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(FORM UPDATED: 08/11/2010)

WISCONSIN STATE LEGISLATURE ... PUBLIC HEARING - COMMITTEE RECORDS

2011-12

(session year)

Assembly

(Assembly, Senate or Joint)

Committee on Natural Resources...

COMMITTEE NOTICES ...

- Committee Reports ... **CR**
- Executive Sessions ... **ES**
- Public Hearings ... **PH**

INFORMATION COLLECTED BY COMMITTEE FOR AND AGAINST PROPOSAL

- Appointments ... **Appt** (w/Record of Comm. Proceedings)
- Clearinghouse Rules ... **CRule** (w/Record of Comm. Proceedings)
- Hearing Records ... bills and resolutions (w/Record of Comm. Proceedings)
(**ab** = Assembly Bill) (**ar** = Assembly Resolution) (**ajr** = Assembly Joint Resolution)
(**sb** = Senate Bill) (**sr** = Senate Resolution) (**sjr** = Senate Joint Resolution)
- Miscellaneous ... **Misc**

* Contents organized for archiving by: Stefanie Rose (LRB) (August 2013)

APPENDIX B: Regulation in Other States

Missouri

Regulations: The Water Well Drillers Act (1987); amended in 1991 to include the Heat Pump Construction Code.

Language: *Vertical closed-loop heat pump well* is defined as, “the borehole perpendicular to the horizon deeper than ten feet (10') into which a closed-loop pipe is placed for the purpose of heat transfer.”

Department: Missouri Department of Natural Resources, permits are administered by the state.

Advisory Board: Water Well Drillers Board; 9 person board that must contain one water well driller.

Driller Licensing Requirements: Missouri requires that drillers complete two-year apprenticeships.

Fee Schedule: Standardized.

Notes: Regulators report that by standardizing what is required of GSHP projects they have created a level playing field for drillers and consumers alike⁹⁶. Missouri has seen marked growth in the commercial side of the GSHP industry⁹⁷.

Table 3 provides an outline of many, though not all, guidelines contained in Missouri’s Heat Pump Construction Code.

⁹⁶ Conversation with Beth Marsala of Missouri Department of Natural Resources

⁹⁷ Conversation with Beth Marsala of Missouri Department of Natural Resources

Table 3

Missouri Department of Natural Resources – Heat Pump Construction Code ⁹⁸	
Driller Qualifications	Water well driller permit, which requires a 2-year apprenticeship with a fully permitted contractor ⁹⁹ .
Reporting	Certification report form must be submitted within 60 days after completion of the system.
Certification Process	Review of the certification report form, after which a certification number will be issued to the landowner.
Location	<p>Vertical heat pump systems: at least 300 ft from a storage area for commercial fertilizers or chemicals, landfill, lagoon, or above-ground storage tank for petroleum; 100 ft from a below-grade manure storage area, cesspool, unplugged abandoned well, grave, building or yard used for livestock or poultry; 50ft from an existing operating well, septic tank, buried sewer.</p> <p>Horizontal heat pump wells: least 2ft above or below any other intersecting underground piping (to prevent freezing of water lines) or wiring on the property.</p> <p>*A variance may be granted if set back distances cannot be met.</p>
Exclusions/Exemptions	Closed loop heat pump systems installed in trenches or pits 10ft or less in depth are exempt from these rules.
Sealing the borehole	Full-length grout is recommended and may be required.
Sealing materials	Bentonite slurry, nonslurry bentonite, thermal grout slurry, other grout as approved.
Heat Pump Loop Materials	High density polyethylene or polybutylene pipes
Loop Fluids	Pure glycerine solution, food grade propylene glycol, dipotassium phosphate, sodium chloride, potassium acetate, methanol, water, ethanol or other fluids as approved. All fluids must be 90% biodegradable.
Hole Depth	<p>Closed-loop heat pump wells must not be deeper than 200ft.</p> <p>*A variance must be obtained to drill deeper than</p>

⁹⁸<http://www.dnr.mo.gov/env/wpp/lawsregs.htm>

⁹⁹<http://www.sos.mo.gov/adrules/csr/current/10csr/10c23-1.pdf>

	200ft.
Fee Schedule ¹⁰⁰	<p>Well certification fees are capped at \$125 per well.</p> <p>Well registration fees are capped at \$100 per well.</p> <p>Open-loop and closed-loop heat pump</p> <p>Well certification fees:</p> <ul style="list-style-type: none"> • One to fifty (1–50) ton heat pump unit \$150 • Over fifty (50) ton heat pump unit \$250

New Jersey

Regulations: The New Jersey Department of Environmental Protection (NJDEP) distributed the first regulations pertaining to GSHPs on September 2001. Currently, these rules sunset every five years and they were most recently republished in March 2007. A few minor amendments were made to the most recent regulations, including: a fee hike, requiring that wells be located using GPS, and the removal of an onerous apprenticeship requirement for drillers. In addition, New Jersey also regulates pump installers.

Language: *Closed loop geothermal wells* are defined as, “a well or a borehole drilled to a specific depth either singly or in a series wherein a continuous closed loop of pipe is inserted from one well to another for the purpose of noncontact thermal energy transfer from a fluid in the loop to or from the earth.”

Department: New Jersey Department of Environmental Protection; Permits are administered by the state and local authorities have the opportunity to pass local ordinances for their jurisdiction.

Advisory Board: State Well Drillers and Pump Installers Examining and Advisory Board¹⁰¹. This nine-member board¹⁰² was established by the “Subsurface and Percolating Water Act,” and provides advice to the dU.S. EPartment on exam questions, license status, and recommendations to the Department of Environmental Protection on new rules and regulations. All meetings of the board are open to the public.

¹⁰⁰<http://www.sos.mo.gov/adrules/csr/current/10csr/10c23-2.pdf>

¹⁰¹. <http://www.state.nj.us/dep/watersupply/advisoryboard.htm>

¹⁰² Three master well drillers, 1 licensed well driller, 1 pump installer, 1 public member, 3 NJDEP Representatives

Driller Licensing Requirements: New Jersey requires that drillers complete a three-year apprenticeship but regulators report that the state currently faces a lack of qualified drillers because the test for drillers is only offered two times a year.

Fee Schedule: Standardized.

Notes: In re-writing their regulations, the Department of Environmental Protection reports that they have learned that they need to give themselves the flexibility to provide for new technologies (refrigerants etc)¹⁰³.

Table 4 provides an outline of many, though not all, guidelines contained in New Jersey's Well Construction Code.

Table 4

New Jersey NJ Department of Environmental Protection at N.J.A.C. 7:9D (Well construction)	
Driller Qualifications	Licensed Driller, which requires 3 years of well drilling experience ¹⁰⁴ .
Reporting	Well Record Document must be submitted by the driller.
Certification Process	Site Wide permit is required
Location	Minimum distance not specified for GSHPBs
Exclusions/Exemptions	None specified
Sealing the borehole	The entire annular space between the closed loop and the uncased borehole shall only be sealed under pressure.
Sealing materials	High-grade bentonite, cementitious thermally enhanced grout or Thermal Grout 85.
Heat Pump Loop Materials	Pipe material for the underground buried portion of the heat exchanger shall be 160 psi polyethylene pipe
Loop Fluids	The circulating fluids utilized in the closed loop system shall be potable water or an appropriate mixture of potable water with one of the following antifreeze solutions: i. Calcium Chloride;

¹⁰³ Conversation with Pat Bono of the New Jersey Department of Environmental Protection

¹⁰⁴ http://www.state.nj.us/dep/watersupply/app_journeyman.pdf

	ii. Ethanol; iii. Potassium Acetate; iv. Potassium Carbonate; v. Propylene Glycol; or vi. Sodium Chloride;
Hole Depth	Not specified
Fee Schedule	Each sitewide permit application for borings, cathodic protection wells, closed loop geothermal well systems or dewatering well systems shall be accompanied by a fee of \$1,300.00. A sitewide permit shall allow for the construction of 10 or more borings, cathodic protection wells, closed loop geothermal wells, or dewatering wells or dewatering wellpoints for each project area. Where less than 10 borings, cathodic protection wells, closed loop geothermal wells, or dewatering wells or dewatering wellpoints are proposed to be drilled at a site, individual well permits are required, and the fee at (b)1 above applies.

