

**CONSTRUCTED WETLAND TREATMENT SYSTEMS
FOR ENVIRONMENTALLY FRIENDLY DRILLING**

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Waters involved in oil and gas drilling and production may require renovation prior to discharge or reuse. Treatment of these waters to transfer or transform constituents of concern may be the limiting factor in production at marginal sites. Constructed wetland treatment systems can treat a variety of constituents to achieve performance criteria for discharge or reuse in many situations. Targeted constituents may include oil and grease, metals, metalloids (e.g. selenium and arsenic), and chemicals used in drilling and completion fluids. Each system is built with a unique combination of sediments, plants, size, and other design parameters. Factors such as excessive temperature, salts (e.g. chlorides, boron), and high oil and grease may require "hybrid" constructed wetland treatment systems to achieve the treatment performance goals. These "hybrid" systems involve additional steps or pathways to treat constituents that are deleterious to sustained performance of constructed wetlands or cannot be reliably treated in constructed wetlands. In this presentation, we will examine a strategy for designing and developing constructed wetland treatment systems. We will use data from pilot scale as well as full scale constructed wetland treatment systems to illustrate removal rates and extents for targeted constituents achievable by specifically designed constructed wetland treatment systems.

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