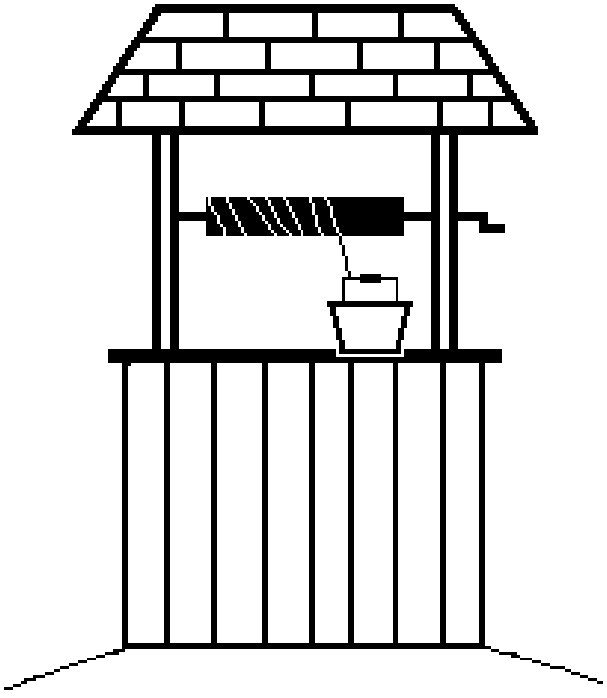
PROPER USAGE AND OPERATION OF YOUR HOUSEHOLD WATER WELL

A PLAIN ENGLISH GUIDE FOR THE HOMEOWNER

Dingman Township



Property location: _____

Permit number: _____

WELL INFORMATION:

Drilling Company: _____

Date of Completion: _____

Depth of Well: _____ **feet**

Casing: _____ **feet**

Yield: _____ **gallons per minute**

☐ **Rotary Drilled** ☐ **Percussion Drilled**

Dingman Township
Pike County Pennsylvania

2006

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I. Introduction

a. Introduction

Welcome to your new home. If you received this booklet with your certificate of occupancy, you should be aware that you are not connected to a public water system. You are the owner and operator of your own personal water company. Like a public water company, you will extract the water from the ground, convey it through a piping system, and pressurize and store the water for consumption in your home. In some cases, you may also filter and disinfect the water.

Homeowners connected to public water systems usually do not have to worry about the water system. Water company employees work hard to ensure a constant supply of good, potable water. As your own water system operator, it is your responsibility to protect your water source and keep your water system in proper working condition.

This booklet is designed to provide you with basic information on protecting and maintaining your water system. The information applies only to the water systems commonly installed for new houses within the Township. Older homes and those built in other regions may have systems other than those described here.

Please read this booklet at your earliest opportunity. If you have any questions, please call the Dingman Township Well Department at (570) 296 – 8455.

b. How to Use this Booklet

Inside the front cover is information specific to your water well. Please refer to it when reading this booklet.

II. Definitions

When using this booklet, the following words shall be defined as noted below:

ARTESIAN WELL - a well drilled into a confined aquifer in which the hydrostatic pressure forces the water to the surface of the ground.

AQUIFER - An underground vein of sand and/or gravel; or rock that is fractured or porous that transports and stores water.

CASING – a steel pipe that lines the interior of the well to protect the well from caving in and to prevent surface water and debris from entering the well. The casing should extend at least 50 feet below the surface or until the well has extended at least 10 feet into solid rock, whichever is greater.

FECAL COLIFORM - a family of bacteria usually found in the intestines of warm blooded animals. Fecal Coliform usually serves as an *indicator species*.

GROUT – a clay or cement like material injected between the casing and the wall of the well to provide a waterproof seal.

INDICATOR SPECIES - bacteria that, though not necessarily harmful to human health, are easy and inexpensive to detect. If an indicator species is found in your water, it would indicate that there is a possibility of other, more dangerous organisms may be present.

PERCUSSION DRILLING – the use of a cable-tool drilling rig that creates a well by repeatedly raising a large weight and dropping it on a large chisel. The chisel point breaks the rock into small pieces that are drawn to the surface through the casing.

POUNDER – a local name for a cable-tool drilling rig that drills a well by a method known as Percussion Drilling.

