MARK D. ROSENBAUM (BAR NO. 59940)
CATHERINE E. LHAMON (BAR NO. 192751)
PETER J. ELIASBERG (BAR NO. 189110)
ACLU Foundation of Southern California
1616 Beverly Boulevard
Los Angeles, California 90026
Telephone: (213) 977-9500

JACK W. LONDEN (BAR NO. 85776)
MICHAEL A. JACOBS (BAR NO. 111664)
MATTHEW I. KREEGER (BAR NO. 153793)
LEECIA WELCH (BAR NO. 208741)
MEGAN M. AUCHINCLOSS (BAR NO. 194304)
MORRISON & FOERSTER LLP
425 Market Street
San Francisco, California 94105-2482
Telephone: (415) 268-7000

ALAN SCHLOSSER (BAR NO. 49957)
MICHELLE ALEXANDER (BAR NO. 177089)
ACLU Foundation of Northern California
1663 Mission Street, Suite 460
San Francisco, California 94103
Telephone: (415) 621-2493

JOHN T. AFFELDT (BAR NO. 154430)
Public Advocates, Inc.
1535 Mission Street
San Francisco, California 94103
Telephone: (415) 431-7430

Attorneys for Plaintiffs
ELIEZER WILLIAMS, etc., *et al.*

SUPERIOR COURT OF THE STATE OF CALIFORNIA

COUNTY OF SAN FRANCISCO

UNLIMITED JURISDICTION

ELIEZER WILLIAMS, a minor, by SWEETIE WILLIAMS, his guardian ad litem, *et al*., each individually and on behalf of all others similarly situated,

Plaintiffs,

v.

STATE OF CALIFORNIA, DELAINE EASTIN, State Superintendent of Public Instruction, STATE DEPARTMENT OF EDUCATION, STATE BOARD OF EDUCATION,

Defendants.

No. 312236

EXPERT REPORT OF DR. MEGAN SANDEL

Date Action Filed: August 21, 2002

I. INTRODUCTION

A. Qualifications

1. I am an assistant professor of pediatrics at Boston University, where I have been a researcher since 1999. My research has concentrated on the effects of the indoor environment on children's health, focusing on residential hazards and the manifestation of childhood illnesses, including asthma, lead poisoning, and unintentional injuries. I am currently a co-Principal Investigator of the Boston Healthy Homes Partnership, a $1.9 million dollar study funded by the United States Department of Housing and Urban Development to examine cost effective strategies to remediate substandard housing conditions and evaluate any effects on health of children. I am also an investigator in a study with researchers from the National Institute of Environmental Health Sciences to examine effective cockroach allergen reduction in heavily infested homes. A recent copy of my Curriculum Vitae in attached.

2. I serve as faculty for the first Environmental Health Fellowship offered to pediatricians. I will supervise two Environmental Health fellows in their community and research placements, as well as participate in teaching sessions at the Harvard School of Public Health, the Boston Children's Hospital and the Cambridge Health Alliance.

3. I have written extensively about the connection between indoor environment and child health, both in reports and medical journals. My reports have included "Not Safe at Home: How America's Housing Crisis Threatens the Health of its Children," and peer-reviewed and invited journal articles have included "How Substandard Housing Affects Children's Health," "Inner City Asthma," and "Housing Subsidies and Health of Children."

4. I have lectured extensively about the connection between indoor environment and children's health, both regionally and nationally. I was a featured speaker at Department of Housing and Urban Development's Healthy Home training throughout New England. I also have spoken at national meetings for Affordable Comfort and Department of Housing and Urban Development's Lead Grantees conferences.

5. I have served as a consultant to many projects, including the Urban Institute's HOPE VI panel study evaluating the effects of relocation of families from public housing. I also serve as a member of the Asthma Regional Council a consortium of educational, environmental and public health agencies from the six New England states and regional federal offices of the United States Departments of Health and Human Services and Housing and Urban Development, and the Environmental Protection Agency.

6. I am a practicing pediatrician with many primary care patients. I will include case examples from my practice to complement the medical evidence offered in this report.

B. Scope of Assignment

7. I have been asked by the plaintiffs in the Williams case to provide my opinion as to whether the physical condition of school facilities has an effect on students' short term and long term health.

