, the PWTA test results do not reflect the drinking water quality that is being consumed after the water passes through the treatment system. When water sample results exceed drinking water standards, local health departments are notified and further post-treatment samples collected at a kitchen tap are recommended to determine the quality of the water consumed and to evaluate the effectiveness of any treatment system. Results of these follow-up samples taken by the buyer or the seller of a property are not required to be sent to NJDEP.

Contaminants Included in the Private Well Testing Act

The PWTA requires that all wells covered by the Act be tested for the presence of 29 primary drinking water contaminants:¹ bacteria, nitrate, lead, and 26 volatile organic chemicals. Certain areas of the state are also required to test for three additional primary drinking water contaminants: arsenic, mercury and gross alpha particle activity. Testing for three secondary parameters (pH, iron and manganese) is also required. See Table E1 for the list of PWTA parameters.

Table E1: List of Private Well Testing Act Program Analytes

<i>Primary Contaminants</i>	<i>Secondary Parameters</i>
<u>Bacteriological:</u> Total Coliform (Fecal or <i>E. coli</i>)	<u>With Optimum Range:</u> pH
<u>Organics:</u> All 26 Volatile Organic Compounds with Maximum Contaminant Levels	<u>With Recommended Upper Limits:</u> Iron Manganese
<u>Inorganics:</u> Arsenic* Lead Mercury* Nitrates	
<u>Radiological:</u> 48-Hour Rapid Gross Alpha Particle Activity*	

*These parameters are required only in certain counties

The test results from the PWTA sampling are compared to the Maximum Contaminant Levels that have been established by the Federal and State drinking water regulations.

¹ A primary drinking water standard protects public health by limiting the levels of contaminants in drinking water.

A Maximum Contaminant Level (MCL) is the highest level of a contaminant that is allowed in drinking water. Two of the 29 primary contaminants are handled somewhat differently in this report. The first exception is lead, which has an Action Level of 15 ug/L. An Action Level is different than an MCL. Since the majority of lead in drinking water is attributed to leaching from the pipes and distribution system, the action required by the Safe Drinking Water regulations centers on corrosion control and public notice. Since the PWTA program requires testing of untreated water, the State's Ground Water Quality Standard (GWQS) is used as a surrogate in the absence of an MCL established under the Safe Drinking Water Act. An exceedance for lead under the PWTA is thus determined by comparing the well test results to the GWQS. The GWQS for lead was lowered from 10 micrograms per liter ($\mu\text{g/l}$) to 5 $\mu\text{g/l}$ on November 7, 2005.

The second exception is arsenic. The MCL in effect for arsenic when the PWTA was signed was 50 $\mu\text{g/l}$. The USEPA adopted a new MCL of 10 $\mu\text{g/l}$ on January 22, 2002 (effective February 22, 2002): however, those public water systems required to comply with the new arsenic standard had until January 23, 2006 to do so. For the purposes of the PWTA, the NJDEP used the newly adopted Federal MCL of 10 $\mu\text{g/l}$ for assessing the PWTA results beginning in September 2002. On January 23, 2006, the same date that compliance with the federal MCL became mandatory for certain public water systems, a new State MCL of 5 $\mu\text{g/l}$ became effective. After January 23, 2006, 5 $\mu\text{g/l}$ was the MCL used to determine PWTA compliance. This report evaluates the arsenic test results based on 10 $\mu\text{g/l}$, and the more recent test results based on 5 $\mu\text{g/l}$.

Primary Contaminants: Protecting Human Health

Primary Drinking Water Standards are established for contaminants that have either an immediate or long-term effect on human health. Based on the results of the 51,028 wells tested between September 2002 and April 2007, 88 percent (%) of the wells "passed" (did not exceed) all of the required primary standards for drinking water. Of the 12 % (6,369) wells that exceeded a primary drinking water standards ("failed"), the most common exceedances were for gross alpha particle activity² (2,209 wells), arsenic³ (1,445 wells), nitrates (1,399 wells), fecal coliform or *E. coli* (1,136 wells), volatile organic compounds (VOCs) (702 wells), and mercury⁴ (215 wells). A summary of the primary contaminant test results is presented in Figure E1.

Secondary Parameters: Measuring Natural Water Quality Characteristics

The PWTA requires testing for three naturally occurring secondary drinking water parameters: pH, iron, and manganese. Secondary drinking water parameters are contaminants that cause aesthetic problems such as corrosivity of plumbing fixtures, and taste and odor problems. Secondary parameters also affect the water's suitability

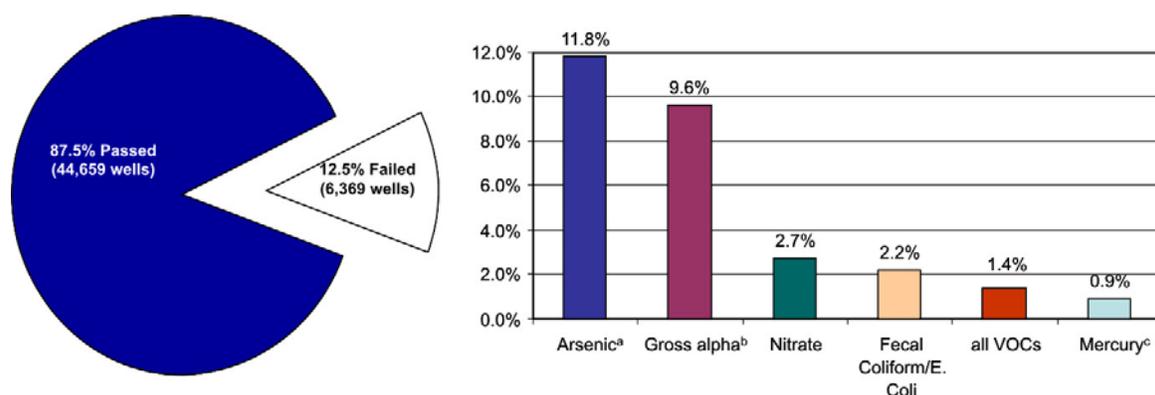
² The following counties are required to test for gross alpha: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Monmouth, Ocean, Salem, Mercer, Hunterdon, and Middlesex

³ The following counties are required to test for arsenic: Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Morris, Passaic, Somerset, and Union.

⁴ The following counties are required to test for mercury: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Monmouth, Ocean, and Salem.

for laundering, plumbing, and showering. MCLs have not been developed for secondary parameters, but instead the NJDEP has adopted “recommended upper limits.” Testing for secondary parameters is used to determine if any treatment is recommended to make the well water aesthetically pleasing to the consumer.

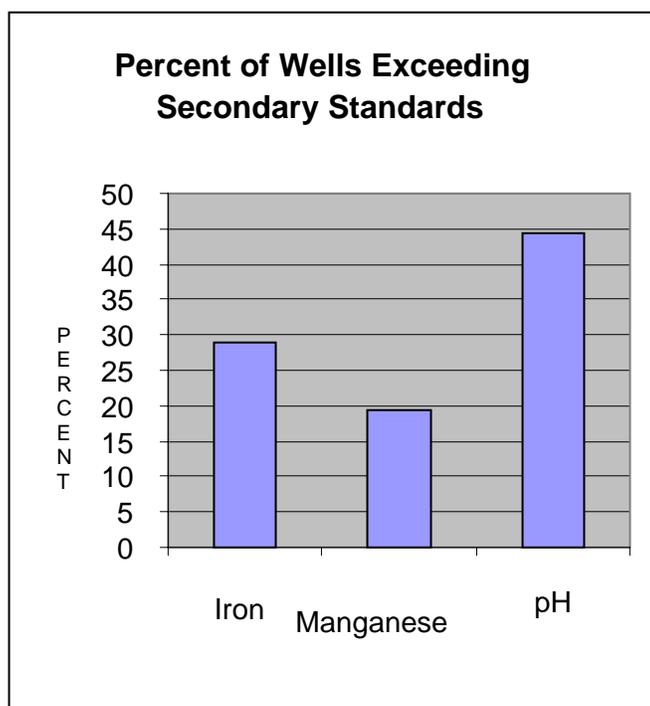
**Figure E1: Statewide Summary of Private Well Testing Act Results
For Primary Drinking Water Standards
September 2002 – April 2007
(Of 51,028 wells)**



- a. Ten counties were required to test for arsenic: Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Morris, Passaic, Somerset and Union. A total of 12,263 wells were test for arsenic using a sensitive analytic method.
- b. Twelve counties were required to test for gross alpha: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Hunterdon, Mercer, Middlesex, Monmouth, Ocean and Salem. A total of 22,904 wells were tested for gross alpha.
- c. Nine counties were required to test for mercury: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Monmouth, Ocean and Salem. A total of 25,270 wells were tested for mercury.

A total of 32,530 (64%) of the 51,028 wells tested exceeded one or more of the recommended upper limits for secondary parameters. Due to the nature of soils and geology, the ground water in the southern part of the state tends to be acidic (pH below 7), while ground water in the northern part tends to be neutral (pH = 7) to basic (pH above 7). Of the wells tested, 22,699 wells (45%) had pH values outside the recommended range of 6.5 to 8.5. Both iron and manganese are inorganic ions that occur naturally in soils and rocks throughout the state. A total of 14,751 (29%) wells reported iron levels above the recommended upper limit of 0.3 mg/l, and 9,890 wells (19%) were above the recommended upper limit of 0.05 mg/l for manganese. (See Figure E2).

Figure E2: Percent of Wells with Results that Exceeded the Recommended Upper Limit for Secondary Parameters (Of 51,028 wells)



Benefits of the Private Well Testing Act

As a result of the Private Well Testing Act, buyers and sellers of real property whose potable water source is a well that is subject to the PWTA, obtain information regarding the quality of the supplied drinking water and how their untreated water quality compares to the state and federal standards for the parameters required to be analyzed under the PWTA rules. The data that are collected in accordance with the PWTA provides valuable information concerning the ground water quality. These test results allow both parties to make informed decisions as to the potability of the untreated water. Information about financial assistance to pay for treatment of groundwater contamination is also provided with each test result.

Similarly, landlords of real property where the source of potable water is a well that is subject to the Act are also required to test the drinking water being supplied to their tenants, and to share this information with the tenants accordingly. As a result of the PWTA, certain private well owners are now provided with pertinent information regarding untreated ground water quality.

The PWTA test result information that is submitted to the NJDEP provides not only the NJDEP, but county and local health agencies, and other groups with an understanding of groundwater quality throughout New Jersey since the sample results submitted are of untreated water. For example, the Monmouth County Health Department has used PWTA data for tracking volatile organic compound (VOC) plumes in groundwater in Monmouth County, and the United States Geological Survey (USGS) is planning to use PWTA data to study nitrate contamination in the Highlands region of New Jersey.

Some results have confirmed expectations about ground water quality; in those counties requiring arsenic testing, the results have shown that arsenic is detected in the Piedmont region of New Jersey at a greater frequency than other areas of the State that are required to test for arsenic. Other results are leading us to a better understanding of ground water quality; the fecal coliform results have shown that the wells in the bedrock aquifers of New Jersey are more likely to have fecal coliform contamination than wells in the Coastal Plain. These analyses can be used by the NJDEP to further refine the PWTA analytical requirements throughout the State so that those wells located in specific geological formations are testing for the appropriate parameters.

Part 1: Introduction

On March 23, 2001, the Private Well Testing Act (PWTA or Act), as set forth by N.J.S.A. C.58:12A-26 *et seq.*, was signed into law. A copy of the Act is available online at <http://www.njleg.state.nj.us/2000/Bills/PL01/40 .htm>. The Act and its associated regulations require that buyers and sellers, and landlords and tenants, whose potable water supply is provided by a private well, share information about the quality of that water. Private wells of properties either being sold or leased must be tested for a specific list of parameters in accordance with the Private Well Testing Act Regulations at N.J.A.C. 7:9E *et seq.*⁵ The Act made the exchange of information regarding the quality of the ground water and its untreated potability mandatory, similar to other required information obtained during the purchase of a house, such as a termite inspection and a building inspection. This water quality information is required to be shared with the New Jersey Department of Environmental Protection (NJDEP) to enhance the understanding of statewide groundwater quality. Whenever a contaminant is found to exceed the drinking water standard, the NJDEP is required to notify the county or local health department. The county or local health agency may then notify neighboring homes and businesses that may be affected without disclosing the location of the particular well test failure.

This report summarizes the analytical results from over 51,028 private wells tested between September 2002 and April 2007 under the Private Well Testing Act. This report is a follow-up to the NJDEP's report entitled Initial Well Test Results for September 2002 - March 2003 that was released in March 2004.

A total of 55,749 samples were submitted to the state's PWTA database during the period of September 2002 through April 2007 from a total of 51,028 wells throughout the state. If a well was sampled more than once, the highest PWTA parameter result value was used in this analysis. The results found in this report confirm many of the findings that were presented in the initial PWTA Report of March 2004. Data associated with gross alpha particle activity are included and evaluated in this report for the first time. Gross alpha particle activity data was not included in the initial PWTA report because this testing requirement was initiated and phased in beginning in March 2003, the cut-off date for the initial report.⁶ The phase-in occurred initially in those counties where gross alpha particle activity in groundwater was suspected to be the greatest.

This report includes a Definition and Terms Section (Appendix A) providing many commonly used terms that relate to the PWTA program. In addition, further information about the PWTA program can be found at the PWTA webpage at <http://www.nj.gov/dep/pwta>. For information regarding common treatments available to homeowners having well contamination above a Maximum Contaminant Level, Action

⁵ The NJDEP estimates that there are about 400,000 private domestic wells in New Jersey, or about 13 percent of all New Jersey private wells.

⁶ The gross alpha particle activity measurement is required in Atlantic, Burlington, Camden, Cape May Cumberland, Gloucester, Hunterdon, Mercer, Middlesex, Monmouth, Ocean, and Salem Counties.

Level or Recommended Limit please see Appendix D or visit our website at www.state.nj.us/dep/pwta for links to other appropriate websites, such as National Sanitation Foundation www.nsf.org or USEPA's drinking water website www.epa.gov/safewater. You may also call the USEPA Drinking Water Hotline at (800) 426-4791 to obtain a copy of USEPA's pamphlet entitled "Home Water Treatment Units" (WH-550A).

Summary of the New Jersey Private Well Testing Act

The Private Well Testing Act requires that private well(s) on properties involved in certain real estate transactions to be tested for a specific list of drinking water parameters (see Table 1). Some parts of the Act became effective immediately, but the testing requirements did not become effective until September 14, 2002 to allow the NJDEP time to promulgate regulations that provided details for the implementation of the Act. Beginning September 14, 2002, certain contracts of sale involving real properties with private wells, and some public wells, were required to have the well water tested before going forward with the real estate closing. The buyer and seller are notified of the test results prior to the closing and both must attest to the fact that the test results have been reviewed. The well water must be tested by a laboratory certified for the parameters listed in the Act and for the supplementary parameters in N.J.A.C. 7:9E *et seq.* Once the sample analysis is completed, a copy of the test results must be given to the person who requested the test on a standardized form and must be submitted electronically to NJDEP. Specific information about individual water tests, such as results, address or other location information is confidential as mandated by the Act.

Table 1: List of Private Well Testing Act Analytes

<i>Primary Contaminants</i>	<i>Secondary Parameters</i>
<u>Bacteriological</u> Total Coliform (Fecal or <i>E. coli</i>)	<u>With Optimum Range</u> pH
<u>Organics</u> All Volatile Organic Compounds with Maximum Contaminant Levels	<u>With Recommended Upper Limits</u> Iron Manganese
<u>Inorganics</u> Arsenic* Lead Mercury* Nitrates	
<u>Radiological</u> 48-Hour Rapid Gross Alpha Particle Activity*	

*These contaminants are required only in certain counties.

Who is required to test and when?

Real estate transactions subject to the PWTA are those which involve real property where: 1) the potable water supply at that property is from a private well; or 2) property (such as commercial property) where the water supply is a well that has less than 15 service connections or that does not regularly serve an average of 25 people daily at least 60 days out of the year. What this means is that certain public water systems, called noncommunity water systems, meet the applicability criteria defined in the PWTA and must also test. The Act mandates that the sale may not occur until testing of the water supply has taken place, and until both the buyer and seller have received and reviewed a copy of the test results. The buyer and seller must certify in writing that they have received and reviewed the test results. Neither the Act nor the regulations specifies whether the buyer or the seller is financially responsible for the fees for the PWTA testing or possible treatment. Therefore, it is up to the buyer and seller to negotiate who pays for the test, as well as what actions, if any, will occur if the test results indicate a contaminant is present in the drinking water supply that exceeds an applicable standard. The Act and subsequent regulations do not require water treatment if any test parameter standard level is exceeded. However, the NJDEP does provide information regarding various treatment alternatives and potential funding sources (see <http://www.nj.gov/dep/pwta>). The Act is considered a "notice" of potable water quality for interested parties involved in the real estate transaction.

