UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 4
ATLANTA FEDERAL CENTER
61 FORSYTH STREET
ATLANTA, GEORGIA 30303-8960

October 25, 2006

Mr. Mike Slenska
Environmental Manager
Beazer East, Inc.
One Oxford Centre, Suite 3000
Pittsburgh, PA 15219-6401

SUBJECT: EPA Review of Recent Floridan Aquifer Reports and Plans for Additional Investigation in the Floridan Aquifer, Koppers Superfund Site, Gainesville, Florida

Dear Mr. Slenska:

The United States Environmental Protection Agency (EPA) is providing comments, with this letter, on two reports pertaining to the Koppers Site in Gainesville, Florida, recently submitted by Beazer East, Inc. EPA is also including two plans outlining additional Floridan aquifer investigation activities required for the Koppers Site.

EPA has reviewed two reports submitted by Beazer East that pertain to the Koppers Superfund Site in Gainesville, Florida. In the attachments to this letter (Attachments 1 and 2), comments are provided on the Supplemental Upper Floridan Aquifer Monitoring Well Installation – Addendum to the Floridan Aquifer Monitoring Plan (GeoTrans, July 26, 2006) and the Addendum to the Floridan Aquifer Monitoring Plan, Gainesville, Florida (GeoTrans, August 18, 2006).

Beazer's proposed plan for additional Floridan aquifer well installation and monitoring at the Koppers Site is presented in Section 4.0 of the Addendum to the Floridan Aquifer Monitoring Plan, Gainesville, Florida (GeoTrans, August 18, 2006). EPA does not concur with several components of the proposed plan, including some of the objectives, proposed locations of additional monitoring wells, monitoring constituents and monitoring frequency. To be used in lieu of Beazer's proposed plan, EPA has developed a plan for additional well installation and monitoring in the Floridan aquifer, which is provided in Attachment 3. EPA is also providing a plan in Attachment 4 for conducting pumping tests to be conducted at the Koppers Site. EPA anticipates that data from the pumping tests described in Attachment 4 will be used to estimate Floridan aquifer hydraulic characteristics, evaluate contaminant concentration trends and capture zones, and to generally assess the potential for groundwater restoration. EPA requests that Beazer implement both plans (Attachments 3 and 4) at the Koppers Site as soon as possible.

It is anticipated that a meeting or conference call with Beazer, EPA and other Stakeholders may be necessary to discuss the Floridan plans in more detail. Please contact me at (404) 562-8776 to discuss these issues.

Sincerely,

Amy L McLaughlin

Amy L. McLaughlin
Remedial Project Manager

Enclosures:
(1) Attachment 1: EPA Comments on the Supplemental Upper Floridan Aquifer Monitoring Well Installation – Addendum to the Floridan Aquifer Monitoring Plan
(2) Attachment 2: EPA Comments on the Addendum to the Floridan Aquifer Monitoring Plan
(3) Attachment 3: Floridan Aquifer Well Installation and Monitoring Plan
(4) Attachment 4: Required Pumping Tests

Attachment 1
EPA Comments on the Supplemental Upper Floridan Aquifer Monitoring Well Installation—Addendum to the Floridan Aquifer Monitoring Plan, Koppers Inc. Site, Gainesville, Florida (July 26, 2006).

1. Section 4.2 on page 35 includes the statement "geologic core samples from the UTZ demonstrate that the total porosity for this formation is high and approaching that of an unconsolidated alluvial silty-sand deposit." The text then states "...it would be reasonable to assume that the average effective porosity for this formation is in the range of 10 to 15 percent, consistent with the GeoTrans fate and transport model analysis." There has been no quantitative determination of the porosity of the geologic materials encountered at the Site. The estimation of the effective porosity in this report is based on professional opinion. The report compares the porosity of the geologic materials encountered during this drilling program to a non-carbonate material such as a silty sand. Such a comparison is perhaps incorrect. In clastic depositional environments, there is commonly a grain-size sorting process that results in the deposition of grains of more or less equal size in discrete layers. The generally unconsolidated carbonate sediments encountered at Koppers may not have been subjected to such a grain-size sorting process. There is the potential for the encountered geologic materials to consist of primarily very poorly sorted carbonate sediments, with fine silt and clay-sized particles filling in the interstices between larger grains, unlike a better sorted non-carbonate silty sand. Although grain size distribution has not been determined on the samples obtained during this investigation, the observation of some of the retrieved aquifer materials indicates there was probably a very poorly sorted material present in some of the cores, a condition that would result in a relatively low porosity. Thus, rather than the 10 to 15 percent porosity value listed in the report, it is conceivable that the overall porosity of the UTZ may be only a few percent.

