Georgia Department of Natural Resources

Environmental Protection Division-Land Protection Branch
2 Martin Luther King Jr., Dr., Suite 1054, Atlanta, Georgia 30334
(404) 657-8600; Fax (404) 657-0807
Judson H. Turner, Director

February 26, 2016

VIA U.S. MAIL AND E-MAIL

CSX Real Property, Inc.
c/o Mr. Samuel Ross, P.E.
Manager, Environmental Remediation
6737 Southport Drive South, Suite 100
Jacksonville, FL 32216

Re: Sixth Semi-Annual VRP Progress Report dated 1/27/2016
CSX Real Property, Hutchinson Island
Savannah, Chatham County, Georgia 30312
HSI #10101, Tax Parcel No. 1-0436-01-017

Dear Mr. Ross:

The Georgia Environmental Protection Division (EPD) has reviewed the Sixth Semi-Annual Progress Report dated January 27, 2016 (Progress Report #6). This report was submitted by your consultant AMEC Foster Wheeler in accordance with the schedule in the Voluntary Investigation and Remediation Plan (VIRP) and Application dated June 7, 2012 as approved by EPD on January 31, 2013.

In response to discussions between Ms. Carolyn Daniels of EPD and Mr. Steve Foley of Amec Foster Wheeler regarding the modeling effort in Progress Report #4, the comments below address the revised modeling effort documented in Section 3.0 and Appendix C of Progress Report #6. EPD has no other comments regarding Progress Reports #4 and #5. EPD's comments on Progress Report #6 are as follows:

1. Every revision to the groundwater contaminant fate and transport model submitted to EPD should be a stand-alone document, either 1) under separate cover from or 2) as an attachment to a scheduled submittal. The modeling effort documented in Progress Report #6 is not a stand-alone document that contains all necessary documentation for EPD's review. Please note the following:

   a. The sensitivity analysis results for the BIOCHLOR model input parameters, referenced as Table A in Progress Report #6, appears to have been omitted. Every input value used and shown on the model input sheets should be included in the analysis.

   b. A table summarizing all model input parameter values and their sources is needed. Page 15 of the Progress Report references a combination of field-measured parameters and literature values used in the model and then adjusted until the constituent distribution curves reasonably matched the groundwater conditions measured at the site. The source for all input parameter values should be clearly identified according to name and date of the submittal in which the field-derived values were reported and/or a reference for the publication from which literature values were obtained. Where field-measured and/or literature values have been manipulated, the measured or published baseline values (or range of values) before manipulation should be included for comparison purposes.

   c. Digital copies of the actual model program used to generate the output should be included for each model run presented in the submittal. These should be provided on compact discs with the electronic copies of the submittal.

   d. Contaminant plume and source dimensions used directly by the model or to estimate

specific input parameter values used by the model should be superimposed (*e.g.*, use colored lines with notations, *etc.*) on groundwater contaminant isoconcentration maps as justification for the values used.

e. The time vs. concentration graph used to initially estimate the source decay constant (least squares slope) used for both modeled pathways was referenced in Section 3.6 of Progress Report #6, but was not included as documentation. These graphs should be provided as justification for the source decay constant used in the model, even if the calculated value was manipulated during model calibration, for comparison to the final value used.

2. After the model has been properly calibrated, please compare predicted contaminant concentrations against at least one additional field-acquired groundwater analytical data set from another date a few years before or after the set used to calibrate the model and provide the associated input/output sheets as an initial validation of the calibration effort. The modeler should not have to change input values other than the groundwater analytical data, the date of sampling, and the model simulation time. In future submittals predicted concentrations should be compared to:

   - Actual analytical results acquired during future groundwater monitoring events, or
   - If additional groundwater monitoring is not anticipated or proposed for the site, then predicted results should be compared to at least one additional existing analytical data set for additional validation of the model.

