

The International Ground Source Heat Pump Association
hereby confirms

Matthew Schwartz
as an Accredited Installer

Accreditation ID

2756582

Expires on: 6/30/2025



Certificate of Training



this certifies that

Eric Bruns

Has successfully completed a basic study with hands on training on the principles and fundamentals of butt fusion and socket fusion as outlined in ASTM F 2620 for polyethylene geothermal pipe and fittings.

Signed Joe Pejsa

Date 1/15/2022

Certificate of Training



this certifies that

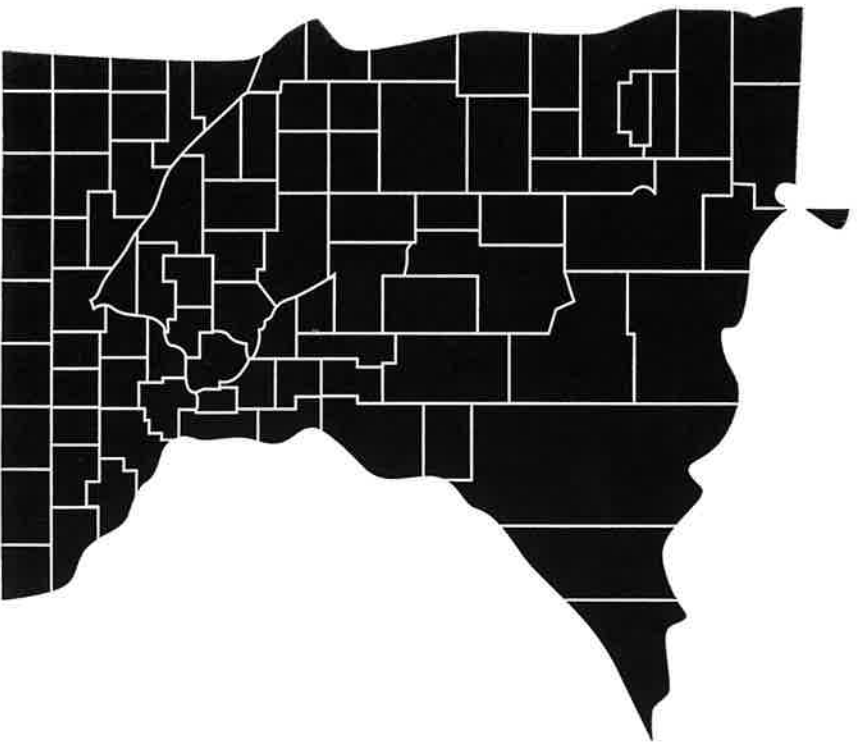
Colby Bruns

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Signed Joe Pejsa

Date 1/15/2022

Registered Drilling Machine/Hoist



2022

mn
DEPARTMENT
OF HEALTH



Bored Geothermal Heat Exchangers

SUMMARY OF RULES EFFECTIVE MARCH 22, 2021

Rulemaking Process and Timeline

In 2013, the Minnesota Legislature amended Minnesota Statutes, chapter 103I (www.revisor.mn.gov/statutes/cite/103I), to include regulating all bored geothermal heat exchangers (BGHEs), not just vertical heat exchangers. The Minnesota Department of Health (MDH) revised Minnesota Rules, chapter 4725 (www.revisor.mn.gov/rules/4725) (Wells and Borings) to reflect the 2013 statutory amendments and to accommodate varying BGHE construction methods. The new rules went into effect on March 22, 2021.

This document provides a summary of the major rule changes for BGHEs. For questions about the specific rule changes, contact the MDH Well Management Section at 651-201-4600 or health.wells@state.mn.us.

