FACT SHEET

In-situ recovery mining of uranium

Who is Cauldron Energy?

Cauldron Energy Ltd (Cauldron) is an Australian mineral exploration and resource development company listed on the Australian Securities Exchange (ASX:CXU). The company focuses on exploring uranium, a resource that is critical to the nuclear power renaissance occurring globally.

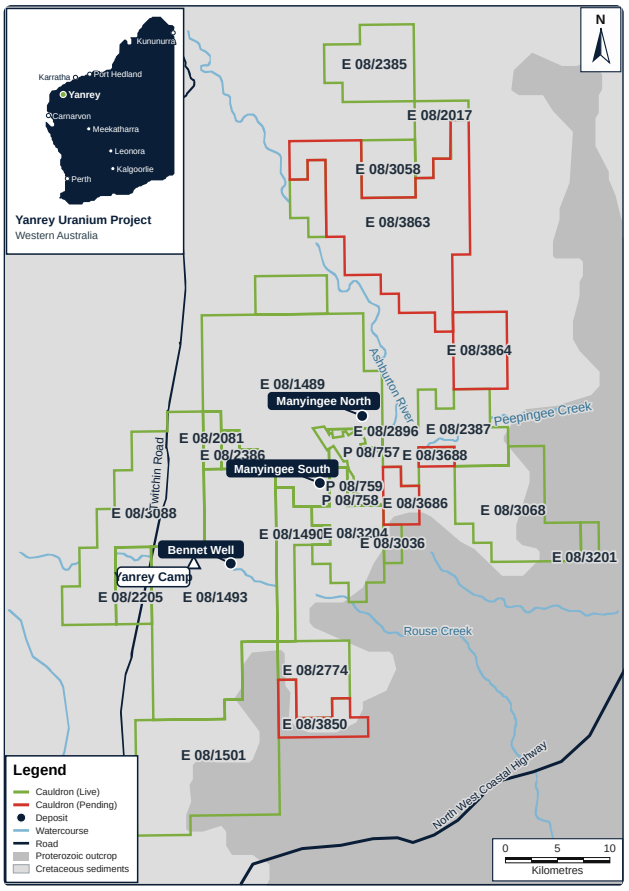
Cauldron's flagship project is the world-class Yanrey Uranium Project located in northern Western Australia (WA), which encompasses three separate uranium deposits – Bennet Well, Manyingee South and Manyingee North. In addition, Cauldron holds several sand tenements in the Onslow region of WA.

The Yanrey Uranium Project

The Yanrey Uranium Project is located around 100 kilometres south of Onslow in northern WA.

The project is situated in a highly prospective, mineral-rich region containing multiple known economic uranium deposits.

The project area comprises a mostly contiguous group of 21 granted exploration tenements and five exploration licenses (ELs) under application, covering about 1,490 square kilometres (km²). The ELs cover about 80 kilometres of a highly prospective linear paleo-foreshore, which hosts much of the known uranium mineralisation in the district and is centred on the Bennet Well Uranium Deposit.



Yanrey Uranium Project tenements, Western Australia

Subject to policy change in WA, Cauldron proposes to mine uranium via the in-situ recovery (ISR) mining method at Yanrey.



Heritage surveys prior to exploration drilling at Yanrey in 2026

What is in-situ recovery?

In-situ recovery is a mining technique used in 56% of the world's uranium production, based on statistics provided by the World Nuclear Association[1]. It is also the fastest growing form of uranium mining – its share of world production has more than tripled, from 16% in 2000 to 56% today.

It has been safely used in uranium mining operations for the past 25 years in South Australia. In-situ recovery is also used in other parts of the world including the United States, China, Russia, Kazakhstan and Uzbekistan.

In-situ recovery is a mining method that extracts uranium without digging an open pit or underground mine. Instead, a network of small wells is used to circulate water and a mining solution through the uranium-bearing rocks deep underground. The uranium dissolves into the water and is pumped to the surface for processing.