The true porosity of the geologic materials can be estimated in at least two ways, if a more exact estimate of the porosity is needed. One way would be to perform a series of grain size analyses on collected core samples, and after determining the grain size distribution, using some empirical relationships between sorting and porosity to estimate the overall porosity of the aquifer. A second approach would involve determining the aquifer storage coefficient from a pumping test, then using the relationship $S = \theta? \gamma? b(\frac{1}{BE})$ (Lohman 1972, equation 22) and the determination of barometric efficiency $BE = \frac{\gamma \Delta h}{\Delta p_a}$ (Todd, 1980, equation 6.6) to estimate the porosity, where:

S is the storage coefficient
$\theta?$ is the porosity
$\gamma?$ is the specific weight of water
b is the aquifer thickness
is the inverse of the bulk modulus of elasticity of water
BE is the barometric efficiency
$\Delta?h$ is the change in hydraulic head

and $\Delta?pa$ is the change in atmospheric pressure.

Regardless of what method is used, without any such method, EPA's position is that the average porosity of the UTZ of the upper Floridan aquifer at this site cannot be adequately approximated (within ± 5 percent) based on the available data. It is most likely to be in the range of 1% to 20%, based on a combination of modeling analyses and observations of the geologic material present in cores from the Koppers monitoring well cores.

2. On page 36, in the third paragraph of Section 4.3, the report states that the low hydraulic gradient noted at the site "...is an indication that the transmissivity...value of the UF Aquifer is moderately high and consistent with the value used in the GeoTrans numerical model." The low hydraulic gradient is an indication of a moderately high transmissivity. The gradient does not indicate that the transmissivity is consistent with that used in the model. There is no way to determine the validity of the transmissivity used in the modeling analysis from the hydraulic gradient at anything more than an "order of magnitude" level.

3. Sections 4.4 and 4.5 of the report present several statements that are questioned or disputed by EPA. While not requesting that specific changes be made to the text, the following points of disagreement or potential disagreement are noted:

- The text refers to the absence of widespread contamination when the lateral and vertical extents of the areas of more significant contamination noted in the initial sampling have not been determined. The use of the term widespread is entirely qualitative and subjective.

- Sampling following the data collection reported in this document has revealed more significant contamination than was apparent from the initial monitoring of the multilevel wells. The most likely cause for this discrepancy is the presence of residual water introduced during well construction, which has either been removed through further well development/sampling or has been dispersed through the aquifer and is thus of less significance in the water quality results. Subjective terms defining contaminant concentrations such as "low" may have some relevance for the initial sampling event but have been or may be invalidated by further sampling.

- The text refers to the "drag down" element as being responsible for the water quality observed in FW-6, the well near the North Lagoon area that has had relatively high contaminant concentrations in previous samples. EPA accepts that some contamination noted in samples from FW-6 is related to "drag down." However, because of other factors, EPA does not accept that all of the FW-6 contamination is related to "drag down", and EPA intends to consider the most recent and future water-quality results from FW-6 as being representative of ground-water quality in the Floridan aquifer unrelated to the construction of that well.

- Section 4.4 text on page 40 indicates the water-quality data discussed in Section 4.5 "...supports the conclusion of a low vertical hydraulic gradient and minimal vertical mixing." EPA does not dispute the apparently low vertical hydraulic gradient in the

upper Floridan aquifer; however, it is clear from the monitoring data obtained as early as the initial sampling documented in this report that some areas of significant vertical movement of contaminants within the upper Floridan aquifer are present. Specifically, for example, the presence of significant organic contamination in zone 4 of FW-12B demonstrates vertical contaminant migration of at least 70 feet within the upper Floridan aquifer.

