

February 10, 2021

VIA EMAIL ONLY

Nancy Breems
Secretary of State, Elections Division
180 State Office Building
100 Rev Dr Martin Luther King Jr Blvd
St. Paul, Minnesota 55155-1299
official.documents@state.mn.us

**Re: *In the Matter of the Bored Geothermal Heat Exchanger Rules*
OAH 21-9000-36766; Revisor R-4192**

Dear Ms. Breems:

Enclosed for filing is an electronic copy of the above-entitled adopted rules.

Please send the agency copy of the rules to:

Nancy Jo La Plante
Minnesota Department of Health
625 Robert St N
PO Box 64975
Saint Paul, MN 55164
nancyjo.laplant@state.mn.us

If you have any questions regarding this matter, please contact Denise Collins at (651) 361-7875, denise.collins@state.mn.us or via facsimile at (651) 539-0310.

Sincerely,



LISA ARMSTRONG
Legal Assistant

Enclosures

cc: Nancy Jo La Plante (via email)

Date Filed: February 10, 2021
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Office of the Minnesota Secretary of State
Steve Simon

1.1 **Department of Health**

1.2 **Adopted Permanent Rules Governing Wells and Borings**

1.3 **4725.0100 DEFINITIONS.**

1.4 *[For text of subp 1, see M.R.]*

1.5 Subp. 1a. **Absorption area.** "Absorption area" has the meaning given in part
1.6 7080.1100, subpart 2, and includes the area of soil designed to absorb sewage effluent.

1.7 *[For text of subps 1b to 21d, see M.R.]*

1.8 Subp. 21e. **Bored geothermal heat exchanger.** "Bored geothermal heat exchanger"
1.9 has the meaning given in Minnesota Statutes, section 103I.005, subdivision 1a, and includes
1.10 bored geothermal heat exchanger piping installed in a boring for thermal conductivity testing.
1.11 Bored geothermal heat exchanger does not include a closed-loop piping system installed in
1.12 a boring 15 feet or less below the established ground surface.

1.13 Subp. 21f. **Bored geothermal heat exchanger contractor.** "Bored geothermal heat
1.14 exchanger contractor" means a person issued a limited well/boring contractor's license for
1.15 constructing, repairing, and sealing bored geothermal heat exchangers.

1.16 Subp. 21g. **Bored geothermal heat exchanger piping.** "Bored geothermal heat
1.17 exchanger piping" means the pipe and fittings of a bored geothermal heat exchanger installed
1.18 and buried below the ground surface and includes:

1.19 A. the pipe loop installed in a bore hole;

1.20 B. the buried pipe between a bore hole and a header or manifold;

1.21 C. the buried header or manifold; and

1.22 D. buried supply and return pipe between a buried header or manifold and the
1.23 heat pump.

2.1 Subp. 21h. **Boring.** "Boring" has the meaning given in Minnesota Statutes, section
2.2 103I.005, subdivision 2, and includes environmental bore holes, bored geothermal heat
2.3 exchangers, and elevator borings, except that for the purposes of this chapter, boring does
2.4 not include exploratory borings regulated under chapter 4727.

2.5 *[For text of subps 22 to 23, see M.R.]*

2.6 Subp. 23a. **Community water system.** "Community water system" has the meaning
2.7 given in Code of Federal Regulations, title 40, section 141.2, and means a public water
2.8 system that serves at least 15 service connections used by year-round residents, or regularly
2.9 serves at least 25 year-round residents.

2.10 *[For text of subps 23b to 24g, see M.R.]*

2.11 Subp. 24h. **Directional drilling.** "Directional drilling" means a drilling method that
2.12 utilizes a steerable drill bit to cut a bore hole for installing underground pipe. Directional
2.13 drilling is also known as horizontal directional drilling, or HDD.

2.14 *[For text of subps 25 to 30g, see M.R.]*

2.15 Subp. 30h. **Interceptor.** "Interceptor" has the meaning given in Uniform Plumbing
2.16 Code (UPC) section 211.0 as incorporated by part 4714.0050.

2.17 *[For text of subps 30i to 48, see M.R.]*

2.18 Subp. 48a. **Suction line.** "Suction line" means a pipe or line connected to the inlet
2.19 side of a pump or pumping equipment or any connection to a casing that may conduct
2.20 nonsystem water into the well or boring because of negative pressures.

2.21 Subp. 48b. **Thermally enhanced bentonite grout.** "Thermally enhanced bentonite
2.22 grout" means a bentonite-based grout that is mixed with sand or graphite to improve the
2.23 thermal efficiency of a bored geothermal heat exchanger system.

2.24 *[For text of subps 49a to 49d, see M.R.]*

3.1 Subp. 49e. [See repealer.]

3.2 Subp. 49f. [See repealer.]

3.3 Subp. 49g. [See repealer.]

3.4 *[For text of subps 49h to 54, see M.R.]*

3.5 **4725.0150 INCORPORATIONS BY REFERENCE AND ABBREVIATIONS.**

3.6 This part indicates documents, specifications, and standards that are incorporated by
3.7 reference in this chapter. This material is not subject to frequent change and is available
3.8 from the source listed, for loan or inspection from the Minnesota Department of Health, or
3.9 through the Minitex interlibrary loan system. To borrow or inspect a reference, e-mail the
3.10 Minnesota Department of Health Well Management section at health.wells@state.mn.us,
3.11 or go to Search Minnesota Department of Health Library and Beyond
3.12 (www.minnesotadepartmentofhealthlibrary.on.worldcat.org/discovery). The abbreviations
3.13 listed in parenthesis after the source name are used in this chapter.

3.14 *[For text of items A and B, see M.R.]*

3.15 C. American National Standards Institute (ANSI), 25 West 43rd Street, New York,
3.16 New York 10036.

3.17 ANSI Schedule 5 and Schedule 40, "Dimensions of Welded and Stainless Steel Pipe"
3.18 as contained in ASA Standard B36.19 - 1965, "Welded and Seamless Wrought Steel Pipe."

