From:	Robert Law
To:	LaPoma, Jennifer
Cc:	John Connolly; Peter Israelsson; Scott Kirchner; Willard Potter; Naranjo, Eugenia; James Wands; elizabeth.A.Franklin@usace.army.mil
Subject:	Re: Contaminant Partitioning
Date:	Tuesday, October 04, 2016 3:33:49 PM
Attachments:	IMAGE.png IMAGE.png IMAGE.png

The CPG acknowledges receipt of your email, will review and address the information provided by the Region.

Thank you.

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>>> "LaPoma, Jennifer" <LaPoma.Jennifer@epa.gov> 10/4/2016 3:15 PM >>>
Rob,

For the June 28, 2016 modeling meeting, the CPG prepared a memo (the attached PDF) detailing the proposed approach for representing contaminant partitioning, which is intended to address the observation that the suspended organic carbon in the LPR probably does not have enough time in the water column to reach equilibrium with the dissolved phase. Additional information on partitioning was provided in a memo (the attached WORD file) by the CPG for the September 20, 2016 modeling meeting. The approach showed promise in that it could represent a fraction of the contaminant resistantly sorbed while still allowing the remaining fraction to participate in equilibrium partitioning. Unfortunately applying the proposed approach to the data raises some concerns.

Figure 1 below presents the fraction dissolved computed from equation 13 of the CPG's June 2016 memo. The figure presents the measure dissolved 2,3,7,8-TCDD fraction from the hv-CWCM program on the X-axis and the value computed using equation 13 on the Y-axis. The partition coefficients and equilibrium fraction from the CPG memo were used in the calculation. Also plotted for reference is the average of the fraction dissolved from the data. The figure highlights two main concerns; 1) the computed dissolved fraction is nearly constant across all samples, and 2) the computed dissolved fractions are all less than the average of the data. Figure 2 presents similar information for the particulate phase computed with equation 15 from the June 2016 memo. The proposed approach results in a largely invariable particulate fraction that is greater than the average of the data. The significance of this is that the freely dissolved portion of the operationally defined dissolved fraction will be used as input to the bioaccumulation model.
An additional concern with the proposed approach is that detrital POC bound fraction for 2,3,7,8-TCDD would be at least 91% even at extremely low POC concentrations.

The proposed approach should be revised so that it better represents the variations in dissolved and particulate fraction from the measured data. The approach revision should start with adding a scale factor to the detrital POC partitioning terms of Equations 5 and 6 from the June 2016 memo and performing a sensitivity analysis to the ratio of $a_{\text{detrital POC}}$ to a_{phyt}. These values would be constrained by the following equation.

<!--[if !msEquation]-->

$$a_{POC} \times K_{OC} \times POC = a_{phy} \times K_{oc} \times [Algal\ POC] + a_{det} \times K_{oc} \times [detrital\ POC]$$

