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The New Jersey Private Well Testing Act: An Overview

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Abstract

In March 2001, the New Jersey Private Well Testing Act (PWTA) was signed into law, and its regulations became effective in September 2002. The PWTA is a consumer information law that requires sellers (or buyers) of property with wells in NJ to test the untreated ground water for a variety of water quality parameters, including 32 of human health concern, and to review the test results prior to closing of title. Landlords are also required to test their well water once every five years and to provide each tenant with a copy of the test results. The test data is submitted electronically by the test laboratories to the NJ Department of Environmental Protection for statewide analysis of ground water quality. This report provides details of the PWTA, including individual sample and PWTA program costs, and issues related to program implementation and electronic data quality. The information is provided for the benefit of states or municipalities that might be considering their own private well testing program, and as reference material for a report that analyzed the first four and a half years of test data (Louis et al, 2009).

Introduction

New Jersey (NJ) is the most densely populated state in the U.S. It is estimated that over 85% of NJ's 8,700,000 residents (2007 census estimate) obtain their drinking water from public water systems. The potable quality of the water derived from these systems is assured through a variety of federal and state drinking water regulations. There are no federal regulations assuring the quality of the water consumed by the population who obtain their drinking water from private wells, either in single residences or multiple unit buildings.

Over the years, a number of contamination events have occurred in private wells throughout the state. As a result of these events, in 2000 legislation was proposed to assure the quality of water drawn from private wells. On March 23, 2001, the New Jersey Private Well Testing Act (PWTA) was signed into law (NJSA, 2001) and its regulations became effective September 16, 2002 (NJ Reg, 2002). One county in NJ (Ocean) had a private well test program in place prior to passage of the statewide PWTA. That program was begun in 1987.

Prior to passage of the PWTA, NJ regulations for private well testing applied only to newly constructed wells (New Jersey Administrative Code 7:10-12.30). In addition to various construction requirements (which include setback distance requirements from certain potential pollution sources such as septic tanks), newly-constructed wells must be tested for the same parameters as required in the PWTA, and treatment of the water is required if any of the standards are exceeded.

The PWTA is analogous to a consumer information law, assuring that the purchasers and lessees of properties served by private potable wells are aware of the quality of the drinking water source prior to the sale or lease of a home or business. The law requires buyers or sellers of property in NJ to test the water before the sale and to review the results prior to closing of title. Landlords are required to test and to provide tenants with a written copy of the test results. Sampling and testing are conducted by certified laboratories. The laboratories provide test results to the requesting client on a standardized form. They also report the results electronically to the New Jersey Department of Environmental Protection (NJDEP). The NJDEP utilizes the data to ascertain ground water quality throughout the state and to provide this information to counties, municipalities or other government entities.

Although some municipalities and counties in other states have, or have proposed, similar private well testing programs, the authors are unaware of any other state having a statewide private well testing program.

This article describes the NJ PWTA to provide information to other states considering implementing a private well testing program, and to provide background to a companion article which analyzed the results of the first four and a half years of PWTA data (Louis et al, 2009).

In the Louis et al (2009) article, the NJDEP analyzed well test data from over 55,700 samples from over 50,000 private wells that were reported to the NJDEP from the September 2002 inception of the PWTA through April,

2007. The cumulative cost of acquiring that data, as reflected in the expenses incurred by sellers (or buyers) and lessors, the NJDEP, and the county and municipal health authorities, is approximately \$40 million (see below).

Because NJ has coastal plain and bedrock (sedimentary, igneous, and metamorphic rock) geologies, water quality information obtained from the PWTA data base should be useful to many other states and countries. The data is unbiased with respect to time and biased with respect to space only to the extent that areas with wells tend to be located in rural and lower-density suburban parts of the state. In addition, there are few or no wells located in coastal communities, parks, forestry areas, wildlife preserves including the preservation areas of the Pinelands National Reserve (<https://nj.gov/pinelands/home/maps/maps/documents/archD.pdf>), and federal and state open spaces.

Applicability

Participants in the sale of a property containing a private well or wells are regulated by the PWTA. Also regulated by the PWTA are participants in the sale of a property containing a public water system that has less than 15 service connections to year-round residents or that does not regularly serve an average of at least 25 individuals daily at least 60 days out of the year. The cost of testing can be borne by the buyer, the seller, or both (the PWTA is silent on this issue). Closing of title shall not occur unless both the buyer and seller certify in writing that they have received and reviewed the test results.

