New Jersey Clean Air Council
2006 Annual Public Hearing Report

"In Memoriam-Dr. Raymond Manganelli is recognized for his innumerable contributions to the protection of the environment, his exceptional service to the Clean Air Council and the citizens of New Jersey and his ability to inspire students and professionals alike. The Clean Air Council dedicates this hearing report and reaffirms our commitment to advancing our mission of assuring cleaner air for all of the citizens of New Jersey in the name of Dr. Raymond Manganelli."

2006
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INDOOR AIR QUALITY

Public Hearing April 5, 2006

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NEW JERSEY CLEAN AIR COUNCIL

Public Hearing, Wednesday, April 5, 2006
Trenton, New Jersey

TABLE OF CONTENTS

NEW JERSEY CLEAN AIR COUNCIL

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INDOOR AIR QUALITY

SCOPE

New Jersey has made substantial progress in controlling outdoor air pollution and over the last 20 years has made progress in improving indoor air quality as well. In 1986 the Clean Air Council accepted indoor air quality as the topic for its annual hearing and made recommendations regarding indoor air, some of which were enacted. The adoption in February 1997 of the Indoor Air Quality Standards (IAQ) for public workplaces represented an important step in protecting the quality of indoor air. The April 2006 Smoke Free Air Act bans smoking in public places, with only a few exemptions. Although this is a giant step in the right direction, indoor air can still be more polluted than outdoor air.

Americans spend an average of 92% of their time indoors at home, in school, at work and in automobiles. New Jersey residents may spend an even higher fraction of time indoors than the national average. Sources of indoor air pollution include secondhand smoke, volatile organic compounds (VOCs) from consumer products and vapor intrusion, as well as mold, radon gas, asbestos and lead. All of these sources pose health concerns both acute (allergies and other inflammatory disorders, coughs & wheezing) and chronic (cancer, respiratory disorders and heart and vascular diseases). citation: NJDEP, 2003. Final Report of the NJ Comparative Risk Project, Trenton, NJ

The Council held its annual Public Hearing on April 5, 2006 to solicit testimony from interested parties, the scientific and technical communities and the public to assist the Council when it advises the Commissioner of the New Jersey Department of Environmental Protection (NJDEP), New Jersey legislators and the commissioner of other state departments, as appropriate, on matters dealing with indoor air quality. After considering the testimony presented at the April hearing, the Council prepared this document to serve as an advisory report to the recipients mentioned above.

RECOMMENDATIONS

RADON:

1. The Clean Air Council recognizes the threat that radon poses in homes, schools and businesses. In areas of the state where high concentrations of radon have been identified, the Council recommends that testing be

mandated by the state, at a minimum in all schools and upon property transfers.

2. The Clean Air Council recommends additional research and improved dissemination of information concerning radon, radon testing, and the synergistic effects of radon and cigarette smoking with a particular emphasis on exposure to residents.

3. The Clean Air Council recommends that NJDEP sponsor research on moisture and VOC vapor intrusion from soil into homes and other buildings. The applicability of radon mitigation technology to moisture reduction and VOC vapor reduction in homes based on the NJDEP's experience is also fertile area suggested for further research.

SCHOOLS:

4. The Clean Air Council recommends that the State train or provide training resources to school officials and maintenance staff so that they understand the importance of preventing chronic moisture intrusion and mold as well as the proper approaches for addressing mold contamination and reducing VOCs from cleaning products and pesticides.

5**.** The Clean Air Council endorses the recommendations from NJDEP and the Environmental Protection Agency (USEPA) regarding cleaning products and integrated pest management (IPM) and recommends that they be adopted by New Jersey schools.

6. The Clean Air Council recommends that the Public Employees Occupational Safety and Health program at the Department of Health and Senior Services (DHSS) be given more resources to investigate employee complaints about IAQ in schools and that PEOSH be allowed to enforce its recommendations regarding improvements in indoor air quality within public sector workplaces.

7. The Clean Air Council recommends that the State strongly encourage New Jersey schools to adopt USEPA's Indoor Air Quality Tools for Schools and USEPA's *Healthy School Environments Assessment Tool* (HealthySEAT) in order to make schools healthier for children. These currently can be found at *http://cfpub.epa.gov/schools/index.cfm.*

8. The Clean Air Council recommends that New Jersey consumers and school districts be encouraged to utilize board certified professionals when mold assessments or mold remediation are needed. Information on board certified indoor air quality professionals can be found at *www.aiha.org*, *www.iaqcouncil.org*, and *www.iaqa.org.* Information on proper mold remediation techniques can be found at *www.epa.gov*, and *www.osha.gov.*

RESEARCH & INTERAGENCY COOPERATION:

9. The Clean Air Council recommends increasing collaboration and cooperation among the NJDEP, DHSS and the Department of Community Affairs (DCA) on IAQ issues. Such collaboration may be enhanced via establishment of an interagency task force which meets monthly to discuss technical and administrative IAQ issues impacting New Jersey citizens, with cross-departmental jurisdiction, or for which no regulatory support currently exists.

10. The Clean Air Council recommends that increased resources (funding and training) be provided to local health departments to assess IAQ in homes.

11. The Clean Air Council recognizes that many scientific research questions concerning indoor air still exist and that the State should encourage its scientists to keep informed on indoor air research. The DEP and DHSS should work closely with state epidemiologists and UMDNJ researchers to understand the health impact of indoor air pollution and to improve the predicative capabilities in estimating potential public health impact.

12. The Clean Air Council recommends that the State encourage a streamlined approach to assessment and remediation of IAQ in order to make remediation proceed more efficiently.

13. The Clean Air Council recommends that the DHSS in cooperation with appropriate county and municipal agencies develop methodologies and procedures to assure compliance with the Smoke Free Act of 2006.

PUBLIC EDUCATION & OUTREACH:

14. The Clean Air Council recommends focused outreach and education for the public regarding sources of indoor air pollution that they can control, such as smoking in residences and automobiles where children can be exposed to secondhand cigarette smoke.

15. The Clean Air Council recommends that the NJDEP educate homeowners concerning the reduction of indoor pollution from consumer products, wood-burning stoves, stored gasoline containers, small engines (lawn mowers, snow and leaf blowers) and home heating oil. NJDEP should encourage the use of products that contain no or lower amounts of VOC and Hazardous Air Pollutant (HAP) solvents. The NJDEP should continue to encourage hazardous waste disposal days for the residents of each county to safely dispose of solvents and other hazardous materials accumulated in cellars and garages.

LEGISLATION:

16. The Clean Air Council recommends that legislation be enacted requiring a relevant agency to adopt the appropriate IAQ standards for private sector workplaces. This is needed since OSHA has no IAQ standard for the private sector.

17. The Clean Air Council recommends that NJDEP require reductions of solvents which are VOCs or HAPs in consumer products and paints (sometimes referred to as architectural coatings) in order to improve both indoor and outdoor air quality.

18. The Clean Air Council recommends that NJDEP update its air pollution control rules to require new gasoline containers to be resistant to spills and to avoid VOC migration through the plastic. Newer California rules have improved upon those adopted in the past. NJDEP should discourage the storage of gasoline containers in cellars or in garages attached to residences.

19. The Clean Air Council recommends that the federal EPA require that air pollution emissions from new small engines be substantially reduced. Use of such engines near buildings can cause migration of the significant outdoor air contaminant concentrations into the indoor environment. NJDEP should encourage the replacement of existing high emitting small engines with electrically powered engines or lower emitting new engines.

