

**BLOOMING GROVE TOWNSHIP**  
**PIKE COUNTY, PENNSYLVANIA**

**WATER WELL ORDINANCE**  
**ORDINANCE # 55**

AN ORDINANCE PROVIDING FOR THE SUPERVISION AND REGULATION OF WATER WELLS IN BLOOMING GROVE TOWNSHIP; ESTABLISHING RULES AND REGULATIONS GOVERNING CONSTRUCTION AND OPERATION OF WATER SUPPLY WELLS; PROVIDING FOR WELL CERTIFICATION; PROVIDING FOR MANDATORY CONNECTION TO CENTRAL WATER SYSTEMS; AND PROVIDING PENALTIES FOR VIOLATIONS OF THIS ORDINANCE.

BE IT ENACTED AND ORDAINED by the Township of Blooming Grove, Pike County, Pennsylvania, under the authority granted by the Pennsylvania Second Class Township Code, Act of May 1, 1933 (P.L. 103, No. 69), Reenacted and amended July 10, 1947 (P.L. 1481, No 567), as amended; and it is hereby enacted and ordained by the authority of the same as follows:

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## **SECTION 100 -- SHORT TITLE**

This Ordinance shall be known and may be cited as *THE BLOOMING GROVE TOWNSHIP WATER WELL ORDINANCE*.

## **SECTION 200 -- PURPOSE**

The purpose of this ordinance is:

- A. To promote and protect the general health and welfare of the residents of Blooming Grove Township by conserving the supply and preventing the pollution and contamination of groundwater;
- B. To protect the quantity, quality, suitability, and sustainability of water supplies and;
- C. To secure and maintain the minimum required isolation distances between water supplies and sewage disposal systems or other sources of pollution and contamination.

## **SECTION 300 -- APPLICABILITY**

This ordinance shall apply to the construction and/or installation of all water wells to the extent that the same are not regulated by the Pennsylvania Department of Environmental Protection.

## **SECTION 400 – MANDATORY WATER SUPPLY CONNECTIONS**

The intent of this §400 is to limit the number of wells in areas where a central water system is available and can provide an adequate supply; and to maintain the economic viability of the central system. All water users located within the service area of a central water supply system shall be required to make connection to such system and pay applicable tapping and connection fees and service rates to the system owner. The construction of individual wells within the service area of the central system shall not be permitted except by waiver in accord with §900 where the Applicant provides documentation that the central system cannot provide an adequate and safe supply.

## **SECTION 500 – PERMITS**

### **501 - Permit Required**

The installation of a well, casing, or well pit shall require a permit.

### **502 - Application Form; Enforcement Officer**

Application for a well permit shall be made upon a form supplied by the Township and shall be submitted to the duly appointed Enforcement Officer.

### **503 - Application Information; Site Plan**

- A. Application Information - The application shall be completed in full and be signed and dated. The Township shall require any such additional information as deemed necessary to document compliance with the provisions of this Ordinance.
- B. Site Plan - The Applicant shall provide a site plan of the premises drawn to scale showing:
  - 1. The boundary lines of the premises upon which the well is proposed and the name of the adjoining street.
  - 2. The proposed location of the well
  - 3. The location or proposed location of all buildings.

4. The location or proposed location of septic tanks and drain fields.
  5. The names of adjoining property owners.
  6. Such other information as may be required to document compliance with the isolation distance and other requirements of this Ordinance.
- C. Survey - In cases where the well is proposed at or near the minimum isolation distance requirements of this Ordinance, the Township may require a survey made by a Professional Land Surveyor.

## **504 - Fees**

Each application for a well permit shall be accompanied by a fee payable to Blooming Grove Township in accord with a schedule of fees established from time to time by resolution of the Board of Supervisors.

## **505 - Incomplete or Inadequate Information**

When the Enforcement Officer finds an application incomplete, or the enforcement officer is unable to verify the information submitted, the application shall be rejected.

## **506 - Inspection; Permit Issuance, Denial and Revocation**

- A. Site Inspection - Upon receipt of a complete application, the Enforcement Officer shall perform an inspection of the premises on which the well is to be constructed to determine if the location conforms to the standards of this ordinance.
- B. Well and Lot Line Locations - The location of the well and all lot lines shall be clearly marked on the premises by the Applicant.
- C. Action - Upon completion of the inspection, the Enforcement Officer shall either:
  1. Issue a permit to the Applicant indicating the approved location for the well and special instructions for construction, if any; or
  2. Deny the issuance of the permit, and, in such event, provide the Applicant with written reasons for such denial.
- D. Time for Action - Permits shall be issued or denied within thirty (30) days after receiving a completed application for a permit.
- E. Permit Effective Dates - All permits shall be in effect as of the date of issuance and shall remain in effect for a period of three (3) years. If construction has not been completed within the three-year period the permit shall expire, all fees paid shall be forfeited, and a new permit shall be required.
- F. Revocation - A permit shall be revoked by the Enforcement Officer for any one (1) or more of the following reasons, which shall be incorporated into a written revocation:
  1. When any change has occurred in the physical conditions of any lands which will materially affect the operation of the well.
  2. When information material to the issuance of the permit has been falsified.
  3. When the Permittee has violated any of the provisions of this ordinance.

## **507 - Final Inspection: Certificate of Operation**

- A. Inspection - Upon the completion of construction, or at such other time as the Enforcement Officer may deem appropriate, the Enforcement Officer shall perform a final inspection of the well to determine compliance with the permit issued.
- B. Action - Upon completion of the said inspection, the Enforcement Officer shall:
  - 1. Issue a certificate of operation upon the original permit, or
  - 2. Deny such approval due to non-compliance with the permit issued, and, in such event, provide the Applicant with written reasons for such denial.
- C. Information Required - As a condition precedent to the issuance of the certificate of operation, the Applicant shall provide the well completion report as required by this ordinance, including, but not limited to, the number of gallons of water per minute produced by the well, the depth, size and type of casing, and water quality test reports.
- D. Non-Guarantee - The issuance of an operating permit by the Township does not in any way constitute a guarantee to the applicant that the subject well will produce any quantity of water or that the subject well is pure and fit for consumption either at the time of the issuance of the permit or at any time in the future.

