Attachment 2. POLA comments on the "Los Angeles-Long Beach Harbors and San Pedro Bay Hydrodynamic and Sediment-Contaminant Transport Model" developed by Tetra Tech, Inc. for USEPA Region 9

After reviewing the draft report dated May 2008 and the recent presentation (June 30, 2008) of some additional model simulations for the hydrodynamic and sediment-contaminant transport model developed by Tetra Tech, the Port of Los Angeles (POLA) has concerns about whether the model has been adequately calibrated for the region for the use of TMDL development. We raised some major concerns about the model in our comments to the EPA and the Regional Board when the model was first presented in 2006. Even though it was stated in the response to our comments (prepared by Tetra Tech September 18, 2006) that the issues that we had raised would be addressed in the revised model, we found that the latest model has not addressed our concerns regarding the calibration of the hydrodynamic model. Most of the assumptions and model simulations for the hydrodynamic portion of the model remains the same as the earlier version. The latest model adds the sediment and contaminant transport calibration on top of a mostly unchanged hydrodynamic model.

Comment provided earlier that remain unaddressed:

1. The model has used wind data far away from the harbor (e.g. LAX and Long Beach Airport) that may not be representative of the local wind. In fact, our work for Dominguez Channel Estuary Model Study (DCEMS) shows that wind can make a difference in the hydrodynamics of the harbor and it is important to use local winds to drive the model.

2. The EPA model substantially under-predicts the salinity at the 20 locations where field data in the harbor are available. In addition, while the field data shows some stratification in the system, the model predicts the water column to be well mixed. We have recommended further calibration of the model with other salinity data such as those that have been collected for the DCEMS. However, the latest model has not addressed this significant discrepancy between model predicted and field measured salinities. In addition, no other model calibration with the DCEMS data is shown.

We believe that the EFDC model platform is a reasonable choice for this system; however, it is our opinion that the hydrodynamic portion of the model has not been properly calibrated. The EPA model salinity calibration results showed that the model under-predicts both the salinity and vertical stratification of the salinity levels. As such, model-predicted surface and bottom salinity levels were nearly the same, whereas the observed salinity showed lower surface salinity compared to the bottom salinity.

Additionally, it hasn't been demonstrated that the EPA modeling effort made use of the Dominguez Channel Estuary Model (DCEM), developed by POLA with grant funding from the State Water Resources Control Board. The State committed $1.3 million and POLA spent approximately $350,000 in matching funds with the understanding that the model would be a useful tool in the TMDL development process.

As we have mentioned in our recent meetings, POLA is in the process of developing and implementing a Water Resources Action Plan (WRAP) to take a pro-active approach at improving water quality within the Port. As part of the WRAP, a numerical model similar to the EPA model is being developed as a management decision tool. We have directed Everest International Consultants, Inc. to expand the DCEM which was calibrated for the Dominguez Channel Estuary.

We recently used the preliminary WRAP model to simulate the 2005 salinity calibration period of the EPA model. A direct comparison of the EPA and WRAP models was not possible because the EPA model calibration report does not include information regarding the station numbers. However, comparisons were made based on model-predicted ranges in salinity levels. To do this, we randomly paired observed salinity levels with stations and also generated a predicted value for each station. A comparison of the EPA and WRAP model scatter plots are shown in Figures 1a and 1b, respectively. While field data shows a difference between surface and bottom salinity (stratification) during the rain events, the EPA model predicts similar surface and bottom salinity (i.e. no stratification). Despite the assumptions in location and timing of the salinity observations, the WRAP model shows a better match to the range of observed salinity levels than the EPA model. This exercise illustrates that better comparison between model-predicted and field measured data can be achieved when incorporating the recommendations we have made (i.e. improved hydrodynamic calibration and incorporation of publicly available wind data).

We also remain concerned as to how the model will be able to respond to the scenario where a sediment hot spot is remediated. Within industrialized harbors, contamination in the sediment is often isolated in selected hotspots. It is unclear from the document, the prior meetings, and the teleconference how the model will handle such hotspots in the sediment. We recommend the model continue to be refined to increase accurate representation of the current conditions or the future state of the harbor waters or sediments.

Detail Comments on Draft "Los Angeles-Long Beach Harbors and San Pedro Bay Hydrodynamic and Sediment-Contaminant Transport Model Calibration" prepared by Tetra Tech, Inc. for USEPA Region 9, May 2008.

1. The model is being developed for the greater Los Angeles and Long Beach Harbor, including the Los Angeles River estuary and San Pedro Bay (Pgs 1 and 2). Please provide a figure to define the primary area of interest.

2. Please provide information on how the POLB tide gage and current meter listed in Table 1 was used in model calibration or configuration.

3. The salinity open boundary conditions were specified based on fitting monitoring data to a seasonally varying function with an adjustment factor, which were calibrated (Pg 8). What monitoring data were used and were they different from the data used for calibration? Please provide more details (e.g. how the adjustment factors were calibrated) on how the salinity open boundary conditions were specified.