Summary of New Rules

Clarified and Added BGHE Definitions

- **Bored Geothermal Heat Exchanger (BGHE):** An earth-coupled heating or cooling device that consists of a closed-loop piping system installed in a boring in the ground to transfer heat to or from the surrounding earth with no discharge. This includes piping installed in a boring for thermal conductivity testing and does not include a closed-loop piping system installed in a boring 15 feet or less below ground surface.
- **BGHE contractor:** A person issued a limited well/boring contractor license to construct, repair, and seal BGHEs.
- **BGHE piping:** Pipe and fittings of a BGHE installed and buried below ground surface, including:
 - the pipe loop installed in a boring,
 - the buried pipe between the boring and header or manifold,
 - the buried header or manifold, and
 - the buried supply and return pipe between the buried header or manifold and the heat pump.
- **Directional drilling:** A drilling method that utilizes a steerable drill bit to cut a bore hole for installing underground pipe, also known as horizontal directional drilling or HDD.

Limited BGHE Contractor Certified Representative Applicants

Applicants must have three years of experience constructing, repairing, and sealing BGHEs; or in well drilling. The BGHE experience must be obtained under a licensed well contractor or limited BGHE contractor, unless it was obtained during directionally drilling BGHEs that were not regulated by MDH at the time of construction. The well drilling experience must be obtained under a licensed well contractor, and the applicant must also be accredited by the International Ground Source Heat Pump Association, certified by the National Groundwater Association, or have an equivalent certification.

BGHE Permits and Records

Only licensed well contractors and limited BGHE contractors can construct, repair, or seal BGHEs.

A BGHE must not be constructed until a permit has been issued by MDH. The application must be complete and signed by the licensed contractor and the property owner or their agent. The application must include a plan diagram showing the location of the BGHE borings, property lines, and structures. Incomplete applications cannot be processed and will be returned to the applicant. For the updated BGHE permit application form, visit: [Bored Geothermal Heat Exchanger \(BGHE\) and Groundwater Thermal Exchanger Device \(GTED\) Construction Permit Applications \(www.health.state.mn.us/communities/environment/water/wells/lwcinfo/bghegtedprmts.html\)](http://www.health.state.mn.us/communities/environment/water/wells/lwcinfo/bghegtedprmts.html).

Following permit approval, the licensed contractor must notify MDH of the proposed construction starting time at least 24 hours before starting construction of the BGHE borings.

BGHE construction records must be submitted within 60 days of the completion of the BGHE and must include the following information, in addition to what is required for all records:

- The number of pipe loops in each boring.
- The results of the required pressure test.
- GPS coordinates for the location where each pipe loop enters a boring, or GPS coordinates marking the corners or perimeter of the loop field.
- A scaled map showing the location where each pipe loop enters a boring, with angles and directions from survey property corners, a permanent benchmark, or the corner of a permanent structure. For directional BGHE piping, a scaled map showing the location of the entire length of each pipe loop and a cross-sectional profile showing the depth profile of the pipe loops.

BGHE Construction

New Piping Materials and Connections

High-density polyethylene (HDPE) and cross-linked polyethylene (PEX) are allowed. The pipe must have a minimum pressure rating of 160 pounds per square inch at 73 degrees Fahrenheit. The following requirements apply for the different pipe materials:

- **HDPE:** The pipe must meet ASTM Standards D3035 or F714, and the walls of the pipe must be SDR 11 or thicker. Socket fusion, butt fusion, and electrofusion connections are allowed. Socket fusion and butt fusion connections must be made in accordance with ASTM Standard F2620. Socket fittings must meet ASTM D2683. Electrofusion connections must meet ASTM Standard F1055.
- **PEX:** PEX pipe must be designated as PEXa. All components of the PEXa system must be from the same manufacturer. The pipe must meet ASTM Standard 876. The fittings must meet ASTM Standards F1807, 1960, or 2080. The fittings must also meet ASTM Standard 877. Fittings must not be buried in a pipe loop boring or between a pipe loop boring and the heat pump unit, unless the fitting is located in a vault or other structure accessible from the ground surface or building floor.

