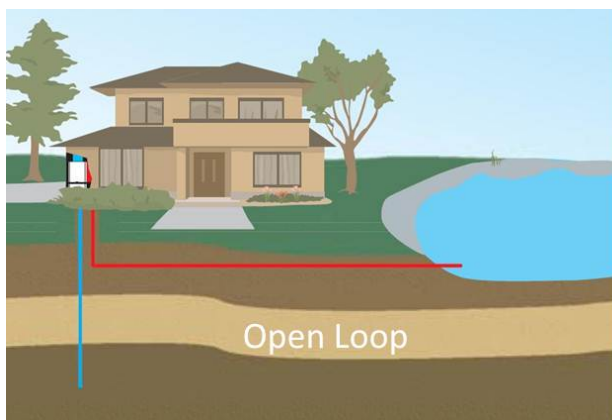


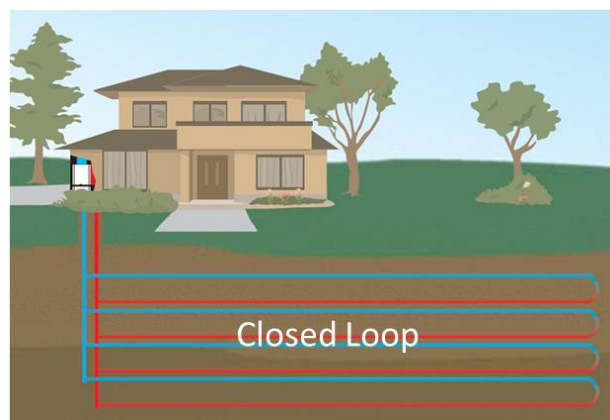
# Once-Through Geothermal Systems

## Background on Once-Through Geothermal Systems

A once-through geothermal open loop system uses groundwater from a well to heat and cool your home or building. The water is pumped from the well through the geothermal heat pump's water-to-refrigerant heat exchanger coil and then is generally discharged to the land surface or a local water body. In the cooling season, it transfers heat from your home or business into the water. In the heating season, it transfers heat from the water into your home or business.



Once-through geothermal systems are also called “open loop systems” or “pump and dump” systems.



A closed loop system recycles a heat-transfer fluid.

## Important Law Change

Since 1989, Minnesota law has prohibited once-through geothermal systems using more than 5 million gallons per year (5 MGY)<sup>1</sup>. **Effective January 1, 2015, the DNR is not allowed to issue a permit for any new once-through geothermal system** (i.e. those that use between 1 and 5 MGY). The law was changed by the 2014 Legislature. Existing once-through systems may not be expanded and must convert to water-efficient alternatives within the design life of existing equipment.

## Existing Once-Through Geothermal Systems May Require a DNR Permit

Anyone who uses more than 10,000 gallons per day or 1 million gallons per year requires a water appropriation permit from the DNR. Residential once-through geothermal systems may use more than 1 million gallons per year. Businesses tend to be larger spaces than residential and use more water than residential systems. If you have questions about your water use, please talk with your HVAC contractor and your local DNR staff.

## Annual Fees Required for Water Use

In 1989, the Minnesota Legislature established a special rate for use of once-through geothermal system water of \$420 per million gallons. For example, if a residential system uses approximately 3 MGY, it would cost \$1,260 in annual water use fees. For this and other reasons, many people have chosen to install closed loop systems, which don't use any groundwater and therefore don't require a water appropriation permit or use fee.

## What this Means to Homeowners and Businesses

- Any once-through system constructed on or after January 1, 2015 that will use more than 1 MGY is in violation of the law. A non-permitted system that uses less than 1 MGY in most years, but exceeds 1 MGY in a particularly cold or hot year is also in violation of the law.
- Systems constructed prior to January 1, 2015 that use between 1 and 5 MGY must be permitted by the DNR. Operation of these systems without a permit is a violation of law.
- All existing systems that use more than 1 MGY cannot be expanded and are required by law to be converted or decommissioned within their current design life.
- As of January 1, 2015, the DNR cannot:
  - Issue a permit for any once-through geothermal system constructed on 1/1/15 or later.
  - Amend a permit to increase the volume of water used.
- Talk with your contractor about options such as:
  - Installation of a closed loop system that does not require a DNR permit or DNR regulation. Remember that other state and local permits may be required.
  - Installation of a groundwater thermal exchange device; see below for more information.

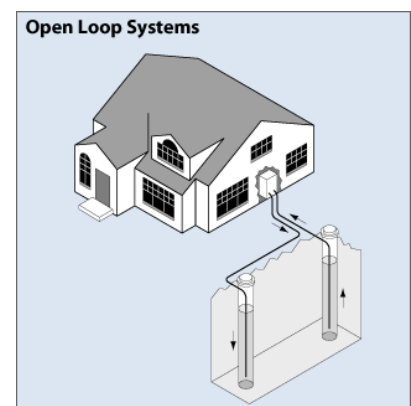
## What about a Groundwater Thermal Exchange Device?

A bill was authorized by the 2015 Legislature that allows the DNR to:

- issue permits for groundwater thermal exchange device (GWTED) systems, both existing and newly constructed systems
- reduce the annual water use fee rate for GWTEDs to that of traditional water uses, versus the higher once-through system rate

A GWTED is a type of once-through system. However, unlike the traditional "pump and dump," the water in a GWTED is discharged back into the aquifer from which it was drawn. Thus, it does not draw down aquifer levels nor cause problems at the discharge point with scouring, water quality, human health and safety concerns or other degradation.

The Legislature set higher annual water use rates (\$420/MGY) to discourage once-through systems that use groundwater and discharge



it to surface water. GWTEDs do not cause aquifer declines since the water is returned to the source aquifer, so a higher water use rate is not necessary.

Landowners who would like to apply for a GWTED permit from the DNR must:

- Submit a Well Construction Preliminary Assessment (WCPA) request to DNR.
- Obtain a permit from the Minnesota Department of Health (MDH) to install the system. Have the system installed by an MDH licensed well contractor.
- Apply for a permit under permit use type “geothermal groundwater exchange with reinjection (HVAC).”
- Recognize that the DNR permit authorizes operation while the system reinjects water to the original source aquifer. If the reinjection system fails, discharge to the surface is not authorized and pumping must cease. Changes or repairs to the system likely require a permit amendment with the DNR.

## **How do I Apply for a Well Construction Preliminary Assessment and a DNR Permit?**

You may apply for a WCPA request and a DNR permit online through the Minnesota DNR Permitting and Reporting System (MPARS). Simply go to [mndnr.gov/mpars](http://mndnr.gov/mpars), create an account and enter the requested information. You are able to save your steps along the way, so you can come back at a later time to finish your application, if needed.

## **What if I Have Questions?**

DNR staff are available and happy to help you. You can find your local DNR staff person by going online to [http://files.dnr.state.mn.us/waters/area\\_hydros.pdf](http://files.dnr.state.mn.us/waters/area_hydros.pdf).

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<sup>i</sup> M.S. 103G.271 Subd. 5