20. The Clean Air Council recommends that NJDEP work with the Northeast States for Coordinated Air Use Management (NESCAUM) and the petroleum stakeholders in developing, with a reasonable timeframe for implementation, a regional standard for the sulfur content of home heating oil. This process will provide improved air quality throughout the region without disrupting the home heating oil marketplace or endangering adequate supplies.

21. The Clean Air Council recommends that NJDEP continue its efforts to reduce and eventually eliminate the emissions of perchloroethylene from dry cleaning operations. Indoor air pollution occurs from contamination of the indoor air where dry cleaners are co-located in buildings, from residual perchloroethylene on dry-cleaned clothing, and from emissions from nearby dry cleaners into other buildings.

22. The Clean Air Council, in furthering the intent of New Jersey's government to provide a safe environment for its citizens, as demonstrated by the recent passage of the smoking ban, recommends that the NJDEP in conjunction with DHSS and related agencies develop additional legislation to create "healthy consumer zones" that would encourage healthy indoor environments with emphasis on the needs of children. These healthy consumer zones, in the public

domain where practical, should relate, but not be limited to schools and similar public areas with guidance for homeowners and private establishments.

CONSTRUCTION:

23. The Council recommends that the Department restrict the operation of dry cleaners in cohabitated residential and commercial buildings.

24. The Clean Air Council recommends improved and modified building codes similar to the green building codes established by LEED (Leadership in Energy and Environmental Design), including radon resistant construction and moisture control. The Council recommends that flat-roof construction in schools and public buildings be avoided when the appropriate architects, code/permit officials, and engineers deem this feasible. This type of construction often results in leaks and water damage causing chronic indoor mold and contamination problems.

BACKGROUND

Indoor levels of certain pollutants are frequently 2 to 5 times higher and occasionally more than 100 times higher than outdoor levels. Indoor air pollution consists of toxic gases or particles that can adversely affect health. These pollutants build up rapidly indoors to much higher levels than found outdoors.

Concentrations of VOCs are consistently higher indoors than outdoors. VOCs are emitted by a wide array of products numbering in the thousands. Examples include: paints and lacquers, paint strippers, cleaning supplies, pesticides, building materials and furnishings, office equipment such as copiers and printers, correction fluids and carbonless copy paper, graphic and craft materials including glues and adhesives, permanent markers and photographic solutions. Indoor emissions of reactive VOCs combine with ozone (from outdoors to form aldehydes and organic particulate matter (PM).

Organic chemicals are widely used as ingredients in household products. Organic solvents are contained in wax, cleaning, disinfecting, cosmetic, air freshening, degreasing and hobby products.

Health effects include eye, nose and throat irritation; headaches, loss of coordination, nausea; damage to the liver, kidney and central nervous system and increased asthma. According to the DHSS publication “Asthma in New Jersey, 2005 Update,”711,000 New Jerseyans suffered from asthma in 2003, the latest period for which data are available. A substantial number of common indoor pollutants have been classified as carcinogens. Examples include formaldehyde, benzo(a)pyrene and other polycyclic aromatic hydrocarbons

(PAHs), tobacco smoke, benzene, chlorinated solvents such as tetrachloroethylene and radon gas. As with other pollutants, the extent and nature of the health effect depends on many factors including level of exposure and length of time exposed. Since there are no standards for VOCs in non-industrial settings, it is largely up to the homeowner, business owner and school administrator to control indoor air pollution.

Asbestos, lead and mold are also indoor pollutants and some remediation of these chemicals in indoor settings has been accomplished.

As stated above, the adoption in February 1997 of Indoor Air Quality Standards for public workplaces represented an important step in protecting the quality of indoor air. This legislation established a formal complaint process for public sector employees including office and school employees and introduced a methodology for determining fresh air introduction rates. It established a mechanism for PEOSH inspectors at DHSS to investigate IAQ complaints, issue citations for mold contamination and make other recommendations. As written, NJPEOSH Act has greater authority and regulatory latitude to address IAQ issues than does Federal OSHA.

From the mid-1980's there were several bills passed that attempted to restrict smoking in various public spaces, including schools. Several other bills, such as PL 1985 Chapter 184 Revised Statutes Smoking in Place of Employment, adopted in 1985, required that employers with more then 50 employees post signs where smoking was permitted. No significant enforcement mechanism was associated with this law. Some legislation had ambiguous language and loopholes that made enforcement difficult and unclear. However, these laws have now been replaced by the Smoke Free Air Act of 2006, which applies to all workplaces and is unambiguous. This new law bans smoking in public places, with only a few exemptions. Although this is a giant step in the right direction, indoor air can still be more polluted than outdoor air.

Comparative risk studies performed by the USEPA and its Science Advisory Board have consistently ranked indoor air pollution among the top four environmental risks to the public. (ALA 2000) In addition, the NJDEP conducted their own extensive survey of environmental risks and also found that among all environmental stressors, indoor air pollution poses some of the highest health risks to citizens of NJ. citation: NJDEP, 2003. Final Report of the NJ Comparative Risk Project, Trenton, NJ

The economic impacts of indoor pollution, including health care costs, lost productivity, legal costs and human welfare impact, have been estimated at billions of dollars each year. For example, economists have estimated an annual cost of $6.6 billion dollars in direct and indirect costs for the workforce and employers due to occupational chronic obstructive pulmonary disease (COPD) and occupational asthma (Leigh et al. (2002) Costs of COPD and Asthma. *Chest*

121:264-272). Indoor Air quality is both an important health issue but also an important economic issue.

ORAL TESTIMONY

Commissioner Lisa Jackson, NJ Department of Environmental Protection

This public hearing will allow us to determine whether there is more NJDEP can do to improve indoor air quality within the limits of our legislative and regulatory authority in the Clean Air Act. This year's focus on indoor air quality highlights this intrinsic nexus between Environmental Protection and Public Health.

With respect to VOCs, according to EPA, concentrations of many VOCs are consistently higher indoors than outdoors, as much as ten times higher in some cases. There are indirect benefits to indoor air resulting from the reduction of ozone precursors, such as VOCs in the outdoor atmosphere. In most cases reduction of VOCs also leads to the reduction of fine particles and HAPs.

NJDEP is developing plans to reduce air pollution and is currently evaluating more than 60 control measures on consumer products. Consumer product rules reduce the amount of VOCs in products sold in our state, such as cleaning supplies, air fresheners and hairsprays. The Department has also been taking steps to reduce perchloroethylene emissions from dry cleaners, including restricting the location of dry cleaners in residential and other multi-use buildings.

Vapor intrusion has received increased attention and evolved rapidly as an issue because of the potential exposure pathway in the investigation and remediation of contaminated sites. The presence of VOCs in the soil or groundwater offers the potential for chemical vapors to migrate through subsurface soils along preferential pathways such as underground utility lines, impacting IAQ. In October 2005 the NJDEP finalized its Vapor Intrusion Guidance Document to ensure appropriate investigations to protect public health.

Radon is another indoor air pollutant. The first cycle of testing for radon in schools was to have been completed by 2005. To date 49,000 radon tests have been performed in at least 1,194 New Jersey public schools, about 48 percent of the public schools. Based on data reviewed so far, 123 schools in the state had at least one result which shows a level of radon exposure above USEPA's level of 4 picocuries per liter. One side benefit of radon testing in schools was identifying malfunctioning HVAC systems, which contribute to poor indoor air quality.

