CHAPTER 39
REQUIREMENTS FOR PROPERLY PLUGGING ABANDONED WELLS

567—39.1(455B) Purpose and applicability. ~~The purpose of t~~This chapter ~~is to~~ implements Iowa Code section 455B.190 by providing a schedule and required procedures for the proper plugging of abandoned wells to protect the groundwater by permanently sealing off contamination to individual aquifers.

~~**567—39.2(455B) Applicability.** These rules govern the proper plugging of abandoned wells.~~

a. ~~Some examples of types of w~~Wells covered by these rules are those accessing groundwater (withdrawing water from or injecting water into the groundwater) and can include, but are not limited to,~~:~~ public and nonpublic water wells, test wells, observation wells, monitoring wells, agricultural drainage wells, heat pump recirculation wells, and cooling water wells.

b. ~~Some examples of types of w~~Wells or subsurface structures not covered by these rules include: small diameter (2" or less) test holes, observation wells or monitoring wells installed for a limited time which can be sealed by withdrawing~~al of~~ the casing and allowing the hole to collapse; soil borings; septic tanks; underground storage tanks; and cisterns, if not used for accessing groundwater.

c. For additional guidance and background information, refer to "Guidelines for Plugging Abandoned Water Wells," Technical Information Series 15, Geological Survey Bureau, Iowa DNR~~Department of Natural Resources~~, 1987, available on the department's website at: www.iowadnr.gov.

567—39.2~~3~~(455B) Definitions. In addition to the definitions in 567—Chapter 40, 567—Chapter 49, 567—Chapter 82, and Iowa Code sections 455B.101, 455B.171, 455B.190 and 455B.190A, which are hereby adopted by reference, the following definitions shall apply to this chapter:

~~*"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 water is unsafe or impractical.~~

"Agricultural lime" means all calcium and magnesium products sold for agricultural purposes in the carbonate form, not including quicklime or hydrated lime, of a size comparable with that of crushed stone, gravel, or pea gravel.

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

"Aquifer" means a water-bearing geologic formation capable of yielding a usable quantity of water to a well or spring.

"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 water which is free of contaminants, turbidity, and settleable solids.

"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 material in wells, including graded bentonite, bentonite pellets, and bentonite grout.

"Capped" means the application of a layer of sealing material at the top of the well casing.

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

~~*"Certified well contractor"* means a well contractor certified by the department in accordance with 567—Chapter 82.~~

~~*"Class 1 well"* means a well 100 feet or less in depth and 18 inches or more in diameter.~~

~~*"Class 2 well"* means a well more than 100 feet in depth or less than 18 inches in diameter or a bedrock well. Bedrock wells include:~~

~~1. Wells completed in a single confined aquifer;~~
~~2. Wells completed in a single unconfined aquifer; and~~
~~3. Wells completed in multiple aquifers.~~

~~*"Class 3 well"* means a sandpoint well or a well 50 feet or less in depth constructed by joining a screened drive point with lengths of pipe and driving the assembly into a shallow sand and gravel aquifer.~~

Commented [1]: Combined with previous rule.

Commented [2]: Abandoned well - Defined in 455B.171.

Commented [3]: Certified well contractor - Defined in 455B.190A.

Commented [4]: Class 1 well - Defined in 455B.190.

Commented [5]: Class 2 well - Defined in 455B.190.

Commented [6]: Class 3 well - Defined in 455B.190.

"Concrete" means a mixture of one sack (94 pounds) of Portland cement, up to but not exceeding an equal amount by volume of sand and up to but not exceeding an equal amount by volume of gravel or crushed stone and not more than six gallons of water which is free of contaminants, turbidity, and settleable solids.

"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 stone (predominantly limestone), crushed and well graded, with 100 percent passing a 1-inch sieve, in accordance with the 1984 edition of Iowa ~~d~~Department of T~~t~~ransportation (DOT) specification No. 4120.04 for Class A crushed stone.

~~*"Department"* means the department of natural resources created under Iowa Code section 455A.2.~~

~~*"Designated agent"* means a person other than the state, designated by a county board of supervisors to review and confirm that a well has been properly plugged.~~

~~*"Director"* means the director of the department.~~

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

"Frost pit" means a sunken area located directly over or within four~~4~~ feet of a well and used to house the equipment for discharging water from a well into the water system.

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

"Gravel" means stone screened from river sand or quarried, with 100 percent passing a ¾-inch sieve, in accordance with the 1984 edition of the Iowa DOT~~Ddepartment of Ttransportation~~ specification No. 4120.02 for Class B gravel.

