

Pipeline Decommissioning Trial AWE Berkshire UK - 13619

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ABSTRACT

This Paper details the implementation of a 'Decommissioning Trial' to assess the feasibility of decommissioning the redundant pipeline operated by AWE located in Berkshire UK. The paper also presents the tool box of decommissioning techniques that were developed during the decommissioning trial.

Constructed in the 1950's and operated until 2005, AWE used a pipeline for the authorised discharge of treated effluent. Now redundant, the pipeline is under a care and surveillance regime awaiting decommissioning.

The pipeline is some 18.5km in length and extends from AWE site to the River Thames. Along its route the pipeline passes along and under several major roads, railway lines and rivers as well as travelling through woodland, agricultural land and residential areas.

Currently under care and surveillance AWE is considering a number of options for decommissioning the pipeline. One option is to remove the pipeline. In order to assist option evaluation and assess the feasibility of removing the pipeline a decommissioning trial was undertaken and sections of the pipeline were removed within the AWE site.

The objectives of the decommissioning trial were to;

- Demonstrate to stakeholders that the pipeline can be removed safely, securely and cleanly
- Develop a 'tool box' of methods that could be deployed to remove the pipeline
- Replicate the conditions and environments encountered along the route of the pipeline

The onsite trial was also designed to replicate the physical prevailing conditions and constraints encountered along the remainder of its route i.e. working along a narrow corridor, working in close proximity to roads, working in proximity to above ground and underground services (e.g. Gas, Water, Electricity).

By undertaking the decommissioning trial AWE have successfully demonstrated the pipeline can be decommissioned in a safe, secure & clean manor and have developed a tool box of decommissioning techniques.

The tool box of includes;

- Hot tapping – a method of breaching the pipe while maintaining containment to remove residual liquids,
- Crimp and shear – remote crimping, cutting and handling of pipe using the excavator
- Pipe jacking – a way of removing pipes avoiding excavations and causing minimal disturbance and disruption.

The details of the decommissioning trial design, the techniques employed, their application and effectiveness are discussed and evaluated here in.

INTRODUCTION

Constructed in the 1950's and operational until 2005 AWE operated a discharge pipeline. The pipeline formed part of AWE's liquid waste management system and was used for discharge of treated effluent from its Aldermaston site. Sampling confirmed discharges of effluent were in accordance with the discharge authorisations permitted by the Environment Agency (EA). Now redundant, the pipeline is under a care and surveillance awaiting decommissioning.

The pipeline is an interconnected twin pipeline some 18.5km in length extending from AWE Aldermaston to the River Thames. The pipeline is constructed of mild steel and has a nominal 5 inch bore. The external surfaces of the pipeline are coated with a protective layer of bitumen. During its operational life a layer of residue formed on the internal surfaces of the pipeline. The residues are such that it is subject to legislative control under the Environmental Permitting Regulations 2010.

Along its route through the countryside, the pipeline passes along and under several major roads, a Canal, railway lines as well as passing through swaths of agricultural land, woodland and a number of residential areas.

Currently under care and surveillance AWE is considering a number of options for decommissioning the pipeline. One option is to remove the pipeline. In order to assist option evaluation and assess the feasibility of removing the pipeline a decommissioning trial was undertaken and sections of the pipeline were removed within the AWE site. The details of the decommissioning trial are discussed here in.

Objective of the Decommissioning Trial

The objectives of the trial was to:

- Replicate the conditions and environments encountered along the route of the pipeline
- Demonstrate the pipeline can be removed safely, securely and cleanly
- Develop a 'tool box' of methods that could be deployed to remove the pipeline

Conditions and Constraints of the Environments along the route

The pipeline runs along side a number of highways, through woodland, bridleways, and miles of agricultural land. The pipeline also passes through a number of villages, residential areas and encounters a variety of services including gas, water, high voltage and low voltage electrical supplies, communication cables, oil pipelines and over head cables. The pipeline also crosses numerous roads, under a canal and a railway line.

Although these environments are all distinctly different they have a number of similarities; the constraints are common to all environments. Each environment has lateral constraints which restrict the works to a narrow corridor. Furthermore, in some cases there is an obstacle crossing the pipeline which restricts excavations.

A key objective was to develop working arrangements which could successfully remove the pipeline whilst working accommodating the constraints.

THE SITE

The decommissioning trial replicated a number of the conditions, constraints and environments. The trial replicated removing the pipeline with lateral constraints and obstacles crossing the pipeline hence replicating a number of the environments.

The trial site was bounded to the west by a fence line and to the east by a car park or an above ground pipeline. The site trial site also had a number of obstacles crossing the pipeline such as below ground services, roads or above ground pipelines.

The trial site was littered with a suite of services including gas, water (foul, potable and fire hydrate supply), electrical (high voltage, low voltage) as well as above ground telephone cables and below ground fibre optic communication cables.

DEVELOPING A TOOL BOX OF TECHNIQUES

A key objective of the decommissioning trial was to develop a tool box of techniques that can be used to remove the pipeline.

By undertaking the decommissioning trail AWE was able to successfully develop the process for removing the pipeline.

