DRAFT

A bill to amend 1978 PA 368, entitled "Public Health Code,"
(MCL 333.1101 to 333.25211) by adding part 128.

THE PEOPLE OF THE STATE OF MICHIGAN ENACT:

PART 128. CLOSED-LOOP GROUND SOURCE HEAT EXCHANGE SYSTEMS

Sec. 12801.(1) As used in this part:

(a) "Approved alternate grout" means a specific grout recipe or mix that is submitted to and approved by the department prior to use. This recipe or mix may be subject to specific limitations as deemed necessary by the developer or the department and shall only be used in specific applications where approved.

(b) "Backfill" means a material consisting of drill cuttings or any other materials that do not form a uniform low permeability seal. A backfill material is not allowed to fill the void space between piping and a closed-loop ground source heat exchange borehole wall without prior approval from the local health department or department.

~~(a)~~(c) "Bentonite grout" means a slurry that consists of sodium montmorillonite bentonite and water and any approved additives, mixed following the manufacturer's specifications, that has a solids concentration of not less than 20%. Bentonite grout does not include a slurry of drilling fluid bentonite and water or cuttings from the drilling operation, either singularly or in combination.

~~(b)~~(d) "Cementitious grout" means a mixture of the following components, or other cement-based admixtures designed for geothermal applications, as authorized by the department prior to use:

(i) Six and two-tenths gallons of fresh water.

(ii) Two hundred pounds of silica sand with not less than 80% of the sand having a diameter smaller than 0.0117 inches and passing through a U.S. Sieve #50.

(iii) One pound of 200-mesh sodium montmorillonite bentonite.

(iv) Ninety-four pounds of Type I Portland cement conforming to American Society for Testing and Materials International (ASTM) ~~International~~ Standard C150/C150M – 16e1, standard specification for Portland cement.

(v) Twenty-one fluid ounces of a Type F water-reducing admixture or plasticizer conforming to ASTM International Standard C494/C494M – 16, standard specification for chemical admixtures for concrete.

(~~c~~e) "Concrete grout" means a mixture of cement, sand, and water in the proportion of the following:

(i) One bag of Portland cement (94 pounds) conforming to ASTM International Standard C150/C150M – 16e1, standard specification for Portland cement.

(ii) One cubic foot of dry sand or gravel aggregate.

(iii) Not more than 6 gallons of fresh water.

~~(d) "Closed-loop" or "CL" means a ground source heat exchange system consisting of a loop of sealed piping installed either singularly, or in a series or parallel pattern, installed in the earth in boreholes in a vertical, angled, or diagonal configuration, extending 15 feet or more below the ground surface, for the purpose of transferring heat between a building space and the earth.~~

(fe) "Closed-loop ground source heat exchange borehole" means a borehole drilled in the earth that is installed for the purpose of placing into it a piping loop through which a heat transfer fluid is circulated and into which is also placed a thermally conductive grout material.

(g) "Closed-loop ground source heat exchange system" or "CLGSHES" means a system consisting of a loop of sealed piping installed either singularly, or in a series or parallel pattern, installed in the earth in boreholes filled with thermally conductive grout in a vertical, angled, or diagonal configuration, extending 15 feet or more below the ground surface, for the purpose of transferring heat between a building space and the earth through the circulation of a fluid. System does not include near-surface horizontal ancillary piping, heaters and manifolds installed for the purpose of connecting borehole piping to the mechanical system within a building space.

~~(f) "Closed-loop ground source heat exchange system" or "CLGSHES" means a mechanical system for space heating or cooling that relies upon a transfer of thermal energy from the earth utilizing the circulation of a heat transfer fluid in polyethylene pipe loops that are installed into boreholes filled with a thermally conductive grout.~~

(hg) "Closed-loop ground source heat exchange system contractor" means a person that possesses a certificate of registration issued in accordance to this Part ~~qualified~~ to engage in the business and supervise the constructing, installing, repairing, or decommissioning of closed-loop ground source heat exchange boreholes.

(hi) "Department" means the Department of Environmental Quality.

