Beazer

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December 18, 2006

Ms. Amy McLaughlin
Remedial Project Manager
U.S. Environmental Protection Agency
Region IV, Superfund North Florida Section
61 Forsyth Street, SW
Atlanta, GA 30303-3104

Re: Transmittal of Beazer's Comments on the U. S. EPA letter entitled "EPA Review of Recent Floridan Aquifer Reports and Plans for Additional Investigation in the Floridan Aquifer, Koppers Superfund Site, Gainesville, Florida"

Dear Ms. McLaughlin:

Beazer East, Inc. (Beazer) is writing to provide a response to the October 25th letter developed by the United States Environmental Protection Agency (EPA) entitled "EPA Review of Recent Floridan Aquifer Reports and Plans for Additional Investigation in the Floridan Aquifer, Koppers Superfund Site, Gainesville, Florida." The October 25th letter included the following attachments:

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

Beazer's detailed response to each of these attachments is provided as Attachment A to this letter. As discussed in Beazer's November 20, 2006 and December 8, 2006 letters to the EPA, we believe that it would be prudent to meet following EPA's review of this letter and attachment.

If you should have any questions or require additional information, please contact me at 412-208-8867.

Sincerely,

Michael Slenska, P.E.
Environmental Manager

Attachments

cc: B. O'Steen, EPA
K. Helton, FDEP
J. Mousa, ACEPD
M. Brourman, BEI
L. Paul, KI
J. Erickson, GeoTrans

Attachment A—Response to EPA October 25, 2006 Letter

Response to Comments on 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).

Attachment 1, Comment 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 $S = \theta ? \gamma ? b\left(\frac{1}{BE}\right)$ *(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
θ? is the porosity
γ? 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
Δ?h is the change in hydraulic head

and Δ?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 a 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.

Response: EPA speculates that the unconsolidated carbonate sediments making up the Upper Floridan Aquifer may be poorly sorted with fine silt and clay-size particles filling in the interstices between larger grains, thereby reducing the porosity to as low as "only a few percent." The basis for EPA's estimate for porosity of only a few percent is unclear. Also, EPA changes the discussion from effective porosity to porosity without explanation. The core data, however, do not support EPA's speculation on porosity. As the logs in Appendix A (Supplemental Upper Floridan Aquifer Report, July 26, 2006) indicate, much of the Upper Floridan Aquifer is classified as Poorly Indurated Packstone (PIP) and/or Weakly Indurated Packstone (WIP). As defined on p. 3 of Appendix A, for PIP,

> "The majority of all clasts (silt to fossils) are disaggregated from each other (presumably due to solution weathering) giving the impression of unconsolidated clean to sandy gravel sediments. Much of the original matrix is preferentially dissolved creating substantial secondary coarse-grained porosity."

Thus, PIP is not poorly sorted and has porosity similar to that of coarse-grained porous media. WIP is similar to PIP but contains substantial fines and, hence, would have a lower porosity than PIP. It is common practice to estimate porosity and effective porosity from literature values for similar media. While this method is approximate, it indicates that PIP porosity is greater than a few percent as EPA has speculated.

A higher porosity value is further supported by grain-size analysis. Grain-size analysis was conducted in order to determine screen slot size and gravel pack for the Westbay wells. Samples were randomly selected from the Ocala limestone; the composite samples were from FW-14B (180 to 190 ft) and FW-12B (155 to 165 ft). The uniformity coefficient was 4.84 for FW-14B and 6.07 for FW-12B. According to Fetter (1988), the uniformity coefficient of sediment is a measure of how well or poorly sorted it is. A value less than 4 is well sorted, whereas a value greater than 6 is poorly sorted. The sediment analyzed in FW-14B is not poorly sorted, and the sediment in FW-12B is just slightly above the value of 6, but neither sample is very poorly sorted as EPA is stating in their comment. Recall that these were composite samples that contained both PIP and WIP, which likely explains the value of 6.07 for FW-12B. According to the geologic logs, FW-14B contained 75-80% unconsolidated PIP/WIP for the 180 to 190 ft interval with a Unified Soil Classification System (USCS) of GM/GW (dirty gravels/clean gravels).

FW-12B contained 70% unconsolidated PIP/WIP for the 155 to 165 ft interval with a USCS classification of GM/GW. EPA in their RCRA Facility Investigation (RFI) Guidance (EPA 530/SW-89-031) indicates in Table 10-4 that a USCS classification of GM corresponds approximately to an effective porosity of 20%. Thus, although some portions of the Upper Floridan Aquifer underlying the Site may have low-flow zones with lower porosity, the geologic logs and grain-size analysis of the dominant PIP material suggest that the porosity and effective porosity of a substantial portion of the Upper Floridan Aquifer is greater than EPA's speculation of a few percent for porosity. Given the heterogeneities of the aquifer material found within the Upper Floridan Aquifer beneath the Site, it would be impossible to quantify the effective porosity value within 5%, but it is clear from the geologic descriptions and the grain-size analysis that the effective porosity value should be on the order of 10 to 15%, not a few percent.

Attachment 1, Comment 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.*

Response: The low hydraulic gradient is consistent with a higher transmissivity. This statement is correct even assuming an "order of magnitude" level for transmissivity.

