

# Georgia Department of Natural Resources

2 Martin Luther King, Jr. Dr., S.E., Suite 1462 East, Atlanta, Georgia 30334

## Reply To:

Response and Remediation Program  
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Mark Williams, Commissioner  
Environmental Protection Division  
Judson H. Turner, Director  
Land Protection Branch  
Mark Smith, Branch Chief

January 20, 2012

## VIA E-MAIL AND REGULAR MAIL

**COPY**

Mr. Henry Wirth  
F.S. Associates, L.P.  
c/o Mr. Scott Laseter  
Kazmarek Geiger & Laseter LLP  
One Securities Center, Suite 201  
3490 Piedmont Rd NE  
Atlanta, Georgia 30305

Re: VRP Compliance Status Report, June 2011  
Hunting Creek Shopping Plaza, HSI Site No. 10832  
Conyers, Rockdale County, Georgia  
Tax Parcel ID: 075001034A

Dear Mr. Wirth:

The Georgia Environmental Protection Division (EPD) has reviewed the June 6, 2011, Voluntary Remediation Program (VRP) Compliance Status Report (CSR) submitted pursuant to the Georgia Voluntary Remediation Program Act (the Act). EPD does not concur with the certification statement that groundwater is in compliance with Type 1 Risk Reduction Standards (RRS), and we have noted the following deficiencies that must be addressed:

### Fate and Transport Modeling

1. According to the *BIOCHLOR: Natural Attenuation Decision Support System User's Manual Version 1.0* (January 2000), Biochlor assumes simple groundwater flow conditions and assumes uniform hydrogeologic and environmental conditions over the entire model area. Biochlor was used to predict fate and transport of the groundwater contaminant plume flowing southeast from the property toward the potential receptor (unnamed body of water located approximately 550' downgradient). The downgradient data point used in the model is monitoring well MW-6. According to Section 3.4, the similarity of groundwater elevations in the shallow monitoring well MW-5 and adjacent deep bedrock well MW-8 indicate connectivity between the residual soil and bedrock. This was verified during the installation of monitoring well MW-6. According to Section 6.3, while drilling to install MW-6, bedrock was encountered at 7' below ground surface (bgs) and groundwater was at 9' bgs. Therefore, groundwater has migrated through fractures and the water table is contained in the bedrock at this location. The Biochlor User's Manual states that the model should not be applied where vertical flow gradients affect contaminant transport. EPD questions the appropriateness of using the Biochlor model to predict fate and transport of the groundwater contaminant plume at this site. If transport in both residual soil and bedrock is to be considered, then at minimum, a numerical two-layer model should be used. Additionally, if flow in the bedrock is mainly along fractures, then modeling may not even be appropriate. The responsible party must provide justification for choosing Biochlor for fate and transport modeling and the conceptual site model must be updated to reflect this site-specific information.

2. Section 7.3 states in order to calibrate the model to the results of the last groundwater sampling event in 2010, the initial PCE source concentrations and model time were assumed to have occurred approximately 18 years ago. The calibration run and a discussion of how the model was calibrated must be submitted for EPD's review. EPD is concerned there are not enough downgradient data points to adequately calibrate the model. Five years of historical data are available for monitoring well MW-5; however, the concentrations fluctuate drastically with no significant decreasing trend. There is only one data point (<5 µg/L in April 2011) for the next downgradient well MW-6, which is screened into bedrock. EPD prefers the model be calibrated with an adequate data set from a minimum of 3 monitoring wells located along the centerline of the plume along the principal direction of groundwater flow.
3. Additional information must be submitted to justify the model inputs, which includes, but is not limited to, the following:
  - a. Seepage velocity: The seepage velocity used in the model was calculated using a hydraulic gradient and effective porosity values that are not appropriate for site conditions (see b and c below);
  - b. Hydraulic gradient: The hydraulic gradient was calculated between monitoring wells MW-1 and MW-7. The measured gradient between those wells is in an east-northeast flow direction. Section 3.3 and Section 6.4.1 of the narrative state that groundwater flow is interpreted to be in the southeast direction. The value for hydraulic gradient to be used in the Biochlor model must be along the principal direction of groundwater flow, which is towards the southeast. If multiple flow directions exist at the site, then the model must be run in all directions;
  - c. Effective porosity: Section 3.4 states that the effective porosity was assumed to be 15%, which is typical of Piedmont soils. However, the downgradient data point used in the model is from monitoring well MW-6, which is screened into bedrock;
  - d. Dispersivity values: References must be provided for the values used for dispersion;
  - e. Soil bulk density: A reference must be provided for the value used;
  - f. Foc: Further information must be provided regarding the collection of the total organic carbon (TOC) sample. According to the Biochlor User's Manual, the fraction organic carbon value should be measured by collecting a sample of aquifer material from an uncontaminated area. If unknown, a default value of 0.001 should be used;
  - g. Modeled area length and width: According to the Biochlor User's Manual, the plume length should be slightly larger than the final plume dimensions or should extend to the downgradient point of exposure. Modeled area length must be adjusted to demonstrate the maximum extent the plume will travel. EPD requests the location of the unnamed body of water located 550' downgradient of the property (i.e. the point of exposure) be plotted on the Distance vs. Concentration plots;
  - h. Source area concentration: According to the Biochlor User's Manual, the source term should be located at the point of the maximum measured plume concentration if source data is unknown. If PCE source concentrations are not available for the site, the source zone concentration should be set to the maximum detection of PCE in groundwater (2.9 mg/L in March 2008), not the most recent PCE concentration detected at MW-5 of 0.98 mg/L. Distance to the downgradient point of exposure should then be measured from this location along the principal direction of groundwater flow. Additionally, the source concentration and field data for comparison cannot be the same (0.98 mg/L);