(j) "Grout" means a pumpable slurry mix composed of bentonite and/or Portland cement, and if needed, other additives that when combined form a seal with a maximum allowable permeability value of 1 X 10^{-7} centimeters per second. Once placed, this material will set up within a reasonable timeframe to a plastic or rigid state. A grout material is designed to provide a seal in the annular space when used in borehole construction or decommissioning.

(k) "IGSHPA" means the International Ground Source Heat Pump Association.

(lj) "NGWA" means the National Ground Water Association.

(mj) "Neat cement grout" means a mixture of the following:

(i) One bag of Portland cement (94 pounds).

(ii) Not more than 6 gallons of fresh water.

(iii) Drilling fluid bentonite that is not more than 5% by weight of cement and additional water that is not more than 0.6 gallons for each 1% of bentonite.

(nk) "Person" means an individual, partnership, corporation, association, governmental entity, or other legal entity.

(ol) "Responsible person" means a person that is legally responsible or liable for a decision or action and therefore liable for the outcome.

(pm) "Supervise" means to direct the execution of an activity that is being completed by oneself or another person, either within the person's business entity or under a written contract.

(qn) "Thermally-conductive bentonite grout" means a bentonite grout into which ~~silica sand or other~~ materials approved by the department have been added ~~approved by the department have been added~~ to improve the thermal characteristics of the grout for geothermal applications~~, with a minimum solids content of 60%~~.

Sec. 12802.(1) Beginning 60 days after the effective date of the amendatory act that added this section, before engaging in the business of constructing, installing, repairing, or

decommissioning ~~abandoned~~ CLGSHES boreholes, a person shall obtain a certificate of registration as a CLGSHES contractor using an application furnished by the department. CLGSHES contractors doing business in this state shall biannually file an application for registration with the department in accordance with this part.

(2) Beginning 60 days after and ending not more than 1 year after the effective date of the amendatory act that added this section, upon request, a person that is currently engaging in the business of constructing, installing, repairing, or decommissioning of CLGSHES boreholes ~~an active or practicing CLGSHES contractor~~ shall be issued registration as a CLGSHES contractor by the department if the person meets both of the following:

(a) Documentation indicating that for a period of not less than 24 months occurring within the last 5 years, the applicant has conducted borehole drilling at a minimum of 20 CLGSHES sites.

(b) The applicant has successfully completed the NGWA Certified Vertical Closed-Loop Drilling designation/exam.

(3) A person that is registered as a water well drilling contractor under section 12704 shall be concurrently registered as a CLGSHES contractor upon providing the department with documentation that they have successfully obtained the NGWA Certified Vertical Closed-Loop Driller designation or have obtained accreditation or certification equivalent to the NGWA Certified Vertical Closed-Loop Driller designation from another nationally recognized organization involved with CLGSHES drilling operations accreditation, as determined by the department.

(4) A person that does not possess a certificate of registration as a water well drilling contractor under section 12704 or is not an actively practicing CLGSHES contractor, as defined in this part, may apply to the department for registration as a CLGSHES contractor. The department shall issue a CLGSHES contractor registration if that person submits an application on a form provided by the department containing all of the following:

(a) Documentation indicating the person has successfully completed and obtained the NGWA Certified Vertical Closed-Loop Driller designation within the last 2 years or has obtained accreditation or certification equivalent to the NGWA Certified Vertical Closed-Loop Driller designation from a nationally recognized organization, as determined by the department.

(b) Documentation indicating that for a period of not less than 24 months occurring within the last 5 years, the applicant has conducted borehole drilling at a minimum of 20 CLGSHES sites under the supervision of a CLGSHES~~registered~~ contractor.

(5) An applicant for registration as a CLGSHES contractor shall pay a registration fee with the application. The initial registration fee and the biannual renewal registration fee is $200.00.

(6) The department shall issue certificates of registration as CLGSHES contractors to individuals who meet the requirements of this section.

(7) A certificate of registration is not transferable and expires on December 31, biannually, after the initial year of registration.