PWTA testing requirements also apply to certain lessors (landlords) in New Jersey. The lessor of a property where the water supply is from a private well must also test the water for the same PWTA contaminants as a buyer or seller. These testing requirements were to be completed by lessors by March 16, 2004. In addition, the well water must be tested at least once every five years thereafter, as long as the well is not required to be tested under any other state law. The lessor is required to provide a copy of new test results to each rental unit within 30 days of receiving those results. The lessor must also provide new lessees with a written copy of the most recent test results. Providing new lessees with recent well test results also functions as a type of "notice" provision.

Who does the testing and what are acceptable test results?

Once the buyer and seller determine who will pay for the test and hire a New Jersey certified laboratory, the well sample is collected by an employee of the certified laboratory or by the laboratory's authorized representative. A list of certified laboratories is available on the PWTA website at: <http://www.nj.gov/dep/pwta>. Samples must be collected from an untreated (raw), cold, non-aerated spigot or tap. If a treatment device is on the spigot or tap, the device must be disabled before a sample is collected or collected from a spigot or tap prior to the treatment device. Treated samples do not meet the requirements of N.J.A.C. 7:9E and, therefore, are not considered to be in compliance with the PWTA regulations.

The water is analyzed for the various contaminants listed in the Act and regulations, using specific test methods. A complete list of the PWTA parameters, with their corresponding Maximum Contaminant Levels (MCLs) or recommended upper limits are presented in Appendix B. Appendix C contains a list of the Private Well Testing Act required parameters by county. The test methods have been established and certified by the USEPA, and have been approved by NJDEP's Office of Quality Assurance. As part of the test requirements, the sampler must record the lot and block of the property, as well as the X and Y coordinate locations of the well (or at a minimum the front door) using a Global Positioning System (GPS) unit in accordance with N.J.A.C. 7:1D *et seq.* The person who requested the private well water test should receive their results from the laboratory on the *New Jersey Private Well Water Test Reporting Form*.

Primary contaminants sampled as part of the PWTA include bacteria (total coliform and fecal coliform bacteria and/or *E. coli*), nitrates, lead, and all 26 volatile organic contaminants for which MCLs have been established. In certain counties, testing must include a test for the presence of gross alpha particle activity, mercury and/or arsenic. See Appendix C for a complete list of the required parameters by county.

Secondary parameters are regulated by the state for aesthetic or other concerns (e.g., taste, odor, staining, scaling of home fixtures). The secondary parameters that are regulated under the Act are iron, manganese and pH. Many secondary parameters are *naturally occurring* in ground water due to geologic conditions. Some common examples of the effects of secondary contaminants include: brownish drinking water, staining of plumbing fixtures such as sinks, bathtubs, and toilet bowls, staining of clothing, an unpleasant taste in the water, or damage to a home heating unit.

There are special considerations for arsenic and lead with regards to the data in this report. Neither the USEPA nor the NJDEP have an MCL for lead. An Action Level of 15 µg/L has been established for lead (i.e., if the "90th percentile" lead concentration is greater than 15 µg/L). However, the Action Level for lead is not being used in the PWTA Program. This is because the federal drinking water regulations state that the 15 µg/L Action Level should be applied to a series of samples taken from consumers' taps and the tap samples must stand motionless in the plumbing system for at least six hours prior to sample collection. Since a raw (untreated) groundwater sample is required by the PWTA, the more stringent NJDEP Ground Water Quality standard of 5 µg/L was used as the exceedance threshold because the PWTA sample is a groundwater sample. The report also utilizes the New Jersey established an MCL for arsenic of 5 µg/l which is lower than the federal MCL of 10 µg/l.

How does the data get submitted to the NJDEP?

The PWTA regulations require that the laboratories electronically submit test results including additional pertinent information as *one complete analytical package* to NJDEP within five business days after completion of the analyses. The laboratory does this by creating a data file that contains the test results and other pertinent location information

(i.e., lot, block, etc.) described in the regulations. The data file is e-mailed to a database at NJDEP, which is designed to store all of the PWTA test results.

What if contaminants are found?

If the results indicate that one or more analytical standards have been exceeded, then the PWTA database automatically forwards an electronic copy of the well test results and well information to the appropriate county or local health authority within five business days of receiving the results from the laboratory. A well test “failure” is defined as any result that exceeds a maximum contaminant level (MCL) for primary drinking water standards or a recommended upper limit (RUL) for secondary drinking water standards with the two exceptions noted above (i.e., lead and arsenic). Laboratories are also required to directly notify the county or local health authority of well test failures for nitrate and fecal coliform or *E. coli* because they are considered acute contaminants and may pose immediate health concerns.

Once the local health authority is notified electronically by NJDEP or directly by the laboratory, the health authorities may (but are not required to) notify property owners within the vicinity of the failing well. However, because these individual tests are considered confidential, the exact location of the well test failure cannot be identified.

Limitations of the data

Several factors may affect the measurement and quality of the data collected as part of the PWTA and utilized in this report. These factors include sample collection and transport, laboratory analysis, accuracy of related well location information, and data entry and reporting. Any of these factors, if handled improperly, could result in an unwarranted test failure or approval. Since no state agency has the ability to verify that all real estate transactions (sales and leases) subject to testing under the PWTA have been reported to NJDEP, the absence of results, along with errors or mistakes in the reported data, could have a significant impact on the evaluation and interpretation of the data presented. The following identifies some key issues concerning PWTA data:

1. Sample Collection and Transport - Samples collected or transported improperly often yield contaminated or questionable test results. For example, the NJDEP currently suspects that collection of lead samples from unflushed water tanks or spigots may be the primary reason why many elevated lead results are being reported.
2. Analysis and Data Reporting - The PWTA Program testing data are submitted electronically and are automatically entered into the database without any quality control or quality assurance reviews. It is assumed that the certified laboratory properly met all required protocols and the data are accurate. The PWTA Program relies on the reporting laboratory to catch and correct any data entry errors.
3. Collection of well location information - Without accurate well location information, the analytical results cannot be properly correlated to the well, thereby-hindering

evaluations of the data. The new database that went on-line in the Spring of 2007 included additional quality control checks to improve location data.

When reviewing PWTA results, it is important to remember that the tests were conducted on an untreated or raw water sample collected prior to any water treatment system. Many houses or wells may already have treatment systems in place to remove or lessen the degree of contamination and the PWTA test results do not measure if the treatment is working. Further post-treatment samples collected at a kitchen tap are recommended to evaluate the effectiveness of a treatment system.

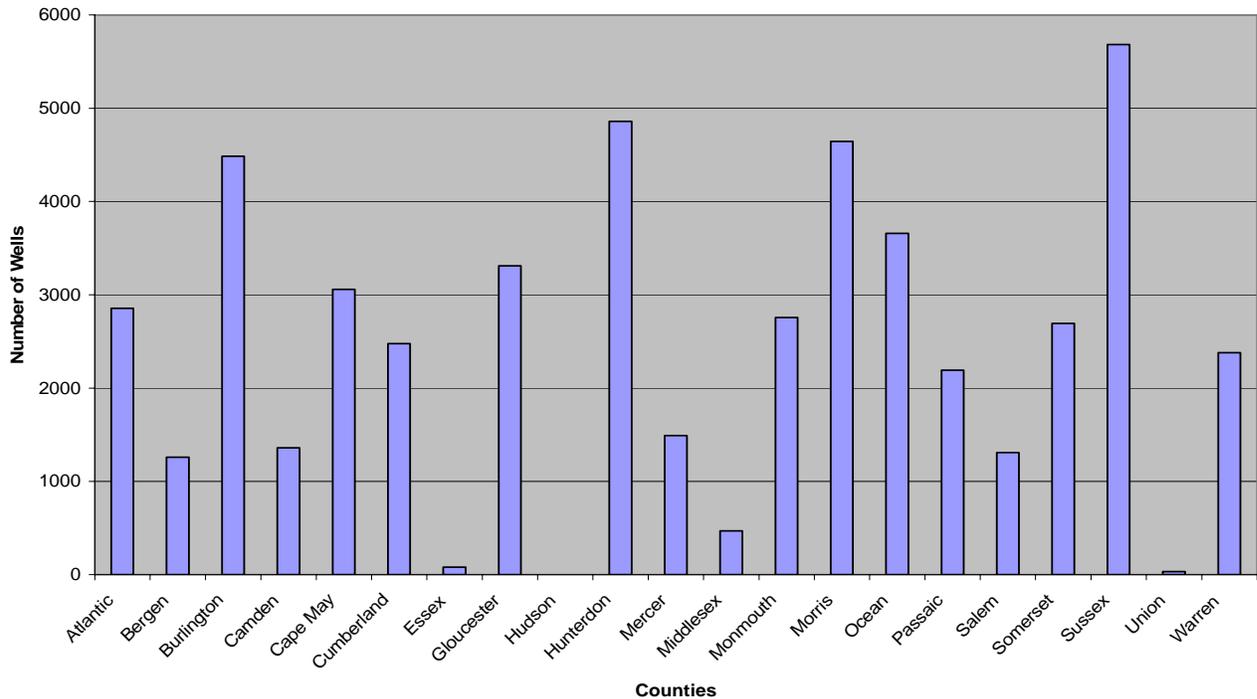
PWTA test results are not confirmed through the collection and analysis of a second, or confirmatory sample. Questionable or unexpected results are neither confirmed nor verified by NJDEP, and have been included in the data analysis and summaries.

Although PWTA testing is more extensive than previous state regulatory requirements, the list of parameters is limited. The requirement to test for some parameters, such as arsenic and mercury, is based on regional occurrence where these parameters are known to be present in groundwater. Other types of compounds may be present in water if the well is near specific sources of contamination. Caution must be used not to conclude that these contaminants are not present in the drinking water. Assumptions about water quality may only be made for the tested parameters.

Part 2: Private Well Testing Act Test Results

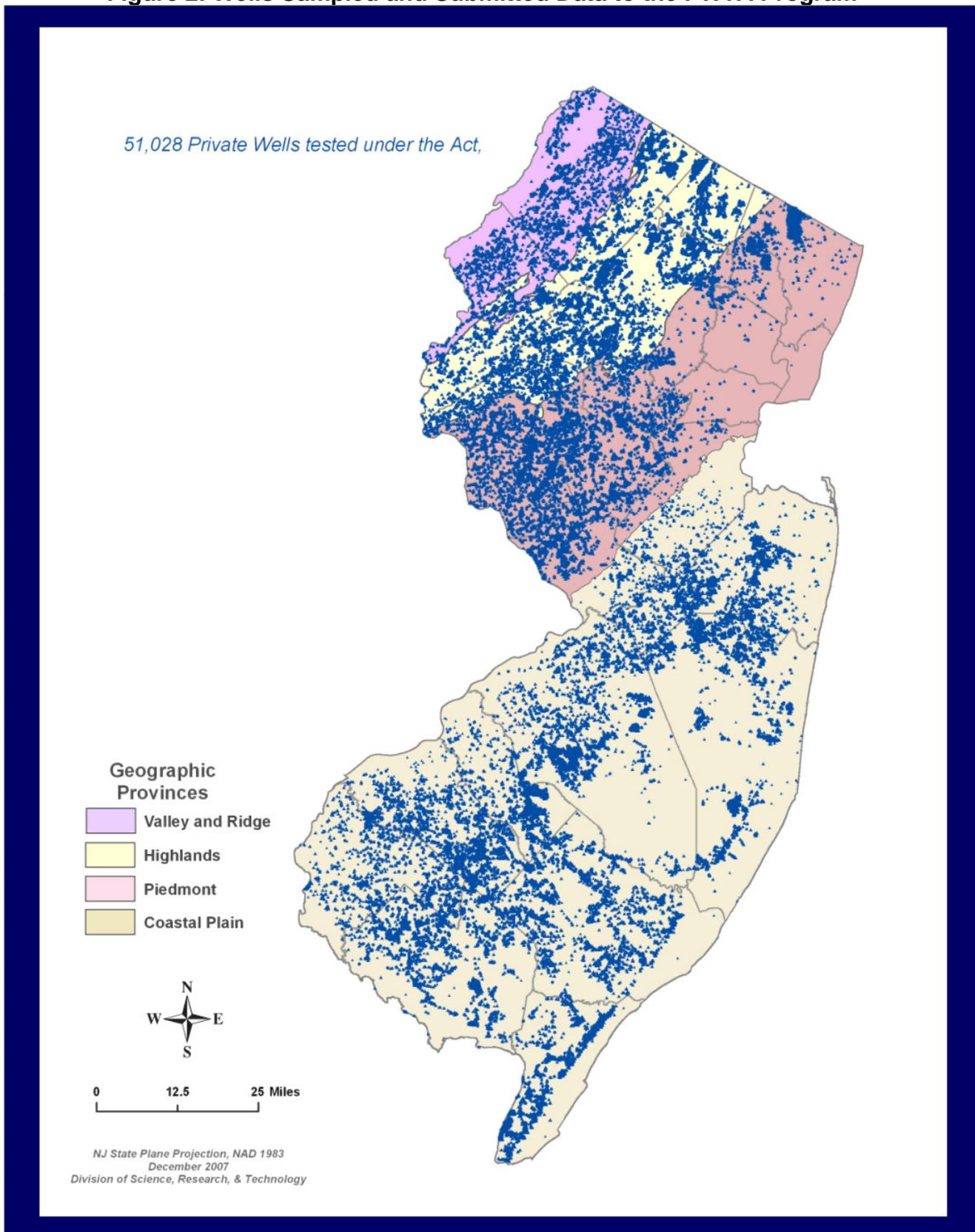
During the first four and half years of the Private Well Testing Act Program (September 2002 through April 2007), a total of 51,028 individual wells were sampled. The number of wells sampled in each county ranged from 1 well in Hudson County to 5681 wells in Sussex County (see Figure 1).

Figure 1: Number of Wells Sampled by County



Although the number of wells sampled for the PWTA represents the number of private wells involved in real estate sales transactions and rentals, over time the water quality from these wells should give us a complete picture of the water quality of in the state. It is estimated that there are about 400,000 private wells in New Jersey. Based on that number the PWTA program has data for approximately 13 percent of New Jersey's private wells. The map in Figure 2 shows the locations of the wells that have been tested in the first four and half years.

Figure 2: Wells Sampled and Submitted Data to the PWTA Program



Data from the Private Well Testing Act Program

The test results from the PWTA Program can be divided into two categories: primary contaminants, that are biological or chemical substances regulated based on potential health effects and secondary parameters, which are regulated for non health-based purposes (e.g., aesthetics, taste, corrosivity).

