Health Consultation

COOPER'S POYNT ELEMENTARY SCHOOL

CAMDEN, CAMDEN COUNTY, NEW JERSEY

FEBRUARY 9, 2005

U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
Agency for Toxic Substances and Disease Registry
Division of Health Assessment and Consultation
Atlanta, Georgia 30333

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HEALTH CONSULTATION

COOPER'S POYNT ELEMENTARY SCHOOL

CAMDEN, CAMDEN COUNTY, NEW JERSEY

Prepared by:

New Jersey Department of Health and Senior Services
Division of Public Health Protection and Emergency Preparedness

Under Cooperative Agreement with the
U.S. Department of Health and Human Services
Agency for Toxic Substances and Disease Registry

Summary

In December 2003, the New Jersey Department of Environmental Protection requested assistance from the New Jersey Department of Health and Senior Services in assessing potential indoor air exposures from total xylene at the Cooper's Poynt Elementary School, Camden, Camden County. This contaminant was thought to be related to a no. 2 fuel oil discharge from an underground storage tank located on school property. Fuel oil is comprised of a complex mixture of petroleum hydrocarbons, including xylenes. The discharge of no. 2 fuel oil from the leaking underground storage tank resulted in the contamination of on-site soil and groundwater, and free product was observed migrating towards the school building in the vicinity of classroom 102 used by pre-kindergarten children. Volatile chemicals in soil and groundwater can emit vapors that may migrate through subsurface soils and into indoor air spaces of overlying buildings. Due to potential vapor intrusion into the school building, indoor air samples were collected in September 2003. The results of this sampling event indicated a number of volatile organic compounds, including elevated concentrations of total xylene.

The New Jersey Department of Health and Senior Services, in consultation with the New Jersey Department of Environmental Protection, calculated a modified indoor air guideline concentration for total xylene using exposure assumptions for four-year old children. Since the concentration of total xylene detected in classroom 102 was more than twice the recommended modified indoor air guideline concentration, school officials suspended the use of classroom 102 and an adjacent room used by students and school employees.

Subsequent sampling, which included the collection of sub-slab soil gas, was performed in January 2004. Sampling results and observations made during a January 2004 site visit indicated that the source of contamination may not be totally attributable to the fuel oil discharge. The storage and/or use of cleaning products may be affecting the indoor air quality of the school. At the present time, there is ***"No Apparent Public Health Hazard"*** from indoor air exposures associated with the fuel oil discharge.

The New Jersey Department of Health and Senior Services evaluated potential health effects from indoor air contaminants detected in the school building. Although the mean and maximum concentrations of benzene and 1,3-butadiene exceeded their health-based comparison values, the concentrations are comparable to those from reported urban/suburban background concentrations, and additional adverse health effects are unlikely. Results of recent indoor air sampling conducted at the school indicated that total xylene concentrations were below the health-based comparison value. Benzene, 1,3-butadiene and total xylene are associated with automobile exhaust and the use and/or storage of cleaning products and solvents.

It is recommended that the federal "Indoor Air Quality Tools for Schools" program be implemented at the Cooper's Poynt Elementary School. The use of "green" alternative cleaning products and janitorial supplies should be considered in an effort to minimize exposures from volatile organic compounds to students and school employees.

Statement of Issues

In late December 2003, the New Jersey Department of Environmental Protection (NJDEP) requested assistance from the New Jersey Department of Health and Senior Services (NJDHSS) in assessing potential indoor air exposures from m-, p-, and o-xylene (xylenes or "total" xylene) at the Cooper's Poynt Elementary School, Camden, Camden County. This contaminant was thought to be related to a no. 2 fuel oil discharge from an underground storage tank (UST) located on school property. Other volatile organic compounds were also detected in the indoor air of the school. The discharge of no. 2 fuel oil from the leaking UST resulted in the contamination of on-site soil and groundwater. During the course of delineation of the contaminant plume, free product (i.e., fuel oil) was observed migrating towards the school building in the vicinity of classroom 102. Classroom 102 is used for pre-kindergarten (four-year old) children.

Through a cooperative agreement with the Agency for Toxic Substances and Disease Registry (ATSDR), the NJDHSS prepared the following Health Consultation for the Cooper's Poynt Elementary School. The purpose of this Health Consultation was to investigate the source of the indoor air contamination and evaluate associated public health implications. Concerned parents are encouraged to read this report in order to have a better understanding of school indoor air quality issues and remedial measures available to school and local health officials in addressing these issues.

Background

Figure 1: Location of Cooper's Poynt E.S.

Cooper's Poynt Elementary School is located at 3rd and State Streets in Camden, Camden County, New Jersey (see Figure 1). The NJDEP is providing oversight to the school on the remediation of environmental contamination associated with the discharge of no. 2 fuel oil from a 10,000 gallon UST. The SmithCo. Group Inc. (previously known as Honeyford and SmithCo Group) was retained by the Camden Board of Education to conduct remedial services associated with the leaking UST. Analytical results of samples collected from monitoring wells installed at the school identified free product in the groundwater beneath the school building. This prompted the collection of indoor air samples to determine contaminant levels in the school building. Volatile chemicals in soil and groundwater can emit vapors that may migrate through subsurface soils and into indoor air spaces of

overlying buildings. The vapor intrusion pathway may be important for buildings with or without a basement. Vapors can accumulate in occupied spaces to concentrations that may pose safety hazards, health effects, or aesthetic problems (e.g., odors).