Idaho

Regulations: As of May 2009, Idaho's Department of Water Resources (IDWR) revised their decades-old well construction standards to include regulations pertaining to closed loop heat exchange wells. Regulations are contained in IDAPA 37.03.09 Well Construction Standards.

Language: *closed loop heat exchange well* is defined as, "a ground source thermal exchange well constructed for the purpose of installing any underground system through which fluids are circulated but remain isolated from direct contact with the subsurface or ground water."

Department: Idaho Department of Water Resources (IDWR); permits are administered by the state.

Advisory Board: Drillers Advisory Committee; typically convenes to address special issues, typically related to driller licensing.

Driller Licensing Requirements: 30 months of drilling experience in Idaho, bonded with at least \$5,000, and passed licensing exam. Employees of drilling firms, co-partnerships,

corporations or associations are authorized to operate drilling equipment for the driller after obtaining an operator's permit. An operator's permit shall be obtained by filing with the director an application in writing on a form provided by the director accompanied by a twenty-five dollar (\$25.00) application fee¹⁰⁵.

Fee Schedule: Standardized.

Notes: In drafting the new language for closed loop heat exchange wells, the IDWR worked with the Idaho Groundwater Association and met with drillers who were involved in the GSHP industry to see how the regulations could both accommodate the industry's needs while meeting well construction standards. In addition, Idaho purposely left their regulations for closed loop heat exchange wells broad enough to allow for regulatory flexibility as new technologies arise.

Table 5 provides an outline of many, though not all, standards contained in Idaho's Well Construction Standards.

¹⁰⁵ <http://www.legislature.idaho.gov/idstat/Title42/T42CH2SECT42-238.htm>

Table 5

Idaho Department of Water Resources – IDAPA 37.03.09 Well Construction Standards Rules	
Driller Qualifications	All persons constructing wells must comply with the requirements of Section 42-238, Idaho Code, and IDAPA 37.03.10, "Well Driller Licensing Rules." (30 months of drilling experience in Idaho, bonded with at least \$5,000, and passed licensing exam.) Application fee is \$200.
Reporting	Every newly constructed, modified or decommissioned (abandoned) well location must be identified by latitude and longitude with a global positioning system (GPS) and recorded on the driller's report in degrees and decimal minutes and within the nearest 40 acre parcel using the Public Land Survey System.
Location	Minimum S.U.S. Separation Distance (Feet) Septic Drain Field – 100; Septic Tank – 50; Property Line – 5;
Exclusions/Exemptions	Artificial openings less than 18 feet deep are exempt from these rules.
Sealing the borehole	All casing must be sealed its entire length with cement or a cement grout mixture unless waived by the Director. The seal material must be placed from the bottom of the casing to land surface either through the casing or tubing or by use of a tremie pipe. The cement or cement grout must be undisturbed for a minimum of twenty-four (24) hours or as needed to allow adequate curing.
Sealing materials	Seal material must consist of bentonite chips, pellets, or granules, bentonite grout, neat cement, or neat cement grout as defined by these rules
Heat Pump Loop Materials	Fluid-tight circulating pipe, composed of high-density polyethylene, grade PE3408, minimum cell classifications PE355434C or PE345434C conforming to ASTM Standard D3350, or other Director-approved pipe.
Loop Fluids	Propylene glycol, or other circulating fluid approved by the Director.
Fee Schedule ¹⁰⁶	One permit (\$200) covers 1 – 10 borings ¹⁰⁷ .

¹⁰⁶ Conversation with Chad Hersley, Idaho Department of Water Resources

¹⁰⁷ Conversation with Chad Hersley, Idaho Department of Water Resources

Testing Requirements	Pressure test the system with potable water prior to installation of the circulating fluid at one hundred percent (100%) of the designed system operating pressure for a minimum duration of twenty-four (24) hours.
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Oregon

Regulations: Oregon Administrative Rules (OAR) Water Resources Department Chapter 690, Division 240.

Language: GSHPBs fall under the Geotechnical hole category, which is defined as, “a hole constructed to collect or evaluate subsurface data or information, monitor movement of landslide features, or to stabilize or dewater landslide features. Geotechnical holes are not monitoring wells or water supply wells as defined below. Various classes and examples of geotechnical holes are listed in OAR 690-240-0035(6)-(9).”

Department: Oregon Water Resources Department; no permitting involved, however drillers must submit reports.

Advisory Board: Ground Water Advisory Committee; 7 person committee that contains members who are drillers who have experience with ground source heat pump boreholes, but it is not their primary source of business.¹⁰⁸

Driller Licensing Requirements: License required, 1 year of experience.

Fee Schedule: Standardized.

Notes:

Table 6 provides an outline of many, though not all, standards contained in Oregon’s Well Construction Standards.

¹⁰⁸ Conversation with Mike Zwart, Oregon Water Resources, October 6, 2009.

Table 6

Oregon Administrative Rules (OAR) Water Resources Department Chapter 690, Division 240 ¹⁰⁹	
Driller Qualifications	
Reporting	A 'Geotechnical Hole Report' shall be filed with the Department within 30 days of the completion of the geotechnical hole
Location	Not specified
Exclusions/Exemptions	Not specified
Sealing the borehole	If permanent casing is installed in a geotechnical hole, it shall meet the casing requirements in OAR 690-240-0430, 690-210-0210, or 690-210-0190 and the sealing requirements in OAR 690-240-0475.
Sealing materials	Well seals shall consist of a physically and chemically stable hydrated grout slurry composed of: Neat cement; or Sodium bentonite; or a cement-bentonite grout mixture containing no more than five percent bentonite by dry weight; or Sodium bentonite granules, pellets or chips placed in an unhydrated state, and subsequently hydrated downhole.
Heat Pump Loop Materials	Not specified.
Loop Fluids	Not specified.
Fee Schedule	Fees are required for Geotechnical Hole Reports only; a \$25 fee was established for the first report and \$10 for each additional report at a project site within a seven-day period.
Testing Requirements	Not specified.

Washington

Regulations: The state of Washington revised its water well construction standards in 2006, adopting language for "Ground Source Heat Pump Borings" in Chapters 173-160 and 173-162 of the Washington Administrative Code (WAC).

¹⁰⁹ http://arcweb.sos.state.or.us/rules/OARS_600/OAR_690/690_230.html
and <http://www.wrd.state.or.us/OWRD/LAW/oar.shtml>

Language: *Ground Source Heat Pump Borings* are defined as, “a vertical boring constructed for the purpose of installing a closed loop heat exchange system for a ground source heat pump.”

