JOINT FS TEAM RESPONSES TO GRU DNAPL CONSULTANT TEAM COMMENTS TO EPA/BEAZER ASSESSMENT; USEPA MEETING OF DECEMBER 18-19, 2007

The GRU DNAPL Consultant Team (GDCT) comments were sent as an attachment to a cover letter to Mr. Scott Miller (USEPA) from Mr. Rick Hutton (GRU) dated June 9, 2008. The body of this letter references a meeting that was "conducted December 18-19, 2008". The correct date is December 18-19, 2007. GDCT's major comments are repeated below followed by our response:

GDCT Comment 1: Remedial Measures to prevent On-going Downward DNAPL Migration

"The potential for on-going downward migration of DNAPL, and the associated dissolved phase contamination is a primary concern, which must be addressed as part of the remediation of the site. The root cause of the contamination of the Floridan Aquifer System is the volume and strong downward head of creosote that connects the Surficial Aquifer with the Ocala limestone (or Upper Floridan Aquifer). If remediation is to be successful, this 'ladder' of DNAPL must be interrupted. It is approximately 20 m from the bottom of the Surficial Aquifer (~170 ft amsl) to the top of the Lower Clay Unit (~110 ft amsl) that separates the Ocala from the LHG, therefore the pressure head on this clay from creosote (specific gravity of HG-16D sample = 1.10) is about 200 kPa. This is apparently sufficient head to drive this viscous NAPL (40 cP at in-situ temperature) into well HG-16D (also HG-10D and HG-12D)."

Response: The Feasibility Study (FS) and remedy selection process will address the potential for downward DNAPL migration and dissolved-phase contamination that results from mobile or residual DNAPL.

(It should be noted that some on the Joint FS team dispute the conceptual model suggested by this comment and the comments that follow. Specifically, the comments suggest that a DNAPL "ladder" of continuous, mobile DNAPL is present from the Surficial Aquifer through the Hawthorn Group and into the Floridan Aquifer. Some contend that this conceptual model is inconsistent with available data.)

GDCT Comment 2: Delineation of DNAPL Zones

"As discussed above, 200 kPa is apparently sufficient head to drive this viscous NAPL (40 cP at in-situ temperature) into well HG-16D (see Table 12 of the September 2004 Data Report for Additional Investigation of Hawthorn Group DNAPL Source Evaluation for the Koppers Industries Properties). That means that there was, and probably still is, mobile creosote in the LHG. However, the pressure head in the Surficial Aquifer is much lower due to the significantly lower head that the creosote can exert on a well screen – perhaps just one meter of head difference (not 20) with a consequent decrease in pressure head to around 10-20 kPa. This may explain why none of the monitoring wells in the Surficial Aquifer had measurable amounts of creosote when tested during 2007

(2007 First Semiannual Stage 2 Groundwater Monitoring Report, August 15, 2007). Therefore, one cannot conclude that there has not been appreciable off-site migration of creosote DNAPL in the Surficial Aquifer, or any aquifer, simply because DNAPL is not entering wells. As shown in the Review and Recommendations report (February 2006), there is strong evidence in the dissolved-phase database that creosote DNAPL migrated off-site to ITW-21, which displayed 5,570 µg/L of naphthalene when it was plugged and abandoned in February 2004 (Review and Recommendations report, p. 4-39 and Figure 4-8) and to various wells in the UHG and the LHG (HG-4S, HG-4I, HG-4D, HG-6D, and HG-26S for example)."

Response: Beazer is currently planning additional delineation work on- and off-Site near the eastern property boundary. This work will include additional borings and Hawthorn Group wells. The work will better delineate the presence of residual DNAPL to the east and northeast of the former Process Area.

GDCT Comment 3: Performance Assessment 'Metrics'

"Specific remedial goals should be defined for each alternative subsurface component. There is probably a preferred goal, and lesser but still acceptable goals. Goals need not be the same for all components, and would probably also be different for different remedial alternatives. Goals may be strictly quantitative, such as meeting groundwater criteria at a specific compliance point; or semi-quantitative, such as removing mobile DNAPL to the extent practicable. The subsurface components specified in the FS should include the following:

DNAPL - Surficial Aquifer
DNAPL - Upper Hawthorn
DNAPL - Lower Hawthorn
DNAPL - Upper Floridan (not currently being considered)
Groundwater - Surficial Aquifer
Groundwater - Upper Hawthorn
Groundwater - Lower Hawthorn
Groundwater - Upper Floridan

Goals for each alternative for each subsurface component, to the degree that they are different, need to be defined. A rigorous monitoring network, monitoring schedule, and conservative triggers (MCLs, GCTLs, and conservative organoleptic criteria) should be used to assess performance of the remedy. Hydraulic containment in the Upper Floridan Aquifer may be required depending on analytical results from the proposed onsite wells downgradient of FW-12B, and results of low-rate pumping at FW-6 and FW-21B. Similarly, whatever method is chosen to attain the reduction in DNAPL seepage to the LHG must also be amenable to quantitative performance assessment (PA). Consequently, the PA issue that concerns us is how do we determine if the supply of creosote DNAPL to the LHG has been cut off and, by implication, to the Ocala limestone as well. Given that it is impractical to measure the pressure head in the creosote, it is therefore not feasible to determine directly if the vertical 'ladder' of DNAPL has been

severed by remedial actions. For this reason it is necessary that EPA be prepared to initiate hydraulic capture in the Floridan using robust groundwater extraction methods. EPA and Beazer should consider using Partitioning Interwell Tracer Tests (PITT), or similar methods, to investigate the distribution and mass of DNAPL in the Hawthorn. As set out in the meeting minutes, compliance points have not yet been set for any of the groundwater components (i.e. Surficial Aquifer, Upper Hawthorn, Lower Hawthorn, and Upper Floridan). The property boundary is commonly a presumptive point of compliance. There is already evidence of site-related contaminant migration, some above criteria, beyond the site boundary in the Surficial Aquifer, the Hawthorn, and the Floridan. At a minimum, Florida GCTLs (and in some cases, more stringent criteria - phenols for example) should be achieved at the property boundary. Additional points of compliance, should establish that unaffected areas below the Koppers site remain unaffected (demonstrating that the plume is not continuing to spread) and currently affected areas show a decline in concentrations (indicating that remedial measures are working). The eventual goal in the Floridan should be reaching GCTLs, MCLs, and other criteria throughout the Floridan."

