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POLICY MEMORANDUM 2001-1

VARIANCE FROM RULE 7.1 OF THE GEOTHERMAL WELL RULES FOR THE CONSTRUCTION OF VERTICAL CLOSED-LOOP GROUND SOURCE SYSTEMS (TYPE A GEOTHERMAL WELL; "HEAT PUMPS") THAT DO NOT PENETRATE A CONFINING LAYER

The Geothermal Well Rules (effective May 1, 1994) were revised. The new Geothermal Rules became effective on September 30, 2004. Pursuant to the new Rules, this policy memorandum is no longer applicable.

This policy memorandum is hereby **revoked**, effective immediately.



Hal D. Simpson
State Engineer

10/12/04
Date

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January 23, 2001

POLICY MEMORANDUM 2001-1

SUBJECT: VARIANCE FROM RULE 7.1 OF THE GEOTHERMAL WELL RULES FOR THE CONSTRUCTION OF VERTICAL CLOSED-LOOP GROUND SOURCE SYSTEMS (TYPE A GEOTHERMAL WELL; "HEAT PUMPS") THAT DO NOT PENETRATE A CONFINING LAYER

Purpose

The intent of this policy is to establish a procedure for obtaining a variance from the requirement of Rule 7.1 of the Geothermal Well Rules, 2 CCR 402-10, as provided in Rule 16 (Variances), to identify the information needed to evaluate a variance request, and to outline the process for certifying individuals ("driller") for the construction of the particular closed-loop geothermal ground source system described in the variance request.

Rule 7.1 requires that vertical closed-loop ground source systems be constructed by a water well construction contractor licensed by the Board of Examiners of Water Well Construction and Pump Installation Contractors. The variance procedure described herein only applies to vertical closed-loop ground source systems that do not penetrate a confining layer (as defined in Rule 5.2.13 of the Water Well Construction Rules) during the construction of the system and that do not divert or use ground water in the process. Structures that penetrate a confining layer during drilling and construction are subject to the provisions of Rule 7.1, however, alternatives for achieving compliance with the licensed contractor requirement are also presented in this policy.

Discussion

As a result of increased cost for traditional gas and electric heating/cooling services, many individuals, and some businesses and institutions are choosing to install new systems or replace (or supplement) existing systems with more efficient and less costly heating/cooling ground source "heat pumps". The systems currently available are generally closed-loop systems constructed of polybutylene or polyethylene pipe in which an "antifreeze" fluid is circulated as a heat exchange/transport medium. Common fluids used include water, calcium magnesium acetate, potassium acetate, sodium chloride and water, potassium chloride and water, ethylene glycol and

water, and propylene glycol and water. Direct exchange (DX) systems use a liquid refrigerant (such as R-22) circulated through copper tubing (or other conductive, corrosive resistant metal) loops, but otherwise operate the same as other closed-loop systems.

Typical "vertical" closed-loop systems are constructed by drilling (vertical or directional) 4 to 6-inch diameter holes into which the closed loop pipe or tubing is installed. The holes are then completely filled with an approved grout or a thermally enhanced grout material. Small hydro-boring rigs and auger rigs, many owned and operated by unlicensed contractors, are ideally suited for drilling to relatively shallow depths in close proximity to existing buildings. Although the Geothermal Well Rules require that the systems be constructed by a licensed water well construction contractor, the demand for the closed-loop systems has provided a market in some areas of the state that exceeds the resources and ability of the licensed contractor working in the area to offer equipment and services competitively for the installation of the systems and still keep up with water well drilling obligations.

Policy

To address the issue, the State Engineer adopts this policy to allow the drilling and construction of vertical closed-loop ground source systems (VCLGSS or "heat pumps") that do not penetrate a confining layer during the drilling and construction by unlicensed drillers upon obtaining a variance from the State Engineer from the requirements of Rule 7.1. An approved variance shall include a condition that the individual ("driller") who is conducting the drilling and grouting of the holes constructed for the system be certified by the State Engineer for such construction. A permit shall not be issued for the construction of geothermal well (vertical closed-loop ground source system) to be constructed by an unlicensed driller until a variance from Rule 7.1 has been granted.

Variance Request

Variance requests may be submitted by any person, company, or corporation ("person") under whose direct authority and supervision the system will be constructed.

The person to whom a variance is issued will be responsible for ensuring that the necessary permit(s) has been obtained prior to constructing the system, that the system is properly constructed, and that it is in compliance with the Geothermal Well Rules and in accordance with the provisions of Article 90.5 of Title 37 of the Colorado Revised Statutes.

