CEDAR COUNTY ORDINANCE #15
CHAPTER 39*
REQUIREMENTS FOR PROPERLY PLUGGING ABANDONED WELLS

567-39.1(455B) Purpose. The purpose of this chapter is to implement 1987 Iowa Code Supplement Section 455B.190 by providing a schedule and required procedures for the proper plugging of abandoned wells.

567-39.2(455B) Applicability. These rules govern the proper plugging of all abandoned wells. For additional guidance, and background information, refer to "Guidelines for Plugging Abandoned Water Wells." Technical Information Series 15, Geological Survey Bureau, Iowa Department of Natural Resources, 1987.

567-39.3(455B) Definitions.

"Abandoned well" means a water well which is no longer in use or which is in such a state of disrepair that continued use for the purpose of accessing groundwater is unsafe or impracticable.

"Agricultural lime" means all calcium and magnesium products sold for agricultural purposes in the oxide, hydrate, or carbonate form; designated as quicklime, hydrated lime, carbonate of lime, and crushed or ground limestone which is used for agricultural purposes as a soil pH buffer.

"Annual space" means the space between the well casing and the well bore or the space between two or more concentric well casings.

"Approved" means accepted or acceptable under an applicable specification stated or cited in these rules.

"Aquifer" means a geological formation, group of formations, or part of a formation that contains sufficient saturated permeable material to yield significant quantities of water to wells and springs.

"Artesian well" means a well in an aquifer where the groundwater is confined under pressure and the static water level in the well stands above the top of the confined aquifer it taps.

"Bentonite" means a naturally occurring highly plastic, colloidal clay composed largely of the mineral montmorillonite which expands upon wetting.

"Bentonite grout (or slurry)" means a mixture of 10 percent processed bentonite (by weight) and clean water.

"Bentonite pellets" means a form of processed bentonite which can be used directly for sealing applications in well plugging operations.

"Bentonite products" means the forms of bentonite which can be used for sealing materials in wells, including graded bentonite, bentonite pellets and bentonite grout.

"Casing" means a tubular retaining structure which is installed in the excavated hole to maintain the well opening.

"Concrete" means a mixture of one sack (94 pounds) of Portland cement, an equal amount by volume of sand and gravel or crushed stone and not more than six gallons of clean water.

"Confined aquifer" means an aquifer in which the groundwater is under pressure greater than atmospheric pressure. The static water level in a well tapping a confined aquifer rises to a level above the top of the aquifer.

"Crushed stone" means Class A or Class B crushed stone as defined in the specifications of the Iowa Department of Transportation.

"Department" means the Department of Natural Resources created under Iowa Code Section 455A.2.

"Director" means the director of the department.

"Fill materials" means soil, sand, gravel, crushed stone, pea gravel and agricultural lime used to occupy space between and below sealing materials in abandoned wells being plugged.

"Graded bentonite" means bentonite which is crushed and sized for pouring and easy handling. Like processed bentonite, it swells when hydrated by fresh water and will form a plastic, essentially impermeable mass.

"Gravel" means Class C gravel as defined in the specifications of the Iowa Department of Transportation.

"Groundwater" means any water of the state, as defined in Iowa Code Section 455B.171, which occurs beneath the surface of the earth in a saturated geological formation of rock or soil.

"Grout" means a fluid mixture of cement and water (neat cement); sand, cement and water (sand cement grout); or bentonite and water (bentonite grout or slurry) of a consistency that can be forced through a pipe and placed as required.

"Limestone" means sedimentary rock which contains greater than 50 percent calcium carbonate and has strong reaction with hydrocholoric acid (HCI).

"Liner pipe" means a protective well casing pipe installed subsequent to initial construction to seal off a zone of bacterial or chemical contamination or a casing pipe installed during or subsequent to the initial well construction to seal off a caving formation.

"Neat cement" means a mixture of one sack (94 pounds) of Portland cement to not more than six gallons of clean water. Bentonite up to 2 percent by weight of cement may be added to reduce shrinkage.

"Plugging" means the proper closure of an abandoned well by procedures which will permanently seal the well from contamination by surface drainage; and where the well penetrates multiple or confined aquifers, will permanently seal off and prevent flow or contamination out of an aquifer or from one aquifer to another. Plugging involves the application of sealing materials and can include fill materials.