Primary Contaminants

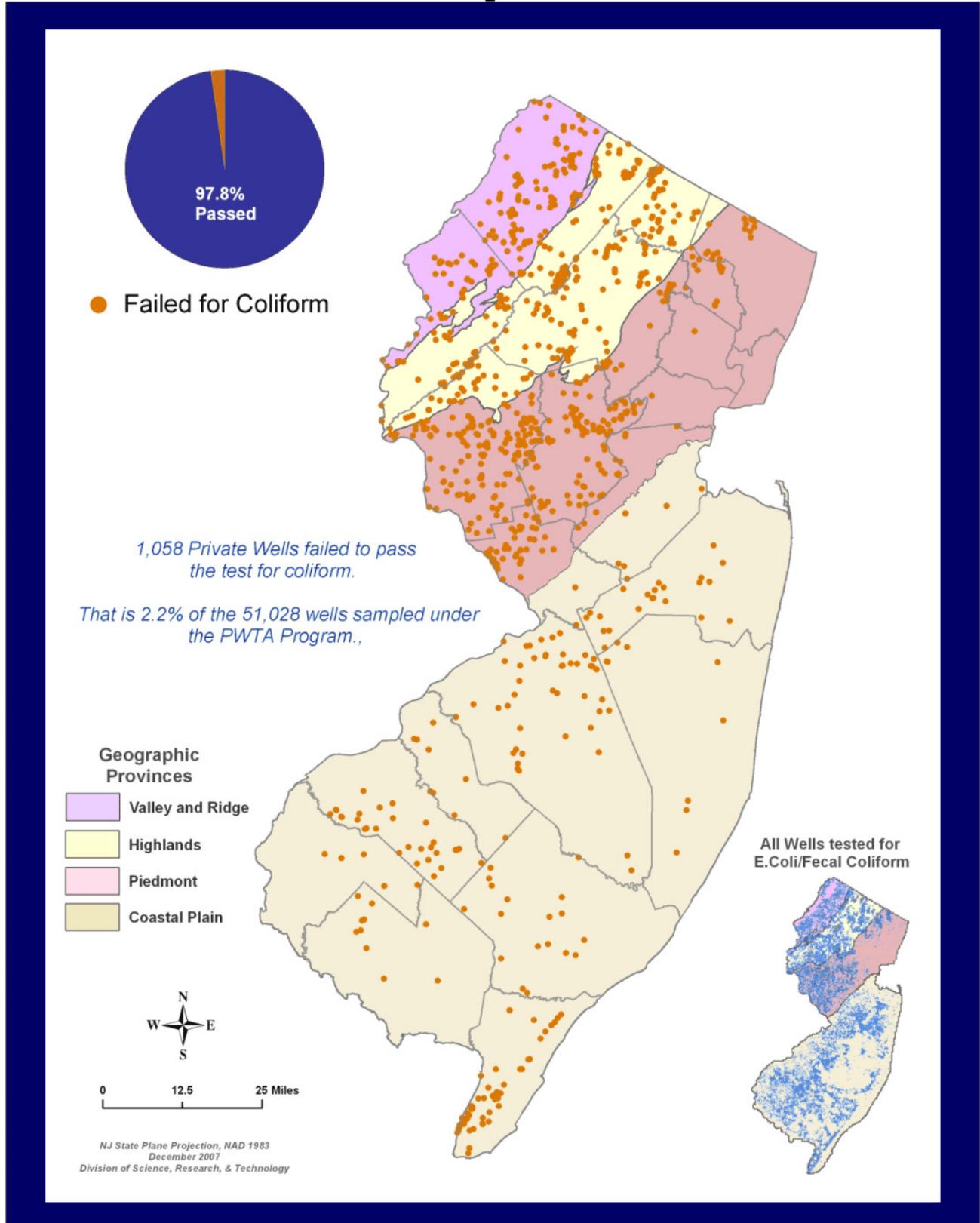
The PWTA Program uses the same federal and state primary standards that apply to New Jersey's public water systems to define which wells "pass" or "fail" under the PWTA Program with two exceptions. As discussed in Part 1, New Jersey adopted a more stringent, MCL for arsenic of 5 µg/l compared to the federal MCL of 10 µg/l. In addition, since no MCL exists for lead, the ground water standard was used. The ground water standard is 5 µg/l.

1. Bacteriological: Fecal Coliform or *Escherichia coli* (*E. coli*)

Fecal waste from humans and animals may contain disease-causing microorganisms. Illness can occur if contaminated water is consumed without adequate treatment to remove or inactivate the pathogens. Therefore, it is important to detect fecal contamination in ground water, especially for systems that do not treat the water prior to delivery. Fecal contamination is usually determined by testing water for the presence of certain fecal-derived "indicator" bacteria, such as total coliform, fecal coliform or *Escherichia coli* (*E. coli*). These bacteria are present in untreated wastes from humans and warm-blooded animals. The presence of these bacteria "indicates" that the water is contaminated and thus may contain disease-causing microorganisms.

- Sources – septic tanks, cracked sewer lines, contaminated surface waters including lakes, streams, rivers and wetlands, storm water runoff and detention/infiltration basins, runoff from agricultural lands, feedlots, stockyards, land-applied sludge or manure, manure storage areas and landfills.
- Counties that Sampled – All counties are required to test for total coliform bacteria. Because the presence of total coliform bacteria is suggestive, but not conclusive proof that fecal contamination is present, all total coliform-positive samples are required to be further tested for either fecal coliform or *E. coli* bacteria. (Note: Many labs conduct total coliform and fecal coliform /*E. coli* tests simultaneously to avoid the extra cost and time-delay involved in conducting follow-up testing of total coliform -positive samples. Also, some methods are designed to test for both total coliform and *E. coli* simultaneously).
- MCL – If a sample tests positive for either fecal coliform or *E. coli*, the well fails the test. The presence of either fecal coliform or *E. coli* is considered sufficient evidence of fecal contamination.

Figure 3: Positive *E. Coli*/Fecal Coliform Exceedances Reported to the PWTA Program



- Number of Wells that Tested Positive for Total Coliform Bacteria – A total of 7,035 (13%) of 51,028 wells tested were positive for total coliform bacteria. This was not considered a “failure”, but these wells were then required to do follow-up testing for fecal coliform or *E. coli*. The NJDEP believes that a significant percentage of wells testing positive for total coliform are not actually contaminated with fecal waste. Some coliform of non-fecal origin may be present as buildup in the plumbing system, for example.
- Number of Wells that Tested Positive for Fecal Coliform or *E. coli* – A total of 1136 (2.2%) of the 51,028 wells that were sampled were positive for either fecal coliform or *E. coli* in at least one of the samples collected at the well. These data are presented by county in Appendix E.
- Geographic Distribution – The percentage of wells with fecal coliform or *E. coli* in the combined counties above Burlington and Monmouth (“northern”) was 3.5%. In the remaining (“southern”) counties, the percentage was 1.0% (see Figure 3 above). The NJDEP believes the northern/southern difference is real and not an artifact of the use of different labs or different methods in these two regions. Both laboratory and method biases exist but do not account for the observed difference between the northern and southern parts of the state. The difference is most likely due to the different geology in these regions. The geology in the north is characterized by areas with limestone subject to solution cavities (called karst), fractured bedrock and gravel/cobble water-bearing zones. The southern part of the state is comprised mainly of the coastal plain (alternating layers of sand and clay). Coastal plain geology appears to protect ground water from fecal contamination better than the other geological areas of the state.
- Comments – The percentage of wells testing positive for total coliform and fecal coliform or *E. coli* after the two years of PWTA testing, when the data were first analyzed, was 13% and 2.1%, respectively (compared to 13% and 2.2% failure rate between September 2002 – April 2007, respectively). Thus, the percentages of wells testing positive are consistent following the testing of an additional 24,964 wells. In the absence of any significant change in the extent of fecal pollution impact, the percentages found in this analysis would not be expected to change to any significant extent in the future.

For the bacteriological analysis, the data are based on a single sample in 91% of the cases.⁷ Thus, the 2.2% fecal coliform/*E. coli* -positive figure should be considered a lower limit of the true extent of fecal contamination in New Jersey. Because microbes are randomly distributed in ground water and because fecal contamination can often be low or intermittent, a single sample can miss the contamination. Alternately, fecal contamination may be present in some samples in the absence of coliform bacteria⁸. A reasonable estimate of the true extent of fecal contamination statewide is perhaps an additional one or two percent.

⁷ Test results are valid for 6 months. For homes that sold more than once during this four and half year period, or did not sell within a 6-month period, the well was tested more than once. The 51,035 wells included 4,431 with multiple test results (93.3% of those were tested twice; 6.1% were tested 3 times; and 0.5% were tested more than 3 times.)

⁸ Atherholt, T. et al. October 2003. Evaluation of Indicators of Fecal Contamination in Ground Water. Journal American Water Works Association. 95 (10): 119.

A well that tests positive for total coliform bacteria but negative for fecal coliform or *E. coli* should be retested, although not required, to further assure the absence of these bacteria. The NJDEP recommends annual testing of these wells.

2. **Inorganic chemicals**

The Private Well Testing Act and implementing regulations require testing for four primary inorganics: nitrate, arsenic, mercury and lead. Testing for nitrate and lead is required for the entire state, while testing for arsenic is limited to 10 Northern New Jersey counties (Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Morris, Passaic, Somerset, and Union). Testing for mercury is limited to nine Southern New Jersey counties (Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Monmouth, Ocean, and Salem).

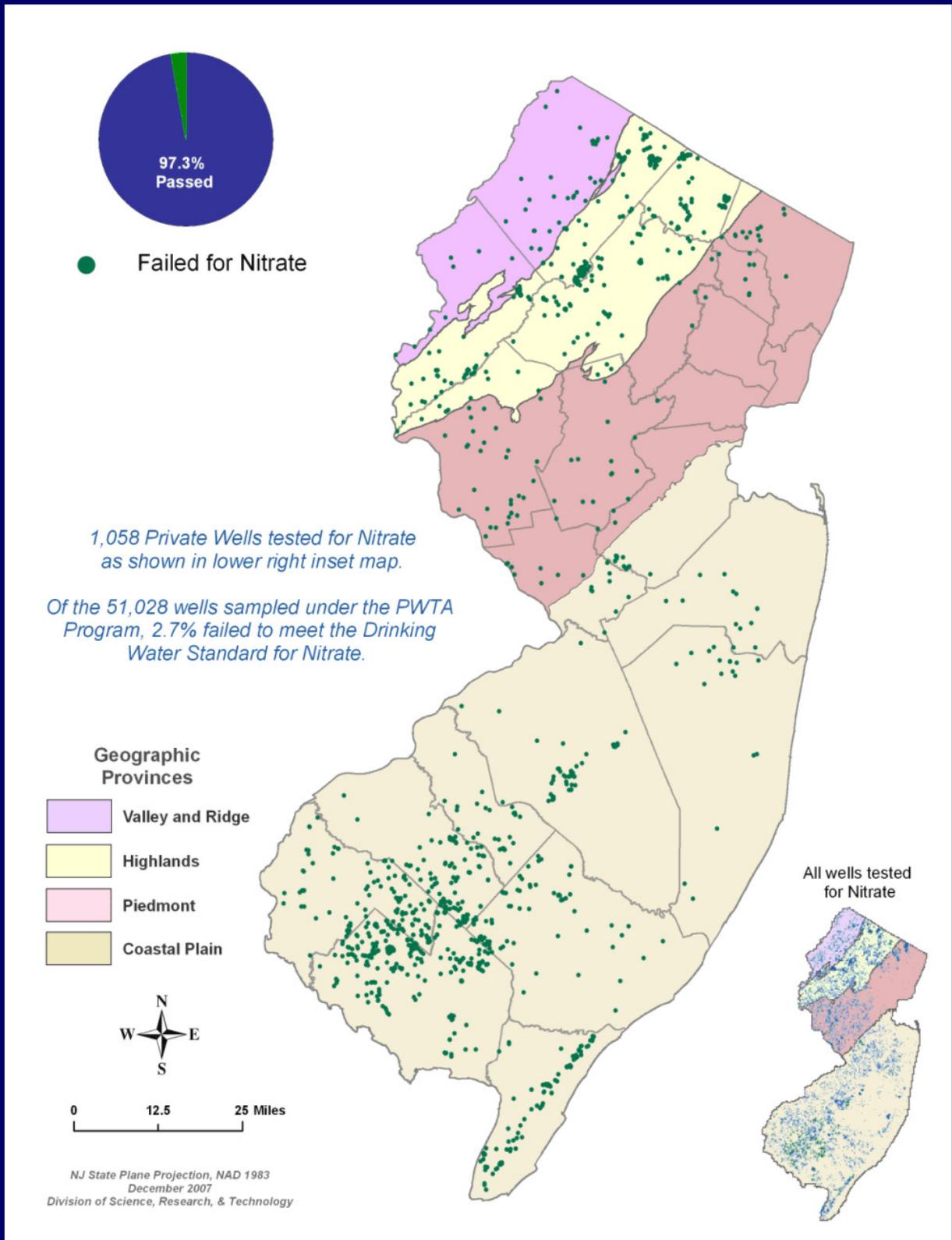
A. ***Nitrate***

- **Sources** - Nitrate and its reduced form nitrite are found in ground water due to a number of factors including natural deposition, runoff from fertilizer use, leaching from septic tanks, and from sewage.
- **Counties that Sampled** - All counties were required to sample for nitrate.
- **MCL** - The MCL for nitrate is 10 mg/l. If nitrate is present in drinking water at levels above the MCL, it can cause blue-baby syndrome in infants below the age of six months. The symptoms include shortness of breath and, if untreated, it can lead to death.
- **Number of Wells that were above the MCL for Nitrate** - A total of 1,399 wells (2.7%) of the 51,028 wells tested had concentrations of nitrate above the MCL (see Figure 4). Two counties had very high rates of exceedances: Cumberland (11%) and Salem (9%). These data are presented by county in Appendix F.
- **Range of Concentrations** - The concentration of nitrate ranged from 0 to 153 mg/l.

B. ***Arsenic***

- **Source** - Arsenic can leach into ground water from the erosion of natural deposits of arsenic, from past use as a pesticide, and from waste from glass or electronics production. In New Jersey, it is known that wells drilled into the Piedmont Physiographic Province in the northern part of New Jersey can contain high levels of naturally occurring arsenic.