3.19 *[For text of item D, see M.R.]*

3.20 E. ~~American Society for Testing and Materials (ASTM)~~ International, 100 Barr
3.21 Harbor Drive, West Conshohocken, PA 19428-2959.

3.22 *[For text of subitems (1) to (7), see M.R.]*

4.1 (8) ASTM D2683-14, "Standard Specification for Socket-Type Polyethylene
4.2 Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing."

4.3 (9) ASTM D3035-15, "Standard Specification for Polyethylene (PE) Plastic
4.4 Pipe (DR-PR) Based on Controlled Outside Diameter."

4.5 (10) ASTM F480-02, "Standard Specification for Thermoplastic Water Well
4.6 Casing Pipe and Couplings Made in Standard Dimension Ratios (SDR), SCH 40, and SCH
4.7 80."

4.8 (11) ASTM F714-13, "Standard Specification for Polyethylene (PE) Pipe
4.9 (DR-PR) Based on Outside Diameter."

4.10 (12) ~~ASTM F876-15a~~ F876-20, "Standard Specification for Crosslinked
4.11 Polyethylene (PEX) Tubing."

4.12 (13) ~~ASTM F877-11a~~ F877-20, "Standard Specification for Crosslinked
4.13 Polyethylene (PEX) Hot- and Cold-Water Distribution Systems."

4.14 (14) ASTM F1055-16, "Standard Specification for Electrofusion Type
4.15 Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked
4.16 Polyethylene (PEX) Pipe and Tubing."

4.17 (15) ASTM F1807-19b, "Standard Specification for Metal Insert Fittings
4.18 Utilizing a Copper Crimp Ring, or Alternate Stainless Steel Clamps, for SDR9 Cross-linked
4.19 Polyethylene (PEX) Tubing and SDR9 Polyethylene of Raised Temperature (PE-RT)
4.20 Tubing."

4.21 (16) ASTM F1960-19a, "Standard Specification for Cold Expansion Fittings
4.22 with PEX Reinforcing Rings for Use with Cross-linked Polyethylene (PEX) and Polyethylene
4.23 of Raised Temperature (PE-RT) Tubing."

5.1 ~~(15)~~ (17) ASTM ~~F2080-16~~ F2080-19, "Standard Specification for
5.2 Cold-Expansion Fittings with Metal Compression-Sleeves for Crosslinked Polyethylene
5.3 (PEX) Pipe and SDR9 Polyethylene of Raised Temperature (PE-RT) Pipe."

5.4 ~~(16)~~ (18) ASTM ~~F2620-13~~ F2620-19, "Standard Practice for Heat Fusion
5.5 Joining of Polyethylene Pipe and Fittings."

5.6 *[For text of item F, see M.R.]*

5.7 G. National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101,
5.8 Quincy, MA 02269-9101, NFPA 30, "Flammable and Combustible Liquids Code, 2015
5.9 Edition."

5.10 H. NSF International, 789 Dixboro Road, P.O. Box 130140, Ann Arbor, Michigan
5.11 48113.

5.12 (1) ANSI/NSF 14-2003, "Plastics Piping System Components and Related
5.13 Materials."

5.14 (2) ANSI/NSF ~~60-2016~~ 60-2018, "Drinking Water Treatment Chemicals -
5.15 Health Effects."

5.16 (3) ANSI/NSF 61-2003e, "Drinking Water System Components - Health
5.17 Effects."

5.18 (4) NSF White BookTM - Nonfood Compounds Listing Directory.

5.19 I. Sims, P.K. and Morey, G.B., "Geology of Minnesota: A Centennial Volume,"
5.20 pages 459-473, "Paleozoic Lithostratigraphy of Southeastern Minnesota" by George Austin,
5.21 1972.

5.22 J. United States Department of Agriculture, Agricultural Handbook Number 18,
5.23 Soil Survey Manual pages 136 to 140, October 1993.

6.1 **4725.0200 APPLICATION TO ALL WELLS AND BORINGS.**

6.2 *[For text of subps 1 to 3, see M.R.]*

6.3 Subp. 4. **Access to information and property.** Upon presentation of credentials, the
6.4 commissioner or an employee or agent authorized by the commissioner, may examine
6.5 records or data related to matters governed by Minnesota Statutes, chapter 103I, and section
6.6 144.99, of any person subject to regulation under Minnesota Statutes, chapter 103I, and,
6.7 for the purpose of taking an action authorized under statute or rule, or otherwise identified
6.8 in Minnesota Statutes, section 144.99, subdivision 1, relating to the enforcement of this
6.9 chapter, may:

6.10 *[For text of items A to D, see M.R.]*

6.11 *[For text of subp 5, see M.R.]*

6.12 **4725.0475 ACTIVITIES REQUIRING LICENSURE OR REGISTRATION.**

6.13 Subpart 1. **Activity requiring licensure or registration.** Except for those persons
6.14 exempted under Minnesota Statutes, section 103I.205, subdivision 4, paragraph (e), a person
6.15 must hold a license or registration issued by the commissioner to:

6.16 *[For text of items A to F, see M.R.]*

6.17 *[For text of subps 2 to 7, see M.R.]*

6.18 **4725.0650 EXPERIENCE REQUIREMENTS; CERTIFIED REPRESENTATIVE**
6.19 **AND INDIVIDUAL WELL CONTRACTOR.**

6.20 *[For text of subp 1, see M.R.]*

6.21 Subp. 2. **Monitoring well contractor certified representative.** Anyone applying to
6.22 be certified as a representative of a monitoring well contractor must meet the requirements
6.23 in items A to C or meet the requirements in item D.

