BioSqueeze
SEALED WELL

Case Study 058



CHALLENGE

Casing Leak(s) Resulting in Loss of Integrity

BioSqueeze Inc. was contracted by an operator to restore mechanical integrity on a disposal well in the San Juan Basin.

- Drilled in the early 2000's targeting the Bluff and Entrada formations.
- Leak isolated to a 32 ft interval on the 4-1/2" production casing at ~7,800 ft.
- Two conventional cement squeezes attempted with low confidence in placement and no meaningful improvement to pressure falloff rates.

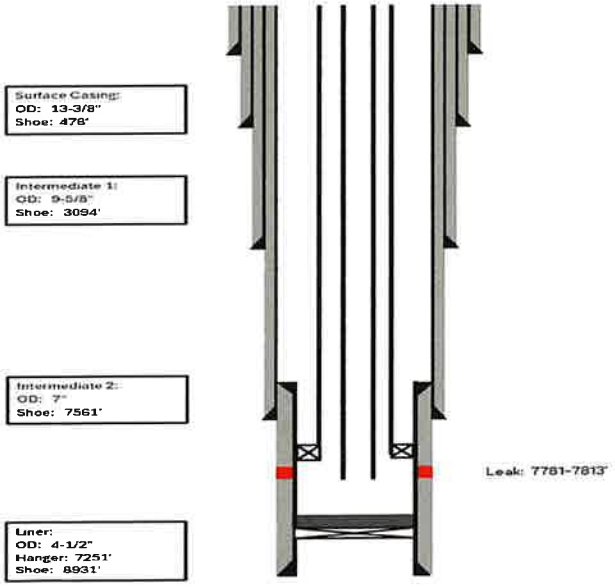
PREPARATION

Rig Reduced Remediation

To prepare the well for treatment via a rigless Downhole BioSqueeze® the following actions were taken:

- Utilize existing bridge plug with cement on top
- Trip packer and work string, set packer at 7,774'
- Trip cap string through packer to 7,825'

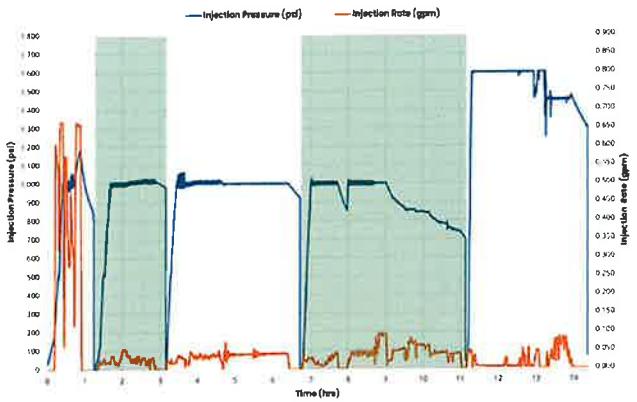
After preparing the well, the workover unit rigged down and moved to a different well. BioSqueeze then began rigless treatment.

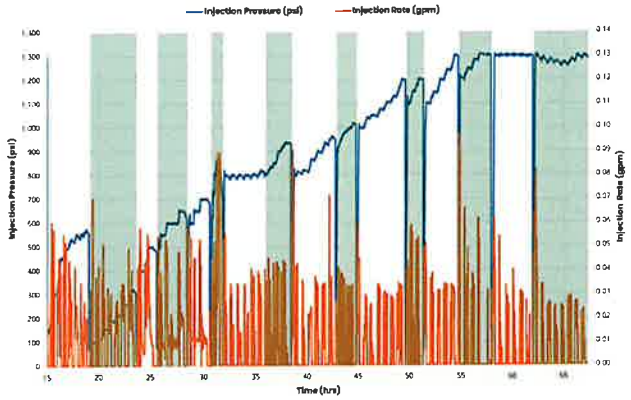


Solution

Rigless Downhole BioSqueeze®

Low-viscosity, biomineralizing fluids were pumped into leakage pathways in the cement behind casing to form new mineral (limestone) and re-establish integrity. Our treatment strategy involved slowly stepping up injection pressure, establishing sustained injection, and sealing at each pressure level before proceeding higher. This methodical approach ensured thorough biomineralization across all accessible leakage pathways, from sub-micron gaps to larger channels.