Variance Procedure

1. Submit to the State Engineer a written request specifically stating the request is for (or includes) a variance from Rule 7.1 of the Geothermal Well Rules.
2. The variance request must include a statement that indicates the drilling and grouting components of the system will be completed by a person certified by the State Engineer to perform the drilling and grouting in accordance with the specific requirements of the vertical closed-loop system to be constructed.
3. Variance requests shall also include, at a minimum, the following information:
 - A conceptual plan (diagram) of a proposed VCLGSS that identifies construction materials (loop material, type of circulating fluid), system layout, and approximate depth of boreholes.
 - A description of the proposed grout material to be used to seal the borehole.
 - Provide a written descriptive analysis for constructing a VCLGSS that demonstrates knowledge of the construction process and compliance with applicable Rules and statutes.

The request for variance from Rule 7.1 may include a request for variance from other specific Rules related to the construction standards of the Geothermal Well Rules such as type of loop material, type of antifreeze, or authorization for directional drilling. It is therefore, imperative that the person submitting a request be thoroughly familiar with the applicable Rules and statutes.

A "blanket" variance can be granted for a particular type of closed-loop system if sufficient information is provided to fully evaluate the construction process. The blanket variance is applicable to only those systems to be constructed by or under the direction of the person to whom the variance is granted.

A condition of granting a variance from Rule 7.1 shall be that the person performing the actual drilling and grouting portions for construction of the vertical closed-loop system shall have the procedures certified by the State Engineer to ensure the equipment and process will safeguard life, health, property, public welfare and the environment. Such certification is not required if the individual performing the drilling and grouting is a licensed water well construction contractor, is directly employed by a licensed water well construction contractor, or is under the continuous on-site supervision of a licensed water well construction contractor.

Certification

To obtain certification for the construction of vertical closed-loop geothermal ground source systems ("heat pumps") that do not penetrate a confining layer, the State Engineer requires the following:

1. Submittal of a completed certification application form. Applications must be submitted by the individual ("driller") who will be performing the actual drilling and grouting procedures. The form requires information regarding:
 - The number of years/months of direct experience constructing vertical closed-loop ground source systems (VCLGSS)
 - Names and addresses of companies of employment while constructing VCLGSS
 - Number and location of VCLGSS constructed
 - Detailed description of the type of equipment used for drilling and grouting in the construction of VCLGSS, and
- Information regarding the driller's insurance or bond.
2. Completion of a written examination administered by the State Engineer that assesses the driller's knowledge of general drilling practice, knowledge of common grouting procedures and its purpose, familiarity with the applicable standards of the Geothermal Well Rules, Water Well Construction Rules and pertinent statutes, ability to accomplish the operation of properly placing grout in saturated and unsaturated environments, and understanding of basic geologic, hydrologic, and engineering concepts.
3. The State Engineer may, at his discretion, require that the driller appear for an oral examination regarding drilling, grouting, and vertical closed-loop geothermal well construction procedures and associated processes. Such oral examination shall be in addition to the written examination.
4. The State Engineer may also, prior to issuance of certification, require that the driller have the drilling and grouting process observed by Division of Water Resources personnel during the

construction and installation of the initial closed-loop system constructed by the driller under the approved variance.

5. The driller seeking certification shall show adequate financial responsibility (insurance, compliance bond, or alternative funds) in the amount of at least \$10,000.00, or that the work performed by the driller is covered by the insurance, bond, or alternative funds (for no less than \$10,000.00) of the person to whom the variance is granted.

A certification shall apply only for the construction of the vertical closed-loop geothermal ground source systems specifically identified in the approved variance (to be stated on the certificate) that are constructed in accordance with the variance by the driller named on the certification. The certification shall not be construed as a "license" or as authorization to construct vertical closed-loop systems not authorized by the stated variance or to oversee or supervise the work of other drillers constructing closed-loop systems under the same or another approved variance.

Certifications are valid for two (2) years at which time the certification must be renewed if the driller intends to continue to work under the variance.

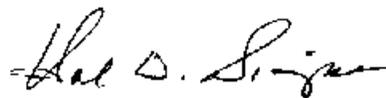
No Variance From Rule 7.1 When a Confining Layer is Penetrated

Requests to allow construction of vertical closed-loop ground source systems that will penetrate a confining layer by unlicensed contractors will be denied and no such certification of the drilling and grouting procedure shall be granted. Securing the assistance of a licensed water well construction contractor prior to constructing such systems is required and can be accomplished by:

- Directly employing a licensed water well construction contractor to conduct the work, or
- Establishing a legal partnership between the unlicensed contractor and licensed water well construction contractor whereby the licensed contractor is legally responsible for the work, or
- Obtaining the continuous on-site supervision of a licensed water well construction contractor.

Note: Section 37-91-102(15.5), C.R.S., provides for an exemption from the continuous on-site provision. To obtain an exemption, a written request from the licensed water well construction contractor to the State Engineer is required. The request must explain how the licensed contractor intends to ensure the proper drilling and construction of the systems for which he is responsible.

This policy is effective immediately and shall be revoked only in writing.



Hal D. Simpson
State Engineer

1/30/01
Date