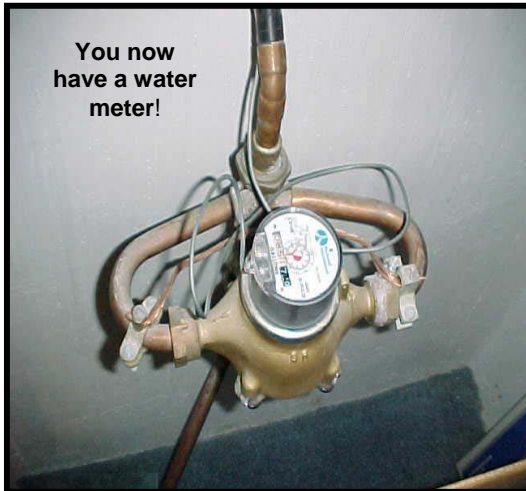


UNPLUGGED ABANDONED WELLS ARE A SAFETY, HEALTH, AND ENVIRONMENTAL THREAT

- ◆ They are a **safety** hazard. The Michigan Department of Environmental Quality (DEQ) has received reports of people, mostly children, falling into old wells. Injury or death can result.
- ◆ They pose a **health** concern by acting as conduits for contaminants to move from the surface, through the earth's protective formations, into deeper aquifers. Drinking water contamination has been caused by abandoned wells.
- ◆ They threaten the **environment** and can degrade water quality. Deteriorated well casings or open, uncased boreholes allow water to move between previously separated aquifers. Abandoned wells have also been used for illegal waste dumping.

The DEQ advises property owners to hire registered water well drilling contractors to plug abandoned wells. Registered water well drillers have the specialized training and equipment necessary to properly plug abandoned wells.



IF I CONNECT TO THE MUNICIPAL WATER SYSTEM, WHAT CAN I DO WITH MY EXISTING WELL?

1) Properly Plug the Well.

- **Properly plugging the old well is the preferred option.** Plugging the well protects the drinking water aquifer and limit the property owner's liability for ground water contamination.
- The Groundwater Quality Control Act, Part 127, 1978 PA 368 (state well code) requires that a well that is abandoned when municipal water is installed be plugged.

2) Restore the well to operational condition.

- To retain the existing well for irrigation, car washing, or other uses, it must be restored to operational condition.
- Plumbing changes are required to physically separate the domestic municipal water piping from the piping connected to the well.
- A cross connection inspection and approval from the public water utility or local health department is required when water service is initiated.
- Where existing wells will be used for nonpotable purposes, construction upgrades are recommended, but not mandatory.

3) Retain the well for future use.

To be classified as "temporarily abandoned," a well casing must be:

- securely sealed with a threaded, welded, or solvent welded cap to prevent access

into the well and eliminate openings into the well.

- in compliance with all construction and isolation distance requirements.
- physically disconnected from any water distribution piping.

WHO IS RESPONSIBLE FOR PLUGGING ABANDONED WATER WELLS?

- ◆ The **property owner** is responsible for assuring that all abandoned wells on his or her property are properly plugged.

WHO CAN PLUG A WELL?

- ◆ A **property owner** may plug a well only at his or her residence.
- ◆ A **registered water well drilling contractor** or his or her employee may plug a well at any residence, farm, industry, business, or other public water supply.

WHERE IS YOUR OLD WELL?

Look for:

- pipes sticking above ground.
- pipes sticking through wall or floor in the basement.
- electrical switch boxes out in the yard.
- cement pits in or under sheds.
- windmills.
- old crock, brick, or stone structures.

For locating buried wells:

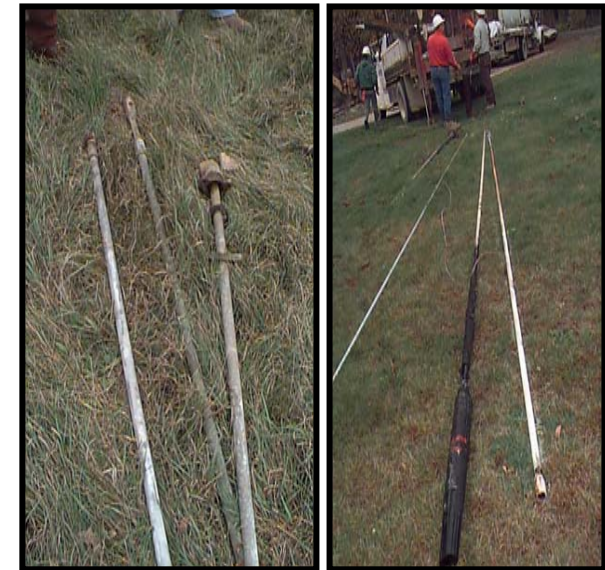
- ◆ Metal detectors may be used to find buried steel well casings. First, find where the old water line exits the home or building. From this point, survey the ground with the metal detector, moving away from the structure. Use a marker to designate the location of any "readings." Usually, well casings will be 4 to 5 feet

below grade and will be located between 3 and 25 feet from the home.