8. Specifically, I have been asked to assume that the schools at issue cover grades K through 12, and that one or more of the following conditions exist in those schools: (1) excessive heat; (2) inadequate air conditioning, heating and ventilation systems; (3) mold and other biologic hazards; (4) pest infestation; (5) lead and other toxic hazards; (6) overcrowding as measured by the stated capacity of the school structure. My report outlines the health consequences of these conditions on children.

C. Summary of Opinions

9. Based on my review of pertinent research studies, and my background and experience in the field, my conclusion is that school facility conditions do affect student short term and long term health. In particular, I reach the following conclusions:

a. Evidence suggests that conditions within school facilities may cause children to become sick with both acute temporary illnesses, as well as chronic illnesses. Some of these conditions, such as molds or allergens, may manifest themselves within days to weeks, while others,

such as toxins, may manifest themselves years later. Examples of acute illness include children who become ill with coughing or headaches in response to conditions such as mold, toxic off-gassing of chemicals or extremes in temperature. Examples of chronic illness include children who may develop asthma symptoms in response to conditions in the school, or may develop cancer later in life in response to carcinogens in schools.

b. Conditions within schools may have both direct and indirect effects on child health, since many facility conditions in schools may manifest themselves through multiple indoor hazards. Certain conditions can both cause a health hazard to develop as well as encourage the development of a second or third hazard, therefore increasing the ill effects. Examples include moist or humid conditions. High humidity can directly result in mold growth. Indirectly, it can also encourage infestations, or cause lead paint to deteriorate and cause lead exposure, conditions which affect children's health as well.

c. School building conditions can exacerbate many diseases students have, which can result in not only severe illness but also missed school days. Examples include children with asthma exposed to conditions they are sensitive or allergic to, such as cockroaches. Exposure to allergens has been proven to make asthma worse in sensitive individuals.

10. All of the studies cited in this report demonstrate a clear relationship between student health and various conditions of the indoor environment. Though the amount of evidence may vary from condition to condition, overall, substandard conditions in school environment lead to poor health and school absences in many children.

II. CHILDREN'S INDOOR ENVIRONMENTS IN CALIFORNIA SCHOOLS

11. Children spend 90% of their time indoors. A majority of that time is spent in the school, day care and home environments. Considering this, the indoor environment is considered the most important environment to children's health.

12. School and home environments are similar and generally manifest the same problems (Institute of Medicine 2000). California classrooms have similar species of mold found in homes when testing has been done in both locations. (Dungy 1986). Cockroach allergen has been found at similar levels in home and classroom dust when schools have warm moist environments (Sarpong 1997). Though the home environment has been more extensively studied, the same conditions that are unhealthy in homes are also unhealthy in schools and vice versa (Etzel 2001).

13. School conditions can be similar in many parts of the country. California schools have been found to have molds, allergens from dust mites, animals and insect allergens, high levels of many chemicals, and inadequate ventilation, all of which are common indoor air problems throughout the nation (EWG 1999, Tootelian 2001, Daisy and Angell, 1998). A 1996 GAO report also cites problems with inadequate heating and cooling in many California schools, undoubtedly resulting in temperatures being too hot and too cold at times (GAO 1996). Similar problems have been investigated in Chicago as well (Institute of Medicine 2000).

14. In my opinion, it is essential to children's health that schools maintain "decent facilities", which have been defined as "…structurally safe, contain fire safety measures, sufficient exits, an adequate and safe water supply, an adequate sewage disposal system, sufficient and sanitary toilet facilities and plumbing fixtures, adequate storage, adequate lighting, be in good repair…"(GAO 1995). Many schools have leaking roofs, plumbing problems, inadequate HVAC systems and other systemic failures (GAO 1996). Inadequate in the GAO report was defined as any one of the following ratings: fair, poor or replace. (GAO 1996).

15. Reports from the U.S. General Accounting Office have shown that school buildings nationwide, including California, are inadequate (GAO 1995). Eighty seven percent of California schools reported at least one unsatisfactory environmental factor (GAO 1995, GAO 1996).

16. In California, over half of the schools are over 30 years old or older (EdSource 1998). Many old buildings need basic repairs such as roof replacement, plumbing updates, new heating systems, new paint and new flooring (EdSource 1998). These substandard schools expose children to such conditions as water leaks, mold growth, pest infestation, temperature extremes, lack of ventilation, and unsanitary bathroom conditions (GAO 1996, Institute of Medicine 2000, Daisy and Angell 1998). Older schools may also have toxic exposures to lead paint, (DHS 1999), and asbestos.