In September 2003, the SmithCo. Group Inc. collected five indoor air samples from several classrooms; ambient and indoor background air samples were also collected from an atrium (AT-111) and classroom 116, respectively (see Figure 2). All air samples were collected using SUMMA® canisters. The samples were analyzed for volatile organic compounds (VOCs) using United States Environmental Protection Agency (USEPA) Method TO-15. The results of this sampling event indicated a number of VOCs including elevated indoor air concentrations of total xylene, with the maximum concentration (261 micrograms of total xylene per cubic meter of air or $\mu g/m^3$) detected in classroom 102 (see Table 1). Fuel oil is comprised of a complex mixture of petroleum hydrocarbons, including xylenes.

As requested by the NJDEP, the NJDHSS calculated a modified indoor air guideline concentration for total xylene based on a specific school exposure scenario (see Appendix A). In consultation with the NJDEP, the NJDHSS recommended that 110 $\mu g/m^3$ be used as the modified indoor air guideline concentration for total xylene. This concentration was determined to be protective of both children and adults at the Cooper's Poynt Elementary School. Since the concentration of total xylene detected in classroom 102 was more than twice the recommended modified indoor air guideline concentration, school officials suspended the use of rooms 102 (classroom) and 103 (lunchroom) by students and school employees.

To further investigate the suspect source of indoor air contamination (including total xylene), the SmithCo. Group Inc. conducted indoor air and sub-slab soil gas sampling at the school in January 2004. Samples were collected from several rooms (including classroom 102) as well as the boiler room. Indoor air results indicated a maximum total xylene concentration of 13.10 $\mu g/m^3$ in classroom 101; xylene was not detected in classroom 102. Sub-slab soil gas samples obtained from classroom 101 indicated a maximum total xylene concentration of 18.80 $\mu g/m^3$. Complete indoor air and sub-slab soil gas sampling results from January 2004 are presented in Tables 2 and 3, respectively.

Site Visit

On January 2, 2004, a site visit was conducted at the Cooper's Poynt Elementary School. Individuals present were Julie Petix and Tariq Ahmed, NJDHSS; Kathleen Katz and Mohammed Qureshi, NJDEP; Robert Lentine, Camden County Division of Health; several members of the Cooper's Poynt Elementary School administrative staff; Craig Tyrrell and Amin Ayubcha, SmithCo Group, Inc.; and George Pulaski, EEJ Mechanical, Inc.

The site visit commenced at 10:30 am. Weather conditions were sunny, cold, and windy with temperatures in the mid 30s. Although students were not present due to

Christmas break/winter recess, a portion of the school was being used for child day care. Ms. Katz and Mr. Ayubcha verbally summarized site activities conducted by the SmithCo Group Inc. at the school. It was also noted that the school converted from oil to gas heat more than 10 years ago and that the fuel oil discharge was first detected in 1998. Ms. Katz stated that delineation of groundwater and soil contamination at the school had not been completed to date.

Both the exterior (i.e., outdoor location of the underground storage tank, below asphalt paving) and interior of the school building was inspected. Indoor areas observed included classroom 102, room 103 (referred to as the "lunchroom" where lunches are picked up by students), room 106 (boiler room); an outdoor atrium (AT 111), and classroom 116. The installation of a new fire door was noted in classroom 102. According to Mr. Pulaski, univents (pneumatic system) are located in each classroom. Each univent differs in effectiveness due to its age. At the time of the site visit, they were reportedly set at 100% recirculation. In several classrooms, particularly classroom 102, a cleaning/chemical/solvent odor was noticeable.

Following the site visit, school administrative staff expressed concern about the contamination and the timeliness of being informed of sampling results. NJDHSS staff provided suggestions to the SmithCo Group Inc. regarding air sampling locations (i.e., placement of SUMMA® canisters) and time frame (regular school hours, normal occupancy rather than during a weekend).

Past NJDHSS or ATSDR Activities

No previous activities have been conducted by the NJDHSS or ATSDR at the school.

Environmental Contamination

Indoor Air, Soil Gas

Results of indoor air sampling conducted at the Cooper's Poynt Elementary School by the SmithCo Group Inc. in September 2003 indicated elevated indoor air concentrations of xylenes as well as other VOCs (see Table 1). Field portable photoionization detector (PID) readings ranged from 3 - 3.8 on the first floor of the school. An indoor air quality survey was completed during this sampling event; a summary of findings are presented below:

Location	Chemical/Product	Observations
basement	glue	glue was being used for adhering floor tiles sump pump non-functioning, standing water observed
first floor	glue	glue was being used for adhering floor tiles unsual odors noted (Smith Annex gym, sewage drain clog); possible clog of septic system
room 106 (boiler room storage closet)	floor stripper, Ginn cleaner, floor finish, chalkboard cleaner, paint, wax stripper, floor guard, degreaser, lime remover, counter cleaner	

In January 2004, additional sampling (indoor air, sub-slab soil gas) was conducted by the SmithCo Group Inc.; VOC results are provided in Tables 2 and 3. During this sampling event, the following chemicals were found at the school:

Location	Chemical/Product	Observations
rooms 101, 102	sodium hypochlorite, mineral spirits, isoparaffinix solvent, 1-methyl-2-pyrrolidinone, petroleum gas	maintenance work completed on the exterior doors
room 103	sodium hypochlorite, mineral spirits, isoparaffinix solvent, 1-methyl-2-pyrrolidinone, petroleum gas	
room 106 (boiler room)		exterior door was open for work crew

Discussion

Assessment Methodology

In this section, exposure pathways were evaluated to determine whether children and adults could have been (past scenario), are (current scenario), or will be (future scenario) exposed to contaminants. In evaluating exposure pathways, NJDHSS investigated whether exposure to contaminated media has occurred, is occurring, or will occur through inhalation of contaminants.