- ◆ Neighbors and senior citizens who have lived in the area for a long time often know where old wells are located. If you take advantage of their input you may save yourself a lot of work.

WHAT DO I HAVE TO DO BEFORE BEGINNING TO PLUG MY WELL?

- Pumps, drop pipe, pump rods, packers, wire, check valves, and all other debris or obstructions must be removed from the well before plugging.
- Due to the equipment necessary, this often requires the services of a registered well drilling contractor.



- Failure to remove obstructions from the well can result in void spaces in the column of plugging material.
- The depth and diameter of the well must be measured before plugging to allow the drilling contractor or well owner to calculate the amount of plugging material necessary to fill the entire depth of the well.

PLUGGING METHODS

Methods used to plug wells depend on the well type and site geology.

- **Dug wells:** These large (12 to 48 inch diameter) wells are made of cement crock, brick, stone, or tile. A 6 inch layer of bentonite chips or pellets shall be placed at the bottom of the well. The remainder of the well shall be plugged by placing clean soil backfill* layers that are not more than 10 feet thick, with a 6 inch layer of bentonite chips between backfill layers. The upper 3 to 4 feet of stone, brick, cement crock, or curbing must be broken up and removed. A final 6 inch layer of bentonite must be placed 3 feet below finish grade, then the remainder of the hole backfilled and crowned to prevent settling and ponding of water over the old well.

*Clean, dry soil backfill may be loam, clay, silt, or sand obtained from commercial sources or from the site. Clean backfill may not contain trash, wood, roots, sod, construction debris, or chemical contaminants.



- **Drilled Wells in Sand or Gravel Formations:** Bentonite grout slurry, neat cement slurry*, or dry bentonite chips or pellets may be used to plug wells with screens in sand and gravel formations. All slurry grouts must be placed using a "tremie" pipe which runs to the bottom of the well. The slurry may be pumped or poured using a funnel into the tremie pipe. Plugging is complete when the grout appears at the surface.

*Neat cement slurry is a mixture of one 94 pound bag of Portland cement and not more than 6 gallons of water.

- **Wells in Bedrock Formations:** Neat cement must be used when plugging bedrock wells. A pump and a tremie pipe (run to the bottom of the well) are used to deliver the grout to the bottom of the well. The tremie pipe is removed as the neat cement is pumped into the well or after thick cement appears at the surface. Bedrock wells should be plugged by registered well drilling contractors.

- **Hand-driven Point Wells:** These small diameter wells (normally 1¼ inch diameter) are plugged by carefully dropping bentonite chips or pellets into the top of the well casing. Another method is to pour a slurry of neat cement through a funnel and tremie pipe extending to the bottom of the well.

If bentonite chips are used, a hardware cloth screen (¼ inch mesh) shall be used to remove fine bentonite particles of powder before the chips are poured into the well. These particles swell upon contacting water and can bridge in the upper part of the well.

- **Flowing Wells:** Because of their unique characteristics, flowing wells should only be plugged by registered well drilling contractors.

Neat cement must be used to plug flowing wells. Its heavy slurry weight is needed to initially overcome the artesian pressure of flowing wells, and then to provide a solidified permanent seal.

Before beginning any excavation to locate buried well casings, contact "Miss Dig" and have all utilities marked. Phone # 800-482-7171

ABANDONED WELL VOLUME

Well Diameter (inches)	Volume per ft. of depth (cubic feet, gallons)		Feet of well plugged	
			Neat Cement (94 lb bag)	Bentonite Chips (50 lb bag)
1¼	0.01	0.07	118.0	70.0
2	0.02	0.17	51.3	32.0
4	0.09	0.66	13.4	8.0
5	0.14	1.00	8.5	5.0
6	0.20	1.50	5.9	3.5
48	12.56	94.0	0.1	9 bags per 6 in. layer

For more information please contact your county or district health department or:

Michigan Department of Environmental Quality
Water Bureau-Lansing Operations Division
Drinking Water & Environmental Health Section
Well Construction Unit
Abandoned Well Management Program
P.O. Box 30273
Lansing, MI 48909-7773
Phone: (517) 241-1377 Fax: (517) 241-1328

Printed by the authority of Part 127, 1978 PA 368
Total number of copies printed: 20,000 Total Cost:\$ 1,262.52 Cost per copy: \$.07
DEQ Michigan Department of Environmental Quality

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Jennifer M. Granholm, Governor
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Steven E. Chester, Director
Environmental Assistance Center 1-800-662-9278
website: www.michigan.gov/deq

Plugging Abandoned Wells

When Community Water Lines Are Extended



Michigan Department of Environmental Quality
Water Bureau