4. It is indicated in the report that wind data were based on data from the Los Angeles and Long Beach Airports and supplemented by data from the California Irrigation Management System for Long Beach and Santa Monica. Work conducted for the DCEMS indicated that local winds have a significant effect on the hydrodynamic circulation. We recommend incorporating wind data available from multiple locations throughout the LA/LB Harbors.

5. It would be useful to include a figure showing the locations of the fresh water inflows and clarify the flow data sources for each fresh water inflow location since the report indicated data provided by the Los Angeles County Department of Public Works or from LSPC watershed model (Pg 9) can be used but did not specify where each of these two data sources were applied.

6. The comparison of the model predicted water surface elevations and velocities with the field data are based on a comparison between the predicted and observed amplitudes and phases instead of a time series comparison. Please provide information on the time period of the field data used for the hydrodynamic calibration, as well as provide some time series comparison of the modeled and measured water elevation and velocities. The model parameters that were calibrated for tidal elevation and velocity should also be stated.

7. The model under predicts the salinity at the 20 locations in the harbor where field data are available. In some cases, the under prediction is severe and would have implications for the mass balance of fresh water (and potentially contaminants) entering the system. We recommend careful attention to resolving this issue so that errors are not carried forward. In addition, while the field data showed some stratification in the system (i.e., lower salinity at the surface than the bottom), the model predicts the water column to be well mixed (i.e., surface salinities are similar to bottom salinity). Therefore, we believe that further calibration with additional salinity data such as data collected from the DCEMS, which includes wet weather salinity data, should be performed to improve the predictive ability of the model in terms of overall level of under predictions and the high level of predicted vertical mixing.

8. The report states that "model calibration involves the adjustment of selected model parameters to achieve a best or targeted level of agreement between model predictions and observations" (pg 51). However, the report has only presented one set of model parameters being used for model simulation and comparison with field data. It is not clear what model parameters have been adjusted in the calibration process. Please provide more details on the set of model parameters that have been adjusted during the calibration process and how different values for these parameters will affect the model simulation results when compared with field data. Also please provide rationale on selected the final set of calibrated model parameters.

9. External loads of sediment and contaminants were provided by a watershed model (Tetra Tech 2006). However, the final watershed model report has not been distributed to the stakeholders for their review. When the draft watershed model was presented to the

stakeholders, there were many comments submitted by the stakeholders. Since the final watershed model has not been distributed to the stakeholders for review, it is not clear whether the concerns and comments of the stakeholders on some of the loading assumptions for the draft watershed model had been adequately addressed.

10. Metal loads also included atmospheric dry deposition rates (Pg 49). Were the atmospheric dry deposition rates simulated in the watershed model or added to the watershed model loads?

11. The flow, sediment, and copper inputs for the Los Angeles River (Figure 31) obtained from the watershed model show high sediment and copper concentrations when there is minimal flow. What is the reason for this and is this apparent for all inflows?

12. Sediment and contaminant model predictions used to compare to field data were averaged over a 6-month dry season period, while the simulation period covered 2002 to 2005. Which 6-month period was the model predictions averaged (i.e., what was the relation of the 6-month period to the observed data)? What is the rationale for using such an average to compare to field data taken in 2005, 2006, and 2007?

13. Sediment and contaminants have only been calibrated for the dry weather condition. However, large amounts of contaminants can enter the Harbor area during wet weather events. In addition, TMDL development requires addressing seasonal variations. Will the model be calibrated for wet weather conditions? If not, how will seasonal variations be addressed?

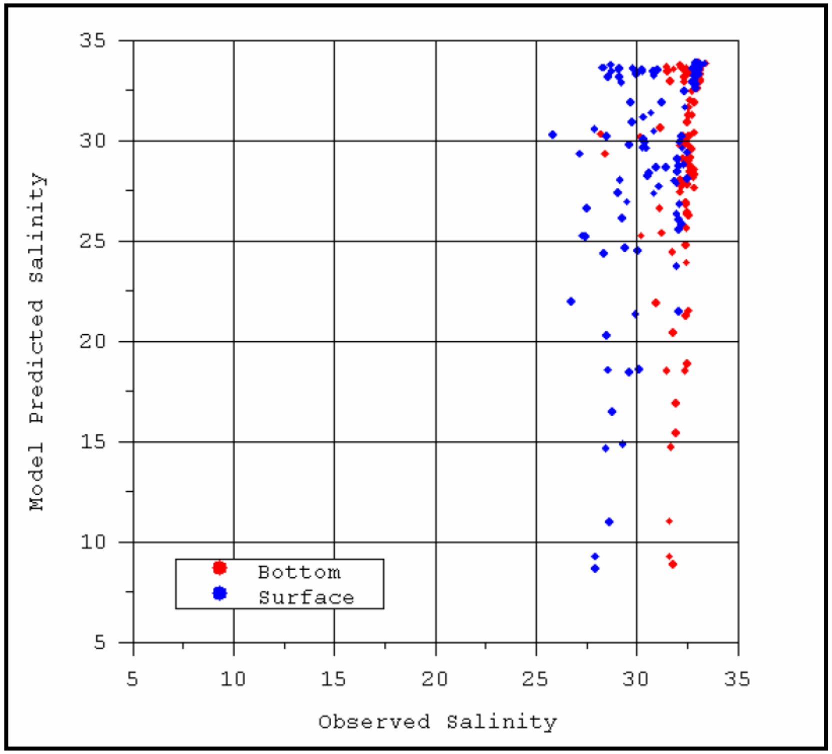
14. The sensitivity analyses concluded that sediment, copper, lead, DDT and PAH are insensitive to watershed loading. However, the sensitivity analyses were conducted only for dry weather condition when loadings are expected to be small. The sensitivity analyses for watershed loading should also be conducted for wet weather.

