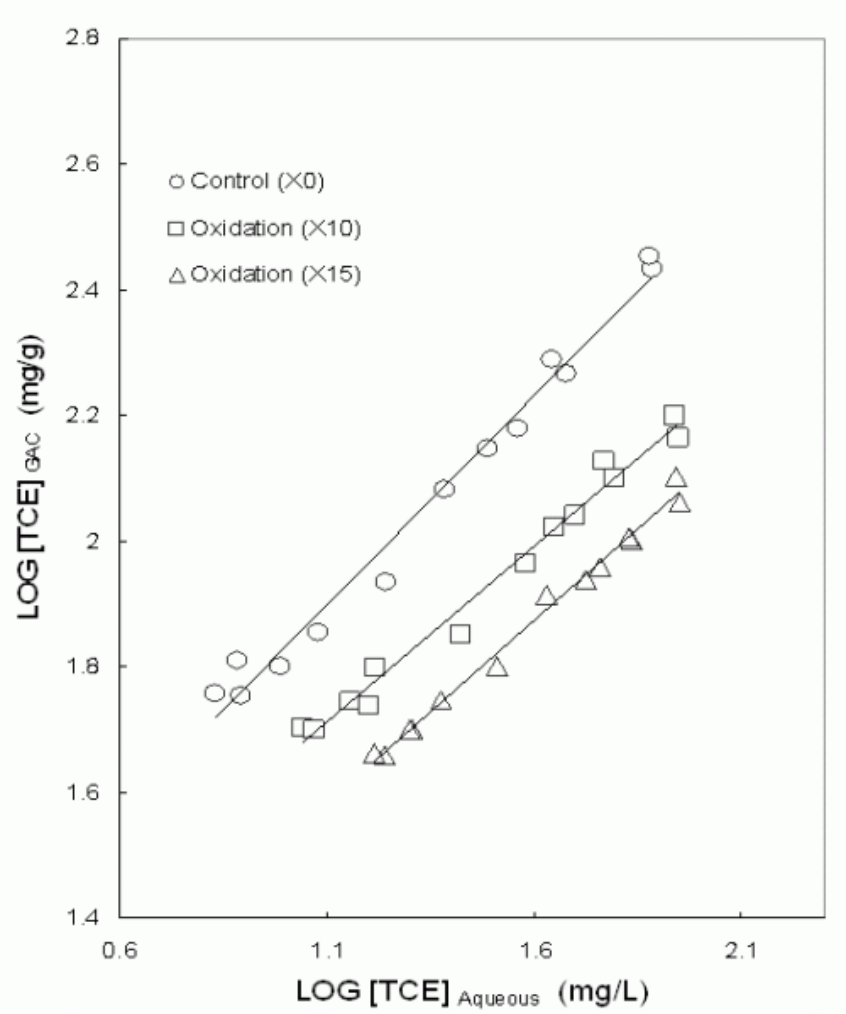
Multiple Oxidation Effects on GAC/MTBE Adsorption Oxidation

Investigators: Scott G. Huling, Kyle Jones, EPA-GWERD
Collaborators: Robert G. Arnold, Wendell Ela
University of Arizona
Department of Chemical and Environmental Engineering
Tucson, AZ 78521