17. The California Department of Health Services (DHS 1999) was required to conduct a study of prevalence of lead and lead hazards in California public elementary schools and childcare facilities. Data collected from 1995-1997 among 200 randomly selected schools estimates that 77.7% of California public elementary schools have lead based paint and over a third of them (37.6%) have either lead based or lead containing paint in deteriorating condition present in the schools, representing a high risk for lead exposure to children. (DHS 1999)

18. However, dilapidated schools are not alone in unhealthy conditions. Poorly constructed new schools may also have substandard conditions from inadequate ventilation, inadequate water drainage and toxic materials used (GAO 1995, EWG 1999).

19. Because of overcrowded conditions and class size mandates, many students are taught in portable classrooms, built of materials containing high levels of many toxins. One report estimates that over 2 million children in California have at least one class per day in a portable classroom (EWG 1999). Many portable classrooms have little to no ventilation, which only increases the amount of exposure to toxic chemicals. (Daisy and Angell, 1998).

III. PHYSICAL CONDITIONS AND STUDENT HEALTH

A. Biologic Hazards

20. One of the most common biologic hazards in schools is mold. Damp and moldy indoor conditions are associated with worsening asthma and cough symptoms in children and adults, even after controlling for potentially confounding factors such as family income, social class, smoking, crowding, and unemployment (Bornehag 2001, Peat 1998). Overcrowding increases the needs of HVAC systems to provide adequate ventilation per person. (Spengler 2001). Lack of an adequate ventilation system can result in increased humidity and moisture in schools, which can result in mold growth. (Spengler 2001, Institute of Medicine 2000, Daisey and Angell 1998).

21. Overcrowding has also been shown to increase transmission rates of infectious diseases, resulting in significantly missed work and school days (Spengler 2001, Institute of Medicine 2000).

22. Water intrusion is linked to damp and mold problems, especially in schools (Institute of Medicine 2000, Daisey and Angell, 1998). Leaking roofs, poorly sealed windows and inadequately drained basements provide multiple water sources in schools to encourage mold growth. Personally, I have had children in my practice who will not attend school on rainy days since their schools have water leaks and mold grows rapidly on those days. After mold exposure, they have asthma attacks that require medication every few hours, even through the night, to prevent a trip to the hospital.

23. Studies of children with and without asthma, also known as case control studies, have documented the connection between increased mold and dampness in the indoor environment and asthma, probably due to increased dust mite and molds (Williamson 1997). Cross sectional studies, or surveys of children at one point in time, have connected indoor mold and dampness exposures with increased rates of cough, wheezing, atopic dermatitis, and increased bronchial hyper-reactivity (Dales 1991, Verhoeff 1995).

24. Large survey studies of children have also established associations between indoor mold and dampness exposures and recurrent headaches, fever, nausea , allergic rhinitis, and vomiting, and sore throats (Bornehag 2001, Platt 1989).

B. Allergens

25. Allergens are small proteins that cause the human immune system to react (Rudolph 1987). Allergic reactions can include swelling, redness, and itchy feelings in the throat and skin. Atopic dermatitis or eczema, is an allergic reaction of the skin, causing severe itching, darkening and drying of the skin. Allergic rhinitis is a swelling of the airways in the nose, resulting in congestion and sore throat. Asthma is an allergic reaction in the airways of the lung, where the airways swell to a point where very little to no air can pass through. People who have asthma describe it as trying to breathe through a coffee stirrer.

26. People develop allergies by being exposed to these proteins in the environment at times when they are vulnerable, such as childhood. Some people are also more likely to develop allergies if they have a certain genetic predisposition. Most people develop allergies in childhood, though some adults will develop allergies and allergic reactions from occupational or other environmental exposures. Regardless of where the allergy was developed, once a person is allergic to certain conditions in the environment, being exposed to the conditions will make them sick.

27. One of the strongest allergens results from pest infestations. Pest infestations, through their association with asthma and infectious diseases, provide another linkage between substandard school facility conditions and childhood illness. Pests, such as cockroaches, mice, and rats, seek indoor environments if certain conditions are present. Pests require an entry point into a building, ready water supply, and access to some food (Howard 1993). Without these conditions, pest infestation is entirely preventable. Conditions in schools where water leaks, trash is not well sealed and bathrooms poorly maintained invite pests into schools, where they leave behind their feces and skin to cause and exacerbate allergies and asthma in children. Therefore, where

cracks in walls and foundation can be corrected, and regular cleaning and maintenance can be done, the likelihood of pest infestation can be decreased or prevented.