"Groundwater" means any water beneath the surface of the earth.

"Grout" means~~, for the purposes of this chapter,~~ 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 a strong reaction with hydrochloric acid (HCL).

"Neat cement" means a mixture of one sack (94 pounds) of Portland cement to not more than six gallons of water which is free from contaminants, turbidity, or settleable solids. Bentonite up to ~~2~~two percent by weight of cement may be added to reduce shrinkage.

~~*"Owner"* means the titleholder of the land where an abandoned well is located.~~

"Pea gravel" means gravel sized from ⅛ inch to ⅜ inch in diameter.

~~*"Plug"* means the closure of an abandoned well with plugging materials by procedures which will permanently seal the well from contamination by surface drainage and permanently seal off the well from contamination into an aquifer. This involves the proper application of filling and sealing 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.

"Rock" means stone screened from river sand or quarried, free of debris, foreign matter, and any toxic or agricultural chemical residue, up to 2½ inches in diameter.

"Sand" means clean, medium-textured quartz (concrete sand), either ~~and shall be~~ at least 25 percent with diameters between 2.0 and 0.25 mm, less than 35 percent with diameters between 0.25 and 0.05 mm, and less than 5 percent with diameters between 0.002 and 0.05 mm.

"Sand cement grout" means a mixture of one sack (94 pounds) of Portland cement, an equal amount by volume of sand and not more than six gallons of water which is free from contaminants, turbidity, and settleable solids.

"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.

"Sealing" means the proper placement of sealing materials into an abandoned well to seal off flow into, out of, or between aquifers.

~~*"Sealing materials"* means bentonite products. Sealing materials may also include neat cement, sand cement grout and concrete.~~

Commented [7]: Department - Defined in 455B.190.

Commented [8]: Designated agent - Defined in 455B.190.

Commented [9]: Director - Defined in Chapter 40 and 455B.101.

Commented [10]: Filling materials - Defined in 455B.190.

Commented [11]: Owner - Defined in 455B.190.

Commented [12]: Plug - Defined in 455B.190.

Commented [13]: Sealing materials - Defined in 455B.190.

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

"Static water level" means the water level in a water well or aquifer when the well is not flowing or being pumped; sometimes referred to as the water line. The static water level for an abandoned well is determined just prior to commencing plugging operations.

"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, augered, washed, driven, dug, jetted or otherwise constructed for accessing groundwater.~~

Commented [14]: Water well - Defined in 455B.171.

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

Commented [15]: Duplicative of new 39.4(2) below.

567—39.3~~5~~(455B) Abandoned well plugging schedule.

Commented [16]: Authority to set this schedule is in 455B.190(2).

~~**39.5(1)** Class 1 wells abandoned prior to April 25, 1990, must be properly plugged by July 1, 1995.~~

~~**39.5(2)** Class 2 and 3 wells abandoned prior to April 25, 1990, must be properly plugged by July 1, 2000.~~

~~**39.5(3)** Wells near contamination sources. All classes of wells abandoned prior to April 25, 1990, and located less than 200 feet from an active well supplying potable water or located less than 660 feet from a point source of potential contamination which may include, but is not limited to, industrial waste sites; uncontrolled hazardous waste sites; petroleum storage areas; hazardous waste treatment, storage, or disposal areas; agricultural chemical storage areas; animal feedlots; and wastewater treatment facilities must be properly plugged by July 1, 1993.~~

~~**39.5(4)** Wells abandoned after April 25, 1990.~~ All classes of wells which are abandoned on or after April 25, 1990, must be properly plugged within 90 days of the date of abandonment.

567—39.4~~6~~(455B) Abandoned well owner responsibilities.

39.4~~6~~(1) *Plugging requirements.* The well owner is responsible for ensuring an~~the~~ abandoned well is plugged pursuant to this chapter.

39.4~~6~~(2) *Record.* It is the responsibility of the owner to complete, certify, and submit to the department the well plugging form documenting ~~on DNR Form 542-1226 "Abandoned Water Well Plugging Record,"~~ that an abandoned well has been plugged in accordance with the requirements ~~and time schedule contained~~ in this chapter, within 30 calendar days of the completed plugging. The well plugging form~~This report~~ shall~~must~~ include confirmation of the well plugging by the designated agent for the county or a certified well contractor. The form is available on the department's website at www.iowadnr.gov.~~Within 30 calendar days of the date the plugging was completed, the owner shall submit to the department a copy of DNR Form 542-1226.~~

567—39.5~~7~~(455B) Abandoned well plugging materials.

