Eco-Healthy Child Care®

Training Manual

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Training Manual

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Introduction

Welcome to your Eco-Healthy Child Care® (EHCC) Training Manual. This manual is designed to help you, the trainer, give trainings on potential environmental health threats in the child care setting. This manual will also familiarize you with the Eco-Healthy Child Care® program, an endorsement program managed by the Children's Environmental Health Network (CEHN), which rewards providers who commit to improving environmental health in their facilities.

Why Is Eco-Healthy Child Care® Important?

Research increasingly shows that the first years of a child's life are extremely important in shaping their future health and development. Child care providers can make small changes that make a big impact on the children in their care. By reducing toxicants, such as chemicals in certain cleaning products and weed killers, providers will help prevent illnesses like asthma, certain learning disabilities, and even some forms of cancer. For these reasons, providing environmentally-healthy, low-toxic settings is particularly important in the places children spend the majority of their time.

About This Training

Thank you for participating in the Children's Environmental Health Network's Eco-Healthy Child Care® program's Train the Trainer.

As a participant in this session, you will be included in the EHCC Train the Trainer network. We do not share your information with others, but, as a member of this network, you will receive monthly updates regarding environmental health best practices and new resources and research. You will be able to post your upcoming EHCC trainings on our calendar as well as receive a limited number of free copies of the EHCC checklist for you to distribute.

We are delighted at your interest in this topic, and we are happy to support your efforts to improve environmental health in the child care and early learning setting. Please contact us with any questions or comments. EHCC staff contact information is at the end of this manual.

This training manual is designed to be used in conjunction with additional materials provided at the Eco-Healthy Child Care® Train the Trainer session, including access to electronic versions of a variety of supplemental materials plus a basic PowerPoint® presentation. Printable materials that you will be able to access include this manual, EHCC's topical fact sheets, and much more. We recommend that you review the materials that are available electronically so that you are aware of these additional tools. The 'comments' section of the PowerPoint® presentation will mention relevant additional materials that you will be able to access as well as include citations for the studies or data presented on the PowerPoint®.

Please note that this manual, the EHCC fact sheets, the EHCC checklist and the PowerPoint® presentation are all copyrighted materials. We encourage their use, but only with appropriate attribution. In addition, the Eco-Healthy Child Care® name is legally registered. Whenever you use the full Eco-Healthy Child Care® name (i.e., in outreach materials for your trainings) please be sure to use the registration mark. It is not necessary when only using the EHCC acronym.

EHCC's checklist and fact sheets are not only available for you to access, but are available to you and the public to download for free from our website: www.cehn.org/ehcc. We also offer FAQs on some topics. Since environmental health is an evolving field, sometimes recommendations for best practices change. In the future, if you wish to assure that you are using the most recent version of our materials, you can visit the Website for the most current versions of these materials.

PowerPoint® presentation: The presentation is designed for you to pull out relevant sections to use for your trainings and workshops. Please do not alter the content of the EHCC slides. If you add additional slides of your own, please make sure your slides are clearly distinguished from EHCC slides (eg, that your slides do not contain EHCC logo or CEHN copyright information).

Some of the slides include a red star; this indicates that there are additional resources on this topic either in your training folder or available for you to access. See the comments section of the presentation for more information. This star is included as a memory device for you; feel free to delete it if you wish.

EHCC Fact Sheets: Your electronic documents include versions of the 16 EHCC fact sheets -- one on each of the 11 areas included on the EHCC checklist list, plus 5 additional fact sheets: Asbestos, The Built Environment, Healthier Celebrations, Noise Pollution, Nutrition & Physical Exercise.

Each fact sheet includes information regarding the health effects of concern regarding the toxicants discussed, as well as where these toxicants can be found in the child care setting, and best practices for eliminating or decreasing children's exposures to the toxicant. Each fact sheet also includes a box providing links to additional resources. In some cases, the number of helpful resources is too large to all be included on the fact sheet. We have created a Webpage -- www.cehn.org/ehcc/resources -- listing the full range of resources.

Training Pointers

- Please review Appendix B for ideas for adult learning activities that may help your session be more effective and more fun for participants.
- Please conduct research and find data that relate to your specific state. For example, how many children suffer from asthma in your state? Are providers required to use chlorine bleach as a disinfectant, or can they use other alternatives? These facts will help drive home the points you are trying to make

(e.g., avoiding asthma and allergy triggers -- such as aerosols, air fresheners, and candles -- will help create a healthier environment).