6.24 *[For text of items A to D, see M.R.]*

7.1 *[For text of subps 3 to 7, see M.R.]*

7.2 Subp. 7a. **Limited well/boring contractor certified representative; bored geothermal**
7.3 **heat exchanger.** Anyone applying to be certified as a representative for a limited well/boring
7.4 contractor licensed to construct, repair, or seal bored geothermal heat exchangers must meet
7.5 the requirements in item A or B.

7.6 A. The applicant must have three years of experience constructing, repairing, and
7.7 sealing bored geothermal heat exchangers. A year of experience is a year in which the
7.8 applicant:

7.9 (1) constructed at least three permitted bored geothermal heat exchanger
7.10 systems;

7.11 (2) constructed at least 2,000 feet of bored geothermal heat exchanger bore
7.12 hole; and

7.13 (3) worked at least 500 hours designing, constructing, or field supervising
7.14 the construction, repair, or sealing of bored geothermal heat exchangers.

7.15 Experience must be obtained under the supervision of a licensed well contractor or
7.16 licensed bored geothermal heat exchanger contractor, unless that experience was obtained
7.17 during directionally drilling bored geothermal heat exchanger systems that were not regulated
7.18 by this chapter at the time of construction. Experience on unregulated systems ~~shall be~~
7.19 ~~counted~~ counts toward an applicant's experience, whether or not the ~~work~~ experience was
7.20 ~~done~~ obtained under the supervision of a licensed well contractor or licensed bored
7.21 geothermal heat exchanger contractor.

7.22 B. The applicant must:

7.23 (1) have three years of experience in well drilling. A year of experience is a
7.24 year in which the applicant, under the supervision of a licensed well contractor:

8.1 (a) constructed at least ten water-supply wells; and

8.2 (b) worked at least 1,000 hours constructing, repairing, or sealing wells
8.3 and borings; and

8.4 (2) be accredited by the International Ground Source Heat Pump Association
8.5 or certified by the National Ground Water Association as a ground source heat pump driller
8.6 or installer, or have an equivalent certification, as determined by the commissioner, based
8.7 on number of hours of training, subject material, and testing.

8.8 *[For text of subps 8 and 9, see M.R.]*

8.9 **4725.0900 COUNCIL EVALUATION OF APPLICANTS.**

8.10 Upon request by the commissioner, the council may conduct oral examinations using
8.11 a standardized examination developed by the commissioner in consultation with the council.

8.12 Upon request by the commissioner, the council may also provide recommendations as to
8.13 the appropriate disciplinary action for representatives, licensees, and registrants found to
8.14 be in violation of this chapter and Minnesota Statutes, chapter 103I.

8.15 **4725.1675 CRITERIA FOR CONTINUING EDUCATION.**

8.16 A Continuing education activity must meet the criteria in items A to E for credit to be
8.17 given.

8.18 A. ~~The activity~~ Continuing education must be related to wells or borings, drilling
8.19 technology, groundwater contamination, health aspects of water quality, groundwater
8.20 monitoring, geology, hydrology, well or boring construction or sealing, water systems or
8.21 treatment, geothermal systems, dewatering, or elevator borings, ~~or other subjects approved~~
8.22 ~~by the commissioner.~~ Any other continuing education topic must be approved by the
8.23 commissioner.

8.24 *[For text of items B to E, see M.R.]*

9.1 **4725.1833 BORED GEOTHERMAL HEAT EXCHANGER CONSTRUCTION**
9.2 **PERMITS.**

9.3 This part applies to the construction of bored geothermal heat exchangers, including
9.4 bored geothermal heat exchanger piping installed in a boring for thermal conductivity testing.

9.5 A. A bored geothermal heat exchanger must not be constructed, or have piping
9.6 installed or removed below the frost line, until a permit has been issued by the commissioner
9.7 to the well or bored geothermal heat exchanger contractor.

9.8 B. The well contractor or bored geothermal heat exchanger contractor must submit
9.9 to the commissioner a bored geothermal heat exchanger permit application on a form
9.10 provided by the commissioner. The application must be legible and signed by the well
9.11 contractor or bored geothermal heat exchanger contractor and the property owner or property
9.12 owner's agent. The application must include:

9.13 (1) the name and license number of the well contractor or bored geothermal
9.14 heat exchanger contractor;

9.15 (2) the name and address of the owner of the property on which the bored
9.16 geothermal heat exchanger will be installed;

9.17 (3) the township number, range number, section and one quartile, and the
9.18 property street address if assigned, of the proposed bored geothermal heat exchanger;

9.19 (4) a plan diagram showing the location of the bored geothermal heat
9.20 exchanger borings, property lines, and structures on the property;

9.21 (5) the geological materials expected to be encountered by the borings;

9.22 (6) the number, diameter, and depth of all bore holes drilled to install the
9.23 bored geothermal heat exchanger piping;

9.24 (7) the grout materials and grouting method;

10.1 (8) the type of heat transfer fluid to be used; and

10.2 (9) the system operating pressure.

10.3 C. The well contractor or bored geothermal heat exchanger contractor must inform
10.4 the commissioner of the proposed construction starting time 24 hours before starting
10.5 construction of bored geothermal heat exchanger borings. The information must be reported
10.6 by telephone, facsimile, electronically, or in person between ~~the hours of~~ 8:00 a.m. and 4:30
10.7 p.m., Monday through Friday, excluding holidays.