"Processed bentonite" means bentonite which has been kiln dried and processed into pellets for direct use in well sealing applications or into powder or coarse granules for use in bentonite grout for sealing.

"Pump pit" means a sunken area located directly over the well used to house the equipment for discharging water from a well into the water system.

"Quaternary sediments" means the unconsolidated materials, such as alluvium, soil, loess, glacial drift clay, and sand and gravel, above the bedrock.

"Sandpoint well" means a small diameter water well constructed by joining a screened drive point with lengths of pipe and driving the assembly into a shallow sand and gravel aquifer. Sandpoint wells commonly are less than 30 feet deep.

"Sand cement grout" means a mixture of one sack (94 pounds) of Portland cement, an equal amount by volume of clean masonry sand and not more than six gallons of clean water.

"Sealing" means the application of sealing materials (bentonite products, neat cement, sand cement grout or concrete) for plugging an abandoned well to seal off unwanted flow into, out of or between aquifers.

"Standby well" means a water well which is temporarily taken out of service with the expectation of being returned to service when needed.

"Static water level" means the water level in a water well when the well is not flowing or being pumped.

"Tremie pipe" means a device, usually a small diameter pipe, that carries grouting materials to the bottom of the hole and which allows pressure grouting from the bottom up without introduction of air pockets.

"Unconfined aquifer" means an aquifer in which the static water level does not rise above the top of the aquifer, i.e., the pressure of the water in the aquifer is approximately equal to that of the atmosphere.

"Water well" means an excavation that is drilled, cored, bored, augured, washed, driven, dug, jetted or otherwise constructed for accessing groundwater.

"Well screen" means the intake section of the well that obtains water from an aquifer and serves as a structural retainer to support the bore hole in unconsolidated materials.

567-39.4(455B) Forms. The following form is currently in use: Abandoned Water Well Plugging Record. 2/88. 542-1226.

567-39.5(455B) Abandoned well plugging schedule.

39.5(1) Certification. Within 30 calendar days after completion of plugging, abandoned well owners must certify on DNR Form 542-1226, Abandoned Water Well Plugging Record, that abandoned wells have been properly plugged in accordance with the requirements and time schedule contained in this chapter.

39.5(2) Category I. Abandoned wells eight inches or larger in diameter abandoned prior to November 23, 1988, must be properly plugged by July 1, 1990.

39.5(3) Category II. Wells abandoned prior to November 23, 1988, and located less than 200 feet from an active well supplying potable water or located less than one-eighth mile (660 feet) from a point source of potential contamination must be properly plugged by July 1, 1990. Examples of point sources of potential contamination include, but are not limited to, industrial waste sites; uncontrolled hazardous waste sites; petroleum storage area; hazardous waste treatment, storage or disposal area; agricultural chemical storage areas; animal feed lots; and wastewater treatment facilities.

39.5(4) Category III. All other wells which were abandoned prior to November 23, 1988, must be properly plugged by July 1, 1993.

39.5(5) Category IV. Wells which are abandoned on or after November 23, 1988, must be properly plugged within 90 days of the date of abandonment.

567-39.6(455B) Water well plugging materials.

39.6(1) Sealing materials. Approved sealing materials are bentonite products (graded bentonite, bentonite pellets and bentonite grout), neat cement, sand cement grout and concrete.

39.6(2) Fill materials. Approved fill materials include soil, sand, pea gravel, gravel, crushed stone and agricultural lime. Fill materials are not required for well plugging, but may be used to save on quantities and costs of sealing materials as provided in 567-39.7(455B). The fill materials shall be free of sticks, leaves or other foreign matter and shall be free of any toxic or agricultural chemical residue.

567-39.7(455B) Water well plugging procedures.

39.7(1) Freedom from obstructions. Abandoned wells must be checked before they are plugged in order to ensure freedom from obstructions that may interfere with plugging operations. Drop pipes, check valves, pumps, and other obstructions shall be removed if practicable.

39.7(2) Wells in quaternary sediments.

a. Large diameter wells 100 feet or less in depth. The services of a registered well contractor are not required for the plugging of large diameter (18-inch diameter or more) wells 100 feet or less in depth in quaternary sediments (above bedrock). These wells may be plugged by pouring fill and sealing materials from the top of the well or by using tremie pipes, except for sand cement grout placed below water, which must be placed by dump bailer.

