

Water Rights for Geothermal Applications in Nevada

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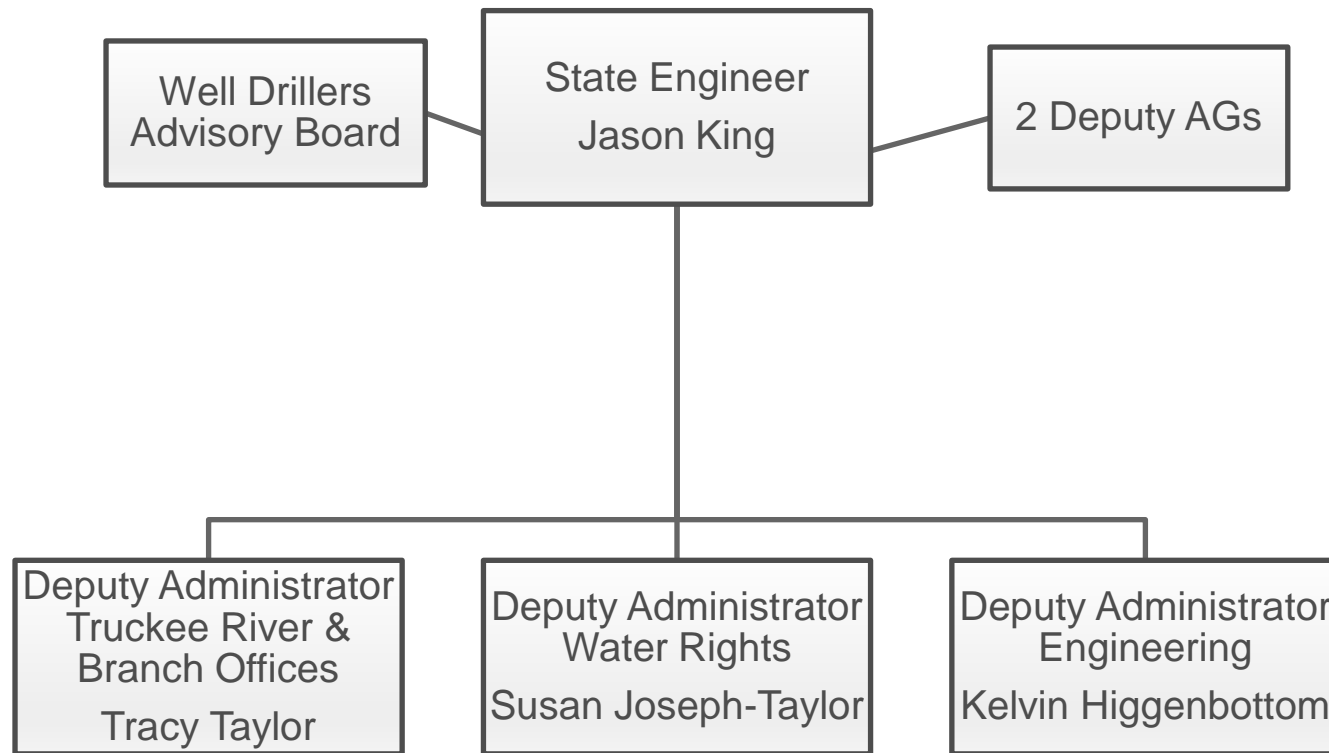
What I'm going to tell you:

- Basis for water law in Nevada
- Nevada Division of Water Resources
- Duties of State Engineer
- Geothermal Fluid: water or mineral
- Determining Availability
- Appropriation
- Protest and Adjudication
- Conditions of Approval
- Temporary Change in Method of Use or Point of Diversion
- Case Studies

Nevada Water Law

- Nevada Revised Statute (NRS) Chapter 533 (Enacted in 1905)
 - **NRS 533.025:** The water of all sources of water supply within the boundaries of the State whether above or beneath the surface of the ground, belongs to the public.
 - **NRS 533.030.1:** Subject to existing rights, and except as provided otherwise in this section, all water may be appropriated for beneficial use as provided in this chapter and not otherwise.
 - **NRS 533.040.1:** Except as otherwise provided in this section, any water used in this State for beneficial purposes shall be deemed to remain appurtenant to the place of use.