Wood smoke is another source of indoor air pollution. A number of strategies are under consideration for dealing with the harmful effects of wood smoke.

Lastly, there are things that the public can do to limit exposure to harmful indoor air quality. Homeowners with attached garages should refrain from idling their vehicles in the garage and avoid garage storage of lawn mowers and other gasoline-powered equipment.

NJDEP worked with the Green Buildings Council to organize the Green Building Colloquium last December to develop ideas and strategies to promote green sustainable buildings. An important reason that this Council should consider Green Building guidelines is that such guidelines focus on indoor air quality based on pollutant concentrations that affect health, comfort and performance for the occupants of those residences.

Governor Corzine has made it clear that increased energy efficiency is a top priority for all state government. NJDEP will be working to implement the Governor's mandates on energy efficiency and conservation within state government, but also to work with BPU to raise our residents' awareness of the importance of good air quality, as well as indoor air quality.

Fred M. Jacobs, M.D. J.D., Commissioner, NJ Department of Health and Senior Services

The average person spends about 90 percent of his time indoors. Studies have indicated that indoor air contains higher levels of contaminants than outdoor air.

A smoke-filled indoor air environment is the single most hazardous pollution affecting public health. Fortunately, New Jersey has taken an historic step in its landmark Smoke-Free Air Act, which bans smoking in indoor public places and work places, including bars and restaurants. This new law is a public health victory for our state and for those groups who advocated for its passage; the American Cancer Society, the American Lung Association, the American Heart Association, New Jersey GASP, New Jersey Breathes, and the Communities Against Tobacco coalitions.

This Act will reduce illness and premature mortality through secondhand smoke. According to the Journal of the American Medical Association, waitresses have a higher rate of lung and heart disease than any other female-occupation group. Cigarette smoke is a toxic soup of more than 4,000 chemicals, including 200 known poisons and 69 known or probable cancer-causing substances. Secondhand smoke, itself a Class A carcinogen, causes more cancer deaths than asbestos, arsenic, radiation, benzene, pesticides, vinyl chloride, hazardous waste sites, contaminated sludge, mining waste and chemicals found in drinking water combined. Secondhand smoke kills approximately 62,000 nonsmokers each year in the United States, including 3,000 from lung cancer and between 35,000 to 40,000 from heart disease, according to the American Cancer Society.

The major enforcement areas will be local health departments. Individuals can file complaints if they see an individual smoking in a bar or restaurant who hasn't stopped at the proprietor's request. If there is a recalcitrant individual, local law enforcement can be called.

In the area of other indoor air contaminants, much needs to be done. The Indoors Environment Program conducts field investigations of mold, lead-based hazards and paint and asbestos-containing materials and assesses exposure and hazard control technologies associated with indoor environmental contaminants. It also certifies training companies and individuals to conduct asbestos and lead-based-paint abatement. It provides education, consultation and technical support to public schools, local health departments, consultants, doctors, and other health care professionals.

Our staff conducted more than 500 lead and asbestos inspections over the past year, handled more than 5,000 inquiries and received more than 4,000 visits a month to the website.

PEOSH enforces IAQ quality standards. The program offers free consultation to public employers to help them comply with IAQ standards.

There is a new Department initiative called "The Healthy School Facility Environment" that makes information available on our website to help identify and control health and safety hazards in our 3,600 public and private school buildings. This will help with problems such as inadequate heating and ventilation, disruptive noise and dust from construction projects, or leaky roofs that can damage buildings and lead to mold contamination.

Paul Giardina, Chief, Indoor Air and Radiation Branch, USEPA Region II

Even though we spend up to 90 percent of our time indoors, the public doesn't always think of indoors as an environment. To many people, especially in a densely populated state such as New Jersey, the environment is a patch of open space somewhere and not inside their home, school or office.

USEPA's current indoor air program focuses on five major topics: radon, asthma, environmental tobacco smoke, Tools for Schools and Green Buildings. This list is in very close agreement with New Jersey's 2003 Comparative Risk Project.

Secondhand smoke or Environmental Tobacco Smoke (ETS) has major health impacts for children and is also a significant trigger of asthma episodes. Studies have shown that significant impacts on asthma management can be made by controlling indoor air asthma triggers. Indoor microbial pollution, including mold,

can cause severe symptoms in sensitive individuals including asthma attacks. Indoor air pollutant sources come from five major categories:

1. Outdoor air, which includes combustion by-products, ozone, allergens, including mold spores, VOCs, particulate matter.
2. Building materials which include paints, the finishes, the furnishings, the adhesives, the caulk, the pressed wood products.
3. Cleaning products, such as personal care products, cleaning products, air fresheners,
4. Occupant activities, such as tobacco smoking.
5. Soil gas intrusion, such as radon or VOCs.

Radon risks are based on strong science, human data, widespread exposures and an extrapolation from miners to homes. Approximately 12 percent of lung cancer deaths annually in the United States are attributed to radon. New Jersey estimates as many as 500 radon-related deaths per year. Data shows that USEPA's voluntary radon program is very cost-effective compared to several major regulatory programs on a cost per life saved basis. In times of restricted budgets for IAQ, spending money for radon risk reduction provides a very high return on those resources, maybe the highest in the environmental public health area.

New Jersey has one of the premier radon mitigation programs in the country. Although the NJDEP Radon Program has an outreach component, there are still advances to be made. My recommendations are:

1. As part of the 2010 Healthy New Jersey goals, DHSS should encourage local health departments to highlight radon risk.
2. Although many people test as part of real estate transactions, very few buyers of new homes test them for radon. DCA should work with the radon program to assist in getting all new homes tested. In addition, the Radon Hazard Subcode is only mandated in the highest risk areas. DCA and NJDEP should work to encourage use of the subcode for new construction in all areas.
3. DCA should work with NJDEP to promote a school specific section of the Radon Hazard Subcode. This draft code was developed by the Eastern Regional Radon Training Center at Rutgers under an agreement with USEPA Region II. New Jersey students should study radon testing in fourth grade social studies since it impacts geology, government and science in New Jersey.
4. New Jersey should use its extensive database of radon mitigated homes and possibly vapor intrusion mitigated homes to continue to evaluate potential humidity reductions from these systems.
5. New Jersey's Interdepartmental Asthma Committee should evaluate mechanisms used in other jurisdictions to address housing issues by training code inspectors, providing IPM for buildings with low-income families and using health codes to address environmental triggers. ETS is clearly a health risk for children and EPA has an award winning public service campaign entitled "Not in Mama's Kitchen," which attempts to reach smoking parents.

6. New Jersey should use the publicity surrounding the Smoke-Free Air Act to initiate a statewide effort to protect its children with a Smoke-Free Home campaign. USEPA would happy to partner in that effort.

Public schools are covered under N.J.A.C. 12:100.13. However, this law was designed for public employees in all buildings. It was not specifically designed for schools. It does not cover over 1,000 non-public schools in the state.

USEPA does not have a mold program in the same way we address radon, asthma or ETS. USEPA does give guidance for mold remediation on its website including an extensive resource list. Recently, USEPA joined with other federal agencies to adopt high performance and sustainable building principles. This agreement specifies that indoor air quality is part of the process. New Jersey should insure that future Green Building work includes indoor air quality as a requirement.