An exposure pathway is a series of steps starting with the release of a contaminant in a media and ending at the interface with the human body. A completed exposure pathway consists of five elements:

1. source of contamination;
2. environmental media and transport mechanisms;
3. point of exposure;
4. route of exposure; and
5. receptor population.

The ATSDR and NJDHSS classify exposure pathways into three groups: 1) completed pathways, that is, those in which exposure has occurred, is occurring, or will occur; 2) potential pathways, that is, those in which exposure might have occurred, may be occurring, or may yet occur; and 3) eliminated pathways, that is, those that can be eliminated from further analysis because one of the five elements is missing and will never be present, or in which no contaminants of concern can be identified.

Exposure Pathways

There is a completed exposure pathway from VOCs in indoor air to children and adults at the Cooper's Poynt Elementary School.

Source of Indoor Air Contamination

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A leaking fuel oil UST was located on the Cooper's Poynt Elementary School property, adjacent to the exterior wall of rooms 101 and 102 (classrooms), 103 (lunchroom) and 106 (boiler room) (see Figure 2). Results of groundwater monitoring indicated free product beneath the school building. In September 2003, indoor air sampling was conducted at the school (see Table 1); in January 2004, indoor air and sub-slab soil gas sampling was conducted at the school (see Tables 2 and 3).

As previously mentioned, Table 3 provides the sub-slab soil gas data collected at the school in January 2004. Table 4 provides a comprehensive summary of VOCs detected in the school indoor air from samples obtained in September 2003 and January 2004. As shown in these tables, several VOCs (i.e., tetrachloroethylene, 1,3,5-trimethylbenzene, ethanol, tetrahydrofuran and 2-hexanol) detected in the soil gas were not detected in the indoor air of the school and, as such, will not be discussed further. The following VOCs were detected at the school in both the soil gas and indoor air: 2-butanone; dichlorodifluoromethane; ethylbenzene; 4-ethlytoluene; styrene; toluene; 1,2,4-trimethylbenzene; and xylenes.

Figure 3 shows the mean and maximum concentrations of VOCs detected on the first floor of the school building in comparison with mean sub-slab soil gas concentration. Both the mean and maximum indoor air concentrations of 2-butanone, dichlorodifluoromethane, ethylbenzene, styrene, toluene and total xylene were greater than that detected in the soil gas. Since subsurface vapors are typically diluted by 100 to

10,000 times before they enter indoor air, the detection of these VOCs cannot be fully attributable to the fuel oil discharge associated with the UST (USEPA 2002). Only concentrations of 4-ethyltoluene and 1,2,4-trimethylbenzene were detected in higher concentrations in the soil gas than that detected in the indoor air. They were not detected at levels, however, that can be fully attributable to soil gas. Although these substances may be constituents of fuel oil, they are also found in automobile exhaust and other products such as solvents (4-ethlytoluene) and dyes, perfumes and paint thinners (1,2,4-trimethylbenzene).

An August 2, 2004 letter from the NJDEP to the Camden Board of Education concluded that the VOCs detected in the indoor air of the Cooper's Poynt Elementary School are not attributable to the UST fuel oil discharge (see Appendix B).

There were a number of VOCs detected in the indoor air that were not detected in the soil gas: acetone; benzene; bromoethene; bromomethane; 1,3-butadiene; chloromethane; cyclohexane; 1,4-dichlorobenzene; n-heptane; n-hexane; methylene chloride; methyl-tert-butyl-ether (MTBE); trichlorofluoromethane; and 2,2,4-trimethylpentane. Although not related to the fuel oil discharge, the health implications of these contaminants were evaluated.

Health Guideline Comparison

Typically, as the first step in evaluating health hazards associated with completed exposure pathways, the concentration of each contaminant detected is compared to an established environmental guideline value. For contaminants exceeding these "screening" values, site-specific conditions are evaluated to determine likely exposure scenarios for a given exposure pathway. Since the environmental and health-based comparison values (CVs) are the same for indoor air contaminants, all contaminants were compared directly with health-based CVs.

The United States Department of Health and Human Services (USDHHS) has classified the carcinogenicity of contaminants typically found in the groundwater and indoor air at hazardous waste sites. Cancer classes are defined as follows:

1 = Known human carcinogen
2 = Reasonably anticipated to be a carcinogen
3 = Not classified

The cancer class of indoor air contaminants detected at the Cooper's Poynt Elementary School is provided in Table 5. The mean and maximum concentrations of each contaminant detected, along with the health-based CV, are also provided in Table 5.

