

# ORC Advanced® and PersulfOx® Application Reduces BTEX, TPHg, and TPHd at an Active Service Station in Las Vegas

Enhanced Aerobic Biodegradation and *In Situ* Chemical Oxidation Used to Remediate Difficult Geology

## Project Highlights

- Significant cost savings to client achieved using enhanced aerobic biodegradation and *In Situ* Chemical Oxidation (ISCO)
- Highly successful project, despite difficult caliche soil (sedimentary rock) found specifically in desert regions

## Project Summary

An active service station in downtown Las Vegas, Nevada was contaminated with high levels of BTEX, TPHg, and TPHd in the soil and groundwater.

REGENESIS® partnered with Antea® Group, a leading environmental firm, to complete three ISCO injections. For the first injection, approximately 310 lbs. of PersulfOx® and 45 lbs. of ORC Advanced® were mixed with 211 gallons of water at a 15 percent solution for a total of 226 gallons of solution injected per well.

A total of 3,100 lbs. of PersulfOx, 450 lbs. of ORC Advanced, and 2,260 gallons of solution were injected during the second and third injection events. The injection pressures ranged from 35 to 40 pounds per square-inch (psi) with flow rates ranging from 6 to 10 gallons per minute. Closely monitoring flow rates and injection pressure allowed REGENESIS to successfully apply the products without any surfacing occurring.

## Technology Description

**PersulfOx** is a chemical oxidant that rapidly reduces the mass of the contaminants. This chemical consists of 90% of sodium persulfate and 10% catalyst powder. PersulfOx is very effective in rapid oxidation of petroleum hydrocarbons in both soil and groundwater. Typically, sodium persulfate is activated with the addition of heat, chelated metals, hydrogen peroxide, or base in order to generate sulfate radicals. These activation processes are inherently complex, costly and can pose additional health and safety risks. In comparison, PersulfOx is a relatively safe and easy-to-use ISCO agent.

**ORC Advanced** is an engineered, oxygen release compound designed specifically for enhanced, *in situ* aerobic bioremediation of petroleum hydrocarbons in groundwater and saturated soils. ORC Advanced provides remediation practitioners with a significantly faster and highly effective means of treating petroleum contaminated sites.



## Site Details

**Site Type:** Service Station

**Contaminant of Concern:** PHCs

**Concentration:** TPHg: 12,200, Benzene: 7,400 µg/L, Ethylbenzene: 1,300 µg/L, Xylenes: 4,700 µg/L and TPHd

**Remediation Approach:** Enhanced Aerobic Biodegradation, *In Situ* Chemical Oxidation

**Treatment Area:** 2,000 ft.<sup>2</sup>

**Soil Type:** Caliche cement soils with interbedded silts

**Technology Used:**



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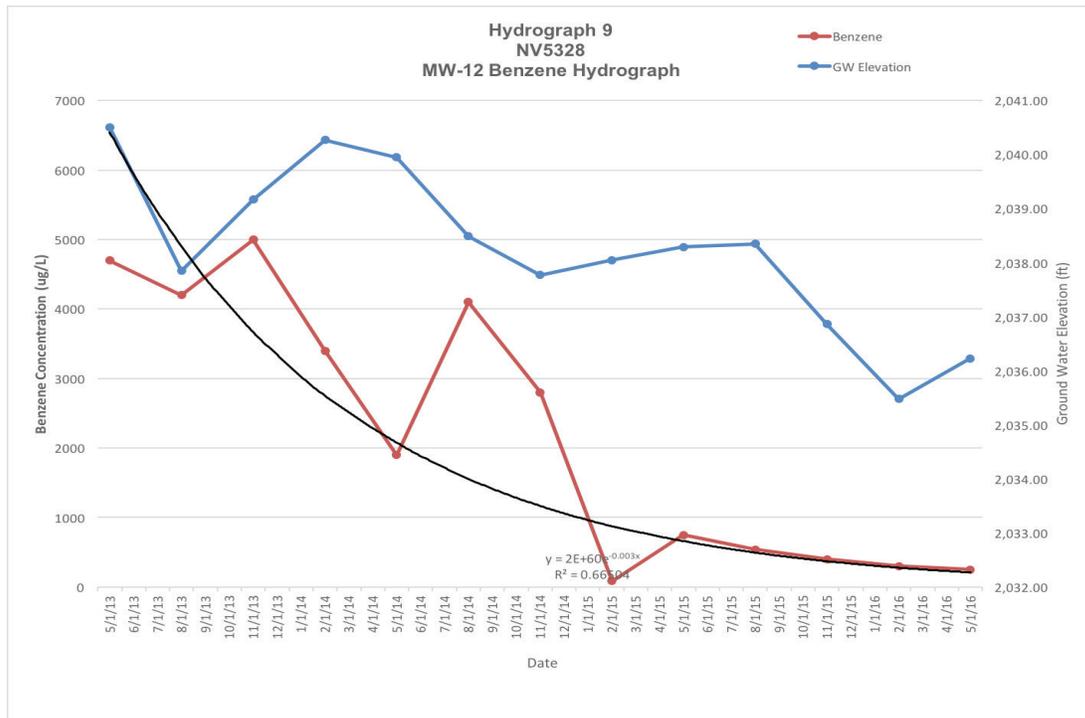


Figure- MW-12 Benzene Concentration Levels Over Time

### Reduction of BTEX After PersulfOx and ORC Advanced Injection

Following three ISCO injection events, significant reductions in BTEX compounds continue to be observed in source area groundwater monitoring well MW-12. A reduction from 7,400µg/L to 250µg/L and declining was observed. Additionally, increased sulfate concentrations persist in groundwater at monitoring well MW-12 following the injections, indicating that groundwater geochemical changes are still occurring as a result of the injection of PersulfOx, and ORC Advanced. As a result of the rapid successful reduction of BTEX, TPHg, and TPHd, the client will be petitioning for “No Further Action”.

### About the Consultant

Antea Group is a multinational environmental consulting firm that combines innovation with integrity, integrates local support with global perspectives and unites technical expertise with superior project management to deliver results-focused sustainable business solutions for clients worldwide. Antea Group's experienced environmental management professionals accommodate client-specific goals, stakeholder expectations and regulatory requirements by providing comprehensive strategies designed to reduce environmental footprints, mitigate safety risks, protect against engineering failures and minimize social impacts.