Michael S. Silva, Assistant Area Director, US Department of Labor, OSHA

My goal today is to inform the public on OSHA's role regarding IAQ complaints. OSHA's mission is to ensure that all employees are provided with a safe and healthy working environment. We ensure health by conducting inspections and enforcing our safety laws. There are four types of inspections:

1. A fatality or catastrophe inspection
2. A referral inspection.
3. A planned inspection.

All of these inspections require the employer to provide OSHA with sampling information in an air contaminant issue. We also ask the employer to examine HVAC systems to determine how often filters are changed, how often air ducts are cleaned and the type of air exchange on an hourly basis. Non-formal inspections are done over the phone and by fax. There is no actual on-site inspection. If the complainant is satisfied with the employer's response, the case is closed. If the complainant is not satisfied it would generate an on-site inspection.

A formal complaint is issued by a current employee and involves an on-site inspection. We try to determine where the hazards are located, what types of air contaminants are present and what approach to take to determine the exposure. As part of the inspection we would do air monitoring. We could also do a screening and/or full shift sampling.

OSHA has what are called permissible exposure limits (PELs), that is limits that employees are legally allowed to be exposed to a particular type of chemical without being protected or having any type of engineering controls in place. We

do screening during an IAQ complaint inspection to determine levels of employees' exposure. Throughout that inspection we also conduct employee interviews to determine symptoms and when and how often they are occurring.

If we sample and find violations, we issue a citation and force the company to abate the situation. If the sample is below the permissible exposure limit, we make recommendations to remediate the problem. Sometimes this involves increasing air exchange per hour or re-locating fresh air intakes, examining the HVAC system's setup or maintenance. It is important to note that our PELs are set based in an industrial setting and not an office setting. The majority of complaints from offices are handled non-formally

Elissa Favata, M.D. Environmental and Occupational Health Associates

Often the most dangerous environmental exposures for children come from the very place children usually feel the most safe, their homes and schools. Significant among those exposures is ETS, which promotes lung cancer as well as cardiac and pulmonary diseases. Carbon monoxide, nitrogen dioxide and sulfur dioxide are the byproducts of combustion and represent health hazards. VOCs and formaldehyde are both irritants of the airways and exacerbaters of asthma. Formaldehyde also causes nasal cancer. Particulates are irritants of the respiratory tract along with pesticides. Radon and asbestos are also on the list of hazards in IAQ. Because of the complexity of indoor air contaminants exposure, health risk assessments require a very systematic detailed review.

First the source of the contaminants is identified. Next, the exposure of the building occupants is explored for dose, duration, and the specifics of the interface between the occupant and the offending agent. The unique susceptibilities of the occupant are also considered. Finally, subjective and objective findings are analyzed after a comprehensive medical evaluation has assessed the relationship between the toxin and the exposed individual.

The respiratory system is the most common site affected by indoor air pollutants. Indoor contaminants, which act as irritants, mainly include VOCs, formaldehyde, ETS, and air toxins. Allergens and microbial contamination have been associated with allergic rhinitis and asthma in genetically susceptible populations. Respiratory disease is a major cause of school absences in children. Approximately 12 percent of New Jersey children have been diagnosed with asthma. A study by Gauderman confirmed that lung development was reduced in children ages 10 to 18 if they were exposed to higher levels of ambient air pollution (NO_2, acid vapor, particulate matter and elemental carbon).

Socioeconomics also impacts on air quality and the health effects. This is manifest in the higher prevalence of asthma and increased asthma morbidity in

inner city children. Fine particle concentrations in homes of inner city children with asthma appeared in multiple cities, and the most important indoor particle source in these homes is cigarette smoking.

Epidemiologic case studies have revealed 33 percent of indoor air quality problems are related to microbial contamination caused by moisture intrusion or increased dampness. The principal indoor microbial contaminants are fungi, bacteria, viruses and protozoa. Beyond the microbe itself there are metabolisms of these organisms that produce microbial VOCs which produce the moldy smell associated with fungal contamination. Microtoxins are also contaminants. More research needs to be done to fully understand the scope of the effect of microtoxins in the inhaled state.

Schools frequently have problems related to moisture intrusion and microbial contamination related to building design, construction and maintenance issues. School IAQ is also adversely impacted by the furnishings and carpets in the classroom that act as reservoirs of irritants and allergens. One school study reviewed measurements of ventilation rates and CO_2 concentrations and found that ventilation was inadequate in many classrooms.

Finally, budgetary constraints are cited by school system administrators to explain shortcomings in annual and daily maintenance. All too often leaks continue for months or years resulting in health problems. It is important to educate school communities, using the EPA Tools for Schools, to form indoor air task forces and to develop proactive IAQ policies. Financial assistance for remediation needs to insure that the renovation of existing structures as well as the construction of new schools promote healthy indoor air quality.

Increased resources are needed for DHSS and the PEOSH Program. Comprehensive evaluations in problem buildings will result in decreased morbidity in New Jersey.

John Rutkowski, American Lung Association, New Jersey Board Chair

The average person breathes about 3,000 gallons of air each day. Most of us do not fully understand the potential health effects of this seemingly simple but absolutely necessary act.

Most people are aware that outdoor air pollution can damage their health, but many don't know that indoor air pollution can also cause harm. USEPA's studies indicate that indoor levels of pollutants may be two to five times and occasionally more than a hundred times higher than outdoor levels.

Comparative risk studies by the USEPA and its Science Advisory Board have

consistently ranked indoor air pollution among the top four environmental risks to the public. Health effects from indoor pollutants may be acute; for example, eye and throat irritation, or chronic; respiratory disease and cancer.

Indoor air pollution occurs when man-made and natural chemicals, gases, particles, and other substances are produced or released in or near the home, school or place of work. Common pollutants found indoors are VOCs, formaldehyde, particulates, radon, asbestos, and combustion gas and by-products, including ETS. These pollutants come from a variety of sources such as cleaning products, fuels that are burned, building materials and products, furnishings, paint strippers, pesticides, the soil under a building, and human activities.

Beginning in the mid-1970's, IAQ complaints increased for two reasons; air tight buildings resulted from the energy crisis and more chemical-containing products were introduced.

Children in schools have little or no recourse through governmental agencies. If a public school teacher is affected, they do have recourse through PEOSH. The Healthy Schools Initiative is therefore important because indoor air pollution can cause a variety health problems, from irritant effects to respiratory disease, cancer and premature death. Children are also exposed to ETS making them at increased risk for lower respiratory tract infections, bronchitis, pneumonia, fluid in the middle ear, asthma symptoms, and sudden infant death syndrome. One of the objectives of the Healthy People 2010 Initiative seeks to reduce the percentage of children regularly exposed to ETS. In 1998, the U.S. Department Health and Human Services estimated that there were 540,000 persons with asthma in New Jersey.

Indoor air pollutants exacerbate asthma symptoms, resulting in breathing difficulties. Scientists found sufficient evidence of an association between exacerbations of asthma and exposure to high levels of nitrogen dioxide and other nitrogen species, and mold. They found limited evidence of asthma exacerbation with exposure to formaldehyde and fragrances.

A substantial number of common indoor pollutants have been classified as carcinogens, such as formaldehyde, benzo[a]pyrene and other polycyclic aromatic hydrocarbons, tobacco smoke, chlorinated solvents such as tetrachloroethylene, and radon gas.