Fill materials of sand, gravel, crushed stone, pea gravel or agricultural lime shall be placed up to one foot below the static water level. A minimum of one foot of bentonite pellets, graded bentonite or neat cement shall be placed on top of the fill material up to the static water level as a seal. Sand cement grout placed with a dump bailer also may be used on top of the fill material up to the static water level and in standing water above the static water level to act as a seal. Fill material of soil, sand gravel, crushed stone, pea gravel or agricultural lime shall then be added up to four feet below the ground surface.

The fill materials may be omitted and sealing materials may be used to fill the entire well up to four feet below the ground surface. Bentonite pellets, graded bentonite or neat cement sealing materials shall be used below the static water level. Sand cement grout placed with a dump bailer also may be used below the static water level or in standing water above the static water level. Sealing materials which may be used above the static water level include bentonite pellets, graded bentonite, neat cement, sand cement grout and concrete.

The casing pipe shall be removed down to four feet below the ground surface and shall be capped by a minimum of one foot of bentonite pellets, graded bentonite, neat cement, sand cement grout or concrete. The cap shall extend six or more inches beyond the outside diameter of the top of the remaining well casing and shall terminate three feet below the ground surface.

If there is any curbing, pump pit or pump house structure located directly over the well, this shall also be removed down to a minimum of four feet below the ground surface. The top four feet (three feet above the cap) shall then be back filled with soil and graded so that surface water is directed away from the abandoned well location.

b. Wells less than 18 inches in diameter or greater than 100 feet in depth, excluding sandpoint wells. Plugging of wells less than 18 inches in diameter or greater than 100 feet in depth must be performed by a well contractor registered pursuant to 567--Chapter 37.

Fill material consisting of sand, gravel, crushed stone or pea gravel shall be placed in the bottom portion of the well open to the water-bearing formation up to four feet below the static water level. A minimum of four feet of sealing materials consisting of bentonite products or neat cement shall be added above the fill material up to the original static water level. If bentonite grout or neat cement is used, it shall

be placed by tremie pipe. If graded bentonite or bentonite pellets are used, they may be added by pouring in place and agitating to avoid bridging. Any of the approved sealing materials shall be added above the static water level up to four feet below the ground surface. If bentonite grout is used, it shall be capped by at least six feet of neat cement terminating four feet below the ground surface.

The fill materials may be omitted and bentonite products or neat cement sealing materials may be used to fill the entire well up to four feet below the ground surface. If bentonite grout is used from the static water level to the top of the well, it shall be capped by at least six feet of neat cement terminating four feet below the ground surface.

The upper four feet of the casing pipe below the ground surface shall be removed and if there is any curbing, pump pit or pump house structure located directly over the well, this shall also be removed down to a minimum of four feet below the ground surface. The top four feet shall then be backfilled with soil and graded so that surface water is directed away from the abandoned well location.

c. Sandpoint wells. The preferred method of plugging a sandpoint well is to pull the casing and sandpoint out of the ground, allowing the hole to collapse and fill. This does not require the services of a registered well contractor. If the sandpoint and casing cannot be extracted, they shall be tremied full of neat cement or completely sealed with bentonite products, and this plugging must be performed by a well contractor registered pursuant to 567--Chapter 37.

The upper four feet of the casing pipe below the ground surface shall be removed and if there is any curbing, pump pit or pump house structure located directly over the well, this shall also be removed down to a minimum of four feet below the ground surface. The top four feet shall then be backfilled with soil and graded so that surface water is directed away from the abandoned well location.

39.7(3) Bedrock wells. Plugging of all bedrock wells shall be performed by well contractors registered pursuant to 567--Chapter 37. If the details of well construction are unknown, the well shall be tremied full of neat cement up to four feet below the ground surface or tremied full of bentonite grout up to ten feet below the ground surface, with the bentonite grout capped by at least six feet of neat cement terminating four feet below the ground surface.

a. Bedrock wells completed in a single confined aquifer. Before proceeding to plug the well, a bridge plug or packer shall be placed at or below the bottom of the casing to stop the flow of water if necessary where the pressure in the confined aquifer is great, causing the well to flow at the surface. In such cases, fill materials shall be placed in the lower portion of the well before the bridge plug or packer is set.

