Dunton ENVIRONMENTAL
Restoring Our Environment

Rapid ex-situ remediation and encapsulation management of 3,000 tons of Cyanide (Cn) and Hydrocarbon contaminated soils at Uttoxeter Gasworks, Uttoxeter.

Abstract

Dunton Environmental successfully utilizes **Regener8-19** Heavy Metals treatment solution in combination with **Bio-Accelerator** Hydrocarbon treatment solution, for the remediation and treatment of approximately 3,000tons of Cyanide impacted soils at a former gas works site in Uttoxetter. **The process reduced the total Cyanide concentrations by 90%, and the total TPH concentrations by 76% within 3 weeks of product application. The process diverted all the waste from hazardous landfill and enabled the safe reuse of the materials on site resulting in a direct cost benefit to the Client.**

Bio-Accelerator™ and Regener8-19 Technical Background

Bio-Accelerator is a developed formula which significantly enhances the degradation of organic pollutants such as petroleum hydrocarbons, various other fuel oils, solvents and phenols. When used in combination with the Regener8-19 technology it is also successful in activating the treatment of inorganic compounds such as Cyanides. The product contains a number of strains of specially selected bacteria combined with nutrient media and Dunton's bio acceleration compound reagent.

Regener8-19 is applied to soils that are polluted with various heavy metal contaminants. The product acts to alter the chemical environment within the solid matrix, allowing the removal of the heavy metals from the solid. **Regener8-19** is applied in a liquid or powder medium to the solid waste by a variety of mechanisms depending on the nature and composition of the soil or solid waste. **Regener8-19** is mixed and distributed homogenously through the soil or solid waste via Dunton Environmental's **Soterion** batching; Dunton Environmental's Stabilization Unit or Dunton Environmental's Allu mixing process.

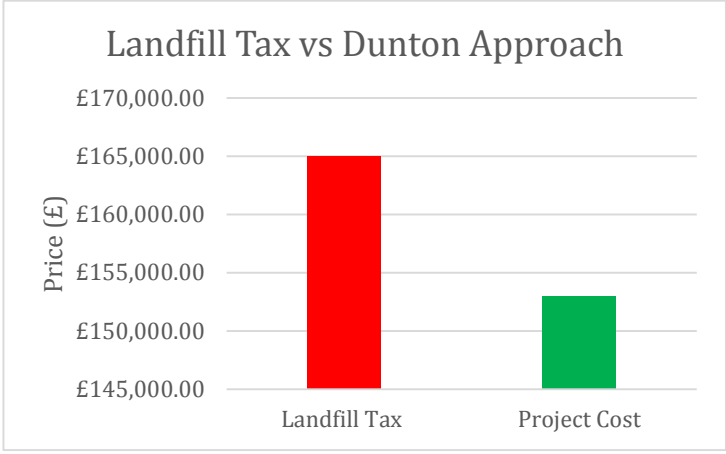
Regener8-19 comprises specific metal-binding polymer particles which target the contaminants designated for reduction. The chemical process involves the exchange of ions from the solution for similarly charged ions attached to the solid particles.

Project Background

The project site, known as Uttoxeter Gasworks at Pennycroft Lane in Uttoxeter was a brownfield site with the desk study research showing that the site was formerly part of the Gas Works. The historical maps show that two in-ground gasholder were present on site. The desk study showed that some of the gas works waste generated on the site was utilised to raise land levels in the south east part of the site. This was a common practice in those days.

The Phase II site investigation showed significant **Cyanide (up to 22,200mg/kg)** and **Hydrocarbon TPH** (up to **4,993mg/kg**) values identified. The Remediation Strategy produced outlined that one of the options would be off-site disposal of grossly contaminated material. Initial waste classification of this material was Hazardous waste.

Removal of hazardous waste would attract the highest landfill tax rate and therefore Dunton proposed treating the soils to enable safe re-use on site.



Gas works waste is heavily odorous material which can result in a number of neurological symptoms and even death due to carcinogenic impacts. It was necessary to introduce health and safety best practice procedure when dealing with the gas works waste. Dunton Environmental was mindful of the nearby residents, hence ongoing monitoring of volatile organic compounds with the use of photoionization detector was carried out to measure benzene at the prescribed monitoring points and at source point in the dig operation. Further control measures of decontamination units were deployed on site. The site area where the in-ground gas holder was located was isolated from the rest of the site to ensure that no unauthorized people entered this area.

Project Challenge

Dunton Environmental's approach was to follow the 2012 Contaminated Land Statutory Guidance for classifying land as contaminated under Part 2A of the Environment Protection Act 1990. Under these guidelines a contaminated land risk assessment was carried out and a target concentration for the principle contaminants in residential areas in the surface soils and for the protection of ground water had been set.