Indoor air pollution poses a significant health risk to our citizens. Indoor pollution can trigger asthma attacks, cause cancer, heart and lung disease, and immediate irritant and neurological effects, such as eye, throat irritation and headaches. Options for mitigation include focused outreach and education as well as improved and modified building codes.

Robert J. Gogats, Burlington County Health Department

Indoor air quality involves, not only the health of our citizens, but also the efficient delivery of services. Prior to the establishment of the NJDEP, public health departments were responsible for all public health and environmental regulations. These departments were grossly under funded, understaffed and unprepared to deal with the highly specialized and technical aspects of environmental protection. Thus, in the early 1970's NJDEP was established.

Seeing value and efficiency in working with County Health departments, the NJDEP helped enact the County Environmental Health Act (CEHA), empowering Public Health Agencies to work as a subcontracting agency to provide enforcement in the areas such as air, water, noise, pollution, solid waste, odor, pesticides, and most recently, the new Private Well Testing Act. Continuing to require public health officials to work on new programs without the necessary support will lead us back to pre-1970 and render local health departments less able to respond to public health emergencies.

IAQ work could fit within the CEHA format. Some of the investigating and testing work could be performed at the local and county level, providing education, training and equipment. CEHA could provide the DHSS and the NJDEP with a seamless ability to administer an IAQ program, and for that matter other environmental programs.

Before creating another cottage industry within our regulatory agencies for mold remediation contractors, consultants and code requirements for abatement, we need to consider consolidating the environmental industry as a whole. Creating additional regulatory schemes for IAQ and mold remediation will further increase the overall cost of construction and reconstruction. This is supported by recent proposed legislation in IAQ such as: A639 Mold Hazards in the Indoor Environments, A3895 - Registration of mold inspectors and remediators, and S1249 - Toxic mold protection Act.

Environmental remediation is far too complex and costly. To be efficient and effective, we need to rely more on private sector certifying agencies and nationally recognized industrial hygiene organizations, such as the American Industrial Hygiene Association, the American Conference of Governmental Industrial Hygienists, the Institute of Inspection and Cleaning and Restoration, the American Indoor Air Quality Council that currently offers twelve certifications in IAQ courses. We do not need separate agencies certifying firms and individuals for IAQ work. Qualified firms and consultants are already out there. Adding bureaucracy is not efficient. Where federal standards exist, we need to adopt those and streamline the state requirements.

Barbara Turpin, Ph.D., Associate Professor, Rutgers University, Department of Environmental Sciences

Even in industrialized countries like the United States, the indoor environment is a major location where exposures occur because people spend most of their time indoors. The average U.S. resident spends about 86 percent of their time indoors. Indoor air quality is impacted by both outdoor and indoor emissions. For pollutants, which have negligible indoor sources like ozone, the indoor environment is dictated by the outdoor ozone concentrations. If there are significant indoor sources, then indoor environments are dominated by indoor sources. This is true for many VOCs, formaldehyde, asbestos, and brominated flame retardants.

It is important to note that that the mass of a pollutant that comes into a building depends on the outdoor concentration of that pollutant and its ability to penetrate through the building envelope and also the ventilation rate of the building. The infiltration factor or the infiltration efficiency is the fraction of the outdoor pollutant concentration that ends up in the indoor air. The infiltration behavior, the infiltration efficiency of non-polar gases of the VOCs is about 100 percent. So VOCs like benzene, toluene and xylene have very small loss rates indoors and the penetration factor is very close to unity.

However, water-soluble gases like formaldehyde, nitric acid and hydrogen peroxide and fine particles have much lower infiltration efficiencies. The process of coming indoors reduces their concentration.

In the case of benzene, the concentrations indoors are similar to outdoors. Whereas, with formaldehyde indoor sources dominate indoor exposures. There is formaldehyde in building materials. With PM the Relationship between Indoor and Outdoor Pollution (RIOPA) study found that for the median, nonsmoking homes 58 to 70 percent of indoor PM came inside from outside. The size of the particle influences its infiltration behavior. Particulate sulfate, for instance, has an infiltration efficiency of about 90 percent. But, elemental carbon has an infiltration efficiency of only 40 percent and organic carbon is also about 40 percent. If the carbon is a soil element, then the particle is larger and has trouble penetrating in from outside. These infiltration efficiencies are only about 20 percent.

Polycyclic Aromatic Hydrocarbons (PAHs) for the most part come in from outdoors. Bringing outdoor PAHs inside and having them encounter indoor emissions of organic PM changes the gas particle partitioning it and thereby shifting the PAHs from the gas phase more into the particle phase.

On a high ozone day, ozone comes in from outdoors. If there are VOCs indoors, they can interact with the ozone and form aldehydes, as well as organic particulate matter. In an urban environment generated pollutants are for the most part primary emissions: VOCs, CO, NOx. The primary particulate matter, non-polar organic compounds, elemental carbon and some metals emitted locally and then join with regionally formed pollutants. These pollutants are substantially transformed through atmospheric processing and are predominately secondary, formed in the atmosphere from emissions of ozone oxygenated organics and particulate sulfate, nitrate and particulate polar organic compounds.

Primary sources of pollutants are CO, NOx, SO_2 and particles emitted from industry and transportation. In addition, there is long distance transport, pollutants that are transformed through sunlight and photochemical reactions to form different types of particulate matter, ozone and oxygenated organic gases. In New Jersey cities about 70 or 75 percent of PM 2.5 mass is regional and 20 or 25 percent is local. Living within a block of an interstate highway increases the PM concentration by a factor of 2. With PAHs emitted from mobile sources there are enhancements on the order of 20 times within a block of an interstate highway.

To sum up, human exposures to indoor and outdoor generated pollutants mostly occur indoors and these indoor concentrations result from a combination of indoor and outdoor sources. Primary pollutant concentrations are enhanced when close to sources.

Joseph Ponessa, PH.D., Extension Specialist & Professor, Housing, Indoor Environments & Health, Rutgers Cooperative Research &Extension

In addition to mold, there are other indoor contaminants, other biologicals, including bacteria, viruses and insects. Building moisture problems, the same ones that force the mold growth, also enhance the growth of these other biologicals. Although this is a problem, the mold issue has been overblown by the media.

There are indeed serious health impacts from mold exposure, but these are not widespread. The most important aspect in the interrelation between mold and health is the understanding that there is a very wide range of individual sensitivity to mold exposure.

Mold has been on the planet since the beginning of life. It's everywhere. It surrounds us. It's collected in air samples from high-flying aircraft. So the notion of a mold-free environment is impossible. The role of mold in the environment is to breakdown dead organic matter. The Earth would be inundated with up to a

depth of about six feet in dead organic material within a matter of months without the presence of mold. The limiting factor for mold growth is moisture.

Field testing for mold is a waste of money. There are no criteria for mold in buildings. There's no safe level. If you smell mold or see it, the building has a mold problem. Money should then be spent on moisture diagnostics and remediation, not on mold detection.

Some common types of testing include air sampling, which provides information compared to outdoors. If there is a large difference in either the counts or the species of mold, then mold is growing in the indoor environment. Another test uses tape to lift some visible mold for identification.

Remediating mold is a two-fold approach. The first component is to find and fix the moisture problem. Second, is removing, not killing the mold, with soap and water. Bleach is not the answer for solving a large mold problem. Potential sources of water or moisture in the building are rainwater, plumbing or condensation. Identifying moisture sources is an extremely difficult and complex process and not easily done.