39.5~~7~~(1) *Sealing materials.* Approved sealing materials are bentonite products (graded bentonite, bentonite pellets, and bentonite grout), neat cement, sand cement grout, and concrete. If graded bentonite or bentonite pellets are used, they may be added by pouring in place and agitating to avoid bridging.

Commented [17]: New 39.5(1), "If graded bentonite..." - moved sentence from old 39.8(3).

39.5~~7~~(2) *Filling materials.* Approved filling materials include agricultural lime~~, soil~~, sand, pea gravel, gravel, and crushed stone. Soil may only be used to backfill the top four feet above the final sealing cap. The filling materials shall be free of debris, foreign matter, and any toxic or agricultural chemical residue. Filling materials are not required for well plugging.

Commented [18]: Added for clarification.

567—39.6~~8~~(455B) Abandoned well plugging procedures.

39.6~~8~~(1) *Freedom from obstructions.* Abandoned wells must be checked before they are plugged in order to ensure there are no obstructions that may interfere with plugging operations. Drop pipes, check valves, pumps, and other obstructions shall be removed if practical.

39.6~~8~~(2) *Removal of casing and housing for all wells.* Casing pipe and any curbing, frost pit, or pump house

Commented [19]: New 39.6(2) created to remove redundancy.

structure shall be removed to a depth of four feet below the ground surface. The remaining depth shall be sealed, as specified based on well type, backfilled with soil, and graded so that surface water is directed away from the abandoned well location.

39.6~~8~~(3~~2~~) *Class 1 wells.*

a. Class 1 ~~These~~ wells may be plugged by pouring filling and sealing materials from the top of the well or by using either tremie pipes, ~~except for sand cement grout or concrete placed below the static water level, which must be placed by tremie pipe~~ or dump bailers. Bentonite grout is not an approved sealing material for Class 1 wells. Sand cement grout or concrete placed below the static water level shall be placed by tremie pipe or dump bailer.

b. Filling materials ~~of sand, gravel, crushed stone, rock, pea gravel or agricultural lime~~ shall be placed up to one~~1~~ foot below the static water level~~; soils are not permitted below the static water level due to naturally occurring bacteriological, organic and inorganic contaminants~~. A minimum of one~~1~~ foot of sealing materials~~bentonite pellets, graded bentonite or neat cement~~ shall be placed on top of the filling material up to the static water level as a seal. ~~Sand cement grout or concrete applied with a tremie pipe or dump bailer also may be used on top of the filling material up to the static water level and in standing water above the static water level to act as a seal.~~ Filling material may then be added up to four~~4~~ feet below the ground surface.

~~It is preferable that the filling materials be omitted and that sealing materials be used to fill the entire well up to 4 feet below the ground surface. Sand cement grout or concrete shall be placed with a tremie pipe or dump bailer when used below the static water level.~~

~~The casing pipe and any curbing, frost pipe or pump house structure shall be removed to a depth of 4 feet below the ground surface and shall be capped by~~

c. A~~a~~ minimum of one~~1~~ foot of sealing materials~~bentonite pellets, graded bentonite, neat cement, sand cement grout or concrete~~ shall be placed where the casing, curbing, frost pit, or pump house structure is removed. The sealing materials~~cap~~ shall extend six~~6~~ or more inches beyond the outside diameter of the top of the remaining well casing and shall terminate three~~3~~ feet below the ground surface. The remaining three~~3~~ feet (below the ground surface) shall then be backfilled with soil and graded so that surface water is directed away from the abandoned well location.

39.6~~8~~(4~~3~~) *Class 2 wells other than bedrock wells.*

a. If the details of well construction are unknown or obstructions that may interfere with well plugging cannot be removed, the well shall be tremied full of neat cement or bentonite grout up to four~~4~~ feet below the ground surface. If bentonite grout is used from the static water level to the top of the well, it should be capped by neat cement, sand cement grout, or concrete terminating 4four feet below the ground surface.

b. Filling material ~~consisting of sand, gravel, crushed stone, pea gravel or agricultural lime~~ shall be placed in the bottom of the well up to four~~4~~ feet below the static water level. S~~A minimum of 4 feet of s~~ealing materials consisting of any bentonite products or neat cement shall be added above the filling material up to four feet below ground surface~~the original static water level~~. If bentonite grout or neat cement is used, it shall be placed by tremie pipe. Concrete and sand cement grout are permissible starting at the static water level. ~~If graded bentonite or bentonite pellets are used, they may be added by pouring in place and agitating to avoid bridging. Sealing materials shall be added above the static water level up to 4 feet below the ground surface. If bentonite grout is used from the static water level to the top of the well, it should be capped by neat cement, sand cement grout, or concrete terminating 4 feet below the ground surface.~~