## **508 - Appeal**

Upon denial of a permit or certificate of operation, or the revocation of a permit, the Applicant may request in writing a hearing before the Board designated by the Board of Supervisors within fourteen (14) days of the Applicant's receipt of the denial or revocation. The designated Board shall conduct a hearing within sixty (60) days of receipt of such request. Hearings and any subsequent appeal shall be pursuant to the Act of December 2, 1968, P.L. 1133, No. 353, as amended, known as the Local Agency Law.

## **509 - Reporting**

The Applicant shall, upon completion of the well, provide to the Township a copy of the Well Completion Report submitted to the Pennsylvania Department of Conservation and Natural Resources and the results of the testing required in §700.

## SECTION 600 – WATER WELL LOCATION AND CONSTRUCTION

### 601 - Adjoining Lots

When proposing a location for a water well the Applicant shall take into consideration the need to site a water well and/or an on-lot sewage disposal system on neighboring properties. Unless a waiver is granted in accord with §900, no permit shall be issued for any well location which would preclude the development of an adjoining lot with a single-family dwelling. No such waiver shall be granted unless the Board of Supervisors finds that there is no other location possible for the construction of the well.

### 602 - Aquifer Depth

The source of supply for any water well shall be drawn from a water bearing formation not less than forty (40) feet from the ground surface.

### 603 - Isolation Distances

The following isolation distances shall be maintained from all water wells:

POTENTIAL POLLUTION SOURCE	MINIMUM REQUIRED ISOLATION DISTANCE (feet)
Animal enclosures and manure piles	100
Any clear water (roof/basement) drain	10
Building foundations	10
Cemetery or grave site	50
Chemical preparation/storage area	300
Chemicals; above- or below-ground storage	100
Fertilizers preparation/storage area	300
Hazardous spray materials preparation/storage area	300
Lakes, ponds, streams	25
Landfill, existing, proposed, or abandoned	1,000
Property lines	10
Railroad tracks	50
Rainwater pits	25
Road right of way, private	10
Road right of way, public	25
Salt piles	300
Salvage yard	300
Septic tanks	50
Sewage disposal systems, subsurface	100
Sewage seepage pits, privies, cesspools	100
Sewage sludge or septage disposal sites	300
Sewer lines	50
Silos, farm	100
Spray irrigation sites	300
Storm drains	25
Storm water retention/stabilization basins	25
Water well, properly decommissioned	10
Water well, existing	25

## 604 - Construction Standards

The construction of all water wells in the Township shall conform to the following standards and such compliance shall be certified by the well driller in the well completion report. In cases where state or federal regulations are more stringent, such standards shall apply.

- A. Construction by Licensed Driller - All water wells in the Township shall be constructed in accordance with PA Act 610 (Water Well Drillers License Act) by a well driller licensed by the Commonwealth of Pennsylvania..
- B. Disinfection Criteria - The well owner shall disinfect a water well in accord with *Attachment A* prior to testing and prior to use. A statement that the well has been disinfected shall be submitted to the Township along with the Water Well Completion Report.
- C. Sanitary Seal - A sanitary seal (well seal) shall be provided on the top of the water well casing.
- D. Casing
  1. Casing Stickup
    - a. Permanent casing for all water wells shall project at least twelve (12) inches above a pump house floor or concrete apron, and at least twelve (12) inches above the final ground surface.
    - b. Where a well house is constructed, the floor surface shall be at least six (6) inches above the final ground surface.
  2. Casing Length
    - a. All water wells shall be constructed in such a manner to be watertight to such depths as may be necessary to exclude pollution from surface runoff and from polluted aquifers above the aquifer serving as the source of supply.
    - b. The minimum protective casing depth shall be forty (40) feet or fifteen (15) feet into bedrock, whichever is greater.
  3. Casing Material
    - a. Protective casing of wrought iron or steel shall have minimum weights and thickness as specified in AWWA's most recent Standard for Deep Wells. Well casing material other than wrought iron or steel must be resistant to the corrosiveness of the water and to the stresses to which it will be subjected during installation, grouting and operation. Casing and grouting materials must be compatible.
    - b. In general, the criteria established in AWWA Standard A-1 00-90 should be followed.
    - c. Ferrous casings shall:
      - 1) be new pipe meeting ASTM or API specifications for water well construction.
      - 2) have additional thickness and weight if minimum thickness is not considered sufficient to ensure reasonable life expectancy of the well.
      - 3) be capable of withstanding forces to which it is subjected.
      - 4) be equipped with a drive shoe when driven.
      - 5) have full circumferential welds or threaded pipe joints.
    - d. Nonferrous casing shall meet appropriate ANSI/ASTM or NSF standards for well casing applications as outlined in AWWA Standard A-100-90. Nonferrous casing

materials shall not impart taste, odor or toxic substances to the well water. Nonferrous casing, if used, shall not be driven. The casing shall be placed a minimum of five (5) feet into the consolidated formation with a minimum annular opening of three (3) inches larger than the outside diameter of the casing so that grout can be placed in accordance with §604,E.

E. Grout Requirements - A statement that the well has been grouted in accord with this Section shall be submitted to the Township along with the Well Completion Report. All permanent water well casings shall be surrounded by a minimum of one and one-half (1.5) inches of grout to a minimum depth of at least five (5) feet below grade to effectively prevent contamination from ground surface sources. Grouting materials shall comply with the standards established by the American Water Works Association in the most current *AWWA Standard for Water Wells* or as otherwise approved by the Township.

F. Well Pits

1. Where well pits are used, such pits shall be designed to remain free of water at all times. The floor of the pit shall be a watertight reinforced concrete platform at least four (4) inches thick poured around the casing and shall be provided with a watertight seal. The floor of the pit shall extend at least two (2) feet from the center of the casing in all directions. In all cases, the pit shall be sized to allow adequate working space.
2. The pit shall have watertight reinforced concrete walls four (4) inches thick or equivalent which provide for an effective watertight seal against the floor. The top of the pit shall be a watertight reinforced monolithic concrete slab at least four (4) inches thick (or an approved equivalent) which shall be sealed with the wall to effectively prevent the entrance of water. The top of the pit shall not be more than six (6) inches below the ground surface. A durable watertight manhole shall be installed in the top of the pit centered over the casing and effectively sealed with the top to prevent the entrance of water, or an approved equivalent.
3. Pit installations shall not be used in areas subject to flooding by ground or surface water or where the ground water level rises to within one (1) foot of the bottom of the proposed pit.
4. Where pipes enter the pit, the annular opening between the pipes and the wall shall be effectively sealed by a watertight permanent seal.
5. The design of the well and well pit system shall make provision for:
  - a. Access to disinfect the well
  - b. A properly constructed casing vent.
  - c. Facilities to measure water levels in the well.
  - d. A cover at the upper terminal of the well that will prevent the entrance of contamination.
  - e. A contamination-proof entrance connection for electrical cable.
  - f. An inside diameter as great as that of the well casing, up to and including casing diameters of twelve (12) inches, to facilitate work and repair on the well, pump, or well screen.
  - g. At least one (1) check valve within the well casing.