RESULTS

Restored Mechanical Integrity, Enabling Injection to Resume

98.8% Reduced injection rate from 0.668 gpm to 0.008 gpm with 112 gal injected.

97.8% Reduced pressure falloff from 18.4 psi/min to 0.4 psi/min.

H-5 MIT Successful mechanical integrity test, holding at 1,200 psi for 30 min.

" Eliminate Leaks Without Sacrificing ID "

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SEALED WELL

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Restoring Mechanical Integrity in Active Wells



2026 IOGCC Chair's Stewardship Award

Application: Small Company

Explanation

Active wells, including production, injection, disposal, and underground storage wells depend on casing to manage pressure and contain fluids. A pinhole, corrosion pit, crack, failed connection, or damaged perforation can cause a pressure-test failure even when the rest of the casing remains intact, leading to shut-in production, suspended injection, workovers, and risk of fluid movement outside designed containment. Cement and resin squeezes struggle to address defects and can shrink or debond; patches and liners add hardware and may leave the leak unresolved.

Purpose

BioSqueeze adapted its in-situ biomineralization platform, developed through sustained casing pressure and gas-migration remediation, to address discrete casing leaks in active and return-to-service wells. The objective is to restore integrity demonstrated by a pressure test while preserving full drift. This provides an option for localized defects in otherwise usable infrastructure where a patch, liner, or major recompletion would restrict pump capacity, tool access, future intervention, or eventual plugging. Applications include completion, production, injection, disposal and storage service when the leak can be isolated.

Process

Biomineralizing fluids are placed across the identified leak interval through a workstring, coiled tubing, or a rigless configuration when conditions allow. Their water-like viscosity follows the same pathways as the leaking gas or fluid, including defects that bulk sealants cannot. As calcium carbonate forms inside the defect, flow is restricted and the fluids self-divert to remaining pathways. Unlike cement and resin, the mineral does not cure, shrink, or debond; unlike patches and liners, the repair adds no permanent hardware or lost drift. Results are verified by the applicable pressure test or static pressure hold.

Environmental Contributions

Regulators need assurance that casing contains pressure and prevents unintended movement of gas or fluid. Leaks in injection and disposal wells can threaten underground sources of drinking water; producing and storage-well leaks can create migration, emissions, well-control, worker-safety, and public-safety risks. Repairing the defect and confirming the result through pressure testing reduces uncertainty associated with interval-level workarounds. A durable repair also lowers the likelihood that a small leak becomes a larger event while reducing repeat workovers, mobilizations, waste, and personnel exposure.

Accomplishments

BioSqueeze has treated more than 400 wells across North America with an overall well-integrity success rate above 90%. Mechanical-integrity treatments have enabled producing, injection, disposal, and storage wells to pass pressure tests or static holds and return to service, including after cement, resin, or patch attempts. All repairs preserve full drift and avoid new downhole hardware.

BioSqueeze

Mechanical Integrity

Remediate Leaks with BioSqueeze – No Patches, Liners, or Lost Drift

CHALLENGE

Mechanical integrity is among the most persistent and costly well integrity challenges operators face. Whether caused by corrosion, mechanical damage, thread failures, or poor cement bonding, leaks can compromise pressure containment and lead to loss of mechanical integrity, triggering regulatory action, costly intervention, and prolonged downtime.

Traditional repair methods involve tradeoffs: cement shrinks as it sets up, making it difficult to produce a permanent bond to casing, this often provides a short term solution with leaks returning after a few months; casing patches isolate the interval but, introduce additional hardware that restricts ID and can complicate future interventions.