10.8 *[For text of item D, see M.R.]*

10.9 **4725.1851 WELL AND BORING RECORDS.**

10.10 *[For text of subp 1, see M.R.]*

10.11 Subp. 2. **Construction records.** Construction records for wells and borings must be
10.12 completed on a form provided by the commissioner and must contain the information in
10.13 subpart 3, items A to F, and the following information:

10.14 *[For text of items A to L, see M.R.]*

10.15 M. hydrofractured interval if hydrofractured;

10.16 N. drilling fluid used; and

10.17 O. for bored geothermal heat exchangers, the following additional information
10.18 must be provided either on the commissioner's form or on an accompanying document:

10.19 (1) the location where each pipe loop enters the drilled hole must be shown
10.20 on a scaled map with angles and directions from surveyed property corners, a permanent
10.21 benchmark, or the corner of a permanent structure;

11.1 (2) for bored geothermal heat exchanger piping installed using directional
11.2 drilling technology, a scaled map showing the location of the entire length of each pipe loop
11.3 and a cross-sectional profile showing the depth profile of the pipe loops;

11.4 (3) GPS coordinates for the location where each pipe loop enters the drilled
11.5 hole or GPS coordinates marking the corners or perimeter of the loop field;

11.6 (4) the number of pipe loops in each bore hole; and

11.7 (5) the results of the required pressure test.

11.8 *[For text of subps 3 and 4, see M.R.]*

11.9 **4725.2050 USE OF WELLS OR BORINGS FOR DISPOSAL OR INJECTION**
11.10 **PROHIBITED.**

11.11 A well or boring must not be used for disposal or injection of surface water,
11.12 groundwater, or any other liquid, gas, or chemical, except for groundwater thermal exchange
11.13 devices, bored geothermal heat exchangers, drilling fluids, vertical turbine prelubrication
11.14 water, treatment chemicals, priming water, water used for hydrofracturing, and water used
11.15 for disinfection according to parts 4725.1831, 4725.1833, 4725.2950, 4725.3250, 4725.3725,
11.16 4725.5050, 4725.5475, and 4725.5550. This does not prohibit the injection of air for drilling,
11.17 development, or sparging.

11.18 *[For text of items A and B, see M.R.]*

11.19 **4725.2150 REQUIRED DISTANCE FROM GAS PIPES, LIQUID PROPANE TANKS,**
11.20 **AND ELECTRIC LINES.**

11.21 *[For text of subps 1 and 2, see M.R.]*

11.22 Subp. 3. **Exceptions.** Subpart 1 does not apply to:

11.23 *[For text of items A to C, see M.R.]*

12.1 D. an overhead electric line when the repairing or sealing of a well or boring does
12.2 not involve the use of a drilling machine or hoist;

12.3 E. a buried electric line or buried gas pipe when the repairing or sealing of a well
12.4 or boring does not involve excavation; or

12.5 F. a buried electric line or gas pipe when a nonvertical bored geothermal heat
12.6 exchanger boring is installed using directional drilling technology, provided that:

12.7 (1) the notice of excavation and location of buried utilities are completed
12.8 according to Minnesota Statutes, chapter 216D; and

12.9 (2) the point where the drill bit penetrates the ground surface complies with
12.10 the isolation distances in subpart 1.

12.11 The requirements of this part are minimum standards and do not exempt persons from more
12.12 restrictive requirements of the Occupational Safety and Health Administration.

12.13 **4725.2185 DISTANCE FROM A BUILDING.**

12.14 A minimum horizontal isolation distance of three feet must be maintained between a
12.15 well or boring and the farthest exterior projection of a building, including the walls, roofs,
12.16 decks, overhangs, and other permanent structures unless the well or boring is located in a
12.17 building constructed according to part 4725.2175. A building, deck, or other permanent
12.18 structure, except a well house, must not be built to enclose a well or boring. The well or
12.19 boring must be accessible for repair and sealing. Environmental bore holes and monitoring
12.20 wells are exempt from this subpart if sealed within 72 hours of the time construction begins
12.21 on the well or boring. A directionally drilled bored geothermal heat exchanger is exempt
12.22 from this provision if constructed according to part 4725.7050, subpart 3.

12.23 **4725.2250 GENERAL CASING REQUIREMENTS.**

12.24 *[For text of subps 1 to 6, see M.R.]*

Subp. 7. **Temporary casing.** Casing installed temporarily during drilling is not required to meet the specifications for casing in this part except subparts 2, 7, and 16 and part 4725.2350, 4725.2550, or 4725.6650, but must be of sufficient strength to withstand the structural load imposed by conditions both inside and outside the well or boring, and free of oil or other contaminants. The casing must be removed on completion of the well or boring.

[For text of subps 8 to 17, see M.R.]

4725.2950 DRILLING FLUIDS.

[For text of subp 1, see M.R.]

Subp. 2. **Drilling additives.** Drilling additives, including bentonite, must meet the requirements of ANSI/NSF Standard 60-2016 as determined by a person accredited by ANSI. A drilling additive is a substance added to the air or water used in the fluid system of drilling a well or boring.

4725.3350 INTERCONNECTIONS AND CROSS CONNECTIONS.

No connection between a well or boring and another well, boring, water supply system, or contamination source is allowed unless the connection is:

A. protected by an air gap as described in UPC section 603.3.1 as incorporated by part 4714.0050;

B. protected with a backflow prevention device as specified in UPC sections 603.0 to 603.5.23.4 as incorporated by part 4714.0050;

[For text of item C, see M.R.]

D. between wells or borings that meet the construction standards of this chapter, are used for the same purpose, and have equivalent water quality.

14.1 This part does not apply to a water distribution system after the pressure tank; however,
14.2 this part does not exempt water distribution systems otherwise regulated by chapter 4714.

14.3 **4725.3450 FLOWING WELL OR BORING.**

14.4 *[For text of subp 1, see M.R.]*

14.5 Subp. 1a. **Low flow and low pressure.** A flowing well or boring that flows 70 gallons
14.6 per minute or less, and that has an artesian pressure ten pounds per square inch or less, must
14.7 be constructed by:

14.8 A. drilling a bore hole larger than the casing into the flowing aquifer, installing
14.9 casing into the flowing aquifer, and grouting the annular space surrounding the casing with
14.10 neat-cement grout or cement-sand grout from the bottom of the casing to the base of the
14.11 pitless adapter or unit, or to the established ground surface according to part 4725.3050;

14.12 B. driving steel casing with welded or threaded and coupled joints into the flowing
14.13 aquifer; or

14.14 C. for a bored geothermal heat exchanger, grouting the annular space surrounding
14.15 the bored geothermal heat exchanger piping with neat-cement grout or cement-sand grout
14.16 from the bottom of the bore hole to the established ground surface or upper termination of
14.17 the bored geothermal heat exchanger piping.

