Preliminary Result for Scenario 1 (Central-tendency values) of Riverside Ag Park PCB Air Modeling Study

The objective of the study is to assist DTSC in identifying sampling locations where windblown PCB concentrations in the soil are most likely the highest.

Air dispersion modeling was conducted to estimate the amount of PCB deposited over a 13¼-year period (from July 2003 through September 2016).

Both AERMOD and CALPUFF will be used to calculate PCB deposition. Both models are recommended by the U.S. EPA for regulatory usage. They have been extensively evaluated and well documented, and have been widely used in various applications.

Surface and precipitation observational data from Riverside Municipal Airport, along with upper air radiosonde data from Miramar Naval Air Station (near San Diego) were used to generate model-ready meteorological data sets. AERMET is AERMOD's meteorological pre-processor that generates all meteorological data needed by AERMOD. The meteorological field for AERMOD is horizontally uniform but vertically variable to reflect the vertical variations of meteorological variables such as wind shear. The CALPUFF model needs a 3-dimensional meteorological field to calculate transport and diffusion of the pollutants of interest. The 3-D meteorological data for CALPUFF are generated by CALMET, CALPUFF's companion model.

Because PCB is emitted predominantly by soil erosion in the park, it is reasonable to assume the mechanism of PCB emissions is same as that of total suspended particulates (TSP). However, there is an important difference between PCB and TSP emissions: PCB emissions are highest in areas where PCB concentrations are high, and lower in areas where PCB concentrations are low, while TSP emissions are approximately same everywhere in the park. A detailed description of the steps to calculate emissions follows.

The entire modeling period is divided into three phases:

a) 7/1/2003 to the end of the 2009 clean up;
b) The period between the end of 2009 and the end of the 2013/14 cleanup; and
c) From the end of the 2013/14 cleanup period to September 2016.

Temporal variation of PCB emissions is determined by wind speed and precipitation:

- In any hour during which a measurable amount of precipitation (no less than 0.01 inch) is recorded at the Riverside Municipal Airport, PCB emission in that hour and the following five hours is set to zero;

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- In any hour during which a trace amount of precipitation is recorded, PCB emission is set to zero for that hour alone;
- In all other periods the hourly PCB emission rate is determined by wind speed because PCB emissions are assumed to be caused by soil erosion.

Due to the many uncertainties associated with this study, and with the objective of assisting subsequent sampling efforts, the air dispersion modeling results are presented in a normalized manner. That is, if the model results show that the estimated level at point A is higher than that at point B, then it is likely the measured level of windblown PCB deposition at point A is higher than that at point B. The result generated with the present air dispersion modeling is intended solely to provide an indication where the highest PCB levels due to windblown dust are likely to be found.

In the modeling, the physical and chemical properties of PCBs are treated the same as those for TSP (total suspended particles) because PCB-laden soil particles are the carrier of PCBs.

The preliminary CALPUFF modeling results for scenario 1 (central-tendency values) are shown in Figure 1. The results from AERMOD, as well as for the other scenarios, are forthcoming.

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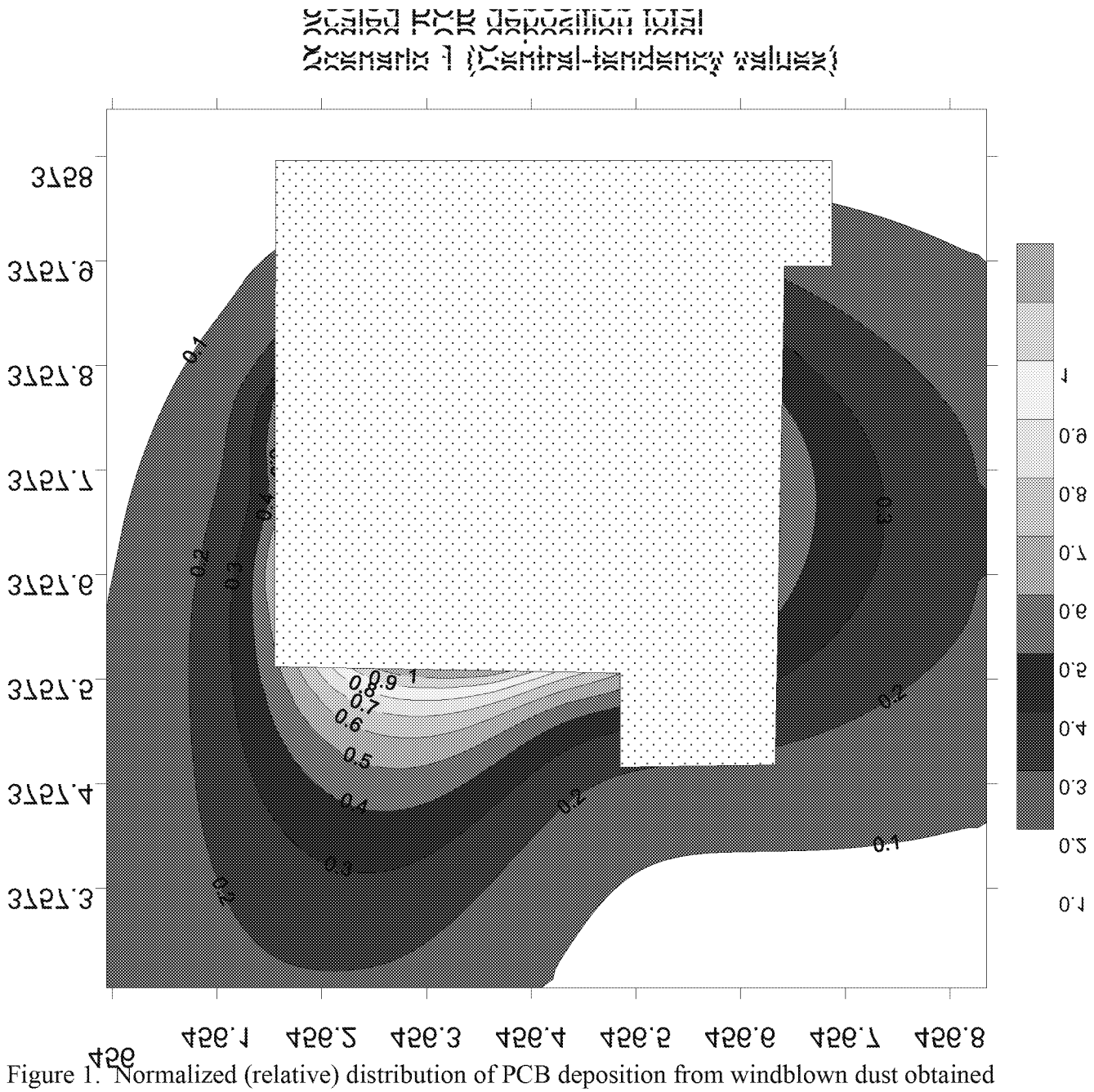

Figure 1. Normalized (relative) distribution of PCB deposition from windblown dust obtained from CALPUFF modeling of Scenario 1. Coordinates along the x- and y-axis are UTM coordinates (km).