$$= \frac{C_P \times (1 + a_{DOC} \times K_{OW} \times DOC)}{C_{Td}}$$

<!--[endif]-->

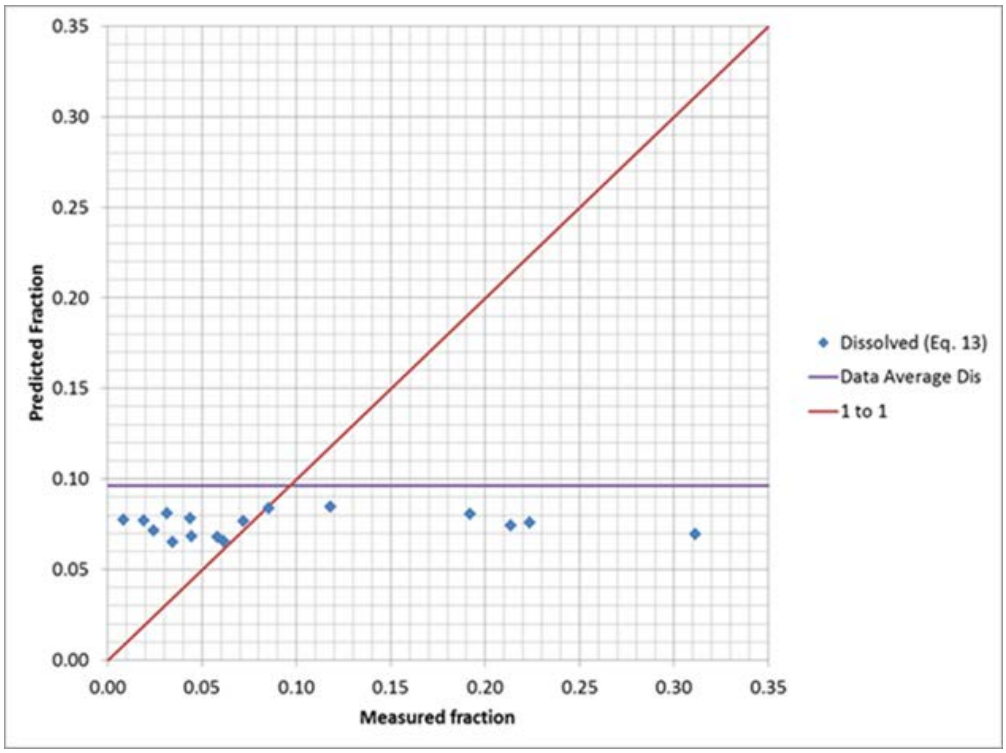

Figure 1. 2,3,7,8-TCDD Dissolved Fraction From Equation 13

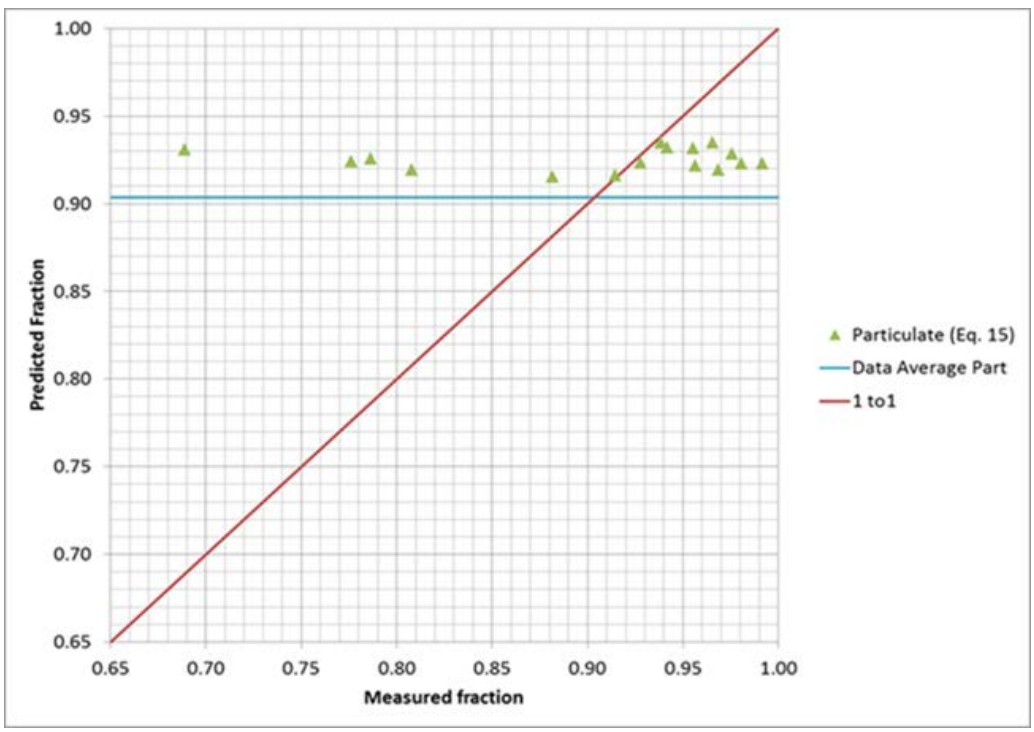

Figure 2. 2,3,7,8-TCDD Particulate Fraction From Equation 15

Please include those that are cc'ed on this email if there is a response.

Thank you,
Jennifer LaPoma