28. Exposure to cockroaches can cause allergic sensitization and has emerged as an important asthma trigger. Children with asthma who are sensitized and exposed to cockroaches are at elevated risk for hospitalization (Rosenstreich 1997). Though many children suffer from many allergens, cockroach allergy is associated with particularly severe and chronic asthma (Kang 1989, Kang 1990).

29. A seminal study from the New England Journal of Medicine examined skin test sensitivity, bedroom dust allergen levels, and asthma morbidity among 476 asthmatic children (Rosenstriech 1997). Children with the combination of a positive skin test reaction to cockroach extract and a bedroom level of cockroach allergen exceeding 8 U/g of dust, a relatively small amount of cockroach residue as result of cockroach infestation, had significantly more hospitalizations for asthma, more unscheduled medical visits, and more missed school than non-exposed cockroach allergic children. (Rosenstreich 1997) Parents of children exposed to cockroaches reported their kids wheezed more than other children. Children also reported more nights awake, a risk factor for poorer performance in school. (Rosenstreich 1997) I have had many children as patients whose asthma symptoms worsen after increased cockroach allergen exposure.

30. Mouse allergen also acts as a clinically important cause of allergy and asthma morbidity (Phipantakul 2000). When children are exposed to an allergen in early life, their immune systems can react strongly to the allergen and become "sensitive" to it. The child is now sensitized or allergic. Many studies have shown sensitization and exposure to rodents can make asthma worse. Epidemiologic or survey studies among workers in laboratories with rodents, such as mice and rats, showed increases in asthma symptoms and decreased lung function among workers exposed to rats (Hollander 1996). Other studies showed positive associations between mice and rat allergy and asthmatic symptoms (Cockcraft 1991).

31. However, even if children developed an allergy from exposure in another environment, being exposed to cockroaches at school will still exacerbate

allergies and asthma (Institute of Medicine 2000). Other studies have also shown that exposure to mice or rats in laboratories among asthmatics who already have a sensitivity to mice or rats will exacerbate allergies and asthma (Institute of Medicine 2000).

32. Leaking pipes, roofs and other sources of water provide drinking sources for many pests. Inadequate trash disposal facilities, in classrooms and bathrooms, provide opportunities for obtaining pests to find food. Dead spaces in walls harbor pests and permit circulation throughout many rooms and floors in large buildings (Howard 1993).

C. Toxins

33. Exposure to volatile organic compounds (from particle board and floor coverings) has been linked with asthma and sick building syndrome (Institute of Medicine 2000, Daisey and Angell, 1998). Sick building syndrome is defined as a "phenomenon whereby people experience a range of symptoms when in specific buildings. The symptoms are irritation of the eyes (e.g., dry/watery eyes), nose (e.g., runny/blocked nose), throat (e.g., dry/sore throat), and skin (e.g., dryness/redness), together with headache, lethargy, irritability, and lack of concentration. Although present generally in the population, these symptoms are more prevalent among occupants of some buildings more than others and are reduced or disappear over time when the afflicted persons leave the building concerned." (Spengler 2001).

34. Moderately elevated levels of carbon monoxide (from poorly functioning heating systems) cause flu-like systems, while higher levels result in acute intoxication (Walker 1999).

35. Portable classrooms can frequently expose children to toxic chemicals such as formaldehyde, benzene and toluene, which can be respiratory irritants and carcinogens. Formaldehyde is a known carcinogen, with even relatively small exposure times increasing ones chances of developing blood and lung cancers to a level two to three times what is deemed acceptable under the Clean Air Act. Since 2 million children are exposed to portable classrooms in California, primarily as a result of overcrowding,

there is a demonstrable risk of increased number of cases of cancer in children and adults due to overcrowding. (EWG 1999). Many studies have shown indoor air to have higher formaldehyde levels than outdoor air and portable classrooms are likely to have higher levels than permanent buildings (Daisey and Angell 1998). A limited number of studies in California have showed some classrooms to have levels of formaldehyde higher than the 0.05ppm standard recommended by California Department of Health Services (Daisey and Angell 1998). In my opinion, as a result of using portable classrooms to alleviate overcrowding, some California children could be diagnosed with cancer in the future.