References

Lohman, S.W., 1972, *Ground-Water Hydraulics*, U.S. Geological Survey Professional Paper 708.

Todd, D.K., 1980, *Groundwater Hydrology*, Second Edition, John Wiley & Sons, New York.

Attachment 2
EPA Comments on the Addendum to the Floridan Aquifer Monitoring Plan, **Koppers Inc. Site, Gainesville, Florida** (August 18, 2006)

1. In Section 3.1 under the heading Potentiometric Surface and Hydraulic Gradients, the report states that the hydraulic gradient is an indication that the transmissivity of the aquifer is consistent with the value used in the GeoTrans numerical model. There is no means of verifying this statement on the basis of hydraulic head data alone. The hydraulic gradient is likely indicative of a fairly high hydraulic conductivity, as noted elsewhere in this discussion. However, how closely the actual aquifer transmissivity matches the model transmissivity is in some doubt.

2. Section 3.2.1 discusses organic contaminant concentration trends at well FW-6, which is the older well with the most significant concentrations of organic contaminants. The discussion concludes that concentration trends at FW-6 are consistent with the conceptual model of contaminant "drag down" during well installation. This point appears to have some validity when considering the water-quality data, with the exception of the benzene concentration (Figure 3-10), where the concentration peaked in the fourth sample collected from the well.

EPA accepts that some of the contamination noted in FW-6 samples is likely related to the "drag down" during well installation. However, there is also likely to be a component of this contamination that is unrelated to the "drag down" hypothesis. This statement is made on the basis of (1) the identified depth and magnitude of DNAPL, soil and ground-water contamination in the Hawthorn Group near FW-6, (2) the increase in benzene concentration noted from the first to fourth sample events, which is inconsistent with the "drag down" explanation, (3) the detection of significant concentrations of benzene and other contaminants in samples new multilevel monitoring wells at the Site and specifically FW-12B downgradient of FW-6, (4) the persistence of contamination at FW-6 despite nine sample events over two years, along with removal of a substantial volume of water during attempts to flush out contamination that may have been introduced into the Floridan aquifer during the construction of FW-6, and (5) the identification of "creosote-like odors" in cores from the upper transmissive zone of the Floridan aquifer (UTZ) when new multilevel monitoring wells were constructed in 2005/2006, indicating the presence of contaminants within the Floridan aquifer and unrelated to well construction. EPA therefore intends to consider the most recent and future water-quality results from FW-6 as being representative of ground-water quality in the Floridan aquifer unrelated to the construction of that well.

3. At the bottom of page 10, the text discusses the fluctuations in contaminant concentrations noted in certain zones and wells recently constructed as a part of the multilevel monitoring zone program for the Floridan aquifer. This discussion is correct in stating that a longer period of monitoring will be needed to establish concentration trends and to analyze contaminant fate and transport. The text also indicates that one explanation for the observed increases in concentrations between the first and second sampling rounds is that preferential pathways have been created for contaminant migration as a result of well construction. At this time, EPA is very concerned about the contamination that is being detected in several of the new

monitoring wells and either does not agree with the preferential pathway explanation or has a great deal of doubt that the preferential pathway explanation is a valid reason for the observed contamination in samples from the multilevel monitoring wells. Reasons for this position are as follows:

- At monitoring well FW-12B, the highest levels of contamination have been detected on three occasions from the two deepest monitoring zones. This pattern is inconsistent with an explanation of the contaminants being introduced to the aquifer via a preferential pathway. Creosote odors were also reported at depths well below the top of the Ocala Limestone in cores obtained when the well was drilled (Appendix A; Appendix B, GeoTrans, 2006). Thus, analytical results from FW-12B sampling are considered to be indicative of ground-water contamination in the upper Floridan aquifer unrelated to any well construction factors.

