

Well plugging specification for Hubbard Ice Co. Jordan well – GeoSam ID W-7621

NOTE 1: GeoSam ID W-2867 was used to determine the geological profile from 0 – 420 feet below surface grade. More specific plugging protocol may be provided if a casing log for this well is found before plugging activity starts.

Note 2: This plugging protocol replaces a number of the major aquicludes/aquitards penetrated when the well was originally drilled.

Note 3: Well depth should be determined before any plugging is initiated. If measured depth of well is less than full recorded depth, reasonable effort must be used to try to “wash” the tremie pipe (drill pipe) through the obstruction before any fill or grout is placed. If the obstruction will not yield, the plugging may start from the measured depth upward starting with a 25’ thick sealing layer. Please note that if the measured depth of the well is much less than 1450, you should contact the DNR for additional discussion and guidance.

Note 4: This plugging spec utilizes both fill material (clean 3/4” limestone chips) and sealing material (pumpable bentonite grout or pumpable neat cement grout). Grout shall be placed via tremie pipe at the bottom of each sealing level.

Plugging described from the bottom of the well upward as follows:

Fill with ¾ inch road stone from 1515’ to 1365’ (150’)

Seal from 1365’ to 1335’ (30’) – Seal directly above Jordan aquifer

Fill with ¾ inch road stone from 1350’ to 1250’ (100’)

Seal from 1250’ to 1135’ (115’) – Oneota seal

Fill with ¾ inch road stone from 1135’ to 985’ (150’) – St. Peter aquifer + top of PduC

Seal from 985’ to 895’ (90’) – Glenwood seal

Fill with ¾ inch road stone from 895’ to 450’ (445’)

Seal from 450’ to 415’ (35’) - Maquoketa seal – Ordovician top

Fill material - ¾ inch road stone from 415’ to 325’ (80’) – lower Silurian aquifer

Seal from 325’ to 300’ (25’) – mid Silurian confining unit

Fill with ¾ inch road stone from 300’ to 200’ (100’) – upper Silurian aquifer - fractured.

Seal from 200’ to 180’ (20’) – mid Devonian seal

Fill with ¾ inch road stone from 180’ to 140’ (40’) – Fractured bedrock area

Seal from 140’ to 115’ (25’) – Glacial contact seal

Fill material - ¾ inch road stone from 115' to 90' (25') – lower casing fill

Seal from 90' to 55' (45') – First seal below alluvium

Fill material - ¾ inch road stone from 55' to 30' (20') – upper casing fill

Seal from 30' to 4' (26') to seal off the upper well casing after removing the casing from the surface down to 4' below grade. Watch for subsidence of grout and replace as necessary. If bentonite grout is used, please make sure that a 1' thick plug of concrete is the final cap inside the well casing from 5' below grade to 4' below grade.

Additional comments:

- 1) If there are any nearby wells being pumped, extreme care should be used in plugging this well because of the chance of grout movement to nearby wells. The well may need to be plugged in separate "lifts" with enough time between each lift to ensure grout set.
- 2) This type of plugging will take multiple days – dependent on well open depth and equipment/experience you have with plugging deep wells.
- 3) Please contact Russ Tell at 515.725.0462 if you have any questions, comments, concerns, or for future guidance based on actual plugging activity.