- i. Source area width and thickness: A groundwater plume map and cross-section demonstrating how the source area width and thickness, respectively, were determined must be submitted; and
  - j. Source decay constant: The value of source decay constant is typically calculated by plotting contaminant concentrations in a source area versus time on a semi-log plot and determining the slope of the best fit line. Plotting the groundwater data for source zone well MW-5 at the Hunting Creek site over the last 5 years shows no significant decreasing trend in concentrations of PCE indicating a decaying source. Additionally, free phase or residual phase DNAPLs can act as continuing sources of groundwater contamination. Three separate monitoring events resulted in concentrations of PCE that were in excess of 1% of PCE's effective solubility, potentially indicating the presence of a source below the water table. Therefore, it may be more appropriate to run the model as a constant/continuing source. This would be much more conservative and protective of potential receptors. If the model, appropriately calibrated and verified by adequate field data, demonstrates the PCE plume will not migrate to the receptor, then the remedy would be acceptable.
4. The model projects the plume forward for a period of approximately 20 years. The concentration versus distance plots show the plume continues to migrate. EPD requests to continue projecting the model forward in time until the model shows the maximum distance the plume is expected to travel and then continue to project forward until the plume demonstrates it is diminishing in concentration and/or reaches asymptotic levels. EPD also requests generating concentration versus distance plots for future sampling events and comparing the model prediction to actual field data for model validation.
  5. According to the Biochlor User's Manual, sensitivity analyses are recommended when literature values are used or if there is uncertainty in an input parameter. Therefore, a sensitivity analysis of the model input parameters must be provided.
  6. A proposed uniform environmental covenant must be submitted to EPD that restricts groundwater use on the qualifying property because groundwater is not in compliance with any RRS.
  7. The 15-year and 20-year model runs indicate the plume will migrate off the qualifying property. Therefore, a uniform environmental covenant may be needed for the down gradient property(ies) or a groundwater monitoring schedule designed to validate the model's findings with regard to off-property groundwater contamination will be required. Any groundwater monitoring must be proposed in a groundwater-monitoring plan that is referenced in the uniform environmental covenant.

#### **Groundwater Sampling**

8. Only 4 groundwater sampling forms were submitted. These forms have no dates indicating with which monitoring event they are associated. Groundwater sampling forms, appropriately dated, for all samples collected January 2010 through May 2011 must be submitted.

#### **Slug Testing**

9. It is unclear how the well radius value was determined. For example, according to the monitoring well construction diagram, MW-5 is a 2-inch well with an 8-inch boring diameter. On the datasheet for MW-5, the value for well radius ( $R_w$ ) is shown as 0.25. EPD calculates an  $R_w$  value of 0.333 for an 8-inch boring. Clarification must be provided regarding the calculation of  $R_w$  for all wells in which variable head tests were conducted.

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10. The anisotropy ratio ( $K_z/K_r$ ) value shown on the datasheets is 1. This value infers the vertical and horizontal hydraulic conductivities are equivalent. Typically,  $K_r$  is greater than  $K_z$ , resulting in an anisotropy ratio value of 0.1. Clarification must be provided regarding the calculation of the anisotropy ratio for all wells in which variable head tests were conducted.

#### **Discrepancies**

11. Page 7-3 states the results of the total organic carbon (TOC) analysis for the soil sample collected at monitoring well location MW-7 is summarized on Table 6. Table 6 is the Summary of Indoor Air Testing Results. The TOC data is not on Table 6 nor was it found in any of the other tables.
12. Table 6 has a transposition error for the indoor air testing result listed for 2,2,4-Trimethylpentane in run HC-2: the data sheet shows  $0.47 \mu\text{g}/\text{m}^3$ , not  $0.27 \mu\text{g}/\text{m}^3$ .
13. Table 6 also shows the incorrect industrial comparison standard for dichlorodifluoromethane: it should be  $440 \mu\text{g}/\text{m}^3$ , not  $880 \mu\text{g}/\text{m}^3$ .

#### **Vapor Intrusion**

14. When indoor air sampling is conducted, the United States Environmental Protection Agency (USEPA) 2002 Draft Subsurface Vapor Intrusion Guidance recommends performing more than one sampling event and conducting ambient (outdoor) air sampling in conjunction with the indoor air sampling. Therefore, EPD is requiring an additional vapor intrusion sampling event. The sampling event must include, at a minimum, one indoor air sample from the former dry cleaner unit, an indoor air sample from two additional units that are representative of units in the building, and a concurrently collected outdoor air sample. Please note that EPD recommends performing sub-slab air sampling in conjunction with indoor air sampling to further distinguish exposures originating from the subsurface from those due to background sources.

F.S. Associates, L.P. must address these comments to EPD's satisfaction in order to demonstrate compliance with the provisions, purposes, standards and policies of the Act. EPD may, at its sole discretion, review and comment on documents submitted by F.S. Associates, L.P. However, failure of EPD to respond to a submittal within any timeframe does not relieve F.S. Associates, L.P. from complying with the provisions, purposes, standards and policies of the Act.

If you have any questions, please contact Jessica McCarron of the Response and Remediation Program at (404) 657-0485.

Sincerely,



David Brownlee, Acting Program Manager  
Response and Remediation Program

cc: Charles T. Ferry, MACTEC  
Hunting Creek Retail LLC