For cancer class 3 contaminants, a comparison with the ATSDR Minimal Risk Level (MRL) was made. An MRL is an estimate of the daily human exposure to a hazardous substance that is likely to be without appreciable risk of adverse non-cancer

health effects over a specified duration of exposure. When a MRL for a contaminant was unavailable, the USEPA Reference Concentration (RfC) or the USEPA Region 3 non-cancer risk-based concentration (RBC) was used. The RfC is an estimate of a continuous inhalation exposure to humans that is likely to be without an appreciable risk of deleterious effects during a lifetime. Non-cancer RBCs are contaminant concentrations corresponding to a fixed level of non-cancer risk (i.e., a Hazard Index of 1) in water, air, biota, and soil.

For cancer class 1 or 2 contaminants, ATSDR Cancer Risk Evaluation Guides (CREG) were used as the health-based CV. CREGs are media-specific CVs that are used to identify concentrations of cancer-causing substances that are unlikely to result in an increase of cancer rates in an exposed population. When a CREG for a contaminant was unavailable, the USEPA Region 3 cancer RBC was used. Cancer RBCs are contaminant concentrations corresponding to a fixed level of cancer risk (i.e., lifetime excess cancer risk of one in one million) in water, air, biota, and soil.

As shown in Table 5, the mean and maximum indoor air concentrations of acetone, bromoethene, 2-butanone, chloromethane, cyclohexane, dichlorodifluoromethane, ethylbenzene, n-hexane, methylene chloride, MTBE, styrene, toluene, trichlorofluoromethane and 1,2,4-trimethylbenzene were less than their corresponding health-based CV. As such, it is unlikely that inhalation of these VOCs would pose a risk to students and school employees of the Cooper's Poynt Elementary School. During the January 2004 indoor air sampling event, a maximum concentration of 160 $\mu g/m^3$ of n-heptane was detected in classroom 101. Although no health-based CV is available, this concentration is approximately 12,500 times lower than the United States Occupational Safety and Health Administration (OSHA) time-weighted average of 2,000,000 $\mu g/m^3$.[1] As such, adverse health effects associated with n-heptane exposures are unlikely.

Health-based CVs are also unavailable for 4-ethyltoluene and 2,2,4-trimethylpentane. Since 4-ethyltoluene is structurally similar to 1,3,5-trimethylbenzene or 1,2,4-trimethylbenzene, the dose-response value for these contaminants was used as a surrogate for 4-ethyltoluene (ATSDR 2003a). The concentration of 4-ethyltoluene detected in classroom 101 (January 2004) was below the health-based CV of 6.2 $\mu g/m^3$; as such, adverse health effects associated with 4-ethyltoluene exposures are unlikely. Health risks from exposure to 2,2,4-trimethylpentane could not be assessed. Both 4-ethyltoluene and 2,2,4-trimethylpentane may be constituents of fuel oil; they are also found in automobile exhaust and products such as solvents (4-ethlytoluene; 2,2,4-trimethylpentane) and thinners and household laundry products (2,2,4-trimethylpentane).

[1]Most of the federal OSHA standards (29 CFR 1910), including the indoor air contaminant limit for n-heptane, have been adopted under the New Jersey Public Employees Occupational Safety and Health (PEOSH) Act.

Both the mean and maximum concentrations of benzene, 1,3-butadiene and total xylene detected in the indoor air of the Cooper's Poynt Elementary School exceeded their corresponding health-based CV. Benzene, 1,3-butadiene and xylenes are common indoor and ambient air contaminants in urban/suburban areas (ATSDR 2003b); reported indoor and ambient air concentrations of benzene 1,3-butadiene and xylenes in the United States are as follows:

Contaminant	Max. Indoor Air Concentration at the School ($\mu g/m^3$)	Reported Ambient Air Concentration ($\mu g/m^3$)	Reported Indoor Air Concentration ($\mu g/m^3$)
benzene	3.5	1.44 - 4.76[1]; 19[2]; 6[3]	15[3]
1,3-butadiene	3.8	0.077 - 0.37[1]; 6.75 - 75[4]; 28[5]; 9.45[6]	11, 19[4]; 2.7 - 4.5[5]; 20.25[6]
total xylene	261	3 - 380[7]; 31[8]	10 - 47[9]; 4.3 - 14[10]

[1]National Air Toxics Assessment Data (1996), [2]USEPA (1987), [3]Wallace (1989), [4]Lofroth et al. (1989), [5]Brunnemann et al. (1990), [6]Stephens and Burleson (1967), [7]Merian and Zander (1982), [8]Seila et al. (1989), [9](m&p) Seifert and Abraham (1982), [10](m&p) Wallace (1986)

As shown above, the maximum indoor air concentration of benzene and 1,3-butadiene detected at the school was within the range of concentrations reported for indoor air. Although the concentrations of benzene and 1,3-butadiene exceeded their corresponding health-based CV, the risks associated with these concentrations are comparable to those from reported background concentrations. Therefore, any additional adverse health effects are unlikely from these exposures. The maximum indoor air concentration of total xylene detected in classroom 102 in September 2003 was above the range reported for indoor air concentrations. It should be noted that total xylene was not detected in this classroom during subsequent sampling (January 2004); total xylene concentrations detected elsewhere in the school were below the health-based CV (see Table 2).

