

Control Valve Design Greatly Improves Service Life in Geothermal Power Generation

KEY RESULTS

- > Optimized design and materials eliminated impacts of erosive media.
- > Increased reliability, uptime, and profitability.
- > Savings of \$38,000 USD over two years of service.



APPLICATION

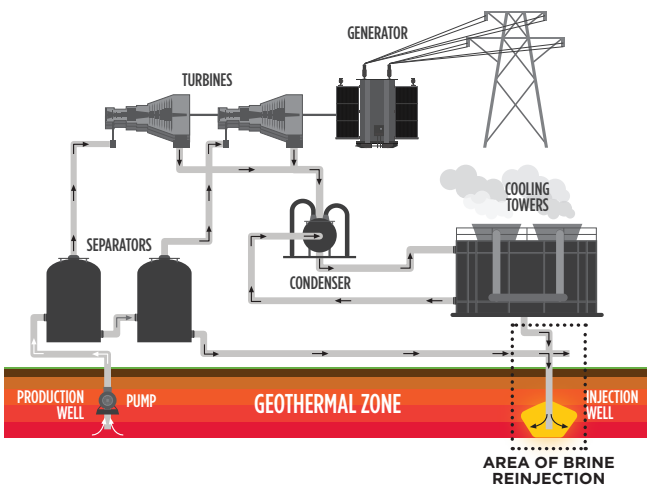
In geothermal power generation, **brine reinjection** is the process of returning geothermal fluids back into the reservoir after energy extraction. This is done to maintain reservoir pressure, as well as for environmental benefits. The process requires precise flow control to maintain fluid equilibrium in the system. Failure to properly control the media may result in safety hazards (such as burns), environmental contamination, or loss of production.

The process involves abrasive brine media, high temperatures, and high flow rates — resulting in erosion and high wear rates of the main valve components, such as discs, balls, or seats.

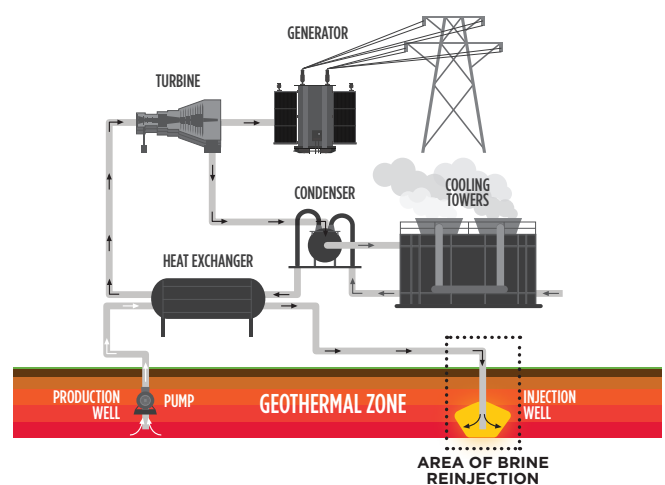
PROCESS CONDITIONS

Industry	Geothermal Power Generation
Process	Geothermal Power Plant
Application	Wellhead Brine Reinjection
Media	Geothermal Brine
Upstream Pressure	30 to 150 psi 2 to 10 bar
Downstream	Vacuum
Operating Temperature	200°F to 250°F 93°C to 121°C
Performance Requirements	Precise Flow Control; High Flow Rate; High Temperatures; Abrasive Media

TYPICAL FLASH STEAM POWER PLANT



TYPICAL BINARY CYCLE POWER PLANT



CUSTOMER SUCCESS

CHALLENGE

In this brine reinjection application, the existing wellhead flow control valve was experiencing premature failure from the severe media conditions, which included:

- > Media scaling and buildup, leading to jamming and increased torque requirements
- > Media flashing, leading to significant erosion on the ball segment and seats
- > Severe body erosion, leading to serious brine leakage.

The customer was experiencing frequent downtime for extended periods, plus the associated loss of production. Complete valve replacement was necessary at least once a year, at a cost of \$19,000 USD. A more reliable, cost-effective solution was needed to minimize downtime and unplanned maintenance costs.



The existing control valve experienced severe erosion and media leaks, requiring frequent replacement and costly downtime.

SOLUTION

After visiting the plant and learning more about the process conditions, Bray recommended a Series 19L segmented ball valve to address customer concerns of reliability, durability, and precise flow control. The Series 19L had already proven highly successful in similar abrasive media/suspended solid applications, and several key design features would extend overall service life in this harsh application:

- > Reversed flow direction to minimize erosion on the valve internal wall and face of the ball segment.
- > Solid tungsten carbide seat and downstream bore liner to provide erosion protection.
- > Proprietary tungsten carbide based coatings to prevent erosion on the ball segment.
- > Upper and lower stem seals to protect against media ingress in the drive train.

Bray's engineering team then employed CFD analysis to confirm the Series 19L performance in the reinjection application, and used their valve sizing tool to specify a Class 300 NPS 8 inch valve. A fully automated solution was supplied, including a double-acting Series 92 pneumatic actuator with corrosion resistant coating, an air filter regulator, a volume booster, a Series 6A electro-pneumatic positioner, and a manual override gear.

RESULTS

Bray's engineered solution has provided reliable performance in the reinjection application, remaining in service after 2½ years of continuous duty.

The benefits to the customer include:

- > Increased reliability: Bray solution lasted 2.5 times longer than competitor.
- > Reduced downtime and lost production related to frequent valve failure and replacement.
- > Significantly reduced operational costs, saving \$38,000 USD over two years.

BRAY PRODUCT DETAILS

Valve	Series 19L Segmented Ball Valve.
Size	NPS 8 DN200
Pressure Class	ASME 300
Modifications or Upgrades	Erosion Resistant Downstream Liner.
Actuator	Series 92 Double Acting Pneumatic with Corrosion Resistant Coating.
Controls	Series 6A Positioner; Air Filter Regulator; Manual Override Gear.

Bray Series 19L segmented ball valve remains in service after 2½ years of continuous duty.



For more information about Solutions for Geothermal Power, contact your local representative or visit Bray.com.