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Memorandum

Date: December 8, 2008

To: Peter Kozelka, Ph.D., US EPA, Region 9

Cc: John Craig, Tetra Tech, Inc.

From: John Hamrick, Ph.D., P.E.

Subject: Response to comments on "Los Angeles-Long Beach Harbors and San Pedro Bay Hydrodynamic and Sediment-Contaminant Transport Model" Report dated May 2008 and subsequent conference call presentation of June 30, 2008.

Introduction

This memorandum provides responses to comments by the Port of Los Angeles, Port of Long Beach, and Los Angeles County Department of Public Works. The responses are presented in topical form.

Response by Topic

Hydrodynamic and Salinity Calibration

Comments related to the calibration of the hydrodynamic and salinity transport component of the model focused on the used of data collected for the Dominguez Channel Estuary Model (DCEM) and the quality of the salinity transport calibration. Inherent in these comments was the suggestion that use of the PORTS wind data for POLA and POLB would have resulted in better model performance. It is useful to note that the results of the hydrodynamic and salinity calibration have been available since the distribution of an earlier version of the report in July 2006, but the comments being responded to in this document were not received until July 2008. With respect to use of the DCEM field data, both water surface elevation and current meter data collected

during that study were used in the calibration of the our model. Comparison between observations and model predictions for both water surface elevation and currents were based on least square harmonic analysis, which is the preferred and most rigorous quantitative methodology for tidal dominated processes. It is also noted that long-term sub-tidal sea level predictions were shown to agree extremely well with observations using time series error measures. All of these comparisons are documented in Chapter 5.

Salinity calibration for the greater harbors system is difficult due to the scarcity of salinity observations differing from the relatively constant dry weather ambient level of 34 practical salinity units (psu). The only data set identified having significant salinity responses has sparse spatial coverage (Figure 5). The data set does show significant salinity responses to high inflow events during the periods of December 2002 to March 2003 and December 2004 to March 2005 (Figures A-1 through A-20). It is agreed that the model predictions summarized in Figure 7 and presented in Appendix A do not indicate a high level of point by point agreement. Sensitivity tests not included in the report found that the salinity response at these stations was very sensitive to the Los Angeles River inflow which is provided by either observed flows or watershed model predicted flows. Comments suggest that use of the NOAA Ports wind data could have improved model predictions. The NOAA Ports observational system for Los Angeles and Long Beach Harbors began providing wind speed and direction data for seven stations in May 2005. Since these data spanned only 25 percent of the 2003-2005 simulation (i.e., the last eight months of the simulation period from May to December 2005) and did not cover the high freshwater inflow events during this period, they were not used in the current model configuration. In addition, during the period of May 2005 to December 2005, there were no salinity data to evaluate whether these data would improve model performance. However, they should be considered for use in potential updated model configurations if the simulation intervals are expanded into 2006 and beyond (when additional observational data may be available to further evaluate model performance). The POLA comments include a comparison of Figure 5 with salinity observations and predictions from an unspecified set of stations. Without detailed information on the station locations and time period, further commentary on the difference in results is not appropriate.

Contaminant Transport Calibration

Comments related to the contaminant transport calibration focused on estimation of equilibrium partition coefficients, selection of the period for comparison of model predictions and observations, and perceived dramatic disagreement between model predictions and observations. To clarify the estimation of partition coefficients, at the time of completion of the May 2008 draft report, only 2006 sediment bed data were available to directly determine bed partition coefficients (Tables 21 and 22). The lack of sediment concentration measurements corresponding to the 2006 overlying water column samples precluded direct estimation for water column partition coefficients. In this case, water column metals partition coefficients were approximated using the particulate to dissolve concentration ratios and an expected range of sediment concentration. The POLA 2005 mid-water column and POLB 2006 mid-water column data sets did not include TSS concentrations which would have allowed direct estimation of water column

partition coefficients. POLA provided additional 2006 and 2008 mid-water column metals data after the May 2008 draft report was completed. The 2006 data did not include TSS concentrations. The 2008 data included TSS concentrations and have been subsequently used to directly estimate water column metals partition coefficients, which tend to confirm the previous indirect estimates. Appendix E documents the analysis of the additional POLA 2006 and 2008 water column data and discusses its relation to the analysis in Section 7.3.

The calibration or performance evaluation of the contaminant transport model is based on a very limited set of water column observations, which include a total of four sets of observations in Los Angeles Harbor (two taken in 2005, one in 2006, and one in 2008) and a single set of observations in Long Beach Harbor in 2006. The 2006 and 2008 Los Angeles Harbor observations were not made available until after the distribution of the May 2008 draft report. The sparse temporal nature of the water column observations and the fact that they were collected during extended dry periods indicated that point in time by point in time comparisons yielded little insight. Instead, model predictions were averaged over a six month dry period in 2005. We agree that model predictions for specific contaminants are either over or under predicted, but the limited temporal extent of the data would tend to preclude calibration to match one or two observations over the course of a year.

Sensitivity analyses were conducted to gain insight into discrepancies in model predications and observations during dry weather conditions. The results indicated that the sediment erosion rate was the most sensitivity determinant of water column concentrations. The lack of extensive observational data sets to further define the erosion rate of fine silt, clay and associated organic matter limits the ability to reduce this sensitivity which would likely require use of spatially varying erosion rates.

Subsequent to the distribution of the May 2008 draft report, a long-term, four year simulation was conducted to evaluate model response to wet weather events and demonstrate event time scale response to watershed load reductions. The complete results for these simulations are included in Appendix D of the revised report.

Remediation Application of the Model

A number of comments addressed the utility of the model to address the response of contaminant levels to local hotspot remediation. The model is well suited to simulate hot spot remediation in an efficient manner. Remediation could include combinations of removal of bed contaminants and/or capping. Either can be simulated by modifying the initial or restart sediment bed conditions to lower contaminant levels, which would correspond to removal of contaminants or addition of clean stable sediment to the top of the bed sediments. A demonstration of the model's ability to address hot spot remediation can be conducted upon definition by the stakeholders for individual candidate remediation locations or en mass.