Department: Washington Department of Ecology

Advisory Board: Technical Advisory Group; 50% of the members are drillers. These drillers may have experience with ground source heat pump boreholes; however there is no specific GSHP industry presence.¹¹⁰

Driller Licensing Requirements: Washington requires that drillers have at least 600 hours of drilling experience working under the direct supervision of a licensed operator who has held a Washington state water and/or resource protection well drilling license for at least three years; have obtained six continuing education units as approved by the Department; and pass a written examination.¹¹¹

Fee Schedule: Standardized.

Notes: Washington reports an average boring depth of 300 feet and that hundreds of these boreholes are constructed in the state every year.

Table 7 provides an outline of many, though not all, standards contained in Washington’s Well Construction Standards.

Table 7

Washington Department of Ecology – Chapters 173.160 & 173.162 Washington Administrative Code (WAC) ¹¹²	
Driller Qualifications	Drillers must have at least 600 hours of drilling experience working under the direct supervision of a licensed operator who has held a Washington state water and/or resource protection well drilling license for at least three years, have obtained six continuing education units as approved by the Department, and pass a written examination. The application fee for the license is \$75.
Reporting	Water well report must be submitted 30 days after well completion.

¹¹⁰ Conversation with William Lum, Washington State Department of Ecology, October 6, 2009.

¹¹¹ Conversation with William Lum, Washington State Department of Ecology, October 6, 2009.

¹¹² <http://www.ecy.wa.gov/programs/wr/wells/wellhome.html> and <http://apps.ecy.wa.gov/welllog/>

Location	A ground source heat pump boring shall not be located within one hundred feet from any water supply well. The setback from public water supply wells for ground source heat pump borings must comply with applicable dU.S. EPArTment of health sanitary control zone regulations for the public water supply wells. Where the sanitary control zone is greater than one hundred feet the setback should reflect the expanded distance. Variances to the standard setback for water supply wells can be obtained.
Exclusions/Exemptions	None specified.
Sealing the borehole	Site-specific conditions shall be assessed to determine the best method and materials to be used for sealing the well annulus to protect the ground water. Grouting (sealing) the bore hole of a ground source heat pump boring must be completed immediately after the heat exchange loop is installed to avoid cave in of the uncased hole.
Sealing materials	Sealing must be done with an active solids content Bentonite grout slurry (minimum twenty percent active solids by weight) per WAC 173-160-221. Use of controlled density fill (CDF) and fly ash is prohibited.
Heat Pump Loop Materials	The material used to make up the heat exchange loop that is placed into the ground must be able to withstand the typical forces, which act upon it during and after construction. It shall be resistant to the corrosive effects of the surrounding formations, earth, water, and heat exchange fluids within the pipe.
Loop Fluids	All fluids used in the construction and testing of ground source heat pump borings will be handled and utilized in a manner that does not contaminate the ground water or surface water.
Fee Schedule	The fee for a ground source heat pump boring or a grounding well is forty dollars for construction of up to four ground source heat pump borings or grounding wells per project and ten dollars for each additional ground source heat pump Boring or grounding well constructed on a project with more than four wells.
Testing Requirements	Pressure testing will be done in accordance with manufacturer recommended specifications. The Closed-loop assembly pipe within the borehole shall not leak or cause contamination to the ground water.

APPENDIX C: County and Jurisdictional Data

County	Alameda
Special Jurisdiction	None
Agency	North Alameda County Public Works Agency
Contact	510.670.6633
Drilling Classification	Geothermal Well
Rationale	
Regulations	California Department of Resources Water Well Standards DWR Bulletin 74-99
Permits	Required and available online
License	C-57
Fees	\$345 for inspection costs
Additional Comments	The applicant applies for a permit under which they specify "geothermal well". The agency then has to go back to the applicant to see what kind of system they want to install (vertical, closed loop, horizontal etc). The applicant submits a site map of what they want to install and where they want to install it. The agency prefers installations in the backyard vs. the front yard due to potential problems with easements in the front yard. Concerns particular to Alameda are the shallow groundwater zone which requires permitting for drilling even at shallow depths. Their process is guided by a 1997 U.S. EPA manual (U.S. EPA 430-B-97-028).

County	Alameda
Special Jurisdiction	Pleasanton, Dublin, Livermore, Sunol
Agency	Zone 7 Water Agency
Contact	925-454-5000, http://www.zone7water.com/
Drilling Classification	Water Well
Rationale	Geothermal wells have certain construction requirements that a borehole does not need, i.e., sanitary surface seal. There is no casing involved in borehole drilling – one has to back fill with native material or cement.
Regulations	California Department of Water Resources Water Well Standards
Permits	Required and must indicate the type of project
License	C-57

Fees	None to date
Additional Comments	None

County	Alameda
Special Jurisdiction	City of Berkeley
Agency	City of Berkeley (Toxics Management Division)
Contact	510.981.7460
Drilling Classification	Borehole
Rationale	
Regulations	California Department of Water Resources Water Well Standards Alameda County Code Berkeley Municipal Code
Permits	A building permit is required through the Permit Service Center and the Toxics Management Division requires a soil boring permit
License	C-57
Fees	Fees for soil boring are \$188 for the first and \$112 for each additional boring
Additional Comments	

County	Alameda
Special Jurisdiction	Fremont, Newark, Union City
Agency	Alameda County Water District
Contact	510.668.4460, http://www.acwd.org/
Drilling Classification	Water Well
Rationale	
Regulations	California Department of Water Resources Water Well Standards
Permits	Required
License	C-57
Fees	There is a \$520 per well fee. If a job takes longer than 5 days there is an additional inspection fee \$100/hour.
Additional Comments	This jurisdiction is concerned with interconnection with aquifers because they have problems with salt water intrusion. They do not allow bentonite as a seal.

County	Alpine
Special Jurisdiction	None
Agency	Environmental Health
Contact	530.694.2146
Drilling Classification	Water Well
Rationale	
Regulations	California Department of Water Resources Well Water Standards The county has a county well ordinance that contains standard well permitting conditions.
Permits	Required
License	C-57
Fees	\$360 per well
Additional Comments	There are no GSHPs installed in Alpine county. It is the state's smallest county, with a population of 1,100 and has a large transient population. It is a resort area and the main industry is tourism.

County	Amador
Special Jurisdiction	None
Agency	Amador County Environmental Health
Contact	209.223.6439
Drilling Classification	Water Well – "other"
Rationale	
Regulations	California Department of Water Resources Water Well Standards
Permits	Required and available online
License	C-57
Fees	Well ordinance \$211 first, additional wells are \$63
Additional Comments	The main concern in Amador County is cross-contamination. They have a few heat pumps installed in the county. A common issue that arises is that drillers want to use bentonite to fill right to surface and they usually resist that because it is not as structurally sound.

County	Butte
Special Jurisdiction	None
Agency	Butte County Public Health
Contact	530.891.2727, 530.538.7281

Drilling Classification	Water well
Rationale	Butte County only permits closed loop wells, they also require basic construction specifications to see how they are sealed, what materials they are using, and what the heat exchange media is.
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99
Permits	Required
License	C-57
Fees	\$368 per well
Additional Comments	They probably have a total of 10 GSHP systems county-wide. They just had a series of fee changes so not sure the precise fee.