ROTARY DRILLING - the use of a drilling rig in which a rotating bit grinds away the rock producing a cylindrical hole.

SANITARY CAP - a cap placed on the top of the well casing to prevent debris and animals from entering the well.

SUBMERSIBLE PUMP - a pump that is installed below the water level in a well and used to pump water to the house.

SUCTION PUMP - a pump found in the basement of the house or a separate outbuilding which sucks the water from the well. Rarely used for new housing today, suction pumps differ from *submersible pumps* which are placed in the well and blow the water to the house.

WATER COLUMN - the depth from bottom of the well to the top of the water in the well. The depth may vary throughout the day depending on the amount of water used and the speed in which the well is recharged. The depth may also vary seasonally as the aquifer water level fluctuates.

WELL – for purposes of this booklet, a well will be defined as a hole, drilled into the ground through which water is extracted for domestic consumption. Wells drilled for other purposes such as heat pump wells will not be discussed.

III. The Water Cycle

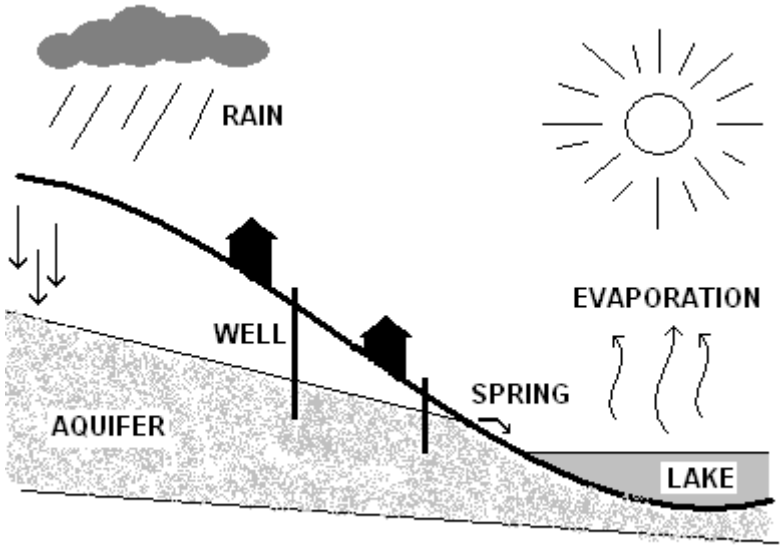
a. The Water Cycle (Simplified)

Water vapor condenses and falls to earth in the form of rain, ice, and snow. Some of the rain and melted ice/snow flows across the ground surface (runoff). Most however, soaks into the ground and filters through the soil. As the water soaks through the soil it flows into veins of sand and gravel, porous rock, or rock with interconnected fractures that collect and store the water. This area of water saturated sand and gravel or rock is called an aquifer.

Water flows through the aquifer. In some cases this flow is relatively rapid. In other cases it is very slow. Eventually the water flows to the surface of the ground creating a spring. The spring water joins with other springs and runoff forming streams. Streams join forming rivers eventually flowing into the ocean. Along the way, stream, lake, and ocean water evaporates and becomes water vapor. Eventually, the water vapor condenses and the cycle begins again.

b. The Water Cycle Purifies Drinking Water

Like distilled water, water vapor provides an inhospitable environment for bacteria and other pathogens. Therefore, rainwater is usually fairly pure to start with. The soil then acts as a bio-chemical filter. The chemical components of the soil help to remove any harmful chemicals that may have been picked up as the water vapor moved about the atmosphere. Microorganisms living in the soil further remove impurities and, as the water flows through the soil, particulate matter is filtered out. When the water reaches the aquifer, it is usually very pure.