A brief discussion of the toxicologic characteristics of these contaminants is presented in Appendix C.

Child Health Considerations

ATSDR's Child Health Initiative recognizes that the unique vulnerabilities of infants and children demand special emphasis in communities faced with contamination in their environment. Children are at greater risk than adults from certain kinds of exposures to hazardous substances. They are more likely to be exposed because they play outdoors and they often bring food into contaminated areas. They are shorter than adults, which means they breathe dust, soil, and heavy vapors closer to the ground. Children are also smaller, resulting in higher doses of chemical exposure per body weight. The developing body systems of children can sustain permanent damage if toxic

exposures occur during critical growth stages. Most important, children depend completely on adults for risk identification and management decisions, housing decisions, and access to medical care.

Based on indoor air sampling results from September 2003, the NJDHSS calculated a modified indoor air guideline concentration for total xylene for four-year old children attending classes in room 102. This concentration (110 $\mu g/m^3$) was determined to be protective of both children and adults. Since the concentration of total xylene detected in classroom 102 was more than twice the recommended modified indoor air guideline concentration, school officials suspended the use of rooms 102 (classroom) and 103 (lunchroom) by students and school employees.

Additional investigation of the suspect source of indoor air VOC contamination (including total xylene) was conducted in January 2004 and included the collection of sub-slab soil gas. Results indicated that the source of the VOCs detected in the indoor air cannot be fully attributable to the fuel oil discharge associated with the UST. Observations made during a January 2004 site visit indicated the storage and/or use of cleaning products may be affecting the indoor air quality of the school.

Conclusions

Based on the results of indoor air sampling conducted at the Cooper's Poynt Elementary School in September 2003, the NJDHSS calculated a modified indoor air guideline concentration for total xylene (110 $\mu g/m^3$) using exposure assumptions for four-year old children. Results of subsequent sampling, which included the collection of sub-slab soil gas, as well as observations made during a January 2004 site visit, indicated that the source of VOCs may not be totally attributable to the UST fuel oil discharge and may be from indoor sources. At the present time, there is ***"No Apparent Public Health Hazard"*** from indoor air exposures associated with the fuel oil discharge.

The NJDHSS evaluated potential health effects from exposures to the VOCs detected in the indoor air of the school building. The mean and maximum concentrations of benzene, 1,3-butadiene and total xylene exceeded their health-based CV. Since health risks associated with benzene and 1,3-butadiene are comparable to those from reported urban/suburban background concentrations, additional adverse health effects are unlikely. The maximum concentration of total xylene detected at the school in September 2003 was more than twice the recommended modified indoor air guideline concentration, and school officials suspended the use of affected rooms. Subsequent indoor air sampling indicated that total xylene concentrations were below the health-based CV. Benzene, 1,3-butadiene and total xylene are associated with automobile exhaust and the use and/or storage of cleaning products and solvents.

Recommendations

1. The Camden County Division of Health should provide assistance to the Camden Board of Education in implementing the USEPA "Indoor Air Quality Tools for Schools" program. The NJDHSS Indoor Environments Program is available to provide assistance with this program.

2. Once the "Indoor Air Quality Tools for Schools" program is implemented, the Camden Board of Education should conduct additional indoor air sampling to evaluate the effectiveness of the program.

3. The use of green/alternative cleaning products should be investigated and considered. The Camden Board of Education should consider the use of alternative cleaning and janitorial supplies in an effort to minimize exposure to VOCs found in cleaning products. Resources available on the Internet include:

   Healthy School Environments
   http://www.epa.gov/ebtpages/humachildrschoolenvironments.html

   Resource Links to Environmentally Friendly Cleaning Products
   http://www.epa.gov/oppt/epp/cleaner.htm

   Environmentally Preferable Purchasing Guides
   http://www.epa.gov/oppt/epp/documents/pfs.htm

   Reasons for Using Environmentally Friendly Cleaning Products
   http://www.epa.gov/oppt/epp/documents/clean/cleaning.htm

4. The remediation of the site under continuing NJDEP oversight should be completed as soon as feasible

Public Health Action Plan (PHAP)

The purpose of a PHAP is to ensure that this Health Consultation not only identifies public health hazards, but also provides a plan of action designed to mitigate and prevent adverse human health effects resulting from exposure to hazardous substances in the environment. Included is a commitment on the part of the ATSDR and the NJDHSS to follow up on this plan to ensure that it is implemented. The public health actions to be implemented by the ATSDR and NJDHSS are as follows:

Public Health Actions Taken

1. Results of indoor air and sub-slab soil gas sampling conducted at the school were evaluated by the NJDHSS.

2. Representatives of the NJDHSS conducted a site visit of the Cooper's Poynt Elementary School on January 2, 2004.

3. In August 2004, the NJDHSS Indoor Environments Program provided assistance to the Camden County Division of Health regarding indoor air quality issues.

Public Health Actions Planned

1. The Health Consultation will be provided to the Camden Board of Education and the Camden County Division of Health.

2. Representatives of the ATSDR and NJDHSS are available to discuss the results of this report with school officials and concerned parents.

