DOCUMENT REVIEW FORM

SITE NAME: Flint Hills Resources – North Terminal
New Hanover Co.

DOCUMENT: Pilot Study Report

RECEIVED: 11/30/04

CONSULTANT: Catlin Engineers and Scientists

REVIEWED BY: Sam Watson on 12/02/04

COMMENTS:

Report presents results of the chemical oxidation pilot study conducted at the site from May 14, 2004 to August 6, 2004.

The pilot study was conducted in two phases. The initial phase was conducted to determine the most effective amendment to be used. All of the amendments included hydrogen peroxide (H_2O_2). The study examined the use of Fenton's Reagent, H_2O_2 alone, and proprietary vender-supplied catalyst that is combined with the H_2O_2.

Results of the first phase indicate that the H_2O_2 alone was most effective in reducing para-xylene concentrations. The determination of the "effectiveness" of the amendment included a cost analysis. Therefore, although the H_2O_2 alone may not have caused the greatest total reduction in para-xylene concentrations, it was effective and the most cost-effective of the three options tested.

The second phase was conducted to determine the amount of H_2O_2 that will be needed to treat the impacted area. Results of this phase indicate that approximately 818,800 lbs of H_2O_2 may be needed for the full-scale implementation at the site.

The report recommends that planning begin for full-scale implementation of chemical oxidation using H_2O_2 alone at the site.

An in-house evaluation of the data suggests that some of the reductions in para-xylene concentrations may be attributable to natural background fluctuations in para-xylene concentrations. As noted in the report, results of the pilot study may be skewed since the study was not conducted in a closed environment.

The data also suggests that the reactions that took place where very short-lived. The time between the application of the amendment and the first sampling for para-xylene was 10 days. The field data, collected 24 hours after the amendment application, suggests that the reaction occurred immediately following the amendment application and had already completed before the "Day 10" sampling event. This quick reaction time would allow relatively high concentrations of para-xylene impacted groundwater to then migrate from upgradient and mask the true effectiveness of the amendments.

I believe it is safe to say, however, that reactions are occurring at the site and that para-xylene concentrations are likely to be reduced across the site if chemical oxidation is used at the site. I recommend that full-scale implementation planning should proceed as proposed.