- At new well FW-20B, contamination has been more significant in the shallower monitoring zones during both March 2006 and July 2006 sampling events, and has increased between the March and July sampling events. This increasing concentration pattern is consistent with a preferential pathway explanation. The increasing concentration pattern is also consistent with the progressive flushing of water introduced during the well construction, with the later sample being more representative of ground water in the aquifer. It is also considered unlikely that significant vertical migration across a preferential pathway would have occurred at this monitoring well within a short time after the well was constructed. The March 10, 2006, samples from FW-20B contained detectable and in some cases significant concentrations of organic contaminants (GeoTrans, 2006, Table 4-3b) and field pH data (GeoTrans, 2006, Table 2-5) show no indications of grout contamination in the monitoring zones which are elsewhere identified as the hallmark of the preferential pathway explanation (Addendum Section 3.2.3). Note that FW-20B is constructed in a manner that would allow for ground water in contact with cement grout to mix with ground water in the upper Floridan aquifer in the absence of any preferential pathway. Thus a high pH measurement in an FW-20B sample could not be attributed to the preferential pathway explanation without any alternative cause being plausible. Furthermore, the boring log from FW-20B indicates creosote contamination was in the Floridan aquifer when this well was drilled (Appendix A, GeoTrans, Inc., 2006). Considering all of these factors, EPA considers the contamination detected in all samples from FW-20B as being indicative of ground-water contamination in the upper Floridan aquifer unrelated to any well construction factors.

- At FW-21B, there were no apparent creosote or other organic odors detected at depths below the third string of casing in the well and no moderate or strong creosote odors detected from relatively permeable materials for several feet above that depth (meaning that for the preferential pathway explanation to have validity, contamination would have probably had to have migrated from no lower than a relatively permeable zone in the upper part of the lower clay unit and then migrate along the outside of the lower part of

the third string of casing, then along the outside of another 10 ft + of the fourth casing string before reaching the uppermost Ocala Limestone). This preferential pathway scenario, while not impossible, is considered to be very improbable. Samples from all four zones of FW-21B contained measurable or significant organic contamination when the well was first sampled in March 2006 (Table 3-2b in the Addendum) and the pH of all zone ground-water samples was not indicative of the preferential pathway explanation for this initially observed organic contamination (see discussion of FW-20B result above for more on the pH-preferential pathway connection). Thus, it is obvious that some organic contamination is present in the Floridan aquifer at FW-21B. It also seems inconsistent with the PRP contractor's obvious concern about the preferential pathway issue and given the Floridan aquifer water quality from the initial FW-21B sample to have not obtained further pH data when FW-21B was resampled. The available data indicate that ground-water contamination in the UTZ at FW-21B is probably not a result of a preferential pathway explanation. This conclusion is reached on the basis of all of the information presented above for FW-21B data, along with the observed contamination at FW-12B and at FW-20B which clearly demonstrate the contamination of the Floridan aquifer at those locations.

Considering these points, EPA is requesting additional characterization of groundwater contamination near the identified areas of probable or confirmed significant groundwater contamination in the Floridan aquifer, as identified through the multilevel monitoring program. Further commentary on this point follows.

4. Section 3.2.3 discusses the concerns regarding preferential pathways from shallower, highly contaminated materials to the Floridan aquifer that may have developed as a result of monitoring well construction. The presence of such features is suggested by high pH ground water, which is not indicative of ground water anticipated in the Floridan aquifer. This point has some validity; however, it is unclear if such preferential pathways are the only means by which such high pH ground water would be observed. For example, monitoring well FW-6 (not discussed in Section 3.2.3) was constructed in a manner such that grout was lost to the Floridan aquifer (reference GeoTrans, 2004, Section 3.3.2.4). It is unclear why GeoTrans did not present previously monitored pH values for FW-6 in Section 3.2.3, especially considering that this well has been proposed to be abandoned (Section 4.3.3). Under these circumstances, it cannot be discerned if a high pH measurement is due to movement of water along the outside of a well casing or due to the influence of grout lost into the Floridan aquifer on the water quality in the immediate vicinity of the monitoring point. Older Floridan aquifer monitoring wells at the Site were not constructed with the diligence applied to construction of Floridan aquifer wells that included and followed FW-6. For example, logs of FW-2 through FW-5 (TRC, 2003) indicate these wells were installed with one conductor casing set into the upper part of the lower Hawthorn Clay and a 2-inch inner casing that ended in the very uppermost Floridan aquifer, with a bentonite seal of some sort that may have only been emplaced into the very lowermost part of the Hawthorn Group. This design contrasts with the construction details for FW-6 (quadruple casing).

