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DATE: January 12, 2007

SUBJECT: Impact of Mercury Emissions on Nearby Communities: Linden Chemical and Plastics (LCP) site

This memorandum is in response to concerns expressed by the New Jersey Department of Environmental Protection (NJDEP) regarding the potential for human exposures associated with emissions of metallic mercury vapor to the ambient air from the Linden Chemical and Plastics (LCP) Superfund site in Linden, Union County, New Jersey. On November 9, 2006 the NJDEP discussed the results of on-site ambient air observations and measurements of mercury vapor. The on-site ambient air mercury levels were reported to be as high as 300 ng/m^3 in October 2006 which is equivalent to the USEPA reference concentration (RfC) for mercury in ambient air. This may be related to recent remedial investigation activities (disturbing soils, taking soil borings) or recent storms with high winds and heavy rains. Beads of mercury were been reported to be observed on the site surface.

The primary concern was whether these levels of metallic mercury in the ambient air at LCP site are sufficient to pose health threats to any nearby residential communities (located to the northwest and southwest of the site). To this end, NJDHSS has applied air dispersion modeling to determine the average concentration relationships between the on-site area and nearby communities.

Background

The LCP site is located on the Tremley Point Peninsula adjacent to South Wood Avenue and the Arthur Kill in Linden, Union County. The site is currently inactive. Chlorine, sodium hydroxide, and hydrochloric acid were produced on-site by use of mercury cell electrolysis process from 1972 to 1982. Waste sludge containing mercury was placed into an on-site lagoon.

The public health assessment report for the LCP site (ATSDR 1999) concluded that there was no apparent health hazard due to the site because there were no identified completed human exposure pathways. No mercury was reported to be visible on the surface of site soils at that time.

The site is being remediated by the potential responsible party (PRP) with USEPA oversight.

Air Dispersion Modeling

A standard air dispersion model (ISCST3) was used to calculate the dispersion of mercury emissions from the LCP site. Using google map, the LCP site dimensions were assumed to be 300 m X 150 m, located near the center of the model coordinate system[1]. Hourly weather data collected at the Newark International Airport (1991-95) was used as the input to the model (see attached input file) to represent long-term meteorological conditions.

Exposure concentrations at two nearby communities located to the northwest and southwest of the site were evaluated. The locations of the northwest and southwest communities with respect to the model coordinate system are (-1600 m, 600 m) and (-1600 m, -1200 m), respectively. Since actual mercury emission flux from the site is unavailable, an arbitrary unit flux (g/m^2-sec) was assumed. Using the above input parameters, 5-yr average ambient mercury concentrations at the site and at the northwest and the southwest locations were calculated and presented in the following table. The table values are not actual concentrations since they are based on an arbitrary unit flux. However, the values indicate the average *relative magnitude* of mercury concentrations on site and at the two off-site locations.

Location (Model Coordinates)	**5-yr. Average Concentration[a] (g/m^3)**
On site (0,0)	5.2
Northwest (-1600 m, 600 m)	0.0083
Southwest (-1600 m, -1200 m)	0.013

[a]based on arbitrary unit mercury emission flux (g/m^2-sec)

Using these calculated concentrations based on an arbitrary flux, actual off-site ambient air concentrations can be estimated using the measured on-site value (i.e., 300 ng/m^3). The average exposure concentrations at the two communities located to the northwest and southwest of the site would be as follows:

$$\text{Northwest} = (0.0083/5.2) * 300\ ng/m^3 = 0.47\ ng/m^3$$

$$\text{Southwest} = (0.013/5.2) * 300\ ng/m^3 = 0.75\ ng/m^3$$

[1]The shape of the emission area would have more affect on the calculated concentrations within/near the site than those calculated for a distant location.

To exceed an average level above 300 ng/m^3 at the northwest location, the average on-site concentration would need to be above about 188,000 ng/m^3 (=300*5.2/0.0083). Similarly, for an average level above 300 ng/m^3 at the southwest location, the average on-site concentration would need to be above about 120,000 ng/m^3 (=300*5.2/0.013).

Conclusions

The results show that the average ambient air mercury exposure concentrations at the two communities located to the northwest and southwest of the site would be about 625 and 400 times lower than those measured at the site (i.e., 300 ng/m^3). Since the USEPA RfC for mercury is 300 ng/m^3, the calculated concentrations in the residential areas are not likely to result in any adverse health effects. The analysis also indicates that, in order for mercury concentrations to exceed the USEPA RfC in the residential locations, mercury concentrations in the air at the site would have to be hundreds of times higher than recently observed.

If you have any questions please call me at (609) 584-5367.

Attachment

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