County	Calaveras
Special Jurisdiction	None
Agency	Calaveras County Environmental Health Dept.
Contact	209.754.6399
Drilling Classification	Geothermal Heat Exchange Well
Rationale	They have specified GHEWs on the well construction application because the purpose of the drilling is functionally different than well water drilling.
Regulations	California Department of Water Resources Water Well Standards
Permits	Required. The county requests that a site map accompany the application, and they also request a work plan.
License	C-57
Fees	There is a fee for the application and the permitting of the well – also if the project generates hazardous waste then you fall into a different program and there would be sU.S. EPA rate fees. The per well fee is \$445.
Additional Comments	

County	Colusa
Special Jurisdiction	None
Agency	Colusa County Environmental Health
Contact	530.458-0395 or 0398
Drilling Classification	
Rationale	

Regulations	
Permits	
License	
Fees	
Additional Comments	

County	Contra Costa
Special Jurisdiction	None
Agency	Contra Costa Environmental Health
Contact	925.692-2500, 925.692.2533
Drilling Classification	This type of well would be designated under "other" on the proposed use section of the application.
Rationale	
Regulations	California Department of Resources Water Well Standards Bulletin 74-99
Permits	A sU.S. EPARate application and fee is needed for each well.
License	C-57
Fees	\$531 per well
Additional Comments	Contra Costa County has permitted a few jobs that involve Geothermal heat exchange wells. Officials expect to see more in the future as there has been increasing interest in this type of work within driller forums.

County	Del Norte
Special Jurisdiction	None
Agency	Dept of Health and Human Services - Environment
Contact	707.464.3191 ext 295
Drilling Classification	Exempt
Rationale	If they are not extracting/injecting water then no permit is required.
Regulations	Department of Water Resources Water Well Standards Although GHEWs are exempt, Del Norte county would look at the proposal to make sure it meets set-back requirements and that the circulation medium does not endanger ground water w/contamination. They must be closed loop systems. County code also has some requirements such as requiring that the drilling be 100 feet from a septic tank and leach lines. County code references water well

	standards.
Permits	Not required
License	C-57
Fees	Del Norte County would charge a \$60 fee for a plan check. They would not permit each well.
Additional Comments	Depending on the area of Del Norte county they have pretty shallow groundwater (60ft or less) so they are sensitive to contamination concerns. They also want to make sure that the circulating medium is not a contaminant or pollutant.

County	El Dorado
Special Jurisdiction	None
Agency	Environmental Management
Contact	530.573.3451
Drilling Classification	Water Well – Other
Rationale	
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99
Permits	Required
License	C-57
Fees	\$258 for the first well, \$129 for each additional well
Additional Comments	El Dorado County has 10-20 GSHP systems. The seal requirement is important because of contamination concerns in El Dorado County. They prefer neat cement and bentonite would require special approval.

County	Fresno
Special Jurisdiction	None
Agency	Department of Public Health
Contact	559/445-3357
Drilling Classification	Fresno county has one application, "permit to construct a well" application.
Rationale	
Regulations	California Department of Water Resources Water Well Standards.

Permits	Required. The permit process typically takes no more than a few days if there are no land use issues.
License	C-57
Fees	The cost is \$605 with the permit application.
Additional Comments	

County	Glenn
Special Jurisdiction	None
Agency	Glenn County Health Department
Contact	530.934.6102, 530.934-6546
Drilling Classification	Water well
Rationale	
Regulations	California Department of Water Resources Water Well Standards
Permits	Required
License	C-57
Fees	\$475 per well
Additional Comments	They haven't had to permit any of these systems but if they did they would treat them as water wells, require a permit and require them to be sealed up.

County	Humboldt
Special Jurisdiction	None
Agency	Humboldt County Department of Health & Human Services
Contact	707.445.6215
Drilling Classification	Water Well
Rationale	
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-81
Permits	Required; not available online
License	C-57
Fees	1-2 wells \$246, each additional well \$22
Additional Comments	Humboldt county has at least one GSHP system installed.

County	Imperial
Special Jurisdiction	None
Agency	
Contact	760.482.4675 ext. 4278
Drilling Classification	From a building perspective there is no difference between water well drilling and borehole drilling
Rationale	Unfamiliar with technology
Regulations	California Department of Water Resources Water Well Standards Title 9 land use ordinance
Permits	Required
License	C-57
Fees	A conditional use permit is required for all wells drilled in the county. Well permit = \$600, the conditional use permit is \$3,500 - this is a discretionary permit that goes to planning commission for approval.
Additional Comments	They do not yet have their permits online but they are planning to do so in the future and also post a pricing schedule.

County	Inyo
Special Jurisdiction	None
Agency	
Contact	760.878.0238
Drilling Classification	Water Well
Rationale	
Regulations	California Department of Water Resources Water Well Standards
Permits	
License	
Fees	
Additional Comments	

County	Kern
Special Jurisdiction	None
Agency	Environmental Health Services
Contact	661.862.8700
Drilling Classification	Water Well – however, GHEWs may incur different fees.

Rationale	
Regulations	California Department of Water Resources Water Well Standards
Permits	Required and available online
License	C-57
Fees	\$675 for most well types and \$75 application processing fee.
Additional Comments	

County	Kings
Special Jurisdiction	None
Agency	
Contact	559.582.3211 ext 2670
Drilling Classification	None
Rationale	
Regulations	
Permits	
License	
Fees	
Additional Comments	They have never had a request for GHEWs. If they have a request in the future they would look in the codes to figure out how to permit them.

County	Lake
Special Jurisdiction	None
Agency	
Contact	707.263.1164
Drilling Classification	Water Well – "Other"
Rationale	If a borehole is for a purpose other than water use and intercepts a water table, then a permit is required; "other" on well permit.
Regulations	California Department of Water Resources Water Well Standards
Permits	Required
License	C-57
Fees	The county applies a basic fee for a well construction and an additional hourly rate for inspectors to perform duties associated with the well seals. Fees are approximately \$248 per permit and \$101 per

	hour consultation fee.
Additional Comments	There was one GSHP installation the Tallman Hotel in Upper Lake.

County	Lassen
Special Jurisdiction	None
Agency	
Contact	530.251.8852(8)
Drilling Classification	Water Well Permit, "other"
Rationale	
Regulations	California Department of Water Resources Water Well Standards County ordinance requires a bentonite seal from the bottom up
Permits	Required
License	C-57
Fees	\$146 for the first well, \$50 for each additional well.
Additional Comments	Permit process – download form, send in with a fee. The permit application says they need a plan of work.

County	Los Angeles
Special Jurisdiction	None
Agency	Department of Health Services, Drinking Water
Contact	626.430.5420
Drilling Classification	Water well
Rationale	
Regulations	CA well standards
Permits	Required and available online
License	C-57
Fees	\$317 for each well
Additional Comments	

County	Los Angeles
Special Jurisdiction	Long Beach
Agency	Department of Public Health and Human Services, Bureau of Environmental Health, Water Quality, and Cross Connection Section

Contact	562.570.4134
Drilling Classification	N/A
Rationale	They have not had an application for one yet. The City of Long Beach would consult with Los Angeles County and Orange County to determine the guidelines.
Regulations	
Permits	
License	
Fees	Unknown
Additional Comments	

County	Los Angeles
Special Jurisdiction	Pasadena
Agency	Water and Power Department, Water Division
Contact	(626) 744-4436
Drilling Classification	
Rationale	
Regulations	
Permits	
License	
Fees	
Additional Comments	No answer forthcoming from city. They could not give an answer to how they would deal with a GHEW.

