

## Passive Water Treatment of Metals and Inorganics

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Metal and inorganic impacts to groundwater and surface waters are a critical issue facing many industries given the rigorous water quality criteria for problematic metals and metalloids such as arsenic, selenium, as examples. A wide range of commercially available treatment solutions exist however, the operational requirements of many industries make most conventional technologies expensive and difficult to comply with discharge criteria. Due to these pressures, several industries are undergoing a transformation from providing conventional to innovative environmental management solutions such as passive water treatment. Passive water treatment technologies work by stimulation of biogeochemical processes for the oxidation or reduction of constituents of concern. Many of these systems have the potential to minimize compliance issues and operational requirements, and assist in meeting sustainability goals.

This presentation will provide an overview of passive treatment technologies including development, design and implementation. Applications of technologies including in situ and ex situ treatment reactors such as Gravel Bed Reactors™ and bioreactors, phytotechnologies, constructed and engineered wetlands, pit lake in-pit treatment, and permeable reactive barriers will be presented as case studies. The deployment of mobile treatment systems to mine sites, such as containerized columns and “wetlands on wheels”, will be discussed as an important stage to facilitate treatability studies, regulatory approval, and advancement of technology application to full-scale.

Each technology will be discussed as a function of its implementability from a perspective of site-specific conditions, effectiveness and expected impact on the local environment. Further, treatment system configurations, treatment mechanisms, and seasonality will be explored to highlight the flexibility of their application in the context of various industry treatment needs.

### Silvia Mancini

Dr. Silvia Mancini, Ph.D., P.Geo. (ON), is a Principal Geoscientist in the remediation group of Geosyntec Consultant's Toronto office focused on managing soil and groundwater remediation programs. She obtained a doctoral degree from the University of Toronto focusing on innovative technologies including bioremediation and stable isotope analysis. Silvia's consulting experience includes implementing and managing remediation programs using advanced technologies such as smouldering combustion (STAR), in situ chemical oxidation/reduction, gravel bed bioreactors (GBRs), and permeable reactive barrier (PRBs). Silvia also provides expert opinions and litigation support on litigation cases in both Canada and the USA. Silvia is an author of several journal articles in her field of expertise and continues to manage government research programs focused on innovative methods and technologies for site characterization and remediation, including maintaining an Adjunct Professorship at the University of Toronto. These programs include the Natural Science and Engineering Council of Canada (NSERC) as well as the US Department of Defense Strategic Environmental Research and Development Program (SERDP) and Environmental Security Technology Certification Program (ESTCP).