The lessor of a property containing a well or wells for which testing is not already required under any other state law (e.g., public water systems) is also regulated by the PWTA. The lessor must have conducted an initial test by March 16, 2004 and must also test at least once every 5 years thereafter. Within 30 days following receipt of the results from the test laboratory, the lessor must provide a written copy to each rental unit on the property. The lessor must also provide a written copy of the latest test results to a new lessee of a rental unit on the property.

Sample collection and testing entities

Sample collection and analysis are conducted by laboratories certified by the NJDEP's Office of Quality Assurance. The names and locations of PWTA laboratories certified to collect samples and to conduct testing under the provisions of the PWTA are provided on the NJDEP website (www.nj.gov/dep/oqa).

Sample collection

Samplers follow standardized sample collection protocols. Untreated water is collected. If there is any type of treatment device in place, such as a water softener or purifier, the water is collected from a tap prior to treatment. If treatment does exist, the type of device(s) is

recorded on the test report form. Sampling must be from a cold, non-aerated spigot or tap. For lead analysis samples (see below), it is specified that the system must be flushed for two or more minutes prior to sample collection. The measurement of pH at the time of sample collection must be performed by a certified analyst.

Property location information is collected during sampling. This information includes property (well) address, mailing address (if different), county, property block and lot numbers, and global positioning system (GPS) coordinates (Geographic Information System projection: GRS80, NAD83, State Plane, NJ FIPS 2900, Feet) of either the wellhead or the residence front door (or a location as close as possible to either). Well-specific information, such as the NJDEP well record or permit number can also be collected, but to date, this information has only been collected (or available) for about 5% of the tested wells. Initially, information on the well construction contractor and installation date, if known, was also gathered but collecting this information has been discontinued since so little data was available. Information on well depth is usually not available and was not collected.

Sample testing

Test laboratories use standardized test protocols for each test parameter that have been approved for PWTA testing by the Office of Quality Assurance. These methods have been established and certified by either the US Environmental Protection Agency and/or by the NJDEP.

Within 5 days of obtaining the test results, the data are conveyed to the requesting client on standardized forms that include, in addition to the location information noted above, the sample collector name and company, the sample collection point (e.g., kitchen or bathroom tap), the date and time of sample collection, the test laboratory name and address, the date and time of sample analysis, the test results, the methods used, and the recommended limit for each parameter (see below). The results are also submitted electronically to the NJDEP within that time period. For privacy reasons, the test laboratory is prohibited from providing test results to any entity other than the buyer and seller or lessor (or any person authorized by these persons), the NJDEP, the health authority having jurisdiction, or any person designated by court order.

The length of time a test result is valid is one year starting from the sampling date, except for coliform bacteria test results which are valid for 6 months. If a property is sold again within those time frames, additional PWTA testing is not required.

Test parameters

The list of parameters for which testing is required is shown in Tables 1 and 2. The parameters were selected as part of the PWTA based on known or potential broad-

based contamination concerns in NJ. The primary parameters selected are those that may have adverse health effects if they occur in the water at concentrations above the recommended limit. Some of the primary parameters occur as a result of human activities (e.g., volatile organic chemicals), while others may have man-made and/or natural sources. The secondary parameters selected are naturally-occurring parameters, and values in excess of their recommended limit or range can cause one or more of the following types of problems: objectionable taste and odors, discoloration of skin or teeth, staining of plumbing fixtures or clothes during washing, or corrosion or scaling of plumbing and fixtures. The recommended limit for each parameter is either a federal or NJ Maximum Contaminant level (MCL) or other limit. An MCL is the maximum permissible concentration of a contaminant in publicly-supplied drinking waters.

In addition to measuring the pH of the water at the time of sampling, the PWTA requires that the all wells throughout the state be tested for the presence of total coliform (TC) bacteria, as well as the concentrations of nitrates, lead, 26 volatile organic chemicals (VOCs), iron, and manganese (Tables 1 and 2). Based on existing information, and in consultation with the NJ Drinking Water Quality Institute (NJDWQI), NJDEP may limit testing of some parameters to a specific geographic area. The NJDWQI is a 15-member advisory board that recommends water quality standards and offers expertise on drinking water issues to the NJDEP Commissioner. The NJDEP limited the test requirement for total (gross) alpha particle radioactivity, mercury and arsenic to certain areas of the state (see below and Table 1).

