

Accompanying short course

***Innovative Technologies for Recalcitrant Compounds Remediation:
Fundamentals and Field Experiences***

Date: 14 September 2010 (10.00 – 16.00)

Venue: DGI-Byen, CPH-Conference

- *Technologies for remediation of recalcitrant compounds (fundamentals) - (60 min - Trento University Italy): Available innovative technologies for recalcitrant compounds will be presented and described along with their fundamentals and mechanisms. The following compounds will be discussed: chloroethenes (PCE, TCE, DCE, VC), chloroethanes (TCA, DCA mainly), energetics/explosives (TNT and similar), Organic lead, Chloroform, CFCs, DNAPL, pesticides*
- *In situ Chemical Oxidation (ISCO) and In Situ Chemical Reduction (ISCR) – (60 min Dr. Dan Bryant PhD - Geocleanse USA / Lorenzo Sacchetti Carus Europe). ISCO field of application will be discussed. We will present the different available oxidizers (Fenton, Permanganate, Ozone, Persulfate), their characteristics (single component, multi components, ...) and their applicability with respect of Contaminants of Concern (COCs), geology, soil chemistry and Natural Oxidant demand. For ISCR we will present reduction with zero valent iron and use of zero valent iron dispersed in oil for source area treatment. An overview of distribution technologies (in wells injection, direct push injection, recirculation, soil mixing) will be provided too*
- *ISCO/ISCR Field applications – (60 min Dr. Bryant – Dr. Dingens Carus Corporation USA): we will present several case studies from sites in Europe and in the USA. For each site will be shown the conceptual model including contamination horizontal and vertical distribution (for different contaminants including CFCs and recalcitrant chlorinated compounds) and the technology selection process. Drawings and pictures from fieldworks will explain carried out activities and achieved results (including lessons learned from unexpected issues).*
- *ISCO workshop (45 min) – see below*
- *Vertical Recirculation Technologies for Remediation (60 min): Vertical Recirculation Technologies can be used in order to induce in the subsoil (aquifer*

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and/or vadose) a recirculation cell with a very large horizontal and vertical extent. Into such cell can be activated several processes (physical, chemical, biological) in order to remove detected contaminants. Commonly Vertical Recirculation can be used to convey impacted water into a special recirculation/treatment well in which stripping and adsorption treatments are carried out to remove contaminants. Such devices can also be successfully used to disperse chemicals into the circulation cell to treat soil with bioremediation or ISCO and ISCR. Hydrogeological and treatment wells design fundamentals will be shown along with case studies.

- *Reductive Dechlorination for Halogenated Hydrocarbons (45 min Dr. Ing. Lorenzo Sacchetti Carus Europe). After a description of the reductive dechlorination phenomena we will discuss the technology applicability with respect of field evidences of existing dechlorinative pathways by autochthonous bacteria. Different natural and engineered substrates (HRC, CAP18, emulsionated oils) will be presented along with distribution options. Technology and substrate limitations will be presented.*
- *Aerobic Biostimulation (30 min Dr. Bryant – Dr. Dingens). This presentation will describe common activities carried out to enhance natural occurring aerobic biodegradative phenomena in soil and groundwater. We will discuss advantages and limitations of bioventing, biosparging and different oxygen release compounds.*
- *Bio Treatment field applications (45 min Dr. Bryant – Dr. Dingens - Dr. Ing. Lorenzo Sacchetti Carus Europe) we will present several case studies form sites in Europe and in the USA of aerobic and anaerobic biostimulation (chlorinated hydrocarbons, petroleum hydrocarbons). For each site will be shown the conceptual model including contamination horizontal and vertical distribution and the technology selection process. Drawings and pictures from fieldworks will explain carried out activities and achieved results and detected limitations.*
- *Bio Workshop (45 min) – see below*

WORKSHOPS

Workshops have been designed in order to develop a remediation scenario for the presented classes of pollutants technologies. We will provide to attendees some field data (geological cross sections, drilling logs, soil and groundwater contamination results,) from real sites and we will build together the site conceptual model and the remediation alternatives.

Preliminary programme – subject to possible changes

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