

# SIDISA 2021-XI International Symposium on Environmental Engineering

29 June to 2 July 2021  
Turin, Italy



## ERM experts at the Symposium



Alessandro Battaglia  
Partner



Piero Mori  
Partner



Edoardo Masut  
Senior Consultant



## Papers presented at *Polluted Sites* and *Polluted Sites New Tech* sessions

### Remediation of Chlorinated Solvents through Electrical Resistance Heating (ERH) at an active Industrial Site

Authors: P. Mori\*, A. Gigliuto\*, M. Cappelletti Zaffaroni\*, G. D'Ambrosio\*, E. Ballatore\*

ERM\*



**ERM's approach demonstrated the value of using source treatment technology to enable more rapid closure and remove longer term remediation costs**

- A full scale programme of in-situ thermal treatment through ERH was carried out at an active manufacturing site with soil and groundwater contaminated by chlorinated hydrocarbons
- After a period of about 7 months, the System, using 60 electrodes at 38 locations and co-located extraction wells, removed a mass of contaminant comparable to the initial estimation
- Based on interim soil and groundwater sampling, the detected residual contaminant concentrations are mostly below remediation goals for both media with a reduction > 99%
- The works were completed safely, allowing the facility to operate without business interruption

### Groundwater Flow Model to understand the Groundwater Circulation Well (GCW) both from Water Balance and Flow Direction point of view

Authors: A. Battaglia\*, L. Ferioli\*, E. Masut\*, A. Legnani\*, M. Prieto\*, G.A. Stefania\*

ERM\*



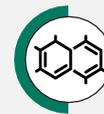
**A groundwater mass balance approach can be used to estimate the dilution effect induced by the GCW, and the following groundwater treatment performance**

- A novel approach for the numerical simulation of the GCW was developed based on the water mass balance between circulation cell and the aquifer
- The study of GCW system through the mass balance analysis obtained by the numerical model has highlighted that the circulation cell is not a closed system, but rather an open system that is able to exchange water with the surroundings
- The approach proposed can be used for the conceptual design of cases where more than one GCW is needed to completely cover an impacted aquifer volume, and where the induced flows are considerably more complex

### Bench-Scale Microcosm Treatability Studies for evaluating a Wood Mulch-Based Amendment as an Electron Donor for Complete Reductive Dechlorination

Authors: A. Battaglia\*, L. Ferioli\*, E. Masut\*, A. Legnani\*, C. Cruz Viggi\*\*, M.L. Di Franca\*\*, S. Rossetti\*\*, F. Aulenta\*\*

ERM\*, IRSA-CNR\*\*



**Wood mulch can be an effective, low-cost and sustainably-sourced electron donor to stimulate the complete reductive dechlorination**

- A wood mulch-based amendment was tested in a laboratory scale microcosm study in order to assess potential for the complete dechlorination of TCE and DCE-polluted groundwater samples
- Amendment with Mulch and Mulch + Iron filings, together with a bioagumentation inoculum, resulted in the complete dechlorination of site-specific contaminants (TCE/cis-DCE) to ethene
- The presence of millimetric iron filings may enhance both the reaction rate of dechlorination and the yield of the dechlorinating biomass