Geothermal Rescue: What is it?

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Geothermal Rescue: W

GEOTHERMAL RETURN
GEOTHERMAL SUPPLY
SHUTOFF FOR LOOP PUMPS IN ELECTRICAL ROOM
GEA
NELSON MECHANICAL DESIGN

Geothermal systems have worked in a reliable and trouble-free fashion since the 1930s. There was a tremendous surge of interest in geothermal systems in the mid 1930s by electric utilities as they realized that the heat pump approach was a wonderful way to even out their winter and summer power loads. The geothermal heat pump systems they installed were still in use into the 80s in many cases. There are many modern geothermal heat pump systems in operation today that are entering their second decade of successful service. This tells us that the concept of the geothermal heat pump and system is sound and a realistic long-term source of reliable heating and cooling.

There are many great reasons to go geothermal – quiet operation, no equipment outside to get damaged by the salt air or clogged up with snow, very efficient when designed correctly, very reliable when installed correctly, etc., etc. However, we have heard and dealt with enough geo horror stories to make geothermal "rescues" a significant part of our service work.

What went wrong with my geothermal installation?

There are many ways for a geothermal system to have issues – poor design and installation both have a role. Some of the issues we have seen and dealt with include the following:

geothermal heat pump failures – typically these heat pumps should last at least 10 years if not 15.

changes in water chemistry in open source geothermal systems – it is common for water use by an open geothermal system to change the chemistry of the aquifer which results in more acidic water. This more corrosive geothermal water can then destroy heat pumps and system parts.

changes in water availability – it is common to see a reduction in water available for an open source geothermal system when other homes nearby start accessing the same aquifer.

excessive repairs due to heat pumps working too hard – heat pumps are not designed to operate at their maximum ranges (flow through the heat pump too low or geothermal water too cold or too hot).

excessive repairs due to heat pumps working too long or too short – heat pumps are not designed to run very short cycles (because they are oversized for the load) or very long cycles (because they are undersized for the load).

geothermal field is too small or the heating load is too big – it is common for geothermal loop temperatures to drop as the heating season progresses due to a heat load that is too large (or has changed due to the heat load added by an addition to the house) or to a geothermal field that is too small (too much heat is extracted from the Earth to heat the house and the field gets colder and colder as the heating season progresses).

geothermal field is too small or the cooling load is too big – it is common for geothermal loop temperatures to climb as the cooling season progresses due to a cooling load that is too large (or has changed due to the cooling load added by an addition to the house) or to a geothermal field that is too small (too much heat is rejected to the Earth to cool the house and the field gets hotter and hotter as the cooling season progresses).

Why is geothermal design and installation challenging?

It really isn’t either. Or at least it doesn’t need to be. All geothermal heat pump manufacturers have very clear guidelines about the minimum flow of water to keep the compressors in the heat pumps happy. They also spell out the safe range for water temperatures to keep the heat pumps happy. It is critical to make sure that the heat pumps do not run for very long at their published minimum or maximum water flow and temperatures.

Modern geothermal field loop design software can create a very sophisticated model of your geothermal system and how it will look throughout the heating and cooling seasons and over the next decade. Knowing the long-term balance of heat extraction (for winter heating) and heat rejection (for summer cooling) is critical to understanding how the geothermal field will hold up over the next several decades.

What can NMD do to repair my system – the geothermal "rescue"

We have a lot of experience "rescuing" geothermal systems and we have documented some of them in our NMD Showcase. Please visit the following pages for more detail on each specific geothermal issue and our resolution:

Geo Rescue – closed loop with inadequate flow causing heat pump failure

Geo Rescue – closed loop with a geothermal field too small for the cooling load

Geo Rescue – closed loop circulator too small and heat pumps won't work

Geo Rescue – closed loop with a geothermal field too small for the heating load

Geo Rescue – closed loop with a geothermal field too small for the heating load

Geo Rescue – direct exchange geothermal heat pump repiping to save the compressor

Geo Rescue – open loop with the aquifer becoming acidic and eating heat pumps

What should geo look like when it is done correctly??

A geothermal system should look neat and clean, should be quiet when operating, and need minimal annual service (air filters and coil cleaning). Simple and elegant.

Our goal is to be **Martha's Vineyard's premier plumbing and HVAC outfit** – we appreciate the opportunity to discuss a ***"rescue" strategy for your geothermal system*** in your home.