

Sustainable Treatment Optimization

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Background/Objectives. Sustainable treatment of intergenerational chemical manufacturing impacts on the environment forms the basis of a multidisciplinary ITRC remediation process optimization (RPO) approach to achieve a balanced environmental outcome for the community. The commercial reality of clean-up can often become lost in the perception of risk and the emotional outrage for clean up at all costs. Whilst we all agree, pollution caused by past practices should not have happened or been allowed to happen, our view can often be clouded by our emotional outrage over what happened, and whether there is any real or imminent risk to beneficial uses. Rest assured that despite any evil perception, no-one wants to cause environmental pollution and any “evil” past practices no longer exist. These challenges formed the basis of environmental clean-up works undertaken at a complex and diverse chemical manufacturing facility, Australia.

Whilst major loss of containment remains within the memory of Site operators, it was the small drips, weep of oil and washing of chemicals down drains that made the greater contribution to soil and groundwater contamination at this Site. These practices, while seemingly insignificant, over 70+ years of operations, contributed to a benzene-dominated groundwater plume with commingled chlorinated compounds (chlorobenzene and pentachlorophenol) 30 ft beneath the surface and extending off site (qtr mile).

Approach/Activities. Consideration of numerous technologies based upon the ITRC RPO, from simple hand bailers through to in-situ six phase electrical heating involved engagement of third party experts from around the world and a detailed assessment of the complex interaction of chemical compounds. Technical assessments including, the physical nature of chemical mixtures, solubility interactions, fate and transportation, and biological processes within fractured basaltic rock groundwater and the vadose environment were undertaken. Feasibility ITRC RPO assessment (technical, logical, economic and intergenerational) considerations precluded a number of treatment approaches as a single source approach, and supported implementation of combined approaches to achieve a real world sustainable approach. As technology continues to evolve overtime, further consideration of a best for environment outcome becomes more of a reality whereby active treatment of energy intensive approaches such as multi-phase vacuum extraction, soil vapour extraction and cryogenic treatment applied at the Site was successfully followed by enhanced biological treatment. Whilst enhanced biological treatment has been historically perceived as a limited approach, current works at this site supports enhanced microbial treatment as the final stage in restoration of the environment and a sustainable solution.

Results/Lessons Learned. A multidisciplinary approach using ITRC RPO was implemented to achieve a balanced environmental outcome for the community by using various treatment technologies. This approach has strategically ensured protection of both the environment and human health from past activities in a sustainable and timely manner. We estimate that implementation of a multidisciplinary RPO sustainable approach and a willingness to think outside of the “square” using a solid scientific rationale represented a significant cost saving to the client when compared to standard energy intensive approaches. There was a fine balance whilst implementing this approach to address the emotional outrage for clean up at all costs and ensure a balanced environmental outcome was achieved for the community in a timely manner.