THE WATER CYCLE

IV. How Your Water System Works

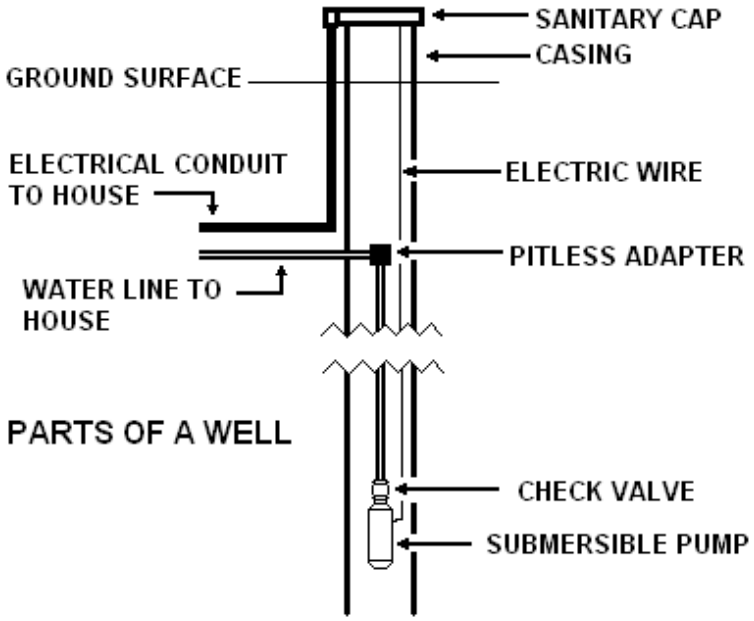
a. The Well

When a well is drilled, a hole is bored into the ground. The driller will bore through the soil layers and into the aquifer. The aquifer will be tested to ensure that the vein can adequately serve the needs of the user. If it can not, the driller continues deeper.

Eventually, the driller hits a vein that is satisfactory. The well is constructed and the pump is installed. Hydrostatic pressure in the aquifer often causes the water to rise higher in the well than the vein from which it flows. This provides a reservoir which allows a slower flowing vein to be used while still providing adequate water for the house. Occasionally, the hydrostatic pressure raises the water to the ground surface a condition that is known as an artesian well.

b. The Pump

There are three basic types of pumps used in household water systems: 1) Suction pumps, 2) Jet pumps, and 3) Submersible pumps. As the first two are rarely, if ever, used in new housing in Dingman Township, only submersible pumps will be discussed here.



PARTS OF A WELL

A submersible pump is, as its name implies, submersed below the water level in the well. The pump is usually suspended below the midway point of the water column. This is done to ensure that the pump remains well below the top of the water column as the water is drawn down. (Water below the pump can not be pumped.) The part of the water column below the pump allows for any sand and grit that may get into the well to settle out below the pump. This both protects the pump and improves water quality. The pump is used to draw water from the aquifer and to convey it to the house.

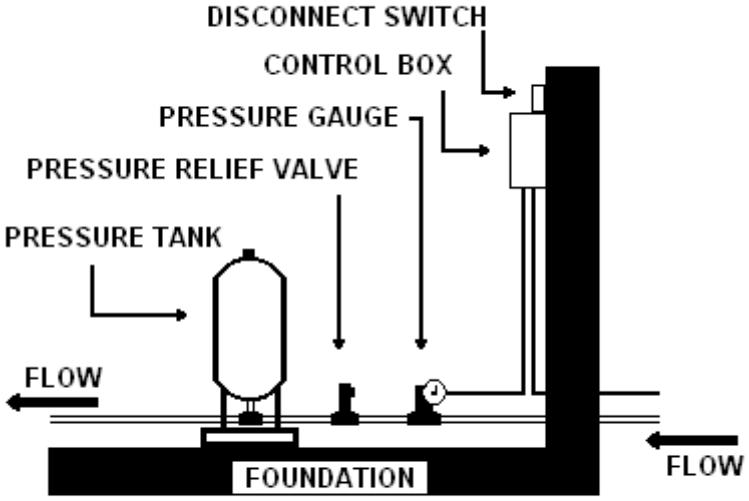
c. The Rest of the Water System

The water delivery line runs through the well from the pump to a hole in the well casing. The line then exits the hole and continues onto the house. The water delivery line is usually buried at least four feet below ground to reduce the chance of freezing.

The delivery line enters the house through the foundation. The water passes through a pressure switch and into the pressure tank. The pressure tank pressurizes and stores the water. This way, water is available on demand without a drop in water pressure. The pressure switch activates the well pump when the pressure in the pressure tank starts to drop.

While the previously mentioned items are standard for most water systems, some homeowners elect to add other equipment to their water system. Sediment filters are inexpensive devices designed to remove sediment from the well water. Sediment filters often contain an activated carbon filter intended to improve the water's taste. Other homeowners, especially those who have had problems with their water, install expensive reverse osmosis water filters or ultraviolet disinfectant units.