The basic removal process involved;

- Detailed mapping of the site / location of services
- Site mobilisation to create a safe working environment
- Trial holes to locate services
- Excavations to uncover the pipeline
- Support the excavations to create a safe working environment
- Hot tapping the pipeline. Remove any residual liquids
- Crimp and shear the pipeline into sections
- Lifting the sections out of the excavations
- Progress the excavations along the length of the pipe
- Backfill excavations and make sections of pipe are removed
- Load removed sections of pipe into containers
- Reinstate the site
- Site demobilisation

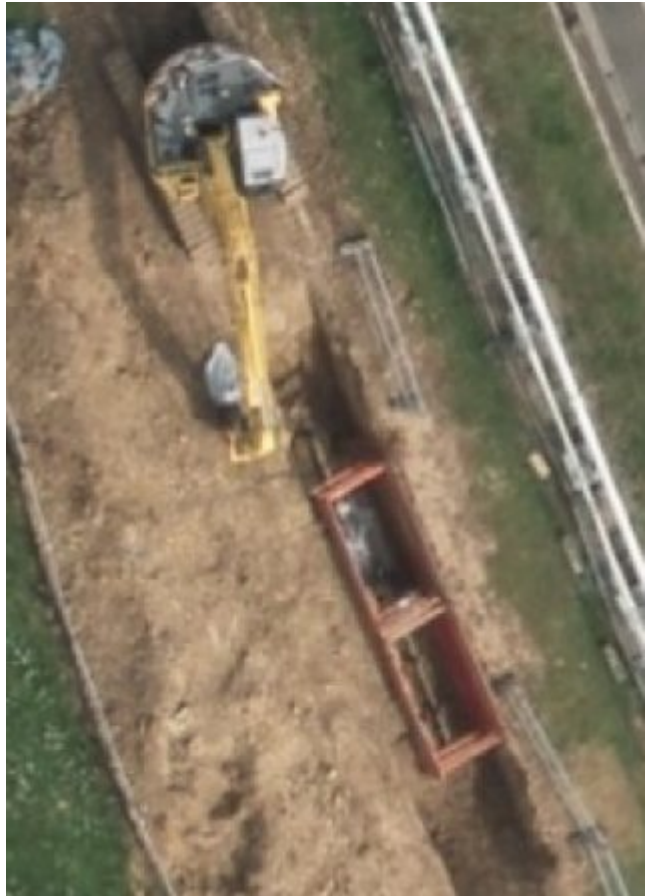


Figure 1; Pipeline removal in progress

Hot Tapping

A key tool of the decommissioning trial was the use of ‘Hot tapping’. Hot tapping uses proprietary equipment and is a process of drilling into a pipe while maintaining containment and preventing the escape of any liquids. Once the drilling is complete and a ‘tap’ has been threaded into the pipe the drill assembly is removed. Then the tap can be used to drain residual liquid from the pipe.

The benefits of using hot tapping are related to maintaining control of the operations. Operators are breaching a pipe with an unknown volume of liquid. Hot tapping maintains containment and allows for controlled liquid removal if liquid is discovered.

Crimp and Shear

Crimp and shear was a very effective way of cutting and handling the pipe. The excavator was fitted with a shear tool. The blades of the tool were set to both crimp and shear the pipe. Crimp and shear proved very successful, it was a very quick and efficient way of cutting the pipe. Once

the pipes were cut the excavator then used the tool to pick the pipes out of the excavations and load the sections of pipe into containers.

The benefits of crimp and shear were its effectiveness and efficiency of cutting the pipe. Crimping and cutting the pipes takes seconds, operators cutting the pipe using reciprocating saw takes minutes. Crimp and shear is remote cutting so operators were remote from the operations hence the radiological and conventional risks and hazards are minimal.

Pipe Jacking

Where obstacles such as roads or above ground pipelines were encountered, removing the pipe via excavation was precluded. In these cases pipe jacking would be used.

Pipe jacking is a method by which the pipe is removed from beneath an obstacle. Pipe jacking works by establishing an excavation either side of the obstacle. The pipes within the excavation are cut and removed. The end of the pipe remaining in the ground is cut square and a new sacrificial section of pipe is lowered into the excavation and welded onto the existing pipe. A ram is then attached to the sacrificial pipe and the pipes are driven through the soil. The existing pipe is pushed into the receiving excavation where it is cut into sections and removed. Once the pipes are complete the sacrificial pipe is left in-situ.

The benefits of pipe jacking were its effectiveness at removing the pipes from below above ground structures and below ground services. The efficiency of pipe removal was high. Furthermore this method allows the pipeline to be removed from areas where excavations are not possible.

DISCUSSION

By undertaking the decommissioning trial AWE have successfully demonstrated the pipeline can be decommissioned in a safe, secure & clean way. The completion of the decommissioning trial will assist AWE in evaluating the options for decommissioning the pipeline.

The decommissioning trial replicated the conditions and constraints associated with many different environments encountered along the route of the pipeline. By undertaking the decommissioning trial AWE has developed a tool box of decommissioning techniques.

The tool box of decommissioning includes;

- Hot tapping – a method of breaching the pipe while maintaining containment to remove residual liquids,
- Crimp and shear – remote crimping, cutting and handling of pipe using the excavator and attachments
- Pipe jacking – a way of removing pipes avoiding excavations and causing minimal disturbance and disruption.

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