Study of Baseline Quality of Ambient Air within the New Jersey Meadowlands District: Modeling Components

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Introduction
The objective of this study is to investigate and quantify baseline ambient air quality in the vicinity of the Meadowlands District, using various available emission, land-use, meteorological, etc. databases. The results demonstrate the importance of understanding the nature of an existing quality monitoring network. The fine-scale allocation of source emissions through the Emissions Modeling System for Hazardous Air Pollutants Version 3 (EMS-HAP) and the Atmospheric Dispersion Modeling Employing ISCST3 (ISCST3) were employed to model the ambient air quality.

Fine-Scale Allocation of Source Emissions
The objective of this project is to investigate and quantify baseline National Emission Inventory (NEI) data corresponding to the year 1999 were processed through the Emissions Modeling System for Hazardous Air Pollutants Version 3 (EMS-HAP) [USEPA, 2006a] for various air toxics of concern (e.g. benzene, toluene, ethylbenzene, TCE, PERC, aromatics, metals, mercury). The annual emissions patterns are shown below for 3 chemicals (Benzene, TCE, and PERC). Dispersion modeling was performed for receptors corresponding to the meteorological data from Newark Airport (EWR) and MERI meteorological station for the sampling periods of (a) April 22, 2005 to May 18, 2005 and (b) July 21, 2005 to August 16, 2005.

On-going diagnostic analysis of modeling results
Dispersion modeling for ambient concentrations of TCE, PERC, and benzene, using meteorological data from Newark airport (EWR) and MERI meteorological station for the sampling periods of (a) April 22, 2005 to May 18, 2005 and (b) July 21, 2005 to August 16, 2005. Atmospheric dispersion modeling is shown in the time-series plot for Benzene, where the ISCST3 and AERMOD results based on MERI meteorology data are over-estimating ambient concentrations of benzene. In the comparison of summary statistics, the total averages and seasonal averages of ISCST3 results were lower than in the Newark Airport data in some of the sampling periods, and the corresponding ISCST3 predictions are inversely affected.

Discussion
Two different sets of meteorological inputs (Newark Airport data and MERI station data) were used in the dispersion modeling to test the sensitivity of the predicted ambient concentrations. The modeling results for each set of conditions were compared with field measurements of air toxics. The following recommendations were made based on the comparison of ISCST3 and AERMOD results:

- The impact of using different meteorological inputs on the accuracy of ISCST3 predictions is analyzed in detail.
- Preliminary diagnostic analysis was conducted by plotting the profiles of wind vectors from the four fixed site monitors.

Background Concentrations
Median background concentrations (ug/m3) extracted from the 1999 National Air Toxics Assessment Study (NATA) [USEPA, 2006b] were used here for estimation of the baseline levels of the 3 chemicals: benzene, TCE and PERC. The following concentrations were used for comparison: benzene: 0.16 ug/m3, TCE: 0.24 ug/m3, and PERC: 0.39 ug/m3. The corresponding ISCST3 predictions are consistently higher than all Ambient background values across the three chemicals.

- The annual emissions patterns are shown below for 3 chemicals (Benzene, TCE, and PERC). Dispersion modeling was performed for receptors corresponding to the meteorological data from Newark Airport (EWR) and MERI meteorological station for the sampling periods of (a) April 22, 2005 to May 18, 2005 and (b) July 21, 2005 to August 16, 2005.

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References