G. Pitless Well Installations

1. Pitless units shall:
  - a. be shop-fabricated from the point of connection with the well casing to the unit cap or cover.

- b. be threaded or welded to the well casing.
  - c. be of watertight construction throughout.
  - d. be of materials and weight at least equivalent and compatible to the casing.
  - e. have field connection to the lateral discharge from the pitless unit of threaded, flanged or mechanical joint connection.
  - f. have the well casing terminate at least twelve (12) inches above final ground elevation.
2. The design of the pitless unit shall make provision for:
- a. Access to disinfect the well.
  - b. A properly constructed casing vent.
  - c. Facilities to measure water levels in the well.
  - d. A cover at the upper terminal of the well that will prevent the entrance of contamination.
  - e. A contamination-proof entrance connection for electrical cable.
  - f. An inside diameter as great as that of the well casing, up to and including casing diameters of twelve (12) inches, to facilitate work and repair on the well, pump, or well screen.
  - g. At least one (1) check valve within the well casing.

## **SECTION 700 – YIELD AND QUALITY**

- A. Certification - Certification as to capacity and quality by a licensed well driller shall be required prior to issuance of a certificate of operation of any water well in accord with §507.
- B. Yield Test - The well yield shall be determined by a pumping test of not less than one (1) four (4) hour duration conducted at a rate of not less than one hundred fifty (150) percent of the intended long-term withdrawal from the well. The 1-hour test shall be conducted at a constant pumping rate that should not deviate greater than five (5) percent, plus or minus, during the test.
- C. Report - Upon completion of the well the Applicant shall provide the Township with a copy of the report submitted to the Pennsylvania Department of Environmental Protection and sufficient data and documentation to verify compliance with this §700.

## **SECTION 800 – ABANDONED WATER WELLS**

- A. Filling and Sealing - An abandoned well shall be filled and sealed in accord with *Attachment B*.
- B. Act 160 - Well owners shall comply with the well abandonment requirements of the regulations implementing PA Act 160.



## **SECTION 900 – WAIVERS/MODIFICATIONS**

### **901 - Intent**

The provisions of this Ordinance are intended as a minimum standard for the protection of the public health, safety, and welfare. If the literal compliance with any mandatory provision of these regulations is shown by the Applicant, to the satisfaction of the Board of Supervisors, to be unreasonable or to cause undue hardship as it applies to a particular property, or if the Applicant shows that an alternative proposal will allow for equal or better results, the Township may grant a waiver/modification from such mandatory provision, so that substantial justice may be done and the public interest secured while permitting the reasonable utilization of the property. However, the granting of a waiver/modification shall not have the effect of making null and void the intent and purpose of this Ordinance.

### **902 - Conditions**

In granting waivers/modifications the Board of Supervisors may impose such conditions as will, in its judgement, secure substantially the objectives of the standards and requirements of this Ordinance.

### **903 - Procedure**

All requests for waivers/modifications shall be in writing, shall accompany and be a part of the development application, and shall include:

- A. The specific sections of this Ordinance in question.
- B. Provisions for the minimum waiver/modification necessary as an alternate to the requirements.
- C. Justification for the waiver/modification including the full grounds and facts of unreasonableness or hardship.

### **904 - Action**

If the Board of Supervisors denies the request, the applicant shall be notified, in writing, of the reasons for denial. If the Board of Supervisors grants the request, the water well permit shall include a note which identifies the waiver/modification as granted.

## SECTION 1000 – DEFINITIONS

For purposes of this Ordinance, the following terms, phrases, words, and their derivations shall have the meaning given herein unless the context clearly indicates otherwise:

**ANSI**: American National Standards Institute.

**Aquifer**: A geological formation that contains and transmits water.

**Annular Opening**: The space between two (2) cylindrical objects, one of which surrounds the other, such as the space between a borehole and a casing pipe.

**API**: American Petroleum Institute.

**ASTM**: American Society for Testing and Materials.

**AWWA**: American Water Works Association.

**Board of Supervisors**: The Board of Supervisors of Blooming Grove Township, Pike County, Pennsylvania.

**Casing**: An impervious durable pipe placed in a well to prevent the walls from caving and to seal off surface drainage or undesirable water, gas or other fluids and prevent their entering the well.

**Central Water Supply**: Any water supply system serving fifteen (15) or more connections which is operated by a community association or homeowners association or which is operated by any entity regulated by the Pennsylvania Public Utility Commission.

**Grout**: A permanent water tight joint or connection made by filling with concrete, neat cement, or other approved impervious material between the casing and the undisturbed formation surrounding the well or between two (2) strings of casing.

**NSF**: National Sanitation Foundation.

**Pitless Adaptor**: A device or assembly of parts which will permit water to pass through the wall of the well casing or extension thereof, and which provides access to the well and to the parts of the water system within the well in a manner to prevent entrance of pollution into the well and the water produced.

Township: Blooming Grove Township, Pike County, Pennsylvania.

**Water Well**: Any excavation that is drilled, cored, bored, washed, driven, dug, jetted, or otherwise constructed when the intended use of such excavation is for the location, acquisition or artificial recharge of groundwater. This includes but is not limited to test wells, test borings, and monitoring wells, in addition to wells to be utilized as private, shared, agricultural, or irrigation water supplies.

**Well Seal**: An approved device or method used to protect a well casing or water system from the entrance of any external pollutant at the point of entrance into the casing of a pipe, electric conduit or water level measuring device.

