



Department of the Environment

Geothermal Wells in Maryland

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MDE- Water Management Administration

On-Site Systems Division





- **Subtitle 26 MARYLAND ENERGY ADMINISTRATION**
- **14.26.05 Geothermal Heat Pump Grant Program**
- Authority: State Government Article, §9-2008,
Annotated Code of Maryland;
Ch. 132, Acts of 2008
- **Notice of Emergency Action**
- **[08-210-E]**
- The Joint Committee on Administrative, Executive, and Legislative Review has granted emergency status to amendments to Regulations **.04** and **.07** under **COMAR 14.26.05 Geothermal Heat Pump Grant Program.**



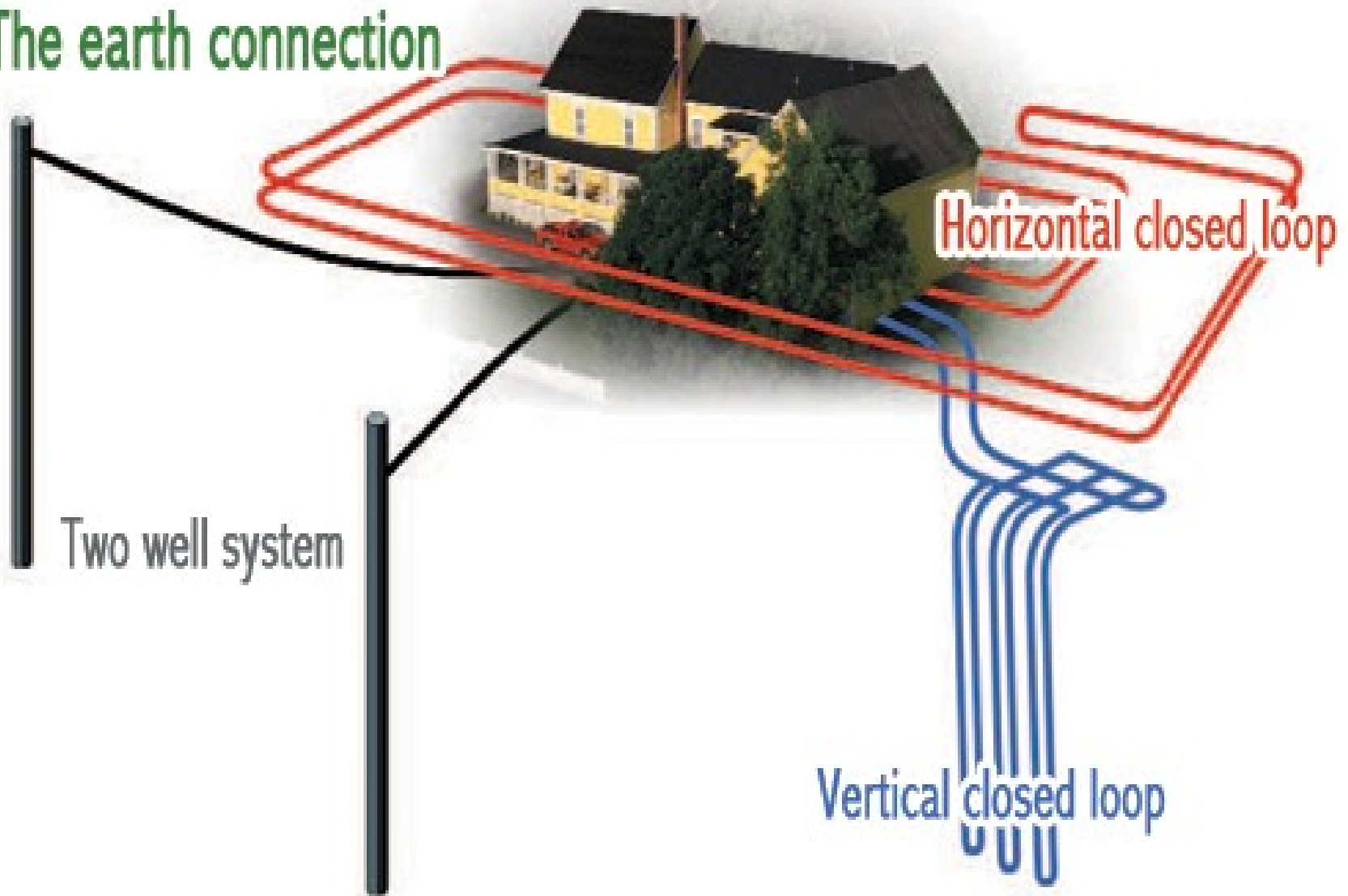


Types of Geothermal Wells

- Closed Loop
- Return Flow
- Geothermal (subject to Maryland's Geothermal Resources Act 5-601 to 605)



The earth connection





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Geothermal – sub. to MD Geothermal Resources Act

Written Application to MDE for permit.

Include project description, methods of construction.

Public notice and opportunity for hearing.

Appropriation permit may be issued.





Return Flow Well

- Construction of well subject to certain COMAR 26.04.04 (MD Well Const. Regulations).
- Groundwater Appropriation permit required for withdrawals >5000 gallons per day.



Return Flow Well

- Exemption to GAP may be requested for residential groundwater heat pumps if withdrawal is <5000 gpd and water is returned to same aquifer from which it is withdrawn.
- Must not be from within a water management strategy area.
- UIC permit to return water to aquifer.



Return Flow Well - Issues

- Greater screen area required for injection well than for withdrawal well.
- Some constituents such as copper or total dissolved solids may increase.



Closed Loop Wells

- More popular than return flow wells due to greater regulation and engineering required for returning water to aquifer.
- and because of the difficulty in obtaining an NPDES permit to discharge withdrawn water to the surface. Permit may require temperature limitation, for example.



Closed Loop Wells

- These are wells according to definition in Environment Article 9-1305.
- Permit required to construct well.
- Requirement for licensed well driller.
- Plumbing permit required by locals.
- Well permits can be special conditioned to require non-toxic transfer fluids and to grout from bottom to top.