36. The relationship of lead exposure (from leaded paints) and neuro-developmental abnormalities is clearly established. (Rosen 1995, Needleman 1990). Though most studies focus on the neuro-developmental outcomes from lead exposure in children under 72 months of age since they have the hand to mouth behaviors that increased lead dust exposure, there is still documented risk associated with of lead exposure in young elementary school age children as well (CDC 1991, DHS 1999). Some children already diagnosed with developmental disorders, such as autism, may be at continued risk because of the persistence of hand to mouth behaviors in these children (Shannon 1988).

37. Lead exposure to children predominately comes from lead paint dust (Lanphear 1998, DHS 1999). Lead dust can arise from chipping paint, but also can arise from inside window wells and doors from friction after opening and closing (Schwartz 1994). Therefore, many children can become lead poisoned without ever ingesting a paint chip, but by simply sitting or playing near windows and doors that shed lead paint particles into household dust. Another possible exposure is through improper and unsafe lead remediation. If lead was removed in a way that does not control dust, then lead particles can travel and potentially poison children. I once treated a child in the hospital whose lead exposure was from his father who worked at an unregulated construction site dealing with lead paint. The father had brought the lead dust home on his clothes and poisoned his child. The child's lead level was so high he needed to be hospitalized for intravenous medication to bring down his lead level.

38. Lead has been found to be especially toxic to the developing brain. Children with high levels of lead in the umbilical cord had lower mental development scores and problems with fine motor and interactional/linguistic skills (Bellinger 1992). Some studies have found long lasting cognitive effects, with an estimated 2.5 point drop in IQ for each increment of 10ug/dl in blood lead level (Rosen 1995). Children with lead levels 15 ug/dl and higher have poorer speech and language processing, disordered classroom behavior, more daydreaming, and an inability to follow directions than children without high lead levels (Needleman 1990).

39. However, there is increasing evidence that no detectable threshold or minimum safe amount exists for the adverse effects of lead exposure on neurodevelopment (Schwartz 1991, Rosen 1995). Therefore no level of lead exposure should be considered safe. Blood lead concentrations as low as 5 □g/dl are associated with deficits in cognition and academic abilities (Lanphear 2000). Low-level elevation in blood lead concentration has been associated with cognitive deficits, poor growth, aggressive behavior, and hearing dysfunction (Baghurst 1992, Frisancho 1991, Schwartz 1991, Needleman 1990). Lead exposure has been associated with delinquent behaviors in adolescents (Needleman 1996), and increased rates of cardiovascular disease and mortality from all causes in adulthood (McDonald 1996).

40. The long-term effects of lead exposure are not limited to cognitive or delinquent behaviors. Evidence suggests lead exposure in childhood can be a risk factor for development of hypertension in adulthood as well, one of the leading causes of premature death in this country (Schwartz 1988).

41. Another toxin present in many school environments is asbestos exposure. Like lead, no level of asbestos exposure is considered safe for children or adults. Asbestos exposure (from deteriorating insulation) can cause mesothelioma and other lung cancers (Landrigan 1998). This is an easily detected and removable health hazard and entirely preventable cause of cancer.

IV. INDIRECT CAUSES OF POOR STUDENT HEALTH

42. Absence of hot water and lack of soap for washing, pest infestations, and ineffective disposal of trash have long been identified as contributing to the spread of infectious diseases, such as diarrhea and other viruses (Marsh 1982).

43. Old, dirty carpeting is often found in substandard buildings and is an important reservoir of dust, allergens and toxic chemicals (Roberts 1995). Exposure to these agents can result in allergic, respiratory, neurologic and hematologic illnesses.

44. Deviation of indoor temperature beyond a relatively narrow range has been associated with increased risk of disease in vulnerable populations, such as infants and the elderly (Collins 1986). These health concerns have contributed to the development of standards for thermal comfort (ASHRAE 1981). Adequate temperatures are accepted conservatively to be 67 degrees to 76 degrees (Spengler 2001).

45. Extremes of temperature have been well recognized to worsen infectious and other diseases. Heat related illnesses include fainting, rashes, dehydration, and viral infections, which are more serious in children than adults. (Markus 1993). Extremes of cold can exacerbate asthma and encourage influenza and other respiratory illnesses to proliferate and spread (Spengler 2001).