There is no federal MCL for total coliform (TC) bacteria in source water *per se*. When the provisions of the federal Ground Water Rule (Fed Reg, 2006) go into effect on December 1, 2009, NJ public water systems not already providing full treatment must test their source water for *E. coli* if TC bacteria are detected in their delivered water as per requirements of the federal Total Coliform Rule (Fed Reg, 1989). If *E. coli* is detected, repeat sampling and other corrective actions will be required. For the PWTA, if TC bacteria are detected in the untreated source water, that sample is further tested for the presence of either fecal coliform (FC) or *E. coli* bacteria. The choice of which parameter to measure is up to each laboratory. The presence of either FC or *E. coli* bacteria is considered an exceedence of the recommended limit while the presence of TC bacteria only, in the absence of FC or *E. coli* bacteria, is not considered an exceedence.

There is no federal or NJ MCL for lead, as lead in public water supplies is regulated as an Action Level. Therefore the PWTA uses the NJDEP Ground Water Quality Standard for lead as the PWTA limit. The ground water quality standard was 10 micrograms per liter ($\mu\text{g/L}$) until November 7, 2005 when it was lowered to 5 $\mu\text{g/L}$.

Wells in all nine NJ counties located in the Southern Coastal Plain are required to test for mercury.

Table 1. NJ Private Well Testing Act Test Parameters		
Parameter	Recommended Limit (a)	RL Origin (b)
Primary		
<i>Bacteriological</i>		
Total Coliform (c)	0 /100 ml (FC or <i>E. coli</i>)	S-RL
<i>Organic chemicals</i>		
26 volatile organic chemicals	see Table 2	F&S-MCL
<i>Inorganic chemicals</i>		
Nitrate/nitrite (as nitrogen)	10 mg/L	F-MCL
Lead	10 $\mu\text{g/L}$ (to 11/6/05); 5 $\mu\text{g/L}$ (after 11/6/05)	S-GWQS
Arsenic (d)	10 $\mu\text{g/L}$ (to 1/22/06); 5 $\mu\text{g/L}$ (after 1/22/06)	S-MCL
Mercury (e)	2 $\mu\text{g/L}$	F-MCL
<i>Radiological</i>		
48-h gross alpha particle radioactivity (f)	15 pCi/L	S-MCL
Secondary		
pH	6.5 - 8.5	F-OP
Iron	0.3 mg/L	F-RL
Manganese	0.05 mg/L	F-RL
(a) Units: ml = milliliter; $\mu\text{g/L}$ = microgram per liter (part per billion); mg/L = milligram per liter (part per million); pCi/L = picoCurie per liter.		
(b) The NJDEP adopted a federal (F) standard or derived its own state (S) standard. RL = recommended limit; MCL = Maximum Contaminant Level; GWQS = Ground Water Quality Standard; OP = optimum range.		
(c) If Total coliform test positive, sample tested for either fecal coliform (FC) or <i>E. coli</i> . The RL is exceeded if FC or <i>E. coli</i> are detected.		
(d) Testing required in 12 northern and central counties only.		
(e) Testing required in 9 southern counties only.		
(f) Testing required in 12 southern and central counties only. 24-h test: if > 5 pCi/L, tested again at 48-h. If > 15 pCi/L, MCL exceedence.		

As of March 17, 2008, wells in all twelve of NJ's bedrock counties in the northern and central part of the state were required to test for arsenic. Prior to that date wells in Sussex and Warren counties were not tested for arsenic (NJ Reg, 2008). On January 22, 2002, the federal MCL for arsenic for public water systems was lowered from 50 $\mu\text{g/L}$ to 10 $\mu\text{g/L}$, but systems had until January 23, 2006 to comply with the new standard. When the PWTA went into effect, the PWTA arsenic limit was established at the future federal MCL of 10 $\mu\text{g/L}$. On January 23, 2006, a new NJ arsenic MCL of 5 $\mu\text{g/L}$ became effective and the PWTA recommended limit is now based on the new MCL.

Due to laboratory capacity concerns, testing for alpha particle radioactivity was phased in on a county-by-county basis over an 18-month period. At present, Hunterdon, Mercer and Middlesex Counties in the Piedmont geological portion of the state and the nine Southern Coastal Plain counties are required to test for radioactivity. The test requires two readings. The first reading is done within 24 hours of sample collection. If the result exceeds 5 picoCuries per liter (pCi/L), a second test is carried out within 48 hours. The NJ MCL is exceeded if the second test result is greater than 15 pCi/L.