14.18 Subp. 2. **High flow, high pressure, or special construction area.**

14.19 A. A well or boring, including a bored geothermal heat exchanger boring, must
14.20 be constructed according to the requirements in this subpart when:

14.21 *[For text of subitems (1) to (3), see M.R.]*

14.22 *[For text of item B, see M.R.]*

14.23 *[For text of subps 3 and 4, see M.R.]*

Subp. 5. **Overflow discharge.** A water discharge from a flowing well or boring that disposes of water to the surface, a surface water body, sewer, or subsurface must:

A. be protected with an air gap according to UPC section 603.3.1 as incorporated in part 4714.0050;

[For text of items B and C, see M.R.]

[For text of subp 6, see M.R.]

4725.3725 CHEMICAL TREATMENT AND REHABILITATION.

Subpart 1. **Treatment chemicals.** Chemicals placed in a well or boring to increase the yield, remove or treat contaminants or objectionable tastes or odors, or rehabilitate the well or boring must meet the requirements of ANSI/NSF Standard 60-2016 as determined by a person accredited by ANSI. Sodium or calcium hypochlorite may be used if registered by the United States Environmental Protection Agency according to the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), section 3(c)(7)(A), as an antimicrobial pesticide for use in potable water. Treatment chemicals must be neutralized or removed from the well, boring, and any connected piping systems prior to use of the well or boring. This part does not apply to chlorine or other treatment chemicals added to a water distribution system, or to a drilling additive used according to part 4725.2950.

[For text of subp 2, see M.R.]

4725.3750 REPAIR, CORRECTION, OR SEALING OF WELLS AND BORINGS.

Subpart 1. **Repair, correction, or sealing required.** The property owner must:

[For text of items A and B, see M.R.]

C. disconnect a cross-connection between a well or boring and a public water system unless approved by the public water supplier and protected with an air gap or

16.1 backflow prevention device according to UPC sections 603.0 to 603.5.23.4 as incorporated
16.2 by part 4714.0050.

16.3 A well or boring not repaired or corrected must be permanently sealed.

16.4 *[For text of subps 2 to 6, see M.R.]*

16.5 **4725.4450 WATER-SUPPLY WELL DISTANCES FROM CONTAMINATION.**

16.6 Subpart 1. **Isolation distances.** A water-supply well must be located where there is
16.7 optimum surface drainage and at the highest practical elevation. Whenever possible,
16.8 water-supply wells should not be located down slope or down gradient of a contamination
16.9 source. A water-supply well must be constructed as far as practical from a contamination
16.10 source, but no less than the distances in this part.

16.11 The isolation distances in this part are minimum distances measured horizontally from
16.12 the closest part of the upper termination of the water-supply well casing to the closest part
16.13 of the contamination source, or the vertical projection of the contamination source on the
16.14 established ground surface, whichever is closer.

16.15 Where this chapter establishes a minimum regulatory volume of a liquid, the volume
16.16 of multiple tanks, each below the minimum, are not additive, unless the tanks are
16.17 interconnected without backflow protection.

16.18 The minimum isolation distances must be maintained between a new well and a source
16.19 of contamination no longer in use, unless all contaminants have been removed from the
16.20 source, and visibly contaminated soils have been removed.

16.21 A contamination source must not be placed, constructed, or installed any closer to a
16.22 water-supply well than the distances in this part.

16.23 A water-supply well must be no less than:

16.24 *[For text of items A to D, see M.R.]*

17.1 E. 50 feet from:

17.2 *[For text of subitems (1) to (11), see M.R.]*

17.3 (12) a buried sewer, except as provided in item G, subitem (5), that:

17.4 *[For text of units (a) and (b), see M.R.]*

17.5 (c) is constructed of materials that do not meet the specifications,
17.6 methods, and testing protocol in UPC table 701.1 and section 723.0 as incorporated by part
17.7 4714.0050;

17.8 *[For text of subitems (13) to (15), see M.R.]*

17.9 (16) the buried piping of a bored geothermal heat exchanger or any other
17.10 closed loop geothermal heat exchanger, except as provided in items F, subitem (1), and H,
17.11 subitem (2);

17.12 *[For text of subitems (17) to (30), see M.R.]*

17.13 F. 35 feet from:

17.14 (1) the buried piping of a bored geothermal heat exchanger or any other closed
17.15 loop geothermal heat exchanger that is more than 15 feet below the established ground
17.16 surface, provided that the geothermal heat exchanger conforms to part 4725.7050, subpart
17.17 1; and

17.18 *[For text of subitem (2), see M.R.]*

17.19 G. 20 feet from:

17.20 (1) a sewage sump with a capacity of less than 100 gallons that has been
17.21 successfully tested according to UPC section 712.0 or 723.0 as incorporated by part
17.22 4714.0050 and constructed according to UPC sections 710.8, 710.10, and 710.12 as
17.23 incorporated by part 4714.0050;

18.1 *[For text of subitems (2) to (4), see M.R.]*

18.2 (5) a buried sewer serving one building, or two or less single-family
18.3 residences, constructed of cast iron or plastic pipe according to the material specifications,
18.4 methods, and testing protocol described in UPC table 701.1 and section 723.0 as incorporated
18.5 by part 4714.0050 or a floor drain connected to the buried sewer, except for:

18.6 *[For text of units (a) and (b), see M.R.]*

18.7 *[For text of subitems (6) to (12), see M.R.]*

18.8 H. ten feet from:

18.9 *[For text of subitem (1), see M.R.]*

18.10 (2) the buried piping of a bored geothermal heat exchanger or any other closed
18.11 loop geothermal heat exchanger that is 15 feet or less below the established ground surface,
18.12 provided that the geothermal heat exchanger conforms to part 4725.7050, subpart 1.