A public awareness education program is critical. The marketplace today consists of a mix of highly qualified firms and others not qualified. Some sort of certification program is essential. The certification for radon investigators and mitigators seems to work well without a huge superstructure.

The biggest issue in schools, aside from having flat roofs, is that administrators tend to provide lowest priority to maintenance of schools and to doing repairs. There are a number of good efforts in the PEOSH programs and Tools for Schools. However, there appears to be no program in which a parent of a child in a moldy school can seek recourse.

Judith B. Klotz, MS, DrPH, Adjunct Associate Professor UMDNJ School of Public Health

Studies have been conducted on residential risks from radon. The actual agents that deliver most of the radiation dose to the body are short-lived radon decay products. Two of these are alpha emitters, which come into direct contact with the lung tissues when inhaled. The traditional units for measuring radon are curies and picoCuries. In industry the international units of becquerels per cubic meter are used. The conversion is approximately 1 picoCurie per liter equals 37 becquerels per meter. Recommended limit in living areas is 4 picoCuries per liter.

The health outcomes are specifically lung cancer and other suspected cancers such as Leukemia and stomach cancer. Residential exposures can be in the range for which excess lung cancer among uranium miners have been

unequivocally documented. The risks from residential exposure to radon exceed most other risks.

The EPA risk assessments are based on underground miner data that were analyzed by the National Research Council BEIR Committees, particularly the 1999 BEIR VI report. This report was based on a pooling of studies of 11 different underground mine groups, totaling over 68,000 workers. It concluded that radon was the second leading cause of lung cancer in the population. The risk of smokers they concluded was more than additive, but slightly less than multiplicative. Therefore, most lung cancer cases due to radon are seen in current or past smokers. The proportion of annual U.S. lung cancer deaths to which radon contributed is between one-seventh and one-tenth.

There was a miner study done in Saskatchewan that included surface workers who did not have exposures nearly as high as some of the uranium miners. The risk for lung cancer was doubled among those miners. Their working level was in the 5 to 24 range. This was significant because if someone lived in a residence for 25 years at 1 to 4 picoCuries per liter exposure, it would be equivalent to the 4 to 25 working level range.

There are some residential risk issues that are not addressed by the mining studies: slower rates of exposure, more hours per month, women, children and elderly exposures. There are problems trying to investigate radon exposures in the residences including latency, differences in homes over the decades as well as changes of behavior of people.

New Jersey and other places in the Reading Prong have tremendously high exposures. In a New Jersey Residential study done by the DHSS, the results showed a significant trend of association with lung cancer despite really few highly-exposed cases. There has also been a recent pooling of seven North American Studies that included the New Jersey study with a particular time frame of five to thirty years before diagnosis as the focus. The pooled data relative risk per 100 Bq per meter cubed (about 2.7 picoCuries) was 1.11, that is 11 percent excess risk of lung cancer. A European study of pooled risk showed an 8.4 percent increased lung cancer risk per 100 Bq per cubic meter over a 30-year period. Smokers and males had a higher association. At roughly 3 picoCuries there is a 15 percent increase. In conclusion, the pooled North American and European residential studies confirm the BEIR VI risk estimates upon which the USEPA advisories are based. Radon appears to be the second greatest cause of lung cancer in U.S. population. About a third of lung cancers attributed to radon could be prevented if homes met the USEPA guidelines of 148 Bq per cubic meter.

Patricia Gardner, Manager, NJ DEP Bureau of Environmental Radiation

Twenty years ago the analytical radon program was created in the NJDEP. The evidence is strong that radon is the second leading cause of lung cancer. Nearly one in every 15 homes in the United States is estimated to have radon above the USEPA's action level of 4 picoCuries per liter. USEPA's action level of 4 picoCuries per liter is technology-based, not health-based. Indoor air quality cannot be discussed without considering radon. Radon is easy to detect and easy to fix. In New Jersey there is a well-established group of certified mitigation and testing businesses.

New Jersey's Radon Program started in 1985. The danger of radon exposure was discovered when a man named Stanley Watrass, who worked at the Limerick Nuclear Power Plant, set off the radiation detectors on the way to work, not on the way out. He had become contaminated from living in his house which had a high radon concentration.

The New Jersey Radon Program performed 200,000 tests from 1986 to 1991. In 1991, a mandatory certification program was established. At present there are about 700 certified radon testers and mitigators in New Jersey and 40 businesses. DEP collects all testing and mitigation data from the businesses each month. We have now conducted over a million tests and accomplished 36,000 mitigations since 1991; that's about 19 percent testing of homes in New Jersey and about 40 percent of those with high radon concentrations were mitigated. There is still work to be done. Currently about 75 percent of the radon testing is done as part of a real estate transaction. Even though it's not mandatory, lending institutions have required it as part of the contracts.

The Radon Hazard Subcode is required in all Tier 1 communities. All new structures are required to be built with radon resistant construction, which consists of a 4-inch layer of gravel beneath the slab, plastic sheeting, and a 3- or 4-inch PVC pipe. It only costs about $300 to $500 to activate with the addition of a fan installed by a certified mitigator. Last year there were about 1300 homes that were built with radon resistant new construction. Costs are reasonable if they are done initially at the time of construction.

Another area that needs to be addressed is school testing. In 2000, the legislature passed a law that required public schools to test. In 2004, the law was determined to be an unfunded mandate and the law was struck down. There are schools with concentrations of 4 picoCuries per liter or higher. There were more than 50,000 tests performed in schools since September of 2003 during the time the law was in effect. A new bill with funding is essential to require radon testing in schools again.

There is an Elevated Radon Awareness Program. Homes with 100 picoCuries per liter are indicators that 75 percent of the homes in that area may also be above 4 picoCuries. Working with the local communities where radon

concentrations are high, we provide them with $1,000 to purchase test devices to provide to residents. About 24 municipalities have participated.

Exposure to radon in groundwater happens by ingestion as well as inhalation. There is a stomach cancer risk associated with ingestion. Currently, there is no standard for radon in drinking water. USEPA proposed a Maximum Contaminant Level and an Alternate Maximum Contaminant Level in 1999. It was called the Multi-Media Mitigation Program, but it was never promulgated. One of the numbers they were looking at for the MCL was 300 picoCuries per liter. The national average radon concentration in water is 249 picoCuries per liter. So an MCL of 300 would require the mitigation of a lot of water systems.

The NJDEP is not waiting for USEPA to take action on radon in water, but is working with the Drinking Water Quality Institute. There are two ways to treat radon-contaminated water: with activated charcoal and by aeration. USEPA estimates that radon in water causes about 200 cancer deaths per year in the United States.

The following initiatives would help improve New Jersey's indoor air quality:

1. Require mandatory radon testing during real estate transactions.
2.Require radon-resistant construction in all tiers.
3. Require radon testing in public schools.
4.Conduct outreach to homeowners with high radon concentrations.
5.Conduct technical studies to determine the impact from mitigation.

Paul Sanders, Ph.D., NJDEP Division of Science, Research and Technology

Vapor intrusion results from the migration of VOCs from contaminated groundwater or soil to the interior of buildings. Parts-per-billion levels of VOCs in groundwater may result in unacceptable indoor air concentrations of these chemicals. This was initially predicted by a model, but has since been confirmed with field evidence collected in the 1990's.