Figure 4: Nitrate Exceedances Reported to the PWTA Program

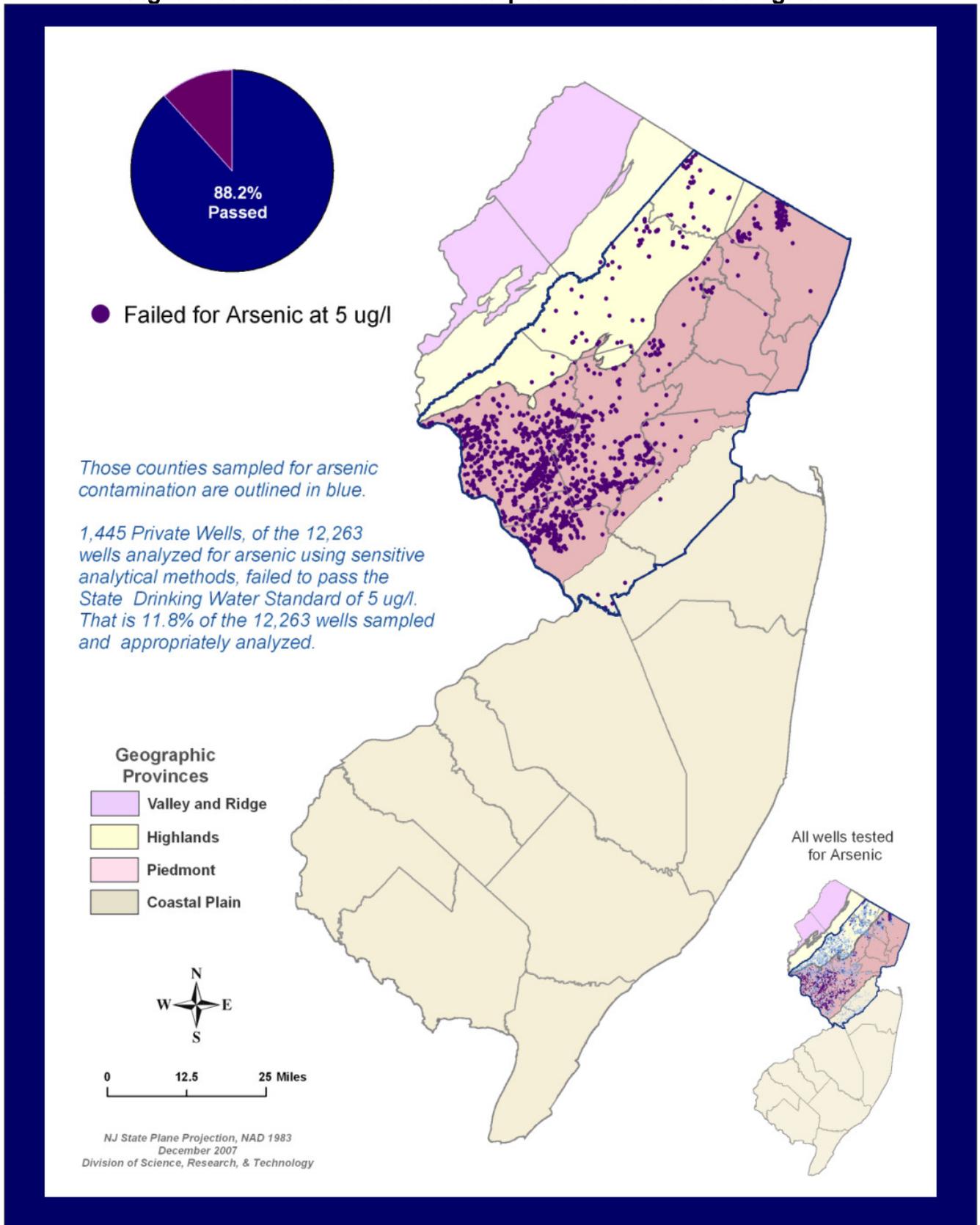


B. Arsenic (cont.)

- Counties that Sampled - The 10 counties in the Piedmont region of the State were required to sample for arsenic. The counties are Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Morris, Passaic, Somerset, and Union. These data are presented by county in Appendix G.
- Health Effects - Arsenic is a known human carcinogen linked to increased risk of skin, lung, liver, kidney, and urinary bladder cancer.
- Federal MCL - The MCL in effect for arsenic when the PWTA was signed was 50 µg/l, a standard that was set by the U.S. Public Health Service in 1942. On January 22, 2002 (effective February 22, 2002), the USEPA adopted a new MCL of 10 µg/l, however, those public water systems required to comply with the new arsenic standard had until January 23, 2006 to do so. For the purposes of the PWTA, the NJDEP used the newly adopted Federal MCL of 10 µg/l for assessing the PWTA results beginning in September 2002.
- State MCL - The NJDEP proposed a new arsenic MCL of 5 µg/l which became effective January 23, 2006. For the purposes of this report, all the data were evaluated using the Federal MCL of 10 µg/l; those results that were analyzed by appropriate methods (except EPA method 200.7) were evaluated using the State MCL of both 5 µg/l.
- Number of Wells over the federal MCL of 10 µg/l - A total of 605 wells (3.4%) of the 17,714 wells tested for arsenic had arsenic concentrations over the new federal standard of 10 µg/L.
- Number of Wells over the state MCL of 5 µg/l - One of the analytical methods used to determine the concentration of arsenic in water, EPA Method 200.7, is not sensitive enough to measure arsenic concentrations below 8 µg/l. In order to determine the number and percent of wells that exceeded the NJDEP standard of 5 µg/l, it was necessary to first exclude samples analyzed using Method 200.7. A total of 12,263 samples (70% of arsenic results received) were analyzed for arsenic using the more sensitive analytical methods. Of those 1,445 wells (12%) exceeded the MCL of 5 µg/l.
- Range of Concentrations - The arsenic concentrations in ground water ranged from 0 to 254 µg/l.
- Geographic Distribution - Arsenic exceedances were most commonly found in Hunterdon (18%), Mercer (20%) and Somerset Counties (17%) (See Figure 5).
- New Arsenic sampling requirements for Sussex and Warren Counties - PWTA data have shown that elevated arsenic concentrations also extend to the ground water supply in the Highlands Region of the State based on the results from some PWTA samples collected in those Northern counties that also extend into the Highlands Region. Therefore, beginning March 14, 2008, PWTA regulations were revised to require, all PWTA samples collected in Sussex and Warren be tested for arsenic in addition to all other required PWTA parameters.

The evaluation of the arsenic data using the more stringent State MCL (5 µg/l) resulted in three times the number of wells exceeding the arsenic standard when compared to the number of wells exceeding the federal MCL (10 µg/l).

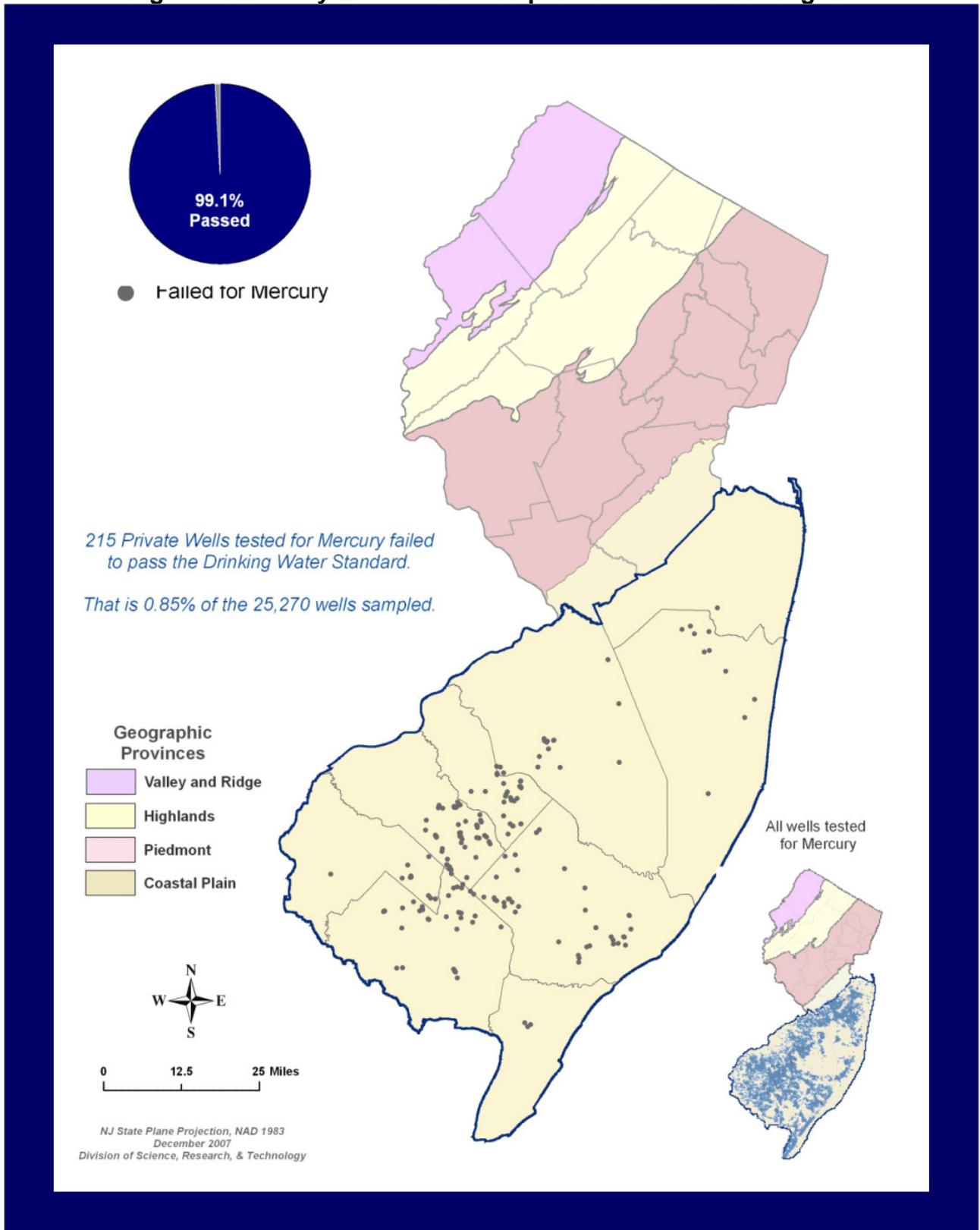
Figure 5: Arsenic Exceedances Reported to the PWTA Program



C. Mercury

- Sources - Sources of mercury include air deposition, past pesticide use, and discharges from industrial facilities.
- Counties that Sampled - Mercury has been found in private wells in Southern New Jersey. Nine Southern counties were required to test for mercury: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Monmouth, Ocean, and Salem.
- MCL - The MCL for mercury in drinking water was established by USEPA, and adopted by NJDEP, at 2 µg/l. Mercury has been linked to neurological problems.
- Number of wells over the MCL - A total of 215 wells (0.9%) out of 25,270 wells tested for mercury had concentrations above the MCL. These data are presented by county in Appendix H.
- Range of Concentrations - The range of mercury concentrations varied from 0 to 114.2 µg/l.
- Geographical Distribution - There are no obvious geographic patterns for the mercury exceedances (See Figure 6). The highest percent of exceedances were in Camden County (2.4%), Gloucester County (1.8%), and Cumberland County (1.7%).

Figure 6: Mercury Exceedances Reported to the PWTA Program



D. Lead

- Source – Previous ground water studies in New Jersey carried out by NJGS (private communication, Mike Serfes, 2007), the Site Remediation Program and USGS have determined that lead is seldom found in ground water samples in New Jersey. The source of lead in drinking water is almost always from the plumbing inside the home.
- Counties that Sampled – All counties were required to sample for lead.
- Sampling – The sampling protocol for PWTA sample collection includes flushing the house system for at least two minutes (preferably 5 or 10 minutes) and collecting the water sample at the tap where the flushing occurred
- Standard – There is no MCL for lead, however an Action Level of 15 ug/L is used to evaluate the water left standing in the plumbing for a prolonged period of time. The PWTA Program is using the NJDEP Ground Water Quality Standard to evaluate water quality. When the program began the ground water standard was 10 µg/l. On November 7, 2005, the Ground Water Quality Standard was changed to 5 µg/l.
- Lead samples in homes – A total of 5,523 (11%) of the homes had lead levels above the previous Ground Water Quality Standard of 10 µg/l. This number increased to 9,368 (18%) of homes that had lead levels above the new Ground Water Quality Standard of 5 µg/l. This indicates that many homes still have lead in their plumbing systems, since it is unlikely that it originated from the raw ground water supply.

3. Gross Alpha Particle Activity

- Source - Erosion of natural deposits of certain minerals that are radioactive may emit a form of radiation known as *alpha* radiation. The *alpha* radiation is emitted from both short-lived and long-lived radionuclides. In the Southern part of the state, it is probably the decay of radium and its isomers that results in the alpha radiation, while in the northern counties uranium may be implicated.
- Counties that Sampled:
 1. Cumberland and Gloucester Counties - Sampling was required beginning on March 15, 2003.
 2. Atlantic, Burlington, Camden, and Salem Counties - Sampling was required beginning on September 16, 2003.
 3. Cape May, Hunterdon, Mercer, Middlesex, Monmouth, and Ocean - Sampling was required beginning on March 16, 2004.
- Testing Requirements and MCL - The gross alpha test involves two readings. The first test is done within 24 hours of sampling. If the sample contains more than 5 pCi/l, a second test is carried out within 48 hours. If the value of the second test is greater than 15 picoCuries per liter (pCi/l), the sample exceeded the MCL
- Number of Wells over the MCL – 2,209 wells out of 22,904 wells tested for gross alpha particle activity or 9.6% had concentration above the MCL. These data are presented by county in Appendix I.

- Range of Concentrations - The gross alpha results ranged from non detectable to 481 pCi/l.
- Geographic Distribution – The counties with the highest percent of exceedances were Camden (33%), Cumberland (25%), Salem (14%), and Gloucester (11%). (See Figure 7)
- Additional Sampling - There is considerable evidence that radionuclides are present in the ground water in Northern New Jersey. It is recommended that in the future gross alpha testing be extended to all counties in New Jersey.

4. Volatile Organic Compounds

New Jersey has primary drinking water standards, or Maximum Contaminant Levels (MCLs), for 26 volatile organic compounds (VOCs):

- Sources - VOCs include solvents, degreasers, and components of gasoline. (See Table 2 for a more detailed description of sources).
- Counties that Sampled - All counties were required to sample for VOCs.
- MCLs - The individual MCLs for the 26 regulated VOCs are listed in Table 2.
- Number of Wells that exceeded one or more MCLs - One or more VOCs were detected above their MCL in 702 wells (1.4%) of the 51,028 wells. A total of 636 wells exceeded a standard for one VOC; 55 wells exceeded two MCLs, and 11 wells exceeded three MCLs. See Table 3 for a summary of the VOCs that were detected over their respective MCLs. A summary of the VOC exceedances by county are presented by county in Appendix J.
- VOCs that most frequently exceeded their MCL - There were 247 wells that exceeded the trichloroethylene MCL (0.5%), 223 wells that exceeded the tetrachloroethylene MCL (0.4%), 66 wells that exceeded the benzene MCL (0.1%) and 58 wells that exceeded the carbon tetrachloride (0.1%).
- Geographic Distribution – No geographic pattern was observed. (See Figure 8)