It was agreed that the TPH contamination should be reduced to below 500mg/kg and the Cyanide treated to show a reduction of more than 80% of the starting concentrations to reduce the risk to controlled waters. It was agreed between **Dunton Environmental** and the **Environment Agency (EA)** that contaminated soils above these levels would be treated to enable reuse on site below a capping layer of soil to **reduce the risk to human health and controlled ground waters.**

Solution

Dunton Environmental provided a solution of ex-situ treatment of grossly contaminated material and encapsulated it on site at depth, **avoiding expensive disposal costs** as all the soils would have been originally classed as hazardous.

Bio-Accelerator™ and **Regener8-19** product was utilized in the treatment process.

During the treatment process **close monitoring** of the treated material was undertaken by means of **regular sampling** and keeping **constant temperature** of the stockpile to enhance greater microbial activity and thus ensure contamination reduction.

After each stage of treatment, soil samples were obtained to ensure that the degradation of contaminants and leachable values were reducing.

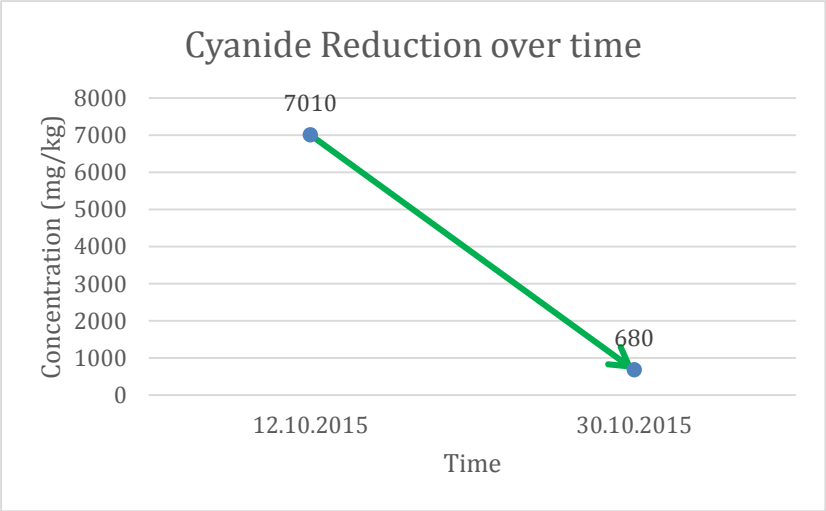
Over the period of 3 weeks a set of results were obtained of the treated material and following approval from the local authorities and the EA material was re-placed on site.

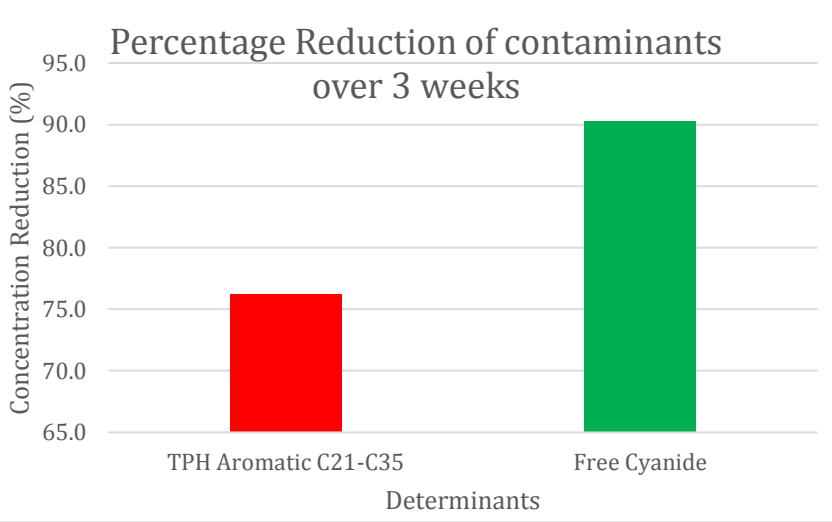
The overall duration for **treatment and validation of the material was 3 weeks.**

Result

Bio-Accelerator™ and Regener8-19 product showed significant reduction of total concentrations. The data showed that on average the total concentration of Cyanide was reduced from an average starting concentration of 7,010mg/kg to 680mg/kg representing a reduction of 90%. The TPH total values were reduced by 76% within 3 weeks to achieve the target concentrations

- Cyanide had been reduced by 90% from a peak value of 7,010mg/kg
- TPH total had been reduced by 76%





Conclusion

Dunton Environmental's approach to this challenge demonstrated their understanding of recent regulatory and health and safety guidelines and the benefits that the use of the Bio-accelerator and Regener8-19 approach has in land remediation and hydrocarbon and Cyanide treatment. The use of this technology helped save the Client on unnecessary hazardous landfill disposal costs.

Implementation of the proposed Regener8-19 and Bio-Accelerator solution not only achieved the goal of complete reduction of total concentrations by more than 76%, but also reduced the cost to the Client by more than 60% with full regulatory compliance and approval.