~~It is preferable that the filling materials be omitted and that sealing materials be used to fill the entire well up to 4 feet below the ground surface.~~

~~Casing pipe and any curbing, frost pit or pump house structure shall be removed to a depth of 4 feet below the ground surface. The remaining 4 feet shall then be backfilled with soil and graded so that surface water is directed away from the abandoned well location.~~

39.6~~8~~(5~~4~~) *Class 2 bedrock wells.* If the details of well construction are unknown or obstructions that may interfere with well plugging cannot be removed, the well shall be tremied full of neat cement or bentonite grout up to four~~4~~ feet below the ground surface. If bentonite grout is used from the static water level to the top of the well, it should be capped by neat cement, sand cement grout, or concrete terminating four~~4~~ feet below the ground surface.

Commented [20]: Repetitive of filling material repetitive of definition.

Commented [21]: Removed text duplicative of 39.5 Abandoned well plugging materials.

Commented [22]: Suggestions, not rules. Repetitive.

Commented [23]: Duplicative of new 39.5 Abandoned well plugging materials.

Commented [24]: Old 39.8(3), "If graded bentonite..." - moved sentence to new 39.5(1).

Commented [25]: Captured in 2nd sentence of paragraph.

Commented [26]: This is the same sentence as the last sentence of the first paragraph above, now "a".

Commented [27]: Now in new 39.6(2).

~~The casing pipe and any curbing, frost pit or pump house structure shall be removed to a depth of 4 feet below the ground surface. The remaining 4 feet shall then be backfilled with soil and the surface shall then be graded to divert water away from the abandoned well location.~~

a. Bedrock wells completed in a single confined aquifer.

(1) 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 where the pressure in the confined aquifer causes the water to flow from the well to the surface. In such cases, filling materials shall be placed in the lower portion of the well before the bridge plug or packer is set.

(2) Filling material ~~consisting of pea gravel, crushed stone, gravel or agricultural lime~~ shall be placed from the bottom of the well up to 10 feet below the bottom of the casing or uncased confining layer, whichever is lower. Sealing materials consisting of any bentonite products, sand cement grout, or neat cement shall be placed from the top of the filling material to at least 10 feet above the bottom of the casing or uncased confining layer or to the static water level, whichever is higher. If bentonite grout, neat cement, or sand cement grout is used, it shall be placed by tremie pipe. ~~If graded bentonite or bentonite pellets are used, they shall be added by pouring in place and agitating to avoid bridging.~~ The casing shall then be filled up to four~~4~~ feet below the ground surface with sealing materials. If bentonite grout is used from the static water level to the top of the well, it should be capped by neat cement, sand cement grout, or concrete terminating four~~4~~ feet below the ground surface.

(3) It is preferable that the filling materials be omitted and that approved sealing materials be used to fill the entire well up to four~~4~~ feet below the ground surface.

~~The casing pipe and any curbing, frost pit or pump house structure shall be removed to a depth of 4 feet below the ground surface. The remaining 4 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.

(1) For the lowest aquifer, filling material ~~consisting of pea gravel, crushed stone, gravel or agricultural lime~~ shall be placed from the bottom of the well up to 10 feet below the bottom of the casing or uncased confining layer, whichever is lower. Neat cement tremied in place shall then be placed as a sealing material on top of the fill and extend upward at least 20 feet. Sealing materials shall then be placed in at least the top 10 feet of each subsequent aquifer and extend at least 10 feet into the confining layer or casing above, whichever is higher. The same type of filling materials and sealing procedures shall apply for each subsequent aquifer.

(2) Filling material may be placed from the top of the uppermost aquifer seal up to the static water level of the well. The casing shall then be filled with ~~approved~~ sealing ~~or filling~~ materials to four~~4~~ feet below the ground surface. If bentonite grout is used from the static water level to the top of the well, it should be capped by neat cement, sand cement grout, or concrete terminating four~~4~~ feet below the ground surface.

(3) It is preferable that the filling materials be omitted and approved sealing materials be used to fill the entire well up to four~~4~~ feet below the ground surface. Sand cement grout or concrete shall be applied with a tremie pipe or dump bailer when applied below the static water level.