Figure 7: Gross Alpha Exceedances Reported to the PWTA Program

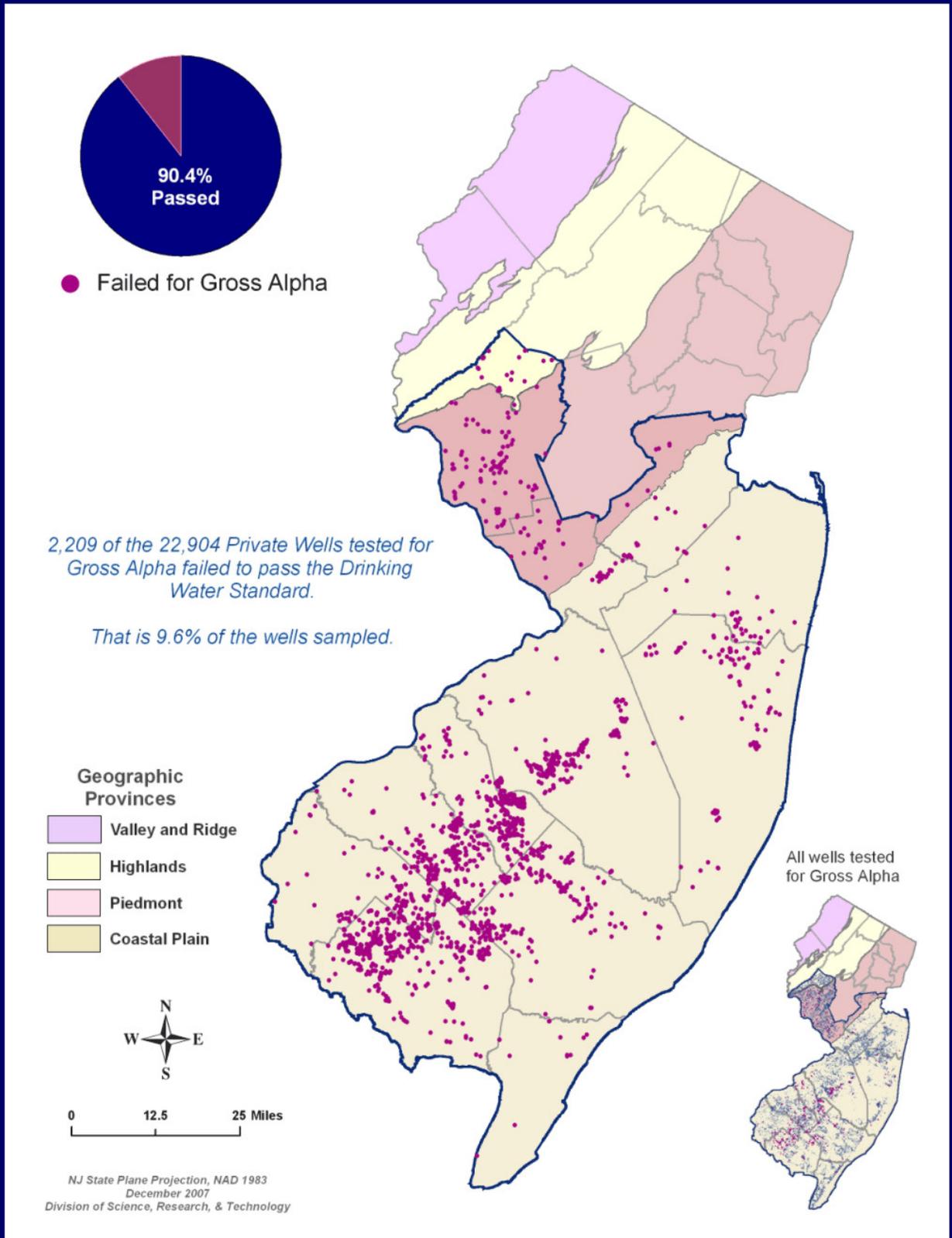


Figure 8: VOCs Primary Standards Exceedances Reported to the PWTA Program

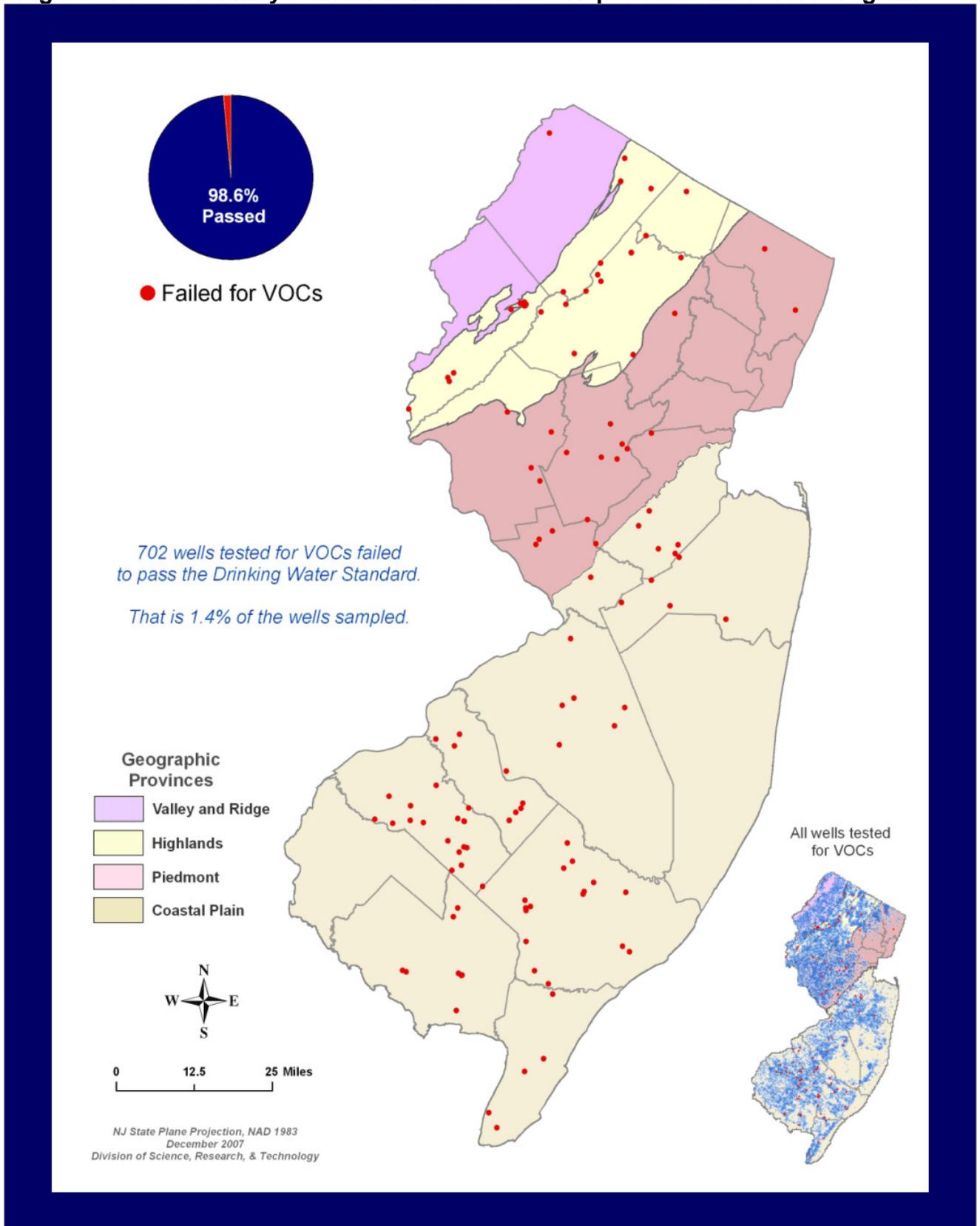


Table 2: Regulated Volatile Organics Compounds, MCLs and Sources

Volatile Organic Compounds	MCL* (in µg/l)	Sources of Contaminants in Ground Water
Benzene	1	Discharge from factories; leaching from gas storage tanks and landfills
Carbon Tetrachloride	2	Discharge from chemical plants and other industrial activities
Chlorobenzene	50	Discharge from chemical and agricultural chemical factories
1,2-Dichlorobenzene	600	Discharge from industrial chemical factories
1,3-Dichlorobenzene	600	Discharge from industrial chemical factories
1,4-Dichlorobenzene	75	Discharge from industrial chemical factories
1,1-Dichloroethane	50	Discharge from metal degreasing sites and other factories
1,2-Dichloroethane	2	Discharge from industrial chemical factories
1,1-Dichloroethylene	2	Discharge from industrial chemical factories
cis-1,2-Dichloroethylene	70	Discharge from industrial chemical factories
trans-1,2-Dichloroethylene	100	Discharge from industrial chemical factories
1,2-Dichloropropane	5	Discharge from industrial chemical factories
Ethylbenzene	700	Discharge from petroleum refineries
Methyl-tertiary Butyl Ether	70	Leaking underground gasoline and fuel oil tanks; Gasoline and fuel oil spills.
Methylene Chloride	3	Discharge from drug and chemical factories
Naphthalene	300	Discharge from industrial chemical factories; exposure to mothballs
Styrene	100	Discharge from rubber and plastic factories; leaching from landfills
1,1,2,2-Tetrachloroethane	1	Discharge from industrial chemical factories
Tetrachloroethylene	1	Discharge from factories and dry cleaners
Toluene	1000	Discharge from petroleum factories and underground storage tanks.
1,2,4-Trichlorobenzene	9	Discharge from textile finishing factories
1,1,1-Trichloroethane	30	Discharge from metal degreasing sites and other factories
1,1,2-Trichloroethane	3	Discharge from industrial chemical factories
Trichloroethylene	1	Discharge from metal degreasing sites and other factories
Vinyl Chloride	2	Leaching from PVC pipes; discharge from plastic factories
Xylenes	1000	Discharge from petroleum factories; discharge from chemical factories and underground storage tanks.
*MCL= Maximum Contaminant Level Units of Measure= µg/l = micrograms/liter (parts per billion)		

Table 3: Summary of Volatile Organic Compounds Results
September 2002 to April 2007
(out of 51,035 wells)

Compound	MCL (µg/l)	No. of Wells with VOCs over the MCL	Range of detected concentrations (µg/l)
Benzene	1	66 (0.1%)	ND - 101
Carbon tetrachloride	2	58 (0.1%)	ND - 75
Chlorobenzene	50	0	ND - 15.8
1,2-Dichlorobenzene	600	0	ND - 5
1,3-Dichlorobenzene	600	0	ND - 18.6
1,4-Dichlorobenzene	75	0	ND - 19.0
1,1-Dichloroethane	50	1 (0.002%)	ND - 82
1,2-Dichloroethane	2	28 (0.1%)	ND - 31.3
1,1-Dichloroethylene	2	34 (0.1)	ND - 54.1
cis-1,2-Dichloroethylene	70	2 (0.004%)	ND - 362
trans-1,2-Dichloroethylene	100	0	ND - 15.6
1,2-Dichloropropane	5	23 (0.05%)	ND - 240
Ethylbenzene	700	0	ND - 39.7
MTBE	70	38 (0.1%)	ND - 1550
Methylene Chloride	3	44 (0.1%)	ND - 48.1
Naphthalene	300	0	ND - 22.9
Styrene	100	1 (0.002%)	ND - 149.4
1,1,2,2-Tetrachloroethane	1	8 (0.02%)	ND - 25.1
Tetrachloroethylene	1	223 (0.4%)	ND - 540
Toluene	1000	0	ND - 464
1,2,4-Trichlorobenzene	9	0	ND - 1.5
1,1,1-Trichloroethane	30	1 (0.002%)	ND - 50.5
1,1,2-Trichloroethane	3	3 (0.006%)	ND - 12.2
Trichloroethylene	1	247 (0.5%)	ND - 550
Vinyl chloride	2	2 (0.004%)	ND - 5.1
Xylenes, Total	1000	0	ND - 122.8

Secondary Parameters

NJDEP has established standards for various water quality parameters called secondary parameters. There are three secondary water quality constituents included in the PWTA program: pH, manganese, and iron. Secondary standards or recommended upper limits (RUL) were established for contaminants that may cause problems with taste and odor, cause discoloration of skin, or teeth, and contaminants that corrode, stain plumbing fixtures or clothes during washing.

The pH is a numerical expression indicating the degree of acidity or alkalinity of water. The pH is measured on a scale of 0 to 14. Water with a pH of zero is the most acidic, 14 is the most alkaline, and 7 is neutral. The secondary standard, or RUL, for pH was set for both aesthetic reasons and for control of corrosion. The pH for drinking water should be between an optimum range of 6.5 and 8.5. If the pH is too low (less than 6.5) water may have a bitter metallic taste, and there may be corrosion of pipes and fixtures. If the pH is too high (greater than 8.5) the water may have a slippery feel, taste like soda, and deposits can form on plumbing fixtures. In general, ground water in southern New Jersey is acidic (lower than pH 7.0), and ground water in northern New Jersey is basic (higher than pH 7.0).

Iron is a naturally occurring inorganic constituent of ground water. The secondary standard, or RUL, for iron is 0.3 mg/l. If the concentration of iron is above the standard, the water may have a rusty color, a metallic taste, cause reddish or orange staining and a sediment deposit in the holding tank and in the plumbing fixtures.

Manganese is a naturally occurring inorganic constituent of ground water. The RUL for manganese is 0.05 mg/l. If the concentration of manganese is above the RUL, the water may appear black to brown colored, black stains may occur on plumbing fixtures, and the water may have a bitter metallic taste.

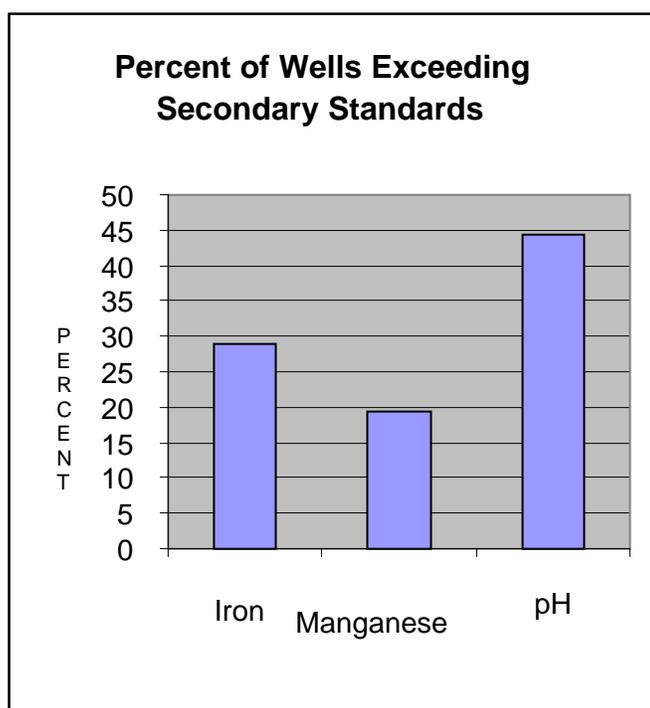
Figure 9 provides a summary of the percent of wells with results that exceeded any of the secondary standards (pH, iron, manganese) between September 2002 and April 2007.

pH - Of the 51,028 wells sampled between September 2002 and April 2007, 22,699 (45%) exceeded the secondary standard (optimum range of 6.5 to 8.5) for pH. Out of the wells tested 22,373 wells (44%) of the wells had a pH below 6.5 and only 326 wells (0.6%) had a pH above 8.5. Typically the pH of ground water in New Jersey ranges from 4 to 9.

Iron - Of the 51,028 wells sampled between September 2002 and April 2007, 14,751 or 29% of the wells exceeded the secondary standard for iron. Iron concentrations ranged from ND to 19,735 µg/l.

Manganese – Of the 51,028 wells sampled between September 2002 and April 2007, 9,890 or 19% of the wells exceeded the secondary standard for manganese. Manganese concentrations ranged from 0-2300 µg/l.

Figure 9: Percent of Wells with Results that Exceeded the Recommended Upper Limit for Secondary Parameters (Of 51,028 wells)



What are the data telling us about private wells?

This report is based on 55,749 samples that were submitted between September 2002 and April 2007 to the Private Well Testing Act Program collected from 51,028 individual wells throughout the State. A total of 6,369 wells (13%) exceeded one or more of the MCLs developed for primary drinking water contaminants (i.e., arsenic, mercury, nitrate, total coliform and fecal coliform, gross alpha particle activity, and volatile organic compounds). One well exceeded 6 MCLs; 3 exceeded 5 MCLs; 3 exceeded 4 MCLs; 48 exceeded 3 MCLs; 692 exceeded 2 MCLs; and the remaining 5,622 exceeded one MCL.

Figure 10 depicts the percentage of wells that passed the primary standards; lead results are discussed separately because of problems encountered with the test results for lead.

With the exception of lead, the greatest percentage of private wells that exceeded a primary drinking water standard were naturally occurring contaminants: arsenic and

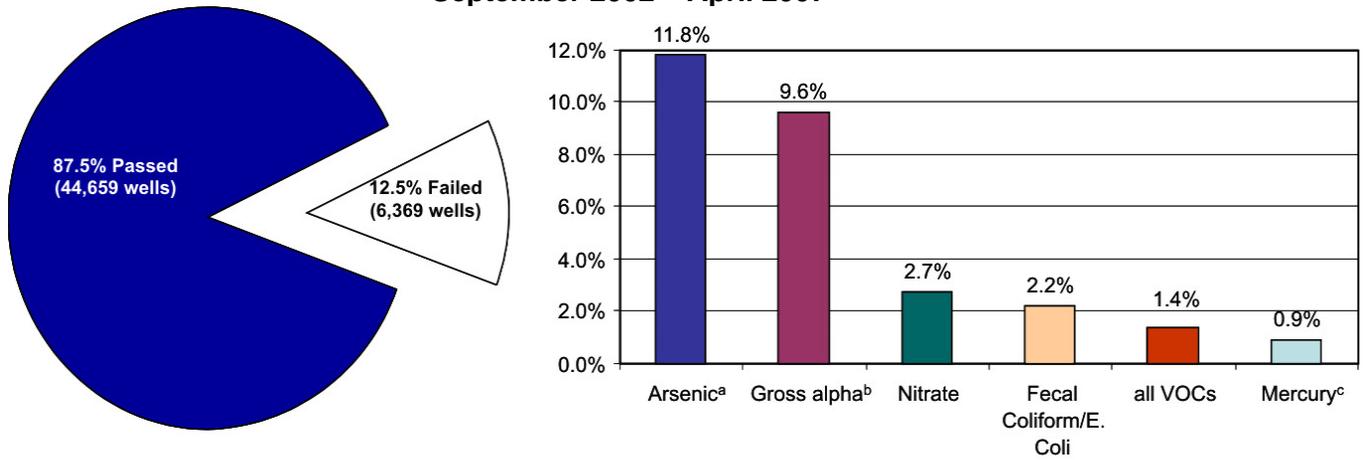
gross alpha particle activity. Both of these contaminants are known to cause serious human health effects, including certain cancers, when consumed for an extended period of time above the MCL. Gross alpha particle activity and arsenic are required to be tested for in certain counties (see Appendix C). PWTA data collected for gross alpha particle activity have shown that 9.6% of sampled wells exceeded the MCL of 15 pCi/L. It should be noted that sampling for gross alpha particle activity is only required in counties where NJDEP has historically found elevated levels. A total of 12% of those wells tested exceeded the New Jersey state arsenic standard of 5 µg/l. Arsenic test results continue to illustrate that certain areas of Northern New Jersey are more likely to experience arsenic contamination. Specifically, certain geological formations in the Piedmont region contain naturally occurring geologic units that may leach arsenic into the groundwater as it passes through this formation.

Test results for PWTA parameters that are required in all New Jersey counties continue to show that nitrate and fecal coliform/*E. coli* MCLs are most frequently exceeded, 2.7% and 2.2%, respectively. Both of these contaminants are regulated as acute parameters because exceeding the standard might lead to immediate health concerns. The percentage of volatile organic compounds (VOCs) exceedances above the MCL was 1.4%. This percentage is consistent with what was observed in the initial PWTA report. The percentage of wells exceeding the mercury MCL was 0.9%. Mercury testing is only required in the certain counties located in the southern part of the state

Secondary parameters (pH, manganese and iron) throughout New Jersey continue to exceed their particular Recommended Upper Levels (RULs) in a significant number of wells. Sixty-four (64) percent (or 32,530) of the 51,028 wells tested exceeded an RUL for at least one secondary drinking parameter, with pH exceeding the RUL in the greatest percentage of wells (45%). A total of 2,932 wells exceeded the RULs for all three parameters, 9,813 exceeded two; and 19,524 exceeded one of the RULs.