County	Los Angeles
Special Jurisdiction	Vernon
Agency	Department of Community Services and Water
Contact	(323) 583-8811, Ext. 279
Drilling Classification	Water Well – "other"
Rationale	
Regulations	California Department of Water Well Standards; Bulletin 74-99; there may be additional regulations depending on well location.
Permits	Required, one application.

License	C-57
Fees	\$258 per well (might consider these wells cathodic wells).
Additional Comments	Any well over 50 ft requires a permit, plot plan and if necessary a plan to control water contamination. If they had more information, they would consider other ways to deal with geothermal boreholes.

County	Madera
Special Jurisdiction	None
Agency	Environmental Health Department
Contact	559.675.7823
Drilling Classification	Madera county does not specifically classify a geothermal well on the well permit application. The best fit per the current application would be an industrial well.
Rationale	
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-81 and 74-90 Madera County has reviewed the draft standards for geothermal heat exchange wells (Bulletin 74-99), however, they currently have not adopted them nor do they have any ordinance that addresses geothermal wells.
Permits	Permit required
License	C-57
Fees	Currently, the County water well permit application fee for domestic, agricultural and industrial wells is \$205. A public water well is \$285 and Monitoring Well/Test Borings are \$243. The county's fees increase each year on July 1st based on the Consumer Price Index (CPI).
Additional Comments	

County	Marin
Special Jurisdiction	None
Agency	Environmental Health Services
Contact	415.499.6907, 415.499.6667
Drilling Classification	Monitoring well – for smaller systems
Rationale	
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99

Permits	The county requires different information for different systems; for larger systems they ask for elevation drawings, plans for controlling drilling fluids, emergency response plan, contact info, etc.
License	C-57
Fees	Fees \$364.00 for the initial hole, \$60 for each additional (\$2000 max/site)
Additional Comments	Marin County has about 10 GSHP systems, several with more than 100 boreholes (Marin College, Lucas Films Big Rock Ranch)

County	Mariposa
Special Jurisdiction	None
Agency	Mariposa County Health Department
Contact	209.966.2220
Drilling Classification	Water Well
Rationale	If it acts like a well, they treat it like a well. Borehole drilling is more for testing purposes.
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99. There are no local ordinances for geothermal heat exchange wells.
Permits	Required
License	C-57
Fees	Charge \$100 for first \$60 for additional wells.
Additional Comments	All of the drilling in Mariposa County is hard rock/fracture drilling. During these projects they talked with drillers to make sure they didn't cross contaminate between water bearing fractures. The county is concerned about what kind of liquids they would be using in their heat transfer systems. Do have some areas with high nitrate in shallower areas. They know those areas and require those to be sealed off. If the well cluster went deeper in those areas, they would want the first 50 feet properly sealed with a seal around the casing.

County	Mendocino
Special Jurisdiction	None
Agency	Environmental Health Division
Contact	707.463.4466
Drilling Classification	Monitoring Well
Rationale	They do not have a sU.S. EPARate permitting process for geothermal wells. They used the monitoring well application because it enabled

	them to permit more than one well at a time.
Regulations	California Department of Water Resources Water Well Standards, Bulletin 74-99 The county has also consulted with the Coastal Commission.
Permits	Required
License	C-57
Fees	For 1-3 boreholes \$429 total, each additional borehole \$200.
Additional Comments	The county had its first GSHP project in the winter of 2008. The Environmental Health Division spoke with Sonoma county in order to get guidance on the permitting process. Sonoma informed Mendocino of Bulletin 74-99. Mendocino reports that the process went well for the one residential installation in winter '08. If the county receives more applications for geothermal heat exchange wells they might revise their policies.

County	Merced
Special Jurisdiction	None
Agency	Merced County Environmental Health
Contact	209.381.1100
Drilling Classification	Water Well
Rationale	C-57 licensed driller and property owner complete and submit the application and fees, we review and approve the permit application, driller calls in at least 24 hours in advance for inspection.
Regulations	California Department of Water Resources Water Well Standards
Permits	Required
License	C-57
Fees	\$226 for a Low Temperature Geothermal Well Permit (per site)
Additional Comments	

County	Modoc
Special Jurisdiction	None
Agency	Modoc County Environmental Health
Contact	530.233.6310
Drilling Classification	Water Well
Rationale	
Regulations	California Department of Water Resources

	Bulletin 74-99
Permits	Required
License	C-57
Fees	There is a standard fee of \$60 per well. If the project requires significant time to inspect or permit, the time will be billed at \$122 an hour.
Additional Comments	

County	Mono
Special Jurisdiction	None
Agency	Mono County Health Department
Contact	760.924.1845, 760.932.5588
Drilling Classification	Exempt
Rationale	They do not currently permit heat pump wells. They require permits for wells that pump water; if the GSHP is a closed loop system with a water solution, the county likes to see information regarding construction however, there is no permitting involved.
Regulations	None
Permits	None
License	C-57
Fees	Fees for a standard water well agricultural/domestic/industrial \$460 permit fee, Monitoring well \$150
Additional Comments	The county has not permitted any of these systems. People will call sporadically about these types of wells and systems.

County	Monterey
Special Jurisdiction	None
Agency	Environmental Health Services
Contact	831.755.4511
Drilling Classification	Geothermal Heat Exchange Well
Rationale	
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99
Permits	Required
License	C-57

Fees	Fees are \$542.00 for each GHEW up to the first 4 wells. The fees are \$72.00 for each additional well.
Additional Comments	

County	Napa
Special Jurisdiction	None
Agency	Napa County Environmental Management
Contact	707.253.4471, 707.259.8328
Drilling Classification	Geothermal Heat Exchange Wells
Rationale	Napa County has a sU.S. EPA rate application for geothermal heat exchange wells.
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99 Napa County Code specifically states that Geothermal Heat Exchange wells are wells covered by the well ordinance,
Permits	There is a specific Geothermal Heat Exchange Well permit; all wells go in under one permit.
License	C-57
Fees	The County fee for geothermal heat exchange wells is \$538 for the first 5 wells and \$21 for each additional well on the same permit.
Additional Comments	

County	Nevada
Special Jurisdiction	None
Agency	Environmental Health
Contact	530.265.1464
Drilling Classification	
Rationale	
Regulations	
Permits	
License	
Fees	
Additional Comments	They have one person who wants to convert a water well under his house into a GSHP system and they don't know how to proceed.

County	Orange
Special Jurisdiction	None
Agency	Orange County Environmental Health, Water Quality
Contact	714.433.6000
Drilling Classification	Geothermal Heat Exchange Well
Rationale	
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99 The Orange County Well Standards Advisory Board made revisions/deletions to the State of California standards as they pertain to the geology and/or hydrology of Orange County.
Permits	Required
License	C-57
Fees	\$378 for the first well and \$181 for each additional well
Additional Comments	The county does not permit open-loop systems

County	Orange
Special Jurisdiction	Anaheim
Agency	Public Works Engineering Department Subdivision
Contact	(714) 765-4231
Drilling Classification	Other
Rationale	Well permits are required for all wells, which are defined as any vertically drilled excavations that have a casing installed. Soil borings or push probes to a depth of 20 feet or more, or that encounter groundwater also require a well permit.
Regulations	California Department of Water Resources Water Well Standards
Permits	Required and available online. For heat wells they would require special classification and would require the depth of the well to be specified on the permit.
License	C-57
Fees	Each well app has \$110 fee, there is also a fee for every well, \$80
Additional Comments	

County	Orange
Special Jurisdiction	Buena Park
Agency	Public Works Department, Engineering Services
Contact	(714) 562-3686, 714.562.3687
Drilling Classification	
Rationale	
Regulations	
Permits	
License	
Fees	Unknown
Additional Comments	They would need to see plans to make a determination as to how they would deal with a GHEW system. They have extensive groundwater contamination concerns that would need to be addressed to their satisfaction.