After the water leaves the pressure tank and passes through any of the optional water treatment devices, it flows to the water taps, toilet, and other water using devices.



TYPICAL HOUSEHOLD WATER SYSTEM

V. Protecting Your Well

We use water for drinking, for food preparation, for cooking, and for cleaning. Yet, while it is so important in our daily lives, we tend to take it for granted. We really do not appreciate our water until a problem occurs. Most homeowners fail to take even the most basic steps to protect their water supply.

a. PROTECT YOUR WELL HEAD

- **Be sure that there is a good, properly fitted sanitary cap on the well at all times. An open well or loose cap will allow dirt, debris, and animals to enter the well. (A drowned mouse does not improve your water quality.)**

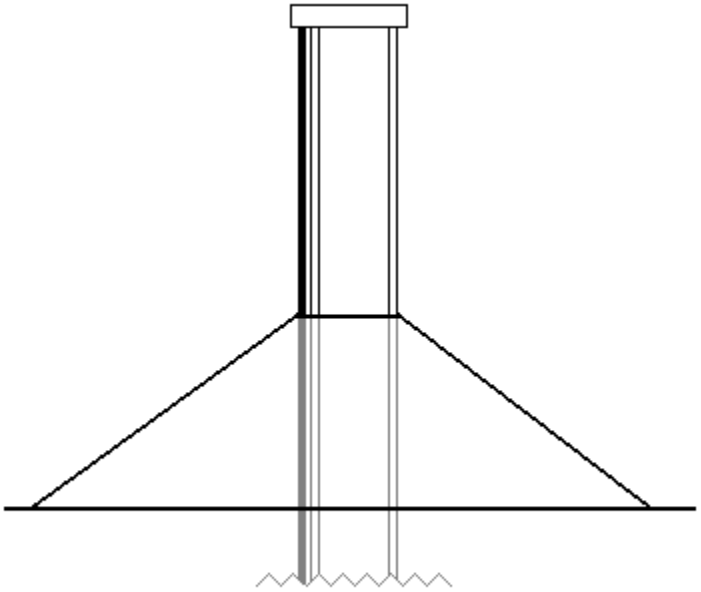
- **Mound soil around the exposed well casing to divert surface runoff away from the well. This may prevent surface pollutants from entering your well should there be a gap in the grouting.**

- **If your well is near the driveway, place a barrier to protect against cars or snowplows hitting the casing. Hitting the well casing could result in**

cracks in the grouting and surface pollutants entering the well.

- **Avoid using lawn chemicals around your well. Fertilizers, weed killers, and pesticides could enter the well if there is a crack in the grouting.**

- **Do not pour oil, paint, gasoline, kerosene, or other chemicals onto the ground. Not only is this against the law, but also the chemicals could find their way into the aquifer.**



SOIL MOUNDED AROUND WELL

b. TEST YOUR WATER REGULARLY

- **Although you may be vigilant in protecting your well, unforeseen problems may occur. Check your water on a regular basis.**

c. DISINFECT YOUR WELL

- **Anytime your well water comes in contact with anything that enters it from the surface, contamination may occur. Disinfect your well any time you change a pump or do work on any interior component of the well.**

d. DON'T DO STUPID THINGS

- **Use your head when working on your well. Empty your shirt pockets before looking in the well to keep objects from falling in the well.**

- **If you need to measure well depth, use a clean stainless steel weight. Do not use fishing sinkers or any other lead or brass weight. (If the weight were to come off in the well, it could leach lead into the water.)**

Recommended Testing Schedule

It is important to regularly monitor your water to ensure its potability. Homeowners are recommended to follow the below listed schedule. Homeowners suspecting a problem should have their water tested immediately and continue testing on a more frequent basis.