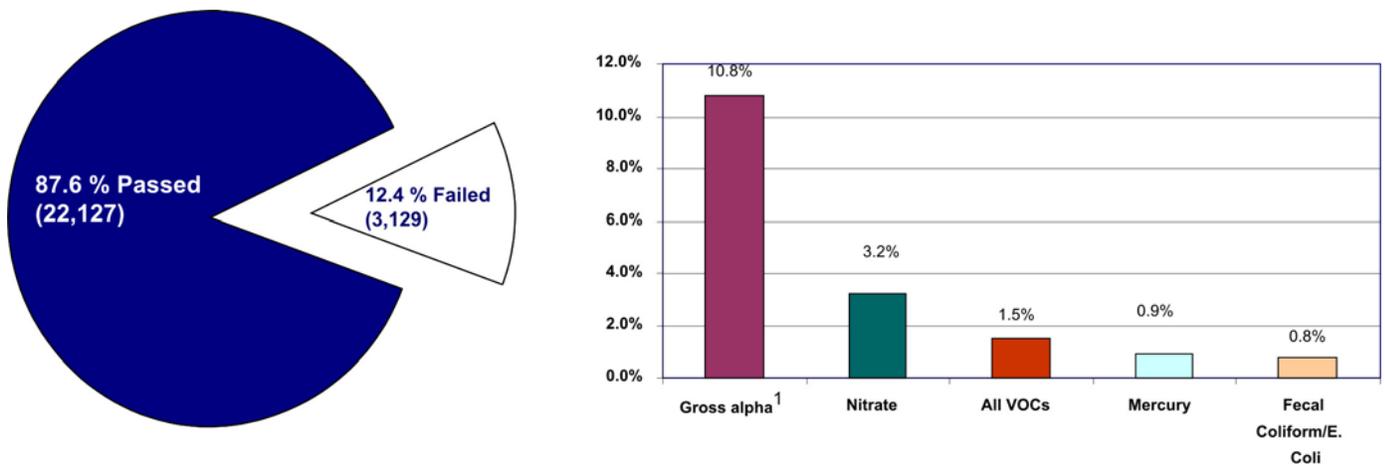
A comparison can be made between contaminants in Northern New Jersey and Southern New Jersey by looking at the counties that sampled for arsenic and gross alpha in the north and comparing it to the counties that sampled for mercury and gross alpha in the south. Figures 11 and 12 illustrate the comparison.

Figure 10: Statewide Summary of PWTA Results For Primary Drinking Water Standards September 2002 – April 2007



- a. Ten counties were required to test for arsenic: Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Morris, Passaic, Somerset and Union. A total of 12,263 wells were test for arsenic using a sensitive analytic method.
- b. Twelve counties were required to test for gross alpha: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Hunterdon, Mercer, Middlesex, Monmouth, Ocean and Salem. A total of 22,904 wells were tested for gross alpha.
- c. Nine counties were required to test for mercury: Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Monmouth, Ocean and Salem. A total of 25,270 wells were tested for mercury.

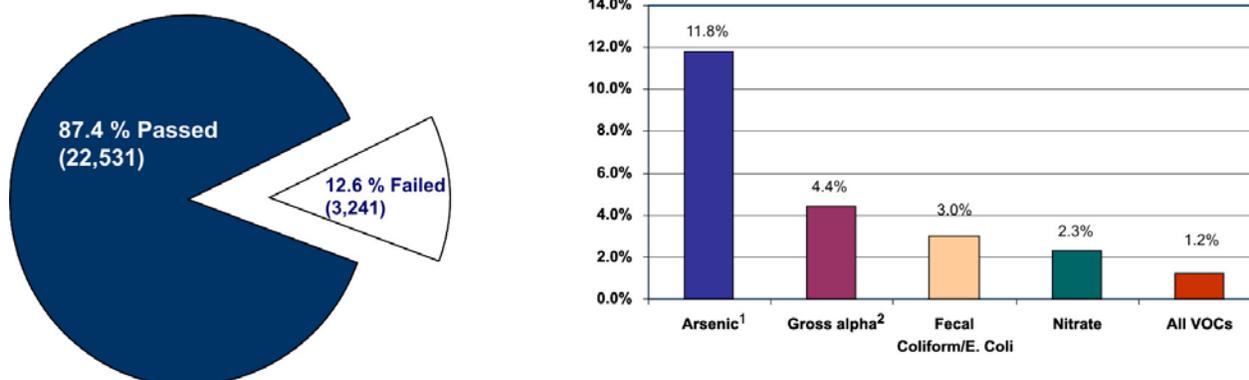
Figure 11: Southern New Jersey - Summary of Private Well Testing Act Results for Primary Drinking Water Standards September 2002 – April 2007 Out of 25,256 wells



¹ A total of 18,755 wells in Southern New Jersey were tested for gross alpha.

In the nine Southern New Jersey counties, 12% of the 25,256 wells exceeded one or more MCLs. Failures for gross alpha particle activity were most common followed by nitrates, VOCs, mercury and fecal coliform/*E. coli*.

Figure 12: Northern New Jersey - Summary of Private Well Testing Act Results For Primary Drinking Water Standards September 2002 – April 2007
Out of 25,772 wells



¹ A total of 12,263 wells in Northern New Jersey were tested for arsenic using the more sensitive analytical method. Sampling was required in all northern counties except Sussex, and Warren counties.

² A total of 4,148 wells in Hunterdon, Mercer and Middlesex counties were tested for gross alpha.

In the 12 Northern New Jersey counties, 12% of the 25,772 wells exceeded one or more primary drinking water standards. The most common failure was for arsenic (12%); followed by gross alpha particle activity (in Mercer, Middlesex, and Hunterdon Counties only); fecal coliform/*E.coli*, nitrates and VOCs.

Lead Testing Results (Variability in Results)

Exposure to lead is a significant health concern, especially for young children and infants whose growing bodies tend to absorb more lead than the average adult, and because of the concern that it may impair a child's mental development. Drinking water is one possible source of lead exposure. Infants whose diets consist mainly of liquid can get 40 - 60% of their lead exposure from water. Some drinking water pipes, taps, solder and other plumbing components contain lead. Lead-containing plumbing materials are still being sold. Some fixtures may still contain up to 8% lead, which is used as an alloying material in brass. For example, yellow brass contains 1-3% lead and red brass contains 5-6% lead. Depending upon the corrosivity of the well water, the brass plumbing materials can leach lead at varying concentrations into the water and pose a health risk when the water is consumed.

Even though ground water, which is the source of water for private well owners, may have little or no lead, a water sample collected from a home as part of the PWTA

requirements may still show elevated lead due to the presence of lead and lead-containing plumbing materials and water use patterns. The NJDEP did not originally expect raw water samples to exhibit elevated levels of lead.

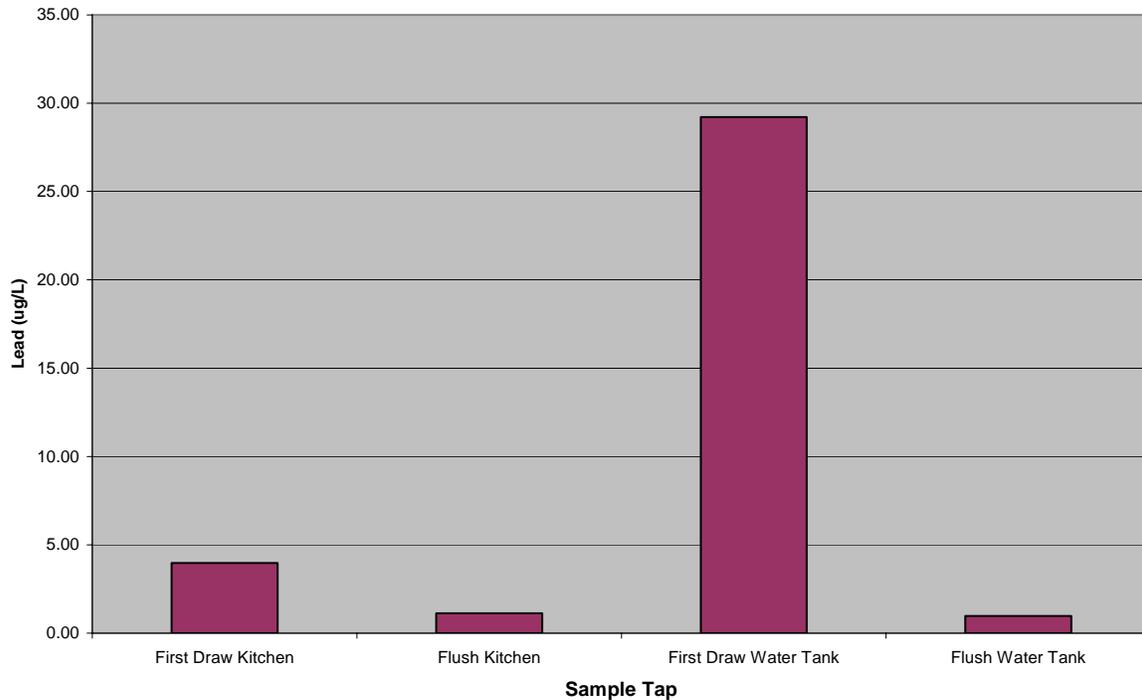
Shortly after PWTA sampling began, county and local health agencies noted that some of the reported lead results were unexpectedly high. Often the local health departments, through confirmatory sampling, could not substantiate the results. Well water testing conducted prior to the PWTA rarely detected the presence of lead in well water. Historically, when high levels of lead were found in drinking water it was attributable to the well structure or plumbing, not groundwater sources. Therefore, the NJDEP considers the lead results to be questionable, and did not include them in the summary charts. The raw lead test results indicate that 5,523 wells (11%) out of the 51,028 tested had lead levels above the old ground water standard of 10 µg/l, and 9,368 (18%) wells had lead levels above the new ground water standard of 5 µg/l. Furthermore, some of the samples contained unrealistically high concentrations of lead with the highest being 20,200 µg/l. This level is significantly above any level that would be expected to occur in ground water. Based on the NJDEP's experience with groundwater investigations and monitoring of ambient groundwater, the homes with water samples showing elevated lead levels are not near areas where lead is likely to be a contaminant in ground water. It is very unlikely that the source of lead was the groundwater.

Research conducted in the 1990's by scientists at NJDEP and Rutgers demonstrated that lead in well water samples collected from homes served by private wells in New Jersey is most likely coming from plumbing. Further, the research shows that the sampling method, sample volume and sampling location are vital in distinguishing between lead in the ground water versus lead coming from the plumbing. As a result of the observed high lead levels in the PWTA database, the NJDEP conducted a study with Rutgers University to more definitively determine the source of the lead.

The sampling procedure used in the study included flushing the house system for five or 10 minutes and collecting the water sample as close to the well head as possible. In most cases, this sampling procedure results in a water sample being collected at the tap at the water tank, not the kitchen sink. The resulting water sample is, in effect, an unflushed sample because the tap at the water tank may not have been opened in years. Although flushing technically occurred, the flushing took place at the kitchen tap, which is not where the water sample was collected.

Information from 10 homes, where extensive water samples were collected and analyzed for lead confirmed this scenario (see Figure 13). The first draw kitchen tap (FD-kitchen) water samples show high lead concentrations. After a five-minute flush, the lead levels decreased. After the kitchen tap was flushed, water samples were collected from the water tank tap, representing a first draw water tank (FD Water Tank)

Figure 13: Lead in Water Samples



sample and a five minute flushed water sample from the kitchen tap. The lead levels in the first draw water tank sample contained the highest levels of lead of all the samples collected. After flushing at the water tank tap for five minutes, lead levels decreased.

The conclusion of the study is that the elevated lead levels observed in the PWTA water samples are due to the fact that sampling was conducted at water tank taps that were not flushed. Therefore, it was concluded that the high lead concentrations were a consequence of the plumbing, and not the ground water quality.

It should be reiterated that, regardless of its source, elevated lead levels are a serious health concern. Homeowners with elevated levels of lead, regardless of the source, should take immediate steps to remediate the situation, assuming treatment is not already in place. The PWTA only requires a raw or untreated sample for lead since this is an indication of the ground water quality. A homeowner may want to collect a first draw sample (no flushing) in order to determine if there may be any issues with lead in the home's plumbing system.

Part 3: Private Well Testing Act Education and Outreach

Communication Efforts

From the inception of the PWTA Program, the NJDEP recognized the importance of public education and outreach. The NJDEP was aware of the fact that the program would not only impact buyers, sellers, landlords and renters, but also would affect other professionals involved in real estate transactions including, but not limited to, municipal officials, health agencies, realtors, and certified laboratories. The PWTA program consequently developed and utilized several measures to educate these constituents and provide the necessary support to make the implementation process as straightforward as possible, and to lessen any burden incurred.

Two education initiatives were the development of a toll free hotline and the development of the Private Well Testing Act website (PWTA website) at www.nj.gov/dep/pwta. The PWTA Website, since its inception, has been a popular public information resource. The PWTA website includes a list of frequently asked questions that address issues and concerns related to the requirements of the Private Well Testing Act and implementing regulations. Frequently asked questions are developed from commonly submitted questions to the PWTA program and routinely updated and posted. For the convenience of visitors to the PWTA website, an e-mail box is available and is frequently utilized to ask questions that could not be ascertained by viewing the website.

In addition, other PWTA educational and informational materials have been developed and distributed to the public and targeted audiences. Fact sheets on the PWTA Program were developed and are available on the PWTA website. Also, a list of certified laboratories is available. Two important publications assist the PWTA Program in communication efforts with New Jersey's county and local health departments and certified laboratories that perform PWTA testing, and are distributed on a periodic basis.: "Health Officer Advisory Bulletin" was established and distributed to inform New Jersey county and local health officials of pertinent PWTA-related issues and "Laboratory Advisory Bulletin" was initiated to facilitate communication with New Jersey certified laboratories that offer PWTA-related laboratory services and to provide them with pertinent information regarding PWTA data management issues.

Educational and Outreach Needs

While the PWTA program has made some significant efforts to explain the program and educate our constituents during the past years, there are still areas that must be addressed. These include the development of additional fact sheets for the public for specific drinking water contaminants (i.e., lead, mercury, arsenic, etc.). Additionally, PWTA sponsored training events to update targeted audiences such as realtors, buyers and sellers of real estate with private wells, real estate attorneys, certified laboratories and county and local health officials need to be scheduled. Coordination of efforts between NJDEP and other agencies will continue in order to assist our constituency,

and other interested parties. PWTA issues, such as health-related education concerning drinking water contaminants, Geographic Information System (GIS), real estate law and the implementation and compliance with the PWTA and its regulations, must be conveyed through further organized educational and outreach events.

Part 4: Case Studies

Private Well Testing Act Case Study #1 - Evesham Township, Burlington County

In 2005, a home in Evesham Township, Burlington County had a private well which was tested under the PWTA program. The well was contaminated with tetrachloroethylene, a solvent widely used by the dry cleaning industry. The test result indicated that the well had 4 ppb of tetrachloroethylene. The Maximum Contaminant Level (MCL) is 1 ppb.

When a well exceeds a health based MCL, the PWTA authorizes the county health authority to notify neighboring properties within 200 feet of the contaminated well. In this case, the Burlington County Health Department sampled 18 private wells in the vicinity. Of the 18 wells tested, 12 were found to have tetrachloroethylene concentrations that exceeded the MCL, with one well having an extremely high concentration of 840 ppb. The County Health Department then contacted the Site Remediation Program in the NJDEP to assist with follow-up testing and remedial activities.

The NJDEP tested an additional 40 private wells in the area. Of those 40 wells, 6 wells exceeded the MCL for tetrachloroethylene, with the highest concentration at 70 ppb. In addition, four of the 40 private wells exceeded the MCL for mercury. All of the wells that exceeded the MCL's for tetrachloroethylene and mercury were eligible in accordance with the NJDEP's Spill Compensation Fund (aka Spill Fund), and had all of the drinking water remedial treatment costs related to tetrachloroethylene and mercury contamination covered by the Spill Fund.

Private Well Testing Act Case Study #2 - Byram Township, Sussex County

In the summer of 2004, a well at a house being sold in Byram Township, Sussex County was found to be contaminated with trichloroethylene above the Maximum Contaminant Level (MCL) of 1 microgram per liter (or part per billion (ppb)). The concentration detected was 29 µg/l. The public notification provisions within the PWTA regulations suggest that the local health authority notify neighboring properties within at least 200 feet whenever a drinking water standard (e.g., MCL) is exceeded. Because of the location of the affected property, no homes were located within 200 ft of the affected property, so neither the local health authority nor the State performed any subsequent sampling.

Approximately nine months later, a home in the same neighborhood was sold and the well exceeded the MCL for trichloroethylene with a concentration of 39 µg/l. The local health authority notified neighboring properties. Twenty additional wells were tested by neighboring residents. Out of the 20 wells tested, 13 exceeded the MCL for

trichloroethylene while seven others had no detectable level of trichloroethylene. The concentrations of trichloroethylene in the 13 wells ranged from 4 µg/l to 64 µg/l.