Certification Page

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Table 1: September 2003 indoor air sampling results, Cooper's Poynt Elementary School

Contaminant	Air Concentration (μg/m^3)						
	Room 101	Room 102	Room 103	Room 116	Room 201	Room 203	Atrium 111
Acetone	*	29	29	5	21	17	*
1,3-Butadiene	*	3.8	*	*	*	*	*
2-Butanone	*	3.8	20	2.4	*	*	*
Chloromethane	1.4	1.4	*	1.4	*	*	1.4
Cyclohexane	*	*	1.8	*	10	2.5	*
1,4-Dichlorobenzene	*	*	*	3.8	*	*	*
Dichlorodifluoromethane	3	3.1	3.4	2.7	3.3	2.9	2.8
Ethylbenzene	3.7	41	18.2	10	4.8	4.3	*
n-Heptane	*	*	4.9	*	12	2.6	*
n-Hexane	*	*	*	*	2.8	*	*
Methylene Chloride	*	*	*	*	1.8	*	*
MTBE	2.3	2.5	4.3	2.3	5.4	4	2
Styrene	*	*	3.4	*	*	*	*

Table 1: (Cont'd.)

Contaminant	Air Concentration (μg/m^3)						
	Room 101	**Room 102**	**Room 103**	**Room 116**	**Room 201**	**Room 203**	**Atrium 111**
Toluene	3.1	3.7	3.4	6	3.4	2.8	1.9
2,2,4-Trimethylpentane	*	*	3	*	*	*	*
Total Xylene	21.1	261	110	52	29.7	27.8	*

*Not detected

Table 2: January 2004 indoor air sampling results, Cooper's Poynt Elementary School

Contaminant	Air Concentration (μg/m^3)								
	Room 100	Room 101	Room 102	Room 103	Room 104	Room 106	Room 116	Room 201	Atrium 111
Acetone	*	20	*	14	19	*	14	19	12
Benzene	1.8	3.5	*	2.8	2	*	2.1	2.1	1.9
Bromoethene	*	*	*	*	2.1	*	*	*	*
Bromomethane	*	*	*	*	*	*	3.3	*	*
2-Butanone	2.4	15	*	4.1	4.1	*	2.9	2.9	1.7
Chloromethane	*	*	1.1	*	1	1.1	*	*	*
Cyclohexane	2.3	55	2.5	4.5	2.3	*	*	21	*
1,4-Dichlorobenzene	*	*	*	*	*	*	6.6	*	*
Dichlorodifluoromethane	*	*	*	*	6.9	*	*	*	*
Ethylbenzene	*	3.9	*	*	*	*	*	*	*
4-Ethyltoluene	*	3.1	*	*	*	*	*	*	*
n-Heptane	5.7	160	*	12	3.7	*	2.6	31	*

Table 2: (Cont'd.)

Contaminant	Air Concentration (μg/m^3)								
	Room 100	**Room 101**	**Room 102**	**Room 103**	**Room 104**	**Room 106**	**Room 116**	**Room 201**	**Atrium 111**
n-Hexane	2.2	35	1.9	4.6	1.9	*	1.9	6.7	*
Methylene Chloride	*	3.4	*	*	*	*	*	*	*
MTBE	2.2	3.6	3.1	6.5	3.3	*	3.5	3.6	2
Styrene	*	2.2	*	*	*	*	*	*	*
Toluene	*	120	*	7.9	4.5	2.9	4.9	5.7	3.7
Trichlorofluoromethane	*	*	*	*	3.4	*	*	*	*
1,2,4-Trimethylbenzene	*	4.4	*	3	*	*	*	*	*
2,2,4-Trimethylpentane	*	*	*	2.7	2.8	*	*	*	*
Total Xylene	*	13.1	*	5.2	2.5	*	3.7	5.2	2.3

*Not detected

Table 3: January 2004 sub-slab soil gas sampling results, Cooper's Poynt Elementary School

Contaminant	Air Concentration (μg/m^3)				
	Room 101	Room 102	Room 103	Room 106	Mean
2-Butanone	*	7.1	2.3	4.4	4.6
Dichlorodifluoromethane	2.7	2.9	2.6	2.5	2.68
Ethylbenzene	3.2	2.2	*	2.3	2.57
Ethanol	5.5	34	2.6	10	13.03
4-Ethyltoluene	*	12	12	*	12
2-Hexanone	*	*	*	2.2	2.2
Styrene	2.1	*	*	*	2.1
Tetrachloroethylene	3.5	*	5.3	*	4.4
Tetrahydrofuran	*	*	2.1	5.8	3.95
Toluene	18	11	11	14	13.5
1,2,4-Trimethylbenzene	27	23	23	14	21.75
1,3,5-Trimethylbenzene	*	5.4	4.8	*	5.1
Total Xylene	18.8	13.1	12.2	9.9	13.5

*Not detected

Table 4: Summary of September 2003 and January 2004 indoor air sampling results, Cooper's Poynt Elementary School

Contaminant	First Floor (μg/m^3)		Second Floor (μg/m^3)		Background† (μg/m^3)		Boiler room (μg/m^3)
	Mean	Maximum	Mean	Max	Ambient	Indoor	
Acetone	22.2	29	19	21	12	32	*
Benzene	2.53	3.5	2.1	2.1	1.9	2.1	*
Bromoethene	2.1	2.1	*	*	*	*	*
Bromomethane	*	*	*	*	*	3.3	*
1,3-Butadiene	3.8	3.8	*	*	*	*	*
2-Butanone	8.23	20	2.9	2.9	1.7	2.65	*
Chloromethane	1.23	1.4	*	*	1.4	1.4	1.1
Cyclohexane	11.4	55	11.17	21	*	*	*
1,4-Dichlorobenzene	*	*	*	*	*	5.2	*
Dichlorodifluoromethane	4.1	6.9	3.1	3.3	2.8	2.7	*
Ethylbenzene	16.7	41	4.55	4.8	*	10	*
4-Ethyltoluene	3.1	3.1	*	*	*	*	*
n-Heptane	37.26	160	15.2	31	*	2.6	*

Table 4: (Cont'd.)