- We recommend that you review your state's child care licensing requirements. To date, we have found few if any state licensing requirements conflict with EHCC recommendations. Your packet may already contain an EHCC fact sheet regarding your state and/or an electronic version may be available for you to access.
- Please use as many local resources as possible. Is there a program that offers free radon testing kits in your area? Where are the nearby hazardous waste recycling centers, so providers can properly dispose of batteries, fluorescent light bulbs, cell phones, and mercury-containing thermometers? Does your state's Extension program offer Integrated Pest Management trainings or resources?

Context, choices and empowerment: Although familiar with other child care training topics (health and safety, disaster preparedness, inclusion of children with special needs), most child care providers do not have a comprehensive knowledge of environmental toxicants commonly found in child care settings (family child care and center-based). While most providers are familiar with most sources of lead and the associated negative effects of exposure, they are not as familiar with the adverse consequences of exposure to household chemicals, pesticides, certain plastics, play equipment and more. That being said, many of the topics covered in this trainer's manual will be brand new to providers. The topics and related facts can be rather alarming! So…

- Please prepare providers in the beginning of the training by telling them that they will learn some scary information about potential environmental health threats. Though they may not be able (financially) or willing (all the work involved) to make the suggested changes immediately, please encourage them to begin making changes one at a time.
- Providers can use the EHCC checklist as a source of ideas for best practices. Other resources include "My Environmental Health Plan," a document that providers can use to plan how they will make healthier choices over time. The PowerPoint® presentation that is available for you to access includes several slides that will assist you in shaping the discussion to direct it toward empowerment of providers and making healthier choices.

Training Expectations

If you train or educate child care providers, we ask that you offer at least two sessions on topics covered by this session over the next 12 months. We recommend offering one or two of the topics covered by this training at a time, in 60 or 90 minute segments, rather than offering the full session at one time.

Introduction to Children's Environmental Health

Environmental health is a field of study that considers how environmental factors (including chemicals in our air, water, food, consumer products, workplaces, schools and child care facilities) impact human health. Children are particularly susceptible to health impacts from some chemical exposures. By creating healthier environments for children, we help to ensure that our living spaces are safe for everyone. In addition, by reducing chemicals that harm human health, we keep dangerous chemicals out of our eco-systems and food supplies.

> "Introduction to Children's Environmental Health," a white paper by the Children's Environmental Health Network, provides additional background. It is included in your training materials.

Since the mid-1900s, the global production and use of chemicals have increased substantially. Thousands of new chemicals have been introduced into children's environments since World War II. For the vast majority of these chemicals, little is known about their health effects on children.[1] Scientific studies have found two things: 1) many of these chemicals may pose a danger to human health and 2) these chemicals can be found everywhere—in our homes, workplaces, schools and child cares, and in our bodies.

The primary federal law regulating chemicals is the 1976 Toxic Substances Control Act, or TSCA. Of the 81,600 chemicals registered in the United States, 62,000 were already in production in 1979 when TSCA was implemented. These "existing" chemical substances, as they are classified under TSCA, are assumed to be safe unless the U.S. Environmental Protection Agency (EPA) can demonstrate that they present an unreasonable risk to human health or the environment. Additionally, the EPA must weigh health risks against the economic costs of banning, limiting, or phasing out a chemical. As of 2005, the EPA has performed internal reviews of only an estimated 2% of the 62,000 TSCA pre-1979 chemicals.[2] As the American Academy of Pediatrics notes, TSCA "is widely recognized to have been ineffective in protecting children, pregnant women, and the general population from hazardous chemicals in the marketplace."[3]

Today, most people assume that the chemicals, materials and products in their homes, workplaces and schools are safe. This is not necessarily the case.

Chemicals are all around us -- in the air we breathe, the water we drink, the food we eat, and the products that are in our homes, child cares, schools, and workplaces. While

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[1] Schaefer M. Children and Toxic Substances: Confronting a Major Public Health Challenge. *Environmental Health Perspectives* 1994;102(Supp 2):155-156.
[2] United States Government Accountability Office. (2005). *Chemical Regulation: Options Exist to Improve EPA's Ability to Assess Health Risks and Manage Its Chemical Review Program*. GAO-05-458. Retrieved August 21, 2008, from http://www.gao.gov/new.items/d05458.pdf.
[3]American Academy of Pediatrics. (2011). Policy Statement—Chemical-Management Policy: Prioritizing Children's Health, *Pediatrics* Volume 127, Number 5, May 2011.

many of these substances are likely to be safe, evidence is building that a number of widely used chemicals pose a threat to our health and to the health of the environment. Scientific research is revealing that everyday exposures to these common chemicals can contribute to the development of cancers, learning disabilities, asthma, early puberty, birth defects, infertility, and other health problems. For many chronic conditions faced by today's children as well as premature birth, lead poisoning, some childhood cancers, and some birth defects, a child's environment plays a role.[4]

In addition to the emotional and human costs these diseases incur, the financial costs to society are huge. According to a recent study, the annual costs of environmentally attributable diseases in American children total $54.9 billion.[5] The Centers for Disease Control and Prevention reports that children with asthma incur 88% higher health care costs per year on average than asthma-free children.