The NJDEP's Site Remediation Program (SRP) performed additional confirmatory testing on those private wells that were affected by trichloroethylene contamination. The SRP also tested additional neighboring private wells for trichloroethylene contamination in 2005, and determined that overall, the water supply from 17 private wells exceeded the MCL for trichloroethylene. All 17 properties that were affected by trichloroethylene qualified, in accordance with the NJDEP's Spill Fund, to have all of the drinking water remedial treatment costs related to trichloroethylene contamination covered by the Spill Fund.

Appendix A: Definitions and Terms

The following words and terms used in this report shall have the following meanings unless otherwise noted:

Act or PWTA - refers to the Private Well Testing Act, P.L. 2001, c. 40; N.J.S.A. 58:12A-26 *et seq.*, which applies to buyers, sellers and lessors of certain real property as follows:

(a) All contracts of sale for any real property in which the potable water supply is a private well located on the property, or for any other real property in which the potable water supply is a well that has less than 15 service connections or that does not regularly serve an average of at least 25 individuals daily at least 60 days out of the year, shall include a provision requiring the testing of that water supply for certain parameters as set forth in the Act; and (b) the lessor of any real property in which the potable water supply is a private well for which testing of the water is not required pursuant to any other State law. The lessor shall test that water supply for certain parameters as set forth in the Act. Testing of the water is required at least once every five years. In addition, within 30 days after receipt of the test results, a written copy of the results must be provided to each rental unit and each new lessee.

Acute parameter - a contaminant in drinking water that has significant potential to have serious and adverse effects on human health as a result of short-term or limited exposure.

Authorized representative – a person other than an employee of a New Jersey certified laboratory from which a New Jersey certified laboratory accepts a drinking water well sample(s) and also accepts responsibility for such a sample(s) in accordance with the requirements of N.J.A.C. 7:18-9.1(c).

Certified laboratory - any laboratory, facility, consulting firm, government or private agency, business entity or other person that the NJDEP has authorized pursuant to the Regulations Governing The Certification of Laboratories and Environmental Measurements, N.J.A.C. 7:18, to perform analysis in accordance with the procedures of a given analytical method using a particular technique as set forth in a certain methods reference document, and to report the results from the analysis of environmental samples in compliance with a NJDEP regulatory program.

Contaminant – Any physical, chemical, biological, or radiological substance or matter that has an adverse affect on air, water or soil.

Drinking Water Standard - a standard that applies to a contaminant that is required to be tested pursuant to the New Jersey Safe Drinking Water Act, N.J.S.A. 58:12A-1 *et seq.* that include a maximum contaminant level, recommended upper limit, or in the case of lead analysis, an action level.

Exceedance - the concentration of a contaminant that is greater than a MCL, action level, standard or recommended upper limit for that given contaminant.

Global Positioning System (GPS) Location – refers to a specific geographic location on the earth’s surface as determined by satellite radio signals.

Local health authority - a county, regional or municipal health agency that serves as the lead point of contact with the NJDEP on environmental issues. This agency would ordinarily be the local health agency certified pursuant to the County Environmental Health Act (CEHA), N.J.S.A. 26:3A2-21 *et seq.* In those counties that do not have a certified CEHA health agency, the local health authority is the agency that serves as the lead for administering the Local Information Networks and Communication System (LINCS) as designated by the Department of Health and Senior Services.

Maximum contaminant level (MCL) - the maximum permissible concentration of a contaminant in drinking water. Maximum contaminant levels shall apply to public and non-public water systems, in accordance with the New Jersey Safe Drinking Water Act, N.J.S.A.58:12A-1 *et seq.* and implementing rules at N.J.A.C. 7:10.

Parameter - a general term that includes other terms such as contaminant, constituent, substance, metal, organic/inorganic chemical, and characteristics that are used to designate an analyte, group of analytes, attribute, or physical property.

Potable water - any water used, or intended to be used, for drinking and/or culinary purposes which is free from impurities in amounts sufficient to cause disease or harmful physiological effects, and complies with the bacteriological and chemical quality conforming to applicable standards the New Jersey Safe Drinking Water Act rules at N.J.A.C. 7:10.

Potability – See Potable Water.

Private well - a potable water well that serves a dwelling unit and is located on the same real property as the dwelling unit.

Public notification - a general notice sent by the appropriate local health authority of private well test failures to surrounding and/or neighboring owners of real property. The notification can include recommendations to test for the parameters of concern to the owners of surrounding or neighboring properties served by wells.

Recommended upper limit - the optimum range for pH or upper limit for iron, and manganese, in accordance with the New Jersey Safe Drinking Water Act rules at N.J.A.C. 7:10-7.

Reporting laboratory - the certified laboratory responsible for reporting a complete set of required information related to the analysis of a private well sample to the NJDEP.

Secondary parameter - a drinking water contaminant regulated for aesthetic purposes rather than health effects under the SDWA rules at N.J.A.C. 7:10. Secondary parameters include pH, iron and manganese.

Water test failure - an exceedance of an applicable drinking water standard of a required test parameter under the Private Well Testing Act. This term includes all applicable maximum contaminant levels, recommended limits, and an action level for lead analysis.

Water treatment system - a device applied to the drinking water at a house or building for the purpose of reducing contaminants in the drinking water distributed in the house or building. Examples: point-of-entry devices and point-of-use devices.

Well - a hole or excavation larger than four inches in diameter or a hole or excavation deeper than 10 feet in depth that is drilled, bored, cored, driven, jetted, dug, or otherwise constructed for the purpose of removal or emplacement of, or investigation of, or exploration for, fluids, water, oil, gas, minerals, soil, or rock.

Well permit - a written approval issued by the NJDEP, pursuant to Well Construction; Maintenance and Sealing of Abandoned Wells Regulations at N.J.A.C. 7:9D, to a licensed well driller which authorizes a licensed well driller of the proper class to construct a well or wells.

Well record - the form provided by the NJDEP that depicts the construction details of a well, which is completed by the well driller subsequent to well permit issuance and well installation.

Appendix B: Private Well Testing Act
Analytes and Applicable Standards



New Jersey Private Well Testing Act Primary and Secondary Drinking Water Standards

Primary Standards

Secondary Standards

(Primarily Aesthetics)

Volatile Organic Compounds	MCL	Units
Benzene	1	µg/l
Carbon Tetrachloride	2	µg/l
meta-Dichlorobenzene	600	µg/l
ortho-Dichlorobenzene	600	µg/l
para-Dichlorobenzene	75	µg/l
1,1-Dichloroethane	50	µg/l
1,2-Dichloroethane	2	µg/l
1,1-Dichloroethylene	2	µg/l
cis-1,2-Dichloroethylene	70	µg/l
trans-1,2-Dichloroethylene	100	µg/l
1,2-Dichloropropane	5	µg/l
Ethylbenzene	700	µg/l
Methyl tertiary butyl ether	70	µg/l
Methylene Chloride	3	µg/l
Monochlorobenzene	50	µg/l
Naphthalene	300	µg/l
Styrene	100	µg/l
1,1,2,2-Tetrachloroethane	1	µg/l
Tetrachloroethylene	1	µg/l
Toluene	1,000	µg/l
1,2,4-Trichlorobenzene	9	µg/l
1,1,1-Trichloroethane	30	µg/l
1,1,2-Trichloroethane	3	µg/l
Trichloroethylene	1	µg/l
Vinyl Chloride	2	µg/l
Xylenes (Total)	1,000	µg/l

Inorganic Compounds	MCL	Units
Mercury	2	µg/l
Nitrates	10,000	µg/l
Arsenic	5*	µg/l
Lead	5**	µg/l

Microbiological	MCL	Units
Total Coliform	0	pres/abs
Fecal Coliform [†]	0	pres/abs
E. coli [†]	0	pres/abs

Radiological ^{##}	MCL	Units
Gross Alpha (initial)	5 [#]	pCi/L
Gross Alpha (final)	15	pCi/L

Secondaries	Standard [‡]	Units
pH	6.5-8.5	Optimum Range
Iron	0.3	mg/l
Manganese	0.05	mg/l

UNITS:

µg/l=micrograms/liter (ppb)
 mg/l=milligrams/liter (ppm)
 pCi/L=picocuries/liter
 pres/abs=presence or absence
 MCL= Maximum Contaminant Level

[‡]Standard means Recommended Upper Limit
^{*}As of January 23, 2006 the effective NJ MCL for Arsenic is 5 Ug/l
^{*}Ground Water Quality Standard NJAC 7:9-6
[†] Either one is required if Total Coliform is present
^{##} Gross alpha particle testing is phased in over time based on county location of the well. The effective dates are:
 3/15/03 - Cumberland and Gloucester counties
 9/16/03 - Atlantic, Burlington, Camden, and Salem counties
 3/16/04 - Cape May, Hunterdon, Mercer, Middlesex, Morris, Monmouth, and Ocean counties
[#] Results greater than 5 pCi/L requires a second gross alpha count. The MCL for gross alpha is 15 pCi/L.

Appendix C: Private Well Testing Act
Required Parameters
by County

List of Required Parameters for Private Well Testing Effective September 16, 2002

	Total Coliform	*Fecal Coliform or E. Coli	Nitrate	Iron	Manganese	pH	VOCs	Lead	Arsenic	Mercury	Gross Alpha Particle Activity
Atlantic	X	X	X	X	X	X	X	X		X	2
Bergen	X	X	X	X	X	X	X	X	X		
Burlington	X	X	X	X	X	X	X	X		X	2
Camden	X	X	X	X	X	X	X	X		X	2
Cape May	X	X	X	X	X	X	X	X		X	3
Cumberland	X	X	X	X	X	X	X	X		X	1
Essex	X	X	X	X	X	X	X	X	X		
Gloucester	X	X	X	X	X	X	X	X		X	1
Hudson	X	X	X	X	X	X	X	X	X		
Hunterdon	X	X	X	X	X	X	X	X	X		3
Mercer	X	X	X	X	X	X	X	X	X		3
Middlesex	X	X	X	X	X	X	X	X	X		3
Monmouth	X	X	X	X	X	X	X	X		X	3
Morris	X	X	X	X	X	X	X	X	X		
Ocean	X	X	X	X	X	X	X	X		X	3
Passaic	X	X	X	X	X	X	X	X	X		
Salem	X	X	X	X	X	X	X	X		X	2
Somerset	X	X	X	X	X	X	X	X	X		
Sussex	X	X	X	X	X	X	X	X			
Union	X	X	X	X	X	X	X	X	X		
Warren	X	X	X	X	X	X	X	X			

* Fecal Coliform or E. coli testing is required only if a sample tests positive for total coliform. See N.J.A.C. 7:9E-2.1(a)2.

- 1 = testing required starting March 15, 2003
- 2 = testing required starting September 16, 2003
- 3 = testing required starting March 16, 2004

**Appendix D: New Jersey Private Well Test
Reporting Form**

New Jersey Private Well Water Test Reporting Form

The New Jersey Private Well Test Reporting Form is a standardized form to be used exclusively by laboratories reporting well test results to their client in accordance with the Private Well Testing Act Regulations N.J.A.C. 7:9E.

These laboratory analyses were completed for the purposes of complying with the Private Well Testing Act.
In accordance with the Private Well Testing Act Regulations all analytical results except for coliform (total, fecal, or E. coli) shall remain valid for a period of one year from the date of sample collection. All coliform (total, fecal, or E. coli) analytical results shall remain valid for a period of six months from the date of sample collection.

- Analytical results meet primary and secondary contaminant standards for drinking water
- One or more of the analytical results do not meet primary ⁺ contaminant standards for drinking water
- One or more of the analytical results do not meet secondary ⁺⁺ contaminant standards for drinking water

CLIENT INFORMATION:

Name: _____ Date Test Requested: _____

Mailing Address & Phone

#: _____

PROPERTY INFORMATION:

Property Address: _____ Municipality: _____

Muni Code (4 digit): _____

County: _____ Property Lot: _____ Block: _____

GPS Location- State Plane Coordinates (feet): (X) _____ (Y) _____

GPS Coordinate Origin (Circle One): Well Head/ Front Door/Sample Collection Point/Other (Explain): _____

NJ Well Permit or Well Record Number: _____ (if known)

LABORATORY INFORMATION:

Reporting Laboratory Name & ID #: _____

Reporting Laboratory Address & Phone #: _____

SAMPLE INFORMATION:

Sample Collector Name:

Authorized Representative/Certified Laboratory Employee Lab Certification ID #:

Sample Type: **NOTE: Only raw or untreated water samples meet the requirements of the PWTA regulations N.J.A.C. 7:9E.**

a.) Indicate Specific Location of Sample Collected:

b.) Type of Treatment Device(s) Installed (if known):

+ **Primary Drinking Water contaminants are those contaminants that have Maximum Contaminant Levels or Action Levels established to protect health. The Primary Drinking Water contaminants are coliform bacteria, nitrate (total), lead, the volatile organic compounds, arsenic, mercury and gross alpha. The standards for primary contaminants are the maximum permissible levels allowed in drinking water based on ingesting the drinking water over the course of a lifetime.**

++ **Secondary Drinking Water contaminants are those contaminants that have Recommended Upper Limits or Optimum Ranges established to protect against those properties that adversely affect the taste, odor, or appearance of drinking water. The Secondary Drinking Water contaminants are iron, manganese and pH.**

New Jersey Private Well Water Test Reporting Form

The New Jersey Private Well Test Reporting Form is a standardized form to be used exclusively by laboratories reporting well test results to their client in accordance with the Private Well Testing Act Regulations N.J.A.C. 7:9E.

These laboratory analyses were completed for the purposes of complying with the Private Well Testing Act

SUMMARY OF WELL WATER TEST RESULTS:

Required Test Parameters	Result	Units	Applicable Standard (Maximum Contaminant Level, Action Level or Recommended Limit)	Standard Exceeded (Y/N)	Laboratory Certification ID #	Analytical Method
Microbial Parameters						
Total Coliform		Pres/Abs	Absent			
Fecal Coliform*		Pres/Abs	Absent			
<i>E. coli</i> *		Pres/Abs	Absent			
Metals						
Arsenic [#]		ug/l	5 ug/l			
Mercury [^]		ug/l	2 ug/l			
Lead**		ug/l	5 ug/l **			
Iron		mg/l	0.3 mg/l			
Manganese		mg/l	0.05 mg/l			
General Chemistry						
pH		pH units	6.5-8.5 (optimum range)			
Nitrate		ug/l	10,000 ug/l			
Volatile Organic Compounds						
Benzene		ug/l	1 ug/l			
Carbon Tetrachloride		ug/l	2 ug/l			
Chlorobenzene		ug/l	50 ug/l			
Dichlorobenzene (1,2-)		ug/l	600 ug/l			
Dichlorobenzene (1,3-)		ug/l	600 ug/l			
Dichlorobenzene (1,4-)		ug/l	75 ug/l			
Dichloroethane (1,1-)		ug/l	50 ug/l			
Dichloroethane (1,2-)		ug/l	2 ug/l			
Dichloroethene (1,1-)		ug/l	2 ug/l			
Dichloroethene (cis 1,2-)		ug/l	70 ug/l			
Dichloroethene (trans 1,2-)		ug/l	100 ug/l			
Methylene Chloride		ug/l	3 ug/l			
Dichloropropane		ug/l	5 ug/l			
Ethylbenzene		ug/l	700 ug/l			
Methyl tertiary-butyl ether		ug/l	70 ug/l			
Naphthalene		ug/l	300 ug/l			
Styrene		ug/l	100 ug/l			
Tetrachloroethane (1,1,2,2-)		ug/l	1 ug/l			
Tetrachloroethene		ug/l	1 ug/l			
Toluene		ug/l	1,000 ug/l			
Trichlorobenzene (1,2,4-)		ug/l	9 ug/l			
Trichloroethane (1,1,1-)		ug/l	30 ug/l			
Trichloroethane (1,1,2-)		ug/l	3 ug/l			
Trichloroethene		ug/l	1 ug/l			
Vinyl Chloride		ug/l	2 ug/l			
Xylenes (total)		ug/l	1,000 ug/l			
Radiological Parameters						
Gross Alpha (initial)-		PCi/l	5 pCi/l~	Not Applicable		
Gross Alpha (final)-		PCi/l	15 pCi/l			

UNITS: Pres/Abs=presence or absence; ug/l= micrograms per liter (also known as parts per billion); mg/l=milligrams per liter (also known as parts per million); pCi/l=picocuries per liter; su=standard units.