There is difficulty in predicting if a residence will have a problem with vapor intrusion. Interest in this pathway began in 1991 when Johnson and Ettinger published a theoretical model for prediction of chemical transport through the soil zone. Interest grew in 1996 when USEPA released a spreadsheet of the model. In 1999 this model was added to USEPA's Soil Screening Level Guidance, which has been used by several states when developing soil cleanup standards. The USEPA dedicated a symposium in Washington on the topic in 2000. In 2002 USEPA published draft vapor intrusion guidance and in 2005 NJDEP released its own guidance.

Buildings often have a negative pressure relative to the outdoors. Heating sources, exhaust fans and temperature differences between indoors and outdoors create a negative pressure pulling soil gas into the building. Factors that affect the rate of vapor intrusion include soil texture, depth to water table and soil moisture. USEPA did a nationwide survey of typical dilution that occurs when a chemical transports across the building foundation. The best number right now is a conservative factor of about a 50-fold dilution.

Chemicals for which groundwater screening levels have been developed include benzene, PCE, TCE, carbon tetrachloride and MTBE. For carcinogens, the screening level is often determined by the detection limit rather than the health level. For noncarcinogens, such as the DCE and TCA, the screening levels are usually much higher. If there is a worker setting rather than a residential exposure, the exposure assumptions change.

Other sources besides vapor intrusion are responsible for volatile organic chemicals in the home, such as a car in an attached garage, dry cleaning, smoking, carpet cleaners and paints. All these things contribute some of the same chemicals that may be of concern in contaminated groundwater or soil. Therefore, consideration of other indoor ambient sources of these chemicals should be considered when conducting indoor air investigations. For indoor air sampling, Summa canisters are used, and samples are collected and analyzed according to USEPA Method TO-15. The canister is a 6-liter evacuated sphere which draws in air over a 20 to 24-hour period. For soil vapor sampling a borehole is drilled into the ground, a sampling tube is inserted, and the Summa canisters are attached to the sampling tubes. To sample under the building, a borehole is drilled through the slab. Although there may be high concentrations of toxins in the groundwater, it does not necessarily mean intrusion will occur. Indoor sampling should be conducted to determine whether or not vapor intrusion is of concern. Some chemicals can degrade rapidly as they transport to the soil zone.

NJDEP's plan is to update toxicity parameters every six months in its vapor intrusion guidance document. The NJ vapor intrusion website is updated frequently.

Debbie DiColo, President, West Windsor-Plainsboro Education Association

Current regulations impede public school employees faced with air quality concerns. Currently, if an employee feels there is a health issue caused by a potentially hazardous material or allergen in the environment, there is no recourse. PEOSH is just not effective. They speak to individuals and test for CO_2 levels. If there are no visible problems, and the CO_2 levels are appropriate, the building meets current air quality standards.

If a further complaint is lodged, PEOSH recommends that the district hire an outside consultant. This is never done because of the cost. PEOSH should be given authority to do more than visual inspections and CO_2 monitoring.

Mold is a serious issue because removal is costly. As school buildings age, mold becomes more of a problem. Mold needs to be removed by professionals. There need to be specific reporting and cleanup procedures.

An additional problem involves appropriate school building temperatures. Properly heated and air conditioned buildings provide healthy building environments. Air conditioning does not exist in most school buildings and heat is frequently set at unhealthy temperatures.

The New Jersey Education Association supports a bill requiring districts to provide appropriate temperatures for school buildings. When building new schools, they should be greener, healthier schools.

Natalie McCloskey, Volunteer with the American Lung Association

Before I had children I never thought asthma was that serious. I always thought someone having an attack would just take a puff or two from an inhaler and feel better. I was terribly ignorant about the disease.

Our struggle with asthma began when our second child, Erin, was just 13 months old. A trip to the pediatrician's office for what I thought was a lingering cold became a several day hospital stay for asthma. Now our days no longer revolved around play dates, but around medicines, breathing treatments and doctors' appointments. Things that never concerned us suddenly consumed us like outdoor air quality, indoor air quality, ozone alerts.

Even our family fun activities had to be altered. Swimming trips to our local YMCA had to be limited to the summertime when they would open the emergency doors to let in fresh air. The odor from the chlorine was so strong when the doors were shut, it would not only trigger an attack in Erin, Dacy, Annalivia, but in me as well.

School is a huge concern as the weather turns warmer because only two schools have air conditioning and it's not the two schools that our children attend. Asthmatic children need air conditioning when the temperature hits 80 degrees. The district suggested moving the girls into the air-conditioned library, but this is not feasible as there is no supervision there and my girls would be prevented from learning. Our girls have suffered and continue to suffer the physical and emotional ramifications of asthma. We are hoping their education won’t suffer as well.

Joanne Held, Formerly with NJDEP Division of Air Quality

New Jersey needs to work in a coordinated fashion with the counties and municipalities to improve IAQ. Currently, there is very little coordination. It is frustrating for the public and does not make good use of limited state resources.

It would be helpful to establish in the NJDEP an Indoor Air Quality Steering Committee. This committee would have members representing the radon program, the pesticide program and people from various parts of the Division of Air Quality. It could include members from the Division of Science and Research and Technology and the Site Remediation Program, especially the Underground Storage Tank Program.

This Steering Committee would be charged with meeting once a month and be forum of information exchange among the different members across the different programs. They could undertake some small projects like putting together lists of companies that can do surveys and assessments, remediation and monitoring.

This Steering Committee would also have members from the DHSS and DCA as well as the Department of Education. There is a precedent in the interagency Risk Assessment Committee that has existed for well over 20 years that includes members of the DHSS.

I would recommend the Radon Program as the lead because they have so much experience in dealing with the public and indoor air quality.

This steering committee could work with the DCA to develop information for residents of public housing on lodging an indoor air quality complaint. Working with the DHSS, the Steering Committee could provide information and training for county and local health departments on IAQ.

David Pringle, New Jersey Environmental Federation.

Concentrations of a variety of pollutants are much greater indoors than outdoors. Focusing on schools is important because so many of our schools are sited near industrial sources of pollution. It is interesting to note that school occupancy tends to be four times denser than a typical office park. So that indoor pollution in the school is going to have a greater impact than corresponding office space.

Standards are not protective of children on a variety of fronts. Contaminated school sites do not require residential mitigation. Caps that permit vapor intrusion can be used to remediate a site. Also, the standards are set for an average adult male, not the more vulnerable populations of children.

NJEF recommends the following:

1. Schools should not be sited on contaminated sites. Standards need to meet residential standards for cleanup at schools.

2. Schools should be sited in such a way that the idling school buses are not near windows or venting systems that can impact IAQ.

3. Indoor and outdoor use needs to be considered when a school is being sited on a contaminated site because different contaminants behave differently. Lead doesn't percolate through the soil the way VOCs do, so if there's lead onsite, the school building could be sited there instead of the playground. If there are VOCs present, it would be more logical to have that underneath the parking lot than underneath the school building.

Jeff Tittle, Director, New Jersey Sierra Club

The Sierra Club was recently involved in Gloucester City where they were planning on building a school on a Superfund site because the other town-owned land was less polluted and more desirable for condos.

The site formerly housed a coal gasification plant, which was polluted with VOCs and benzene leading to vapor intrusion. The site also had seasonally high groundwater. A central problem with vapor intrusion in New Jersey stems from the fact that many parts of the state have alluvial lands that have been filled in to allow building. The Gloucester City site was former filled in alluvial land with seasonal high groundwater. When the water comes to the surface it brings VOCs and benzenes. Unfortunately, the site was examined for building during the dry period in August instead of during the wet spring.