Since many children spend significant periods of time in child care facilities, limiting exposures to environmental health threats in these settings is essential. Potential sources of toxicants in and around child care facilities include lead in drinking water and old paint, pesticides used on lawns or inside buildings, mold, poor indoor air, cleaning products, mercury-containing products, and even vehicle exhaust created while parents idle their cars waiting for their kids.

Many pollutants are more prevalent in lower-income and minority communities, placing children in these communities at particular risk. In addition to a higher prevalence of many toxicants, such as lead, diesel exhaust, and mold and mildew, these populations frequently lack the resources, time or power to reduce their children's exposure to dangerous pollutants. Language barriers, cultural differences and time all act as hurdles to getting messages about environmental health into communities with the greatest need. The disproportionate health impacts of pollutants on low-income communities and communities of color create **environmental justice issues.**

It is essential that we reduce chemical risks to children's health and provide all children, regardless of race and income, a healthy environment in which to live and grow. The aim of this training is to expand the opportunities for children to live in toxic-free environments and to achieve their fullest potential.

Types of Chemicals and Why We Worry About Them

Of particular concern to humans and the environment are chemicals that bioaccumulate, chemicals that are persistent, and highly toxic chemicals including carcinogens, mutagens, reproductive toxicants, and hormone-mimicking chemicals.

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[4] Landrigan PJ, Trasande L, Thorpe LE, et al. The National Children's Study: a 21-year prospective study of 100,000 American children. *Pediatrics*. 2006;118(5):2173–2186.

[5] Landrigan PJ et al. (2002). Environmental pollutants and disease in American children: Estimates of morbidity, mortality, and costs for lead poisoning, asthma, cancer, and developmental disabilities. *Environmental Health Perspectives, 110* (7), 721-728.

Bioaccumulation is the process through which a chemical concentrates in an organism. Chemicals that bioaccumulate can also **biomagnify**, which means that the concentration of the chemical increases as it moves up the food chain. Because humans are at the top of the food chain, these chemicals can have significant negative impacts on our health. Chemicals that bioaccumulate are usually concentrated and stored in an organism's adipose (fat) tissue and organs. For example, methylmercury, a form of mercury (all forms of mercury are toxic), bioaccumulates in fish and biomagnifies in fish that eat smaller fish. That's why some fish species, such as tuna, are more likely to contain high levels of mercury than non-predator species.

Persistent chemicals are substances that do not break down quickly, staying in and degrading the environment for decades, if not longer. Data from numerous studies show persistent toxic chemicals in places they should never be, including human breast milk, the umbilical cords of newborn babies, and whales, eagles, and peregrine falcons, to name a few.[6] Even for chemicals that do break down within the environment, their sometimes ubiquitous presence in everyday products and foods means we are continually exposed to them.

Carcinogens are chemicals that cause cancer. A **mutagen** is a chemical that changes genetic information. As many mutations are known to cause cancer, mutagens are also a type of carcinogen.

Reproductive toxicants can interfere with sexual functioning or reproductive ability from puberty through adulthood. Toxicants that target the female reproductive system can cause a wide variety of adverse effects on sexual behavior, onset of puberty, fertility, gestation time, pregnancy outcome, lactation, and menopause onset. Toxicants that target the male reproductive system can affect sperm count or shape, alter sexual behavior and decrease fertility.

Hormone-mimicking chemicals, or **endocrine disruptors (EDs)**, are chemicals that mimic or suppress hormones such as estrogen. These mimics can interfere with a number of developmental and physiological processes. EDs can harm sexual development, sperm counts and reproductive functioning. These chemicals have also been linked to developmental deficiencies and learning disabilities in children. Some EDs are polychlorinated biphenyls (PCBs), dioxins, and some pesticides (such as DDT).[7]

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[6] Lunder, S., & Sharp, R. (2003). Mother's Milk: Toxic Fire Retardants (PBDEs) in Human Breast Milk, Washington, D .C.: Environmental Working Group. Retrieved July 12, 2007, from http://www.ewg.org/files/MothersMilk_final.pdf.