* If total coliform bacteria are detected then additional analyses are required to determine the specific type (fecal or E. coli) present. Fecal coliform or E. coli analysis are not required if total coliform sample results indicate the absence of total coliform bacteria.

** The results of a "flushed" raw (untreated) water sample, which is required by the Private Well Testing Act regulations, should be compared to the Ground Water Quality Standard of 5 ug/l found at N.J.A.C.7: 9-6 et seq. The Lead Action Level of 15 ug/l applies to a one liter first-draw tap sample collected from a cold water kitchen or bathroom tap/sink in which the water has remained motionless in the plumbing system for at least six hours [40 CFR 141.86(b)(2)]. This type of standing-water sample is NOT required by the Private Well Testing Act regulations.

Arsenic analysis is required only in Bergen, Essex, Hudson, Hunterdon, Mercer, Middlesex, Morris, Passaic, Somerset and Union Counties. A new MCL of 5 ug/l (ppb) took effect on January 23, 2006.

^ Mercury analysis is required only in Atlantic, Burlington, Camden, Cape May, Cumberland, Gloucester, Monmouth, Ocean, and Salem Counties.

~ Gross alpha particle activity testing will be required in Cumberland and Gloucester Counties starting March 15, 2003; Atlantic, Burlington, Camden and Salem Counties starting September 16, 2003; Cape May, Hunterdon, Mercer, Middlesex, Monmouth and Ocean Counties starting March 16, 2004. If the initial Gross alpha particle count exceeds 5 pCi/l a second count is required according to the Method. The MCL for Gross alpha particle activity is 15 pCi/l.

New Jersey Private Well Water Test Reporting Form

The New Jersey Private Well Test Reporting Form is a standardized form to be used exclusively by laboratories reporting well test results to their client in accordance with the Private Well Testing Act Regulations N.J.A.C. 7:9E.

These laboratory analyses were completed for the purposes of complying with the Private Well Testing Act

ADDITIONAL SAMPLE INFORMATION:

Coliform Analyses:

Date/Time Sample Collected: _____ Date/Time Sample Analyzed: _____ Sample ID Number: _____

Date/Time Sample Collected: _____ Date/Time Sample Analyzed: _____ Sample ID Number: _____

Volatile Organics:

Date/Time Sample Collected: _____ Date/Time Sample Analyzed: _____ Sample ID Number: _____

Inorganics:

Date/Time Sample Collected: _____ Date/Time Sample Analyzed: _____ Sample ID Number: _____

Date/Time Sample Collected: _____ Date/Time Sample Analyzed: _____ Sample ID Number: _____

pH Analysis:

Date/Time Sample Collected: _____ Date/Time Sample Analyzed: _____ Sample ID Number: _____

Gross Alpha Analyses:

Date/Time Sample Collected: _____ Date/Time Sample Analyzed: _____ Sample ID Number: _____

Date(s) All Analyses Received by Reporting Lab from Subcontracted Lab (if applicable):

CERTIFICATION OF RESULTS:

I certify in writing that all sampling, analyses, and reporting performed herein, comply with all requirements set forth in N.J.A.C. 7:9E and N.J.A.C. 7:18, and hereby certify that this laboratory is in compliance with all laboratory certification and quality control procedures and requirements as set forth in N.J.A.C. 7:18.

Laboratory Manager or Designee

Date

ADDITIONAL INFORMATION:

Treatment Options

Listed below are the common treatments available to homeowners having well contamination above a Maximum Contaminant Level, Action Level or Recommended Limit. The goal of water treatment is the removal of contaminants to levels below the Maximum Contaminant Level, Action Level or Recommended Limit. For additional information on home treatment devices contact your local/county health department or the NJDEP Private Well Testing Act Hotline at **1-866-4PW-TEST** or visit the Private Well Testing Act webpage at: www.state.nj.us/dep/pwta for links to other appropriate websites, such as National Sanitation Foundation www.nsf.org or USEPA's drinking water website www.epa.gov/safewater. You may also call the USEPA Drinking Water Hotline at (800) 426-4791 to obtain a copy of USEPA's pamphlet entitled "Home Water Treatment Units" (WH-550A). All treatment devices must be properly maintained in accordance with manufacturer recommendations to ensure operating efficiency in removing contaminants. As noted below, not all treatment devices remove every contaminant; there may be more than one device installed if multiple contaminants exist in the drinking water. Water treatment companies may be found by consulting the yellow pages of your local area phone book.

New Jersey Private Well Water Test Reporting Form

The New Jersey Private Well Test Reporting Form is a standardized form to be used exclusively by laboratories reporting well test results to their client in accordance with the Private Well Testing Act Regulations N.J.A.C. 7:9E.

These laboratory analyses were completed for the purposes of complying with the Private Well Testing Act

SUMMARY OF TREATMENT OPTIONS FOR HOMEOWNERS

Treatment Type	Contaminants Treated
Activated Carbon Filtration	Some Organic Chemicals
	Taste
	Trihalomethanes
	Some Pesticides
	Odor
Air Stripping	Volatile Organic Compounds (higher concentrations)
	Iron (with filtration)
	Hydrogen Sulfide
	Radon Gas
Chlorinators	Bacteria (Coliform)
	Microbiological Contamination
Distillation	All Inorganic Chemicals (i.e., Nitrate, Sodium Chloride)
	Some Organic Chemicals
Ion Exchange	Hard Water (Water Softening)
	Manganese
	Some Heavy Metals
	Calcium
	Iron
Reverse Osmosis	Certain Organic Chemicals
	Nitrates
	Dissolved Solids/Metals
Mechanical Filtration	Turbidity
	Dirt
	Sediment
	Particulates (Loose Scale)
Bottled Water	Temporary Solution to Aesthetic Problems & Emergency Situations
KDF-55 with pH adjustment	Mercury
Ultraviolet Radiation	Bacteria (Coliform)
	Microbiological Contamination

II. Health Effects

Drinking water standards are established to protect consumers of drinking water from both adverse health effects (primary drinking water standards) and from qualities that make the water unpalatable (secondary drinking water standards). Both NJDEP and USEPA set drinking water standards; those in effect in New Jersey can be found at www.state.nj.us/dep/watersupply. Both NJDEP and USEPA periodically review this list and add or subtract contaminants based on new scientific information. Standard setting is summarized in a brochure entitled "Standards for Safe Drinking Water In New Jersey" available by calling **1-866-4PW-TEST**.

There are several resources available to assist in interpreting your test results. An informative booklet explaining drinking water results written by Rutgers Cooperative Extension Service entitled "Interpreting Drinking Water Quality Analysis - What do the Numbers Mean? - 5th edition" is available at www.rce.rutgers.edu/pubs/pdfs/e214.pdf. Health effects information developed by the USEPA is summarized at www.epa.gov/safewater/mcl.html. The New Jersey Department of Health and Senior Services, in conjunction with NJDEP's Bureau of Safe Drinking Water and Division of Science Research and Technology, has developed a series of brochures for drinking water and health that can be found at www.state.nj.us/health/eoh/hhazweb/edmat.html.

New Jersey Private Well Water Test Reporting Form

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to their client in accordance with the Private Well Testing Act Regulations N.J.A.C. 7:9E.

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III. Recommendations for Additional Testing

The Private Well Testing Act regulations require well water samples to be collected from untreated or "raw" water. Raw water quality represents the well water quality. Additional water testing may be conducted to determine the effectiveness of a water treatment system or to determine if the distribution system (pipes) may be contributing additional contamination. In those cases sampling of treated or finished water at the tap is recommended. This additional testing of treated water is not required under the Private Well Testing Act regulations. For example, testing of finished water to determine the effectiveness of a treatment system to remove contaminants for a known, pre-existing water quality problem would be desirable. Below are recommendations for additional testing.

Scenario One: There is an existing treatment system or device installed at the house or building due to a known pre-existing water quality problem and raw water testing indicates that one or more parameters are above a Maximum Contaminant Level, Action Level, or Recommended Limit. NJDEP recommends that a second water sample be collected for the parameter(s) of concern at a location after the treatment system or device at a primary tap to insure that the system or device is working properly in removing or reducing the contaminants to below the applicable Maximum Contaminant Level, Action Level, or Recommended Limit.

Scenario Two: After testing, total and fecal coliform bacteria are found to be above the Maximum Contaminant Level. The well is subsequently treated via chlorine disinfection. Re-testing is recommended after a chlorine residual can no longer be detected to insure the effectiveness of the treatment.

Scenario Three: **[FOR LEAD ANALYSIS ONLY]** (**Note:** The Private Well Testing Act regulations require that a "flushed" sample be collected for lead analysis meaning the well water was run to remove any water that may have been in contact with the plumbing for an extended period of time). **In scenario three**, the flushed, untreated sample, collected at the tap, indicates there is lead contamination greater than 5 ug/l. The state's ground water quality standard of 5 ug/l is the more appropriate standard to apply to a "flushed" water sample rather than the drinking water Action Level of 15 ug/l, which is based on sampling drinking water that has been allowed to remain in the plumbing for at least six hours.

If the interested party wants to better evaluate the level of potential lead contamination from the plumbing system, a "first draw" (non-flushed) sample should also be analyzed for lead. This "first draw" water sample may likely contain the highest level of lead to which one is likely to be exposed. The results of this sample should be compared to the lead Action Level of 15 ug/l. Results above 15 ug/l mean that there is a source of lead in the home plumbing system. The interested party may install treatment to make the water less corrosive and less likely to dissolve lead from the plumbing; may attempt to locate the source of the lead and remove it from the home plumbing system or may choose to run the water through the plumbing (or selected faucets) each morning to insure that the standing water is flushed through the pipes and is not consumed.

IV. Remediation/Treatment Funding Sources

- A.) The **Spill Fund Program** administered by the Bureau of Contract and Fund Management within the New Jersey Department of Environmental Protection offers help to innocent parties suffering from direct or indirect damages resulting from the discharge of a *hazardous substance*. A property owner may file a claim for reimbursement for most of the expenses incurred to install a treatment device for a

potable well or to connect to a public water supply because of a hazardous substance in the well water. A claimant has **1 year** from the date he/she learns that the well is contaminated above standards to file a claim. There are specific requirements and guidelines for filing claims with the Spill Fund. For more information, please contact the NJDEP-Bureau of Contract and Fund Management at: 609-777-0101 or visit their website at: www.state.nj.us/dep/srp or you may write to the BCFM: NJDEP-BCFM/Spill Fund, P.O. Box 413, 401 E. State Street, Trenton, N.J. 08625-0413.

- B.) The **New Jersey Housing and Mortgage Finance Agency** (NJHMFA) has a Potable Water Loan Program that is available to owners of single family residences whose source of potable water exceeds the State of New Jersey's Primary Drinking Water Standards, including lead and mercury. In addition, the loan program covers iron and manganese although these contaminants do not have Primary Drinking Water Standards. For further information, please contact the NJHMFA Hotline at 1-800-NJHOUSE (1-800-654-6873) or they may be reached at: P.O. Box 18550, 637 South Clinton Avenue, Trenton, N.J. 08650-2085 or on the web at: www.state.nj.us/dca/hmfa

Appendix E: Private Well Testing Act
Results by County for Fecal Coliform/E.Coli from
September 2002 to April 2007

**Private Well Testing Act
Results by County for Fecal Coliform/E.Coli from
September 2002 to April 2007**

County	No. of Wells Sampled	Wells with positive samples for Fecal Coliform/E.Coli	Percent
Atlantic	2857	19	0.7
Bergen	1258	19	1.5
Burlington	4482	56	1.3
Camden	1359	10	0.7
Cape May	3058	57	1.9
Cumberland	2473	12	0.5
Essex	80	0	0.0
Gloucester	3308	45	1.4
Hudson	1	0	0
Hunterdon	4858	189	3.9
Mercer	1489	57	3.8
Middlesex	469	12	2.6
Monmouth	2756	31	1.1
Morris	4645	109	2.4
Ocean	3656	9	0.3
Passaic	2192	82	3.7
Salem	1307	7	0.5
Somerset	2689	122	4.5
Sussex	5681	228	4.0
Union	33	0	0
Warren	2377	72	3.0
TOTAL	51028	1136	2.2

Appendix F: Private Well Testing Act
Results by County for Nitrates from
September 2002 to April 2007

**Private Well Testing Act
Results by County for Nitrates from
September 2002 to April 2007**

County	No. of Wells Sampled	Exceedances of Nitrate MCL	Percent
Atlantic	2857	77	2.7
Bergen	1258	12	1.0
Burlington	4482	71	1.6
Camden	1359	28	2.1
Cape May	3058	99	3.2
Cumberland	2473	274	11.1
Essex	80	1	1.3
Gloucester	3308	119	3.6
Hudson	1	0	0.0
Hunterdon	4858	40	0.8
Mercer	1489	20	1.3
Middlesex	469	15	3.2
Monmouth	2756	15	0.5
Morris	4645	78	1.7
Ocean	3656	19	0.5
Passaic	2192	101	4.6
Salem	1307	116	8.9
Somerset	2689	16	0.6
Sussex	5681	257	4.5
Union	33	1	3.0
Warren	2377	40	1.7
TOTAL	51028	1399	2.7

Appendix G: Private Well Testing Act
Results by County for Arsenic from
September 2002 to April 2007

**Private Well Testing Act
Results by County for Arsenic from
September 2002 to April 2007**

County	No. of Wells	Exceedances of MCL of 10 ug/l	Percent
Bergen	1258	37	2.9
Essex	80	4	5.0
Hudson	1	0	0.0
Hunterdon	4858	272	5.6
Mercer	1489	108	7.3
Middlesex	469	6	1.3
Morris	4645	34	0.7
Passaic	2192	7	0.3
Somerset	2689	137	5.1
Union	33	0	0.0
TOTAL	17714	605	3.4
County	No. of Wells	Exceedances of MCL of 5 ug/l	Percent
Bergen	573	50	8.7
Essex	26	5	19
Hudson	0	0	0.0
Hunterdon	3791	673	18
Mercer	1381	272	20
Middlesex	325	18	5.5
Morris	3104	56	1.8
Passaic	980	19	1.9
Somerset	2065	352	17
Union	18	0	0.0
TOTAL	12263	1445	12

Appendix H: Private Well Testing Act
Results by County for Mercury from
September 2002 to April 2007

**Private Well Testing Act
Results by County for Mercury from
September 2002 to April 2007**

County	No. of Wells Sampled	Exceedances of Mercury MCL	Percent
Atlantic	2857	38	1.3
Burlington	4482	17	0.4
Camden	1359	33	2.4
Cape May	3058	3	0.1
Cumberland	2473	41	1.7
Gloucester	3308	59	1.8
Monmouth	2756	1	0.04
Ocean	3656	10	0.3
Salem	1307	13	1.0
TOTAL	25256	215	0.9

Appendix I: Private Well Testing Act
Results by County for Gross Alpha from
September 2002 to April 2007

**Private Well Testing Act
Results by County for Gross Alpha from
September 2002 to April 2007**

County	No. of Wells Sampled	Exceedances for Gross alpha	Percent
Atlantic	2174	219	10
Burlington	3464	283	8.2
Camden	1034	340	33
Cape May	1871	13	0.7
Cumberland	2254	568	25
Gloucester	2942	321	11
Hunterdon	2843	114	4
Mercer	1009	45	4.5
Middlesex	296	24	8.1
Monmouth	1684	34	2.0
Ocean	2294	107	4.7
Salem	1038	141	14
TOTAL	22903	2209	9.6

Appendix J: Private Well Testing Act
Results by County for VOCs from
September 2002 to April 2007

**Private Well Testing Act
Results by County for VOCs
From September 2002 to April 2007**

County	No. of Wells Sampled	Exceedances of any VOC MCL	Percent
Atlantic	2857	57	2.0
Bergen	1258	21	1.7
Burlington	4482	43	1.0
Camden	1359	38	2.8
Cape May	3058	50	1.6
Cumberland	2473	69	2.8
Essex	80	3	3.8
Gloucester	3308	62	1.9
Hudson	1	0	0.0
Hunterdon	4858	29	0.6
Mercer	1489	35	2.4
Middlesex	469	9	1.9
Monmouth	2756	29	1.1
Morris	4645	54	1.2
Ocean	3656	29	0.8
Passaic	2192	37	1.7
Salem	1307	10	0.8
Somerset	2689	29	1.1
Sussex	5681	58	1.0
Union	33	7	21
Warren	2377	33	1.4
TOTAL	51028	702	1.4