

**USING PNEUMATIC INJECTION TECHNIQUES FOR ENHANCED DISTRIBUTION
OF BIOAUGMENTATION AND BIOSTIMULATION AMENDMENTS**

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The primary goal of this remedial action was the reduction of Petroleum Hydrocarbons (PHs) present within the overburden aquifer with enhanced in-situ bioremediation of target PH hot-spots regions in an effort to mitigate contaminant migration offsite. In order to achieve these remediation goals and achieve adequate distribution of the amendments, ARS was contracted to provide Pneumatic Fracturing (PF) and atomized liquid injection of an oxygen release compound (ORC; Regenesis, Inc.) followed one day later by a specific microbial culture (Petrox; cl Solutions, Inc.) at the site. A critical component of the in-situ bioaugmentation and biostimulation is ensuring that the amendment is distributed within the subsurface in a manner to maximize its performance. While the chemistry of these processes has been well documented and proven, the challenge to successfully implement any active in-situ treatment is the physical emplacement and dispersion of the reactive material.

Pneumatic Fracturing and the subsequent atomized liquid injection of ORC and Petrox into 16 injection borings targeting treatment zone for each well was designated as 4 to 14 ft. bgs. Post injection sampling results showed very promising results. Bioaugmentation of Pseudomonas and Wild type/naturally occurring colonies has increased 3 orders of magnitude and biostimulation has increased ORP from -200mV to +10mV. Detail design and performance results will be presented.

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