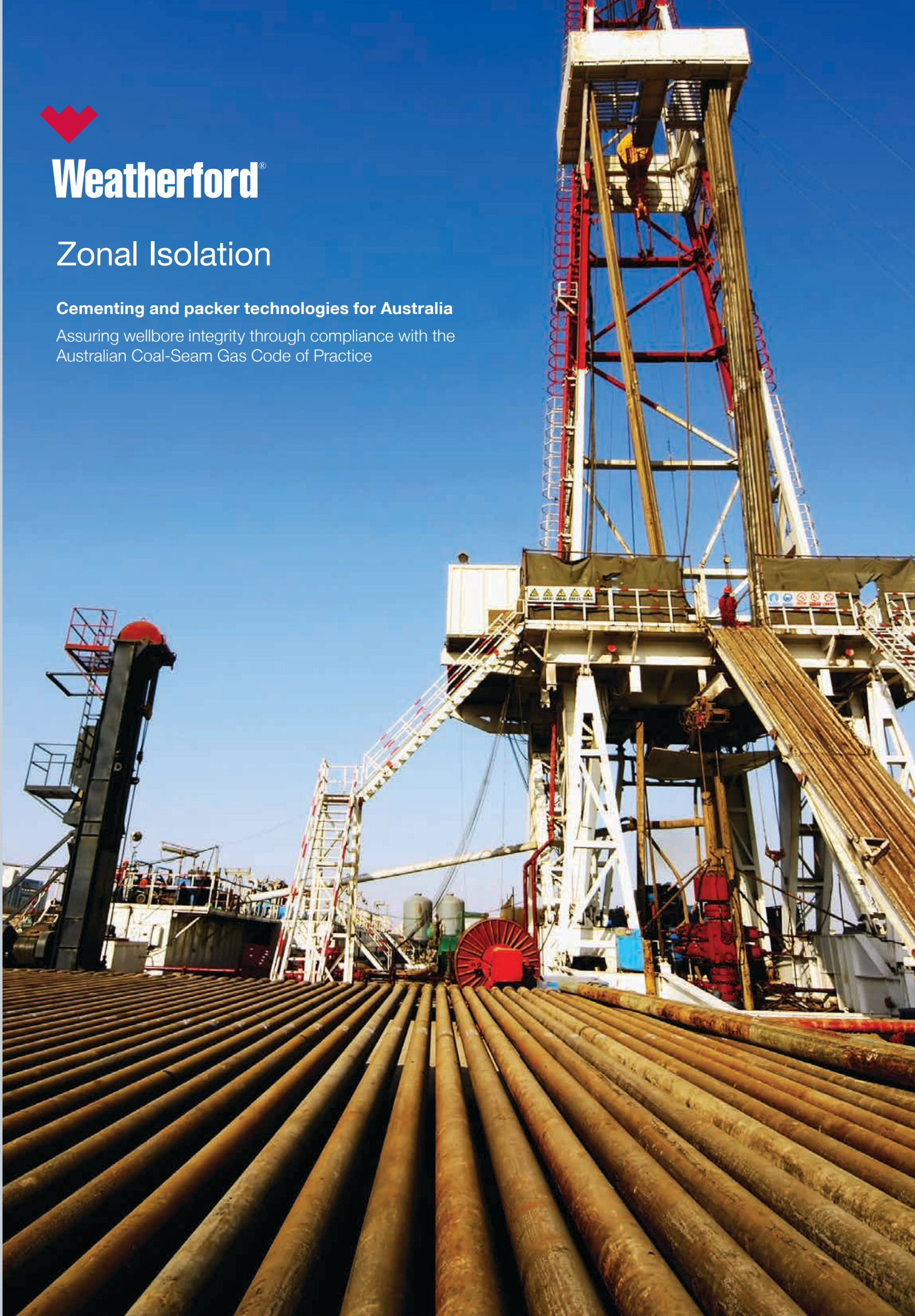
Weatherford®

Zonal Isolation

Cementing and packer technologies for Australia

Assuring wellbore integrity through compliance with the Australian Coal-Seam Gas Code of Practice



New regulations make certain that well integrity is no longer an option—**it's a necessity.**

Australia is an emerging energy superpower. Already a leading oil and gas producing area, Western Australia's offshore natural gas projects along with Queensland's vast coal-seam gas reserves have made the country a global energy destination.

