

## **APPENDIX A**



State of New Jersey

DEPARTMENT OF HEALTH AND SENIOR SERVICES  
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Linda Cullen  
Unit Leader  
Environmental Toxicology and Risk Assessment Unit  
Bureau of Environmental Evaluation and Risk Assessment  
New Jersey Department of Environmental Protection  
P.O. Box 413  
Trenton, New Jersey 08625

Dear Ms. Cullen:

This letter is in response to a New Jersey Department of Environmental Protection (NJDEP) request that the New Jersey Department of Health and Senior Services (NJDHSS) provide a modified indoor air guideline concentration for total xylene appropriate for the Cooper's Poynt Elementary School, 3<sup>rd</sup> and State Streets, Camden, Camden County, New Jersey. Beginning in 1998, discharge of No. 2 heating oil from the school's underground storage tank resulted in the contamination of soil and groundwater. During the course of delineation of the contaminant plume, free product was observed migrating towards the school building in the vicinity of classroom 102. Classroom 102 is used for pre-kindergarten (four-year old) children. Results of indoor air sampling conducted at the school in September 2003 by a consultant retained by the school administration indicated total xylene concentrations as high as 261  $\mu\text{g}/\text{m}^3$  (classroom 102).

In developing non-residential indoor air screening levels, the NJDEP typically adjusts the USEPA Region 3 ambient (residential) risk-based concentration (RBC). For total xylene, this adjustment results in an indoor air screening level of approximately 150  $\mu\text{g}/\text{m}^3$ . This adjustment, however, reflects an adult exposure duration of 250 days per year for 25 years. Therefore, the NJDEP requested that the NJDHSS provide a modified indoor air guideline concentration for total xylene based on the risk posed to four-year old children attending classes in room 102.

The following table summarizes the concentrations of xylenes detected at the school as compared to available health-based guideline values. The maximum concentration detected exceeded available health-based guidelines of the U.S. Environmental Protection Agency (USEPA):

September 2003 Indoor Air Sampling at Cooper's Poynt E.S. Total Xylene (o-, m-, and p) in $\mu\text{g}/\text{m}^3$					
Min. Conc. Detected	Max. Conc. Detected	ATSDR acute MRL <sup>1</sup>	ATSDR Chronic MRL <sup>2</sup>	USEPA Reg. 3 ambient air RBC (non-cancer)	USEPA RfC
20.1	261	4,335	433	110	100

ATSDR = Agency for Toxic Substances and Disease Registry; MRL = Minimal Risk Level; USEPA = U.S. Environmental Protection Agency; RBC = Risk Based Concentration; RfC = Reference Concentration; <sup>1</sup>respiratory effects; <sup>2</sup>neurologic effects

Following discussions with NJDEP, the NJDHSS calculated a modified indoor air guideline concentration for total xylene using the USEPA Region 3 ambient air formula for non-carcinogens, as adopted by the NJDEP. The modified equation, derived from the Region 3 formula by substituting child values, was used to calculate a non-residential indoor air guideline for children is as follows:

$$\text{Modified Guideline } (\mu\text{g}/\text{m}^3) = \frac{\text{THQ} * \text{RfDi} * \text{BWc} * \text{ATnc} * 1000 \frac{\mu\text{g}}{\text{mg}}}{\text{EFc} * \text{EDc} * \text{IRc}}$$

Where, THQ = target hazard quotient = 1;  
 RfDi = reference dose inhalation (mg/kg/day);  
 BWc = average body weight, child (kg);  
 ATnc = averaging time, non-carcinogens (day);  
 EFc = exposure frequency, child (day/year);  
 EDc = exposure duration, child (year); and  
 IRc = inhalation rate, child ( $\text{m}^3/\text{day}$ ).

According to the USEPA Integrated Risk Information System (IRIS) database and the ATSDR Toxicological Profile for Xylene (ATSDR 2003), adequate human data on the carcinogenicity of xylenes are not available, and the available animal data are inconclusive as to the ability of xylenes to cause a carcinogenic response. For the purpose of this evaluation, xylenes are not considered human carcinogens.

The USEPA Region 3 Reference Dose Inhaled (RfDi) for xylenes is 0.03 mg/kg/day, based on protection against chronic, non-cancer health effects. The recommended inhalation rate for children between three to five years of age is 8.3  $\text{m}^3/\text{day}$  (USEPA 1997, Exposure Factor Handbook, Table 5-23). Table 7-3 of the handbook provides the mean and standard deviation of boy and girl body weights. Since the mean body weight of girls was lower than that for boys, the mean girl body weight of 17.0 kg for four-year old girls was selected as a conservative value. To account for the Cooper's Poynt Elementary School exposure scenario, an exposure duration of 210 days (180 school days plus thirty days during the summer) was selected.

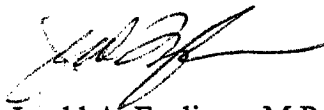
The modified indoor air guideline concentration was calculated as follows:

$$\begin{aligned} \text{Modified Guideline } (\mu\text{g}/\text{m}^3) &= \frac{1 * 0.03 \frac{\text{mg}}{\text{kg} * \text{day}} * 17.0 \text{ kg} * \left( 365 \frac{\text{day}}{\text{year}} * 1 \text{ year} \right) * 1000 \frac{\mu\text{g}}{\text{mg}}}{210 \frac{\text{day}}{\text{year}} * 1 \text{ year} * 8.3 \frac{\text{m}^3}{\text{day}}} \\ &\cong 110 \mu\text{g}/\text{m}^3 \end{aligned}$$

This modified non-residential indoor air guideline for children is lower than the NJDEP adjusted risk-based value of  $150 \mu\text{g}/\text{m}^3$  and similar to the USEPA Region 3 ambient (residential) RBC for adults. The use of  $110 \mu\text{g}/\text{m}^3$  as the modified indoor air guideline concentration should, therefore, be protective of both children and adults at the Cooper's Poynt Elementary School.

Please feel free to contact me or Julie Petix at (609) 584-5367 if you have any questions.

Sincerely,



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Program Manager  
Hazardous Site Health Evaluation Program

c: Julie R. Petix, M.P.H., C.P.M., H.O., Health Assessment Project Manager  
Gregory Ulirsch, Technical Project Officer, ATSDR  
Arthur Block, Senior Regional Representative, ATSDR Region II  
Diane Groth, NJDEP  
Kathleen Katz, NJDEP

References:

ATSDR 2003. Toxicological Profile for Xylene. Agency for Toxic Substances and Disease Registry, Atlanta, Ga.

USEPA 1997. Exposure Factors Handbook: Volume I. EPA/600/P-95/002Fa, U.S. Environmental Protection Agency.