Bioremediation and Sustainable Environmental Technologies—2017. Fourth International Symposium on Bioremediation and Sustainable Environmental Technologies (Miami, FL; May 2017). ©2017 Battelle Memorial Institute, Columbus, OH, www.battelle.org/biosymp. A. Barton and S. Rosansky (Chairs)

Rehabilitation of Former Industrial Area through the Technique of Advanced Chemical Treatment

Marcos Sillos (marcos@edutechambiental.com.br) (EDUTECH, Sao Paulo, Brazil)
Flavio Lima dos Santos (VERT Group, Sao Paulo, Brazil)
Silvia Cremonez Nascimento, Silvia Mara Alvarez, Mathias Saint-Pierre and Luis Fernando Gonçalves (VALGO, Sao Paulo, Brazil)

Background/Objectives. The implementation of industry in São Paulo city is a phenomenon dating from the second half of the nineteenth century, whose technological resources and production systems have been adopted recently, were themselves to the first stages of the industrial revolution, contributing significantly to the generation of environmental liabilities which the society has just known better. The productive restructuring of the industry in these last decades driven by the adoption of new economic models provided greater mobility of enterprises, which was proved with the migration of large industrial centers to further areas of large urban centers. This work presents the main results of the in situ remediation of contaminated soil and underground water with heavy metals in a former industrial area that is currently in use change.

Approach/Activities. The evaluated area includes a former industrial district, which is currently in use change process where preliminary assessments indicated contamination by heavy metals in soil and groundwater. For rehabilitation of the area, the adopted remediation technique, known as Advanced Chemicals Techniques, prioritized the shortest deadline and effectiveness keeping the area free of toxicological risk to human health and the environment. The most part of metal ions are precipitated as hydroxide or oxide at high pH values, however, various precipitates dissolve themselves again in excess of base. Metal precipitation processes in the form of sulfides, as well as being more insoluble than the hydroxides are also less subject to the action of complexing agents and may be precipitated in a unique pH level forming insoluble radicals with heavy metals. Thus, the present work aims to present the results of remediation held in the area aiming the rehabilitation of the former contaminated industrial area with heavy metals through the precipitation of metal ions in the form of sulfides.

Results/Lessons Learned. The technique consisted in the reagents application containing enabled metabisulfite ($S_2O_5^{2-}$) which gives origin to the radical sulfate (SO_3^-). The radical sulfate possesses ion exchange power with the metals at pH conditions / Eh enough to maintain the precipitated metal ions in its lowest oxidation state, even in pH / Eh unfavorable pH / Eh conditions. The assessment of technical efficiency used occurred through analytical monitoring of the underground water, where 15 days after the remedial agent application, the results indicated reduction of up to 100% of the concentration of metal contents dissolved in underground water and remained stable over 8 months under weathering conditions of pH/Eh middle changes.

This technique allowed the treatment to be accomplished in situ, which minimized not only operating costs but also the deadline for the rehabilitation of the former industrial area degraded to insert it again to the economic dynamics of the city.