But with an enormous wealth of energy reserves, come technical challenges. Australia's increasingly complicated well geometries and production zones make achieving the best possible seal more demanding.

Weatherford is a global leader in zonal isolation technologies. But we bring more than tools to your wellsite. Our expert technical support team can help you with prejob planning, procedures, and installation. Combined with our robust R&D program and comprehensive selection of technologies, our services ensure wellbore integrity and total compliance with the Australian Coal-Seam Gas Code of Practice.

Zonal isolation solutions optimized for Australia

For more than 50 years, Weatherford has designed and manufactured innovative zonal isolation technologies that ensure well integrity, save rig time, and boost safety. Our comprehensive selection of cementing products, inflatable packers, swellable packers, and microannulus seals provide a lifetime of value for you and effective isolation in any well environment. Used as a complete zonal isolation package, our tools deliver the safety and well integrity that Australian regulations demand.

Our Zonal Isolation Tools

Cementing tools—We have the world's most complete line of cementing technologies paired with more than half a century of experience. Each product is engineered to deliver unsurpassed reliability and total cement integrity.

- **Free-rotating eccentric guide shoes** allow problem-free running of casing in difficult hole sections. The tool nose rotates to the spot of least resistance without twisting the casing, which allows operators to run the casing string in hole to target depth during the installation.
- **Centralizers** effectively spaced along the length of the cemented casing interval ensure good mud removal and even cement distribution around the casing OD. Our CentraPro Plus® centralizer placement software provides a detailed plan for casing centralization that ensures the casing string is well centered within the wellbore prior to cementing operations.
- **Double-float valves** prevent reverse flow of cement slurry from the annulus into the casing, or flow of wellbore fluids into the casing string. With the security of a second valve, you're assured of a tight seal even in debris-laden environments.

Inflatable packers—For more than 40 years, our inflatable packers have been providing immediate and pressure-tight seals. Our solutions provide zonal isolation for water and gas shutoff, preventing gas migration and facilitating two or three-stage cementing operations.

- **BULLDOG™ ACP® annulus casing packers** provide immediate results with a permanent, reliable, high-pressure seal. The tools eliminate annular flow for the life of the well while maintaining casing integrity.
- **Injection production packers (IPP®)** provide the largest expansion ratio of any packer type in the industry. These versatile tools offer temporary or permanent zonal isolation in a variety of wellbore applications.

Swellable packers activate and seal through contact with wellbore fluids. We offer one-trip, self-setting oil swellable, water swellable, and the industry's only dual-fluid-activated swellable hybrid elastomer technologies.

Micro-Seal® isolation systems (MSIS) prevent gas migration from the producing zone if a microannulus forms during the life of the well as a result of poor cement bond integrity. When deployed with our innovative mechanical cementing products, these simple, economical solutions ensure total wellbore isolation without operator intervention.

Meet the Challenge of Australian Zonal Isolation Regulations

The Australian Coal-Seam Gas Code of Practice lays out your challenge step-by-step. The regulations include mandatory standards for well construction, monitoring, and maintenance with an emphasis on zonal isolation and protecting the environment.

Our tools and services ensure compliance with each measure of the Code of Practice. From safety management to cement integrity to decommissioning, our technologies and services help you manage environmental responsibility while optimizing coal-seam production.