Revised Pressure Testing Requirements

The licensed contractor must conduct a successful pressure test of the BGHE piping after it is installed in the bore hole(s). The pipe must be pressure-tested with potable water at a pressure of 1.5 times the system operating pressure or 100 psi, whichever is greater. Pressure must remain constant for 30 minutes without adding water.

Grout

Neat-cement grout or cement-sand grout must be used in bedrock and borings with flowing artesian groundwater conditions. Neat-cement grout, cement-sand grout, bentonite grout, or thermally enhanced grout can be used in unconsolidated materials without flowing artesian conditions.

Graphite is allowed as a thermal enhancement material in thermally enhanced grout. Thermally enhanced grout must consist of:

- Maximum of 17.5 gallons of water per 50 pounds of bentonite.
 - Thermal enhancement material:
 - Maximum of 200 pounds of sand per 50 pounds of bentonite, with at least 80 percent of the sand passing U.S. Sieve No. 50.
- OR
- Maximum of 20 pounds of graphite that meets ANSI/NSF Standard 60 per 50 pounds of bentonite.

Marking and Accessibility

BGHE piping must be marked from the point where the pipe loop exits the bore hole to the point where the pipe is exposed above ground surface or a building floor by a tracer wire, an underground marking tape detectable from the surface, or a ferromagnetic metal marker above the point where the pipe loop exits the bore hole.

The ends of each BGHE pipe loop must be accessible within a building or buried no deeper than 10 feet below ground surface and must not be built over or made inaccessible. BGHE piping must not be installed on another property without the property owner's written consent.

New Heat Transfer Fluids

Propylene glycol and ethanol products are allowed as heat transfer fluids:

- Propylene glycol must be food grade or USP grade. A propylene glycol with additives, including corrosion inhibitors or dyes, must be certified as meeting the NSF Category Code HT1 (info.nsf.org/USDA/psnclistings.asp).
- Ethanol products must be designed by the manufacturer for use in BGHE systems, and they are only allowed for use after approval by MDH. For approval, submit a complete list of product ingredients and concentrations with the BGHE permit application. Ethanol must be used with safety precautions, including that it can only be used in water solutions with 20 percent or less ethanol by volume, and concentrates must not be brought into the building where the heat transfer fluid will be used. Follow safety precautions and procedures specified by the manufacturer and the requirements of NFPA Standard 30.

No other fluids or additives may be used for heat transfer fluids, except potable water. A permanent sign must be attached to the heat pump identifying the heat transfer fluid in the BGHE and specifying that only approved heat transfer fluids may be used.

Revised Setback Distances

The minimum required isolation distances between a water-supply well and a BGHE are:

- 50 feet from the buried piping of a BGHE or any other closed loop geothermal heat exchanger that is unregulated or not constructed in accordance with the revised rules,
- 35 feet between the well and the buried piping of a BGHE or any other closed-loop geothermal heat exchanger that is more than 15 feet below ground surface and constructed in accordance with the revised rules, and
- 10 feet between the well and the buried piping of a BGHE or any other closed-loop geothermal heat exchanger that is less than 15 feet below ground surface and constructed in accordance with the revised rules.

The point where the drill bit penetrates ground surface for a BGHE boring must be at least 10 feet horizontally from a contaminant source that has contaminants directly entering the soil.

BGHE piping that extends under or within 3 feet horizontally of a building must be at least 10 feet below the lowest part of the building, including foundation and footings.

Backflow Prevention

Water make-up lines to the BGHE must be protected with backflow prevention according to the Minnesota Plumbing Code, Minnesota Rules, chapter 4714 (www.revisor.mn.gov/rules/4714).