18.13 *[For text of subps 2 and 3, see M.R.]*

18.14 **4725.4825 NONPOTABLE WATER-SUPPLY WELLS.**

18.15 *[For text of subps 1 and 2, see M.R.]*

18.16 Subp. 3. **Identification required.** A nonpotable well water system providing water
18.17 to a building with a potable water system, or accessible to the public, must be marked as
18.18 nonpotable according to UPC section 601.2 as incorporated by part 4714.0050.

18.19 **4725.5150 WATER-SUPPLY WELL SUCTION LINE.**

18.20 Subpart 1. **Construction.** As specified in UPC section 604.1 as incorporated by part
18.21 4714.0050, a suction line for a water-supply well must be constructed of:

18.22 *[For text of items A to D, see M.R.]*

18.23 *[For text of subps 2 and 3, see M.R.]*

19.1 **4725.5475 HYDROFRACTURING WATER-SUPPLY WELLS.**

19.2 *[For text of subp 1, see M.R.]*

19.3 **Subp. 2. Injection materials, water, and proppants.**

19.4 *[For text of item A, see M.R.]*

19.5 **B. Additives must meet the requirements of ANSI/NSF Standard 60-2016 as**
19.6 **determined by a person accredited by ANSI.**

19.7 *[For text of item C, see M.R.]*

19.8 *[For text of subps 3 and 4, see M.R.]*

19.9 **4725.5550 WATER-SUPPLY WELL DISINFECTION.**

19.10 *[For text of subps 1 to 3, see M.R.]*

19.11 **Subp. 4. Disinfection materials.** Chlorine materials must meet the requirements of
19.12 ANSI/NSF Standard 60-2016 as determined by a person accredited by ANSI or be registered
19.13 by the United States Environmental Protection Agency according to the Federal Insecticide,
19.14 Fungicide, and Rodenticide Act (FIFRA), section 3(c)(7)(A), as an antimicrobial pesticide
19.15 for use in potable water. Chlorine compounds with additives such as perfumes or algacides
19.16 must not be used for disinfection. An alternate disinfection material may be used if the
19.17 material is a biocide meeting the material and use standards of this part and provides biocidal
19.18 activity equivalent to the chlorine concentrations and contact times required in this part.

19.19 *[For text of subps 5 and 6, see M.R.]*

19.20 **4725.5825 PUBLIC WATER-SUPPLY WELLS.**

19.21 *[For text of subp 1, see M.R.]*

19.22 **Subp. 2. Notification of drilling required.** The licensee must notify the commissioner
19.23 of the proposed construction starting time of a community or noncommunity public

water-supply well 24 hours in advance of beginning construction. The information may be placed on the notification form required in part 4725.1820 or may be reported by telephone, facsimile, or in person. The notification must be made between ~~the hours of~~ 8:00 a.m. and 4:30 p.m., Monday through Friday, excluding holidays.

[For text of subps 3 to 6, see M.R.]

4725.6050 REMEDIAL WATER-SUPPLY WELLS.

Subpart 1. **Additional requirements.** In addition to the general standards in parts 4725.2010 to 4725.3875, and the standards for water-supply wells, in parts 4725.4050 to 4725.5550, a remedial well must:

[For text of items A and B, see M.R.]

C. have connections protected with an air gap or back flow prevention device as specified in UPC sections 602.0 to 603.5.23.4 as incorporated by part 4714.0050 if the well discharges to a sewer or surface water.

[For text of subps 2 to 4, see M.R.]

4725.7050 BORED GEOTHERMAL HEAT EXCHANGERS.

Subpart 1. **Construction.** A bored geothermal heat exchanger must be constructed according to the construction standards in this part and the general construction standards in parts 4725.2010 to 4725.3875.

A. Bored geothermal heat exchanger piping must be high-density polyethylene or cross-linked polyethylene that meets the following requirements:

(1) for high-density polyethylene:

(a) the walls of the pipe must be SDR 11 or thicker;

(b) pipe must meet ASTM Standard D3035-15 or ASTM Standard

F714-13;

21.1 (c) ~~pipe connections must be made with socket fusion, and butt fusion,~~
21.2 ~~or electrofusion joining methods that meet~~ connections must be made in accordance with
21.3 ASTM Standard F2620-13 or F2620-19, and electrofusion connections must be made in
21.4 accordance with ASTM Standard F1055-16; and

21.5 (d) socket fittings must be manufactured in accordance with ASTM
21.6 Standard D2683-14;

21.7 (2) for cross-linked polyethylene:

21.8 (a) pipe must be manufactured by the high-pressure peroxide method
21.9 and designated as PEXa;

21.10 (b) pipe must meet ASTM Standard ~~F876-15a~~ and ASTM Standard
21.11 ~~F877-11a~~ F876-20;

21.12 (c) all components of the PEXa system must be from the same
21.13 manufacturer;

21.14 (d) a fitting for a PEXa system must not be buried in a pipe loop boring
21.15 or between a pipe loop boring and the heat pump unit, unless the fitting is located in a vault
21.16 or other structure accessible from the ground surface or floor of the building; and

21.17 (e) fittings must meet ASTM Standard F1807-19b, ASTM Standard
21.18 F1960-19a, or ASTM Standard F2080-16, and ASTM Standard F877-20; and

21.19 (3) high-density polyethylene and cross-linked polyethylene pipe must have
21.20 a minimum pressure rating of 160 psi at 73 degrees Fahrenheit.