[7] Damstra T, Barlow S, Bergman A, Kavlock R, Van Der Kraak G (Edit.), The International Programme on Chemical Safety (IPCS), for UNEP, WHO. (2012). Global assessment of the state-of-the-science of endocrine disruptors. Accessible at http://www.who.int/ipcs/publications/new_issues/endocrine_disruptors/en/index.html.

Children's Unique Vulnerabilities

Children and fetuses are not simply little adults. They are uniquely vulnerable to health damage from toxic chemicals for many reasons.

- Their organs and systems, including their nervous, reproductive, digestive, respiratory, and immune systems, are still developing. This process of development creates windows of vulnerability. Exposure to a harmful chemical at such times may result in irreversible damage when the same exposure to an adult may cause little or no damage.
- Pound-per-pound, children drink, eat, and breathe more than adults.
- Normal childhood activities -- including hand-to-mouth behavior and crawling around on the floor -- increase the risk of exposure to certain chemicals.

Because of these differences, what is safe for the adult is not necessarily safe for the fetus, infant or child. Exposures that may have no impact or a transitory impact on an adult can cause life-long harm to a child.

Another important finding is that the timing of exposure can be as important as the amount of the exposure. For example, animal tests show that a single dose of certain pesticides on a critical day of development can cause permanent hyperactivity and changes in brain chemistry.[8] Scientific studies report that some hormone disruptors act in the body at extremely low levels.

Rates of certain kinds of cancer, developmental disabilities, asthma and allergies—all of which have known or suspected environmental links—are on the rise in children.

> New Paradigm: *The Dose Is Not All that Makes the Poison*. A common argument against concerns about chemical exposures is that the presence of minute amounts of chemicals in our bodies is not necessarily harmful. However, a number of peer-reviewed studies in scientific journals have found that some common chemicals affect health at lower levels than previously believed. [1] For example, lead, a known neurotoxicant, damages babies' brains at very low exposure levels. We now know there is no safe level of lead exposure.

[8] Greater Boston Physicians for Social Responsibility. (2001). *In Harm's Way: ToxicThreats to Child Development*. Retrieved July 8, 2007, from http://www.psr.org/chapters/boston/resources/in-harms-way-report-download.html

Today's children may be the first generation to see a shorter life expectancy than their parents due to poor health. The pediatric challenges of today -- such as obesity, asthma, learning disabilities, and autism – are multifactorial. Many factors shape a child's health, such as genetics, nutrition, socioeconomic status, and access to health care. A child's environment is one of these factors, playing a role in these chronic conditions. Environmental exposures can cause, contribute to or exacerbate many health and developmental conditions.

Our children's health and environment are at risk because of our failure to protect them from common toxic chemicals.

Birth Defects

According to the Centers for Disease Control and Prevention, approximately 120,000 babies in the U. S. are born each year with birth defects—one out of every 33 (CDC, 2007). A birth defect is an abnormality of structure, function, or metabolism (body chemistry) present at birth that results in physical or mental disabilities or death. Several thousand different birth defects have been identified. For the past 20 years, birth defects have been the leading cause of death in the first year of life (Martin, Kochanek, Strobino, Guyer, & MacDorman, 2003). Genetic and environmental factors, or a combination of these factors, can cause birth defects. However, the causes of about 70% of birth defects are unknown (CDC, 2007).

While some birth defects are inherited, many are caused by factors such as nutritional deficiencies, maternal alcohol or drug use, and exposure to environmental toxicants. Several environmental contaminants cause birth defects when pregnant women are exposed to high concentrations, including mercury and polychlorinated biphenyls (PCBs). For example, fetal mercury poisoning can cause deafness and blindness, and fetal exposure to high levels of PCBs causes skin and nail abnormalities (Harada et al, 1999; Rogan, 1982). Epidemiological studies have demonstrated associations between birth defects and a number of prenatal exposures. Multiple studies have linked women's occupational exposure to organic solvents to increased risk of birth defects such as heart defects and cleft lip and palate (McMartin, Chu, Kopecky, Einarson, & Koren, 1998). Studies evaluating the role of pesticides have found an association between maternal and paternal exposure to pesticides and increased risk of offspring having birth defects (U.S. EPA, 2003). A 2002 study by Ritz et al. found links between certain heart-related birth defects and ambient air pollution.