**SECTION 1100 – PENALTIES FOR VIOLATIONS**

Failure to comply with any provision of this Ordinance, and/or failure to comply with an order to abate a nuisance, shall be violations of this Ordinance. Any person who has violated or permitted the violation of any of the provisions of this Ordinance shall, upon being found liable therefore in a civil enforcement proceeding, pay a fine as prescribed by the Magisterial District Judge plus all court costs, including reasonable attorney fees, incurred by the Blooming Grove Township as a result thereof. Each day that a violation continues shall constitute a separate violation. All fines, costs and reasonable attorney fees collected for the violation of this Ordinance shall be paid over to Blooming Grove Township. If the defendant neither pays nor timely appeals the judgement, the Blooming Grove Township may enforce the judgement pursuant to the rules of civil procedure.

**SECTION 1200 – SEVERABILITY**

Should any section, subsection, clause, provision or other portion of this Ordinance be declared invalid by any court of competent jurisdiction, such decision shall not affect the validity of the remainder of this Ordinance; the Board of Supervisors having adopted this Ordinance as if such invalid portions had not been included therein.

**SECTION 1300 – EFFECTIVE DATE**

This Ordinance shall become effective five (5) days after the adoption thereof.

**SECTION 1400 – ADOPTION**

ENACTED AND ORDAINED into law by the Board of Supervisors of Blooming Grove Township, Pike County, Pennsylvania, this \_\_\_\_ day of \_\_\_\_\_ of 2006.

\_\_\_\_\_  
Fred Hatton, Chairman

\_\_\_\_\_  
Vincent J. Accordino, Vice-Chairman

\_\_\_\_\_  
Randy Schmalzle, Supervisor

ATTEST:

\_\_\_\_\_  
Jo-Anna M. Donahue, Secretary

## ATTACHMENT A

# DEP Fact Sheet

## Commonwealth of Pennsylvania • Department of Environmental Protection DISINFECTION OF HOME WELLS AND SPRINGS

Editor's Note: The disinfection procedure described below is only a temporary measure for use by homeowners to treat for bacteriological contamination (not including the organisms that cause giardiasis or cryptosporidiosis) and may *not* be used by public water suppliers. It should not be considered a permanent correction for a home groundwater source that is continuously exposed to microbiological contamination due to improper location and/or construction.

Disinfection of a home groundwater source should be performed under any of the following conditions:

- After completing construction of a new well or spring supply
- When repair or reconstruction of a well or spring, pumps or attached piping is completed
- If the well or spring has been temporarily flooded or subjected to another temporary source of bacteriological contamination
- Upon receipt of a laboratory report indicating an unsatisfactory bacteriological analysis of the well or spring supply

### MATERIALS NEEDED

You will need a two-gallon or larger bucket, a length of garden hose long enough to reach as far as possible into the home water source, a funnel that fits into the end of the garden hose, and a suitable quantity of a liquid or granular chlorinating compound.

Chlorinating compounds are sold at grocery, hardware, plumbing, and swimming pool supply stores under various trade names. You should look for one of the following:

#### 1. Liquid Forms

- Unscented laundry bleach containing five to six percent sodium hypochlorite
- Sodium hypochlorite solution containing five to 14 percent sodium hypochlorite

**NOTE:** Do not use a laundry bleach containing scent additives. These additives should not be consumed. Since liquid laundry bleach weakens

with time, obtain a fresh supply rather than using old laundry bleach you may have at home.

#### 2. Granular Forms

- Swimming pool granules containing 65 to 70 percent calcium hypochlorite
- Calcium hypochlorite granules (65 to 70 percent)

**NOTE:** Do not use stabilized chlorine products that are meant for swimming pools or non-chlorinated "pool shock" products. These products are not intended for disinfecting wells or springs. There are fast dissolving pellets containing chlorine that are specifically made for disinfecting wells. This should not be confused with the larger stabilized chlorine pellets (one to three inches in diameter) that should not be used. Please check the product label.



**Chlorinating products must be handled in accordance with the manufacturer's directions. Failure to follow instructions could cause bodily injury. Wearing eye and body protection during the procedure is strongly recommended. Do not drink well water containing high levels of chlorine. The water should be tested for bacteria after the disinfection procedure has been completed. Until tested and found potable, bring the water to a rolling boil for at least one minute before consuming or using for food preparation.**

### PROCEDURE

1. First, remove any cover over the well casing or spring vault to allow access to the water source.
  2. Then, add the appropriate amount of chlorinating compound (see below) to three or four buckets of water (6 to 10 gallons total) and mix thoroughly.
- For liquid chlorinating products with 5 to 6 percent available chlorinating chemical, use about 1½ quarts of the chlorinating product.

- For liquid chlorinating products with more available chlorinating chemical, reduce the amount used. For example, for products with 10 percent, use about  $\frac{3}{4}$  quart or for products with 14 percent, use about  $\frac{1}{2}$  quart of the chlorinating chemical.
  - For granular chlorinating chemicals with 65 to 70 percent available chlorinating chemical, use about 4 ounces (10 tablespoons) of the chlorinating product. The process of mixing the appropriate amount of chlorinating product with six to ten gallons of water is important for the following reasons:
    - It helps to mix the disinfectant evenly through the water in the well and force the disinfectant into the surrounding waterbearing rocks.
    - It prevents the concentrated chlorinating chemical from corroding the metal pump and other metal parts of the well.
3. These amounts of chlorinating products will disinfect about 150 gallons of water to 100 – 150 parts per million (ppm). That corresponds to 100 feet of water in a 6-inch diameter well, a spring vault with inside dimensions of 5 feet long by 5 feet wide and a water depth of 1 foot, or a dug well with an inside diameter of 5 feet and a water depth of 1 foot. If your well or spring holds more or less water, the amount of chlorinating product should be increased or decreased proportionately.
  4. Place one end of the garden hose into the well or spring (remove the pump, if necessary) so that the hose is as far into the well or spring as possible.
  5. Place the funnel into the other end of the hose and, with help, pour the contents of each bucketful of diluted chlorinating product through the hose while alternately raising and lowering the hose to disperse the disinfectant throughout the water supply.
  6. When the appropriate amount of disinfectant has been added to the water supply, do the following:
    - If the water source has no pump, close the cover over it.