Attachment 1, Comment 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.*

Response: The observation that the majority of ports sampled had no detected Site constituents (or constituents that were below regulatory limits) supports the absence of widespread constituent plumes. Beazer agrees that the use of the term 'widespread' is qualitative and subjective; however, the use of the term "widespread" is intended to address the incorrect conceptual model, held by some Stakeholders, that constituent plumes were potentially present in the UF Aquifer beneath the four former source areas and that these plumes extended offsite. The water quality data from the monitoring well transect supports the conclusion that width of the constituent plume is less than the spacing of the transect wells (approximately 300 feet). Further, the nondetect to low levels of constituent concentrations in the majority of the transect wells and the fact that extensive development of the monitoring wells would have pulled constituents in from a radius of 10s to 100s of feet, support the conclusion that laterally extensive constituent plumes are not present beneath the Site.

Note also that EPA uses the term "widespread" in Attachment 2, Comment 4 to describe movement of constituents from the Hawthorn Group into the Upper Floridan. Here too, the use of "widespread" could be construed to be "entirely qualitative and subjective".

Attachment 1 Comment 3, Bullet 2:

- *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.*

Response: Beazer agrees that subsequent samples to the initial sampling at new wells are necessary to determine concentration trends. Beazer believes that this comment should also acknowledge another potential cause for temporal increase in constituent concentrations -- vertical leakage from overlying HG deposits. Beazer has stated in numerous reports and correspondence prior to the monitoring well construction that it is impossible to guarantee the annular grout isolation of the approximately 90-foot vertical hydraulic-head differential across the HG lower clay unit. As previously presented to the EPA in status meetings and in the GeoTrans report (August 2006), pH measurements from monitoring wells FW-3 and FW-5 support the conceptual model of impacts due to vertical leakage via the well bore annulus from the overlying HG deposits. Therefore, the EPA should also acknowledge that another "potential cause" for temporal concentration increases in UF wells that does not reflect natural groundwater flow conditions, is the potential short-circuiting of Site constituents into the UF Aquifer due to vertical leakage through the monitoring well annular cement grout.

Attachment 1 Comment 3, Bullet 3:

- *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.*

Response: Beazer agrees that "drag down" helps explain concentrations observed in FW-6. We also believe that some constituents observed downgradient of FW-6 may also, in part, be related to drag down at FW-6. Beazer has previously discussed three likely mechanisms to explain how constituent impacts are being spread to the Floridan Aquifer via wells: 1) Loss of drilling fluids; 2) Loss of drilling mud, similar to FW-6; and 3) Preferential pathway leakage via

incomplete seals in the annular cement grout. Additionally, because the action levels regarding the organic constituents are so low, it does not take much drilling fluid or mud loss impacted with NAPLs to cause concentrations above federal and/or Florida groundwater standards.

It is unclear why EPA is choosing to consider the most recent sampling event at FW-6 as "*..being representative of ground-water quality in the Floridan aquifer unrelated to the construction of that well*" given the approximately 500 gallons of impacted drilling fluid/mud that was introduced into the UF Aquifer at this location. Residual NAPLs that were potentially entrained in the fluids/mud would continue to act as a long-term source to dissolved-phase constituents at this location. In addition, pH readings over the past 2 years for this well have indicated the potential for on-going vertical leakage from overlying impacted groundwater in the HG deposits. Further, the EPA states in their own comment: "*..some contamination noted in samples from FW-6 is related to "drag down"*." Hence, monitoring well FW-6 has two potential sources of constituent impacts: 1) Drag down of impacted fluids/muds during construction and 2) On-going potential leakage outside of the casing grout seal. Given the uncertainty of water-quality results from this well, it is unclear how the EPA can arbitrarily establish that the most recent (June 2006) water-quality data from this well is now "*representative*" of UF Aquifer. Beazer believes that the historical and future water-quality data from monitoring well FW-6 are impacted from drilling fluid/mud "drag down" and that these impacts will continue to compromise water-quality data from this well. Beazer disagrees with the EPA position that "the most recent sampling event" for monitoring well FW-6 is representative of UF Aquifer groundwater and that this well will provide "representative" UF Aquifer data for future groundwater sampling events. As stated in Section 4.3.3 in the GeoTrans (August 18, 2006) and on page 49 of the GeoTrans report (July 26, 2006) report, "*Beazer strongly recommends that this well be abandoned as soon as practical.*" Beazer continues to believe this recommendation is appropriate because it is not representative of UF Aquifer water quality conditions and because it is potentially an on-going source of impacts to the UF Aquifer.

Attachment 1 Comment 3, Bullet 4:

- *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.*

Response: Section 4.4 is titled "Permeability of Annular Backfill Material" and addresses the issue of preferential vertical flow within the annular backfill material. The quote referenced in the EPA comment above is addressing the issue of vertical flow within the annular backfill material and not the issue of vertical flow and mixing within the UF Aquifer, in general. This quote is referencing the fact that water-quality data for the individual sampling zones within a well supports the conclusion that vertical mixing is not occurring through the annular backfill

material. It is not addressing the issue of vertical mixing due to natural hydraulic gradients within the UF Aquifer.