Pesticides and Pest Prevention: Why and Where

Why We Worry About Pesticides:

A pesticide is any substance used inside or outside to prevent, control, repel, or kill insects, plants, fungi, and other pests. Therefore, bug spray, weed killer, insect repellents, flea and tick collars and disinfectants are all forms of pesticides. Unfortunately, their harmful health effects do not always end with the pests or weeds they eliminate. Of main concern is children's exposure to pesticides because of their small size and developing nervous system. In fact, a growing body of research has associated some pesticide exposures with serious health and developmental effects. Some pesticides currently on the market are known to be carcinogenic, mutagenic or toxic to the nervous system, development or reproduction. Health effects of a variety of pesticides range from irritation of skin and eyes, to asthma, to nervous system damage, to cancer. That's why the American Academy of Pediatrics recommends that parents, schools, and the government reduce children's exposure to pesticides.[10], [11]

Pesticides are Widely Used:

Pesticides are widely used not only in agriculture and forestry, but also on roadsides and golf courses, as well as in schools, hospitals, parks, and in homes and gardens. The U.S. EPA estimated that 5.1 billion pounds of pesticides were used in the U.S. in 2007, at a cost of $12.45 billion. About three-quarters -- 74% -- of US households – use pesticides at home.[9]

How Are Children and Child Care Providers Exposed?

Children may be exposed to pesticides by playing on floors, lawns, and play areas; eating pesticide-treated foods; or by handling treated pets. When pesticides are applied indoors as a spray or aerosol, vapors often linger in the air. Small droplets from the sprays can end up on carpets, floors, desks, toys and other surfaces with which children may come into contact either by crawling or mouthing objects. For example, several studies have found that indoor use of the once-widely used insecticide chlorpyrifos leads children playing in the house to unsafe exposures, even when used according to directions and

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[9] U.S. EPA, *Pesticides Industry Sales and Usage; 2006 and 2007 Market Estimates,* Section 3.1 Accessed at: http://www.epa.gov/pesticides/pestsales/07pestsales/usage2007.htm#3_3
U.S. EPA, *Pesticides Industry Sales and Usage; 2006 and 2007 Market Estimates,* Section 5.1 Accessed at: http://www.epa.gov/pesticides/pestsales/07pestsales/historical_data2007.htm#5_1
U.S. EPA, *Pesticides Industry Sales and Usage; 2006 and 2007 Market Estimates,* Section 4.4 Accessed at: http://www.epa.gov/pesticides/pestsales/07pestsales/producers_users2007.htm#table4_4
[10] American Academy of Pediatrics Council On Environmental Health. (2012). Policy Statement: Pesticide Exposure in Children. *Pediatrics*; originally published online November 26, 2012; DOI: 10.1542/peds.2012-2757. http://pediatrics.aappublications.org/content/early/2012/11/21/peds.2012-2757.
[11] Roberts JR, Karr CJ, American Academy of Pediatrics Council On Environmental Health. (2012). Technical Report: Pesticide Exposure in Children. *Pediatrics* 2012;130;e1765; originally published online November 26, 2012; DOI: 10.1542/peds.2012-2758.
http://pediatrics.aappublications.org/content/130/6/e1765.full.html.

for several days after use.[12] Pesticide sprays used outdoors can drift into child care facilities and homes through ambient air or ventilation systems.

When we think of pesticides, we often think of agriculture first. However, studies find that urban and suburban children are highly exposed to pesticides. Pesticide residues or metabolites can be found in blood or urine samples of most Americans.[13] Many pesticides can take a very long time to break down. They persist indoors for weeks on furniture, toys and other surfaces and can persist for years in household dust. Research indicates that pesticide levels in indoor air are often higher than those found in outdoor air.

Health Problems Associated with Exposure

The health effects of pesticides are dependent upon the chemical class and formulation of each pesticide, the level and length of exposure, and the age of exposure, with children being more vulnerable. Pesticide poisoning incidents are most often associated with accidental ingestion of a pesticide or improper application, i.e. not following label instructions. Acute poisoning to pesticides can cause breathing difficulty, chest tightness, vomiting, cramping, diarrhea, blurred vision, sweating, headaches, dizziness, and loss of concentration.

Pesticides are often the cause of acute poisonings, particularly for children younger than six. Several studies implicate pesticides as a cause for chronic diseases such as childhood leukemia, lymphomas and other cancers, even if exposure occurs in the womb. Long-term exposure to pesticides may lead to asthma, cancer, reproductive harm, kidney/liver damage, birth defects, nerve tissue damage and neurobehavioral problems. A study of children with brain tumors in Los Angeles County found that these children were twice as likely as children without the disease to have mothers who had treated their dog(s) for fleas and/or ticks during pregnancy.[14] A recent study also found that children exposed to herbicides in their first year of life are at higher risk for asthma, particularly early persistent asthma.[15]

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[12] Ted Shettler, et al. *Generations at Risk: Reproductive Health and the Environment* (MIT Press, Cambridge,MA and London, England, 1999) 113.
[13] U.S. Centers for Disease Control and Prevention. (2009). Fourth National Report on Human Exposure to Environmental Chemicals. See website www.cdc.gov/exposurereport.
[14] Pagoda, J.M., et al. (1997). Household pesticides and risk of pediatric brain tumors. *Environmental Health Perspectives, 105,*1214-122.
[15] Salam, M., et al. (2004). Early-Life Environmental Risk Factors for Asthma: Findings from the Children's Health Study. *Environmental Health Perspectives*, *112*, 760-765.