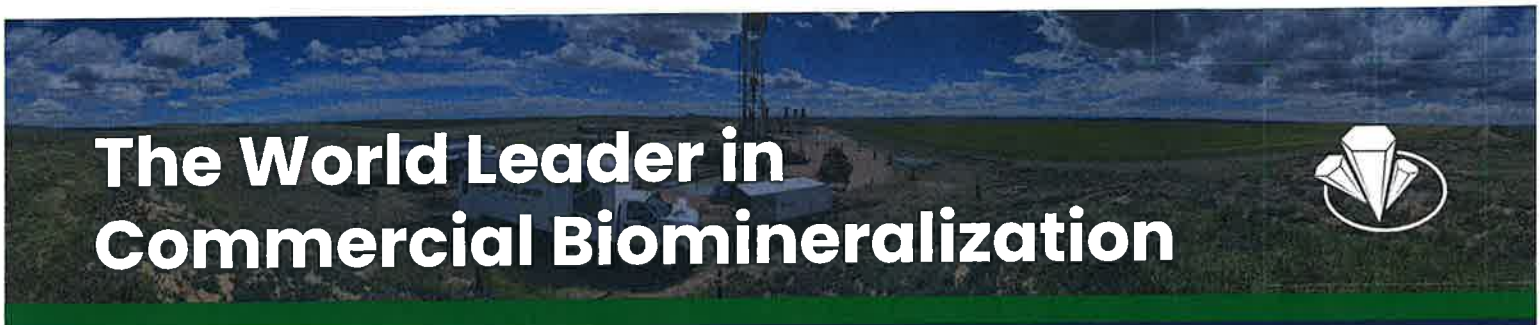
SOLUTION

Squeeze low-viscosity, biomineralizing fluids that self-divert into discrete leakage pathways where conventional methods struggle. Natural microbes precipitate calcium carbonate directly in leaks, forming a gas-tight limestone seal bonded at the molecular level while leaving the wellbore full-drift.

ACCESSES SUB-MICRON LEAKS

BONDS WITHOUT SHRINKING

LEAVES THE WELL FULL-DRIFT



The World Leader in Commercial Biomineralization

LIMITATIONS OF CURRENT METHODS

- **Patches & Liners Reduce Wellbore ID**
  Casing patches permanently restrict the wellbore, limiting pump rates, tool access, and future completion or intervention options
- **Cement Cannot Reach Leak Paths**
  High-viscosity cement slurries fail to penetrate cracks, pinholes, and corrosion pits where the majority of leaks originate
- **Cements & Resins Shrink & Fail**
  Cements and resins contract while setting up, debonding from steel and creating new micro-channels that allow gas to bypass the barrier
- **Repeated Remediation Cycles**
  Failed first attempts lead to costly re-squeeze and escalating expenses with no guarantee of eventual success

BIOSQUEEZE ADVANTAGES

- **Full-Drift Wellbore Preserved**
  No hardware installed or formation of barriers outside leak paths | Wellbore retains original ID for unrestricted tool access and future operations
- **Penetrates the Smallest Leak Paths**
  Water-like viscosity allows biogenic fluids to access cracks, pinholes, and corrosion pits less than a micron in scale
- **Permanent Limestone Seal**
  Crystalline calcium carbonate is grown at the mollecular scale | It forms a gas-tight barrier that does not shrink, degrade, or debond
- **Effective & Flexible**
  Low-viscosity, self diverting fluids trace leaks to ensure coverage, eliminating pump and pray placement and resulting re-treatment

HOW BIOSQUEEZE RESTORES MECHANICAL INTEGRITY

1. **Diagnose** — Locate the leak, identify failure mechanism, gauge severity
2. **Deploy** — Spot fluids downhole via workstring, coil, or riglessly if shallow
3. **Seal** — Fluids self-divert into leak paths, microbes form limestone
4. **Verify** — Rates reduce as sealing proceeds, confirm results with pressure test

Stop Chasing Leaks, Seal Them Permanently with Biogenic Limestone

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