Beazer agrees that there is a low vertical hydraulic gradient within the Upper Floridan Aquifer; however, we have always expressed the conclusion that vertical mixing with the UF Aquifer was highly probable. This is one of the primary reasons that Beazer objected to the use of a multi-level sampling system in the UF monitoring wells because it would be difficult to isolate specific zones due to the vertical hydraulic connection present within the UF Aquifer. The vertical hydraulic-gradient direction is downward within the UF Aquifer. There is approximately 4 feet of hydraulic-head differential across the semi-confining unit, which separates the UTZ from the LTZ. Because of this hydraulic-head difference, analytical equations such as Darcy's law, predicts that groundwater will migrate from the top of the UTZ to the base of the UTZ and ultimately into the LTZ. The natural vertical flow of groundwater will result in vertical mixing of constituents within the UF Aquifer. In addition to the vertical hydraulic gradients, the heterogeneity of deposits will help to disperse constituents both vertically and horizontally within the UF Aquifer.

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

Attachment 2, Comment 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.*

Response: The statement that the low hydraulic gradient is consistent with a relatively high transmissivity similar to that used in the groundwater flow model is a correct statement. The groundwater model was calibrated against all available data including numerous water-level measurements. As a result, the calibrated transmissivity is reliable and a reasonable estimate of the actual UF Aquifer transmissivity. Although there is uncertainty in the transmissivity estimate, as there is in any model application, the doubt that EPA expresses concerning the accuracy of the model versus actual aquifer transmissivity values is unsubstantiated.

Attachment 2, Comment 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.

Response: Please see our response to Attachment 1, Comment 3, Bullet 3. Note also that cross contamination can occur after the well is constructed, as well as during the drilling process. Beazer has gone to great lengths to drill monitoring wells that minimize the potential for cross contamination, but there is no way to insure that no cross contamination will occur. This is of particular concern for wells that penetrate the HG lower clay unit. For this reason, installing UF Aquifer monitoring wells in DNAPL source areas at the Site is not recommended. It is also noteworthy that after the benzene concentration peaked during the fourth sampling event at FW-6, the concentration of benzene has steadily declined and was below the Federal MCL on 9/25/2006.

Attachment 2, Comment 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:*

Response: Beazer acknowledges that a few ports within the Westbay wells had detections greater than regulatory limits that are difficult to explain; however, a significant conclusion in the GeoTrans (July 26, 2006) report is that

> "*Organic constituents were either non-detect or below the Federal MCL drinking water standards, with the exception of low levels of benzene in two monitoring zones; and Organic constituents were either non-detect or below the Florida GCTLs concentration limits in 59 of the 64 monitoring zones.*"

The contaminant mass flux passing through the transect made up of monitoring wells FW-10B through FW-16B is low and is being attenuated as it migrates hydraulically downgradient. Nevertheless, Beazer has proposed and intends to perform further characterization of the Upper Floridan Aquifer to help define and resolve the observed detections.

Attachment 2, Comment 3, 1st Bullet:

- *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.

Response: The discussion on page 10 does not attribute impacts observed in monitoring well FW-12B with vertical leakage via a preferential pathway through the annular cement grout seal. The presence of organic impacts in the deeper two zones of this well and the general absence of impacts in the two shallow zones of this well eliminates this as a potential conceptual model. The following statement from the paragraph at the bottom of page 10 is addressing source areas wells (FW-20B and FW-21B): "*Alternatively, the increase in concentration may reflect vertical migration along the well casing from overlying impacts in these source areas. The technical concern of creating preferential pathway as a result of installing monitoring wells within the source areas was detailed in the GeoTrans (2004a) workplan.*" Beazer concurs with the EPA statement in this 1st bullet: "*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.*

Attachment 2, Comment 3, 2nd Bullet:

- *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.*

Response: The 2nd and 3rd sentences of this bullet concurs with the two potential conceptual models presented in the GeoTrans report to explain concentration fluctuations observed in the

two source areas wells (FW-20B and FW-21B). This bullet then goes on to state: "*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 EPA does not provide any basis for this conclusion. An estimate of the volume of water that could flow through a gap outside of the annular cement grout can be calculated from analytical groundwater flow equations. Based on these calculations, an incomplete annular cement seal can transmit 100s to 1,000s of gpd. These types of calculations demonstrate that a significant volume of impacted groundwater can be introduced into the UF Aquifer through relatively small and continues gaps on the outside of the well casing. Hence, contrary to this statement, significant volumes of groundwater can be introduced into the UF Aquifer over relatively short time periods because of imperfections in the annular grout seal. This is one of the reasons that Beazer recommends limiting the number of wells in and near potential source areas.

Attachment 2, Comment 3, 3rd Bullet:

- *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 EW-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 resarnpled. The available data indicate that groundwater 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.

Response: Based on the discussions above for bullets 1 and 2, it is not clear how the EPA could reach the conclusion that preferential pathways are not present in the grout seal for well FW-21B

or any other UF well at the Site. There are insufficient data with which to definitively reach this conclusion. It is Beazer's position that the potential for preferential pathways exists for UF monitoring wells.