Every year

Total Coliform

Every three years

Lead Sodium Iron Nitrates Copper

VI. Testing Your Water

a. Bacteria and Living Organisms

Generally, the aquifers serving Dingman Township are sterile with no bacteria or other organisms living in the water. Any contamination found is usually confined to an individual well and the result of surface contamination. However, there are some very rare cases where surface contamination may be found in an individual water vein. As a result, homeowners are recommended to test their water once a year as a precaution.

i. Total Coliform Testing

The most common test used to detect biological contamination is the *total coliform* test. Coliform is a family of bacteria that are found on plants, soil, air, and surface water. The test is relatively inexpensive (usually $ 5.00 - $ 25.00) and requires the homeowner to take a sample of the water in a sterile cup for lab analysis. Total coliform tests are used to detect the possibility of sewage contamination but more importantly, the possibility of surface contamination should the total coliform count be high, but the fecal coliform not be present.

There should be no coliform in drinking water. However, homeowners should not panic if some is found. Samples are very often tainted by bacteria growing on the faucet, blown through the air (particularly if the lid is not put on immediately), use of an improperly sterilized container, and, most commonly, the accidental touching of the inside of the test container. Failing to immediately chill the sample may also permit a very low number of organisms to grow rapidly and exaggerate the problem.

Should a total coliform test show a positive result, the homeowner may want to have the water retested prior to taking any other action.

ii. Fecal Coliform Testing

Fecal coliform is a family of coliform bacteria that is found in the intestines of warm-blooded animals. The fecal coliform test is also inexpensive (usually $ 5.00 - $ 25.00) and is usually performed in conjunction with a total coliform and/or an e-coli

test. Fecal coliform tests are usually less likely to be tainted by airborne sources but may still result in false positives if the interior of the sample containers are touched. Fecal coliform tests are not specific to human sewage but, quite frankly, no matter the fecal source (cattle, dog, geese, etc.) you don't want it in your water. A water test should show no fecal coliform present.

iii *E-coli* Testing

***E-coli*, short for *Esherichia coli*, is a more specific family of fecal coliform. Although the bacteria are also found in all warm-blooded animals, it is used as a strong indicator that the water is contaminated with sewage wastes. The sampling is performed the same as any coliform test. No e-coli should be found in drinking water.**

iv. Giardia Testing

Giardia is a protozoa that lives in cold water. The parasite lives in the intestines of a host animal (Humans, dogs, and especially beaver). The parasite produces cysts that leave the hosts through its feces. The consumption of water containing the cysts allows the giardia protozoa to infect a new host. In the case of humans, this results in *giardiasis*, a severe gastrointestinal disease.

It is very rare for a properly drilled well to become contaminated by giardia. In such cases, the well would have to be allowing surface water to enter or be on a water vein that is drawing water, unfiltered, directly from a stream or lake. Because of the long incubation period, people who contact giardiasis do not associate their swimming in a lake or consuming under treated water from a central water system as the source of the disease. Furthermore, it is very difficult to detect giardia in well water requiring many gallons to be removed for testing.

Should giardia be suspected in a well, the well should either be abandoned or the water specially treated. Recommended treatment would include superchlorination to kill the cysts in the well and water lines. A special filter and/or an ozonation system should then be installed. Reverse osmosis and ultraviolet disinfection systems are not recommended.

How to take a Water Sample for Bacterial Analysis

Most water laboratories and testing services will supply the sterile container and instructions on how to obtain a sample. If no instructions are supplied, use these general procedures.

Create a sterile container by boiling a glass jar and a tight fitting lid for 5 minutes. The entire jar and lid must be under the boiling water. Remove the jar and lid and allow to cool.

Just before taking the sample, take a cigarette lighter or lit match and rotate it under the faucet in which the sample will be taken. This is done to kill bacteria living on the mouth of the faucet.

Turn on the COLD water and run it for 5 minutes.

Taking care not to touch the inside of the container, fill the sterile container with water. Immediately cap the container. Mark it with the time and date and place the container in a cooler packed with ice.

Immediately take the sample to the laboratory or the sample pick up point.

b. Minerals and Chemicals

i. Minerals

Various minerals may be found in groundwater. In most cases the minerals are the result of the water eroding or dissolving the rock through which it flows. Others are the result of the oxidizing of the components of the water system. Household piping may be the source of iron and copper. Soldered pipe joints and brass pump impellers may produce small amounts of lead. Water heaters, water softeners, and other system components may also result in small amounts of minerals that may be found in drinking water.

The presence of minerals in drinking water is not necessarily a problem. Some minerals such as iron or calcium can actually be beneficial to human health. However, in large quantities minerals can create problems. Excessive iron and calcium can create deposits on water fixtures, clog small water lines,

and stain porcelain fixtures. Other minerals such as lead can result in health problems.