(8) The department may issue a certificate of registration as a CLGSHES contractor to a person that holds a similar certificate of registration in another state or a foreign country, if the issuance requirements for that certificate of registration do not conflict with this part and are of a standard not lower than that specified by the provisions promulgated under this section and equal reciprocal privileges are granted to a CLGSHES contractor~~registrant~~ of this state.

Sec. 12803. Before beginning the installation of a CLGSHES, the property owner or his or her authorized representative shall furnish the local health department with detailed plans of the

proposed CLGSHES installation using a permit or notification form provided by the department or a permit or notification form provided by the local health department.

Sec. 12804. The department or local health department may enter and inspect, at reasonable hours, an installation on public or private property for the development or decommissioning of CLGSHES boreholes.

Sec. 12805.(1) Beginning on **[DATE]**, a CLGSHES ~~closed-loop ground source geothermal borehole and associated piping~~ must be constructed in compliance with this part.
(2) If construction practices other than those described in this part are proposed to be used, before beginning construction and after consulting with the department, a CLGSHES contractor shall apply for and receive a deviation~~variance~~ from the local health department. In the absence of a permit program at the local health department, the CLGSHES contractor shall apply for and receive a deviation from the department ~~or from the local health department~~. A ~~variance~~deviation shall not be issued unless the deviation~~variance~~ is consistent with this part and is protective of public health, safety, and welfare as well as the environment.
(3) A ~~registered~~ CLGSHES contractor may install the CLGSHES~~closed-loop piping~~, but shall not install horizontal header or manifold piping unless that person also possesses a valid license under Article ~~11~~8 of the Skilled Trades Regulation Act, 2016 PA 407, MCL 339.~~6101~~5801 to 339.~~6133~~5819.
(4) A person who possesses a certificate of registration as a CLGSHES contractor shall complete or supervise the installation, repair, or abandonment of CLGSHES boreholes and assure compliance with this part.
(5) A CLGSHES contractor shall comply with all applicable laws, regulations, ordinances, and codes.
(6) If a local health department, in the discharge of its duties to protect the public health, considers it necessary to establish requirements that are more stringent than these rules, it shall do so and file a record of the requirements with the department.

Sec. 12806. The following apply to the grouting of the void space between closed-loop piping and a geothermal system borehole:

(a) Grouting shall be completed in a manner that prevents the introduction of surface or near surface contaminants into an aquifer, the interchange of water from different aquifers, or the loss of natural artesian pressure from an aquifer.

(b) The maximum allowable permeability value of the set grout shall be 1×10^{-7} centimeters per second, as determined in accordance with ASTM International Standard D5084 – 16a, Standard Test Methods for Measurement of Hydraulic Conductivity of Saturated Porous Materials Using a Flexible Wall Permeameter.

(c) All materials utilized for grouting CLGSHES boreholes shall be approved by the department prior to use.

(d) Except as follows, a CLGSHES borehole shall be grouted with neat cement grout, concrete grout, cementitious grout, bentonite grout, ~~or~~ thermally-conductive bentonite grout, or an approved alternate grout:

(i) A closed loop constructed in fractured, creviced, or jointed bedrock, or in cavernous limestone, or other karst formations, shall be grouted with neat cement grout, concrete grout, ~~or~~ cementitious grout, or approved alternate grout for this application in that portion of the borehole where these conditions occur.

(ii) Grouting in lost circulation zones may be conducted using a mixture of neat cement, ~~or~~ cementitious grout, or approved alternate grout for this application and clean

pea stone aggregate, or utilizing a lost circulation additive, as approved by the department.

