The Narrabri Gas Project
Drilling with care

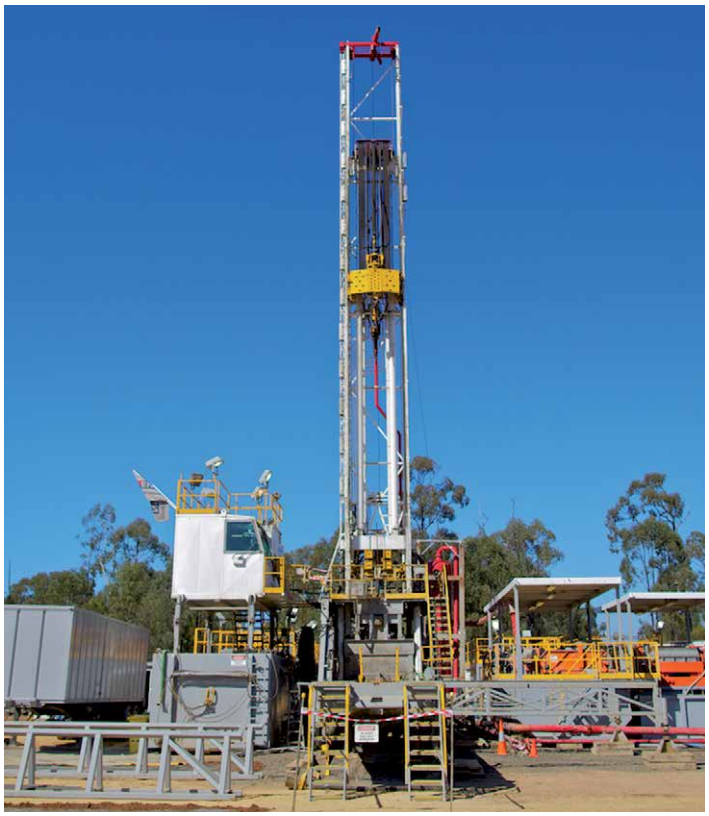
Santos

Santos adopts the highest industry standards to ensure natural gas is produced safely and groundwater is protected.

The NSW Code of Practice for Coal Seam Gas – Well Integrity was also issued in September 2012. This Code establishes a best practice framework for the design, construction and maintenance of each well and has undergone peer review co-ordinated by the NSW Chief Scientist and Engineer.

Complying with the Code of Practice is a condition of our licence to explore and produce gas in the Project area. Some of the features we adopt to meet these standards include:

+ All our producing gas wells contain at least two layers of steel and cement across the Great Artesian Basin
+ These layers isolate the coal seams we are targeting from aquifers and other geologic formations
+ The steel pipe used in our wells is designed to withstand operational pressures during drilling operations, testing and production
+ The cement used in our wells is laboratory tested and designed for the environment in which it is placed
+ Once the cement is in place the casing is pressure tested to ensure well integrity
+ We conduct regular monitoring and maintenance on all of our wells
+ Routine operational visits are undertaken to test equipment and inspect the steel pipe
+ Wells are also monitored remotely in real time and can be shut in manually or automatically if a problem arises
+ Once a well is no longer required, it is decommissioned
+ Surface facilities are removed and the entire well is sealed with cement to ensure aquifers are protected, long after the well is decommissioned
+ Rehabilitation of the site returns vegetation to its original state



A drill rig operating near Narrabri

Lateral drilling

Lateral drilling will be an important part of the drilling program in the Narrabri area. Rather than drilling traditional vertical wells, Santos plans to drill vertically then steer horizontally or "laterally" along the coal seams.

The naturally occurring fractures in the coals around Narrabri are particularly suited to this technology. Santos expects it will significantly improve the flow of gas to the surface by intersecting the coal in this way, reducing the need for other technologies designed to promote gas flow, like hydraulic fracturing or "fracking".

Lateral drilling has the added benefit of reducing the amount of surface disturbance and increasing the spacing between well pads, as laterals can be drilled underground in various directions from a central well pad, accessing more of the coal seams. With traditional vertical wells, a surface pad is required for each well and additional wells are generally needed to produce the same amount of gas.