County	Orange
Special Jurisdiction	Fountain Valley
Agency	Public Works Engineering Department
Contact	N/A
Drilling Classification	Orange County permits wells in this jurisdiction
Rationale	
Regulations	See Orange County
Permits	
License	
Fees	
Additional Comments	

County	Orange
Special Jurisdiction	Orange
Agency	Public Works Department, Water Division
Contact	(714) 288-2475
Drilling Classification	
Rationale	Wells less than 50 ft deep do not require permit

Regulations	California Department of Water Resources Water Well Standards
Permits	Required; fill out an application and show plans
License	C-57
Fees	No permit fee
Additional Comments	

County	Orange
Special Jurisdiction	San Clemente
Agency	Public Works Engineering Department
Contact	(949) 361-6104, 361-6179
Drilling Classification	
Rationale	
Regulations	Public Works does not know of any city or county regulations. As such, they would apply plumbing regulations for underground pipes (e.g. a re-compaction requirement)
Permits	
License	
Fees	\$ 270.00 for first well, each additional \$50.
Additional Comments	

County	Placer
Special Jurisdiction	None
Agency	Placer County Environmental Health – Land Use and Water Resources Section
Contact	530.745.2357
Drilling Classification	Water Well
Rationale	
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99
Permits	Required
License	C-57
Fees	\$604 for the first well, \$276 for each additional well.
Additional Comments	Placer county will only permit vertical closed loop GSHP systems.

County	Plumas
Special Jurisdiction	None
Agency	Environmental Health
Contact	530.283.6355
Drilling Classification	Geothermal heat exchange wells
Rationale	GHEWs are treated a little bit differently; for example, the permit fees are different.
Regulations	California Department of Water Resources Water Well Standards. Plumas county code - Ch 8, Sec 6-8.05. The standard for the geothermal wells is half the distance (set back) vs. water well.
Permits	Required
License	C-57
Fees	\$514 permit fee for 1-10 GHEWs
Additional Comments	Set-backs is their biggest concern, they have a lot of septic systems in their county. The one company that does the majority of the GHEWs does the bentonite seal all the way to the top. They allow them to do that mainly because they know they are doing the seals correctly. There is another company they do not allow to do so - that company has to do cement.

County	Riverside
Special Jurisdiction	None
Agency	Department of Environmental Health
Contact	951.955.8980
Drilling Classification	Water Well "other"
Rationale	
Regulations	California Department of Water Resources Water Well Standards Riverside County Local Ordinance 682
Permits	Required and is available online
License	C-57
Fees	\$260.26 for the first well, \$65.28 for each additional well (same site, same time).
Additional Comments	

County	Sacramento
Special Jurisdiction	None
Agency	Environmental Management Department
Contact	916.386.6652, 916.875.8400
Drilling Classification	Borings that do not come within 10 feet of groundwater do not require a permit in Sacramento county, they are unregulated. If there is a casing in the hole, it needs a permit regardless of depth.
Rationale	Sacramento County well ordinance has a section on geothermal heat pump wells.
Regulations	California Department of Water Resources Water Well Standards Sacramento county also has its own specific ordinances.
Permits	Required and available online
License	C-57
Fees	Permit fee for geothermal heat exchange wells is \$398 (2 hrs of time for permit approval and grout inspection), \$199/hr for additional time (more wells may require longer inspection times).
Additional Comments	

County	San Benito
Special Jurisdiction	None
Agency	Environmental Health Department
Contact	831.636.4035
Drilling Classification	
Rationale	
Regulations	
Permits	
License	
Fees	
Additional Comments	They have no idea what they would do for a GHEW and would need to discuss exact specifics of a job to work out a procedure. They would like something from the state of California detailing how to deal with GHEW, but have no idea of how to proceed in the absence of such guidelines.

County	San Bernardino
Special Jurisdiction	None
Agency	Department of Public Health, Environmental Health, Safe Drinking Water
Contact	909.884.4056
Drilling Classification	Water Well – they would require additional information
Rationale	
Regulations	DWR Water Well Standards
Permits	Required
License	C-57
Fees	\$155 per well
Additional Comments	There are at least 2-3 GSHP systems in the county.

County	San Diego
Special Jurisdiction	None
Agency	Monitoring Well Permit Section
Contact	619.441.4448
Drilling Classification	Water Well
Rationale	These types of wells would be permitted on a case by case basis by the Dept of Environmental Health.
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-81 and 74-90 The County code mimics the state law.
Permits	Required
License	C-57
Fees	\$460 flat fee– this would be the only way to apply a fee to this type of project.
Additional Comments	They would like to see some sort of way to limit contamination of the heat exchange fluid into ground water.

County	San Francisco
Special Jurisdiction	None
Agency	City of San Francisco Public Works/Water Quality
Contact	415.554.5860/5810 / (415) 252-3849
Drilling Classification	Monitoring Well
Rationale	
Regulations	The construction is not regulated. However, an application to operate a well and a well completion report are required.
Permits	Monitoring Well Permit required
License	C-57
Fees	Fees are as follows: \$298 dollars per site and \$800 deposit. If the loops come together before entering building it is considered 1 well. Each well requires a permit to operate it which costs \$47 dollars per year, per well
Additional Comments	There is one GSHP system at City College.

County	San Joaquin
Special Jurisdiction	None
Agency	Environmental Health Department
Contact	209.468.3420
Drilling Classification	Water Well
Rationale	
Regulations	California Department of Water Resources Water Well Standards San Joaquin County well standards available on county website
Permits	Required, must specify the intended use.
License	C-57
Fees	\$325 for the permit
Additional Comments	The water table in San Joaquin County is reachable within 100-200 ft. Some areas of San Joaquin County are known for ground pollution for nitrates - there are known contaminated areas in the county and in these areas they require a deeper grout seal (200 vs. min 100 for other areas).

County	San Luis Obispo
Special Jurisdiction	None
Agency	Environmental Health
Contact	805.781.5544
Drilling Classification	Water Well
Rationale	They do not have very many requests for GHEWs
Regulations	California Department of Water Resources Water Well Standards
Permits	Required; not available online
License	C-57
Fees	\$360 for each well
Additional Comments	San Luis Obispo is concerned with contamination of the aquifer beneath the water basin.