~~The casing pipe and any curbing, frost pit or pump house structure shall be removed to a depth of 4 feet below the ground surface. The remaining 4 feet shall then be backfilled with soil and graded so that surface water is directed away from the abandoned well location.~~

39.6~~8~~(6~~5~~) *Class 3 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. If the sandpoint and casing cannot be extracted, they shall be tremied full of neat cement or completely sealed with bentonite products.

~~The casing pipe and any curbing, frost pit or pump house structure shall be removed to a depth of 4 feet below the ground surface. The remaining 4 feet shall then be backfilled with soil and graded so that surface water is directed away from the abandoned well location.~~

~~**567—39.9(455B) Designated agent.** A county's board of supervisors shall appoint an individual to be responsible to review and confirm an abandoned well to be properly plugged as required by 567—39.8(455B)~~

Commented [28]: Now in new 39.6(2).

Commented [29]: Duplicative of 39.5 Abandoned well plugging materials.

Commented [30]: Added for clarity.

Commented [31]: Duplicative of new 39.5 Abandoned well plugging materials.

Commented [32]: Now in new 39.6(2).

Commented [33]: Duplicative of new 39.5 Abandoned well plugging materials.

Commented [34]: Now in new 39.6(2).

Commented [35]: Now in new 39.6(2).

Commented [36]: Old 39.9 - not needed; in Iowa Code section 455B.190.

~~and authorized by Iowa Code section 455B.190. The designation is effective upon notification to the department by the chairperson of the board of supervisors. This notification will include the identity of the designated agent and the length of appointment. Changes in a designated agent will require new notification by the chairperson to the department.~~

567—39.7~~10~~(455B) Designation of standby wells.

39.6~~10~~(1) *Standby wells.* All standby wells shall:

a. ~~A standby well must b~~Be disinfected prior to being taken out of use for a long period of time and ~~must be disinfected and, as a minimum, checked for bacteria and nitrates~~ when placed back in service. ~~Disinfection of standby wells shall be done~~ in accordance with rule 567—49.24 (455B). ~~AWWA (American Water Works Association) Standard A100;. The well must~~

b. Be checked for bacteria and nitrates, as a minimum, when placed back in service;

c. ~~n~~Not be subject to contamination by surface drainage or from other causes; ~~, and the~~

d. ~~well casing must b~~Be provided with an airtight well casing cover when the well is not in use; and ~~. A well must~~

e. ~~b~~Be repaired so that there is no degradation of groundwater and it is suitable for use prior to being classified as a standby well.

39.7~~10~~(2) *Caveat.* Nothing in these rules shall be construed as exempting public water supply wells from any other requirements set forth in state rules~~the environmental protection commission rules, 567—Iowa Administrative Code~~.

567—39.8~~11~~(455B) Waivers.~~Variances.~~ ~~In accordance with Iowa Code section 455B.181, a~~A waiver~~variance~~ to these rules may be granted by the department provided sufficient information substantiating the need for a waiver is submitted in accordance with the department's waiver procedures in 561—Chapter 10. ~~writing to the department to substantiate the need for a variance and to ensure the protection of all aquifers penetrated by the affected well.~~ When satisfactory justification has been submitted to the director demonstrating that a waiver~~variance~~ to these rules will result in equivalent ~~effectiveness~~ or improved effectiveness and equivalent protection of all aquifers penetrated by the affected well, a waiver~~variance~~ to these rules may be granted by the director. A waiver denial ~~of a variance~~ may be appealed to the ~~E~~environmental ~~P~~protection commission pursuant to 567—Chapter 7.

These rules are intended to implement Iowa Code sections 455B.171 and 455B.190.

[Filed 9/29/88, Notice 4/20/88—published 10/19/88, effective 11/23/88][1]
[Filed 3/2/90, Notice 11/15/89—published 3/21/90, effective 4/25/90][2]
[Filed 8/31/90, Notice 7/11/90—published 9/19/90, effective 10/24/90]
[Filed without Notice 4/23/93—published 5/12/93, effective 7/1/93]

[1] Effective date (11/23/88) delayed until adjournment of the 1989 Session of the General Assembly pursuant to Iowa Code section 17A.8(9) by the Administrative Rules Review Committee at its November 15, 1988 meeting.

[2] Effective date of 39.8(3), second paragraph, first sentence, and 39.8(4) *"a,"* second paragraph, first sentence, delayed 70 days from 4/25/90 by the Administrative Rules Review Committee at its 4/12/90 meeting.

Commented [37]: Moved to new 39.6(1)"b".

Commented [38]: Moved from first sentence in old 39.10(1).

Commented [39]: 455B.181 is not relevant to well plugging.

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Commented [42]: Commission is defined in Chapter 40.