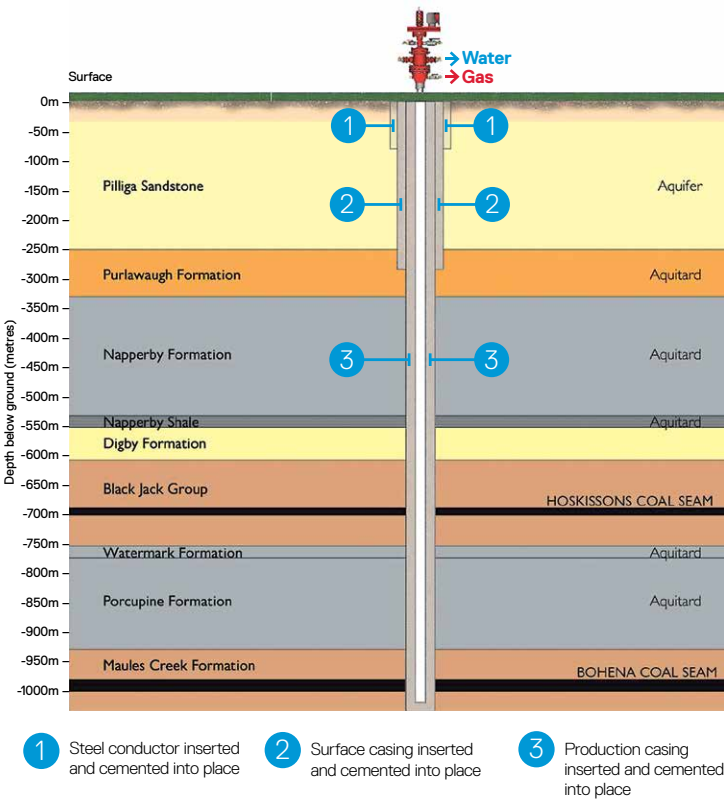
Santos wells are designed to:

+ Protect the environment, particularly underground sources of water
+ Minimise risk to personnel and the public
+ Comply with the NSW Codes of Practice for Coal Seam Gas – Well Integrity, and meet international standards
+ Maximise the production life of the well

How we drill a natural gas well:

+ A 14 inch steel pipe, the conductor, is cemented 10–20 metres into the ground
+ The conductor holds back the loose soil near the surface
+ We drill through the conductor until we reach a geological rock layer through which substances, like water and gas, cannot easily pass. These layers are known as aquitards
+ A second steel pipe, the 9–5/8 inch surface casing, is run to the bottom of the hole, into the rock layer and cemented to surface
+ The surface casing is then pressure tested to ensure well integrity
+ We drill through the surface casing a few metres and pressure test again ensuring the cement is bonded to the rock and steel
+ Drilling continues down through the target coal seams and into the rock below
+ A third steel pipe, the production casing, is run inside the surface casing
+ This 7 inch production casing runs from the surface down into the coal seam and is cemented back to surface
+ The wellhead is positioned on top of the well to allow production of natural gas and water

Typical vertical Narrabri coal seam gas well



Project overview

The Narrabri Gas Project could supply up to half of the natural gas used by NSW homes, small businesses, major industries and electricity generators every day

Operations will be focussed on land in and around the Pilliga, near Narrabri

The Project will create over 1,200 jobs during construction and bring substantial economic benefits to Narrabri and the region, while delivering a clean, reliable source of energy to NSW

Hydraulic fracture stimulation

+ Current information on the geology of the coal seams in the Project area indicates gas flow would not be improved by hydraulic stimulation (commonly referred to as "fraccing" or "fracking")
+ Hydraulic fracture stimulation (commonly referred to as 'fraccing' or 'fracking') is used to improve the flow of gas and increase the productivity of a well
+ This technology has been used safely and sustainably in Australia for more than 40 years
+ Over the past 65 years hydraulic fracture stimulation has been used safely on more than two million wells worldwide (naturalcsg.com.au)
+ If additional geologic data supported the use of the technique to improve gas flow in the Narrabri Project area in the future, a range of additional Government approvals would be required and community consultation would be undertaken

About Santos

An Australian energy pioneer since 1954, Santos is one of Australia's largest domestic gas producers with more than 3,000 employees and a long history of safe, responsible operations.

For more information

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