Cancer

Approximately 41% of Americans will be diagnosed with cancer at some point in their lives, and about 21% will die from cancer. The President's Cancer Panel reports that the incidence of some cancers, including some most common among children, is increasing for unexplained reasons. The Panel also found that the true burden of environmentally-induced cancer has been grossly underestimated.
(U.S. Department Of Health And Human Services. *Reducing Environmental Cancer Risk: What We Can Do Now, 2008–2009 Annual Report , President's Cancer Panel*. April 2010.)

Because they are likely to have many years of life ahead of them, children have more time to develop diseases with long latency periods that may be triggered by early environmental exposures, such as cancer or Parkinson's disease.
(Landrigan PJ and Carlson JE. Environmental Policy and Children's Health. *Future of Children* Summer/Fall 1995;5(2):34-52.)

Childhood Cancer

Childhood cancer is a relatively rare disease, and overall survival rates have improved over the past few decades. However, cancer is the leading cause of disease-related childhood death in the United States, and incidence rates have increased by more than 20% since 1975.
(EPA's *America's Children and the Environment, Second Edition*, American Cancer Society's *Cancer Facts & Figures 2012*)

Experts estimate that pure genetic factors account for no more than 20% of all childhood cancers. They further estimate that depending on the type of cancer, anywhere between 5% - 90% may be attributable, in whole or in part, to environmental factors, including those likely arising from gene-environment interactions. This means that a potentially large percentage of childhood cancers may be preventable.
(Landrigan PJ et al, Environmental Pollutants and Disease in American Children: Estimates of Morbidity, Mortality, and Costs for Lead Poisoning, Asthma, Cancer, and Developmental Disabilities, *Environmental Health Perspectives*, vol. 110, No. 7, July 2002)

Leukemia is the most common of childhood cancers, causing more deaths than any other form of cancer among those under 20 years of age.
(CDC's *Blood Cancers: Leukemia, Lymphoma, and Myeloma*, updated 5/21/12)

Some of the chemical exposures with the strongest and most consistent evidence of a link to an increased risk of developing childhood leukemia are pesticides, tobacco smoke, and paints and solvents.

For more information, visit www.cehn.org/cancer.

Pesticides and Pest Prevention: Recommendations

What to Recommend to Child Care Providers:

Although avoiding all pesticide exposure is difficult, you can significantly reduce pesticides in your diet and your surroundings with a few simple steps.

1) Avoid using pesticides in and around your child care facility.

Instead, implement an Integrated Pest Management (IPM) system. The EPA describes IPM as "not a single pest control method but, rather, a series of pest management evaluations, decisions and controls." IPM has been shown to be both effective and cheaper than conventional pesticide applications.[16] See below for more information about IPM.

We like to break IPM down into four easy steps.

A) Set a Pest Threshold.

Before taking actions to reduce pest populations, IPM asks that you set a pest population threshold, above which action must be taken due to health, environmental, or economic concerns. For instance, it might be acceptable that ants are outside on the sidewalk, but unacceptable for there to be a significant number of ants on your porch or inside your house. By identifying and evaluating

Additional Features of IPM

- IPM does not permit regular application of pesticides. Pest populations should be regularly monitored and pest management techniques should only be implemented when a problem exists.
- Pesticides should not be applied for purely aesthetic reasons.
- Pesticides, even if they are low-impact pesticides, should never be applied when children are present. Children should be kept out of pesticide application areas for as long as possible and at least the number of hours recommended on the pesticide label.
- Many commercial ant and roach killers contain toxic pesticides. Use diatomaceous earth and other less toxic controls to rid your home of these pests.
- Use pet combs, frequent vacuuming and other non-toxic controls of fleas. Many flea collars, sprays, and dips contain dangerous pesticides.
- Limit pesticide use in lawn areas and grow native plants adapted to your area. Your state's native plant society may have helpful information.