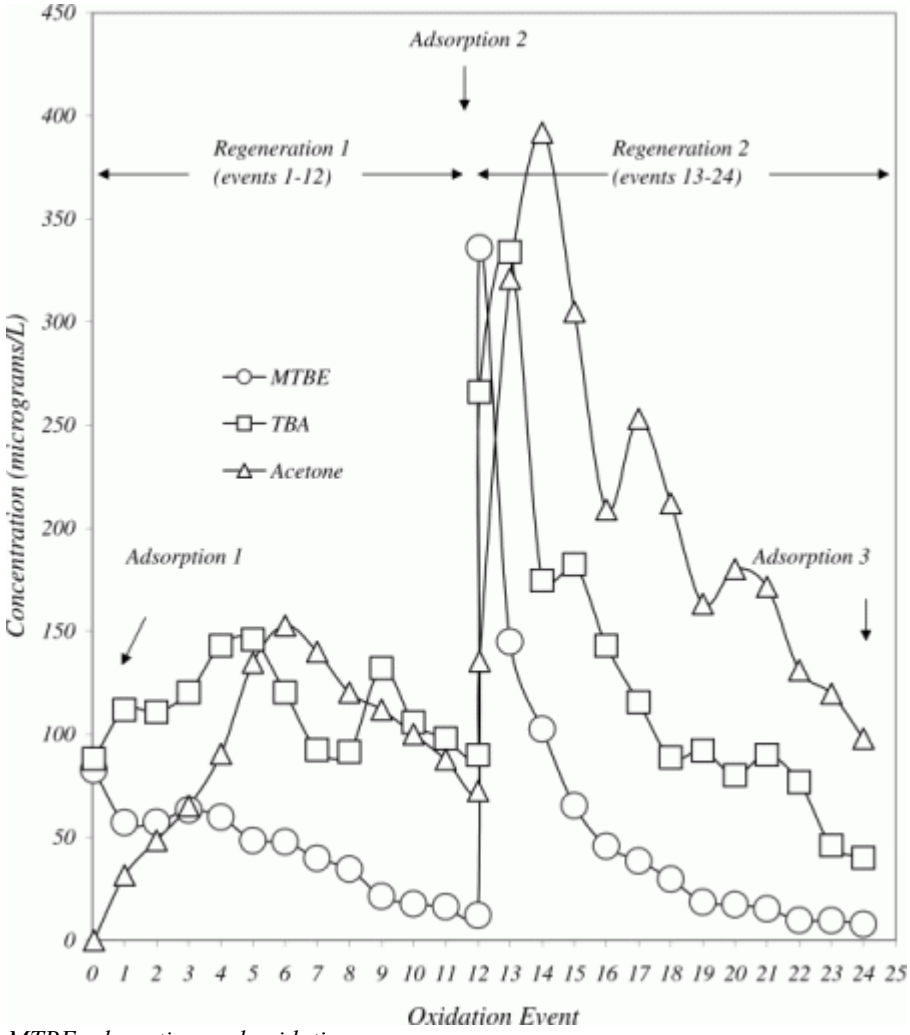
Project Overview/Results:

Carbon regeneration involves the aggressive oxidation of the activated carbon involving high concentrations of H_2O_2. The physical and chemical changes that occur from repeated chemical oxidation (without adsorbate) and the impact these changes have on the long term sorptive capacity of the adsorbent were measured (Huling *et al.*, 2005a).



TCE sorption isotherms in Fe-amended GAC for background GAC, and GAC receiving 10 and 15 applications of H2O2.

Experiments were conducted involving identical experimental conditions as in the repeated oxidation study (above) except MTBE was amended to the GAC. Two regeneration cycles of MTBE-spent activated carbon under aggressive oxidant conditions were accomplished without significant deterioration of the physical structure and adsorption capacity of the carbon. 91 % MTBE regeneration efficiency was measured (Huling *et al.,* 2005b). The reaction byproducts from MTBE oxidation were also degraded and did not accumulate significantly on the GAC.



MTBE adsorption and oxidation.

Multiple treatments of GAC without sorbed contaminants (Huling *et al.,* 2005a) underwent chemical and physical changes that reduced the sorptive capacity of the GAC. Protection of the activated carbon during oxidative treatment can be provided by the adsorbate due to fewer reactions between ·OH and carbon surfaces relative to reactions between ·OH and the target adsorbate (MTBE). Practical operational parameters and guidelines are established in which Fenton regeneration of activated carbon the technology could be deployed.

Huling, S.G., P.K. Jones, W.P. Ela, and R.G. Arnold. 2005a. "Repeated Reductive and Oxidative Treatments on Granular Activated Carbon". *J. Environ. Eng.,* 131(2), 287-297.

Huling, S.G., P.K. Jones, W.P. Ela, and R.G. Arnold. 2005b. "Fenton-Driven Chemical Regeneration of MTBE-Spent Granular Activated Carbon" *Water Research.* (39)2145-2153.