



November 4, 2019

## Subject – Iowa well plugging/sealing requirements during Flood Buy-out Programs

Below you will find detailed well plugging instructions for water wells located in areas within Iowa that are offered flood buy-out programs. For information, please contact Russ Tell, Iowa DNR Private Well Program, phone 515-725-0462, or by email mail to: <mailto:russell.tell@dnr.iowa.gov>.

### Class 3 Wells aka “Sandpoint Wells” – 2” or less in inside diameter steel cased wells

1. Try to pull/extract sandpoint pipe out of the ground if possible. Most point pipes will pull using even and constant pull of reasonable force.
  - a. If pulling pipe is possible:
    - i. Slowly fill the entire remaining borehole with dry bentonite sealing materials until the sealing material reaches the ground surface. Grout may be mixed and placed by tremie pipe as an alternative.
    - ii. Slowly hydrate the bentonite if upper borehole is dry.
    - iii. Compact the sealing materials from surface – refilling the borehole with additional sealing material as needed. Repeat filling with sealing materials as necessary during compaction until sealing materials no longer displaces/settle.
  - b. If pulling the pipe is not possible:
    - i. Slowly plug the well casing/pipe by normal methods using all bentonite sealing materials to a depth of 4 feet below the surface grade.
    - ii. Excavate well head and remove pipe to a minimum depth of 4 feet below surface grade – take care not to over excavate the well as it will require excessive quantities of sealing materials.
    - iii. Place a 1’ thick (minimum) cap of bentonite sealing materials directly over the well head and compact, then hydrate bentonite sealing materials.
    - iv. Gently close excavation, then compact from the surface.
2. Add fill until the final surface elevation at and nearby the well location is at least 6 inches higher than surrounding land surface. This allows for settling and reduce the chances for water pooling during precipitation or flooding events.
3. Complete Iowa DNR Form 542-1226 and any additional documents as required by the local and federal authorities.
4. Submit well plugging form to the local county health department for entry into the Iowa DNR Private Well Tracking System.

## **Class I Wells – Augered or bored wells – wells with tile well curbing 18” and greater in diameter.**

Note: For plugging this type of well, Iowa well plugging rules allow for use of either all sealing materials, or lesser quantity of sealing materials and the use of clean inert fill to fill space within the well during plugging.

1. Measure well depth, well diameter, and static water level - record the measurements so the amount of materials can be calculated and the placement of the first layer of sealing material can be determined.
2. Obtain clean inert filling materials and Holeplug style bentonite clay in adequate quantities as needed to fill and plug well.
3. Remove well pump and all other potential obstructions that may cause bridging of fill and sealing materials.
4. Fill the well using one of the procedures noted in item “a” or item “b” as listed below.
  - a. Slowly fill entire well with bentonite sealing materials to a depth of 5 feet below grade.
  - b. Use clean inert fill with bentonite sealing materials placed at strategic depths.
    - i. Slowly fill the lower well tile with clean inert fill materials taking care not to cause bridging of the material. Continue filling in this manner until you reach the aquifer’s static water level, or if the water level seems artificially high, one-half the depth of the well.
    - ii. Slowly place 1’ of Holeplug style bentonite into well taking care not to introduce too many of the bag’s sized particles – ie. pellet size and smaller.
    - iii. Slowly fill the upper well tile with clean inert fill materials taking care not to cause bridging of the material. Continue filling in this manner until you reach a depth of 5’ below ground surface.
5. Excavate well head and remove pipe to a minimum depth of 4 feet below surface grade – take care not to over excavate the well as it will require excessive quantities of sealing materials - then remove the upper 4’ of well curbing.
  - i. Pour a 1’ minimum bentonite cap inside the well curbing.
  - ii. Continue to place bentonite sealing materials over the top of the well – creating a “mushroom cap” appearing pile of bentonite.
  - iii. Hydrate the bentonite in place to assist sealing.
  - iv. Gently close excavation, then compact from the surface.
  - v. The final surface elevation should be at least 6 inches higher than surrounding land surface to allow for settling and reduce the pooling due to precipitation or flooding.
  - vi. Complete Iowa DNR Form 542-1226 and any additional documents as required by the local and federal authorities.
  - vii. Submit well plugging form to the local county health department for entry into the Iowa DNR Private Well Tracking System.

## Class II Wells, aka “Drilled Wells” – Steel and PVC cased wells 3” and greater in diameter

Note: For plugging of drilled wells, Iowa well plugging rules allow for use of either all sealing materials, or lesser sealing materials and the use of clean inert fill to fill space within the well that is being filled – depending on if a detailed well log exists for the well being plugged.

