PRODUCT DESCRIPTION

This report presents the results of a pilot study conducted to test the potential impact of dibasic acid (DBA) on vertical flow cells (VFCs) constructed to remove selenium and mercury from a flue gas desulfurization (FGD) scrubber discharge. VFCs are a passive treatment technology with very low operational and maintenance costs, and the potential for order-of-magnitude savings over conventional treatment methods. A full-scale VFC system has been constructed at a power generating facility based on pilot testing that involved FGD wastewater from a system that currently does not use DBA; however, it is anticipated that DBA addition will soon be required. The purpose of the pilot study described in this report was to evaluate whether DBA addition would affect the performance of the biological VFC system.

Results and Findings

The findings of this study are that DBA spiked into the FGD wastewater had no apparent adverse effects on VFCs at the pilot scale. It is anticipated that DBA addition will be acceptable for operation of the existing VFC system. Selenium and mercury removal rates were measured to be higher for the test cell receiving DBA than the control cell that did not; however the results are not conclusive as the oxidation reduction potential (ORP) in the control cell increased towards the end of the study. This was due to suspected flow path short-circuiting in the substrate, resulting in ORP conditions in the control cell that may have been less favorable for selenium removal.

Challenges and Objectives

The objective of this study was to assess whether DBA addition to the FGD process would adversely affect the existing VFC treatment system. The challenge of the study is interpreting the results from the relatively short test period observed in conjunction with fuel testing and extrapolating the results from a “real-world” evaluation of DBA addition into the FGD absorber itself.

Applications, Values, and Use

VFCs have the potential to provide widespread and cost-effective treatment for selenium as well as mercury. This report supports the potential use of VFCs in situations where DBA is or will be used as part of the FGD scrubbing process. Site specific pilot testing for the use of VFC’s is recommended for DBA influenced process waters.

EPRI Perspective

The results of this study suggest that DBA itself had no adverse impacts on the removal of selenium and other metals in a pilot VFC treatment system. However, the reader is cautioned that this DBA spiking study does not truly evaluate the impact of DBA addition into the FGD

absorber itself where DBA enhances the mass transfer in the absorber to improve sulfur dioxide (SO_2) flue gas removal, as well as other potential gas/liquid reactions. DBA also decomposes to other smaller chain organic compounds, although we do not envision this having a detrimental impact on biological activity. Additional studies at full-scale applications are needed to thoroughly evaluate DBA impacts on biological water treatment.

Approach

The approach of this report is to transmit the findings of a VFC application study for use at other utility water treatment sites.

Keywords

Water Treatment, Vertical Flow Cells, Dibasic Acid, DBA, Selenium, Mercury, Flue Gas Desulfurization