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BVSPC Project 049067  
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August 28, 2015

Mr. Scott Miller, Remedial Project Manager  
US Environmental Protection Agency, Region 4  
61 Forsyth Street S.W.  
Atlanta, Georgia 30303  
Via Email

Subject: Review of “Concerns Regarding Mobilization of DNAPL by ISGS Injection”  
Cabot Carbon/Koppers Superfund Site  
Gainesville, Florida

Dear Mr. Miller:

Black & Veatch Special Projects Corp. (Black & Veatch) has completed its review of the “Concerns Regarding Mobilization of Dense Non-Aqueous Phase Liquid (DNAPL) by In-Situ Geochemical Stabilization (ISGS) Injection” memo, prepared by Gainesville Regional Utilities (GRU) and dated August 17, 2015. Black & Veatch provides the following observations and comments on the information submitted:

Three potential mechanisms for DNAPL mobilization were noted in the memo: displacement of the DNAPL by injected fluids, hydraulic fracturing and/or liquefaction of the formation, and dilation of pore throats cause by the propagation of pressure waves resulting from injection activities.

Displacement of the DNAPL by injected fluids appears to be the most likely of these scenarios given the current information. In Appendix D of the “Pre Final Design of Former Process Area In-Situ Geochemical Stabilization Remediation” authored by TetraTech, Inc. (TetraTech) and dated February 13, 2015, plots are provided that indicate that a potentiometric response of up to 2 feet was observed in wells as far away as 88 feet from the injection point. Approximately 50 to 60 feet from the injection points, potentiometric responses in wells generally ranged from 2 to 8 feet. Given these significant responses at distances from the injection points, the potential exists for DNAPL to have been mobilized via displacement due to the hydraulic head and increased capillary pressures created by the injection activities. It should be noted however, that not all wells observed responded in the same fashion and several of the observation wells’ groundwater elevations decreased during the injection activities.

Additionally, it is unclear why the increases in DNAPL identified in GRU’s memo are predominantly located to the west and south of the pilot area. That the DNAPL is not appearing more heavily in the downgradient direction, to the northeast, raises the question of what other processes are occurring in the site subsurface that may also cause an increase in DNAPL thicknesses and recovery (for instance,

this could possibly be due to changes in groundwater elevation or heavier DNAPL presence in those directions).

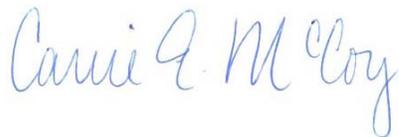
The potential for hydraulic fracturing as a result of the ISGS injections is possible at the injection pressures reported in Tetra Tech's February 2015 report. Initial pressures of up to 150 psig were used during the pilot and in some injection points, this pressure appears to have been sustained throughout the injection. Whether fracturing occurred should be relatively easy to prove or disprove if the injection pressures throughout the injection were recorded. When fracturing has occurred, the initial pressure buildup is quickly released through a fracture and a rapid decrease in the injection pressure should be observed. However, daylighting of the injectate in the Surficial and Hawthorn Aquifer is not necessarily the result of physical movement of soil grains, as would be done where a fracture occurs. Instead, this may represent channelization along sand inclusions or another more permeable pathway.

Given the above, Black & Veatch recommends that the quantity and location of DNAPL be closely monitored during the remainder of the full-scale implementation in the former process area and at frequent intervals following the implementation to determine if significant displacement of DNAPL has occurred. Given that a barrier wall will be installed to enclose the DNAPL-impacted areas, the barrier wall design can and should be adjusted in the event that displacement of DNAPL is found to have increased the vertical and lateral extent of DNAPL. Black & Veatch would be happy to assist with developing a strategy to assess to what degree, if any, displacement has occurred.

If you have any questions about this transmittal, please contact me at (770) 521-8127 or by electronic mail at [McCoyCE2@bv.com](mailto:McCoyCE2@bv.com).

Sincerely,

**BLACK & VEATCH SPECIAL PROJECTS CORP.**



Carrie E. McCoy, PE

Project Engineer

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