

START – Solar Thermal Aerobic Recirculation Treatment system

An award winning sustainable remediation system

How Coffey developed an innovative carbon-neutral groundwater remediation system.

Many industrial and commercial sites exist with residual, fuel-spill related contamination, which typically manifests as a groundwater plume. Active remediation strategies can be costly to implement, and often have a high carbon footprint due to greenhouse gas emissions.

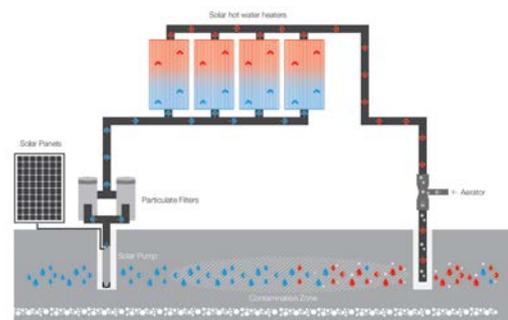
“The START system utilises alternative (solar) energy sources to pump, heat, aerate and re-inject contaminated groundwater. This optimises the conditions that enhance bioremediation, without generating greenhouse gases or other wastes.”

Necessity is the mother of invention

The team were remediating a former retail petroleum site and, following the excavation of the primary contaminant sources, were looking for a cost effective and sustainable approach to treating residual adsorbed and dissolved groundwater contamination. The aim was to devise a method for enhancing bioremediation on a continuous basis for less than the expected cost of several in-situ chemical oxidation (ISCO) injection events. As the site was underlain by relatively permeable sandy strata, it was decided instead to exploit the ability to recirculate heated and aerated groundwater across the site.

START system design

A concept for a groundwater recirculation system was designed. The START system[^] utilises solar energy combined with enhanced bioremediation, to minimise energy usage and reduce the greenhouse gas emissions that arise from conventional fossil-fuel derived electricity. By pumping, heating, aerating and recirculating groundwater through affected sites — all with solar power — an in-situ active cell is created by optimising the conditions that enhance bioremediation.



The START system

Positive results from field trials

With the certain conditions being in place* water temperature increases of more than 7°C are achievable. Improvements in a number of enhanced bioremediation indicators - including alkalinity and electron acceptors - have also been recorded across the treatment area as a result of the START system operation.

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Cost effective and sustainable outcomes

START is noise free, it produces no vapour emissions or waste products and is totally carbon neutral. This all has considerable social benefits, as it limits disruption to site and importantly neighbours.

This solution has low operation and maintenance costs, so compared with chemical amendment injection, START is cost competitive. It also leads to fewer Groundwater Monitoring Events and enables earlier site divestment due to improved remediation timeframes.

Most importantly, START supports inter-generational equity – the pollutants of the past and current generation are not being passed on to future generations as the clean-up is not creating further environmental damage.

The START system recently took out the SuRF™ ANZ Sustainable Remediation Project Recognition Award. The award forms part of the Australasian Land & Groundwater

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Association's remediation awards, which highlight the achievements of those working in land and groundwater remediation across Australia.

The START system has application at petroleum sites, former landfills, and industrial brownfield sites, and is well-suited and cost-effective for treating low-level residual hydrocarbon contamination.



START system on site



START solar panels

*Where ambient temperatures are in the low 20s Celsius, and more than 15°C on days above 30°C, with water recirculation rates of up to 30,000 L/day being achieved with a two-pump system.

^Patent pending