



## A Profile in Using Green Remediation Strategies

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**British Petroleum Site**  
Casper, WY

**WY Voluntary Cleanup**

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**Cleanup Objectives:** Remediate gasoline-contaminated ground water for 50 to 100 years

**Green Remediation Strategy:** Installed radial-flow engineered wetlands operating in tandem with free-water surface wetlands and a cascading aeration system

- Employed Smart Growth principles to complement conversion of the site's former refinery to an office park and recreational facilities
- Designed wetland components for subsurface locations as much as possible to increase operational control and reduce offensive odors or insects
- Constructed radial-flow treatment beds consisting of crushed concrete previously reclaimed during refinery demolition
- Insulated wetland treatment beds with a six-inch layer of mulch to accommodate temperatures reaching -35°F
- Planted emergent wetland plants such as bulrushes, switchgrass, and cordgrass in each of the four wetland areas

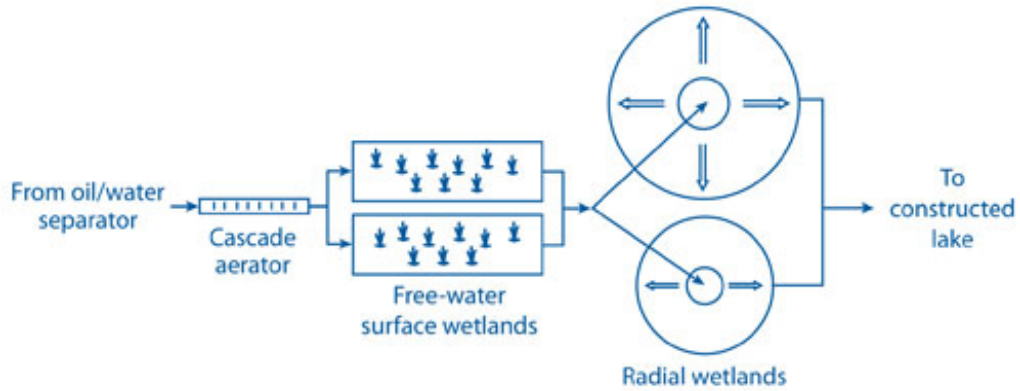
**Results:**

- Treats up to 700,000 gallons of contaminated ground water each day
- Achieves a 50% reduction in BTEX concentrations when compared to influent of the pre-wetlands aeration process
- Achieves non-detectable concentrations of benzene and other hydrocarbons in water prior to discharge into a basin created by former refinery effluent discharge
- Operates year-round despite cold climate
- Incurred construction cost of \$3.4 million, in contrast to projected \$15.9 million for alternative pump-and-treat system employing air stripping and catalytic oxidation
- Found beneficial use for onsite demolition material
- Uses passive-energy systems to biodegrade contaminants
- Allowed for office park occupation within 10 months after the aerated/engineered wetland system began operating

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*Pumped ground water passes through a forced-bed cascade aerator to enhance contaminant volatilization and ferrous iron oxidation. Aerated water is directed through subsurface pipes to one of two parallel free-water surface wetlands, and then passes through additional subsurface pipes to one of two center-feed treatment beds. From there, water radiates under natural hydraulic conditions toward the bed perimeter while undergoing both biodegradation and phytoremediation (including phytovolatilization).*



*After two years of growth, vegetation covered approximately 50% of the radial-flow engineered wetland.*

**British Petroleum Site**

[http://www.cluin.org/greenremediation/profiles/subtab\\_d18.cfm](http://www.cluin.org/greenremediation/profiles/subtab_d18.cfm)



**United States Environmental Protection Agency  
Office of Solid Waste and Emergency Response (5202P)**

**For more information:**  
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