

**LAVA LAW**  
**RUNNING INTERFERENCE:**  
**—Groundwater and Related Features of**  
**State Regulation—**

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The center of the Earth is a hot place—more than 7,600 degrees Fahrenheit. To get there, or at least to locate water or steam temperatures that are viable for electric generation, a prospector of geothermal energy usually must drill through groundwater resources and perhaps lower-temperature geothermal resources as well. This journey from cold water to superheated steam may also take the prospector through the jurisdiction of various state agencies and their respective regulatory requirements. This chapter provides a brief overview of some of the state regulatory issues that the geothermal energy developer encounters along that journey.

## **Groundwater Protection**

Because geothermal resources lie beneath groundwater, virtually all western states have laws that protect groundwater from the effects of geothermal exploration and production. Drillers must install casings to seal off any strata containing fresh water, and operators are normally liable, by statute, for any damage resulting from contamination or depletion of groundwater resources. Injection wells are subject to similar and often more stringent requirements. Abandoned wells must be plugged and sealed, both to prevent freshwater contamination and to protect against blowouts.

Casing requirements vary from state to state in both their level of detail and their stringency. Nevada administrative rules, for example, require surface casing to extend to a depth of at least 10 percent of total well depth, or a minimum of 50 feet. Oregon rules specify 10 percent of well depth for wells deeper than 500 feet, with a 25-foot minimum. However, Oregon requires a minimum 300-foot surface casing for wells located in “areas with no nearby drilling history,” unless the Department of Geology and Minerals (“DOGAMI”) permits otherwise. OAR 632-020-0095.

Sealing requirements for prospect wells also vary. For example, Nevada regulations provide simply that “[h]oles drilled into or through artesian aquifers must be sealed to prevent upward leakage after the drilling pipe is withdrawn at the conclusion of drilling operations.” NAC 534A.150. In Oregon, regulations are more detailed, creating a classification scheme based on freshwater pressure and requiring bottom-to-top plugging of prospect wells where artesian water is present.

## **Protection of Other Geothermal Resources**

In many states, casing and sealing requirements also apply to protect against interference between adjacent or connected geothermal resources. Idaho’s 1987 Geothermal Resources Act is an interesting example. Modeled on provisions of federal law, it allows owners of adjacent geothermal areas to enter into “cooperative unit agreements” that impose drilling and operations restrictions designed to maximize the overall resource. Once approved by the Idaho Water Resource Board, the agreement is immune from antitrust liability under the state action doctrine. If the Department of Water Resources determines that a geothermal resource area should be operated cooperatively to prevent waste of the resource, but the owners refuse to enter into a cooperative unit agreement, then the Water Resource Board can order that the area be operated as a unit and that proceeds and liability be shared equitably.

## **Classification of the Resource**

Idaho’s Geothermal Resources Act is an example of a state’s struggle to classify geothermal resources for purposes of regulation. The act provides: “Geothermal resources are found and hereby declared to be sui generis, being neither a mineral resource nor a water resource, but they are also found and hereby declared to be

closely related to and possibly affecting and affected by water and mineral resources in many instances.” IC 42 4002.

The classification of geothermal resources varies from state to state. Generally, states have chosen between two already established legal templates for resource management: they classify geothermal resources under legal doctrines that govern groundwater appropriation, or they classify the resources according to oil, gas, and mineral principles. In *United States v. Union Oil Company*, 549 F.2d 1271 (9th Cir. 1977), the Ninth Circuit Court of Appeals concluded that the mineral reservation in the Stock-Raising Homestead Act of 1916 was intended to include geothermal resources. Thus we know that under federal law geothermal resources are treated as mineral rights. Likewise, in Hawaii, Texas, and Alaska, geothermal resources are classified and regulated as minerals. Wyoming and Utah, conversely, use the groundwater classification system. Although Utah law separately defines geothermal resources as those with temperatures of at least 120 degrees Celsius, the state classifies geothermal fluids as groundwater. Other western states—including Oregon, New Mexico, and California—use a bifurcated classification system, regulating low-temperature resources differently than high-temperature resources. The Idaho Geothermal Resources Act bifurcates the resource into high- and low-temperature, but the Act regulates geothermal resource development under groundwater appropriation principles, and geothermal permitting is governed by the Department of Water Resources. The state’s ambivalence about such classification can be detected elsewhere in Idaho law, however, such as the statute that reserves to the state the mineral rights located beneath state-owned lands—including, for that purpose, geothermal resources.