- If the water source has a pump or is piped to a house or other outlets, draw the chlorinated water through all the fixtures and outlets until the smell of chlorine is noticed, so that all of the piping and fixtures are disinfected. After the odor is noticed, turn off the water at the fixture or valve outlet.
  - In some cases involving wells, running the water from fixtures may not produce a chlorine odor quickly. In those cases, it may be necessary to run the water from an outside faucet through a garden hose and back into the well to further mix the chlorinating chemical into the well water.
7. The chlorinating solution should remain in the entire water supply system for at least four hours and preferably overnight. The water should be pumped out after that period until no odor of chlorine remains at the fixtures and outlets. Please avoid discharging water containing detectable amounts of chlorine into storm drains, waterways, ponds, creeks, etc. Fish and aquatic animals are very sensitive to very low levels of chlorine and can be killed.
  8. Once the water source is chlorine-free, wait an additional 2-5 days and then resample for bacteria. If total coliform organisms are present, the water should not be consumed unless it is brought to a rolling boil for at least one minute. If total coliform organisms are not found, the water is considered bacteriologically potable. However, the well or spring should be sampled for bacteria at least annually.
  9. If the well or spring continues to be contaminated after disinfection and sampling or is found to be contaminated as the result of a future sample, the construction or location of the water supply should be re-evaluated. For more information, visit DEP's website at [www.dep.state.pa.us](http://www.dep.state.pa.us), Keyword: "DEP Drinking Water."

*Commonwealth of Pennsylvania Department of Environmental Protection*

*Edward G. Rendell, Governor Kathleen A. McGinty, Secretary*

*An Equal Opportunity Employer 3800-FS-DEP0131 Rev. 7/2005*

## ***ATTACHMENT B***

# **WATER-WELL ABANDONMENT GUIDELINES**

**Previously published as Chapter 7 in the DEP publication  
*Ground Water Monitoring Guidance Manual***

## **INTRODUCTION**

Unsealed or improperly sealed wells may threaten public health and safety, and the quality of the groundwater resources. Therefore, the proper abandonment (decommissioning) of a well is a critical final step in its service life.

Act 610, the Water Well Drillers License Act, includes a provision for abandonment of wells. This legislation makes it the responsibility of a well owner to properly seal an abandoned well according to the rules and regulations of the department. In the absence of more stringent regulatory standards, the procedures outlined in this section represent minimum guidelines for proper abandonment of wells and borings. These procedures may be applicable for, but not limited to, public and domestic water supply wells, monitoring wells, borings or drive points drilled to collect subsurface information, test borings for groundwater exploration, and dry wells (drains or borings to the subsurface).

Proper well abandonment accomplishes the following: 1) eliminates the physical hazard of the well (the hole in the ground), 2) eliminates a pathway for migration of contamination, and 3) prevents hydrologic changes in the aquifer system, such as the changes in hydraulic head and the mixing of water between aquifers. The proper decommissioning method will depend on both the reason for abandonment and the condition and construction details of the boring or well.

## **WELL CHARACTERIZATION**

Effective abandonment depends on knowledge of the well construction, geology, and the hydrogeology. The importance of a full characterization increases as the complexity of the well construction, site geology, and the risk of aquifer contamination increases. Construction information for wells drilled since 1966 may be available from the Bureau of Topographic and Geologic Survey's (BTGS) Water Well Inventory System database. Additional well construction data and information describing the hydrologic characteristics of geologic formations may be available from reports published by BTGS and the United States Geological Survey (USGS). Site or program records also may exist. The well should be positively identified before initiating the abandonment. Field information should be compared with any existing information.

Water levels and well depths can be measured with a well sounder or weighted tape measure. In critical situations, well construction details and hydrogeology can be determined with borehole geophysics or a downhole camera. For example, a caliper log, which is used to determine the borehole diameter, can be very helpful in locating cavernous areas in open hole wells.

# WELL PREPARATION

If possible, the borehole must be cleared of obstructions prior to abandonment. Obstructions such as pumps, pipes, wiring, and air lines must be pulled. Well preparation also may involve fishing obstacles out of the borehole. An attempt should be made to pull the casing when it will not jeopardize the integrity of the borehole. Before the casing is pulled, the well should be grouted to near the bottom of the casing. This will at least provide some seal if the well collapses after the casing is pulled.

The presence of nested or telescoped casing strings complicates well abandonment. Inner strings should be removed when possible, but only when removal will not jeopardize the abandonment of the well. If inner strings cannot be removed and sealing of the annular space is required, then the inner string should be vertically split (plastic cased wells) or cut (metal-cased wells) at intervals necessary to insure complete filling of the annular space.

Damaged, poorly constructed or dilapidated wells may need to be redrilled in order to apply proper abandonment techniques. Also, in situations where intermixing of aquifers is likely, the borehole may need to be redrilled.

## MATERIALS AND METHODS

### Aggregate

Materials that eliminate the physical hazard and open space of the borehole, but do not prevent the flow of water through the well bore, are categorized as aggregate. Aggregates consist of sand, crushed stone or similar material that is used to fill the well. Aggregates should be uncontaminated and of consistent size to minimize bridging during placement.

Aggregate is usually not placed in wells smaller than two inches in diameter. Nominal size of the aggregate should be no more than 1/4 of the minimum well diameter through which it must pass during placement. Because aggregate is usually poured from the top of the well, care must be taken to prevent bridging by slowly pouring the aggregate and monitoring the progress with frequent depth measurements.

Aggregates may be used in the following circumstances: 1) there is no need to penetrate or seal fractures, joints or other openings in the interval to be filled, 2) a watertight seal is not required in the interval to be filled, 3) the hole is caving, 4) the interval does not penetrate a perched or confined aquifer, and 5) the interval does not penetrate more than one aquifer. If aggregate is used, a casing seal should be installed (see Section 7.5.1). The use of aggregate and a casing seal must be consistent with the future land use.

### Sealants

Sealants are used in well abandonment to provide a watertight barrier to the migration of water in the well bore, in the annular spaces or in fractures and openings adjacent to the well bore. Sealants usually consist of portland cement based grouts, "bentonite" clay, or combinations of these substances. Additives are frequently used to enhance or delay specific properties such as viscosity, setting time, shrinkage, or strength.

Sealing mixtures should be formulated to minimize shrinkage and ensure compatibility with the chemistry of the groundwater in the well.