Notwithstanding the possible flaws in well construction and high pH values recorded for some of the earlier Floridan aquifer monitoring wells at the Site, these wells all had initial pH values within the range of what would be expected for wells completed in the Floridan aquifer (reference Addendum Figure 3-18; also TRC, 2003). Considering this, it is important to note that some degree of contamination likely related to the Site was detected in the initial sample from all four Floridan aquifer wells constructed in 2003 on the Koppers property (reference TRC, 2003, Table3.3 and Table 3.2). Thus, it is reasonable to conclude that movement of contaminants from the Hawthorn Group into the upper Floridan aquifer is more widespread than what is implied in several written comments by the PRP or its contractors.

5. Section 4.1, paragraph 2 of the Addendum presents the objectives of the Addendum in terms of how data generated by the additional monitoring and well construction program will be used. As stated in the discussion, the data will be used "...to validate the accuracy of the numerical groundwater model, to refine the conceptual Site model and to provide sentinel water quality monitoring points for the UF aquifer to assure continued protection of the source of drinking water for the City of Gainesville..." These objectives do not include any mention of the need to investigate the nature and extent of contamination in the upper Floridan aquifer or to obtain actual data (as opposed to modeling results) that can be used to determine the potential movement of ground-water contaminants in the aquifer and to evaluate possible remedial strategies to address the contamination present. Thus, additional monitoring wells proposed in Section 4 are not intended to further define the extent of and monitor identified Floridan aquifer contamination closer to contaminant source areas, but are instead intended to serve as property boundary monitoring wells (reference Figure 4-1). While construction of wells to act as sentinel monitoring points has merit, it is not the sole issue of concern to EPA regarding Floridan aquifer contamination, and the identification of significant and/or increasing contamination at the Koppers property boundary is not necessary in order for EPA to require remedial action to address the contamination in the upper Floridan aquifer. With regard to the contamination in the Floridan aquifer, EPA has several goals, some of which are in addition to those goals apparently relevant to the PRP. EPA's goals specific to the Floridan aquifer include:

- Protection of the City of Gainesville water supply through monitoring and, if necessary, through remedial actions at the Site.
- Identification of the nature and extent of Floridan aquifer contamination beneath the Koppers property, and, if indicated, beneath the adjacent properties, including the former Cabot Carbon property.
- Evaluation of remedial actions potentially applicable to the Floridan aquifer contamination identified beneath the Koppers property.
- Remediation of ground water in the Floridan aquifer to attain relevant and appropriate standards and to meet any risk-based concentrations of concern, within the area of attainment (reference EPA, 1988) and subject to technical practicability of meeting such standards.

EPA's position is, therefore, that additional monitoring wells and the future Floridan aquifer monitoring program must be consistent with these four goals.

6. Section 4.3 proposes to eliminate seven of the nine existing Floridan aquifer single-zone monitoring wells (i.e. not multilevel wells) from the routine monitoring program. The rationale for elimination of these wells is presented as a redundancy concern (first paragraph of Section 4.3), rather than the concern about the wells functioning as a preferential pathway for vertical contaminant migration into the Floridan aquifer. Note that the text in this first paragraph of Section 4.3 proposes to retain the seven wells for water-level monitoring. This position is inconsistent with the elsewhere often-voiced concern about some, or perhaps all of these wells functioning as a preferential pathway for contaminant movement into the Floridan aquifer. Wells that are obviously or apparently a preferential pathway for contaminant migration into the Floridan aquifer need to be properly plugged and abandoned, rather than maintained for water-level monitoring purposes. Any such wells should be replaced with properly constructed multilevel monitoring wells, given the detection of significant Floridan aquifer contamination in wells closer to identified source areas and due to the lesser degree of Floridan aquifer contamination detected in older, single-zone wells where the preferential pathway scenario is not apparent (e.g. FW-7). The exception to this comment is for well FW-6 (see comments 2 and 8).