Oregon’s system provides an example of how differences in classification can create potential for regulatory confusion. In Oregon, geothermal resources with a bottom hole temperature of 250 degrees Fahrenheit and above are regulated by DOGAMI, while those with a bottom hole temperature of less than 250 degrees are considered groundwater resources, administered by the Water Resources Department. Each agency has its own administrative rules and permitting requirements. In addition, other state agencies are involved. If the resource is located on state-owned land, the Department of State Lands imposes its own chapter of administrative rules on geothermal leasing. If the development requires disposal of drilling or other fluids, DOGAMI regulates reinjection, while the Department of Environmental Quality regulates other disposal methods. If the project will generate 38.85 MW or more, the Oregon Energy Facility Siting Council requires a site certificate. In any such development, of course, local land use and other laws will come into play.

Lending further flavor to this regulatory stew, Oregon defines high-temperature geothermal resources not only by temperature but, alternatively, by depth of the well. Thus a high-temperature resource is one with a bottom hole temperature of at least 250 degrees, but Oregon statutes leave open the possibility that any well located at least 2,000 feet below the surface could be regulated as a geothermal resource. In at least one location in the southern part of the state, however, an industrial developer has located a groundwater aquifer at a depth of between 1,500 and 2,500 feet, creating the potential for double regulation by both DOGAMI and the Water Resources Department. Oregon law addresses such potential regulatory conflict with provisions requiring cooperation among state agencies; these general mandates to cooperate may or may not be helpful to developers trying to navigate the various requirements of different state agencies.

Oregon’s dual agency system may have the advantage of keeping both players—minerals and groundwater—in the game. ORS 522.255 provides, for example, that the two agencies will work cooperatively to resolve conflicts between geothermal wells and groundwater appropriations, using criteria for resolution that will maximize the “most beneficial use of the water and heat resources” while preserving individual rights and protecting the public interest.

Oregon also provides a set of rules permitting the conversion of a prospect well to a groundwater well, in which case the owner would apply for a groundwater appropriation permit from the Water Resources Department, basically shifting the endeavor from the jurisdiction of one agency to another.

Other states have also crafted laws designed to bridge the gap between regulatory jurisdictions. In Nevada, for instance, geothermal development is regulated by the Division of Minerals of the Commission on Mineral Resources. Although geothermal drilling is technically also under the jurisdiction of the Nevada State Engineer, who is in charge of groundwater, the State Engineer has authority to waive water appropriation permitting requirements for geothermal exploration. Thus the agencies appear to share regulatory authority, with an administrative system in place for one agency to defer to the other.

In Utah, the State Engineer administers groundwater, while the Division of Oil, Gas and Mining regulates mineral resources. The state controls geothermal development with a hybrid form of regulation: although geothermal fluids are treated as groundwater, the State Engineer nevertheless controls geothermal resource development in much the same way as the Division of Oil, Gas and Mining controls the development of mineral resources. In particular, under Utah law, ownership of a geothermal resource derives from an ownership interest in land and not from an appropriative right to geothermal fluids.

The Idaho Department of Water Resources administers separate permit programs for groundwater and for high-temperature geothermal resources. The geothermal developer must obtain both a permit to appropriate groundwater as well as a geothermal well permit in any case in which the proposed geothermal development “will decrease ground water in any aquifer or other ground water source or will unreasonably decrease ground water available for prior water rights in any aquifer or other ground water source of water for beneficial uses.” IC 42-4005. This statute was amended effective July 1, 2004 to broaden its provisions to include all groundwater availability, not just availability to meet the existing rights of groundwater appropriators.