In-situ recovery is seen as the most cost-effective and environmentally acceptable method of mining uranium.

Minimal surface disturbance
no pits, waste rock, or tailings

Small footprint
wellfields are low profile and temporary

Lower environmental impact
the ore stays underground

Highly regulated
water quality, pressure, and well integrity are closely monitored

Proven globally
more than half of the world's uranium is produced this way.

How does it work?

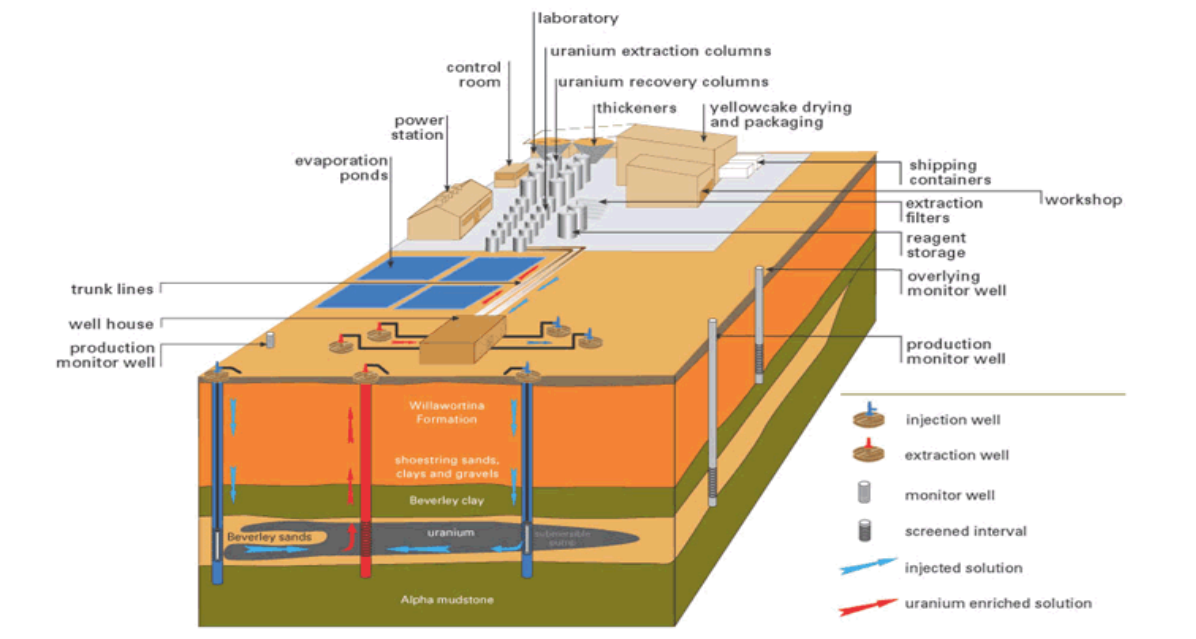
Wells are drilled into a permeable sandstone layer that contains uranium.

Water is circulated through the orebody with a mining solution (a small amount of oxygen and a natural agent – either an acid or alkaline – that helps dissolve uranium).

The water carrying dissolved uranium is pumped to the surface.

Uranium is removed from the water using filters and resins and is precipitated and dried to produce 'yellowcake' (U_3O_8).

The clean water is recycled back underground in a closed loop.



Pictorial representation of ISR uranium mining (Source: World Nuclear Association)

1. World Nuclear Association 2026. 'In-Situ Leach Mining of Uranium'. Accessed August 2026.

Why does geology matter?

In-situ recovery mining only works in very specific geological conditions.

- The uranium orebody must sit within permeable sandstone that is already saturated with groundwater. This allows a mining solution to move through the rock, dissolve the uranium, and for it to be pumped back to the surface for processing.
- The orebody must also be naturally confined by impermeable layers (above and below) such as clays or shales. These act like barriers that keep fluids contained within the mining zone (water can only move laterally, not up or down). Regulators require this geological 'seal' to ensure groundwater protection.
- The uranium minerals themselves must be chemically responsive, meaning they dissolve under controlled, oxygen-rich conditions.

