

# Notes from the Geothermal Drilling and Aquifer Protection Leading Practices Guide Webinar

## November 26<sup>th</sup>, 2024

### Webinar Summary

The objective of this webinar was to present up-to-date leading practices to support municipal understanding of the drilling process for geo-exchange low carbon energy systems and ensure the protection of local aquifers and water supply systems. Understanding of the provincial regulatory process for geo-exchange drillers in Ontario was also discussed.

#### Presenters:

From Ontario Geothermal Association:

- Paul Frith, Paul Frith Consulting
- David Brodrecht, Walter Fedy

#### Key Findings:

- The Regulations and Drilling Primer provides recommendations for leading practices for municipal geo-exchange approvals.
- The Primer places recommendations into one of three categories, which illustrate the specific conditions under which certain types of geo-exchange systems make the most sense and source water protection considerations.
- Larger buildings require more complex permitting requirements compared to low rise residential buildings because of the larger scale of their buildings and the different depths required for larger buildings.
- Municipalities should be aware of the key geo-exchange regulations including [CSA C448](#), [O. Reg. 98/12](#), [O. Reg 903](#), [CSA B52 – Refrigeration](#), [ANSI/AHRI/ASHRAE/ISO 13526](#), and [Ontario Clean Water Act, 2006](#) (described below).

#### Presentation Summary:

**Paul Frith, Paul Frith Consulting and David Brodrecht, Walter Fedy, Ontario Geothermal Association. Geothermal Guidelines for Municipalities, Regulations and Drilling Primer.**

- The purpose of the Geo-exchange Drilling Guideline report is to provide municipalities with the leading practices on geo-exchange systems permitting. There are some municipalities that have not provided approval for geo-exchange systems because of their aquifer protection concerns.
- This Guide presents the leading science and practices related to ensuring aquifer protection while also advancing geo-exchange systems.
- Open loop systems are straightforward to install and extract energy efficiently. However, there are challenges with water quality management because they are susceptible to impacts from nearby construction, and they face stricter regulations regarding water use than closed loop systems
- Closed loop systems have a longer lifespan than open loop, they have lower upfront costs, and their performance is more predictable.
- The importance of municipalities remaining updated on relevant regulations was emphasized, with particular attention to the following:
  - CSA C448: Provides guidelines for geo-exchange systems in Canada related to design, installation, and maintenance. This standard was updated in 2013, and most recently in 2016. The 2013 edition is most frequently referred to for code requirements.
  - O. Reg. 98/12: Requires geo-exchange drillers to obtain an Environmental Compliance Approval (ECA). This involves having safety plans in place to monitor and prepare for encounters with natural gas. This regulation also limits which types of antifreeze can be used in any geo-exchange system to mitigate risks associated with spills.
  - O. Reg 902: A regulation under the Ontario Water Resources Act. The focus of this regulation is water wells, which Open Loop systems fall under. It regulates drilling standards, emphasizes water protection, and sets permit requirements.
  - CSA B52 – Refrigeration: Heat pump related. Governs key aspects of refrigeration systems including design, installation, maintenance, safety requirements, and environmental considerations.
  - ANSI/AHRI/ASHRAE/ISO 13526: Heat pump related. Focuses on heat exchange performance (efficiency and effectiveness). This standard is concerned with testing and performance ratings.
  - Ontario Clean Water Act, 2006: Legislation concerned with protecting drinking water sources in Ontario. Does not mention geo-exchange but drives well head protection areas.
- Municipalities have different source water protection requirements related to well head protection areas, intake protection zones, and aquifer vulnerability. The Guide

collected information from municipalities with regulations and distilled guidance down to a concise recommendation.

- The presentation provided an overview of the recommendations included in the Guide, which have been placed into three categories, where categories outline what type of geo-exchange systems make the most sense under different circumstances
- Category 1 prohibits geo-exchange systems within a well head protection area A (ex. within 100m of a municipal well) and well head protection area B with a vulnerability score of 8 or higher. While proper installation would not impact these wells, improper installation may have a negative impact.
- Category 2 encompasses systems where further study is required. Studies such as environmental assessments and risk management plans may be required on a case-by-case basis.
- Category 3 includes systems that are approved with no additional source water protection requirements. These systems present minimal to no risk to drinking water systems.
- Another important consideration when planning for geo-exchange installation is the coordination of geo-exchange and construction schedules. Drilling before construction begins is often a best practice because it allows time for the geo-exchange system to be operational in time to be integrated into the building's heating and cooling. So often energy decisions have to be made at an early time to enable vertical drilling to take place,
- Residential and Commercial permitting requirements for geo-exchange systems differ in terms of technical specifications, design calculations, and drawing requirements (site plans, mechanical drawings) for different types of buildings. For example, commercial buildings have a different energy load profile from a residential building.

**Contact information:**

Please reach out to us at any time with additional information, questions, or input.

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