Electronic data entry and the NJDEP data base

PWTA data has been required to be submitted electronically to the NJDEP by the reporting laboratory since the implementation of the program. To facilitate the data entry process, the NJDEP initially contracted with EarthSoft, Inc. (Concord, MA) to develop and implement a system to allow electronic delivery and storage of PWTA data. The EarthSoft system, known as "EQulS" (Environmental Quality Information System), was utilized from the inception of the PWTA (September 16, 2002) through April 15, 2007. Due to a number of limitations of the EQulS system, on April 16, 2007, the NJDEP began using systems known as "E2" and "COMPASS" for data delivery and storage, respectively.

The electronic environmental reporting system (E2) is a web-based software product developed by enfoTech & Consulting, Inc. (Lawrenceville, NJ). The system requires the data to pass a number of internally-programmed data quality checks. A few examples of these quality checks include verification that all of the data entry fields have been completed, that the GPS coordinates are located within the proper NJ county and municipality, that the proper method identification number was entered for each analyte, and that the data entry is not a duplicate submission of previously-submitted data. There are other data quality checks as well.

The data storage system is called COMPASS and is a product of CGI Group, Inc. (Fairfax, VA). COMPASS is a data repository that includes data analysis and reporting capabilities with a remote data entry component.

Samples with parameters that exceed a recommended limit.

If either fecal coliform or *E.coli* bacteria are detected or the recommended limit for nitrate is exceeded, the test laboratory must notify the person(s) who requested the test and the public health authority (county, regional, or local) in the jurisdiction of the tested well within 24 hours of obtaining the test result. When a primary or secondary parameter limit is exceeded, the laboratory must notify the NJDEP within 5 days and the NJDEP must immediately notify the appropriate health authority by e-mail.

If treatment is in place at the site of an exceedence (samples are collected prior to treatment), it is recommended but not required that one or more post-treatment samples be collected and analyzed to verify the effectiveness of treatment. The results of any post-treatment sample analysis are not submitted to the NJDEP as part of the PWTA program.

In most cases, private well water is not treated. When an exceedence occurs in these cases, there is no PWTA requirement on the part of the seller or buyer to address the exceedence. The PWTA is a consumer information law and the decision whether or not to address the

Volatile Organic Compound	MCL (µg/l) (a)	MCL Origin (b)
Benzene	1	S
Carbon Tetrachloride	2	S
Chlorobenzene	50	S
1,2-Dichlorobenzene	600	S/F
1,3-Dichlorobenzene	600	S
1,4-Dichlorobenzene	75	F
1,1-Dichloroethane	50	S
1,2-Dichloroethane	2	S
1,1-Dichloroethylene	2	S
cis-1,2-Dichloroethylene	70	S/F
trans-1,2-Dichloroethylene	100	S/F
1,2-Dichloropropane	5	F
Ethylbenzene	700	F
Methyl-tertiary Butyl Ether	70	S
Methylene Chloride	3	S
Naphthalene	300	S
Styrene	100	F
1,1,2,2-Tetrachloroethane	1	S
Tetrachloroethylene	1	S
Toluene	1000	F
1,2,4-Trichlorobenzene	9	S
1,1,1-Trichloroethane	30	S
1,1,2-Trichloroethane	3	S
Trichloroethylene	1	S
Vinyl Chloride	2	F
Xylenes [total]	1000	S

(a) Maximum Contaminant Level. µg/L = micrograms per liter (parts per billion).
 (b) The NJDEP adopted a federal (F) standard or derived its own state (S) standard. S/F = NJ-derived standard, but the same as the federal standard.

exceedence, or how to address the problem, rests with the buyer and seller. However, the health authority in the jurisdiction of the tested well may require installation of appropriate treatment equipment. The health authority may also, at its discretion, notify neighboring homes or businesses within 200 feet of the boundary of the property whose well had an exceedence. For privacy reasons the health authority may not disclose to the neighboring property owners the location of the property whose well had the exceedence. This "neighbor notification process" along with follow-up ground water quality studies by health department and/or NJDEP Site Remediation Program personnel has sometimes identified wider areas of ground water contamination. If the well with an exceedence is a newly-constructed well, treatment is required as per NJDEP regulations.