46. HVAC problems may increase exposure to mold, because inadequate HVAC systems tend to increase humidity thereby encouraging mold growth and other allergy problems. (Institute of Medicine 2000)

47. High humidity, dampness, and overheating can also lead to increased pest and dust mite proliferation, which are both respiratory irritants and allergens (Institute of Medicine 2000, Williamson 1997). Adequate humidity is conservatively set at 20%-60% humidity for human comfort (Spengler 2001).

48. In sum, damp conditions provide a nurturing environment for mites, roaches, respiratory viruses and molds, all of which play a role in respiratory disease exacerbation (Institute of Medicine 2000, Williamson 1997). I have had some patients

describe headaches and dizziness in association with damp, humid and overheated environments that resulted in missed school days and eventual transfer of schools. After moving to a more temperate and less humid environment, the child improved and was able to attend school on a regular basis.

V. DISEASES AND MORBIDITY ASSOCIATED WITH PHYSICAL CONDITIONS IN SCHOOLS

49. It is commonly accepted that childhood asthma is the most frequent health-related cause of school absenteeism, accounting for more than 10 million missed school days annually (ALA 2002). Asthma is one of the most common admitting diagnosis for children (Mannino 1998), accounting for 190,000 annual hospitalizations for children aged 0-14 in 1999 (Mannino 2002).

50. This asthma epidemic caused heavy increases in health expenditure: direct and indirect monetary costs related to asthma were estimated at approximately $11.3 billion in 1998 (NHLBI 2002), to $14.5 billion in 2000 (CDC 2001).

51. The most important factor contributing to asthma is the indoor environment, which includes many known asthma triggers (Lanphear 2001, Institute of Medicine 2000). Excessive dust mite allergen, which generally occur in poorly maintained carpet, excessive humidity, poor ventilation, and pest allergens, such as cockroach (Rosenstreich 1997), mouse and rat (Phipatanakul 2000), all worsen asthma symptoms for allergic children. Mold exposure can also make children with asthma wheeze (Williamson 1997). In my opinion, substandard conditions in schools cause excess asthma attacks and children miss school unnecessarily.

52. Allergic rhinitis and chronic cough symptoms are highly correlated with mold and dust in school environments (Etzel 2001). One child described to me that he developed a chronic cough after construction was done in their school. The child stated that a fine white dust was on the desks each morning. After construction stopped, the cough symptoms went away as well.

53. Infectious diseases are among the most common conditions suffered by children. Many viruses and bacteria are spread airborne. Inadequate ventilation can effectively increase children's exposure to these germs by keeping air longer in classroom and other school space. Also, very dry conditions or low humidity can dehydrate children's lung tissue, making them more vulnerable to germs (Rudolph 1987). Many children will describe dry centrally heated classrooms make their eyes "hurt" because they are dry and some children will have nose bleeds from drying of the mucus in their nose.

54. Lead exposure can cause lifelong learning problems, and may result in increased juvenile delinquency and other behavioral problems as well. (Needleman 1990, Needleman 1996).

55. Life long problems may result from environmental exposures in childhood. Increased risk of hypertension from lead exposure, increased cancer risk from asbestos, benzene and toluene, and worsened chronic asthma from chronic dampness, mold and pest allergens, all can result from environmental exposures in the schools (Schwartz 1994b, EWG 1999, Landrigan 1998, Lanphear 2001, Williamson 1997, Rosenstreich 1997).

References

American Society of Heating, Refrigerating, and Air-Conditioning Engineers. *Thermal Environmental Conditions for Human Occupancy*. ASHRAE Standard ANSI/ASHRAE 55-1981, Atlanta, GA, 1981

Baghurst PA, McMichael AJ, Wigg NR. Environmental exposure to lead and children's intelligence at the age of seven years. The Port Pirie Cohort Study. N Engl J Med 327:1279-1284 (1992).

Bellinger DC, et al. Pediatrics 1992;90:855-861

Bornehag CG, Blomquist G, Gyntelberg F, Jarvholm B, Malmberg P, Nordvall L, Nielsen A, Pershagen G, Sundell J. Dampness in buildings and health. Nordic interdisciplinary review of the scientific evidence on associations between exposure to "dampness" in buildings and health effects (NORDDAMP). Indoor Air. 2001 Jun;11(2):72-86.