Challenge

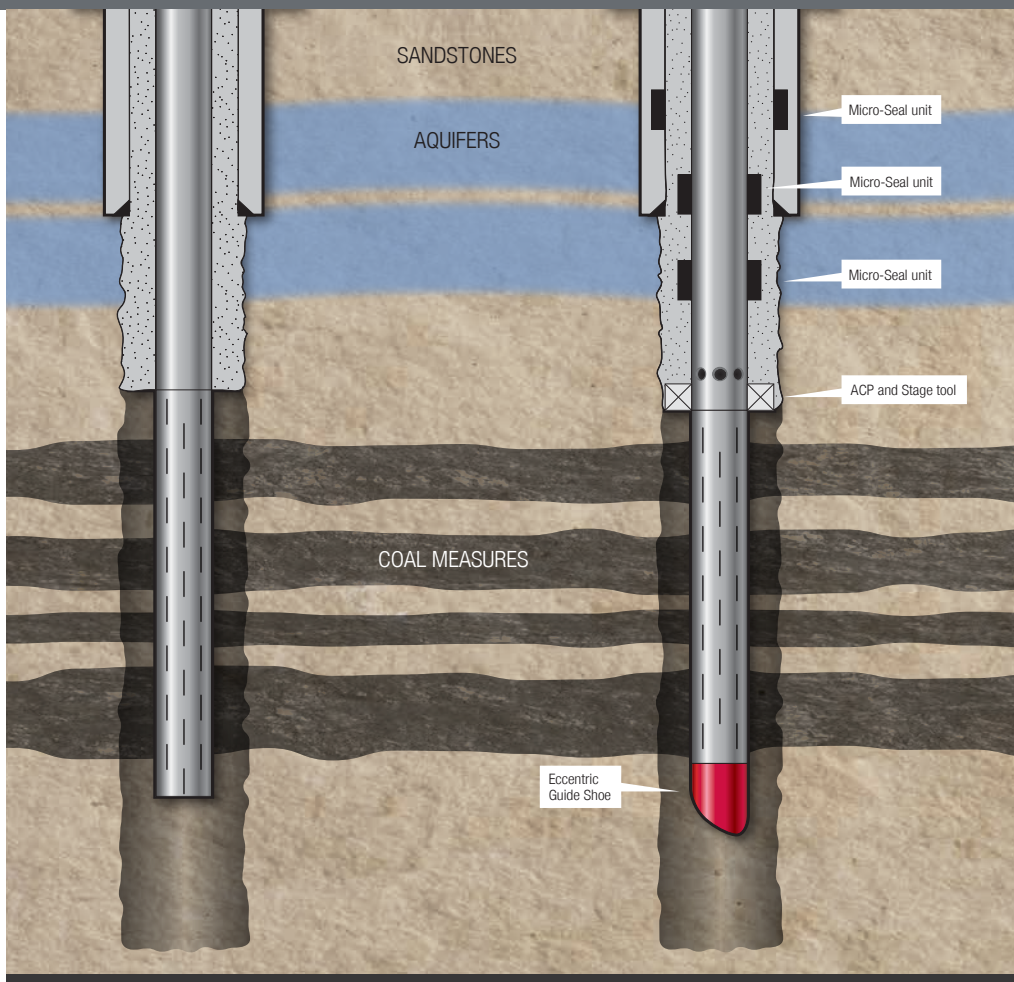
Cementing

Cementing operations must achieve verifiable zonal isolation while preventing cement contamination of the producing zone. Surface casing must be cemented from shoe to surface. Production casing must be cemented from above the upper coal seam to the surface, or at a minimum 50 m inside the previous casing shoe.

Our solution

Cementing and zonal isolation tools

Used as a complete zonal isolation package, our tools deliver the safety and well integrity that Australian regulations demand.



Conventional Well Design **Recommended Well Design**

Conventional design for coal-seam wells

Historical standard practice for coal-seam gas wells is to cement the individual casing strings with slotted liners in the openhole production zones.

Potential zonal isolation issues

- Inferior cement jobs
- Wellbore gas migration
- Microannular gas migration
- Contaminated producing zone
- Contaminated aquifers

Recommended CSG well design

To comply with the stringent Australian Coal-Seam Gas Code of Practice, we recommend enhanced cementing and zonal isolation technologies.

Cementing technologies

- Rotating eccentric guide shoes run below the slotted liner ensure proper casing depth.
- **Stage cementing tool** The tool allows for cement placement in the annulus above the ACP packer.

Zonal isolation technologies

- **BULLDOG ACP packers** provide an immediate platform for cement placement above the coal seams and prevent potential gas channeling within the cement slurry during the curing stage.
- **Micro-Seal units** protect aquifers from casing connection leaks and stop fluid and gas migration if a microannulus forms at the cement and casing interface..

