BaraCRI® Cuttings Reinjection Services

SURFACE AND SUBSURFACE SOLUTIONS TO MAXIMIZE OPERATIONAL EFFICIENCY AND ENSURE INJECTION ZONE INTEGRITY
Each cuttings reinjection (CRI) operation requires a custom solution based on the drilling parameters, geologies, operational environments, and local regulations. Halliburton BaraCRI® services combine robust analysis of subsurface conditions with best-in-class modular technology and service execution to provide fully integrated, end-to-end solutions. Using this approach, we can identify well-defined and well-matched injection zones – and deliver long-term integrity, reliable performance, and lower overall costs.

Streamlined drilling waste disposal
- Allows the disposal of different waste streams, using one method
- Reduces the negative environmental impact of surface disposal
- Decreases the need for surface storage and cuttings pits
- Eliminates cuttings and drilling waste transportation risks

Applications
ONSHORE
Projects with transportation or infrastructure challenges, or projects in environmentally sensitive areas

OFFSHORE
Projects with low- to zero-discharge requirements or complex logistics for surface disposal

CRI Methods
ANNULAR INJECTION
The slurry is injected into the annular space behind the intermediate or production casing above the top of the cement.

DEDICATED DISPOSAL WELL
The slurry is injected into a dedicated injection well. This method provides significantly higher drilling waste disposal capacity.

Our CRI solutions are derived from industry-leading Halliburton technologies and expertise related to:
- Rock mechanics
- Hydraulic fracturing
- Fluid slurries
- Pressure pumping

This range of experience allows us to analyze, design, and execute tailored CRI operations to ensure safe and efficient injection with secure subsurface fractures.

Zero-discharge solution ensures regulatory compliance while improving logistics and cost
Rising transportation costs and restrictive disposal regulations can make CRI an optimal disposal solution for drill cuttings and other operational waste.

CRI provides a permanent and contained zero-discharge solution that helps mitigate the environmental risks and liabilities associated with the transfer, transportation, treatment, and disposal of drilling waste at the surface.

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EXPRESS ANALYSIS
Subsurface engineers review petrophysical and geological field data to verify the applicability of CRI operations. During this process, our experts will identify two critical factors: suitable injection zone(s) for disposal, and barrier zones to prevent waste migration.

FEASIBILITY STUDIES
We comprehensively analyze geomechanical and reservoir properties, and perform hydraulic fracturing simulations to identify safe, long-term disposal zones. Once the appropriate formations are selected, we model injection pressures, injection rates, and erosion to identify possible risk scenarios. Surface and subsurface equipment are proposed based on these findings. The resulting report can be used to obtain the required local regulatory approvals for CRI operations.

SLURRY MODELING STUDIES
Using slurry modeling, we can help determine optimum slurry rheology to ensure effective suspension and injection performance by incorporating drilling waste field data. Slurry modeling can be used to inform on-the-fly adjustments to slurry mixing and reinjection procedures in order to adapt to operational changes. These models can be added to the feasibility or model calibration studies to improve hydraulic fracturing simulations.

PRESSURE MONITORING AND ANALYSIS
Subsurface specialists provide continuous monitoring of injection pressures and rates. Any departure from target parameters can be flagged and resolved before the injection zone is plugged or otherwise damaged. Ongoing monitoring also allows real-time adjustments to be made, thus enhancing efficiency and making the most of the overall injection operation.

CALIBRATION STUDIES
Based on actual historical injection data, calibration modeling is used to update the feasibility study. The operational plan can be adjusted to reflect new findings. This capability also provides information needed for reporting to local legislations to maintain licensing.

Advanced Engineering Throughout the Life of the Project
Front-end engineering analysis of the subsurface geology, tectonics, petrophysical, and lab core data are critical for defining injection parameters. At Halliburton, we provide sound geomechanical and injection domain evaluations of the proposed zones. This analysis helps to optimize the injection process for maximum sustained performance and to ensure that the injection zone safely and efficiently keeps pace with the waste streams throughout the life of the project.

To assure that your projects stay on track, we provide continuous monitoring of baseline metrics during operation. By conducting slurry modeling and calibration studies, we can help optimize operational plans by incorporating live field data.

Challenges:
- Reduce environmental impact in sensitive areas
- Eliminate footprint of surface storage of disposal streams and cuttings pits

Results:
- Eliminated cuttings storage pits
- Injected more than 90,000 bbl downhole, with zero NPT
- Minimized environmental impact and optimized operational costs
Technology Solutions for All Operating Environments

Halliburton offers a full range of industry-leading onshore and offshore CRI technology solutions. We have a well-established track record for operating in a wide range of environments, including arctic conditions, space-constrained offshore platforms, and remote jungle locations. Backed by this experience and a fully modular design, we can deliver the right-sized system for every project. Each operation can be custom-fitted with bulk cuttings storage tanks, cuttings conveyance equipment, slurrification mixers, and high-pressure injection pumps – all designed and operated by specially trained personnel.

Challenges:
- Reduce costs and environmental risks related to skip-and-ship cuttings management process

Results:
- Injected over 1.49 million bbl during six-year project and reduced cuttings disposal costs by more than USD 4 million
- Incurred zero safety and/or environmental incidents

KEY TECHNOLOGIES

**Dual-Stage Hammermill**

The dual stage hammer mill can be used to optimize the downhole injection of cuttings. The technology is primarily used for cuttings injection in areas where hard, high-abrasive drill cuttings are produced. The mill uses kinetic energy with a high-speed rotating hammer assembly to pulverize and degrade the cuttings until reduced to >300µ.

**Slurrification Unit**

The modular unit is fully compatible with all cuttings transfer and containment systems for quick and trouble-free installation and operation. It provides maximum flexibility for process upgrading to secondary grinding and slurry conditioning. Once the cuttings are slurrified to 300 microns or less, they are transferred to a slurry storage tank and then passed through an inline filter to ensure that in-spec slurry reaches the injection pump.

**HT-400™ Pump**

This time-proven technology can be adjusted for pressures up to 20,000 psi (1379 bar) or pump rates of up to 19 barrels per minute (3 m³ per minute). The powerful HT-400™ pump has a nominal rating of 800 hydraulic horsepower (thp).

DESIGN-TO-DELIVERY SOLUTIONS

Our BaraSolve® engineering solutions team can help resolve many challenges related to rig design and location, complex drilling programs, and strict environmental regulations. Solutions include:
- Project management
- Site surveys
- Rig audits
- Feasibility studies
- Engineering design
- Technical drafting
- Equipment installation

CUTTINGS HANDLING SOLUTIONS DESIGNED FOR EFFICIENCY

Our line of fully pneumatic BaraStream™ vacuum and blower systems helps reduce HSE risk and NPT, as well as improve cuttings handling efficiency in both onshore and offshore applications.

CONSISTENT DELIVERY OF DISTINCTIVE SERVICE QUALITY AROUND THE WORLD

At Baroid, we are dedicated to process adherence. All of our processes are mapped on a global perspective and then customized on site to address local legislations and needs. This is what enables us to consistently deliver custom solutions around the world that meet – and exceed – your expectations.
Sales of Halliburton products and services will be in accord solely with the terms and conditions contained in the contract between Halliburton and the customer that is applicable to the sale.

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