Only certain types of sandstone-hosted deposits meet all these criteria, which is why ISR is used in some regions and not others.

PERMEABLE ROCK

Rock that has tiny connected spaces (pores) that allow water or mining solution to move through it. Sandstone is a good example – fluids can flow through it naturally.



IMPERMEABLE ROCK

Rock that does not let water or mining solution pass through. Clay and shale are common impermeable layers that act as natural barriers.



Permeable rocks allow fluids to flow. Impermeable rocks do not. These differences control how water and mining solutions move underground.

Protection of groundwater

In ISR mining, water and a mining solution are pumped into the uranium-bearing sandstone through injection wells and then pumped back to the surface through extraction wells. To keep the system safely contained underground, operators remove a very small extra amount of water – typically only about 1% of the water being circulated, or around 1 litre for every 100 litres.[2] The other 99% is treated and returned to the same aquifer in a closed loop, so the amount of water taken from the aquifer is minimal. This creates slight negative pressure, which ensures groundwater always flows inward toward the extraction well rather than outward.

This controlled inward flow is called the 'bleed', and it is one of the most important environmental safeguards in ISR.

Around the wellfield, monitoring wells continuously record groundwater levels and chemistry to confirm that water stays exactly where it should.

NEGATIVE PRESSURE SIMPLY MEANS:

- More water is being pumped out than pumped in
- So groundwater naturally flows inward toward the extraction well
- It is the same principle as gently sipping through a straw – the suction pulls liquid inward.



WHAT THIS ACHIEVES

- Keeps mining fluids contained within the ore zone
- Protects surrounding groundwater
- Provides a safety buffer even if geology varies slightly
- Allows continuous monitoring through surrounding wells to confirm inward flow

The bleed is one of the most important environmental safeguards in ISR mining.

What about radiation and waste?

Radiation and waste from uranium mining projects in Australia are managed under some of the world's strictest safety frameworks, with clear rules set by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) and the State Environmental Protection Authorities. Any radioactive materials, whether naturally occurring in the orebody or produced during mining, must be contained, monitored, and disposed of in line with national codes of practice.

Regular audits, independent inspections, and mandatory reporting ensure that radiation remains controlled, waste is safely managed, and community and environmental safety are maintained throughout the life of a uranium mining project.

For further information, see our factsheets: 'Radiation' and 'Waste'.

2. Texas Groundwater Protection Committee 2024. 'How Much Groundwater Is Required for an In-Situ Uranium Mining Operation?'. Accessed October 2026.

What does an ISR uranium mine look like?

An ISR operation looks more like a small agricultural or light-industrial site than a mine. You would typically see:

- Low-profile wellheads
- Pipes and pumps
- A small processing facility
- Fenced areas for safety
- Minimal earthworks

In-situ recovery is considered low-impact mining – no blasting, no digging or tunnelling, no trucks hauling rock, and no tailings dams.

In-situ recovery uranium mining in Australia

Australia's uranium has been mined since 1954, as outlined in our factsheet 'What is uranium and what is it used for?'

In-situ recovery mining of uranium has been safely undertaken in South Australia for the past 25 years at Beverly Mine and Four Mile Mine operated by Heathgate Resources and Honeymoon Uranium Mine operated by Boss Energy. Trial ISR is currently being undertaken at the Samphire Uranium Project operated by Alligator Energy, also in South Australia.

In-situ recovery mining of uranium is undertaken in Australia with reference to 'Australia's In Situ Recovery Uranium Mining Best Practice Guide: Groundwaters, Residues and Radiation Protection' published by the Australian Government in 2010.



Honeymoon Uranium Mine, South Australia

Contact us

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