Weatherford zonal isolation technologies deliver real results

Micro-Seal system

Prevents annular pressure
experienced in nearby wells

Isolation system permanently isolated microannuli, prevented gas migration

An operator installed the Micro-Seal isolation system to prevent sustained annulus pressure experienced in a nearby well. The technology sealed the microannuli that formed after cementing, which eliminated the need for remedial cementing.

Location: Qatar

BULLDOG ACP packer

Isolated lower CSG zone
and kept the slotted liner cement-free

Packers and cementing tools sealed lower production zone

Several previous attempts at zonal isolation in a 7-in. coal-seam gas completion had failed. The Weatherford BULLDOG Annulus Casing Packer sealed the zone which enabled an effective cement job with no cement penetration in the slotted liner. The operation avoided formation damage and saved NPT and rig costs.

Location: Queensland, Australia

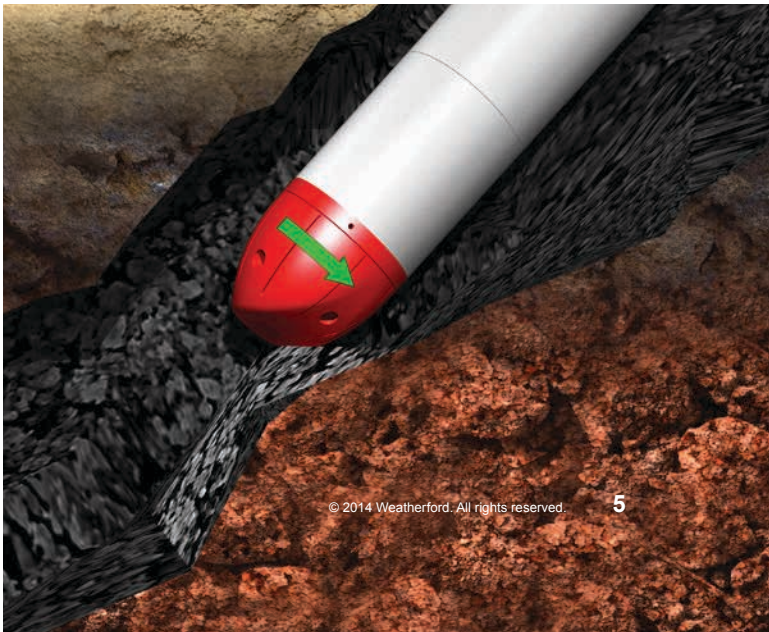
Eccentric guide shoe

Helped run casing in **4 highly deviated wells** with **0 issues**

Free-rotating guide shoe enabled casing to run through many angles and orientations

The Weatherford free-rotating eccentric guide shoe enabled Roc Oil Company Limited to run casing in four highly deviated horizontal wells. Despite numerous doglegs greater than 5° and a wide variety of angles, the tool enabled running the casing problem-free and with no sticking.

Location: Perth, Australia



Challenge

Safety management and record keeping

Operators must maintain a comprehensive record for each well while ensuring that contractors have a complete safety management plan.

Our solution

Safety management—We ensure that your needs are consistently met through our company-wide Operational Excellence and Performance System (OEPS). This system is our internal roadmap to excellence. It encompasses safety, quality, reliability, training, and more. Our experienced professionals are driven by process improvement. They provide prejob planning, written operational procedures, and job-site installation services to help you build a safe and efficient well.

Record keeping—After completing the work, we conduct a post-job assessment and reinforce best practices through our Weatherford Performance Tracking System (WPTS) database.

Challenge

Well design

Well integrity—effectively isolating hydrocarbon zones to protect people, equipment, and the environment—must be a primary objective.

Our solution

Total system compatibility—
Weatherford provides not only products, but also complete engineering, operational, and technical support. Our experienced team of technicians can analyze your well and make detailed recommendations to assist you in selecting and installing the optimal equipment for your well design. This service can reduce well construction costs and lower risk.