Detail Comments on Presentation on "Los Angeles and Long Beach Harbors and San Pedro Bay Modeling" by Tetra Tech on June 30, 2008

1. Slides No. 6 to 8 show the model simulated zinc concentrations in the water column and sediment bed over four years at three different locations. As expected, the water column concentrations show fairly good correlation with the Los Angeles Flow data (shown in Slide No. 5), i.e. there is high water column concentration of zinc when there is high LAR flow and the water column concentration drops to very small value after the passing of a wet flow event. However, the zinc bed **concentration** continuously increases over the four year simulation period, indicating the continuous deposition of contaminated sediment one flow event after another. This continuous accumulation of sediment leading to continuous increase in bed concentration seems unreasonable. Following this trend, if the model is run for another 10 or 20 years, the bed concentration will continue to increase to an unrealistic value. A more reasonable expectation is that concentrations would

approach some value. Please provide an explanation why the model is showing this continuous increase in bed sediment concentration of zinc.

2. Slide No. 14 shows spatial variation of the changes in sediment zinc level for full loading after 4 years. The model predicts that while zinc levels near the mouth of the Dominguez Channel Estuary increases substantially, zinc levels near both the mouths of Los Angeles River and San Gabriel River decrease substantially. Please provide an explanation why the DC behaves so differently from the other two rivers. The model result for LAR implies that there is no sediment accumulation near the mouth of the estuary (otherwise there should be an increase in zinc level). This contradicts the field observation that there is normally substantial sediment deposition near the LAR estuary after rain events. The U.S. Army Corps of Engineers, LA District has to dredge the LAR estuary periodically after rain events.



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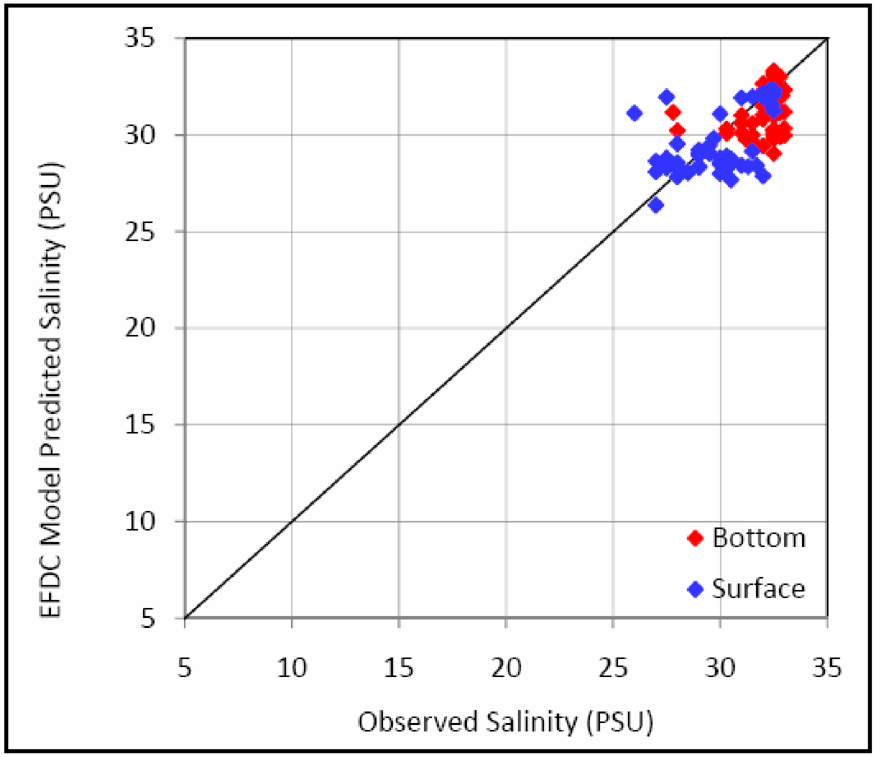
a) EPA Model



b) WRAP Model

Figure 1 – Comparison of EPA and WRAP Model Salinity Scatter Plots