In states with bifurcated classification systems, line-drawing problems seem inevitable. Oregon divides high- from low-temperature resources at the 250-degree point; Idaho puts the line at 212 degrees. California and New Mexico specify the boiling point at the altitude where the resource is found. The differences in classification (often paired with very different regulatory requirements) suggest a qualitative difference in the resource, such as the difference between a resource that can be used to generate electricity and one whose economic value lies in direct use. As technology advances, however, the temperature necessary for economical generation of electricity will continue to shift downward; already, binary systems can generate with resources well below 200 degrees. One hopes that state regulatory systems will keep pace with technology.

## **How Regulatory Classification Affects Ownership Rights**

Besides causing the potential for regulatory stickiness, the classification of geothermal resources also affects the owner’s rights to those resources. Generally, states that classify the resource as groundwater treat ownership rights in accordance with the doctrine of prior appropriation, while states that use the mineral classification treat ownership under the law of real property associated with mineral estates, usually termed the “correlative rights” doctrine. These two doctrines of ownership are distinct, both conceptually and in practical application.

### **Prior Appropriation Doctrine**

Almost all western states have adopted the prior appropriation doctrine to control rights to water. The mantra of prior appropriation is “first in time, first in right.” Thus water belongs to the first person to put it to

beneficial use. That person has the most senior rights to water, but only to the exact quantity actually put to use, and only for so long as the use continues—giving rise to the second mantra of western water law, “use it or lose it.” In times of shortage, senior users take their full measure of water first (that is, they “call the river”); when no more water is available, junior users get cut off altogether. Those holding junior rights know to expect that possibility and prepare for it, just as senior users know they can rely on their full water right.

In applying the prior appropriation doctrine to geothermal resources, states can impose a familiar system of seniority to govern competing interests in the same resource, and they can nudge developers in the direction of efficient utilization of the resource. However, title to water is not equivalent to real property ownership, and the prior appropriation doctrine does not give the geothermal developer real estate-caliber title to the resource. In most states, water (and thus geothermal resources) is owned by the public, or by the state in trust for the public. The water rights holder or geothermal developer possesses only a usufruct—a mere right of use, not of ownership.

### **Doctrine of Correlative Rights**

From the common law of real property, landowners are graced with “ownership ad coelum,” in which ownership of a parcel of land is considered to include the sky above the parcel and the subsurface area below the parcel, bounded by the parcel’s boundaries and presumably extending to the Earth’s core. The mineral rights in most states, however, are subject to the “rule of capture,” which means that although I may own the subsurface area below my land, if I fail to “capture” the minerals there, someone on an adjoining parcel is free to do so. That rule is, in turn, limited by another rule of law, the “correlative rights doctrine,” which is the legal principle that adjoining landowners must limit their “capture” of a common underground resource to a reasonable, proportionate share based on the acreage of surface ownership. Some states such as Utah have confirmed by statute that the rights to geothermal resources and to geothermal fluids extracted in the course of production of geothermal resources shall be based on the principle of correlative rights.

For geothermal development in jurisdictions that classify geothermal resources as mineral interests, this means that land ownership—or leasehold rights—are paramount. Under the rule of capture, the owner of the mineral estate can obtain title to geothermal resources (subject to the correlative rights of adjacent owners) as fast as he or she can get them out of the ground. Conversely, and again depending on the activities of adjacent landowners, if I own the subsurface geothermal resources but fail to develop them, my title remains secure until I decide to develop; the “first in time” and “use it or lose it” mantras do not apply. From the standpoint of economic efficiency, this is beneficial, because the owner need only capture the potential of the resources when it is economical to do so. On the other hand, from the standpoint of resource management, an owner who fails to make use of a geothermal resource can tie it up and prevent anyone else from developing it.

### **Conclusion**

More significant to the practical realities of geothermal energy development is the question of which type of ownership is more secure—and more attractive to investors. Moreover, it is important for developers to understand the classification scheme used by the state in which geothermal resources are located because the nature of ownership will affect not only regulatory decisions, but also decisions about how to structure sales contracts, leases, operating agreements, and insurance policies. A thorough understanding of the specific state’s regulatory system can help the geothermal developer ensure that drilling deep will not land him or her in legal territory that’s too hot to handle.