[16] Kass D, McKelvey W, Carlton E, Hernandez M, Chew G, Nagle S, et al. 2009. Effectiveness of an Integrated Pest Management Intervention in Controlling Cockroaches, Mice, and Allergens in New York City Public Housing. *Environ Health Perspect* 117:1219-1225. http://dx.doi.org/10.1289/ehp.0800149

your tolerance for various pests, you can identify situations which may be a nuisance, but do not require pest control action. Your tolerance for various pests should be in line with the threat the various pests cause. Aesthetic desires should be considered far less than health and safety threats.

B) Determine Why Pests are in Undesirable Areas and Prevent Them from Being There.

When you find a pest in an area you do not want it to be in, determine why it is there and how it got there. Most pests come into our homes and workplaces because of access to food, water or shelter. By eliminating the conditions that attract pests, you can reduce their presence in your child care facility. Some simple steps include reducing crumbs and trash, fixing leaky pipes, monitoring pet food and water bowls, cleaning regularly, and removing clutter so pests have fewer places to hide. Keep trash in a closed container and take it out frequently; don't let trash pile up. Remove empty trash cans from inside the building at the end of the day.

By identifying and eliminating how pests enter your facility, you can also reduce pest problems without resorting to pesticides. Look for cracks around doors and windows where pests can enter. Also make sure pests aren't getting in through holes in your foundation or facility's siding. These mechanical fixes can help prevent pest issues.

You can also use biological methods to prevent pest problems. For instance, there are many beneficial insects that prey on common garden pests. Ladybugs eat aphids, which can harm food and flower crops around your child care facility. By purchasing ladybugs at your local garden shop, you can help manage aphids without having to use pesticides.

C) Managing Undesired Pests

Once monitoring and action thresholds indicate that pest management is required and prevention is no longer effective or available, IPM programs evaluate the proper control method both for effectiveness and risk. Effective, less risky, or least-toxic pest controls are chosen first, including highly targeted chemicals, such as pheromones, to disrupt pest mating, or mechanical control, such as trapping or weeding. If further monitoring and action thresholds indicate that less risky controls are not working, then additional pest control methods are chosen. Pesticides are to be used only as a last resort and never while children are present.[17]

- If you must use chemical pesticides, choose pesticides of low toxicity first, such as boric acid (be sure products are EPA registered).
- Notify families and staff in advance about the timing and location of applications and what product(s) will be used.

[17] US EPA. Pesticides: Topical & Chemical Fact Sheets. http://www.epa.gov/pesticides/factsheets/ipm.htm, Accessed June 14, 2008.

- Read and follow the label instructions on the pesticides including instructions for the allotted time between application and children's exposure.
- Use of bait traps is preferable over spraying. However, ensure baits/traps are not accessible by children. Do not use flea bombs or other "bug bombs" or "foggers."
- Do not apply pesticides in places where children sleep and play (as pesticide residues can linger for a long time).
- When finished, store pesticides out of children's reach. Place child-resistant latches on lids and cabinet doors. Keep all pesticides in their original containers, with their original cap securely in place, and keep the National Capital Poison Center telephone number handy: 1-800-222-1222.

2) When hiring exterminators or pest control managers, choose professionals who are certified IPM specialists and make sure they aren't choosing a spray can as a first option.

3) When possible, choose organic, local, or sustainably produced produce, meats, and dairy products.

Recent research has shown that organic diets significantly lower children's exposure to pesticides.[18] Produce that is certified *Organic* may cost more, but buying sustainably produced, in-season food from your local market is usually the best assurance of reduced pesticides or pesticide-free produce. Also, be aware that smaller growers may meet organic standards, but have not obtained organic certification because of costs or other reasons, so talking to and getting to know your farmer is a wonderful way to learn if they are pesticide-free. Ask your grocer to start carrying local, organic, or sustainably produced food if he or she doesn't already.

The U.S. EPA recommends:[19]

WASHING: Wash and scrub all fresh fruits and vegetables thoroughly under running water. Running water has an abrasive effect that soaking does not have. This will help remove bacteria and traces of chemicals from the surface of fruits vegetables and dirt from crevices. Not all pesticide residues can be removed by washing.

PEELING and TRIMMING: Peel fruits and vegetables when possible to reduce dirt, bacteria, and pesticides. Discard outer leaves of leafy vegetables. Trim fat from meat and skin from poultry and fish because some pesticides residues collect in fat.

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[18] Lu, C., Toepel, K., Irish, R., Fenske, R.A., Barr, D.B., & Bravo, R. (2006). Organic Diets Significantly Lower Children's Dietary Exposure to Organophosphorus Pesticides. *Environmental Health Perspectives*, 114:260-263.