Groundwater pH data were not collected for the recent wells with Westbay systems because the sampling equipment limits the collection of these data. Further, the Westbay system does not allow for the use of a flow-through cell for the collection of field parameters. Therefore, samples collected with the Westbay system would have to be transferred to a separate container prior to making these measurements. The act of transferring the samples would result in degassing and oxygenation of the water sample, potentially invalidating the pH, DO and possibly ORP measurements.

Attachment 2, Comment 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, Table 3.3 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.

Response: This comment is specific to report Section 3.2.3, which discusses the potential for vertical leakage into the UF Aquifer from preferential pathways resulting from well construction. Section 3.2.3 concentrated on pH data obtained from monitoring wells FW-2 through FW-5,

because the well construction for these wells consisted of cement grout above the HG lower clay unit, with no cement grout below this unit. Hence, these were the only wells at the Site where it was possible to identify the source of this high pH groundwater as possibly originating from above the HG lower clay unit. With the quadruple-cased wells, cement grout was installed to the top of the UF Aquifer; therefore, it is not possible to correlate high pH groundwater with vertical leakage from above the lower clay unit. This is the reason for not discussing monitoring wells FW-6 and FW-10B through FW-23B in this report section.

The last two sentences in this comment state the following: "*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, Table 3.3 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*".

The intent of these two sentences is unclear, but Beazer believes they may be intended to imply that there is a relationship between the initial detections of low constituent concentrations in well FW-2 through FW-5 during the early sampling events, to evidence of "widespread" dissolved-phase impacts due to the natural migration of constituents through the HG lower clay unit. The temporal water quality data for these wells over the past 3 years clearly show that the low constituent concentrations detected in these wells were likely due to "drag down" during construction. The fact that constituent concentrations in these wells are all essentially nondetect, with exception of select constituents in FW-3, supports the "drag down" conceptual model for these detections. For the EPA to draw the conclusion that the initial samples from these wells are an indication that "*..movement of contaminants from the Hawthorn Group into the upper Floridan aquifer is more widespread..*" is contrary to more than 2 years of data that show little to no organic impacts in these areas. The water-quality data from the recently installed wells (FW-10B through FW-23B) further demonstrates that constituent impacts are not "widespread".

Attachment 2, Comment 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.

Response: GeoTrans (August 18, 2006; Monitoring Plan) refers to GeoTrans (July 26, 2006; Monitoring Well Installation) in Section 1.0 indicating that "The locations and rationale for five additional monitoring wells were previously discussed..." As indicated in Section 1.0 of the GeoTrans (July 26, 2006) report, Beazer essentially implemented the Revised Floridan Aquifer Monitoring Plan Addendum ("Plan") as specified by the EPA. By implementing EPA's plan, Beazer implicitly incorporated any and all goals and/or objectives intended by EPA. As the report title implies, the focus of the field effort was on establishing a comprehensive monitoring program (as stated in Section 1.1 of the GeoTrans (July 26, 2006) report). As has been discussed frequently with EPA, one of the goals of the monitoring program is protection of the City of Gainesville's water supply. As further stated in Section 1.1,

> *"A second objective of the Floridan Aquifer monitoring program was to investigate the potential for groundwater impacts in the UF Aquifer downgradient of monitoring well FW-6 and beneath the four former source areas."*

Although this statement does not explicitly use the words "nature and extent of contamination", determination of the nature and extent is the intention of the above quote.

Furthermore, the Upper Floridan report refers to and incorporates the reference TRC (2004b), which is the Floridan Aquifer Monitoring Plan. The monitoring program was formally requested by EPA in correspondence to Beazer dated March 18, 2004. A draft Plan was submitted to EPA and review comments were received via EPA correspondence to Beazer dated May 19, 2004. As requested by EPA,

> *"The objective of the monitoring program is to collect data and determine ground water quality conditions and trends in the Florida Aquifer at and downgradient of the Site."*

Thus, the objective of the Floridan Aquifer report is consistent with that requested by EPA and has always included determination of the nature and extent of contamination in the Upper Floridan. EPA's suggestion to the contrary is without merit.

Attachment 2, Comment 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.

Response: Beazer is in agreement with the EPA on the need to abandon wells FW-3 and FW-5. The reason for abandoning these wells is that pH data indicate that vertical leakage may be occurring along the annular cement grout. Some degree of vertical leakage may be occurring in other wells at the Site; however, data are not available to conclusively demonstrate that leakage is occurring. Beazer does not agree with the EPA's position that new multi-level wells need to be installed to replace these wells. The recently installed transect and source zone monitoring wells, in addition to the five new wells to be installed along the northern property boundary, provide a comprehensive monitoring/investigative program and eliminates the need to

replace these wells. Further, the issue of preferential pathways is not just an issue for these older wells; it is also an issue with the recently installed quadruple casing wells in addition to future wells installed at the Site. There is no way to guarantee that an effective grout seal can be constructed across the HG middle and lower clay units. Because of this, it is critical that the installation of additional new wells be limited and that these wells be installed downgradient of the transect wells.