Fill material consisting of pea gravel, crushed stone or gravel shall be placed from the bottom of the well to within ten feet below the bottom of the casing or confining layer. Sealing material consisting of bentonite products or neat cement shall be placed from the top of the fill material to at least ten feet above the bottom of the casing or confining layer or to the static water level, whichever is higher. If bentonite grout or neat cement is used, it shall be placed by tremie pipe. Bentonite pellets or graded bentonite may be added by pouring in place and agitating to avoid bridging. Any of the approved sealing materials shall be added above the static water level up to four feet below the ground surface. If bentonite grout is used, it shall be capped by at least six feet of neat cement terminating four feet below the ground surface.

The fill materials may be omitted and any of the approved sealing materials may be used to fill the entire well up to four feet below the ground surface. Only bentonite products or neat cement sealing materials shall be used below the static water level. If bentonite grout is used from the static water level to the top of the well, it shall be capped by at least six feet of neat cement terminating four feet below the ground surface.

The upper four feet of the casing pipe below the ground surface shall be removed and if there is any curbing, pump pit or pump house structure located directly over the well, this shall also be removed down to a minimum of four feet below the ground surface. The top four feet shall then be backfilled with soil and graded so that surface water is directed away from the abandoned well location.

b. Bedrock wells completed in a single unconfined aquifer. The plugging procedure for these wells is the same as for bedrock wells completed in a single confined aquifer except that a bridge plug or packer is not required to stop the flow of water since this problem will not exist in this type of well.

c. Bedrock wells completed in multiple aquifers. For the lowest aquifer, fill material consisting of pea gravel, crushed stone or gravel shall be placed to within ten feet below the bottom of the casing or confining layer. Neat cement tremied in place shall then be used as a sealing material to ten feet

above the bottom of the casing or above the bottom of the confining layer, whichever is highest. The minimum thickness of the sealing material above each aquifer shall be ten feet except for the uppermost aquifer. This same procedure and type of fill materials and sealing material shall be used throughout subsequent aquifers including the uppermost aquifer. The seal for the uppermost aquifer shall extend from at least ten feet below the bottom of the casing or confining layer to at least ten feet above the bottom of the casing or confining layer. The casing shall be filled above the static water level with any of the approved sealing materials up to four feet below the ground surface. If bentonite grout is used, it shall be capped by at least six feet of neat cement terminating four feet below the ground surface.

The fill materials may be omitted and any of the approved sealing materials may be used to fill the entire well up to four feet below the ground surface. Only bentonite products or neat cement shall be used as the sealing materials below the static water level. If bentonite grout is used from the static water level to the top of the well, it shall be capped by at least six feet of neat cement terminating four feet below the ground surface.

The upper four feet of the casing pipe below the ground surface shall be removed and if there is any curbing, pump pit or pump house structure located directly over the well, this shall also be removed down to a minimum of four feet below the ground surface. The top four feet shall then be backfilled with soil and graded so that surface water is directed away from the abandoned well location.

567-39.8(455B) Standby wells. Standby wells do not require the plugging operations for an abandoned well which renders the well permanently unusable as a source of water supply. A standby well must be disinfected prior to being taken out of use for a long period of time and must be disinfected and checked for bacterial safety when placed back in service after being out of use for a prolonged period. Disinfection of standby wells shall be done in accordance with AWWA (American Water Works Association) Standard A100. The well must not be subject to contamination by surface drainage or from other causes, and the well casing must be provided with an air-tight cover when the well is not in use.

567-39.9(455B) Variances. In accordance with Iowa Code Section 455B.181, a variance to these rules may be granted by the department provided sufficient information is submitted in writing to the department to substantiate the need for a variance and to assure the protection of all aquifers penetrated by the affected well. When justification satisfactory to the director is provided substantially demonstrating that a variance to these rules will result in equivalent effectiveness or improved effectiveness, a variance to these rules may be granted by the director. A denial of a variance may be appealed to the Environmental Protection Commission pursuant to 567--Chapter 7.

567-39.10(455B) Noncompliance. Violations of any of the provisions of this chapter may be addressed by the department pursuant to Iowa Code Sections 455B.109, 455B.175, 455B.191 and 1987 Iowa Code Supplement Section 455B.190.