

July 15, 2008

Mr. Scott Miller  
Remedial Project Manager  
United States Environmental Protection Agency  
Region IV, Superfund North Florida Section  
61 Forsyth Street, SW  
Atlanta, GA 30303

RE: GRU Comments to Phase I ISBS Pilot Study Report March 31, 2008

Dear Mr. Miller:

Attached are GRU's comments to the March 31, 2008 Phase I ISBS – Field Pilot Study Report.

Thank you very much for your on-going effort in addressing the Cabot/Koppers Superfund site. If you need additional information, please contact me at 352-393-1218.

Sincerely,



Rick Hutton, P.E.  
Supervising Utility Engineer

xc: John Mousa (ACEPD)  
Kelsey Helton (FDEP)  
Mitchell Brouman (Beazer East, Inc.)  
John Herbert, Brett Goodman (Jones Edmunds)  
David Richardson, Ron Herget (GRU)  
Correspondence

**RE: Phase 1 ISBS – Field Pilot Study Report, Koppers Superfund Site, Gainesville, Florida**

The GRU DNAPL Team has reviewed the Phase 1 ISBS – Field Pilot Study Report for the Koppers Superfund Site. The report was submitted on March 31, 2008 by Adventus for Beazer. We offer the following comments:

1. Pilot test purpose and objectives are unclear - Meeting minutes by Amy Callaway, dated March 10, 2008, indicate that the purpose of ISBS is to “encapsulate the source [i.e., creosote DNAPL] with a modified permanganate solution injection.” Thus the injected NaMnO<sub>4</sub> solution was expected to be reduced on contact with the creosote and to “encapsulate” it with a mineralized manganese oxide crust. The performance metric is based upon cores collected before and after the pilot test that will presumably show some improvement, although what the quantitative performance metric was remains unclear, e.g., a reduction of the dissolved naphthalene concentration to that of the MCL?
2. This Report indicates that there were two objectives:
  - a. “Validate the ability of the ISBS reagent to stabilize NAPL residuals”, and
  - b. “Confirm the effectiveness of the [injection wells] to properly introduce the ISBS reagents into the subsurface.

Again, it is unclear just what “stabilize NAPL residuals” means quantitatively or conceptually and how “stabilization” is to be verified.

3. It is hard to know what the pilot test tells us so far other than that oxidant can be injected. The "theoretical" degree of reduction in K and dissolved concentrations can likely only be judged based on the testing of soil cores from the treated zones. This testing has not been finished.
4. We do not know whether it has been established on a field scale that the reduction in contaminant flux achieved by ISBS is maintained over the long term and that it is a permanent remedial alternative. For example, will the manganese dioxide crust produced in the oxidation process be degraded if reducing geochemical conditions develop again in the creosote source zones? EPA and Beazer should assess this eventuality and possible contingencies before making a final selection of remedial alternatives.
5. A very clear benefit derived from this test is the chemical analysis of the soil cores listed in Table 1. These data (Appendix C) will allow stakeholders like GRU to have a clear and quantitative picture of the composition of the creosote, i.e., the source term in the groundwater quality monitoring of the Floridan aquifer.

Specific Comments

1. Although the drafted logs do not note any mobile NAPL, the field notes by J. Toth indicate "FP" meaning "NAPL appears to be mobile" in DB-1, DB-2, TB-1, TIP-3, NISBS-1, NISBS-2. And an oil emulsion was observed during development of TIP-4.
2. Also, Key Environmental, Inc. noted free product on the logs of HG-18S and HG-19S in the Upper Hawthorn.

3. It is not clear why the 'primary analytes' (see top of page 5) are metals and not PAHs or chlorophenols. Presumably this is due to the anticipated effect of manganese reduction on soil oxide coatings and the resultant release of these metals to the groundwater. The description of the performance assessment (see top of page 10) appears to be missing sections of text; consequently the logic cannot be followed. It seems that Adventus considers the presence of a purple color as an indicator of successful  $\text{NaMnO}_4$  migration through the aquifer. However, the presence of purple color does not necessarily mean that either further dissolution of creosote is prevented or that continued creosote DNAPL migration is inhibited by the remedial operation. Failing a purple color, it appears that Adventus uses  $\text{H}_2\text{O}_2$  as a means of testing for the presence of low levels of dissolved  $\text{NaMnO}_4$ . Again, it is unclear if this is a reliable indicator of successful remediation.
4. Table 5 shows clearly that the injectate, which has a specific gravity of  $\sim 1.10$  (see page 11), sinks to the bottom of the aquifer and migrates along the top of the UHG clay. Adventus states on page 12 that the injectate follows "preferential flow paths." This is not really true as we are witnessing a density effect that has little to do with heterogeneities in the sand. This is known as 'poor sweep efficiency' in the oil industry and is due to bad design rather than geological complexity. Unless the injection operation is redesigned, only the bottom of the surficial aquifer will be affected.
5. Page 7: 3<sup>rd</sup> paragraph states: "only a small volume of injectate (approximately 40 gallons) was successfully injected in TIP-4." (While 542 gallons were successfully injected in TIP-3)." According to the well development logs, TIP-3 had very slow recharge while TIP-4 had the highest recharge of all the wells. This is inconsistent with the rate of injections and should be explained.
6. Page 7: 3<sup>rd</sup> paragraph states: "Accordingly, a larger well screen slot-size and coarser sand pack may be desirable for future injections through temporary wells." If larger amounts of ISBS reagent were successfully injected into other similarly constructed wells, then we do not believe the lack of injection in TIP-4 is due to the well screen and filter pack.
7. Page 10: 1<sup>st</sup> paragraph, 1<sup>st</sup> sentence states: "...it was envisioned that verification would be accomplished solely through the use of direct observation of the injected color purple." If the only method of verification used was direct observation, the only objective that can be accomplished is to confirm the method of delivery. Nothing in this document validates the ability of the ISBS reagent to form a mineral crust capable of reducing the flux of dissolved constituents to groundwater or to prevent further migration.
8. Page 11: paragraph 2, 1<sup>st</sup> bullet: Adventus speculates that some of the black streaks in the cores could either be NAPL or the product of ISBS/NAPL interaction ( $\text{MnO}_2$ ). We believe that a more definitive test should be conducted to establish the degradation of creosote. The test procedure used in the reported study was to wash the sample in which ISBS reagent might be present with a neutralizing agent ( $\text{H}_2\text{O}_2$ ) and watch for bubbles, either gaseous or product. The gaseous bubbles in the core could have been oxygen or carbon dioxide, which is cited to be caused by one of two reactions detailed on page 10 of the Report. However, we have no control mechanism to indicate that the  $\text{H}_2\text{O}_2$  neutralizer could not have reacted with something other than ISBS reagent or  $\text{MnO}_2$  to create gaseous bubbles of any composition. We must also assume that Adventus has determined that the natural  $\text{MnO}_2$  concentration in the site soil is low. It appears that Adventus is doing lab tests on these cores to check some of these issues.

9. Page 13: paragraph 1: If the mineral crust seals cracks and sandy stringers that connect the surficial aquifer with the Hawthorn, this should be factored into a proposed sequence of injection. It is not desirable to seal those preferential pathways until injection of ISBS reagent into the deeper strata is complete.
10. Page 14: ongoing work elements: We suggest checking hydraulic conductivities before and after injections from individual TIPs to see if even local interstitial spaces are being plugged/sealed.
11. Pg 6: 1<sup>st</sup> paragraph: Adventus states: "it is inconceivable that the injections would have influenced the results at ZOD-1 within such a short time period." We believe that it may be unlikely, but it is conceivable.