Nevada Division of Water Resources



Duties of the State Engineer

- Appropriation
- Adjudication
- Distribution
- Regulation
- Dam Safety
- Water Planning
- Abandonment & Forfeiture
- Water Right Ownerships
- Temporary change of existing rights
- Artificial recharge & recovery
- Subpoena Power
- Protests

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Geothermal fluid: water or mineral?

- Nevada Revised Statute 534A
 - **NRS 534A.010 NDOM** Definitions: a geothermal resource is “...the natural heat of the earth and the energy associated with that natural heat, pressure, and all dissolved or entrained minerals that may be obtained from the medium used to transfer that heat...” *(emphasis added)*
 - **NRS 534A.040:** A consumptive use of water brought to the surface outside of a geothermal well is subject to the appropriation procedures of chapters 533 and 534 of NRS, except for :
 - Water removed from the aquifer or reservoir... if the water is returned to or reinjected into the same aquifer or reservoir, or
 - Reasonable loss of water during testing, or from temporary failure of all or part of a utilization system

Geothermal fluid: water or mineral?

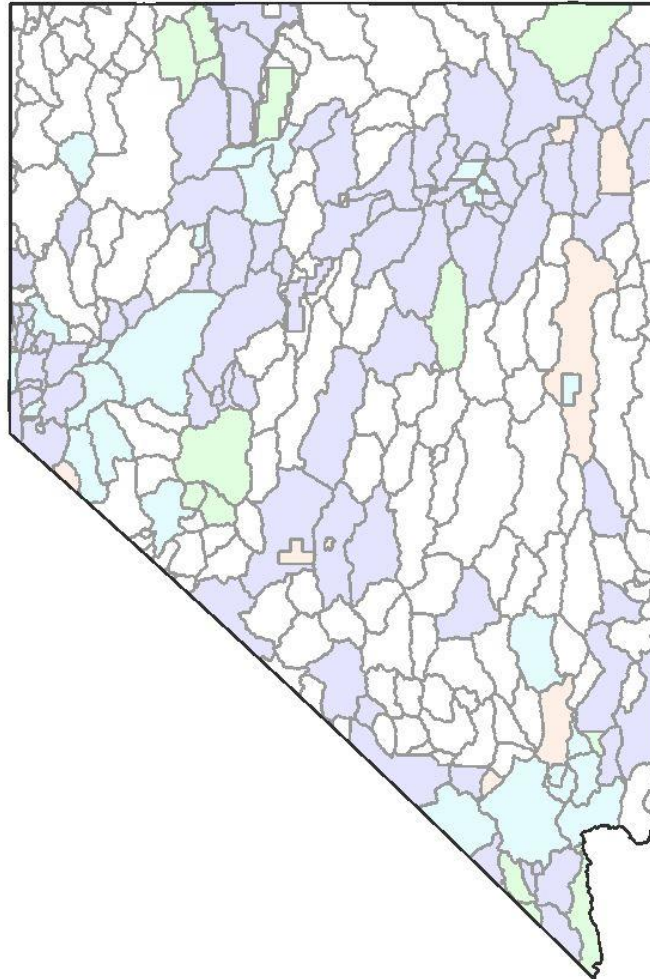
- What does it mean?
 - Heat and minerals are regulated by NDOM under NRS 534
 - Water is always water, and consumptive use is regulated by NDWR, including:
 - Using fresh ground/surface water for EGS
 - Using fresh ground/surface water for reservoir recharge
 - Using fresh ground/surface water for cooling tower makeup
 - Using geothermal condensate for cooling tower makeup
 - Using geothermal fluid or condensate for other purposes (agriculture, recreation, industrial purposes, et cetera)

Is water available?