Based on the well construction details, age of the well, water quality, and the monitored pH, the Floridan aquifer wells that most likely represent a preferential pathway of concern are FW-3 and FW-5. Water-quality results from FW-3, in particular, are intriguing, because while some contaminants have decreased since the well was first sampled (e.g. naphthalene; reference Addendum Figure 3-4), and other contaminant have remained inconsequential in FW-3 samples (e.g. acenaphthene; reference Addendum Figure 3-5), other contaminants have "yo-yoed" up and down since the well was first sampled (e.g. phenol; reference Addendum Figure 3-121). Also of interest with regard to FW-3 is the fact that this well is more or less paired with lower Hawthorn monitoring well HG-8, where contaminant concentrations have been lower than in the FW-3 samples. The water quality data from the lower Hawthorn well compared to the FW-3 data appears to be at odds with the concern about FW-3 being a vertical preferential pathway. EPA believes that FW-3 and FW-5 may be preferential pathways, and EPA requests that a plan for abandonment of these wells should be submitted and that new UTZ multilevel monitoring wells be constructed to replace FW-3 and FW-5.

7. Section 4.3 proposes four new lower transmissive zone monitoring wells completed along or near the northern property boundary for the Koppers Site, and one new UTZ well completed in the same general area. These four wells meet some of EPA's goals identified in comment 5 above; however, they probably do not meet the EPA goal stated in bullet 2 of that comment. Therefore, EPA requests that, in addition to proposed additional monitoring wells located per this Addendum, additional wells be located in positions and at depths intended to define the vertical and horizontal limits to contamination of potential concern (concentrations above MCLs or above Florida ground-water cleanup target levels). Attachment 3 presents the well monitoring plan requested by EPA to be implemented by Beazer.

8. EPA does not wholly concur with the points made in Section 4.3.3 regarding the contamination detected in FW-6. EPA does accept the possibility that some of the contamination that has been detected at FW-6 has been introduced into the UTZ during FW-6 construction. However, EPA has also concluded that some of the contamination detected at FW-6 is due to contamination already present in the Floridan aquifer (see comment 2 above). EPA does not agree that "water quality results for monitoring well FW-6 are localized", if this statement is intended to convey the idea that there is an absence of contamination attributable to the North Lagoon moving away from FW-6. Data from FW-12B contradicts that point. EPA does not concur that water-quality data from FW-6 are of no technical use. EPA considers the most recent data from this well to mostly, if not entirely, represent ground-water quality in the UTZ unaffected by contaminant carry down and is considering the FW-6 data to be representative of the Floridan aquifer ground water unaffected by contaminant carry down. EPA also considers FW-6 to be a useful water-level monitoring point, particularly with regard to EPA's anticipated plans for aquifer testing to evaluate possible long-term or interim remedial strategies to address the observed Floridan aquifer contamination. EPA is, therefore, opposed to the abandonment of FW-6 at this time. The positions expressed in this comment are subject to further review as additional data indicate.

9. EPA does not concur at this time with the plan presented in Table 4-2 to reduce the sampling frequency of the multilevel monitoring wells to semiannually after the first year. After one year's worth of data are obtained from the wells, then changes to the monitoring frequency will be considered. Reduction in the monitoring frequency would be appropriate where data indicate that contamination is not detected or that it has been consistently below regulatory criteria of concern and is not increasing. Any changes to the monitoring frequency need to be accompanied by stipulated "trigger" criteria that allow for resumption of quarterly or more frequent monitoring should there be indications of increasing concentrations at a monitoring point. Where existing data indicate the presence of contamination of regulatory concern in the Floridan aquifer, EPA considers quarterly sampling to be too infrequent and is requesting that for those monitoring zones, sampling be altered to include two additional annual sampling events (6 samples/year).