1. Measure well depth, well diameter, and static water level - record the measurements so the proper amount of materials can be calculated.
2. Obtain clean inert filling materials and Holeplug style bentonite clay in adequate quantities as calculated using a borehole volume calculator.
3. Remove well pump and any other potential obstructions that may cause bridging of fill and sealing materials.
  - a. If a well log does not exist for the well or the well has obstructions that cannot be removed and may interfere with well plugging:
    - i. The well shall be tremied full of neat cement or bentonite grout up to 4 feet below the ground surface.
    - ii. If bentonite grout is used from the static water level to the top of the well, it shall be capped by neat cement, sand cement grout or concrete terminating 4 feet below the ground surface.
  - b. If a well log exists for the well and no obstructions are found that may interfere with well plugging, Holeplug style bentonite may be used. When used, this procedure shall follow the actions below.
    - i. Slowly fill the well casing using great care to prevent bridging of the sealing materials.  
Note - Care must be used to ensure the bentonite dust and smaller pellets of bentonite do not fall into the well or the water as it creates a “gel” of bentonite that easily bridges. This makes the well appear to be full – but leaving unfilled area below the gelled bridge of bentonite that will settle many days, weeks or months after the plugging takes place.
    - ii. Continue filling in this manner until you reach 5’ below the ground surface.
4. Excavate well head to a minimum depth of 4 feet below surface grade – take care not to over excavate the well as it will require excessive quantities of sealing materials - then remove the upper 4’ of well casing.
  - i. Pour a 1’ minimum neat cement cap inside the upper well casing.
  - ii. Pour bentonite sealing materials over the top of the well – creating a “mushroom cap” appearing pile of bentonite over the top of the well.
  - iii. Carefully hydrate the bentonite taking care not to damage the neat cement plug.
  - iv. Gently close excavation, then compact from the surface.
  - v. The final surface elevation should be at least 6 inches higher than surrounding land surface to allow for settling and reduce the pooling due to precipitation or flooding.
  - vi. Complete Iowa DNR Form 542-1226 and any additional documents as required by the local and federal authorities.
  - vii. Submit well plugging form to the local county health department for entry into the Iowa DNR Private Well Tracking System.

**Class I Wells – Hand dug wells – wells of larger diameter lined with brick, rock, or field stones. Many times these wells are 50 -72 inches in diameter.**

Note: For plugging this type of well, Iowa well plugging rules allow for use of clean inert fill to fill space within the well, and the placement of two 1' thick layers of bentonite clay – one at the static water level (or one-half the well depth) and one starting a 5' below surface grade.

1. Measure well depth, well diameter, and static water level - record the measurements so the amount of materials can be calculated and the placement of the first layer of sealing material can be determined.
2. Obtain clean inert filling materials and Holeplug style bentonite clay in adequate quantities as calculated using a borehole volume calculator.
3. Remove well pump and any other potential obstructions that may cause bridging of fill and sealing materials.
4. Start to fill the well slowly with pea stone, road stone, or coarse sand. The finer the material the longer it will take to fill the well. Apply bentonite chips at the proper depth.
  - a. Slowly fill the lower well tile with clean inert fill materials taking care not to cause bridging of the material. Continue filling in this manner until you reach the aquifer's static water level, or if the water level seems artificially high, one-half the depth of the well.
  - b. Slowly place 1' of bentonite Holeplug style bentonite into well taking care not to introduce too many of the bag's fine sized particles – ie. below 3/8" and smaller.
  - c. Slowly fill the upper well tile with clean inert fill materials taking care not to cause bridging of the material. Continue filling in this manner until you reach a depth of 5' below ground surface.
5. Excavate well head and remove bricks or stones to a depth of 4 feet below surface grade – take care not to over excavate the well as it will require excessive quantities of sealing materials.
  - a. Pour a 1' minimum bentonite cap starting inside the stone lining.
  - b. Continue to place bentonite sealing materials over the top of the well – creating a “mushroom cap” appearing pile of bentonite over the top of the well.
  - c. Hydrate the bentonite with water.
  - d. Gently close excavation, then compact from the surface.
  - e. The final surface elevation should be at least 6 inches higher than surrounding land surface to allow for settling and reduce the pooling due to precipitation or flooding.
  - f. Complete Iowa DNR Form 542-1226 and any additional documents as required by the local and federal authorities.
  - g. Submit well plugging form to the local county health department for entry into the Iowa DNR Private Well Tracking System.

## **Groundwater Cisterns**

### **Below grade water storage chambers designed to hold rain water or groundwater until needed for use.**

Note: These structures are not water supply wells, but they can be a groundwater and safety threat if they are not properly abandoned when no longer needed.

1. Measure cistern depth, cistern diameter, or length and width, and note if the cistern currently holds water. Calculate the cubic foot of clean inert fill material needed to fill chamber.
2. Obtain the necessary quantity of clean inert filling materials.
3. Remove all trash that may contaminate the groundwater if left in place. General rocks and rubble may remain in the cistern as part of the required fill.
4. Perforate the bottom of the cistern in at least two places to allow surface water a pathway to drain through the filled cistern.
5. Remove cistern top and upper cistern walls if practical. The rubble from the removal can be placed into the cistern as part of the fill.
6. Fill the cistern opening with clean inert fill material like Ag lime, fill sand, or sandy topsoil that is clean and free of contamination.
7. Finish filled area with a cap of clean soil that is at least 6 inches above the surrounding surface grade to allow for settling. Note – if the cistern top and upper walls are used as fill, increase the amount of soil above the surface to allow for additional settling.
8. Complete Iowa DNR Form 542-1226 and any additional documents as required by the local and federal authorities.
9. Submit Form 542-1226 to the local county.

## **Frost pits/vaults that contain water wells or pressure system related components**

### **Below grade frost-free structures used to house wells, pressure systems, or combinations of both wells and water systems.**

1. Ensure the any well housed within the frost pit/vault is properly plugged using the proper procedure found earlier in this document for the type of well found.
2. Follow the cistern procedure as noted above.
3. For pits/vaults that contain a water well, make sure to note that a well pit/vault was filled as part of the well plugging.
4. For pits/vaults that do not contain a water well, no form is required by the state at this time.
5. Complete and submit any documents required by the local and federal authorities.