- Nevada is divided into 232 hydrographic basins
- Non-designated basins theoretically have water available for appropriation
- Designated basins are theoretically over-appropriated
 - Designated basins are not closed
 - Preferred uses of water are imposed
 - Appropriations for agricultural uses is not preferred
- Withdrawals in designated basins may be restricted in order of priority rights
- DWR Website allows you to search for rights by basin
- Nevada Water Rights Surveyor can help you locate water in designated basins

Hydrographic basins

- Non Designated
- Designated
- Irrigation Denied
- Preferred Use
- Preferred Use - Irrigation Denied



Appropriation

- File application and supporting map with Nevada State Engineer, along with filing fee
 - Date and time of application establishes priority
 - Supporting map illustrating point of diversion must be prepared and signed by a Nevada state water right surveyor
- Public notice in local county newspaper, four consecutive weeks
- Thirty-day protest period
- Action can now be taken by State Engineer; if no protest, permit granted with conditions of performance

Protest and adjudication

- If a protest is filed State Engineer may conduct field investigation or administrative hearing
 - Determine if proposed diversion will affect existing water rights
 - Protester required to support claim of interference with existing rights
 - Applicant must support claim that proposed diversion will not affect existing rights
 - Testimony during field investigation or hearing must be substantial enough to support filing a petition to overrule the State Engineer's decision in a court of law

Who might protest?

- BLM
- NGOs
- Ranchers
- Counties
- Other municipalities
- Other water rights holders
- Project opponents

Once an application is approved:

- Proof of Completion – a description of improvements which enable permittee to divert water to proposed place of use (NRS 533.390)
- Proof of Beneficial Use (NRS 533.400)
 - Exact rate of flow and volume of water placed to beneficial use
 - Additional mapping showing irrigated acres, water service to particular subdivision lots, location of industrial use, et cetera
 - Appropriated water that is not being put to beneficial use reverts back to the State
 - Extensions, one year at a time, may be granted to demonstrate proof of completion or proof of beneficial use
 - Failure in five successive years to beneficially use part or all of the underground water constitutes forfeiture (NRS 534.090)

Temporary change in manner of use or point of diversion

- Using agricultural or stock water for other purposes
- Often necessary if purchasing water from rancher or other water rights holder for uses other than those originally permitted
 - Drilling
 - Construction dust suppression
 - Road maintenance
- Intra-basin change in point of diversion – from one well to another
- May not exceed one year
- May be denied if interferes with another water right
- Lender-Borrower or sale agreement required

Case Study: Fresh water for cooling

- Ormat's Galena 1 project; a 20 MW net, air-cooled, binary power plant located in Reno, Nevada



Hybrid cooling:

- Air-cooled technology with evaporative assist during hottest hours of day
- Much lower water consumption than conventional wet cooling
- Can be retrofitted to existing air-cooled power plants
- Can be switched on and off quickly to help balance grid