10. Section 4.6 of the Addendum indicates that field measurements will not be routinely obtained. Where there are issues about the integrity of monitoring wells (in terms of yielding ground water representative of the water quality of the Floridan aquifer unaffected by well construction residuals or by leakage from overlying contaminated layers), field monitoring parameters that would be relevant to evaluation of sample integrity should be measured in water collected by the Westbay multilevel monitoring system. Also, until such time as a determination can be made that water-quality results are no longer representative of ground water influenced by water introduced during well construction, analysis of bromide in the water needs to be continued.

11. EPA requests that future ground-water quality monitoring data from this project be made available to the Agency as an electronic data deliverable in a format amenable to data manipulation (e.g. in a spreadsheet capable of being manipulated for statistical analysis, data plotting, et cetera).

References

EPA, 1988, *Guidance on Remedial Actions for Contaminated Ground Water at Superfund Sites*, EPA/540/G-88/003.

GeoTrans, 2004, *Data Report for Additional Investigation of Hawthorn Group DNAPL Source Evaluation for the Koppers Industries Property, Cabot Carbon/Koppers Superfund Site, Gainesville, Florida.*

GeoTrans, 2006, *Supplemental Upper Floridan Aquifer Monitoring Well Installation – Addendum to the Floridan Aquifer Monitoring Plan, Koppers, Inc. Site, Gainesville, Florida.*

TRC, 2003, *Addendum, Hawthorn Group Field Investigation Report, Cabot Carbon/Koppers Superfund Site, Gainesville, Florida* (report of August 2003).

Attachment 3
Plan for Additional Floridan Aquifer Well Installation and Monitoring

This plan presents EPA's requirements for additional monitoring in the Floridan aquifer. The conceptual model for the site is that there is a semi-confining unit 100 ft below the top of the UTZ, which separates the UTZ from the LTZ. However, none of the recently installed wells reached this semi-confining unit. Therefore, its existence and its depth are not known. In order to ensure proper construction of the new LTZ wells, and appropriate locations of sampling intervals in these wells, it is imperative that a test boring be drilled in an area to document the stratigraphy of the Floridan aquifer. This can be done by over-drilling one of the proposed UTZ wells.

1. Upper Transmissive Zone Well Locations and Specifications:

EPA requests that Beazer install and monitor additional UTZ multilevel wells at the Koppers site to determine the potential lateral extent of ground-water contamination in the UTZ extending away from identified locations where contamination has been detected or is likely present.

UTZ Well locations:

- One additional UTZ multilevel monitoring well to the northwest of the former North Lagoon (approximately halfway between FW-10B and FW-12B),
- Another UTZ multilevel well downgradient of FW-12B (roughly 250 feet north-northeast of that well, and roughly 300 feet east-southeast of FW-2).
- In addition to the UTZ wells listed above, EPA requests that Beazer install replacement (multi-level) wells for FW-3 and FW-5.

UTZ Specifications:

- Individual monitoring zones in each multilevel well need to be hydraulically isolated to the degree possible. Unlike the initial set of multilevel wells, if new UTZ wells are to be completed in general accordance with the alternative well design approved for UTZ monitoring (alternative design proposed in an October 17, 2005 letter from Jim Erickson of GeoTrans) intervals between monitoring zones need to be isolated by bentonite clay seals, rather than by the fine sand seals used previously and shown proposed on Addendum Figure 4-2.
- Sodium bentonite seals between screens.

2. Lower Transmissive Zone Well Locations and Specifications:

EPA requests that Beazer install and monitor LTZ multilevel wells at the Koppers site to evaluate potential contamination in the LTZ of the upper Floridan aquifer at positions near or downgradient of multilevel monitoring wells where contamination has been identified in the UTZ.

LTZ Well Locations:

- 5 new LTZ wells, located near the following "transect" monitoring wells: FW-11B, FW-

12B, FW-13B, FW-14B and FW-15B. Monitoring of these wells will provide a parallel encompassing ring of LTZ monitoring wells around identified areas of ground-water contamination in the UTZ.