21.21 B. The licensee must complete a successful pressure test of the bored geothermal
21.22 heat exchanger piping after the piping is installed in the bore holes. Pipe must be pressure
21.23 tested with potable water at a pressure of 1.5 times the system operating pressure or 100

22.1 psi, whichever is greater. The pressure must remain constant for 30 minutes without adding
22.2 additional water.

22.3 C. The annular space between the bored geothermal heat exchanger piping and a
22.4 bore hole must be filled with grout according to the procedures in part 4725.3050, subpart
22.5 2, and according to the procedures in part 4725.3450 for a bored geothermal heat exchanger
22.6 boring from which groundwater flows above the established ground surface. The annular
22.7 space must be filled with:

22.8 (1) neat-cement grout or cement-sand grout in bedrock;

22.9 (2) neat-cement grout or cement-sand grout in a boring from which
22.10 groundwater flows above the established ground surface; or

22.11 (3) neat-cement grout, cement-sand grout, bentonite grout, or thermally
22.12 enhanced bentonite grout in unconsolidated materials. Thermally enhanced bentonite grout
22.13 must consist of:

22.14 (a) a maximum of 17.5 gallons of water per 50 pounds of bentonite; and

22.15 (b) thermal enhancement material, including:

22.16 i. a maximum of 200 pounds of sand per 50 pounds of bentonite,
22.17 with 80 percent or more of the sand smaller than 0.0117 inch (passing U.S. Sieve #50); and

22.18 ii. a maximum of 20 pounds of graphite that meets the ANSI/NSF
22.19 Standard 60-2016 requirements per 50 pounds of bentonite.

22.20 D. Heat transfer fluids must be propylene glycol or ethanol that meets the following
22.21 requirements:

22.22 (1) propylene glycol must be food grade or USP grade;

22.23 (2) a propylene glycol with additives, including corrosion inhibitors and dyes,
22.24 ~~shall be approved by the commissioner if documentation is provided to the commissioner~~

23.1 ~~verifying that all ingredients are food grade or USP grade, and that the product is listed in~~
23.2 ~~the NSF White BookTM listing of nonfood compounds~~ must be certified as meeting the NSF
23.3 Category Code HT1 for heat transfer fluids;

23.4 (3) ethanol products must be designed by the manufacturer for use in bored
23.5 geothermal heat exchanger systems. Ethanol products must not be used unless approved in
23.6 writing by the commissioner. A complete list of product ingredients and concentrations
23.7 must be submitted for review;

23.8 (4) ethanol may be used in an ethanol-water solution of not more than 20
23.9 percent ethanol by volume. Ethanol concentrates used to prepare heat transfer fluid must
23.10 be diluted to not more than 20 percent ethanol by volume before being brought into a building
23.11 where the heat transfer fluid is to be used;

23.12 (5) storing, handling, and using ethanol is subject to the safety precautions
23.13 and procedures specified by the ethanol manufacturer, the applicable requirements of chapters
23.14 1305 and 7511, and NFPA Standard 30: Flammable and Combustible Liquids Code, 2015
23.15 Edition; and

23.16 (6) no other fluids or additives may be used except for potable water.

23.17 E. A permanent sign must be attached to the heat pump identifying the heat transfer
23.18 fluid in the bored geothermal heat exchanger and specifying that only heat transfer fluids
23.19 approved in this part may be used.

23.20 F. Water make-up lines to the bored geothermal heat exchanger must be protected
23.21 with backflow prevention according to UPC sections 602.0 to 603.5.23.4 as incorporated
23.22 by part 4714.0050.

23.23 G. The isolation distance between a water-supply well and a bored geothermal
23.24 heat exchanger constructed according to this part must be no less than the distances specified
23.25 in part 4725.4450, subpart 1, items F and H.

24.1 Subp. 2. [See repealer.]

24.2 Subp. 3. **Marking locations.** The locations of all buried bored geothermal heat
24.3 exchanger piping from the point where the pipe loop exits the bore hole to the point where
24.4 the pipe is exposed above the ground surface or floor of a building must be marked by ~~one~~
24.5 ~~of the following methods:~~

24.6 A. tracer wire;

24.7 B. underground marking tape detectable from the ground surface; or

24.8 C. a ferromagnetic metal marker, detectable from the ground surface, located
24.9 above the point where the pipe loop exits the bore hole.

24.10 Subp. 4. **Separation under buildings.** A bored geothermal heat exchanger boring
24.11 installed using directional drilling technology that extends under a building or within three
24.12 feet horizontally of the farthest exterior projection of the building must be located ~~a minimum~~
24.13 ~~of at least~~ ten feet below the lowest part of the building, including the foundation and
24.14 footings. Supply-return piping that is plumbed through the building wall or floor is exempt
24.15 from this requirement.

24.16 Subp. 5. **Isolation distances from certain contaminant sources.** The point where
24.17 the drill bit penetrates the ground surface for a geothermal heat exchanger boring must be
24.18 located at least ten feet horizontally from a contaminant source that has contaminants directly
24.19 entering the soil, including:

24.20 A. the absorption area of a soil dispersal system;

24.21 B. animal feedlot, confining area, or feeding or watering area;

24.22 C. cesspool;

24.23 D. landspreading area for sewage, septage, or sludge;

24.24 E. manure basin, lagoon, or storage area;

- 25.1 F. rapid infiltration basin;
- 25.2 G. seepage pit, leaching pit, or dry well; or
- 25.3 H. wastewater spray irrigation area.

25.4 Subp. 6. **Bored geothermal heat exchanger borings onto the property of**
25.5 **another.** Bored geothermal heat exchanger piping must not be installed on or under property
25.6 other than the property identified in the approved permit without the affected property
25.7 owner's written consent or other legal authority.

25.8 Subp. 7. **Accessibility.** The ends of each pipe loop must be accessible within a building
25.9 or buried no deeper than ten feet below the ground surface. The buried ends of a pipe loop
25.10 must not be built over or otherwise made inaccessible.

