

Sunshine on the Tyne

Solar Powered Gasholder DNAPL Remediation

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INTRODUCTION

Geo2 Remediation Ltd, SWECO UK Ltd and Northern Gas Networks (NGN) present findings, results and lessons learned from a **collaborative DNAPL investigation and recovery project**.



Successful Remediation!



System Installation - Pump Setup.

INDUSTRIAL LEGACY

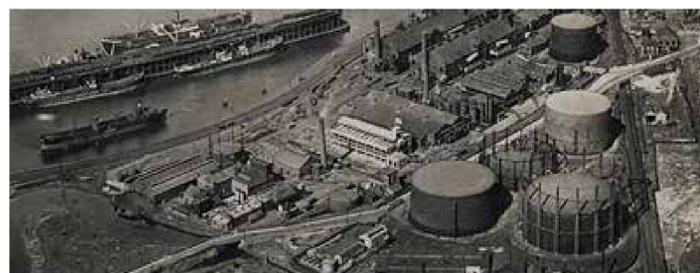
Prior to the introduction of natural gas and the national network of transmission and distribution, **gas was typically manufactured from coal** and distributed locally. Potential contamination which may result from historic gas works includes **tars, phenols, arsenic and cyanide**.

This project forms part of NGN's land contamination management programme, in place to ensure that NGN's sites pose **no significant risk to environmental receptors from land contamination**.

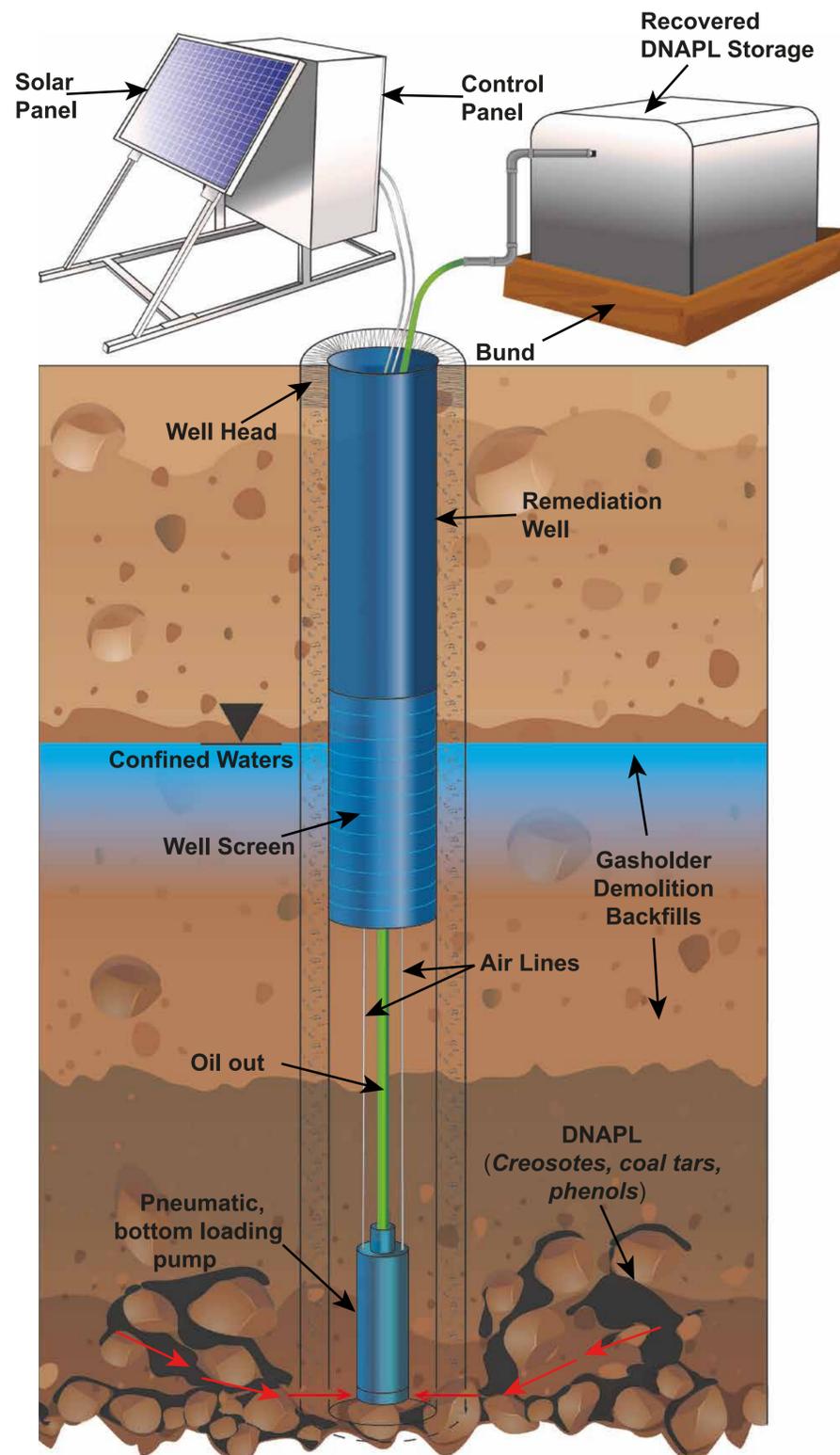
REDHEUGH GAS HOLDER

The NGN owned Gas Holder Station at Redheugh, Gateshead (1890's to date) previously featured four gas holders, three of which have recently been demolished (2017-2018). The fourth gas holder was demolished and infilled during 1980's and is the subject of the remediation project.

Site investigations by SWECO characterised thick (c.2m smearing) **discontinuous lenses of DNAPL (creosotes, coal tars and phenols)** within the hydraulically closed, deep (c.9m bgl) gas holder base.



Aerial image of Redheugh Gasworks c. 1939.



REMEDIAL DESIGN

The remediation project comprised the development of a **robust, field portable solar powered tar recovery system**, designed to meet site specific demands; **unmanned & low maintenance**, reliable recovery, targetable deployment and operation within a 'live' gas site undergoing decommissioning/demolition with **no energy source** or ability to use telemetry.

The modular system was constructed of a **bespoke solar array**, quarantine tank, battery and compressor powering **pneumatic down-hole pumps** enabling intermittent **pulsed recovery** for optimum DNAPL recovery.

Pumping times ranged from 1 min/30-50hrs to balance battery power demands and enable DNAPL recovery and recharge.



Solar Array in Remediation Compound.



Field Trials of Portable Solar Equipment.

SUSTAINABILITY OUTCOMES

System Feature	Environmental Benefit	Social Benefit	Economic Benefit
Renewable energy source	66 t of Carbon offset and 6,100 l of DNAPL recovered over 2 years	Quiet	£28,000 <i>like for like</i> saving over 2 years
In situ method	Minimal waste; Limited vehicle movements	No odours; Low visual impact	Optimised waste disposal costs
Remote operation	Low Maintainance frequency - limiting vehicle emissions	Minimised maintenance requirements	Minimal maintenance costs

LESSONS LEARNED

This is a successful remediation technology suitable for deployment where **DNAPL recovery requires slow sustained pumping**.

6,100 litres of DNAPL recovered over 2 years using 100% renewable energy

Collaborative and creative approaches between Client, Consultant and Contractor can result in innovative technology development for resolution of complex DNAPL contamination.