LTZ Specifications:

- Multilevel monitoring LTZ wells constructed in a manner where individual monitoring zones are hydraulically isolated to the degree possible. The multilevel design proposed by EPA in the July 12, 2005, Revised Floridan Aquifer Monitoring Plan Addendum should be followed with regard to the alternating monitoring zone and isolation packer setup, if stratigraphic conditions permit.
- Case off UTZ.
- Use new UTZ wells to identify the top of the semiconfining unit and to define construction specifications for LTZ wells.
- Set lowermost isolation casing in LTZ wells into top of semiconfining unit.
- Construct LTZ wells in accordance with original plan (with Westbay in open hole).
- Construct LTZ wells with sample ports every 25 feet throughout the LTZ.

3. Sampling frequency: All Floridan monitoring wells (existing and proposed wells) should be monitored every two months for at least a year and until a clear trend is determined. After that, the monitoring frequency can be reevaluated.

4. Monitoring parameters: In addition to the monitoring parameters specified in EPA's July 12, 2005, Revised Floridan Aquifer Monitoring Plan Addendum, EPA requests that all existing and proposed Floridan monitoring wells be monitored for total metals (arsenic, chromium, copper and zinc), bromide, pH, and turbidity.

Attachment 4
Required Pumping Tests

Performance of pumping tests is needed at the Koppers Site at two locations to estimate Floridan aquifer hydraulic characteristics, contaminant concentration trends, capture zones, and generally assess the potential for groundwater restoration. EPA requests that Beazer conduct pumping tests in accordance with the requirements below.

1. Pumping Test Specifications:

- Each pumping well should be constructed with at least 2 screens so that separate portions of the Upper Floridan can be evaluated independently.

- Screens must be adequately separated (hydraulically) by annular seal (sodium bentonite, not fine sand).

- Isolation packers must separate the two screened intervals during tests of the upper and lower intervals.

- 6-8" diameter wells are needed to allow adequate pump size to stress the aquifer.

- Pumping wells should be installed in at least two locations. Proposed locations identified include one in the area between FW-6 and FW-12B, and one near FW21-B (see Locations of Pumping Wells below).

- It is critical that an adequate number of observation wells be located close enough to the pumping wells such that drawdowns can be measured with sufficient precision and accuracy to determine aquifer properties in all directions. Observation wells must be spaced closely enough to identify preferential pathways and anisotropy. Additional observation wells (piezometers) may be required in addition to existing and planned monitor wells.

- The response to pumping should be measured in the Hawthorn Group, as well, to evaluate hydraulic connection between Floridan and Hawthorn. Additional observation piezometers may be needed in the Hawthorn also.

- Geophysical logging should be performed in all wells to the extent possible; this includes caliper, Flow (static and pumping), Gamma, and Temperature.

- Analytical Data: Collect time series analytical data from Floridan & Hawthorn monitoring wells and the pumping wells. Parameters should include creosote constituents, pH, bromide and sodium and aluminum (sodium and aluminum to assess potential causes of elevated pH).

- Evaluate reinjection alternatives and disposal alternatives. Considerations include GRU treatment, NPDES discharge, and groundwater reinjection.

- The flow rate, total volume and level of treatment required for the pump test should be estimated prior to performing pumping tests. This will require preliminary hydraulic modeling.

- The capability of the GRU system to receive the pump test effluent will depend on the flow rate and total volume of water generated.

- Extracted groundwater may need treatment before reinjection. Beazer may not be able to extract/inject across aquifer boundaries.

2. Locations of Pumping Wells:

- Near the point on a line between FW-12B and FW-6 and due west of FW-20B;
- In the area between FW-21B, FW-16B, and FW-5;
- Final locations will depend on anticipated drawdown and K; locate in best position to use existing monitoring wells.

3. Data Collection:

- Determine Kz, Kx, Ky;
- Evaluate anisotropy (need adequate observation wells);
- Obtain data to evaluate pump & treat alternatives for long-term capture within the Floridan aquifer.