A grout pump and tremie pipe are preferred for delivering grout to the bottom of the well. This method insures the positive displacement of the water in the well, and will minimize dilution or separation of the grout.

If aggregate is to be placed above sealant, a sufficient amount of curing time should pass before placing the aggregate above the seal. Curing time for grout using Type 1 cement is typically 24 - 48 hours, and 12 hours for Type III cement.

General types of sealants are defined as follows:

**Neat cement grout:** Neat cement grout is generally formulated using a ratio of one 94 lb. bag of portland cement to no more than 6 gallons of water. This grout is superior for sealing small openings, for penetrating any annular space outside of the casings, and for filling voids in the surrounding rocks. When applied under pressure, neat cement grout is strongly favored for sealing artesian wells or those penetrating more than one aquifer. Neat cement grout is generally preferred to concrete grout because it avoids the problem of separation of the aggregate and the cement. Neat cement grout can be susceptible to shrinkage and the heat of hydration can possibly damage some plastic casing materials.

**Concrete grout:** Concrete grout consists of a ratio of not more than six gallons of water, one 94-lb. bag of Portland cement, and an equal volume of sand. This grout is generally used for filling the upper part of the well above the water bearing zone, for plugging short sections of casings, or for filling large-diameter wells.

Concrete grout, which makes a stronger seal than neat cement, may not significantly penetrate seams, crevices or interstices. Grout pumps can handle sand without being immediately damaged. Aggregate particles bigger than this may damage the pump. If not properly emplaced, the aggregate is apt to separate from the cement. Concrete grout should generally not be placed below the water level in a well, unless a tremie pipe and a grout pump are used.

**Grout additives:** Some bentonite (2 to 8 percent) can be added to neat cement or concrete grout to decrease the amount of shrinkage. Other additives can be used to alter the curing time or the permeability of the grout. For example, calcium chloride can be used as a curing accelerator.

**High-solids sodium bentonite:** This type of grout is composed of 15-20 percent solids content by weight of sodium bentonite when mixed with water. To determine the percentage content, the weight of bentonite is divided by the weight of the water plus the weight of the bentonite. For example, if 75 lbs. of powdered bentonite and 250 pounds of granular bentonite were mixed in 150 gallons of water (at 8.34 lbs. per gallon), the percentage of high-solids bentonite is approximately 20 percent ( $325/(1251+325)$ ). Highsolids bentonite must be pumped before its viscosity is lowered. Pumping pressures higher than those used for cement grouts are usually necessary. Hydration of the bentonite must be delayed until it has been placed down the well. This can be done by 1) using additives with the dry bentonite or in the water, 2) mixing calcium bentonite (it expands less) with sodium bentonite, or 3) using granular bentonite, which has less surface area.

In addition, positive displacement pumps such as piston, gear, and moyno (progressive cavity) pumps must be used because pumps that shear the grout (such as centrifugal pumps) will accelerate the



congealing of the bentonite. A paddle mixer is typically used to mix the grout. A high-solids bentonite grout is not made from bentonite that is labeled as drilling fluid or gel.

**Chip Bentonite:** Chip (coarse grade) or pelletized bentonite can form adequate seals. This type of bentonite is poured directly down the borehole. The size of the bentonite chips also should be no more than 1/4 of the minimum well diameter through which it must pass during placement. Because of the potential for bridging, this material may not be suitable for deep wells or borings where positive displacement is necessary to seal the well.

When coarse bentonite is placed above the water level, water must be added frequently to hydrate the bentonite. Care must be taken with chip or pelletized bentonite to not overload the interval to be sealed. Rapidly swelling bentonite could result in incomplete hydration and a heterogeneous seal containing lumps of dry bentonite. The level of the bentonite should be checked often to make sure that bridging of the chips does not occur.