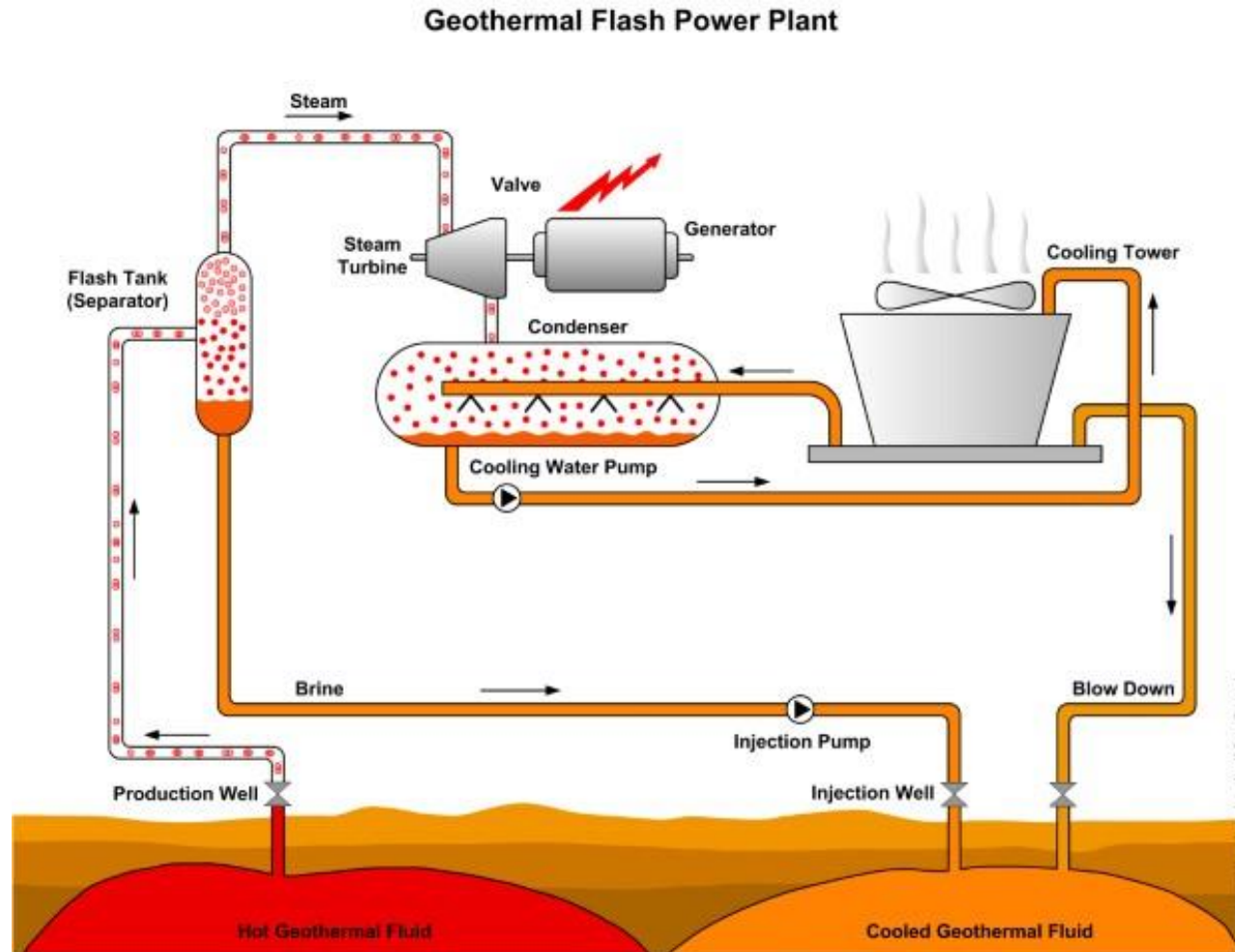
Fogging System at Work



Water Sources

- Ormat considered using geothermal condensate, tertiary treated effluent, agricultural (surface) water from the Steamboat Ditch
- Economic evaluation of capital and operational costs drove the selection of ditch water
- Ormat purchased water rights in the secondary market; existing water rights holders
- Converting from agricultural to industrial requires additional rights for return flows
- In low water years, water allocation may be restricted

Case Study: Geothermal condensate for cooling



Water source:

- Condensate from flashed geothermal fluid
- Submit application for appropriation of maximum estimated condensate evaporation
- Unlikely to be required to obtain existing water rights, assuming a completely different reservoir/aquifer from fresh water users
- Be prepared to defend appropriation: hydrologic and reservoir models to show no impact to other water rights holders, wildlife, or the environment
- Once granted, project must show consumptive beneficial use by metering production and injection, calculating evaporation
- Extensions for additional time to demonstrate beneficial use often granted

DWR interactive Web page

Links | Contact Us



State of Nevada
Division of Water Resources

Home Forms Water Rights Programs Mapping & Data Hearings FAQ

MAPPING APPLICATION LINKS

Mapping Application Links
(Silverlight Required ... More Robust)

- [Water Rights](#)
- [Adjudications](#)
- [Nevada Hydrology Data](#)

Mobile Device Links
(HTML5 Based ... Android/iDevices)

- [Water Rights Mapping Application](#)

References:

- Nevada Revised Statutes Chapter 533 – Adjudication of Vested Water Rights, Appropriation of Public Waters
- Nevada Revised Statutes Chapter 534A – Geothermal Resources
- <http://water.nv.gov/programs/planning/counties/>
- http://water.nv.gov/home/contactlist/contacts_carson.cfm
- http://water.nv.gov/mapping/maps/designated_basinmap.pdf
- <http://webgis.water.nv.gov/>