

# Low-hazard, high-performance, geothermal breaker fluids



## Caring for your reservoir and the environment

Geothermal operations pose a set of truly unique challenges. From extreme downhole temperatures and unstable operating conditions to HSE requirements and sometimes having to operate in or near densely populated areas.

As 'Green Energy' providers, geothermal operators have to abide by the most stringent restrictions relating to HSE. As steam-producing geothermal wells are often in fractured formations with high-temperature limestone and basalt operating conditions, operators are required to use the most reservoir-friendly fluids at their disposal. This is to limit drilling damage and maximize production while protecting the aquifers from drilling, completion and production operations.

Together, these factors present multiple operational barriers which can be exacerbated by the introduction of the hazardous conventional acids traditionally used to treat geothermal wells. As the world's leading geothermal fluids experts, we go further to help your operation anticipate and overcome these challenges.

Our flexible and diverse range of specialist geothermal solutions have been engineered to deliver outstanding operational performance alongside exceptional sustainability.

Allowing you to get to work in complete confidence – no matter where your geothermal operation takes you next.

## Proven geothermal drilling performance

With more than 30 years' geothermal experience to call upon, our international network of fluids experts knows exactly what to expect from even the most challenging of downhole conditions. Including deployment of drilling and completion fluids in bottom hole static temperatures of up to 480 °C (896 °F).

Our range of geothermal drilling fluids have been robustly tested, refined and proven in the field over the last two decades. They enable highly technically effective drilling performance in a wide range of geothermal scenarios, with attributes that include:

- Stable in extremely high temperatures up to 480 °C (896 °F)
- Resistant to 'sag' when a high-solids load is required to prevent gases influx
- Easy to treat in the event of thermal degradation and acid gases contamination
- Resistant to extremely high temperature-static conditions such as bit change trips (over 24 hours)

## Introducing ORCA and DEEPA for geothermal applications

Combining Newpark's TerraTherm™ high-performance geothermal water-based reservoir drill-in fluids with Cleansorb's ORCA™ for OBM breaker technology allows for uniform drilling damage removal for enhanced geothermal well performance. An environmentally sound combination that's been proven in geothermal applications, such as drilling damage removal treatment in a newly drilled geothermal well in a built-up area in a town in the Netherlands.

For use in new wells or as a remedial treatment, Cleansorb's proprietary patented low-hazard ORCA for WBM drilling damage removal fluids are a highly effective single stage filter cake removal treatment. Utilizing in-situ acid generation downhole achieves treatment uniformity and optimized zonal coverage, to improve fluid production or injection.

There is also the potential to use Cleansorb's DEEPA™ treatment fluids in-situ acidizing for cost-effective geothermal well enhancement. Depending on the reservoir characteristics DEEPA fluid can be injected to fill the near wellbore matrix porosity and/or natural fractures intersecting the wellbore in geothermal wells in carbonate formations.

This enables an increase to the matrix permeability and/or conductivity of natural fractures to improve fluid flow. DEEPA also offers a low-hazard approach for carbonate scale removal in geothermal wells. While in-situ acid generation allows for optimized zonal coverage and uniform placement that also reduces the HSE risk, protects the environment and keeps your people safe.

## Safer for the environment, better for your bottom line

We understand the financial pressure on operators to avoid costly mistakes. Which is why our solutions have been developed to ensure you get things right, first time around.

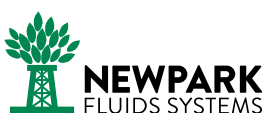
ORCA and DEEPA fluids are based on low-hazard, low-environmental-impact chemicals. This simplifies the handling, use and disposal of used treatment fluids and compliance with stringent environmental requirements for fluids used in geothermal applications.

For example, as our breaker fluids are mixed at the wellsite with conventional equipment, this eliminates the traditional exposure risks associated with the use of neat acids with competitive systems. Many of the proprietary chemicals involved are also derived from natural, renewable resources – key factors that contribute to meeting ESG goals and maximizing return on investment.

All of this is achieved while protecting or enhancing reservoir productivity. When used in combination with TerraTherm™ high-performance geothermal water-based reservoir drill-in fluids, our geothermal breaker fluids work together to dramatically increase the productivity of your well by removing mud damage or the acidizing of the reservoir rock. Delivering improved returns by allowing gas and water to circulate freely – producing more energy in the process.

## Talk to our experts to discover more

To discover how your operation can benefit from our low-hazard, sustainable and cost-effective geothermal fluids solutions – simply contact one of our fluids experts today.



Contact Newpark fluids specialists for more information

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