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Memorandum

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From: Mark Schultheis

Subject: Dual Site Groundwater Operable Unit
Summary of the Additional Bench-Scale Testing of APT's HiPOx Process

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Additional bench-scale testing of an advanced oxidation technology has been conducted on behalf of Montrose Chemical Corporation of California (Montrose) as part of the remedial design for the Dual Site Groundwater Operable Unit for the Montrose and Del Amo Superfund Sites located in Los Angeles, California. This document summarizes the technical need for these tests and provides the results of the additional testing. Details of the test procedures and results are provided in Attachment 1, the vendor-prepared test report.

BACKGROUND

An advanced oxidation technology referred to as HiPOx™, manufactured by Applied Process Technology Inc. (APT), is being considered for treatment of para-chlorobenzene sulfonic acid (pCBSA) for the Torrance Groundwater Remedial System (TGRS). Recently, information became available that indicated the HiPOx™ process has the potential to oxidize bromide to bromate. Bromate has a federal Maximum Contaminant Level (MCL) of 10 micrograms per liter (ug/L). Bromide is an anion that has been detected in groundwater at individual extraction well sites within

the planned TGRS operating area at concentrations ranging from 130 ug/L to 2,700 ug/L. Subsequent calculations indicate the flow-weighted influent concentration of bromide to the TGRS treatment plant will be about 430 ug/L. The additional bench-scale testing was conducted to determine if the oxidation of bromide to bromate could be adequately controlled in the HiPOx process while maintaining adequate destruction of pCBSA to meet the discharge goal of 25,000 ug/L.

TEST SAMPLE PREPARATION

Groundwater from two Montrose wells, BF-OW-3 (near existing extraction well BF-EW-2) and BF-11 (near planned extraction well BF-EW-4), was collected and then blended in accordance with the procedures outlined in a July 2009 advisory memorandum (Geosyntec, 2009). The concentrations of pCBSA and bromide in the blended water provide a worst-case evaluation of the ability of the HiPOx™ system to control bromate formation while achieving adequate destruction of pCBSA.

SUMMARY OF RESULTS

The bench-scale test was conducted on August 7, 2009. The analyses of water samples collected during the bench-scale test demonstrated that bromate in the HiPOx™ process bench-scale effluent was maintained at a maximum of 6.1 ug/L. This outcome was achieved while the required pCBSA destruction efficiency of at least 40 percent was achieved, such that the HiPOx™ system effluent concentrations will meet the 25,000 ug/L injection standard.

CONCLUSIONS AND DESIGN IMPLICATIONS

Results of the bench-scale testing indicate that the HiPOx™ process can be utilized to achieve the desired pCBSA destruction efficiency while controlling bromide conversion into bromate.

Although there is some uncertainty in what the actual influent bromide concentrations will be upon start-up of the TGRS, the HiPOx™ system design is flexible enough to accommodate higher bromide concentrations while achieving the required bromate control. Since the HiPOx™ process can adequately control bromate formation, it will not be necessary to include a contingency for a separate bromate treatment process.

REFERENCE

Geosyntec, 2009. Advisory of Additional Bench-Scale Testing of APT's HiPOx Process. July 29, 2009