County	San Mateo
Special Jurisdiction	None
Agency	Division of Environmental Health
Contact	650.372.6200
Drilling Classification	
Rationale	
Regulations	
Permits	
License	
Fees	
Additional Comments	

County	Santa Barbara
Special Jurisdiction	None
Agency	Environmental Health
Contact	805.681.4900
Drilling Classification	Water well "other"
Rationale	

Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99
Permits	Required. The permitting process is based on seal inspections. They charge per permit which can be a series of holes.
License	C-57
Fees	Charge per permit is \$715
Additional Comments	

County	Santa Clara
Special Jurisdiction	None
Agency	Santa Clara Valley Water District
Contact	408.265.2600
Drilling Classification	
Rationale	
Regulations	
Permits	
License	
Fees	
Additional Comments	

County	Santa Cruz
Special Jurisdiction	None
Agency	Environmental Health Department
Contact	831.454.2728
Drilling Classification	Water Well – specify geothermal
Rationale	
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99
Permits	Required; not currently available online
License	C-57
Fees	\$724 flat fee for any size installation
Additional Comments	Santa Cruz County has permitted 2-3 GSHP installations

County	Shasta
Special Jurisdiction	None
Agency	Environmental Health
Contact	530.225.5787
Drilling Classification	Water well
Rationale	
Regulations	California Department of Water Resources Water Well Standards
Permits	A valid permit to drill, destroy, deepen, or recondition a water well is required in the County and the three cities. Permits are obtained from the EHD after submission of a completed application, plot plan, and fees. EHD staff must be present to verify proper placement of the annular seal around the well casing. Annular seals are usually placed around the top 20 feet of casing but may on occasion be placed just a few feet or as much as several hundred feet deep when required by local conditions.
License	C-57
Fees	\$265.35 - permit fee
Additional Comments	

County	Sierra
Special Jurisdiction	None
Agency	Environmental Health Department
Contact	530.993.6700
Drilling Classification	Water Well – "Other"
Rationale	Sierra county has no specific geothermal ordinances so they treat it as a water well; they are willing to be lenient on 100 ft setback for geothermal wells.
Regulations	California Water Well Standards
Permits	Required
License	C-57
Fees	\$132 flat rate for small residential projects. Commercial may be different. Not specified in fee schedule.
Additional Comments	

County	Siskiyou
Special Jurisdiction	None
Agency	Siskiyou County Health Department
Contact	530.841.4040, 530.841.2112
Drilling Classification	Monitoring well/Borehole
Rationale	
Regulations	California Water Well Standards and local ordinance.
Permits	Required
License	C-57
Fees	\$318 for first 3 wells, \$85 for each additional well.
Additional Comments	

County	Solano
Special Jurisdiction	None
Agency	Dept of Resource Management
Contact	707.784.6765
Drilling Classification	Soil boring
Rationale	They classified the heat wells as soil borings in fairness to the developer. The fee for soil borings is about \$241 for 5 borings whereas well construction permit fees are \$440 for each well. It didn't seem reasonable to charge so much for permit fees so they charged according to the boring fee schedule.
Regulations	California Department of Water Resources Water Well Standards Bulletins 74-81 and 74-90 Local ordinances reference the DWR California well standards.
Permits	Required
License	C-57
Fees	\$241 per 5 borings
Additional Comments	Permitting process: one page application, on website, provide site drawings showing location of wells, and application describe work to be done. The issue of GHEWs doesn't come up very often in Solano County.

County	Sonoma
Special Jurisdiction	None
Agency	Department of Health Services
Contact	707.565.6574
Drilling Classification	Water Well
Rationale	
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99 International Ground Source Heat Pump Association Standards. The county will address ground source heat pump issues by ordinance in the future.
Permits	Required; not available online.
License	C-57
Fees	\$273 for the first boring, \$72 each additional boring.
Additional Comments	

County	Stanislaus
Special Jurisdiction	None
Agency	Environmental Resources Department
Contact	209.525.6700
Drilling Classification	
Rationale	
Regulations	Geothermal wells are new in Stanislaus County
Permits	
License	
Fees	
Additional Comments	

County	Sutter
Special Jurisdiction	None
Agency	Sutter County Environmental Health
Contact	530.822.7400
Drilling Classification	

Rationale	
Regulations	
Permits	A building permit is required for retrofit of an existing system (no additional permit fees for a new structure). Energy compliance documentation for the system is required.
License	
Fees	Permit fees are based on the total construction valuation of the project including equipment, labor and materials. No additional permit costs are added if the system is included in a permit for a new structure as opposed to a retrofit.
Additional Comments	

County	Tehama
Special Jurisdiction	None
Agency	Environmental Health
Contact	530.527.8020
Drilling Classification	Water Well – “Other”
Rationale	Any well over 20ft deep requires a permit be it boring, geothermal or water well.
Regulations	California Water Well Standards
Permits	Required
License	C-57
Fees	Well fee schedule: \$267/\$255/\$201 per well depending on well classification. Geothermal wells would probably fall under “other” and be charged \$201 per well.
Additional Comments	

County	Trinity
Special Jurisdiction	None
Agency	Environmental Health Division
Contact	530.623.1459
Drilling Classification	Exempt
Rationale	They do not typically permit geothermal heat exchange wells
Regulations	
Permits	

License	
Fees	\$197 for basic water well permit
Additional Comments	

County	Tulare
Special Jurisdiction	None
Agency	HHSA- Environmental Health
Contact	559.733.6441
Drilling Classification	Monitoring Well
Rationale	
Regulations	
Permits	Required
License	C-57
Fees	\$110/hr for however long the inspector is on site.
Additional Comments	

County	Tuolumne
Special Jurisdiction	None
Agency	Environmental Health
Contact	209.533.6443
Drilling Classification	Monitoring Well – “Other”
Rationale	
Regulations	California Water Well Standards; Bulletin 74-99
Permits	Required
License	C-57
Fees	\$495.75 per well
Additional Comments	

County	Ventura
Special Jurisdiction	None
Agency	County of Ventura, Groundwater Section
Contact	805.654.2024, 805.654.2907

Drilling Classification	Water well
Rationale	Ventura County well ordinance does not mention geothermal heat exchange wells at all. If someone were to come in today to drill the county would permit it as a water well.
Regulations	California Department of Water Resources Water Well Standards There is also a county ordinance
Permits	Required
License	C-57
Fees	The fee for processing an application to extend a permit pursuant to Section 4813 (E) of the Ventura County Ordinance Code shall be \$25. Well fees are as follows: \$610 for the initial well plus \$90 for each additional well which is located on the same site and is perforated or sealed on the same day the initial well is perforated or sealed.
Additional Comments	

County	Yolo
Special Jurisdiction	None
Agency	Environment Health
Contact	530.666.8646
Drilling Classification	Water Well – other
Rationale	
Regulations	California Department of Water Resources Water Well Standards Bulletin 74-99
Permits	Required
License	C-57
Fees	The county does not have a specific fee for geothermal wells, therefore they would likely charge by the hour. The hourly rate is currently \$119/hr. This may change in the future.
Additional Comments	There are 2 GSHP systems on UC Davis Campus and 2 systems on private residences in Woodland.

County	Yuba
Special Jurisdiction	None
Agency	Environmental Health/CUPA
Contact	530.749.5450

Drilling Classification	Water well
Rationale	
Regulations	California Department of Water Resources Water Resources Water Well Standards Bulletin 74-81 and 74-90
Permits	Required; they have an application and require the work plan
License	C-57
Fees	Soil Boring or Excavation (Additional @ \$47 each) \$150.00
Additional Comments	

APPENDIX D: Stakeholder Interview Transcripts

Lisa Meline
Owner
Meline Designs
July 22, 2009

Introductory Questions

In order to better understand your perspective, I'd like you to describe your area of expertise in the Ground Source Heat Pump (GSHP) Industry. Specifically, what is your role/title today?

- *Mechanical Engineer*
- *Certified Geoexchange Designer*

What is your current responsibility and authority regarding GSHPs?

I represent the owner, the customer. We provide the end-user with a geothermal system design.

