



FACT SHEET: WELL REMEDIATION

KEY POINTS:

- A petroleum well that has reached the end of its productive life must be carefully remediated to prevent the leaking of fluids and gases to protect future generations.
- Effective remediation isolates oil and gas producing zones from aquifers, and remediates the surface for alternative uses, such as agriculture, to meet the relevant regulatory standards.
- Research by the US Ground Water Protection Council has found that the rates of well integrity failure are very low – between 0.01 and 0.03 per cent.

THE FACTS:

1. Well Design

An oil or gas well is a technically advanced bore hole that reaches hundreds, or even thousands, of meters beneath the earth's surface to tap petroleum resources. Once a well has reached the end of its operating life, it must be remediated (the industry term is 'plugged and abandoned'). The aim is to ensure that subsurface rock layers, including oil and gas reservoirs, and any saline or fresh water aquifers penetrated by the well, remain isolated from each other over time.

Wells are designed and constructed to minimise erosion caused by pressure, high temperatures, corrosion and fluid flows. They also undergo regular maintenance over their operating lives, which may be several decades. Remediation enhances the integrity of the well by injecting long-lasting anti-corrosive fluids and mechanical and/or cement plugs into the wellbore to prevent the leakage of fluids or gases.

2. Well Remediation Process

Well remediation requirements are defined by the relevant regulator and generally require the use of non-corrosive fluids and cement or mechanical plugs that are 'fit-for-purpose' based on industry standards.

A well remediation operation usually involves using a drilling rig, or a smaller workover rig, to remove any equipment inside the well, such as subsurface pumps and pipe tubing, and to ensure that the well is unobstructed so that isolation plugs can be properly installed.

Well remediation designs:

- place dense fluid or cement plugs above and/or across the producing oil or gas sections, ensuring the zone of production is isolated;
- place mechanical and cement plugs to isolate oil and gas intervals from aquifers; and
- cut off wells to a depth that will remediate the surface location and not impede alternative uses (eg agricultural or commercial).

Once the well casing has been cut off (usually to a depth of around 1.5 metres) the well site can be revegetated or restored through soil treatment to allow the resumption of past practices such as agriculture.

In some states, a plaque must be placed on the nearest fence, building or other permanent structure to mark an abandoned well's exact location and depth.



3. Effectiveness

The United States has the longest history of oil and gas production, and the most intensive drilling programs. The Groundwater Protection Council (www.gwpc.org) examined more than 34,000 wells drilled and completed in Ohio between 1983 and 2007, and more than 187,000 wells drilled and completed in Texas between 1993 and 2008. These included 16,000 horizontal shale gas wells, with multi-staged hydraulic fracturing stimulations, completed in Texas.

The data shows only 12 incidents in Ohio related to failures of (or graduate erosions of) casing or cement – a failure rate of **0.03%**. In Texas, the failure rate was only about **0.01%**.¹ Obviously the aim is a zero failure rate, but this is still a very low percentage considering the number of wells drilled. Therefore, the well integrity of the casing and cement isolating the casing and rock is well established.

¹ http://fracfocus.org/sites/default/files/publications/state_oil_gas_agency_groundwater_investigations_optimized.pdf