Well Management Section
625 North Robert Street
P.O. Box 64975
St. Paul, Minnesota 55164-0975
651-201-4600 or 800-383-9808
health.wells@state.mn.us
www.health.state.mn.us/wells



Permit No.: VL5280

Date Received: 1/4/2022

Date Approved: 1/14/2022

Variance: TN 6233

Bored Geothermal Heat Exchanger Permit

Permit issued to: **Bergerson-Caswell, Inc.**, License Number **1767**

Bored Geothermal Heat Exchanger (BGHE) system located at:

2190 Williams Ave., Montevideo
SE¼ SE¼
Township 117, Range 40W, Section 17
Montevideo Township
Chippewa County, Minnesota

Property Owner: **State of Minnesota**

Minnesota Department of Health (MDH) is granting this permit to install a Bored Geothermal Heat Exchanger (BGHE) system at the above location. MDH approval is based on the permit application information as well as any accompanying letters, maps, plans, and other supporting data that was submitted. These documents are now a part of and referenced in this permit.

The BGHE system must be constructed in accordance with the requirements of Minnesota Statutes, chapter 103I, Minnesota Rules, chapter 4725, and the following requirements.

General Requirements

- The contractor must notify **Bob Nielsen (507-476-4227, robert.nielsen@state.mn.us)** or **Tom Steffl (507-476-4231, thomas.steffl@state.mn.us)** at least 24 hours before starting construction by telephone, fax, email, or in person between the hours of 8:00 a.m. and 4:30 p.m., Monday through Friday, excluding holidays.
- No change shall be made of any items of work contained in the approved permit without MDH written permission.
- This permit does not release the permittee/contractor from any liability or obligation imposed by state law or local ordinances relating thereto and shall remain in force subject to all conditions and limitations now or hereafter imposed by law.
- No liability shall be imposed upon or incurred by the state of Minnesota or any of its officers, agents, or employees, officially or personally, on account of the granting of this permit or on account of any damage to any person or property resulting from any act or omission of the permittee or any of its agents, employees, or contractors relating to or discussed in this permit. This permit shall not be construed as stopping or limiting any legal claims or right of action of any person other than the state against the permittee, its agents, employees, or contractors for

(Over)

BORED GEOTHERMAL HEAT EXCHANGER PERMIT

violation of or failure to comply with the provisions of the permit or applicable provisions of the law.

Specific Permit Requirements

- Heat transfer fluid: Propylene Glycol with Additives (Must be NSF HT1 Certified.)
- Piping: High Density Polyethylene
- Grouting material: Thermally Enhanced Bentonite
Note: If bedrock or flowing conditions are encountered, neat-cement or cement-sand grout must be used as required by Minnesota Rules, chapter 4725.
- Marking method: Underground Marking Tape/ Tracer Wire

Attention Property Owner

- MDH must be provided access to the property during regular business hours to inspect the portions of the BGHE regulated by MDH, as required in Minnesota Statutes, section 103I. 641, subdivision 3, paragraph (b).
- Only heat transfer fluids approved in Minnesota Rules, part 4725.7050, subpart 1, item D must be used in a BGHE system. No other fluids or additives may be used for heat transfer fluids, except potable water. For questions on approved heat transfer fluids, contact MDH Well Management Section at 651-201-4600 or health.wells@state.mn.us.
- In the event the BGHE system loses pressure or leaks, you must notify MDH and the Minnesota Duty Officer within 24 hours after becoming aware of the pressure loss or leakage. This is required by Minnesota Rules, part 4725.7050, subpart 10.
 - Contact MDH Well Management Section at 651-201-4600 or health.wells@state.mn.us.
 - Contact Minnesota Duty Officer at 651-649-5451, 1-800-422-0798, or fax 651-296-2300.
- You must hire a licensed well contractor or licensed BGHE contractor to seal the BGHE system if it is removed from service or meets any of the sealing provisions of Minnesota Statutes, section 103I.301.
- Report any transfer of rights, or sale or lease of property to MDH. Contact MDH Well Management Section at 651-201-4600 or health.wells@state.mn.us, or by mail at 625 North Robert Street, P.O. Box 64975, St. Paul, Minnesota 55164-0975.
- Provide this permit and documents related to the BGHE to the new owner or lessee of the property following a property transfer or sale.

To obtain this information in a different format call 651-201-4600.
Publications\Form BGHE Permit 03/18/2021R