

Groundwater Remediation Case History: Chemical Free 1,4-Dioxane Purification for Lockheed Martin



In 2013, Purifics commissioned an integrated and fully automated Ground Water Purification (GWP) System for Lockheed Martin to purify contaminated groundwater adjacent to Sarasota Airport in Florida. The groundwater is contaminated with 1,4-dioxane, volatile organic compounds (TCE, PCE, DCE, DCA & VC), aluminum and elevated levels of iron. Once purified, the water is re-injected or discharged.



Purifics' Chemical Free Water Purification Technology is used to purify the contaminated groundwater from 80 extraction wells with the capacity of 1/2 million gallons per day (0.5 MGD). The process has ZLD (Zero Liquid Discharge) and the metals are recovered as a dry cake – chemical free.

Purifics' process has been designed for 25 year life with high durability, reliability and redundancy for continuous 24/7 duty. The purification train has fully automated 0 to 100% turndown capability and other unique features to minimize OPEX. There is no need for direct operator involvement; the process is audited by the operator locally or remotely. The service interval, outside of instrument calibration, is 24,000 hours.

Ground Water Purification Solution

Purifics' integrated technology platform is shown below.

1) Groundwater enters the **Cuf** (Continuous Ultra Filtration) system at continuously changing flow rates that range from 0 to 300 gpm. Fe and Al are oxidized into their insoluble metal oxides. After which the Oxidized Metals and TSS (Total Suspended Solids) are filtered from the water technology with ZLD and no permeate loss.



2) The water then enters the Photo-Cat, which is a Chemical Free Advanced Oxidation Process or AOP+, where the dissolved chemical contaminants (i.e. 1,4-dioxane and VOCs) are destroyed.



3) Purifics Expert System capability has been applied to the GWP train which enables continuous analog process and not a series of discrete inefficient operations. The GWP is equipped with a fully integrated Network, Sensors, Hot Swappable Redundant PLC's and multiple SCADA locations that continuously controls, logs and optimizes the process as it responds in real time.

Background

An interim Photo-Cat system had been purifying contaminated groundwater from 10 source extraction wells at this site from 2006 to 2012 as part of the Interim Remedial Action Plan approved by the Florida Department of Environmental Protection (FDEP).



The final Remedial Action Plan, now operating, was also approved by the FDEP. A Lockheed Martin information bulletin issued about the Photo-Cat process on this site states,

“The extracted groundwater is treated using advanced oxidation technology [Photo-Cat], which Lockheed Martin has found to be the most efficient, safe and cost effective way to treat site-specific chemicals of concern (CoCs), including trichloroethylene (TCE) and 1,4-dioxane.” Lockheed Bulletin, 2011

Purifics proprietary technology combines the best of chemical-free advanced oxidation process (AOP+®) and high flux continuous flow silicon carbide ultrafiltration. The major differences between Purifics' Photo-Cat AOP+ technology and conventional UV & Chemical based AOP systems is that Photo-Cat is the only AOP that eliminates the need for chemical oxidants such as hydrogen peroxide or ozone and their hazard, cost and complexity challenges. Secondly, Photo-Cat technology has the highest commercially available oxidizing potential (and has a unique reduction capability) allowing it to treat contaminants of concern that chemical-based AOP technologies cannot. Photo-Cat is fully automated (no operator required), treats contaminants of concern to levels below the detection limit, and has no air emissions which eliminates the need for air permits.

Purifics' Technologies & Systems have been successfully employed to purify contaminated water since 1994. Purifics' technology used in the Lockheed application is also commercially applied in Water Reuse, Municipal Drinking Water and Oil & Gas applications.



340 Sovereign Road, London, ON, Canada, N6M 1A8
Ph: 519.473.5788, info@Purifics.com, www.Purifics.com

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