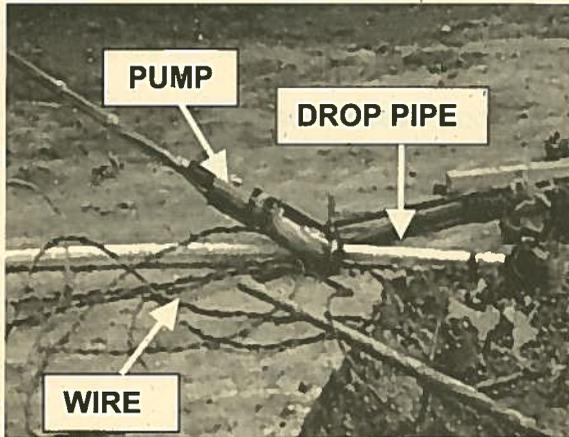


REMOVE ALL OBSTRUCTIONS

Pumps, drop pipe, pump rods, packers, wire, check valves, and all other debris or obstructions must be removed from the well before plugging.



PLUGGING METHODS

Well type and site geology affect the requirements for plugging abandoned water wells. Each well type has specific plugging requirements:

- **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 in a manner that will prevent settling or ponding of water over the old well site.

*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 that runs to the bottom of the well. The slurry may be pumped or poured using a funnel into the tremie pipe. The tremie pipe should be removed after or during the plugging process.

*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 to plug bedrock wells. A pump and tremie pipe, which runs to the bottom of the well, is necessary. The tremie pipe should be removed as the neat cement is pumped into the well or after 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) may be plugged by carefully dropping bentonite chips or pellets into the top of the well casing or by pouring a slurry of neat cement through a funnel and tremie pipe extending to the bottom of the well.

As bentonite chips are poured into the well casing, a hardware cloth screen (with ¼ inch mesh) should be used to remove any fine bentonite powder. These particles swell upon contacting water and can bridge in the upper part of the well. When using dry bentonite chips or pellets, periodic tamping with a pipe will help prevent bridging.

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

Neat cement must be used to plug flowing wells. Its heavy slurry weight is needed to overcome the artesian pressure of flowing wells and to provide a 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:

Water Bureau-Lansing Operations Division
 Drinking Water & Environmental Health Section
 Well Construction Unit
 Abandoned Well Management Program Coordinator
 Phone: (517) 241-1370 Fax: (517) 241-1328

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 Jennifer M. Granholm, Governor

Department of Environmental Quality
 Steven E. Chester, Director
 Environmental Assistance Center 1-800-662-9278
 website: www.michigan.gov/deq

PLUGGING ABANDONED WATER WELLS

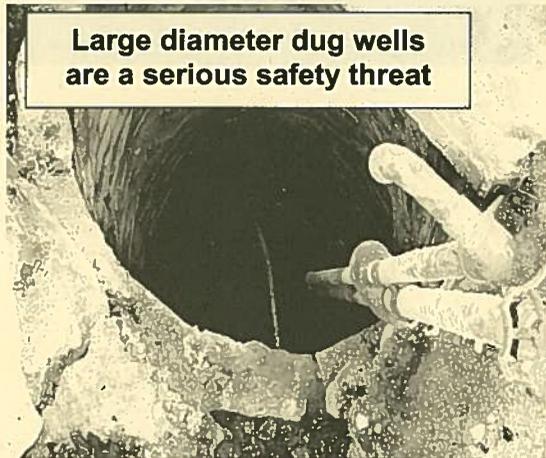


Michigan
 Department of
 Environmental Quality
 Water Bureau

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

- ◆ They are a **safety** hazard. Each year the Michigan Department of Environmental Quality (DEQ) receives 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**. Deteriorated well casings or open, uncased boreholes allow movement of water between previously separated aquifers. This can degrade water quality. Abandoned wells have also been used for illegal waste dumping.

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



Large diameter dug wells are a serious safety threat

WHAT IS AN ABANDONED WATER WELL?

The Groundwater Quality Control Act, Part 127, 1978 PA 368 defines an **abandoned water well** as a well that:

- has its use permanently discontinued.
- is in such disrepair that its continued use for obtaining groundwater is impractical.
- has been left uncompleted.
- is a threat to groundwater resources.
- is or may be a health or safety hazard.

The act defines a **temporarily abandoned well** as a well that:

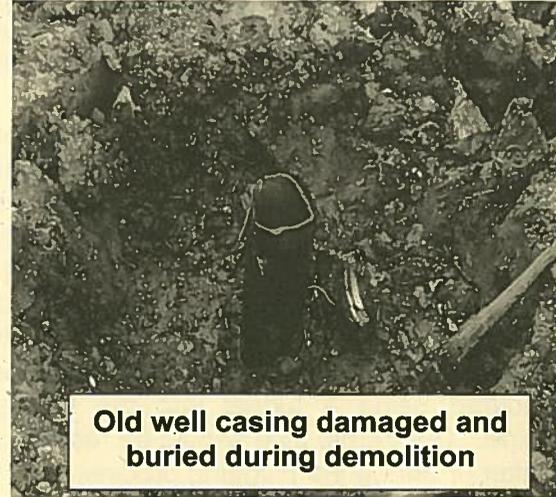
- is not in use, but is intended by the owner to be used as a source of groundwater.

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.
- comply with isolation distance and construction requirements.

EXAMPLES OF ABANDONED WELLS THAT MUST BE PLUGGED:

- wells that are not operational.
- wells that are disconnected and taken out of service at the time connection is made to the municipal water system.
- any inoperable or abandoned well that is not properly sealed that can be a safety or environmental hazard.



Old well casing damaged and buried during demolition

WHO IS RESPONSIBLE FOR PLUGGING ABANDONED WATER WELLS?

- ◆ The **property owner** is responsible for plugging an abandoned water well.
- ◆ An unsuccessful water well (commonly known as a "dry hole") is normally plugged by the well drilling contractor.

WHO CAN PLUG A WELL?

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

Farms often have associated, but not necessarily, contiguous properties that have structures served by water wells. These outlying farm wells are considered the same as the farmer's residential well and may be plugged by the owner.

HOW TO LOCATE ABANDONED WELLS ON YOUR PROPERTY

Begin by searching for water well drilling records or old billing statements that show well depth and well location. Information of this type on your well may be available from the following sources:

- the contractor who drilled or serviced the well.
- the local health department.
- DEQ, Water Bureau, in Lansing.

WHAT IF THERE ARE NO RECORDS AVAILABLE FOR YOUR 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.
- old hand pumps.

For locating buried wells:

- ◆ Metal detectors may be used to find buried steel well casings. First, locate where the old water line exited 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" you get. 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 are an excellent source of information. They often know where old wells are located. If you take advantage of their input you may save yourself a lot of work.