Brunekreef B, Dockery DW, Speizer FE, Ware JH, Spengler JD, Ferris BG. Home dampness and respiratory morbidity in children. Am Rev Respir Dis. 1989 Nov;140(5):1363-7.

CDC 2001(Centers for Disease Control and Prevention) http://www.cdc.gov/nceh/airpollution/asthma/children.htm

CDC 1991 http://www.epa.gov/lead/leadinfo.htm#health

Cockcraft A, Edwards J, McCarthy P, Andersson N. 1981. Allergy in Laboratory animal workers. Lancet 1(8224):827-830

Collins KJ. Low indoor temperatures and morbidity in the elderly. Ageing. 1986 Jul;15(4):212-20.

Daisy JM, Angell WJ. A Survey and Critical Review of the Literature on Indoor Air Quality, Ventilation, and Health Symptoms in Schools. Lawrence Berkeley National Laboratories. March 1998

Dales RE, Zwanenburg H, Burnett R, Franklin CA. Respiratory health effects of home dampness and molds among Canadian children. Am J Epidemiol. 1991 Jul 15;134(2):196-203.

DHS 1999, (California Department of Health Services) report at http://www.dhs.ca.gov/ps/deodc/childlead/schools/sitemap.htm

Dungy CI, Kozak PP, Gallup J, Galant S. Aeroallergen Exposurein the Elementary School Setting. Annals of Allergy. 56(3):218-221, 1986 Mar.

EdSource California's School Facilities Predicament. April 1998

Etzel RA. Indoor Pollutants in Homes and Schools. Pediatric Clinic of North America. Vol 48, No 5, pp1153-1165

EWG Reading, Writing and Risk: Air Pollution in California's Portable Classrooms. May 1999 www.ewg.org

Friscancho AR and Ryan AS. Decreased stature associated with moderate blood lead concentrations in Mexican-American children. Am J Clin Nutr 54:516-519 (1991).

GAO/HEHS-95-61 (General Accounting Office) Conditions in America's Schools 1995

GAO/HEHS-96-103 School Conditions Vary 1996

Hollander A, Doekes G, Heederik D. 1996. Cat and Dog allergy and total IgE as risk factors of laboratory animal allergy. Journal of Allergy and Clinical Immunology 98(3):545-554.

Howard M. The Effects on Human Health of Pest Infestations in Houses. In: Burridge R, Ormandy D. eds. *Unhealthy Housing: Research, remedies and reform.* New York: E&FN Spon, 1993.

Institute of Medicine. *Clearing the Air: Asthma and Indoor Air Exposures.* Washington, DC: National Academy Press, 2000.

Kang B., J. Jones, J. Johnson, J.I. Kang. 1989. Analysis of indoor environment and atopic allergy in urban populations with bronchial asthma. Ann. Allergy. 62:30-34.

Kang B.C. 1990. Ubiquitous dwelling infestation of cockroaches makes allergies more prevalent than previously recognized, particularly in the urban atopic population. American Journal of Asthma and Allergy for Pediatrician. 3:228-233.

Landrigan PJ. Asbestos--still a carcinogen. N Engl J Med. 1998 May 28;338(22):1618-9.

Lanphear BP. The paradox of lead poisoning prevention. Science 281:1617-1618 (1998).

Lanphear, B.P., et al., *Contribution of residential exposures to asthma in us children and adolescents.* Pediatrics, 2001. 107(6): p. E98.

Lanphear BP. Dietrich K. Auinger P. Cox C. Cognitive deficits associated with blood lead concentrations <10 microg/dL in US children and adolescents. *Public Health Reports. 115(6):521-9, 2000 Nov-Dec.*

Mannino D, Homa D, Pertowski C, Ashizawa A, Nixon L, Johnson C et al. Surveillance for Asthma - United States, 1960-1995. Morbidity and Mortality Weekly Report 1998; 47:1-28.

Mannino D, Homa D, Akinbami L, Moorman J, Gwynn C, Redd S, Surveillance for Asthma – United States, 1980-1999, Morbidity and Mortality Weekly Report 2002; 51:1-13.

Markus TA. Cold, Condensation and Housing Poverty. In Burridge R, Ormandy D. eds. *Unhealthy Housing: Research, remedies and reform.* New York: E&FN Spon, 1993.

Marsh BT. Housing and health. The role of the environmental health practitioner. J Environ Health. 1982 Nov-Dec;45(3):123-8.