Beazer has proposed the abandonment of seven wells at the Site because of the recently installed multi-level monitoring wells. The wells proposed for abandonment are restricted to the upper 20 feet of the UF Aquifer and are located downgradient or side gradient of wells FW-10B through FW-23B. In addition, the EPA has previously expressed concerns that the older wells are not constructed to provide discrete zone sampling. Therefore, in the interest of eliminating monitoring wells that provide duplicate data to the multi-level sampling program, Beazer has proposed to remove these wells from the water-quality monitoring program. In addition, Beazer has proposed to abandon well FW-6 (See Section 4.3.3) because water-quality data from this well is compromised by the loss of impacted drilling mud in the sample zone. Contrary to the 1st paragraph under Section 4.3, monitoring well FW-6 will not be retained for water-level monitoring.

The wells have been proposed to be retained as water-level monitoring points to provide additional data on the potentiometric surface elevation at the Site. Site data are not available that conclusively establish that leakage is occurring; however, on-going vertical leakage in select wells is a likely probability that simply cannot be proven conclusively with the current data. Without specific data to document that vertical leakage is occurring via these wells, Beazer did not propose the abandonment of the wells. If the EPA would prefer that these wells be abandoned, Beazer would be willing to evaluate this option.

Attachment 2, Comment 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.*

Response: Please see responses related to Attachment 3. The purpose of Beazer's proposed wells was to determine the nature and vertical extent of contaminants observed in the few ports that had detections above regulatory limits and to establish a comprehensive long-term monitoring program for the LTZ.

Attachment 2, Comment 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.

Response: Please see responses to Attachment 1, Comment 3, Bullet #3 and Attachment 2, Comment 2. Given the loss of impacted drilling fluids/mud during well installation and the constituent concentration temporal trend, this well is clearly impacted and compromised for the collection of representative water-quality data. Therefore, as previously stated under Attachment 1, Comment 3, Bullet #3, and in the GeoTrans report (July 26, 2006) report, "*Beazer strongly recommends that this well be abandoned as soon as practical.*".

Attachment 2, Comment 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).*

Response: The presence of contaminants indicates the need to monitor; it has little to do with the frequency of monitoring, as EPA erroneously indicates. The frequency of monitoring is a function of how rapidly concentrations have changed based on historical monitoring and how rapidly concentrations are expected to change in the future based on the reasonably anticipated fate and transport of the contaminants. Historical monitoring (see i.e., Field & Technical Services 2006 Third Quarter Floridan Groundwater Monitoring Report) shows that concentrations have not changed significantly over time, with many trends showing a decline in concentrations. Thus, based on historical monitoring, a 2-month monitoring frequency, as suggested by EPA, is not warranted. Furthermore, fate and transport modeling, based on Site

data, indicates that changes in concentrations with time are not expected to be significant due to low groundwater gradients, natural attenuation and corresponding slow travel times. Thus, based on historical monitoring and expected future changes in concentrations due to fate and transport considerations, EPA's 2-month monitoring frequency is not substantiated on technical merits.

Beazer's proposed sampling frequency in Section 4.5 and Table 4-2 is quarterly for the 1st year and semi-annual for the 2 years thereafter. This sampling frequency is technically defensible based on observed temporal trends and constituent travel times. Therefore, Beazer proposes that the EPA reconsider the proposed sampling frequency for all wells, with the exception of wells FW-12B, FW-20B and FW-21B where the sampling frequency will remain quarterly until concentration trends stabilize.

Attachment 2, Comment 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.*

Response: Section 4.6 discusses the issues associated with the collection of sufficient sample volumes to measure field parameters with the Westbay system. In addition to these sampling issues, representative measurements of field parameters cannot be performed without transferring water from the Westbay sampling train to additional bottles for measurement. Multiple handing of water through these transfers will impact field measurement such as DO, pH and ORP. As such, Beazer has proposed to discontinue these measurements for Westbay system wells. Beazer does not feel that the collection of these field parameter measurements is technically justified given these sampling issues.

Beazer will continue to collect bromide concentration data for the near term and will evaluate the need for analysis in future sampling events on a well by well basis.

Attachment 2, Comment 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).*

Response: Beazer will provide EPA with future water-quality data in electronic format that is amenable to data manipulation, such as an Excel spreadsheet.

Response to Comments on Attachment 3
Plan for Additional Floridan Aquifer Well Installation and Monitoring

Attachment 3, Introduction: *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.*

Response: The test boring that EPA suggests drilling will not provide the intended information – stratigraphy yielding the depth of the semi-confining unit. The semi-confining unit is defined by its hydraulic response and is not identified by its stratigraphy. Further, it is not clear what is meant by "over-drilling one of the proposed UTZ wells". If "over-drilling" is intended to mean drilling through the UTZ into the LTZ, Beazer is opposed to this approach. Beazer is opposed to installing an open hole from the UTZ to the LTZ and creating a potential preferential pathway connecting these two water-producing zones in the UF Aquifer at any of EPA's proposed UTZ well locations at the Site. EPA has consistently taken the position that Beazer is responsible for all costs associated with investigation and remedy implementation at this Site. However, should EPA mandate activities such as "over drilling one of the proposed UTZ wells", we believe that EPA must be willing to accept responsibility for sharing in any increase in costs that may be necessary should the implementation of such mandated activities result in, or exacerbate, any environmental impacts at the Site.