(iii) Neat cement, concrete grout, ~~or~~ cementitious grout, or approved alternate grout for this application shall be used if any of the following conditions are encountered, or are expected to occur:

a. Flowing artesian groundwater.

b. Presence of methane or other subterranean gas.

c. Groundwater with chlorides over 1,500 milligrams per liter or groundwater with total hardness over 500 milligrams per liter.

d. Grouts, drilling fluids, and any other ~~liquid~~ additive to grouts and drilling fluids shall meet NSF/ANSI Standard 60 – 2016, Drinking Water Treatment Chemicals – Health Effects. Silica sand used in a grouting application is exempt from this provision. Silica sand must be washed and dried prior to use.

e. Subject to the following, all forms of fluid grout shall be placed utilizing a tremie pipe:

i. Granular or powdered-type bentonite being utilized for permanent borehole grouting purposes shall not be poured into the borehole from the surface. It must be mixed with water and any approved additives, using manufacturer's directions, prior to placement, using a tremie pipe.

ii. ~~Cementitious or bentonite-based grouts using sand as a thermal enhancer~~ Any grouting material that includes a thermal enhancement additive that is subject to settling must be effectively mixed using the manufacturer's directions before placement so as to prevent settling or uneven distribution of the ~~sand component~~ additive within the borehole.

f. Subject to the following, in standard boreholes where only one type of grout is being used, the void space between the closed-loop piping and the borehole shall be grouted in one continuous operation from the bottom to the top using a tremie pipe. Tremie pipes shall be initially positioned at the bottom of the borehole or at the bottom extent of the geologic layer that is being grouted. The tremie should be extracted as the grout material is being placed to avoid lodging the tremie permanently in the borehole. During the tremie pipe extraction procedure, the end of the tremie pipe must remain submersed in the grout slurry to prevent nonuniform placement of grout.

g. In boreholes where lost circulation zones or other geologic conditions such as those described in Subdivision (d)*(i)* are encountered, or where more than one type of grout is being placed, a multistep, noncontinuous grout placement procedure may be utilized as follows:

i. If stone aggregate is being utilized as part of a multistep grouting procedure, it may be poured, conveyed, or otherwise gravity-placed into the borehole, from the surface.

ii. If a cementitious grout is being placed as part of a multistep grouting procedure, it is permissible to allow the cementitious grout to harden, prior to initiating the placement of the remaining grout materials.

h. Spacing devices must not place closed-loop piping in direct contact with the borehole wall.

i. When placing bentonite-based grouts, grout shall be pumped through the tremie pipe from the bottom of the borehole until the density of the grout flowing from the annular space at the ground surface is equal to the density of the grout being pumped in.

j. All closed-loop ground source heat exchange system boreholes shall be grouted immediately after placement of the loop piping.

k. During construction or repair, a CLGSHES borehole shall not be allowed to remain open for more than 1~~1~~2 hours unless it is protected with an effective surface plug that will prevent surface water from gaining entry into the borehole. This subdivision applies where single-step grouting procedures are used and where multistep grouting procedures are used that involve an extended wait time to allow for cement hardening.

l. After placement of the grout material, a CLGSHES contractor shall monitor each borehole for settling for a period of not less than 24~~12~~ hours. Additional grout shall be added and the monitoring period shall be extended until settling of grout stops.

m. A closed-loop borehole drilled using horizontal directional drilling techniques shall be grouted after placement of the system piping by pumping grout as the tremie pipe is retracted back through the borehole.

Sec. 12807. The following standards shall apply to piping used for closed-loop ground source heat exchange systems:

(a) ~~(a)~~ Closed loop piping materials must comply with the following:

(i) Acceptable underground material as described in IGSHPA Closed-Loop/Geothermal Heat Pump Systems, Design and Installation Standards, 2017 Edition

(ii) Table 1210.4 of the 2015 Michigan Mechanical Code

(iii) Or as approved by the department

(b) The Standard Dimension Ratio and working pressure rating of closed-loop piping must be sufficient to accommodate the designed total dynamic head of the system and all prepressurization or pressure testing activities. The total system operating pressure must remain below the working pressure of the loops~~, manifolds, and any ancillary pipes~~.

(~~b~~c) ~~Polyethylene p~~Piping ~~and tubing~~ used in CLGSHES boreholes must be factory-assembled and pretested in accordance with IGSHPA Closed-Loop/Geothermal Heat Pump Systems, Design and Installation Standards, 2017 Edition prior to insertion into a borehole.

