

GREEN TECHNOLOGIES PETROLEUM RECOVERY/DESTRUCTION USING AN INTERNAL COMBUSTION ENGINE

EA has used Internal Combustion Engine (ICE) technology for subsurface petroleum recovery as all or part of the remediation efforts at hundreds of sites throughout Texas. One such site is a former retail service station in Houston where a gasoline plume from the station had commingled with a diesel plume from a nearby wrecker service site. Periodic 12- to 24-hour multi-phase (water, liquid fuel, and organic vapor) extraction events with a trailer mounted ICE are used to augment the groundwater pump and treat system that is the primary remediation tool at the site.



ICE remediation is an effective green technology for extraction and destruction of fuel hydrocarbons. The ICE utilizes a modified automotive engine that creates suction to remove liquid and/or vapor-phase hydrocarbons from the subsurface, separates the vapor from the liquid, and burns the vapor as fuel to power the engine. An automatic electronic control system adds ambient air to maintain the required fuel/air mixture, as oxygen concentrations in soil vapor can be very low, especially during the initial stages of operation. In many cases, the ICE can use extracted hydrocarbons as its sole fuel source, requiring no supplemental fuel whatsoever. Furthermore, a generator module can supply up to 40 kilowatts of 110/240-volt electricity to power pumps or ancillary equipment while remaining completely under computerized emission controls.

The mobility of the system enables short-term use at multiple sites or long-term use at a single site without installing significant infrastructure, allowing a relatively small physical footprint and precluding the use of heavy equipment prior to deployment. Because the ICE requires no external electrical power, it can be used in remote areas where power is unavailable. The system destroys hydrocarbons (destruction efficiency is usually greater than 99%) rather than transferring them to other media such as activated carbon. A catalytic converter at the back end of the system reduces emission levels to approximately that of a car or pickup truck, helping to minimize the carbon footprint of the remedial action.

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