Beazer would be willing to evaluate an off-Site location where a hydraulic test could be performed to evaluate the thickness and depth of the UTZ and LTZ.

Attachment 3, Comment 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 EW-IOB 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.*

Response: EPA has requested 4 new UTZ wells, including replacements for FW-3 and FW-5. The other two proposed UTZ wells would be located about halfway between FW-10B and FW-12B and about 250 ft north-northeast of FW-12B. The well proposed between FW-10B and FW-12B, based on discussions with the EPA, will be located half way along a line that connects FW-11B and FW-6. The well proposed to be located approximately 250 feet to the northeast of well FW-12B seems contrary to the EPA's assumption that impacts observed in well FW-12B are originating from the former North Lagoon area (see Attachment 2, Comments 2 and 8). If constituents detected in FW-12B are originating from the former North Lagoon, then the groundwater flow path from the North Lagoon would be to the northwest. Hence based on this conceptual model, the downgradient direction from monitoring well FW-12B would be to the northwest and not the northeast. The area to the northwest of FW-12B is currently being monitoring by wells FW-2 and FW-22B, in addition to the new monitoring wells FW-24B, FW-24C and FW-22C currently being installed in this area. Nevertheless, Beazer agrees that a new monitoring well should be installed to the northeast of well FW-12B. Beazer proposes that this new monitoring well will be paired with a new LTZ well as will be discussed in our response to Attachment 3, Comment 2 below.

Beazer has previously responded to the EPA request to replace monitoring wells FW-3 and FW-5 (see response to Attachment 2, Comment 6). Beazer feels that the EPA request to replace these wells is not technically justified given the extensive monitoring program currently in place and being constructed for the UF Aquifer. In addition, there is no technical justification to further compromise the protectiveness of the HG clay units in these locations.

Attachment 3, Comment 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, FW12B, 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 groundwater 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.*

Response: EPA has requested five new LTZ wells located near monitoring wells FW-11B, FW-12B, FW-13B, FW-14B, and FW-15B. Monitoring wells FW-11B, FW-13B, FW-14B and FW-15B are clean; that is, the vertical and horizontal extent of constituent impacts at these locations has been determined and there are no impacts. Given that the entire UTZ is clean at monitoring well locations FW-11B, FW-13B, FW-14B and FW-15B, there is limited technical justification for the installation of LTZ wells at these locations.

Conversely, dissolved-phase impacts observed in the lower sampling intervals in monitoring well FW-12B necessitate additional investigations downgradient of this area. The new UTZ and LTZ monitoring wells (FW-24B and -24C, FW-22C, FW-23C and FW-4C) currently being installed along the northern property boundary will help to establish the lateral and vertical extent of impacts observed in the FW-12B area. In addition to these new wells that are currently being installed, Beazer proposes to install two additional LTZ wells, approximately 250 feet to the north and northeast of monitoring well FW-12B. Paired with one of the LTZ wells will be a UTZ well (see response to Attachment 3, Comment 2) to further investigate the lateral extent of impacts in the monitoring well FW-12B area. Beazer is opposed to the EPA proposed installation of a LTZ well immediately adjacent to FW-12B because it is likely that the construction of this well could inadvertently introduce contaminants into the most permeable and transmissive zone of the drinking water aquifer for the City of Gainesville. In addition, the long-term issue of a LTZ well becoming a preferential pathway for Site constituents to the LTZ should give the EPA pause when considering the installation of this well in a known impacted area. The EPA should recognize that under CERCLA any person, including the agency, who contributes to the spread of constituents, may be responsible for the implementation, and/or costs, of investigation and remediation activities related thereto. In spite of the EPA's efforts to discount this technical issue (see Attachment 1, Comment 3; and Attachment 2, Comments 2, 3, 4, 6, 8;), actual water-quality data for wells FW-3, FW-5 and possibly FW-6 indicate this issue is real and possibly occurring currently at the Site. Hence, Beazer is not willing to place the LTZ at risk by installing a LTZ monitoring well in the immediate vicinity of monitoring well FW-12B.

Attachment 3, Comment 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.*

Response: Beazer is opposed to a 2-month sampling frequency because it is not technically justified (See the response to Attachment 2, Comment 9).

Attachment 3, Comment 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.*

Response: Beazer agrees with this comment and will modify the list of analytes in the GeoTrans (August 18, 2006) Addendum to the Floridan Aquifer Monitoring Plan. Beazer has previously addressed the issue of collecting field parameter data on pH and turbidity (See response to Attachment 2, Comment 10).

