Remedial Process Optimization – Ongoing Process to Reduce Project Life Cycle Cost

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Union Pacific Railroad used Remedial Process Optimization (RPO) to evaluate ongoing remedial action operations (RAO) at project sites in their portfolio. RPO is a systematic approach used to evaluate remedial systems with the goal of improving effectiveness and efficiency of operation, accelerating the remedy, developing more sustainable solutions, and reducing project life-cycle costs. The RPO process encourages optimization in every stage of a remediation project, from the feasibility study, remedial design, and construction, through operations and closeout. Since its development, RPO has been applied to projects across UPRR's system in a wide range of locales and regulatory environments. This presentation will focus on several case studies in UPRR's portfolio where RPO has been successfully implemented to achieve the desired goals. Where appropriate, normalized metrics will be presented for energy, waste generation and carbon use before and after the optimization.

Remedial action has been ongoing at an active tie treating facility in Oregon since the early 1990's and a water treatment plant was constructed in 1994 to treat wood treating compounds extracted from groundwater beneath the site. RPO was applied to the site to revaluate the remedial strategy and to asses the treatment system for potential optimization. New discharge limits were negotiated and modifications to the treatment plant were implemented which resulted in more than $100,000 in savings annually and $1 million in savings for the total life cycle cost for the site.

At a soda ash derailment site in the Rocky Mountains of Colorado, high pH water has been captured and treated using a solar-powered treatment facility regulated by a NPDES discharge permit that limited the pH of the discharge. The pH of the runoff attenuated over 20 years and in 2009 the pH of the runoff was approximately 9.2 prior to treatment. At the current attenuation rate, it was uncertain how much longer treatment would be required before the discharge permit could be terminated and the site could be closed. An evaluation of the pH and alkalinity of the runoff water suggested that, with slight modifications to the layout of the catchment area associated with the facility, the pH of the surface runoff could be reduced below the 9.0 limit without the need for treatment. Modifications to the facility were negotiated with the State of Colorado in 2010 and have since been implemented. The total life cycle cost savings resulting from the closure of the permit were in excess of $250,000.

At another site in northern California. An evaluation of RAOs for the site and recent the application of RPO have resulted in a revised Corrective Action Plan (CAP). The CAP demonstrates that soil and dissolved-phase plume concentrations have naturally attenuated and that groundwater extraction and treatment operations or no longer required. A modified bentonite clay enhancement for the cutoff wall has been proposed. The application of RPO at this site and the subsequent implementation of the recommended corrective action will lead to a life cycle cost savings of approximately $700,000.