Information on available treatment options is provided as part of the standardized test result reporting form that laboratories must use to convey results to their clients.

Information on the form includes internet links and telephone numbers for additional treatment option information, links to health effects information on the tested water quality parameters, as well as other useful information.

Public information and education programs

The PWTA requires that the NJDEP establish, in consultation with county, regional or local health departments and health officers, a public information and education program to inform the public and appropriate professionals of: 1) the PWTA itself; 2) the potential adverse health effects of consuming water from a well that does not meet the standards; 3) areas of the state at higher risk for failure due to geologic or other reasons; 4) the importance of regularly testing private well water; and 5) suggested techniques, equipment, strategies, and funding sources available to treat water that has exceeded a standard.

To date, the NJDEP has completed these requirements through: 1) numerous informational seminars to health officers, laboratories, realtors and attorneys; 2) establishment of a toll-free hotline; 3) extensive PWTA information on the NJDEP website (www.nj.gov/dep/pwta) that includes the listing of all sampling and test laboratories certified for the PWTA; 4) detailed information included on the test sample result reporting form; and 5) the development of two periodic publications, the "Health Officer Advisory Bulletin" and the "Laboratory Advisory Bulletin." Ongoing objectives include the development of fact sheets for some of the drinking water contaminants and additional training events to further update target audiences.

The PWTA requires the NJDEP to make publicly available a general compilation of water test results arranged by county, municipality or appropriate geographic area, which does not include specific address or location information. A six-month report of the results of testing of 5,179 wells is available on the NJDEP website. The NJDEP was required to submit a five-year report to the Governor and the state legislature. This report was transmitted to the Governor and Legislature on August 8, 2008 and was made public August, 26, 2008 (NJDEP, 2008; www.nj.gov/dep/pwta/pwta_report_final.pdf).

Costs

The cost in 2008 to have a well tested for the PWTA parameters was estimated to be between \$450 and \$650, with the higher cost for those wells that are required to be tested for all parameters including gross alpha particle radioactivity. Thus, the PWTA database has an average yearly sample analysis dollar value of \$6.8 million (\$30.6 million for the number of samples analyzed in the Louis et al report).

Although not required by the PWTA, additional testing, well remediation or the installation of treatment equipment are possible additional economic impacts of a

sample that exceeds a primary parameter limit. The total cost for these expenses is not known.

The costs for the health authorities to support the PWTA program, including notification, follow-up sampling, public outreach and education, etc., have been estimated by the State and County health departments to be between \$1.5 and \$3 million per year.

In order to provide oversight for the PWTA program (including periodic evaluation and correction of data submissions, and to answer questions and provide follow-up to the health authorities as needed), the NJDEP currently employs two full-time employees at an annual cost of \$240,000.

Funding

A sum of \$1,000,000 was appropriated from the existing NJ "Safe Drinking Water Fund" to pay for the initial costs of implementing the PWTA. This included funds to hire new employees, establish and maintain the electronic data base required for the PWTA, and provide grants to county, regional and local health agencies and designated health officers for PWTA-related activities. Due to state fiscal constraints, there has been no dedicated funding for the PWTA. As stated, the costs for the health authorities to support the PWTA program are between \$1.5 and \$3 million per year. Unfortunately, County Environmental Health Act (CEHA) grants given to counties for certain drinking water-related activities were not increased to account for PWTA-related costs.

The NJ Housing and Mortgage Finance Agency's "Potable Water Loan Fund" offers 10-year, no-interest loans (as a second mortgage) up to \$10,000 to owners of single family residences whose well test fails to meet the primary drinking water standards. The Spill Compensation Fund ("Spill Fund"), administered by the Environmental Claims Administration within the NJDEP's Site Remediation Program, offers help to residents that incur direct or indirect damages resulting from the discharge of human-caused hazardous substances. Specifically, a property owner may file a claim for reimbursement for most of the expenditures required to either install a treatment device or connect to a public water supply, when such expenditures occur as a result of a human-caused hazardous substance contaminating the water supply. A claimant has one year to file the claim starting from the date the contaminant was first discovered. However, as of March 2009, purchasers of property having a known human-caused contaminant in the water supply are no longer eligible for Spill Fund compensation.