Response to Comments on Attachment 4
Required Pumping Tests

Attachment 4, Introduction: *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.*

Response: The EPA is requesting that two individual pumping tests be performed to "*estimate aquifer characteristics, contaminant concentration trends, capture zones, and generally assess the potential for groundwater restoration*". The justifications for performing this aquifer test appears to be based on an assumption by the EPA that a pump-and- treat system is needed for the Floridan Aquifer. The data collected from this aquifer test will not be used to evaluate the vertical and horizontal extent of impacts, if present in the UF Aquifer. The data will not be used to better calibrate the fate and transport model, because the volume of aquifer affected by this test will not be large enough meet the Representative Elemental Volume (REV) for the model. The revised FS for the Floridan Aquifer has not been completed, yet it appears that the EPA has decided that site-specific data for the design of a pump-and-treat system is needed. Beazer agrees that an aquifer test would be needed, if the selected remedy for the Floridan Aquifer is a pump-and-treat system; however, it has not been established that impacts to the Floridan Aquifer require such a remedy. The collection of site-specific data to design a remedy prior to even establishing if this remedy is needed is premature and inconsistent with the procedural steps required of EPA in the National Contingency Plan, 40 C.F.R. Part 300. Beazer recommends that the EPA allow Beazer the time to complete the investigation of the Floridan Aquifer prior to requiring the design of a pump-and-treat system.

Beazer is also concerned with the EPA's proposal to perform these aquifer tests beneath former source areas at the Site (FW-21B area). In addition, to the issue of storing, sampling and potentially treating this groundwater, if impacted, there is also the issue of spreading dissolved-phase constituents over a larger area beneath the Site. The monitoring well transect and source areas wells have been in place for less than 1 year. Insufficient temporal data have been collected to establish constituent concentration trends at these wells. In addition, it is not clear if the impacts at these wells are due to natural migration of constituents or if these impacts are due to preferential pathways as a result of the well installation. Without a longer monitoring period and a more complete evaluation of the data from these recently installed wells, it would be premature to hydraulically stress the aquifer in these areas. Hydraulic tests in these areas would have the potential of spreading the constituent plume, if present, into previously non-impacted areas potentially compounding the problem. Similarly, performing an aquifer test downgradient or side-gradient of impacted areas could spread impacts to much larger areas within the Floridan Aquifer. Currently, constituent impacts in monitoring wells FW-20B and FW-21B appear to be restricted to the upper two sampling zones. Performing an aquifer test that stresses the lower portion the UTZ would spread these constituent impacts to the base of the UTZ and potentially accelerate their migration into the LTZ. Beazer has consistently and repeatedly raised the issue with EPA of the potential spread of constituents to and through the Floridan Aquifer due to EPA's insistence on gathering data while ignoring the obvious risks to the Floridan. EPA has

consistently taken the position that Beazer is responsible for all costs associated with investigation and remedy implementation at this Site. However, should EPA mandate activities such as UF Aquifer pump tests in the source areas, we believe that EPA must be willing to accept responsibility for sharing in any increase in costs that may be necessary should the implementation if such mandated activities result in, or exacerbate, any environmental impacts at the Site.

Until the Floridan Aquifer investigation is complete and sufficient data have been collected to more fully understand constituent concentrations in the select monitoring wells with impacts, Beazer is opposed to performing pumping tests beneath the Site. Additionally, Beazer believes that the pumping test approach outlined by EPA would require a number of clarifications before a detailed workplan could be prepared for the implementation of such a test. The remaining comment/response discussion explores these issues.

Attachment 4, Comment 1, 1st Bullet:
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.*

Response: As stated in our introductory response to this comment above, Beazer is opposed to conducting aquifer pumping tests at this time. In addition, this comment indicates that the pumping well should be constructed with two screens in the Upper Floridan. It is not clear from this bullet if the two screens would be located within the UTZ or if the well will be screened in the UTZ and LTZ. Beazer is opposed to designing and constructing a pumping well that is open to both the UTZ and LTZ. As previously stated, Beazer is opposed to performing a pumping test that would potentially spread constituents vertically to deeper zones within the UTZ and/or to the LTZ.

Attachment 4, Comment 1, 2nd Bullet:

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

Response: Beazer agrees with the need to separate screen intervals with a bentonite grout seal, if a multiple-screened well is to be used for an aquifer test.

Attachment 4, Comment 1, 3rd Bullet:

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

Response: Beazer agrees with the need to separate the screen intervals with isolation packers, if a multiple-screened well is to be used for an aquifer test.

Attachment 4, Comment 1, 4th Bullet:

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

Response: Beazer disagrees with the need to install a 6- to 8-inch diameter well for an aquifer test. Well development performed on monitoring wells FW-10B through FW-23B demonstrated that the majority of the wells, which are screened across the entire UTZ, could not sustain pumping rates in excess of 50 gpm. Prior to designing and installing a 6- to 8-inch diameter well, Beazer would propose performing preliminary step-drawdown tests in UF wells in the vicinity of the test area. Depending on the results of these aquifer tests, the pumping well and submersible pump would be designed to match known conditions at the test location. In order to perform these tests, the Westbay systems would need to be removed, which would impact the on-going monitoring programs and characterization.

Attachment 4, Comment 1, 5th Bullet:

- *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).*

Response: See introductory response to this comment above concerning locating aquifer test wells in former sources areas and in areas of known impacts. In addition, if Beazer was performing these tests to collect data for the design of a pump-and-treat system, Beazer would conduct the tests in the area that the system would likely be constructed. At this time, it is not apparent that a pump-and-treat system is required at these locations.

