

THE SOIL AND GROUNDWATER TECHNOLOGY ASSOCIATION

SAGTA REPORT 6 - IN-SITU BIOREMEDIATION

Introduction

The challenges and success of in-situ bioremediation and in particular, natural attenuation were discussed at a SAGTA workshop on 24th September 1997. A wide range of organic compounds (hydrocarbons, chloroaromatics and nitroaromatics) can be degraded by natural microbial populations and this was illustrated at the meeting by a number of presentations that described both UK and US field studies. Industrial members and the Environment Agency identified the principal challenges to in-situ bioremediation as being:

- assessing the site risks;
- demonstrating an understanding and control of the remediation operation;
- ensuring/allowing operational time-scales for effective treatment;
- determining the end point;
- managing and assessing the treatment residuals;
- verifying treatment performance, incl. monitoring and validation.

The employment of multidisciplinary teams, the production of quality data and open communication are essential factors in gaining technological credibility and customer support.

Feedback from Syndicate Sessions

Three syndicate sessions were held to discuss (i) augmentation, (ii) acceptance of bioremediation technologies and (iii) confidence in technology transfer.

1. Augmentation of Natural Processes

The principal challenges identified in this area were the needs to:

- (i) Improve the understanding of how contaminants are effectively dispersed in a matrix.
- (ii) Improve the characterisation of sites.
- (iii) Use molecular microbial ecology techniques to assess a site's biological activities
- (iv) Couple technologies to remediate a site.
- (v) Develop trust and confidence in augmentation through good quality science and data.

Areas of SAGTA Contribution

- approach and encourage the research councils and the Environment Agency to support one or more selected research areas of interest to SAGTA;
- SAGTA members to share experiences and information on case studies with each other.

2. Criteria for Acceptance of Bioremediation Technologies

The principal needs and issues in this area are:

- (i) Risk assessment of the matrix needs to be done to determine the contaminant(s) and the presence of toxic intermediates prior to and during remedial treatment.
- (ii) Risk assessment is key to the validation of any remedial technologies.
- (iii) Guidance on validation from the Environment Agency, DETR, NICOLE, CIRIA etc.
- (iv) Proof that biodegradation is occurring by using the ASTM natural attenuation criteria or a similar agreed protocol.
- (v) Application of QA procedures, sample handling, sample storage and data generation.

Areas of SAGTA Contribution

- input on best practice;
- review of draft guidance document.

3. Assessing/Communicating Confidence in Technology Transfer

- (i) Legislators are the key group that needs to be convinced. Input here may be aided by the:
 - production and circulation of field study reports by SAGTA members;
 - collation of experiences and lessons learnt in the US and elsewhere.
- (ii) Define acceptable criteria - for what, to whom, by whom?
- (iii) Encourage more communication between the regulators and the problem holders to get acceptance and confidence of the technology.
- (iv) Communicate the effectiveness of technical processes to the public in a manner that will gain support and buy-in.

Areas of SAGTA Contribution

- gain support for specific fundamental research through the research councils;
- encourage the production of protocols and assist the regulators by peer reviewing any new guidelines;
- co-ordinate process development, application and understanding with the regulators - the aims should be the same;
- communicate the results of field trials, after peer review in order to share lessons learnt;
- encourage the publication of case studies among members and, where appropriate, in the public domain.

Concluding Remarks from Academics, Environmental Consultants and Regulators Attending the Workshop

- (i) Land contamination should be assessed on a risk-based approach. Site investigation and remediation are frequently viewed as two separate entities in the UK rather than one.
 - (ii) Natural attenuation is one of a range of bioremediation options available and its effectiveness may be enhanced by coupling it with other technologies.
 - (iii) A lack of specific fundamental knowledge to support in-situ bioremediation was identified. Support for these areas should be sought through the research councils.
 - (iv) There is a need to encourage the publication of case studies and best practices;
 - (v) There is a need to encourage better communication and dialogue with and between the regulators and customers.
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