   Please provide a table comparing actual contaminant concentrations and model-predicted concentrations for the calibration and validation runs. Note: *Do not recalibrate the model unless the requested table indicates predicted values are significantly less than the analytical data set values used for comparison.*

3. Please provide an explanation for using 70 years as the maximum timeframe for predicting future contaminant plume behavior at the site. Typically, once you have an adequately calibrated and validated model (see Comments 2 and 6), the following runs for each modeled pathway should be conducted:

   a. **Maximum Extent of Contaminant Plume(s):** The modeled timeframe should extend until the ammonia, nitrite and nitrate plumes cease to migrate and begin to retreat or reach asymptotic levels. Please provide output sheets representing: 1) the predicted year(s) that the ammonia, nitrite and nitrate plumes cease to migrate downgradient and 2) plume conditions on dates immediately before and after showing the plume migrating before and retreating afterward.

   b. **Maximum Acceptable Concentrations:** Using the calibrated and validated model, please:

      i. Manipulate source concentrations for ammonia, nitrite and nitrate to determine the maximum concentrations of each contaminant at the source area that will not result in an unacceptable impact at the point-of-exposure(s) (POE) and the downgradient property boundary, if not the POE. Copies of the associated input/output sheets for this model run should be provided to EPD.

      ii. Using the model run referenced immediately above, manipulate the modeled time to represent the remaining monitoring events to be conducted before submittal of the VRP Compliance Status Report (CSR) *and* five years beyond submittal of the CSR (in the event that it is determined that additional monitoring subsequent to removal from the HSI is necessary) to predict the maximum acceptable contaminant concentrations at each of the groundwater sampling locations along the plume centerline. Note that the modeled area length may also need to be manipulated in order for the model to show the

predicted contaminant concentrations at the specified monitoring locations.

4. The model input sheets provided indicate that the biotransformation yields of 0.79, 0.74, 1.64, and 0.45 were used by the model. These values are the default values representative of the degradation pathway for tetrachloroethene (PCE) and its daughter products. Please revise these values to reflect the degradation pathway modeled or provide an explanation of why these values do not need to be manipulated. The BIOCHLOR User's Manual (EPA/600/R-001008, January 2000), explains how to calculate the yield values for degradation pathways other than those for PCE and/or 1,1,1-trichloroethane.

5. Results for the modeled contaminant migration pathway to the north should be compared to the approved ecological criteria for surface water in the ditch to the north of the CSX property in addition to Risk Reduction Standards for a hypothetical drinking water well 1,000 ft downgradient of the edge of the plume.

6. Calibration of the northerly and southerly modeled migration pathways appear to be good based solely on the predicted no degradation contaminant concentration curves for 2015. However, the field-acquired nitrate concentration at the source for the northerly pathway was approximately five times the model-predicted concentration. EPD is deferring further comment regarding the results of the modeling efforts until Comments 1 through 5 of this letter have been adequately addressed.

7. Model input/output sheets associated with all model runs (calibration, validation and predictive runs) should be provided to EPD. Please ensure that the particular modeling run is clearly noted on the model input/output sheets.

These comments must be addressed to EPD's satisfaction in order to demonstrate compliance with the provisions, purposes, standards, and policies of the Voluntary Remediation Program (VRP) Act. Please respond to these comments in a response-to-comments format in the next VRP submittal, which is due by July 31, 2016. If you have any questions, please contact Carolyn L. Daniels, P.G. or Larry Kloet of the Response and Remediation Program at (404) 657-8600.

Sincerely,

David Hayes
Acting Unit Coordinator
Response and Remediation Program

c: Stephen Foley, PG, Matt Grostick, and Pat Harrison, AMEC Foster Wheeler
Henry Wood, Leidos
Jessica Hansen, Chevron
Ed Hallman, Hallman & Wingate
Mark Sprosty, SEDA

File: 242-0187 (HSI 10101)
S:\RDRIVE\LARRYK\CSX(POWE\VRP\VIRP6thRes - final.doc