

PROJECT:

BP Produced Water Pilot

**NEED**

Due to ongoing oil production in the North Sea, BP wanted to investigate alternative technologies for management of produced water. While most produced water from offshore oil platforms is reinjected, water retained in the oil is transferred onshore and is a management challenge at terminal complexes. One technology of particular interest to BP is constructed wetlands. To be an effective option, the system would have to achieve the following criteria:

- Demonstrate effective treatment of high-strength, high salinity produced waters
- Investigate the use of different types of subsurface flow wetland medias for removal of heavy metals
- Quantify the fate and transport of metals and petroleum hydrocarbon compounds in the treatment process
- Measure biodegradation rates for hydrocarbon compounds
- Provide design criteria for future BP wetland projects

LOCATION

Rugeley, United Kingdom

PROJECT TYPE

Oil Produced Water

COMPLETION DATE

2012

DESIGN FLOW

Pilot System

TREATMENT

Multi-Stage Subsurface
Flow Constructed Wetland

SOLUTION

A three-stage subsurface flow wetland pilot was implemented at Rugeley in the United Kingdom, in conjunction with the UK-based firm ARM Ltd. The first stage of the pilot included the use of peat and compost for sulfate removal and adsorption of heavy metals. The second stage was a floating reed bed for iron and manganese oxidation. The third stage involved an aerated subsurface flow bed using dolomite as a reactive media for pH adjustment and iron removal.

The system demonstrated essentially complete (>98%) removal of petroleum hydrocarbons. In addition, the system removed heavy metals, and for metals present in significant concentrations, removals for Iron (99%), mercury (>99%), and zinc (96%).

BENEFIT

The pilot system demonstrated that effective biological treatment can occur in subsurface flow constructed wetlands, despite the high salinity of the North Sea produced water. Metals removal was also high and exceeded performance expectations. The design information collected from the pilot is being used to develop design standards for future BP wetland systems.