Data limitations

The quality of NJDEP's PWTA database is adversely affected to an unknown extent by several factors. There is no agency responsible for verifying that the data from all real estate transactions (sales and leases) subject to the PWTA are reported to the NJDEP. Therefore, some data is likely missing. Some data that were initially

rejected by the E2/COMPASS quality control system were not resubmitted, despite NJDEP efforts to have these data resubmitted. One laboratory failed to submit data over a 3-year period, although this is believed to be an isolated case.

There are errors in the reported data as well. The PWTA relies on the sampling and testing laboratories for proper conduct of sampling, testing, and data accuracy. As previously stated, all laboratories performing PWTA analysis must be certified. That is, they are required to successfully complete periodic performance evaluations. Certification presumably reduces sampling and analysis errors. Nevertheless, there is no ongoing quality control of the data, either following sample collection, during or after testing, or in reporting results to the client or during electronic entry to the NJDEP database. It is not known how many errors exist in the non-location aspects of the data. As one example, it is suspected that, contrary to PWTA regulations, collection of lead samples from unflushed water tanks or spigots is the primary reason why many elevated lead results were reported. NJDEP personnel periodically evaluate the data and, through contact with the submitting laboratories, correct data submissions. This process also reduces the amount of errors.

There is no GPS certification program for samplers who collect GPS coordinate information. As a result, there were numerous GPS errors, especially during the first year of sample collection. For example, many GPS coordinates were not located in the correct municipality let alone the correct property. Because much of the data analysis relied on accurate well location information, the NJDEP spent approximately one man-year (full time equivalent) correcting well location errors, including address, municipality, county, block and lot and GPS coordinate information for wells sampled from PWTA inception (September 2002) through April 5, 2007. This was done using an electronic, subscription-based, tax parcel website, eTaxmaps.com, to correct block and lot as well as address information errors. Once those errors were corrected, the data for each municipality was organized by block and lot to look for GPS errors. GPS errors were corrected using ArcMap® 9.2 software (ESRI Inc., Redlands, CA) and the following data layers: county and municipal boundaries, county tax parcel boundaries (available for 17 of the 21 counties), NJ roads (from Tele Atlas North America, Inc., v 9.1, April, 2007), and 2002 high-resolution infrared orthophotography (1 foot Ground Resolution Distance). For repeat samples of the same well, identical GPS coordinates were offset 1 foot to distinguish these samples on high resolution maps and to enable certain geospatial statistical analyses. A copy of the database with the correct well location information was created in Microsoft Access®. Because of the extensive location errors, the NJDEP subsequently provided GPS training to all PWTA-certified laboratories.

The PWTA requires just one sample and test during a real estate transaction. No confirmatory sampling and testing that might verify the accuracy of the results from the initial sample is required. However, as of April 5,

2007, 9 % of the tested wells have been tested more than once due to multiple real estate transactions and other reasons.

Wells may be contaminated with pathogens or chemicals that were not among the tested parameters. The list of tested parameters was selected based on known or potential broad-based contamination concerns in NJ, but the list is by no means comprehensive in terms of contaminants that have been identified in ground water in NJ or elsewhere. However, the presence of some of the parameters in excess of the standard may be considered as an indicator of the possible presence of other non-tested contaminants. For example, if fecal coliform or *E. coli* are detected, the well is considered to be contaminated with fecal wastes from either humans or animals. Such wastes may include one or more of a variety of potentially pathogenic microorganisms such as *Salmonella*, *Shigella*, enteric viruses, *Giardia* or *Cryptosporidium*. The presence of VOCs may indicate a higher likelihood that some other man-made chemical contaminants may be present.

Information on well depth was not collected in the PWTA database in most cases. This information would have been helpful to more accurately assess the impact of specific geologic formations on ground water quality. Well construction information, specifically permit application information and, in some cases, well drilling record information, is available for many of the wells in NJDEP's other electronic databases (NJEMS and Hiview). These databases include well identification numbers and well depth information, but it was not possible to transfer this information into the PWTA database (over 50,000 wells) on a well-by-well basis.

Having the well drilling record information or at least the permit application information for all wells rather than for just 5 % in the PWTA database would have assisted data analysis in many cases where there were multiple data records for the same address, block and lot. In some of these cases, it was not certain whether a single well was tested more than once, or there was more than one well at that location, with each well tested just once.

The PWTA addresses NJ ground water quality but not quantity concerns. However, statewide water quantity concerns are addressed through other NJDEP Division of Water Supply programs and through implementation of the NJ Statewide Water Supply Master Plan.

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