Contaminant	First Floor (μg/m^3)		Second Floor (μg/m^3)		Background† (μg/m^3)		Boiler room (μg/m^3)
	Mean	Maximum	Mean	Max	Ambient	Indoor	
n-Hexane	9.12	35	4.75	6.7	*	1.9	*
Methylene Chloride	3.4	3.4	1.8	1.8	*	*	*
MTBE	3.48	6.5	4.33	5.4	2	2.9	*
Styrene	2.8	3.4	*	*	*	*	*
Toluene	23.77	120	3.97	5.7	2.8	5.45	2.9
Trichlorofluoromethane	3.4	3.4	*	*	*	*	*
1,2,4-Trimethylbenzene	3.7	4.4	*	*	*	*	*
2,2,4-Trimethylpentane	2.83	3	*	*	*	*	*
Total Xylene	68.82	261	20.9	29.7	2.3	27.85	*

*Not detected

†Room 116

Table 5: Comparison of indoor air concentrations from September 2003 and January 2004 with health guideline CVs

Contaminant	Cancer Class[1]	Mean (μg/m^3)	Maximum (μg/m^3)	ATSDR Chronic MRL[2] (μg/m^3)	USEPA RfC[3] (μg/m^3)	ATSDR CREG[4] (μg/m^3)	USEPA Region 3 RBC[5] (μg/m^3)	Exceeds the CV
Acetone	3	21	29	30,875	NA[6]	NA	3,285	No
Benzene	1	2.44	3.5	NA	NA	0.1	0.23	**Yes**
Bromoethene	*[7]	2.1	2.1	-[8]	3	NA	NA	No
1,3-Butadiene	1	3.8	3.8	NA	NA	0.03	0.063	**Yes**
2-Butanone	3	7.47	20	-	5,000	NA	5,110	No
Chloromethane	3	1.23	1.4	103	90	NA	94.9	No
Cyclohexane	3	11.32	55	-	6,000	NA	6,205	No
Dichlorodifluoromethane	3	3.77	6.9	-	-	NA	182.5	No
Ethylbenzene	3	12.65	41	-	1,000	NA	1,058.5	No
4-Ethyltoluene	-	3.1	3.1	-	-	-	-	
n-Heptane	-	29	160	-	-	-	-	
n-Hexane	3	7.87	35	2,114	200	NA	208.4	No

Table 5: (Cont'd.)

Contaminant	Cancer Class[1]	Mean (μg/m^3)	Maximum (μg/m^3)	ATSDR Chronic MRL[2] (μg/m^3)	USEPA RfC[3] (μg/m^3)	ATSDR CREG[4] (μg/m^3)	USEPA Region 3 RBC[5] (μg/m^3)	Exceeds the CV
Methylene Chloride	2	2.6	3.4	NA	NA	3	3.79	No
MTBE	3	3.71	6.5	2,523	3,000	NA	NA	No
Styrene	3	2.8	3.4	255	1,000	NA	1,043	No
Toluene	3	17.17	120	301	400	NA	416	No
Trichlorofluoromethane	3	3.4	3.4	-	NA	NA	730	No
1,2,4-Trimethylbenzene	3[9]	3.7	4.4	-	-	-	6.2	No
2,2,4-Trimethylpentane	-	2.83	3	-	-	-	-	
Total Xylene	3	52.84	261	1,302	100	NA	109.5	**Yes**

[1]DHHS Cancer Class: 1 = known human carcinogen; 2 = reasonably anticipated to be a carcinogen; 3 = not classified
[2]Minimal Risk Level
[3]Reference Concentration
[4]Cancer Risk Evaluation Guide
[5]Risk-based Concentrations
[6]NA = Not Applicable
[7]* = An evaluation under USEPA's IRIS program for carcinogenic potential is not available
[8]- = Not Available
[9]USEPA Region 3 RBC