Response: Remedial goals are being discussed and will be formally developed as part of the FS and remedy selection process. These goals will include the specification of points of compliance and will be consistent with applicable federal and state regulations.

There is no remedial goal for DNAPL in the Floridan Aquifer because Site data indicate that DNAPL is not present in the Floridan Aquifer.

The final remedy will include a system of remedy performance monitoring and will include action levels (triggers) for implementation of secondary actions. Hydraulic containment in the Floridan Aquifer is currently being considered as a secondary action. The FS team plans to discuss the possibility of including Floridan Aquifer hydraulic containment as a primary action in one or more Remedial Alternatives.

Per CERCLA regulations, the Site remedy will be designed to reduce the toxicity, mobility, and/or volume of DNAPL to the extent practicable. Sensible and protective performance monitoring will be used to demonstrate compliance with regulations and to trigger secondary actions, if needed.

A partitioning interwell tracer test (PITT) for the Hawthorn Group deposits would likely be ineffective and impractical. According to a 2003 EPA report on DNAPL Remediation (*The DNAPL Remediation Challenge: Is There a Case for Source Depletion?* [EPA/600/R-03/143]), limitations associated with PITT include:

- The DNAPL location must be known;
- The hydraulic conductivity must be large enough to support a tracer test;
- The source area should be relatively small to allow adequate well spacing to conduct a tracer test in reasonable time frame;
- The presence of natural organic carbon may cause some difficulty with the interpretation of the results;

- The DNAPL volume is underestimated for heterogeneous DNAPL distribution (especially pools);
- The test is expensive; and
- Regulatory concerns may require recovery of tracers.

Many of these limitations apply to the Hawthorn Group. For instance, Waterloo Hydrogeologic used a hydraulic conductivity of 0.3 ft/d for the clayey sand in modeling the Hawthorn Group (*Technical Memorandum, A Critique of the GeoTrans Flow and Transport Model, Koppers, Inc. Site, Gainesville, Florida*, 2005). The low hydraulic conductivity of the Hawthorn Group was confirmed by the Hawthorn pilot test recently conducted near HG-10S. An 18-inch recovery well could only pump between 0.5 and about 0.75 gpm.

For comparison, consider the PITT test that was conducted at Camp Lejeune, North Carolina (Duke Engineering & Services and Baker Environmental, Inc., *DNAPL Site Characterization Using a Partioning interval Tracer Test at Site 88, Marine Corps Base Camp Lejeune, North Carolina,* 1999). At this site, PITT was conducted in a small area of about 30 ft by 30 ft, in a zone 17-20 ft deep (3 ft thick). Well spacing was about 15 ft and the test took 40 days. The hydraulic conductivity was about 1.4 ft/d.

At the Gainesville site, the investigation area would be much deeper and larger (in area and thickness) and the hydraulic conductivity is almost 5 times lower than the hydraulic conductivity at Camp Lejeune.

Also see response to Comment 4 below concerning performance monitoring.

GDCT Comment 4: Monitoring Wells for Performance Assessment

"The proposed performance criterion for all of the alternatives for the groundwater components appears to be based on demonstration that "the existing groundwater plume is not expanding". This will be a key requirement of performance monitoring. It is only possible to demonstrate that a plume is not expanding with monitoring locations situated at the leading edge of the plume. It is possible for contaminant concentrations closer to the source zone to be stable or even declining while the plume advances at the leading edge. At the present time, there are insufficient monitoring locations to identify and monitor the leading edge of the plumes in the different groundwater zones."

Response: We are in agreement that monitoring points located near and downgradient of impacted groundwater will be a component of the performance monitoring. These points will be needed to show that the groundwater plume is not expanding.

Constituent mass flux into the Floridan Aquifer will also be estimated using monitoring well data. By estimating mass flux, one is able to monitor the mass entering the Floridan Aquifer over time (increasing or decreasing) and estimate how much mass needs to be attenuated.

GDCT Comment 5: Review of Remedial Alternatives

"The contaminated areas of the Floridan Aquifer should be actively remediated... Etc. (full comment not repeated)."

Response: The Remedial Alternatives have changed since December 2007 and details of the Alternatives continue to be developed. In particular, maps are being developed to show the expected, approximate locations and layouts of remedial technologies (and performance monitoring) in each Alternative.

Additional information is now available on:

- The lack of effectiveness of active DNAPL recovery in the Hawthorn Group; and
- In-situ permanence of ISBS treatment in the Surficial Aquifer.

This information will be in forthcoming Beazer reports.

Beazer will be doing additional field work to investigate the possibility of off-Site DNAPL presence to the east and northeast of the former Process Area.

The Remedial Alternatives will be evaluated based on their ability to meet the stated Remedial Action Objectives and evaluations will be made in accordance with CERCLA-specified criteria. Your comments are being considered by the FS team. There will also be an opportunity for comment upon completion of the FS and upon proposal of a remedy.