Attachment 4, Comment 1, 6th Bullet:

- *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.*

Response: Beazer agrees that a few monitoring wells in close proximity to an aquifer test is a desirable test configuration. It is not clear from this comment what the EPA considers "adequate number of observation wells" and what is meant by "determining aquifer properties in all directions". Specifically, what aquifer properties need to be determined in all directions and what analytical methods does the EPA propose to determine these properties? For example, Beazer is not aware of analytical techniques that can establish one of the more common aquifer properties, hydraulic conductivity, in the three principal tensor directions. Attempts have been made with limited success by some researchers to estimate the permeability ellipsoid (principal tensors) with numerical models. Another aquifer parameter that is commonly estimated from aquifer tests is storage. Beazer is not aware of storage being defined in all directions; yet based on this comment Beazer is being requested to measure it in "all directions". Effective porosity is another key aquifer property, but we are not aware of any method available to establish this

parameter with a pumping test. Further, we are not aware of any method for establishing effective porosity in "all directions". This comment requires additional explanation as to what is specifically being requested and whether these aquifer properties could realistically be determined from a pumping test.

The comment also states: *"Observation wells must be spaced closely enough to identify preferential pathways and anisotropy"*. It is not clear what the EPA means by "*identify preferential pathways*". A preferential pathway in the UF Aquifer could be a fracture, solution cavity, bedding plane or a more permeable layer. Previous discussions of preferential pathways in this comment letter were specifically directed at short-circuiting of impacted groundwater via the well through gaps in the annular cement grout. Beazer assumes that the preferential pathway referenced in this comment is for natural pathways within the Floridan Aquifer. Given this assumption, it is doubtful that a sufficiently dense monitoring well network could be installed to identify preferential pathways in the vicinity of the pumping well. These preferential pathways are likely to be fractures or solution channels on the scale of millimeters. It will be difficult to detect these features by measuring water-level in observation wells. In addition, what is the purpose of identifying these small-scale features and how will these data be ultimately used? If preferential pathways could be identified, they would be specific to that location. These pathways could not be inferred at other locations of the Site, nor could they be incorporated into the Site model.

Attachment 4, Comment 1, 7th Bullet:

- *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.*

Response: Beazer is opposed to installing additional HG wells in an attempt to measure responses to pumping in the Floridan Aquifer. The hydraulic-head differential across the HG lower clay unit is too large to effectively measure small hydraulic-head changes in the UF Aquifer. In addition, water-level data from HG and UF Aquifer wells, in conjunction with Site Model simulations, demonstrated that the lower HG deposits are essentially isolated from hydraulic-head changes in the UF Aquifer. Therefore, there is no need to install additional wells to document this.

An alternative approach to evaluating the hydraulic response in the lower HG deposits is to install transducers in select HG wells and UF Aquifer wells. The water-level change resulting from the Murphree Wellfield pumping and barometric pressure changes can be compared to observed changes in the HG wells.

Attachment 4, Comment 1, 8th Bullet:

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

Response: Geophysical logging could be attempted in any well with an open borehole completion; however, leaving the borehole open for an extended period of time will allow for inter-wellbore flow within the open interval.

Attachment 4, Comment 1, 9th Bullet:

- *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).*

Response: If pumping tests are performed, groundwater samples could be collected for analysis of constituents specified in this comment. However, Beazer requests additional clarification as to the need for sodium and aluminum water-quality data. It is not apparent how these data will be used to: "*assess potential causes of elevated pH readings*".

Attachment 4, Comment 1, 10th Bullet:

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

Response: Beazer agrees with this comment, if and when pumping tests are performed.

Attachment 4, Comment 1, 11th Bullet:

- *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.*

Response: As stated in the introductory response to this comment, Beazer proposes to conduct preliminary aquifer tests in existing wells prior to designing a larger-scale pumping test. In addition, Beazer will evaluate the need for numerical modeling to design the test.

Attachment 4, Comment 1, 12th Bullet:

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

Response: Beazer agrees with this comment.

Attachment 4, Comment 1, 13th Bullet:

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

Response: Beazer agrees with this comment.

Attachment 4, Comment 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.*

Response: Beazer is opposed to performing pumping tests in former source area locations and areas of known impacts (See response to Attachment 4, Introduction).

Attachment 4, Comment 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.*

Response: It is rare, if ever, that aquifer tests allow the determination of hydraulic conductivity in the three principal directions. Beazer requests that EPA provide information from other Superfund sites where the hydraulic-conductivity tensors in the x, y and z directions have been required and measured with an in-situ aquifer test. Further, there is no technical basis for attempting to collect these data at this Site. In theory, there are three principal hydraulic-conductivity tensors that define the permeability of geologic media. However, it is rare that attempts are made in the field to quantify these tensors (See response to Attachment 4, Comment 1).

References

Fetter, C.W., 1988, Applied Hydrogeology, Merrill Publishing Company, Columbus, OH (Second Edition), 592 pp.

U.S. Environmental Protection Agency (EPA), 1989. Interim Final RCRA Facility Investigation (RFI) Guidance, Volume II of IV, Soil, Ground Water and Subsurface Gas Releases, EPA 530/SW-89-031 (OSWER Directive 9502.00-6D) Waste Management Division, Washington, D.C. (May).

Add Beazer letter references, Addendum UFA report, F&TS report, etc.