



Florida Department of Environmental Protection

Bob Martinez Center
2600 Blair Stone Road
Tallahassee, Florida 32399-2400

Rick Scott
Governor

Carlos Lopez-Cantera
Lt. Governor

Jonathan P. Steverson
Secretary

November 13, 2015

Via Electronic Mail

Doug Winkie [dsw@solarwaterworks.org]

Doug Winkie, M.S., P.E.
President
Solar Water Works, Inc.
247 Freshwater Way, Suite 541
Milwaukee, WI 53204

Re: PECO Water Treatment System

Dear Mr. Winkie:

The Petroleum Restoration Program (PRP) hereby accepts the PECO (PhotoElectroCatalytic Oxidation) Water Treatment System for the treatment of recovered groundwater containing petroleum hydrocarbons, chlorinated hydrocarbons, and other suitable contaminants. The system is an aboveground treatment process that combines catalyst plates, UV light, and electricity to generate hydroxyl radicals that destroy contaminants. See enclosure 1 for supplemental information.

The PRP has no objections to the use of the PECO Water Treatment system for the remediation of petroleum contaminated sites pursuant to Chapter 62-780, Florida Administrative Code, provided: (a) the considerations of this letter are taken into account; (b) a site-specific Remedial Action Plan is approved by the Department; and (c) the PECO Water Treatment System is cost-effective in comparison to other viable treatment alternatives.

While the Department of Environmental Protection does not provide endorsement of specific or brand name remediation products or processes, it does recognize the need to determine their acceptability from an environmental standpoint with respect to applicable rules and regulations.

The Department reserves the right to revoke its acceptance of a product or process if it has been falsely represented. Additionally, Department acceptance of any product or process does not imply it has been deemed applicable for all cleanup situations, or that it is preferred over other treatment or cleanup techniques in any particular case. A site-specific evaluation of applicability and cost-effectiveness must be considered for any product or process, whether conventional or innovative, and adequate site-specific design details must be provided in a Remedial Action Plan submitted for Department review and approval. If you have any questions, you may contact me at (850) 245-8911, or by e-mail at Elena.Compton@dep.state.fl.us.

Sincerely,



Elena G. Compton, M.S., P.E.
Professional Engineer II
Petroleum Restoration Program

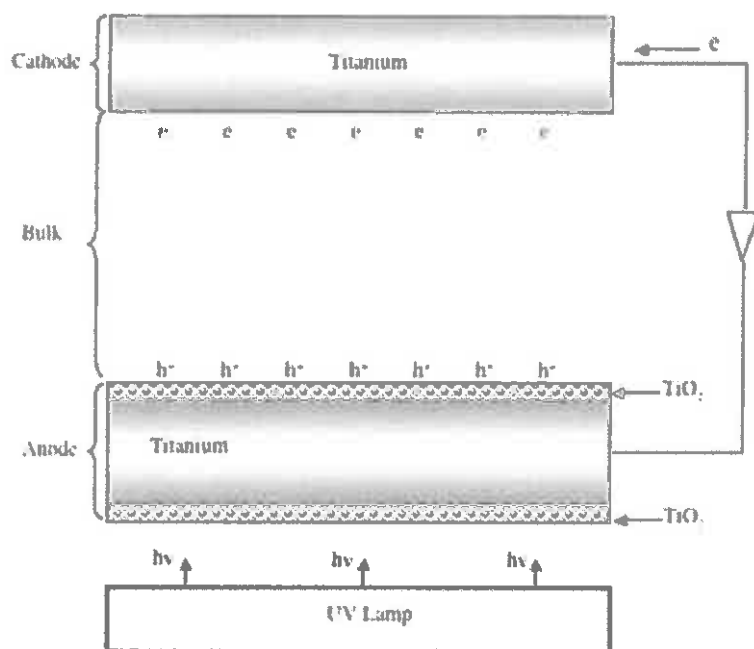
Enclosure: (1) Supplemental Information

cc: Kenneth Busen - FDEP/ Tallahassee
Diane Pickett - FDEP/ Tallahassee

SUPPLEMENTAL INFORMATION REGARDING PECO WATER TREATMENT SYSTEM

1. Description of the photoelectrocatalytic oxidation process and chemical reactions:

Ultraviolet radiation excites a titanium dioxide catalyst, thereby creating hydroxyl radicals from some of the water molecules. These hydroxyl radicals are reactive, and they in turn oxidize contaminants, such as petroleum, to carbon dioxide and water. The titanium dioxide catalyst is unaffected by the reaction. If the contaminant is a chlorinated organic compound, then the reaction products will include chlorides. Per the PECO website, the photoelectrocatalytic oxidation process can be described schematically as shown below. A more detailed technical discussion of the device and the process is available in US Patent No. 8,398,828 B1 of March 19, 2013.



2. Titanium dioxide catalyst: Titanium dioxide (TiO_2) is a solid white powder that is insoluble in water. It is used commercially in toothpaste, as a food additive, and as the white pigment in exterior paints.
3. Free product: Although chemical oxidation reactions are capable of destroying free petroleum product, it may be desirable to consider the amount of free product that is present on a site by site basis, to determine whether or not recovered groundwater should be passed through an oil/water separator before it enters the PECO Water Treatment System.
4. Maximum influent concentration: PECO information presented to the PRP did not indicate if there is a maximum contaminant concentration that can be handled by the system. Per PECO's website, at one of the petroleum remediation test sites, however, the influent contained approximately 7,000 – 14,000 parts per billion benzene, and the average removal was 83%.
5. Effluent quality: The effluent from the PECO Water Treatment System must meet the groundwater standards established in Chapter 62-777, F.A.C., prior to disposal. Remedial Action Plans should determine on a site-specific basis whether or not post-treatment activated carbon should be used to ensure that the effluent will meet the groundwater standards of Chapter 62-777, F.A.C., prior to disposal.