25.11 Subp. 8. **Pipe loop not connected to a geothermal heat exchanger system.** A pipe
25.12 loop that is not connected to a geothermal heat exchanger system, such as a loop installed
25.13 for thermal conductivity testing, must be protected by:

25.14 A. extending the ends of the pipe loop to at least one foot above the ground surface;

25.15 B. encasing the ends of the pipe loop in an ASTM Schedule 40 steel or plastic
25.16 outer protective pipe that is at least four inches in diameter and extends at least one foot
25.17 above and two feet below the ground surface; and

25.18 C. covering the outer protective pipe with an overlapping cap or cover.

25.19 Subp. 9. **Sealing of bored geothermal heat exchangers.** When sealing all or part of
25.20 a bored geothermal heat exchanger:

25.21 A. all heat transfer fluid must be removed from the bored geothermal heat
25.22 exchanger piping that is to be sealed;

25.23 B. the heat transfer fluid must be contained and recycled or disposed according
25.24 to applicable federal, state, and local requirements;

26.1 C. the ends of each pipe loop must be accessed and grouted by pumping grout
26.2 through a tremie pipe inserted to within ten feet of the bottom of the loop, or by pumping
26.3 grout into one end of the loop until grout flowing from the other end of the loop meets the
26.4 minimum specifications and densities in part 4725.0100, subpart 21d, 22b, or 30n;

26.5 D. the portion of the piping in unconsolidated geologic materials must be filled
26.6 with bentonite grout, neat-cement grout, or cement-sand grout; and

26.7 E. the portion of the piping in bedrock must be filled with cement-sand grout or
26.8 neat-cement grout.

26.9 Subp. 10. **Notice of loss or leak.** The owner of a bored geothermal heat exchanger
26.10 system must:

26.11 A. notify the commissioner of leakage from the system piping or loss of pressure
26.12 in the system within 24 hours after the owner becomes aware of the loss or leak; and

26.13 B. notify the Minnesota duty officer of a bored geothermal heat exchanger leak
26.14 according to Minnesota Statutes, section 115.061.

26.15 **REPEALER.** Minnesota Rules, parts 4725.0100, subparts 49e, 49f, and 49g; and 4725.7050,
26.16 subpart 2, are repealed.

26.17 **TERM CHANGE.** In Minnesota Rules, part 4720.9025, subpart 1, change "part 4715.1770"
26.18 to "chapter 4714."

Office of the Revisor of Statutes

Administrative Rules



TITLE: Adopted Permanent Rules Governing Wells and Borings

AGENCY: Department of Health

REVISOR ID: R-4192

MINNESOTA RULES: Chapter 4725

INCORPORATIONS BY REFERENCE: [See attached]

The attached rules are approved for
filing with the Secretary of State

A handwritten signature in cursive script, reading "Sandy Glass-Sirany".

Sandy Glass-Sirany
Senior Assistant Revisor

INCORPORATIONS BY REFERENCE:

Part 4725.0150: The following are available from the American Society for Testing and Materials (ASTM), 100 Barr Harbor Drive, West Conshohocken, PA 19428-2959:

ASTM D2683-14, "Standard Specification for Socket-Type Polyethylene Fittings for Outside Diameter-Controlled Polyethylene Pipe and Tubing."

ASTM D3035-15, "Standard Specification for Polyethylene (PE) Plastic Pipe (DR-PR) Based on Controlled Outside Diameter."

ASTM F714-13, "Standard Specification for Polyethylene (PE) Pipe (DR-PR) Based on Outside Diameter."

ASTM F876-15a, "Standard Specification for Crosslinked Polyethylene (PEX) Tubing."

ASTM F877-11a, "Standard Specification for Crosslinked Polyethylene (PEX) Hot- and Cold-Water Distribution Systems."

ASTM F1055-16, "Standard Specification for Electrofusion Type Polyethylene Fittings for Outside Diameter Controlled Polyethylene and Crosslinked Polyethylene (PEX) Pipe and Tubing."

ASTM F2080-16, "Standard Specification for Cold-Expansion Fittings with Metal Compression-Sleeves for Crosslinked Polyethylene (PEX) Pipe and SDR9 Polyethylene of Raised Temperature (PE-RT) Pipe."

ASTM F2620-13, "Standard Practice for Heat Fusion Joining of Polyethylene Pipe and Fittings."

Part 4725.0150: The following is available from the National Fire Protection Association, 1 Batterymarch Park, P.O. Box 9101, Quincy, MA 02269-9101, NFPA 30, "Flammable and Combustible Liquids Code, 2015 Edition."

Part 4725.0150: The following are available from NSF International, 789 Dixboro Road, P.O. Box 130140, Ann Arbor, Michigan 48113:

ANSI/NSF 60-2016, "Drinking Water Treatment Chemicals - Health Effects."

NSF White BookTM - Nonfood Compounds Listing Directory.

The following are available from the International Association of Plumbing and Mechanical Officials (IAPMO), Ontario, California, incorporated in part 4714.0050, and also available in the office of the commissioner of labor and industry:

Part 4725.0100, subpart 30h: Uniform Plumbing Code (UPC) section 211.0.

Part 4725.3350: UPC section 603.3.1 and UPC sections 603.0 to 603.5.23.4.

Part 4725.3450, subpart 5: UPC section 603.3.1.

Part 4725.3750, subpart 1: UPC sections 603.0 to 603.5.23.4.

Part 4725.4450, subpart 1:

UPC table 701.1 and section 723.0.

UPC section 712.0 or 723.0.

UPC sections 710.8, 710.10, and 710.12.

UPC table 701.1 and section 723.0.

Part 4725.4825, subpart 3: UPC section 601.2.

Part 4725.5150, subpart 1: UPC section 604.1.

Part 4725.6050, subpart 1: UPC sections 602.0 to 603.5.23.4.

Part 4725.7050, subpart 1: UPC sections 602.0 to 603.5.23.4.