Another example in Jersey City and Weehawken existed because former parts of the river had been filled in with chromium. When the water table was high, the chromium pushed up through the caps. A study in Weehawken found chromium coming up through a cap that was less than a year old.

Regarding indoor air pollution, what happens outside affects the inside. There are 17,000 vapor intrusion sites in New Jersey. Some of them have been cleaned up and some of them have only been capped. There are more than 3,500 sites where major contamination directly affects groundwater.

Categorical Exemption Areas (CEA's) are areas in the State where the groundwater is permanently polluted. These sites are not remediated because in 30 years they will naturally attenuate. The problem is that many of these sites are under existing neighborhoods, next to wells. The impact is not just on drinking water, but plumes of pollution move through the groundwater and reach residential basements.

Voluntary cleanup programs are fraught with problems because the least expensive way of cleaning the site is usually chosen. Caps are frequently used

and the installed sewer and utility lines become the transmission routes for hazardous vapors. This is a problem in developing brownfields.

One of the problems with site remediation is that there are conflicting interests and we compartmentalize when we should be working together. There needs to be a holistic approach.

As the cost of energy increases, wood- burning stoves will become more commonplace. This affects indoor and outdoor air. Some burning of scrap wood releases lead into the atmosphere. The burning of waste oil, containing heavy metals, has also become a problem as this is vented into the atmosphere.

Building codes also need to be revised. Plastics are now used for molding and structural supports because it is less costly than wood, however, toxins from degrading and burning are not considered.

WRITTEN TESTIMONY

Eileen Senn, MS, NJ Work Environment Council (WEC) Industrial Hygiene Consultant

WEC is a coalition of 70 labor, environmental and community organizations working for safe, secure jobs and a healthy sustainable environment. I participated in the PEOSH IAQ Sub-committee during 2005. The committee worked to improve enforcement of the State IAQ standard. PEOSH promised to improve training of inspectors, to complete the Inspection Checklist during inspections, to use of language crafted by the committee in agency reports to employers, to close loopholes in the IAQ Standard and to increase staffing of the PEOSH program.

WEC requests that the Clean Air Council address the following:

1. Endorse the promised improvements in the PEOSH IAQ standard and its enforcement.
2. Recommend that the NJDEP adopt the IAQ standards for private sector workplaces. This is needed since OSHA has no IAQ Standard for the private sector. NJDEP might initially adopt the standard and enforcement could begin at a later time.
3. Recommend that NJDEP require contaminant removal clean-ups at school construction sites rather that caps.
4. Support legislation on temperature in schools (68-79 F) when it is introduced.
5. Address the need for carbon dioxide meters in communities and in the workplace. Levels of 1000 ppm indicate that not enough outdoor air is being supplied to dilute air contaminants.

Steve Leone, Chairman, NJ Chapter of Green Building Council

The US Green Building Council (USGBC) has developed a tool that rates a building's "green" aspects called LEED. This system is a voluntary, consensus-based market-driven rating system that is based on accepted energy and environmental principles. The rating system is organized into five categories:

1. Sustainable Sites
2. Water Efficiency
3. Energy and Atmosphere
4. Materials and Resources
5. Indoor Environmental Quality.

Currently, the LEED system only applies to new and existing commercial buildings, including schools, hospitals and apartment complexes. USGBC is in the process of developing new products to rate homes and neighborhoods.

New Jersey is now home to six "green buildings" certified by the LEED Green Building Rating System. An additional 50 + buildings are awaiting certification. Adopting the LEED standard could improve IAQ in all new and existing buildings.

Editor: Eileen Hogan, M.A

Glossary of Acronyms

CAA – Clean Air Act

CEA – Categorical Exception Areas

CEHA – County Environmental Health Act

CEP - Cumulative Exposure Project

CO – Carbon monoxide

COPD – Chronic Occupational Pulmonary Disease

DCA- Department of Community Affairs

ETS – Environmental Tobacco Smoke

HAP – Hazardous Air Pollutant

IAQ – Indoor Air Quality

IPM – Integrated Pest Management

LEED - Leadership in Energy and Environmental Design

NESCAUM – Northeast States for Coordinated Air Use Management

NJDEP – New Jersey Department of Environmental Protection

NJDHSS - New Jersey Department of Health and Senior Services

NOx – Nitrous Oxides

PAH - Polycyclic Aromatic Hydrocarbons

PEL – Permissible Exposure Limit

PM – Particulate Matter

RFG – Reformulated Gasoline

RIOPA – Relationship between Indoor & Outdoor Pollution

SCC – School Construction Corporation

USGBC – United States Green Building Council

USEPA – United States Environmental Protection Agency

VOC – Volatile Organic Compound

WEC – Work Environmental Council

CAC PUBLIC HEARING HISTORY

2005	Air Pollution—Effects on Public Health, Health Care Costs, and Health Insurance Costs
2004	Fine Particulate Matter in the Atmosphere • Health Impacts in NJ • Need for Control Measures
2003	Moving Transportation in the Right Direction
2002	Innovative Solutions for Clean Air
2001	Air Quality Needs Beyond 2000
2000	Air Toxics in New Jersey
1999	The Impact of Electric Utility Deregulation on New Jersey's Environment
1998	CLEAN AIR Complying with the Clean Air Act: Status, Problems, Impacts, and Strategies
1997	Particulate Matter: The proposed Standard and How it May Affect NJ
1996	Clearing the Air Communicating with the Public
1995	Strategies for Meeting Clean Air Goals
1994	Air Pollution in NJ: State Appropriations vs. Fees & Fines
1993	Enhanced Automobile Inspection and Maintenance Procedures
1992	Impact on the Public of the New Clean Air Act Requirements
1991	Air Pollution Emergencies
1990	Trucks, Buses, and Cars: Emissions and Inspections
1989	Risk Assessment - The Future of Environmental Quality
1988	The Waste Crisis, Disposal Without Air Pollution
1987	Ozone: New Jersey's Health Dilemma

1986	Indoor Air Pollution
1985	Fifteen Years of Air Pollution Control in NJ: Unanswered Questions
1984	The Effects of Resource Recovery on Air Quality
1983	The Effects of Acid Rain in NJ
1981	How Can NJ Stimulate Car and Van Pooling to Improve Air Quality
1980	(October) Ride Sharing, Car – and Van-Pooling
1979	What Are the Roles of Municipal, County, and Regional Agencies in the New Jersey Air Pollution Program?
1978	How Can NJ meet its Energy Needs While Attaining and Maintaining Air Quality Standards
1977	How Can NJ Grow While Attaining and Maintaining Air Quality Standards?
1976	Should NJ Change its Air Pollution Regulations?
1974	Photochemical Oxidants
1973	Clean Air and Transportation Alternatives to the Automobile and Will the Environmental Impact Statement Serve to Improve Air Quality in NJ?
1972	The Environmental Impact on Air Pollution: The Relationship between Air Quality, Public Health, and Economic Growth in NJ
1971	How Citizens of NJ Can Fight Air Pollution Most Effectively with Recommendations for Action
1970	Status of Air Pollution From Mobile Sources with Recommendations for Further Action
1969	Status of Air Pollution Control in NJ, with Recommendations for Further Actions