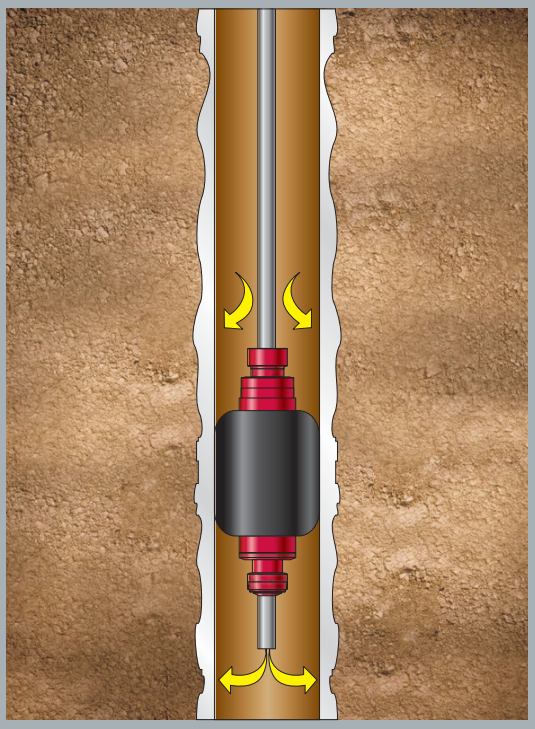
Challenge

Casing integrity

Operators must pressure test each section of casing before drilling a new section of the well.

Our solution

Casing pressure testing—To identify potential leaks in the casing, our Injection Production Packer provides a pressure-tight seal that enables you to test the mechanical integrity of your well. When the packer is placed at depth and inflated, the test zone is completely which enables you to conduct a hydraulic pressure test and monitor for pressure loss.



Pressure Integrity Testing

Challenge

Well monitoring

Wells should be regularly inspected and maintained to identify potential leaks between casing sections or at the surface casing annulus.

Our solution

Casing pressure testing—Our IPP provides value throughout the life of a well. It can be set multiple times and will accommodate nearly any well geometry. It is a simple, cost-efffective, and reliable testing tool.

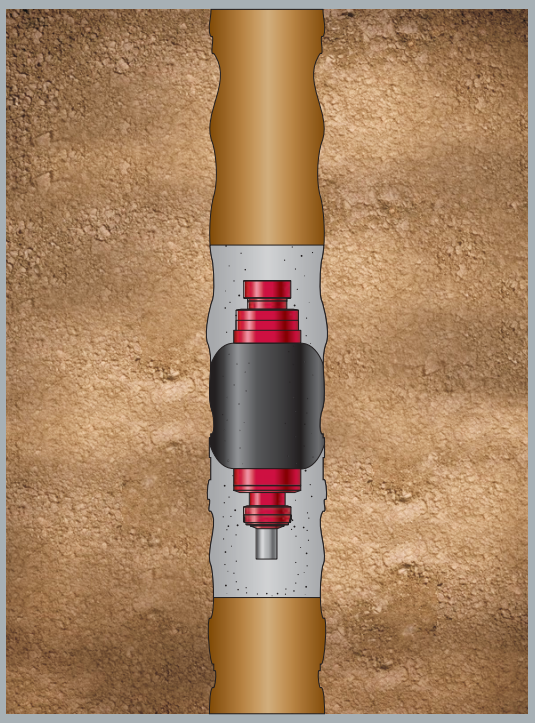
Challenge

Well abandonment

Operators must maintain permanent zonal isolation for nonproducing zones or wells.

Our solution

Plug and abandon (P&A) kits—For a section or an entire well, our plug and abandonment kits deliver a safe, secure, and permanent seal. We reduce rig time by converting our ACP or IPP into a one-trip, openhole cement plug for horizontal or deviated wellbores. When the packer is properly positioned and inflated, cement can be squeezed into the open hole below the ACP, effectively shutting off water, oil, or gas zones.



Plug and Abandonment

To discover all of the advantages of Weatherford zonal isolation tools and services, visit us at **www.weatherford.com**, or contact your authorized Weatherford representative.

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