

Case study

Astra Pyrotechnics

Synopsis

Accelerated Carbonation Technology (ACT) was successfully used to remediate ground contaminated with a variety of heavy metals from pyrotechnics testing and burning of excess chemicals. ACT's performance was found to be superior when compared with standard solidification/stabilisation (S/S) techniques.

The problem

The Astra Pyrotechnics site consisted of clay rich soil contaminated with up to 96 000, 81 000, 750 and 600 mg/kg of copper, zinc, lead and nickel respectively, with hot spots of heavy metal contamination from the testing of fireworks and burning of excess chemicals, making the site unsuitable for development.

The solution

ACT and conventional hydration based S/S were both applied, and their long term performance compared, based on long term leaching tests.

Four separate test cells were excavated and lined. In the first cell, soil was mixed with 20% dosage (w/w) and put through the ACT process for twenty minutes, using a sulphate-resisting fine grained cement, EnviroCem™. The treated material was then placed in the test cell for long term monitoring. The other three test cells were prepared with soil treated with EnviroCem without ACT treatment, soil treated with Ordinary Portland Cement (OPC), and untreated soil.

After accelerated carbonation treatment for just fifteen minutes, the soil was turned into hard, variably sized pellets. Leachate from the ACT treated cell, collected over the last five years, maintains a pH that is much lower (pH 7.5-10.2) than the two conventional cement stabilised cells (pH 10.5-14). The metal leaching levels from the ACT treated soil is also significantly lower than the other cells.

The key advantages of ACT

- Superior leached metals reduction
- Reduced pH

In addition, ACT provided additional benefits:

- Rapid treatment time: 20 minute process time allowed immediate re-use of the treated waste as safe engineering fill on-site
- Low cost treatment with increased value
- Sequestration of CO₂
- Improved geotechnical characteristics

Carbon8 Systems
Medway Enterprise Hub
Chatham Maritime
Kent ME4 4TB
+44 (0)20 8331 9848
info@c8s.co.uk
www.c8s.co.uk

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Business of the Year
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