Abstract

Dunton Environmental successfully treated grossly hydrocarbon impacted soils and tarry sludges to ensure reduced risk of harm to construction workers future site users at a housing development and groundwater as well as eliminating off-site disposal of hazardous waste. Our Bio-Accelerator™ product reduced the concentration of grossly contaminated gasworks waste by 83% within 3 weeks. The process diverted all the waste from original hazardous landfilling and enabled to remove the waste at lower waste classification.

Bio-Accelerator™ Technical Background

Dunton Environmental have developed a Bio-accelerator™ which harnesses the naturally occurring ability of microbial metabolisms to degrade a huge range of compound including hydrocarbons (e.g. oil, petrol, diesel and tarry sludge material), polychlorinated biphenyls (PCBs), and Polyaromatic hydrocarbons (PAH’s).

Our bioremediation technologies can be classified as in situ or ex situ. In situ involves treated the contaminated material in ground without excavation while ex situ involves the removal of the contaminated material to be treated in stockpiles and windrows and made available for reuse elsewhere (i.e. on site or as restoration material at waste management facility).

Our most popular method is ex-situ, which involves the excavation of contaminated soils followed by its fragmentation via a purpose-designed rotary bucket. The soil is then treated and placed into windrows. It is then monitored by ongoing soil testing in our laboratory until the pollutant levels are reduced to the agreed target levels.

Our product and design guarantees a reduction of 50% of the total concentration within 14 days and 85% within 6 weeks of treatment, a real advantage for fast track projects. Our licensed methods of bioremediation are approved...
Project Background

The project site, known as Saltisford Gasworks and Fire Station in Warwick was a brownfield site with the desk study research showing that the site was formerly part of the adjacent main Gas Works, one of the earliest in the UK. The historical maps show part of a main gasholder was present on site. The desk study showed that some of the gas works buildings on the site were demolished and the material was utilised to raise land levels as a common practice in those days.

The Phase II site investigation showed significant visual and olfactory gross contamination of the soils in the form of creosote odour, oily sheen, oozing tar liquid as well as visible free product perched groundwater contamination found in several areas across the site.

The initial site investigation did not encounter any buried substructures, however Dunton Environmental encountered unforeseen ground conditions consisting of several underground structures which contained tarry liquid and sludge.

Gas works waste is heavily odorous material which can results in a number of neurological symptoms and even death due to cacogenic impacts. It was necessary to introduce health and safety best practice procedure when dealing with the gas works waste. 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 to the unforeseen conditions it was deemed necessary to either remove the soils off site to the hazardous landfill or treat the soils to reduce total and leachate concentrations and encapsulate material on site thus reducing the risk towards human health and controlled waters.

Project Challenge

Several changes occurred to the planned works due to the unexpected ground conditions encountering underground tanks contained tarry liquid and sludge. In order to eliminate very expensive removal of this material to Hazardous Landfill Dunton Environmental put forward a solution of bioremediation and immobilisation of the contaminants, and final encapsulation at a part of the site thus reducing the risk to controlled waters and human health.

An agreement with the local authorities, client and the Environment Agency (EA) was reached on the above approach.

To reduce the risk towards end users Dunton Environmental proposed to place treated material at depth in the rear gardens with a geotextile marker layer placed over the material and a further cover of capping overburden soils, including 100mm break layer.
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™ product showed significant reduction of total concentrations which has linear effect on the leachate results. The data showed that on average the total concentration reduction was 83% over a period of 3 weeks.

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.

Bio-accelerator™ was applied to the soils as it was coming out of the allu bucket. This process ensured that the additives was homogenously added to the soils.

After each stage of treatment soil samples were obtained to ensure that the degradation of contaminants and leachable values reducing was is progressing. Over the period of three weeks 3 set of results were obtained of the treated material and following approval from the local authorities and the EA material was placed in the rear gardens at depth.

The overall duration for treatment and validation of tarry sludge material was 3 weeks.
Result

Following the discovery of the underground tanks and grossly contaminated material Dunton Environmental showed that innovative solutions of bioremediation and stabilisation can avoid removal of hazardous material off site and subsequently provide significant cost benefits to the client.

![Concentration Reduction after 3 weeks](chart.png)

**Concentration Reduction after 3 weeks**

- Free Cyanide
- Phenols
- Total PAH
- Acanthophane
- Total TPH, C9-G
- Aromatic-C6-C10
- Aromatic-C10-C12
- Benzene
- Toluene

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 approach has in land remediation and hydrocarbon treatment. The use of this technology helped save the Client on unnecessary hazardous landfill disposal costs.

Implementation of the proposed Bio-accelerator™ solution and encapsulating material on site achieved the goal of diverting grossly impacted soils and tarry sludges from hazardous landfill and subsequently saved the client money by keeping this material on site following treatment. Dunton Environmental have also shown excellence in following best practice procedure in dealing with grossly contaminated material and liaising with the Environment Agency and District Council.