

Groundwater Remediation using Engineered Wetlands: A case study – British Petroleum, Casper Wyoming

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Constructed wetlands are gaining widespread use as a simple, low cost means of industrial wastewater treatment. The former Casper, Wyoming refinery was one of the oldest refineries in the West. It operated from 1908 until 1991. As a result of common management practices during the 80 years of operation, much of the site is underlain with residual hydrocarbons. It has been estimated that 30 million gallons of hydrocarbons (oil) had leaked into the shallow alluvial aquifer adjacent to the North Platte River. BP and the City of Casper agreed to convert the former refinery site into a golf course and office park, with a trail system along the North Platte River. The presence of a large amount of contaminants below the water table created a major challenge. The remediation treatment system needed to handle up to 3 million gallons per day of gasoline-contaminated groundwater, blend it into the middle of a premier golf course and operate for more than 100 years. Knowing that petroleum hydrocarbons are biodegradable and keeping in mind the cost of pumping groundwater for decades, BP chose a wetland treatment technology as the most appropriate solution. Full-scale wetland had to be capable of operating at 6,000 cubic meters per day and deal with potential fouling of the wetland media. A cascade aeration system for iron oxidation and a surface flow wetland for iron precipitation were added to the system. To address flow distribution, an innovative radial-flow wetland configuration was adopted. This innovative system is the largest remediation wetland in North America.

Ryan Devlin, B.Sc. Chem.

Ryan was born and raised here in Alberta and graduated from the University of Alberta with a major in organic chemistry and molecular biology.

Ryan's career began in the specialty chemical industry where his main focus was on water and wastewater treatment. After 14 years serving his major industrial clients in the pulp and paper, municipal, chemical, oil& gas, power generation and mining sectors, Ryan joined the engineering and consulting services of Jacques Whitford - North American Wetland Engineering which was recently purchased by Stantec.

Ryan has considerable knowledge in the mechanical, operational and chemical application of water and wastewater treatment and processes. He has developed best management practices in the procurement, application and troubleshooting of industrial and municipal water and wastewater treatment throughout Western Canada.

In these recent years Ryan attention and expertise has shifted to onsite wastewater treatment using a variety of techniques with a major focus on engineered wetlands for wastewater treatment.