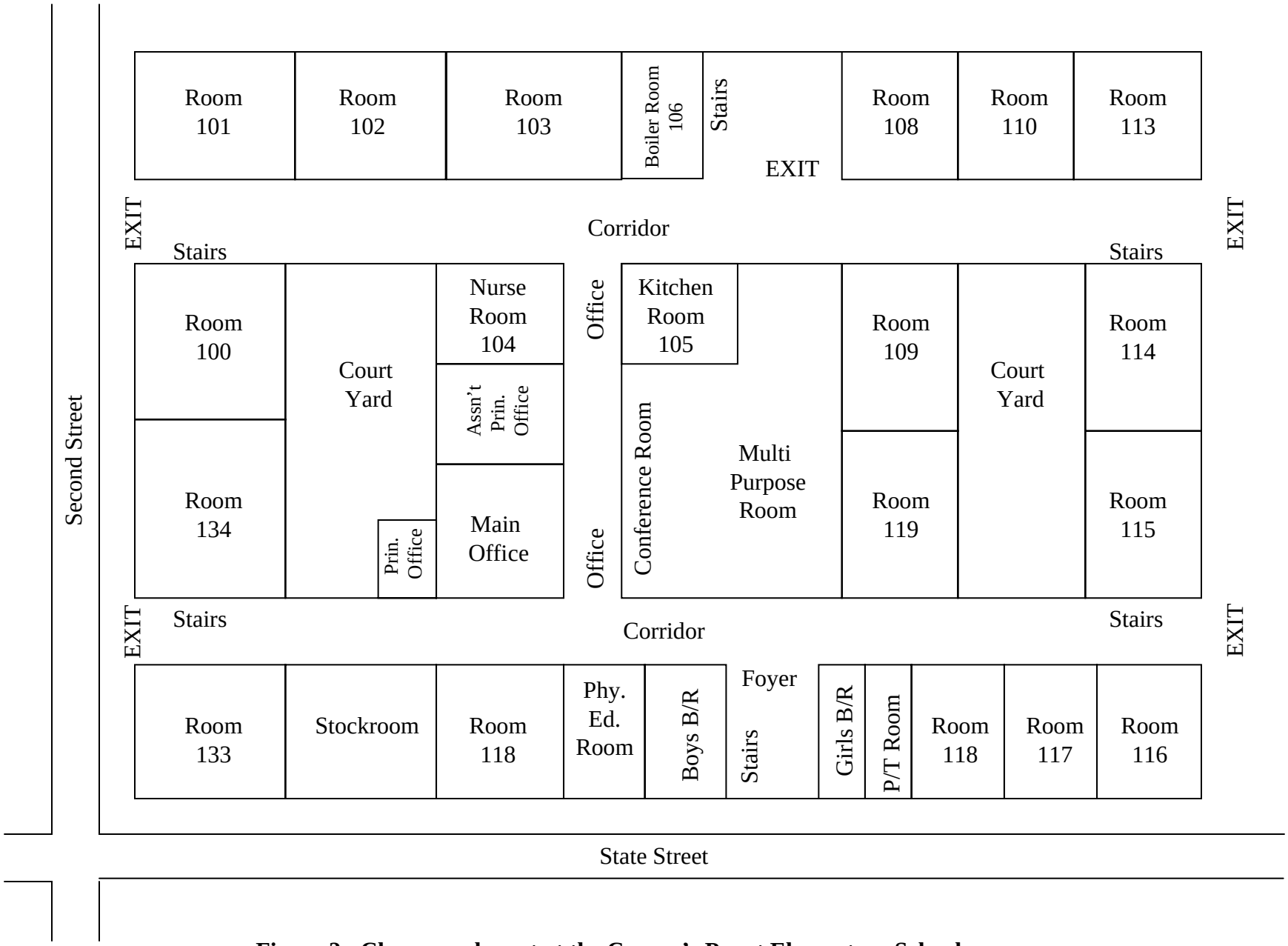

Figure 2: Classroom layout at the Cooper's Poynt Elementary School

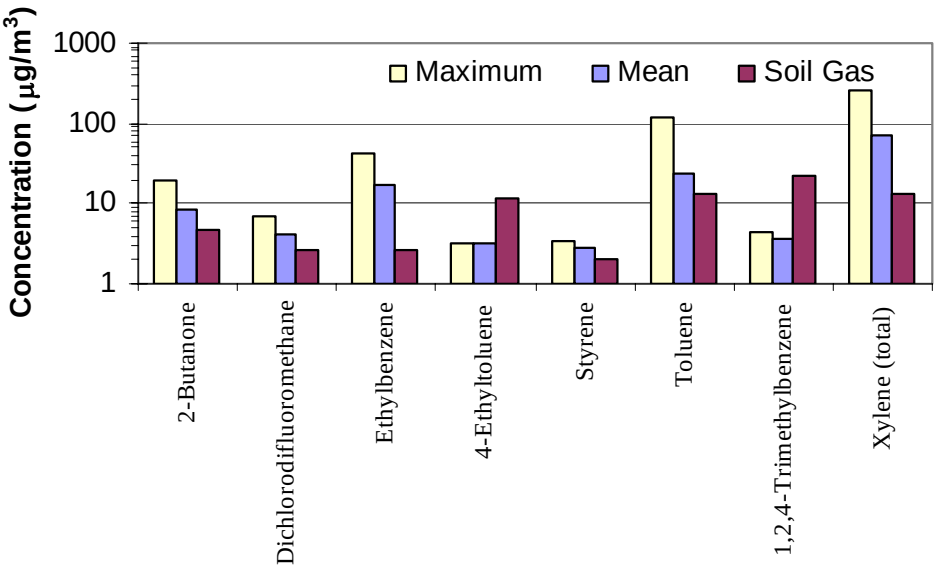

Figure 3: Maximum and mean indoor air and soil gas concentration of contaminants detected at the Cooper's Poynt Elementary School (September 2003 and January 2004)