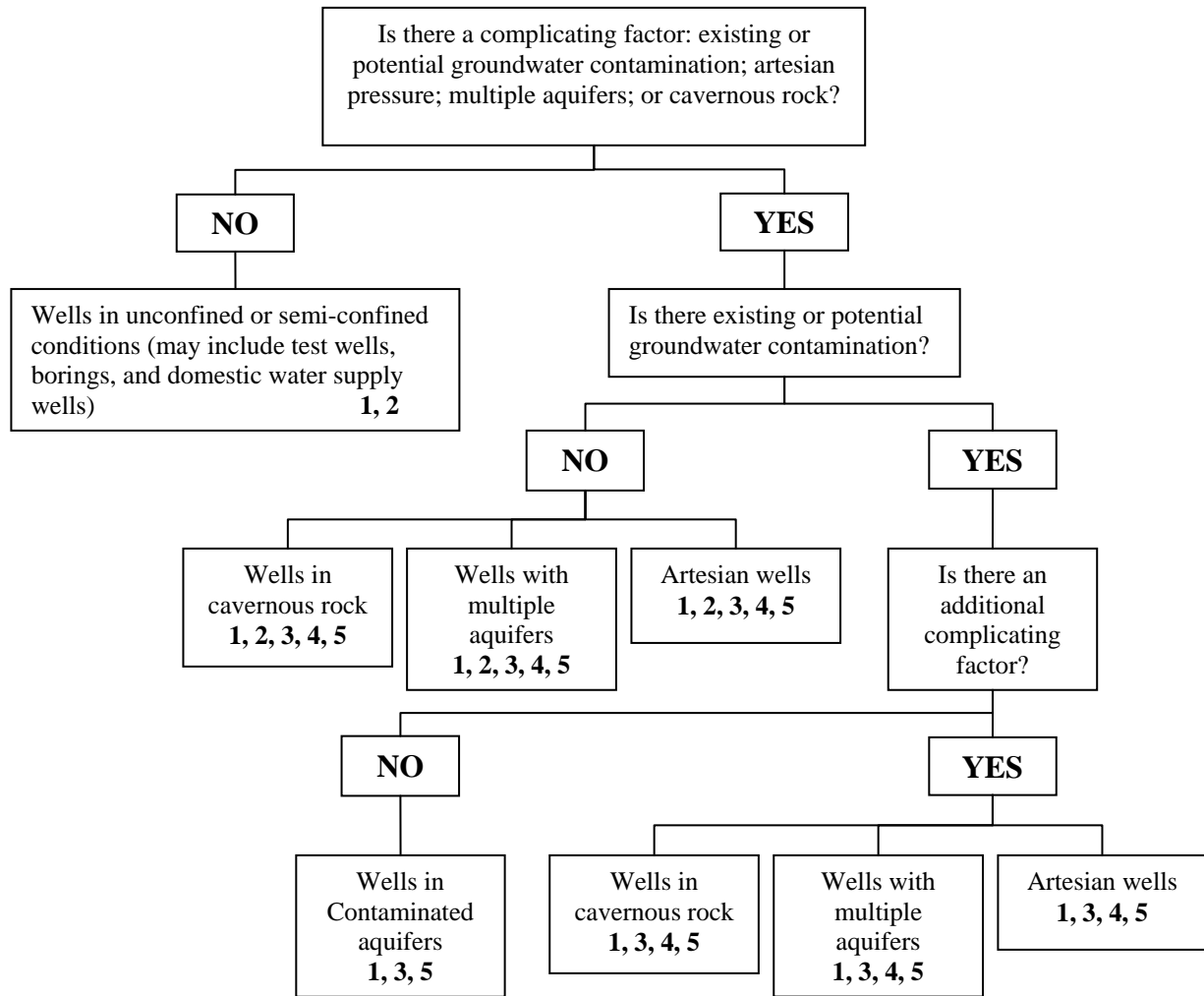
### **Bridge Seals**

A bridge seal can be used to isolate cavernous sections of a well, to isolate two producing zones in the well, or to provide the structural integrity necessary to support overlying materials (and thus protect underlying aggregate or sealants from excessive compressive forces). Bridge seals are usually constructed by installing an expandable plug made of wood, neoprene, or a pneumatic or other mechanical packer. Additional aggregate can be placed above the bridge.

## **RECOMMENDATIONS**

The complexity of the abandonment procedure depends primarily on the hydrogeology, geology, well construction, and the groundwater quality. Four principal complicating factors have been identified; they include 1) artesian conditions, 2) multiple aquifers, 3) cavernous rocks, and 4) the threat or presence of contamination. The recommended procedures for abandoning wells will be more rigorous with the presence of one or more complicating factors. The procedures may vary from a simple casing seal above aggregate to entirely grouting a well using a tremie pipe after existing casing has been ripped or perforated. Figure 10 summarizes the general approach to well abandonment.

**Figure 10 - Summary of procedures for well abandonment.**



- 1. Casing seal
- 2. Aggregate
- 3. Sealant
- 4. Possibly use bridge seal or plug
- 5. Possibly cut existing casing

**Note:** Program requirements must be followed where applicable.

## **Casing Seal**

The transition from well casing to open borehole is the most suspect zone for migration of water. In order to minimize the movement of water (contaminated or otherwise) from the overlying less consolidated materials to the lower waterbearing units, this zone must be sealed. Generally this can be accomplished by filling at least the upper 10 feet of open borehole and the lower five feet of casing with sealant. The length of open borehole sealed should be increased if extenuating circumstances exist. Such circumstances would include a history of bacterial contamination, saprolitic bedrock, or possibly deep fracture zones. Waterbearing zones reported in the upper 20 feet or so of open borehole are indications of fractures and would warrant additional sealant. Casing that is deteriorated should be sealed along its entire length. If the casing is to be pulled the sealant used should remain fluid for a period of time adequate for removal of the casing.

If the casing is to remain, then whenever feasible, it should be cut off below land surface.

After the casing seal discussed above achieves adequate strength, the open casing should at a minimum, be filled with aggregate. It is strongly suggested that a sealant be used in the upper 2 to 5 feet of casing.

## **Wells in Unconfined or Semi-Confined Conditions**

These are the most common type of wells in Pennsylvania. The geology may consist of either unconsolidated or consolidated materials. When applicable, unconfined wells in non-contaminated areas may be satisfactorily abandoned using aggregate materials up to 10-15 feet below the ground surface. This would apply mainly to domestic wells, and test borings or wells not covered by existing regulations. Monitoring wells that are not covered by specific regulatory programs and are located at sites with no known contamination, might be abandoned in this manner. Above the aggregate, the casing seal should be installed. A sealant may be used over the entire depth.

## **Wells at Contaminated Sites**

An abandoned, contaminated well often mixes contaminated groundwater with uncontaminated groundwater. Complete and uniform sealing of the well from the bottom to the surface is required. Therefore, proper well preparation (Section 7.3) must be done before the well is sealed with a proper sealant (Section 7.4.2).

## **Wells in Cavernous Rocks**

Problems can arise when filling wells that penetrate cavernous rock. Although such wells are usually located in carbonate terrain, voids can also occur in areas that have been deep mined. Care must be taken to insure that aggregates and sealants are of a size and consistency to prevent their removal by water flowing in the void. Large voids or high flow velocities warrant placement of a bridge in competent rock over the void. Aggregate and sealants can then be placed above the bridge.

## **Multiple Aquifer Wells**

The main goal in sealing wells that extend into more than one aquifer is to prevent the flow of groundwater from one aquifer to another. If no appreciable movement of water is encountered, and there is no threat of groundwater contamination, sealing with concrete, neat cement, grout, or alternating layers of these materials and aggregate will prove satisfactory. When groundwater velocities are high, the procedures for wells with artesian flow (see the next section) are recommended. If alternating plugs (or bridges) and aggregate layers are used, the plugs should be placed in known nonproductive horizons or, if locations of the nonproductive horizons are not known, at frequent intervals.

## **Flowing Wells**

The sealing of artesian wells requires special attention. The flow of groundwater may be sufficient to make sealing by gravity placement of concrete, cement grout, neat cement, clay or sand impractical. In such wells, large stone aggregate (not more than 1/4 of the diameter of the hole), well packers (pneumatic or other), or wooden plugs will be needed to restrict the flow and thereby permit the gravity placement of sealing material above the zone where water is produced. If plugs are used, they should be several times longer than the diameter of the well to prevent tilting. Seals should be designed to withstand the maximum anticipated hydraulic head of the artesian aquifer.

Because it is very important in wells of this type to prevent circulation between water yielding zones, or loss of water to the surface or to the annular spacing outside of the casing, it is recommended that pressure grouting with cement be done using the minimum volume of water during mixing that will permit handling.