How long have you worked in this, or a closely related field?

- *Since 1999 – 10 years.*

Industry Branding

What terminology do you use to describe the industry/your product and why is that your preference?

Geothermal system design. Geoexchange is in some ways a more accurate description of what they're doing. However, they follow the terminology that the customer is using; as such, I will often explain in presentations the different terminology.

In your experience, do industry participants and consumers use the same terminology when referring to this industry?

No. I get it all different ways, ground source heat pumps, geothermal, geoexchange.

And within the industry, do you find GSHP industry vernacular to be consistent? If not, is this a problem for the industry in terms of building market adoption?

There is no standard out there with regards to terminology. This is not really a problem, however, usually a good part of what I do involves educating the customer.

What terminology do you think would be most appropriate for this industry and why?

[See above]

How important is standardized nomenclature across all segments of the industry and how could the industry achieve it?

General education is a bigger issue than the terminology.

Industry leaders' perspective on consumer decision-making

Would you describe public awareness of GSHP to be high, low or about where you'd expect it to be given the industry's maturity? Why?

Neither high nor low, - it is where you would expect. There are several individuals and organizations who are out educating and when people come to me about this technology, they've done some research and they ask more specific questions than they would 5-10 years ago. However, we have a long way to go in terms of providing better information.

What do you think are the three most important messages to communicate about GSHP in order to generate positive public sentiment for GSHP systems?

- *No petroleum based products on-site (very important to some people – all electric system)*
- *Applied correctly, there will be energy savings but it is not going to be a super quick payback. We need to be upfront about energy savings. California has higher costs for installation and electricity. 7-10 year payback. It's an investment.*
- *Very popular technology – people coming out of the word-work to make money off of it. However, if you don't do it right, you will screw it up. This could affect the entire industry.*

How have your customers become aware of GSHPs/learn of your product?

A lot of them are doing internet research – DOE website. They may have gone to Meline website. Heatspring has been doing training around the country. IGHSPA.

What do you think the primary motivation was for consumers who purchased GSHP systems/your product?

I see four primary motivations:

- 1) They want to save money in the long term, and they understand that they will recover their investment over time.*
- 2) People who want to do the right thing (sustainable, green) concerned about the earth. 3) People who want to do the latest and greatest, coolest stuff – the first adopters. They want cutting edge.*
- 4) I'll give you an example: People who want to build a huge house with single pane windows, may try to off-set energy cost/comply with energy efficiency standards – by using GSHP to trade off (see Title 24). It is a way to compensate for poor construction materials – glass etc. However, Title 24 – energy efficiency standard for CA – will be more restrictive come January 1st.*

Have you observed any similarities in your customer demographics?

- Wealthy homeowners*
- Housing authorities (low income), and people that own multifamily apartments – it is in their best interest to put in a system that costs less to operate.*
- A lot of Do-It-Yourselfers – they might have a backhoe or pond, a retired Prof or contractor who has the resources to do it.*
- Schools*

If you were the head of an industry association, what would you do to increase public awareness of GSHP technology?

A CA-based Geothermal heat pump consortium needs to get out there and educate. Education needs to be provided to the general public (via home and garden shows, fairs), and also needs to be provided for counties, the people who permit these types of systems.

Engineers also need to be educated. Perhaps PG&E and SMUD could be involved with education efforts.

What are some suggestions that you have to better inform consumers of this industry/your product?

[See above]

Adoption of Ground Source Heat Pump Technology

As with any industry, there may be certain barriers that interfere with the market adoption of products and services. I'd like to ask you about your perception of barriers, if any, in relation to regulations, awareness and project economics for GSHP.

For both residential and commercial GSHP applications, what barriers, if any, have you encountered because of regulations – both state and local?

I have encountered barriers in the following two areas:

- 1) *There is no consistency among the counties re: permitting, they aren't sure how much to charge, or how to proceed.*
- 2) *Influencing change at the state level –geothermal heat pumps are not treated fairly in energy efficiency standards. Similarly, modeling software does not treat heat pumps correctly. I highly recommend that they change this (rally manufacturing people, talk to the CEC, costs \$ to make change).*

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for residential applications?

Awareness is better than it has been but people don't understand how it all works. Some people see it as a fad, others see it as a way to save energy but don't understand how the technology works.

Data is a barrier. When people, they ask 2 things:

- 1) *How much are they going to save?*
- 2) *How much will it cost and who can provide services?*

They come to me saying there is no data out there telling them how much they can save. This is because there is not a lot of data being collected. Smart meters will come out and more people will want to know about their usage but right now it is hard to know from current meters what is going on.

What barriers, if any, have you experienced due to lack of awareness of GSHP technology for commercial applications?

[See above]

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe manufacturers/deliverers of GSHP systems are experiencing?

Their costs are related to materials. The cost of heat pumps have gone up – this is across the board.

For both residential and commercial GSHP systems, what economic barriers, if any, do you believe consumers are encountering?

- *Upfront costs.*
- *Permitting costs.*
- *Engineering or contracting firm fees.*

Do you believe that GSHP systems are priced too high, too low, or just right?

Between just right & too high – in some cases they are too high, others ok. A lot of this is contractors and engineers dealing with customers who are demanding and require a lot of special ad-ons. Even though the price is high, it is probably just right due to expectations of the customer.

When compared to traditional HVAC systems, do you think GSHP systems are priced too high, too low, or just right?

Depends on the project.

When compared to other alternative energy solutions, do you think GSHP systems are priced too high, too low, or just right?

For both commercial and residential applications, are there other issues besides cost that are a factor in the adoption of GSHP?

(If needed probe for: time, space, and permitting)

There are some things that really have to be looked at, one of which is the pump itself. You really need to do a good job sizing the pump. Also you can't just put it anywhere, you need to have land.

How would you characterize the size and growth of the GSHP industry, why, and what would need to happen in order to spur greater growth in this industry?

From my perspective, the growth has been huge. I started with 1 project in 1999 and now this type of work is 80% of her volume. There has been so much growth, in fact, that her peers (who are not doing GSHP) are laying people off and she is experiencing growth.

My estimate for the size of industry: market-share 40% growth over the last year, at least.

As to the industry in CA, it is poorly organized. There has to be some kind of organization that pulls together key elements and that provides a consistent voice throughout the state.

Drilling

Drilling is the single largest cost component of GSHP systems and thus has a large impact on GSHP project economics. How important is it to your company to reduce the cost of drilling? Do you have any suggestions as to how to reduce drilling costs?

Drilling is a huge line item cost – but so are the heat pumps.

The GSHP industry currently faces a shortage of drillers. What changes need to be made in order to attract and retain more drillers to the GSHP industry?

I disagree, I've seen more drillers in CA the past few years than the previous 8 years. Some of the water drillers are trying to switch over.

Does the drilling technology currently available meet GSHP industry needs or is there a wish list you have for how the technology could be improved?

From a design perspective I would like to see some stricter standards and guidelines. I would like to see grouting from the bottom up and I'd like to see some better requirements for how those wells get installed.

How would you characterize the permitting process for the drilling required for GSHP systems? If you are dissatisfied with the process, what suggestions do you have as to how the permitting process could be improved?

Is there any other information you would like to share about the GSHP industry, or topic that I did not touch upon that would be useful to this survey?

- *Obama \$/tax credits – does not include water-to-water heat pumps. Might have to do with the rating of that particular piece of equipment. These are the two miscellaneous things floating around in her world.*