(~~c~~d) Closed-loop piping materials~~, joining methods, and~~ pressure testing before backfilling ~~or grouting~~ must comply with both of the following:

(i) IGSHPA Closed-Loop/Geothermal Heat Pump Systems, Design and Installation Standards, 2017 Edition.~~The Building Code, R 408.30401 to R 408.30499 of the Michigan Administrative Code.~~

(ii) ~~The Residential Code,~~ R M2015.28 ~~408.30501 to R 408.03547~~ of the 2015 Michigan Residential Code~~Michigan Administrative Code~~.

Sec. 12808. Heat transfer fluids used for CLGSHES must meet the following requirements:

(a) Heat transfer fluids must be either:

(i) Food-grade propylene glycol-water solution at a concentration specified by the product manufacturer.

(ii) Methanol-water solution up to 20% methanol by volume.

(iii) Ethanol-water solution up to 20% ethanol by volume.

(iv) Other nontoxic compounds that meet IGSHPA Closed-Loop/Geothermal Heat Pump Systems, Design and Installation Standards, 2014~~4~~7 Edition, and are compatible with heat pump manufacturers' specifications.

(b) Final heat transfer fluid solutions shall not be flammable. The heat-transfer fluid flash point shall be not less than 50°F (28°C) above the maximum system operating temperature.

(c) A closed loop that is leaking must be immediately excavated and repaired or the loop shall be permanently decommissioned.

~~(d) A CLGSHES must have a permanent label located at the loop charging valve that identifies the heat transfer fluid, its concentration, charging date, and the name and phone number of the geothermal contractor or the service company.~~

Sec. 12809.(1) The following minimum horizontal separation distances shall be maintained when installing a CLGSHES~~closed-loop ground source heat exchange system~~:

(a) Fifty feet from a household drinking water well.

(b) Seventy-five feet from a Type IIb or Type III public water supply well, as defined in R 325.10502 of the Michigan Administrative Code.

(c) Two hundred feet from a Type I or Type IIa public water supply well, as defined in R 325.10502 of the Michigan Administrative Code.

(d) Two hundred feet from the identified boundary of a groundwater contamination plume.

(e) Twenty-five feet from an on-site wastewater treatment system serving a single-family dwelling.

(f) Twenty-five feet from the replacement area of an on-site wastewater treatment system serving a single-family dwelling.

(g) Ten feet from a buried water service line.

(h) Ten feet from a buried pressure or gravity sanitary sewer line.

(i) Ten feet from a buried pressure or gravity storm sewer line.

(j) Ten feet from a storm water catch basin.

(k) Ten feet from a property line or boundary.

~~(k)~~(l) Ten feet from a surface water body, such as a lake, pond, river, or stream.

(2) Deviations to the separation distances specified in this section may be authorized as provided in Section 12805.

~~**Sec. 12810**. A temporary water line connected to a flush and fill port of a closed loop must be protected with a backflow prevention device as specified in either of the following:~~

~~(1) The Building Code, R 408.30401 to R 408.30499 of the of the Michigan Administrative Code.~~

~~(2) The Plumbing Code, R 408.30701 to R 408.30796 of the Michigan Administrative Code.~~

Sec. 1281~~1~~0. Decommissioning ~~and plugging abandoned~~ closed-loop ground source heat exchange system boreholes shall be conducted in compliance with the following:

(a) ~~A closed-l~~Loop piping ~~field~~ that is leaking or ~~is~~ no longer used shall be decommissioned by flushing the heat exchange fluid out of the piping ~~loop~~ with air and then completely filling

the loop piping ~~field~~ and associated header piping with grout that is equivalent in sealing properties to the material that was used to initially grout the boreholes.

(b) Decommissioning of CLGSHES piping shall be completed or supervised by ~~an individual that possesses a certificate of registration as~~ a CLGSHES contractor.

(c) A record of the decommissioning shall be provided to the property owner, the local health department, and the department not later than 60 days after the closed loop is ~~plugged~~decommissioned, on a form provided by the department.