Common minerals found in Dingman Township ground water include iron, sulfur, manganese, sodium, and chlorides. These are usually not tested for unless the homeowner suspects that there may be a problem.

Iron – look for orange discoloration on porcelain fixtures, water taps, and white clothing.

Sulfur (hydrogen sulfide) – usually detected by smell especially when using hot water.

Manganese – look for black staining around porcelain fixtures, water taps, and white clothing.

Sodium and chlorides are usually not detectable without lab analysis.

Most mineral testing may be done by taking a sample of the water to the lab in a clean glass bottle. Prices vary based on the minerals to be tested for.

ii. Chemicals

Well water may also contain chemicals that could be of concern to a property owner. Some of these chemicals may be of natural origin. Others are the result in human activity. Harmful chemicals may enter a well in two ways. Chemicals poured into the ground around the well may eventually seep into the well. Or, the chemicals may have seeped into the ground miles away where surface water enters the aquifer. Because there are so many chemicals that could contaminate water in quantities too small for the homeowner to notice, government agencies periodically take random samples of well water for "full spectrum" tests to look for contamination.

It is not practical for a homeowner to test their water for every potential chemical. If the homeowner suspects the presence of a particular chemical they should contact a water lab and discuss the testing requirements.

c. Where to Get Your Water Tested

There are various places that a homeowner can go to get their water tested. Drugstores, for example often act as drop off points for water laboratories. Though convenient, most limit the testing to bacterial testing (usually total coliform). The cost is usually greater than dealing directly with the laboratory and the drugstore clerks may not be able to advise you on how to correct any problems that are detected.

There are State certified water laboratories throughout the area. (Look in the yellow pages under the heading *Laboratories – testing.*) Most can test for a wide range of biological and chemical components. If necessary, they can also recommend additional tests and corrective options. Some laboratories will even send a technician to your house to take the samples. Use of a New York or New Jersey certified laboratory is also acceptable if it proves more convenient.

WARNING

Occasionally the area is canvassed by a company purporting to be performing testing for the state or municipal government. The company, in a carefully worded notice, offers free water testing for all area residents. When the results come back showing that the water is contaminated, the company then offers to install a very expensive water treatment system to correct the problem.

Even if the firm is straightforward in their advertising, beware of testing performed by company's that sell water treatment equipment. If a water treatment company does test your water and finds your water to be impure, have an independent laboratory test your water. Not only will you be sure of an honest analysis, but if impurities are found, the laboratory staff may be able to direct you to inexpensive solutions to correct the problem.

VII. Disinfecting Your Water System

From time to time it may become necessary to disinfect your well and water piping. Disinfecting is fairly simple if you follow these steps:

1. Measure the depth of the water column in the well. Take a string at least 10 feet longer than the depth of your well. (See the inside cover of this booklet.) Tie a stainless steel weight to the string. Never use lead or brass! Lower the string until the weight hits the top of the water. Mark the point on the string where the string meets the top of the casing. Subtract the depth to the top of the water column from the total depth of the well to get the height of the water column.

2. In a 5 gallon bucket pour chlorine bleach (laundry bleach) into about 3 gallons of water. The amount of bleach is based on the depth of the water column. Use 1 quart (32 oz.) of bleach for water columns of 100 feet or less. Use an additional pint (16 oz.) for every 50 feet in excess of the first 100. (Do NOT use bleach with additives such as "fresh scent" or "lemony scented.") Stir to mix. When mixed well, pour the water/bleach mixture down the well. Note: It is better to use more bleach than not enough.

3. Go into house and starting with the highest faucet, showerhead, etc. turn on the water until you can smell chlorine. Proceed doing the same throughout the house. Don't forget the toilets and outside taps.

4. Wait at least 4 hours. Overnight is even better.

5. To protect the sewage system, start with the outside tap. Run the water until the chlorine smell disappears. This may take 15 minutes or more. When you are sure that the water is free of chlorine, turn off the tap and repeat throughout the house starting with the lowest fixtures first.

Testing Record

Sample Date	Laboratory	Bacterial	Chemical
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Testing Record

Sample Date	Laboratory	Bacterial	Chemical
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