McDonald J, et al. Lead's legacy? Early and late mortality of 454 lead-poisoned children. Arch Environ Health 1996;51:116-121.

Needleman HL, Schell A, Bellinger D, Leviton A, Allred EN. The long-term effects of exposure to low doses of lead in childhood. An 11-year follow-up report. N Engl J Med. 1990 Jan 11;322(2):83-8.

Needleman H, et al. Bone lead levels and delinquent behavior. JAMA 1996;275:363-369.

NHLBI 2002 (National Institutes of Health National Heart, Lung, and Blood Institute) http://www.nhlbi.nih.gov/health/prof/lung/asthma/asthstat.pdf

Peat JK, Dickerson J, Li J. Effects of damp and mould in the home on respiratory health: a review of the literature. Allergy. 1998 Feb;53(2):120-8.

Phipatanakul W, Eggleston PA, Wright EC, Wood RA. Mouse allergen. II. The relationship of mouse allergen exposure to mouse sensitization and asthma morbidity in inner-city children with asthma. J Allergy Clin Immunol. 2000 Dec;106(6):1075-80.

Platt SD, Martin CJ, Hunt SM, Lewis CW. Damp housing, mould growth, and symptomatic health state. BMJ. 1989 Jun 24;298(6689):1673-8.

Roberts JW, Dickey P. Exposure of children to pollutants in house dust and indoor air. Rev Environ Contam Toxicol. 1995;143:59-78.

Rosen JF. Adverse health effects of lead at low exposure levels: trends in the management of childhood lead poisoning. Toxicology. 1995 Mar 31;97(1-3):11-17.
Vaughan JW, Platts-Mills TA. New approaches to environmental control. *Clin Rev Allergy Immunol*. 2000 Jun;18(3):325-39.

Rosenstreich DL, Eggleston P, Kattan M, Baker D, Slavin RG, Gergen P, Mitchell H, McNiff-Mortimer K, Lynn H, Ownby D, Malveaux F. The role of cockroach allergy and exposure to cockroach allergen in causing morbidity among inner-city children with asthma. New England Journal Of Medicine 1997

Rudolph, AM, et al: Pediatrics, ed 18. Norwalk, CT, Appleton & Lange, 1987.

Sandel M, O'Connor G. Inner City Asthma. Clinics of Allergy and Immunology, in press

Sandel MT, Zotter J. How substandard housing affects children's health. Contemporary Pediatrics October 2000 Vol 17, No 10.

Sarpong S.B., R.G. Hamilton, P.A. Eggleston, J.N.F. Adkinson. 1996. Socioeconomic status and race as risk factors for cockroach allergen exposure and sensitization in children with asthma. J Allergy Clin Immunol. 97:1393-1401.

Schwartz J. The relationship between blood lead and blood pressure in the NHANES II survey. Environ Health Perspect. 1988 Jun;78:15-22.

Schwartz J, Otto D. Lead and minor hearing impairment. Arch Environ Health 46:300-305 (1991).

Schwartz J. Low-level lead exposure and children's IQ: A meta-analysis and search for a threshold. Environ Res 65:42-55 (1994).

Schwartz J. Societal benefits of reducing lead exposure. Environ Res 1994;66:105-124.

Sharfstein J, Sandel MT, Kahn R, Bauchner H. Housing and Child Health. Research Letter. American Journal of Public Health August 2001 91;8:1191-1192

Sharfstein J, Sandel MT eds. *Not Safe at Home: How America's Housing Crisis Threatens the Health of its Children.* Boston Medical Center. Feb 1998

Spengler J et al, *Indoor Air Quality Handbook.*McGraw Hill, Boston MA 2001

Strachan DP. Dampness, Mould Growth and Respiratory Disease in Children. In Burridge R, Ormandy D. eds. *Unhealthy Housing: Research, remedies and reform.* New York: E&FN Spon, 1993.

Verhoeff AP, van Strien RT, van Wijnen JH, Brunekreef B. Damp housing and childhood respiratory symptoms: the role of sensitization to dust mites and molds. Am J Epidemiol. 1995 Jan 15;141(2):103-10.

Walker E, Hay A. Carbon monoxide poisoning. BMJ. 1999 Oct 23;319(7217):1082-3.

Williamson IJ, Martin CJ, McGill G, Monie RD, Fennerty AG. Damp housing and asthma: a case-control study. Thorax. 1997 Mar;52(3):229-34.