Closed Loop Wells- Construction

- In lieu of specific regulation, and in agreement with interested parties, MDE recommended in 2007 that construction must follow the National Groundwater Association's (NGWA) published "Guidelines for the Construction of Vertical Boreholes for Closed Loop Heat Pump Systems" 1997.





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Closed Loop Wells – Construction

Sec. 05.002-100 of NGWA -“Use of Benonite Grouts” recommends that local codes (COMAR 26.02.04) be followed and grouts should be mixed following manufacturer’s specifications.





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Closed Loop Wells Further MDE Guidance

Guidance given to local Delegated Approving Authorities for receipt of applications and issuance of permits for closed loop geothermal wells following calls and complaints regarding grouting and siting of these wells.



Guidance – Application

- Site plan showing well and other pertinent structures, eg.- Septic system, house, property lines.
- Cross sectional diagram of proposed well and statement of intended grout mix.



Guidance - Siting

- 10 ft to property line.
- 15 ft. to right of ways.
- 50 ft from sewage reserve areas.
- Option for Approving Authorities to consider greater or less separation distance.





Guidance – Bentonite Grout

- Bentonite alone to be mixed at 2 pounds or greater per gallon of water.



Guidance: Thermal Enhanced Bentonite Grout

- Bentonite slurry mixed at 2 pounds bentonite to 1 gallon of water.
- Sand shall be 000 well gravel that meets the following:
 - 95% silica
 - Uniformity coefficient of 1.7
 - Particle size range of 0.6 mm to .15 mm

Thermal Enhanced Grout

- Other mixtures may be reviewed by the Approving Authority and considered for approval only after permeability testing, and other testing that may be required.



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Thermal Enhanced Grout - Inspection

Inspector can verify grout mixture by collecting 5 gallon sample and waiting 1 hour to see if sand settles out. If sand settles out grout mix is improper.







MDE Guidance – Special Conditions

- Request for notification of grouting for opportunity to inspect.
- Grouting required to be from bottom to top.
- Clustering of wells under one permit. Size of cluster to be determined by Approving Authority.







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