In wells in which the hydrostatic head producing flow to the surface is low, the movement of water may be stopped by extending the well casing to an elevation above the artesian pressure surface.

## **Wells with Complicating Factors at Contaminated Sites**

Wells with one or more of the above complicating factors that are to be abandoned in areas with contaminated groundwater or in areas where the groundwater is at a high risk for future contamination, require the most rigorous abandonment procedures. In general, the entire length of these wells should be sealed.

When the threat of contamination has been established, the elimination of a potential flowpath is critical. For example, a contaminated well in a karst terrain must be carefully sealed to avoid worsening the situation. In general, the entire lengths of these wells should be sealed. In some situations, a bridge seal may have to be installed, and casing may have to be perforated. In each case, a prudent method should be selected that will eliminate all potential vertical flowpaths.

## **Monitoring Wells**

Monitoring wells should be abandoned in accordance with the rules and regulations of the program under which they were installed and operated. Monitoring wells which do not fall under the jurisdiction of a regulatory program, or fall under a program that has no rules or regulations for abandonment, should be abandoned under the following guidelines.

Monitoring wells that were installed and continue to function as designed, can usually be abandoned in place. Exceptions would include wells whose design precludes complete and effective placement of sealant and wells in locations subject to future disturbance that could compromise the abandonment. In such instances all tubing, screens, casings, aggregate, backfilling, and sealant should be cleaned from the boring and the hole should be completely filled with an appropriate sealant.

Monitoring wells that are abandoned in place should be completely filled with sealant. Screened intervals can be backfilled with inert aggregate if sealant will alter the groundwater chemistry and thereby jeopardize ongoing monitoring at the facility. Intervals between screens, and between the last screen and the surface, must be filled with sealant. Generally, sealant must be emplaced from the bottom of the interval being sealed. Protective casings, riser pipes, tubing, and other appurtenances at the surface which could not be removed should be cut off below grade after the sealant has properly set. When the abandonment will be completed below the finished grade, the area of the boring should be covered with a layer of bentonite, grout, concrete, or other sealant before backfilling to grade.

## **EXISTING REGULATIONS AND STANDARDS**

The Water Well Drillers License Act requires that the owner or consultant who is to abandon the well notify the department of the intent to decommission a well at least 10 days before the well is sealed or filled. Individual department bureaus may have specific regulations or guidelines.

The Bureau of Oil and Gas Management regulates the plugging of oil and gas wells. Plugging provisions for oil and gas wells in coal and non-coal areas are established in § 210 and § 211 of Act 223, and § 78.91 - 78.97 of Chapter 78. These sections describe methods that would stop any vertical flow of fluids or gas within the well bore. Alternate methods of plugging also are allowed if they would afford the same level of protection. Alternate methods must be approved before the plugging is initiated.

The Bureau of Mining and Reclamation regulates the abandonment of borings and wells associated with the mining of coal. Coal exploration holes must be abandoned according to the § 87.93 for surface mining of bituminous coal, § 88.83 for anthracite coal mining, § 89.54 for deep mining of bituminous coal, and § 90.93, coal refuse disposal.

The Bureau of Water Supply and Community Health uses the AWWA Standard A 100-90 for abandonment of public water supply wells. This standard is referenced in Section 3.3.5.11 of Part II of the Public Water Supply Manual.

## **REPORTING**

All abandoned wells shall be reported to BTGS, along with any bureau that requires a report, on forms required by BTGS (and any other forms). If available, the original driller's log should be included along with the details of the well abandonment procedure. A photograph should be taken of the site, and a reference map should be made to locate the abandoned well. It also may be appropriate to survey the exact location of the well. This is especially important for wells associated with contaminated sites.

# REFERENCES

AMERICAN WATER WORKS ASSOCIATION, 1990, Abandonment of Test Holes, partially completed wells and completed wells: AWWA Standard for Water Wells, A100-90, pp. 25-26.

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NYE, J.D., September 1987, Abandoned Wells - How One State Deals with Them, Water Well Journal, pp. 41-46

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U.S. ENVIRONMENTAL PROTECTION AGENCY, 1975, Manual of Water Well Construction Practices, Office of Water Supply, EPA-570/9-75001.

# BLOOMING GROVE TOWNSHIP WELL ABANDONMENT FORM

CONTRACTOR/AGENT: \_\_\_\_\_

REGISTRATION NO. \_\_\_\_\_

DATE: \_\_\_\_\_

TYPE OF SITE OR PROGRAM: \_\_\_\_\_

1. WELL LOCATION: (Show sketch of location on back of this form.)

Municipality \_\_\_\_\_ County \_\_\_\_\_

Quadrangle \_\_\_\_\_

(Road, community, subdivision, lot no.)

Latitude \_\_\_\_\_ Longitude \_\_\_\_\_

2. OWNER AND ADDRESS: \_\_\_\_\_

3. TOPOGRAPHY: (Circle) hilltop, slope, stream terrace, valley, stream channel, draw, local depression, flat

4. USE OF WELL: \_\_\_\_\_

WELL DIAGRAM: sketch a diagram showing depths of well, casing (if present), grouting materials, perforations etc.

5. DEPTH OF WELL: \_\_\_\_\_ DIAMETER OF WELL: \_\_\_\_\_

6. AMOUNT OF CASING REMOVED: \_\_\_\_\_ DIAMETER: \_\_\_\_\_  
 \_\_\_\_\_

7. SEALING MATERIAL:	bags (94 lb):	neat cement	sand cement
	gals of water:	_____	_____
	yds of sand:	_____	_____

OTHER MATERIAL: \_\_\_\_\_ amount: \_\_\_\_\_

8. EXPLAIN METHOD OF EMPLACEMENT OF MATERIAL:  
 \_\_\_\_\_

9. CERTIFICATION: We hereby certify that this well abandonment record is true and exact, and was accomplished on \_\_\_\_\_ day of the month of \_\_\_\_\_, \_\_\_\_\_, with our active participation and that we are qualified to participate in such abandonment actions.

1. Signature of Participant: \_\_\_\_\_

2. Signature of Participant: \_\_\_\_\_

Date: \_\_\_\_\_

Date: \_\_\_\_\_

Address: \_\_\_\_\_

Address: \_\_\_\_\_