(d) At the time of decommissioning, spent heat exchange fluids shall be disposed of in a manner consistent with all state and local waste fluid handling requirements.

Sec. 1281~~1~~2. Water used for drilling closed-loop ground source heat exchange system boreholes shall be as follows:

(a) Water that is used for drilling CLGSHES boreholes must be potable water that contains a free chlorine residual of not less than 10 milligrams per liter.

(b) Surface water shall not be used as a source of water during the drilling of a closed-loop ground source heat exchange system borehole unless it is obtained from a municipal water supply.

Sec. 1281~~3~~2. Compliance with this part does not relieve an individual of his or her responsibility to obtain permits and approvals pursuant to other applicable state and local laws, regulations, and codes involving respect for property lines, easements for utilities and roadways, or other site conditions.

Sec. 1281~~4~~3. A record shall be completed for CLGSHES boreholes as follows:

(1) Not later than 60 days after the installation of a CLGSHES, the CLGSHES contractor shall provide the property owner, local health department, and the department with a copy of a record of the installation, which shall include all of the following:

(a) Date of installation.

(b) Formation descriptions.

(c) As-built drawing showing the location of the closed-loop boreholes relative to permanent structures, water wells, on-site wastewater systems, and property lines.

(d) Depth and diameter of the boreholes.

(e) Depth and diameter of the loop piping.

(f) Type and amount of grout placed in the boreholes.

(g) Latitude and longitude coordinates taken at the approximate center of the system.

~~(h) Volume, concentration and chemical type of heat transfer fluid used in the loop piping.~~

~~(i)~~(h) Other information, as requested by the department.

(2) The information described in Subsection (1) shall be reported by the CLGSHES contractor for each CLGSHES that is installed, using the procedure designated and the form provided, by the department.

Sec. 1281~~5~~4. (1) If the department or a local health department determines that there are reasonable grounds to believe there has been a violation of this part, the department or the local health department shall investigate the violation. If the department or local health department establishes that a violation has been committed, the department or local health department shall order the responsible person to make the proper corrections.

(2) If the department finds that a holder of a certificate of registration has engaged in a practice in violation of this part, or an order issued pursuant to this part, the department may provide written notice of intent to suspend the certificate of registration to the certificate holder.
(3) A person that receives a notice of intent from the department that his or her certificate of registration may be suspended, upon request, shall be granted a hearing before the department or an authorized representative of the department. Failure of the person to request a hearing within 30 days after the day the Notice of Intent to suspend the certificate of registration was issued may result in the department suspending the certificate of registration.

Sec. 1281~~6~~5.(1) A person who violates this part or an order issued by the department or local health department under Section 12815 is guilty of a misdemeanor punishable by a fine of not less than $500.00 and not more than $1,000.00 per day of violation.
(2) The local prosecuting attorney or the attorney general may prosecute a person for a violation of this part. The department may request the attorney general to commence a civil action for appropriate relief, including a temporary or permanent injunction, for a violation of this part.
(3) An action brought by the attorney general under this section shall be brought in the circuit court for the county of Ingham or in the county in which the defendant is located, resides, or is doing business. The court has jurisdiction to restrain the violation and to require compliance.
(4) In addition to any other relief granted under this section, the court may impose a civil fine as follows:

(a) For a person that knowingly violates Section 12802 or an order issued pursuant to Section 12815, a civil fine of not less than $500.00 and not more than $1,000.00 per day of violation.

(b) For a person whose faulty practices or negligence associated with the installation of a closed-loop ground source heat pump geothermal borehole causes groundwater contamination, depletes the natural artesian head of an aquifer, impairs groundwater resources, or creates a public health hazard, a civil fine of not less than $5,000.00 and not more than $25,000.00 per occurrence.

(c) In addition to a fine imposed under this section, the attorney general may file a suit in a court of competent jurisdiction to recover the full value of the costs of surveillance, monitoring, enforcement, and correction of noncompliant conditions by this state or an authorized representative of the department resulting from the violation.