[19] U.S. EPA. Pesticides and Food: Healthy, Sensible Food Practices website, accessed 12/19/13; http://www.epa.gov/pesticides/food/tips.htm

SELECTING A VARIETY OF FOODS: Eat a variety of foods, from a variety of sources. This will give you a better mix of nutrients and reduce your likelihood of exposure to a single pesticide.

Foods with Highest and Lowest Pesticide Residue

So what fruits and veggies are best and worst when it comes to pesticide residues? If you have a choice, try to purchase organic varieties of produce.

But it's a challenge -- if not impossible -- to purchase every type of fruit and vegetable organically. The Environmental Working Group annually updates which varieties of non-organic produce have been found to have the highest and lowest levels of pesticide residues. Look for their 'Shopper's Guide to Pesticides' at *www.foodnews.org*

Air Quality: Why and Where

Why We Worry About Air Quality:

Air quality significantly impacts people's health. The health impacts from exposure to air pollution (indoor and outdoor) can include decreased lung function, asthma, bronchitis, emphysema, and even some types of cancer. According to the U.S. EPA, indoor air can be "more seriously polluted than the outdoor air in even the largest and most industrialized cities." Up to 90% of our time is spent indoors. Thus, indoor air may be a greater health risk than outdoor air. [20]

Children are particularly vulnerable to air pollution because their lungs are still developing and they breathe more air per pound of body weight than do adults. Poor indoor air quality (IAQ) can also harm academic performance and learning and increase child and staff absenteeism.

Asthma is a chronic inflammatory disease of the airways. Asthma has been associated with a number of environmental pollutants including ozone, nitrogen and sulfur oxides, dust mites, second hand smoke, asbestos, and particulate matter [21, 22] and is greatly affected by IAQ contaminants. Although genetic factors can predispose people to the development of asthma, exposure to certain chemicals may contribute significantly to the risk of developing the disease. Once somebody has asthma, exposure to certain IAQ contaminants can increase the likelihood of suffering from attacks. Air pollutants in both indoor and outdoor environments are known contributors to asthma attacks. [23]

Over the past decade, the prevalence of asthma in both children and adults has increased in the United States. In 2009, 9.6% of U.S. children had asthma.[24]

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[20] U.S. Environmental Protection Agency, Office of Air and Radiation. *Report to Congress on Indoor Air Quality, Volume II: Assessment and Control of Indoor Air Pollution*, pp. I, 4-14. EPA 400-1-89-001C, 1989.

[21] Etzel, R. (2003). How environmental exposures influence the development and exacerbation of asthma. *Pediatrics*, 112(1): 233-39.

[22] Institute of Medicine. (2000). *Clearing the air: asthma and indoor air exposures*. Committee on the Assessment of Asthma and Indoor Air, Division of Health Promotion and Disease Prevention, Institute of Medicine. National Academy of Sciences. Washington D.C.: National Academy Press.

[23] U.S. Environmental Protection Agency. (2007, May). Asthma Facts. Washington, D.C., EPA publication #402-F-04-019. Retrieved December 11, 2007, from http://www.epa.gov/asthma/pdfs/asthma_fact_sheet_en.pdf.

[24] Moorman JE, Akinbami LJ, Bailey CM, et al. (2012) National Surveillance of Asthma: United States, 2001–2010. National Center for Health Statistics. Vital Health Stat 3(35).

Air Quality: Recommendations

What to Recommend to Child Care Providers:

1) Prevent mold and mildew by guarding against conditions that lead to excess moisture and mildew. Increase ventilation naturally by opening screened windows and using fans.

Ensure that your HVAC (heating, ventilation and air conditioning) system is properly maintained and meets legal standards. If window air conditioning units are used, check filters regularly and replace as needed. Reduce excess moisture by fixing leaks. Clean spills promptly. For major water leaks hire a professional company to ensure drying within 24-48 hours. Consider removing carpet completely if it has been wet longer than 48 hours; mold can grow in the carpet, the layers of padding beneath the carpet, and on the flooring beneath. If removing carpet is not an option, deep steam clean regularly.

Mold and mildew grow in areas with sufficient moisture and temperature. Certain areas (e.g., bathrooms, kitchens and laundry rooms) in child care facilities provide ideal habitats for mold and mildew growth. During their life cycle, mold and mildew produce spores, tiny reproductive particles that degrade indoor air quality and can increase respiratory illness and aggravate asthma. By increasing ventilation (opening windows, installing and using exhaust fans) in areas prone to mold and mildew growth, you can significantly improve IAQ.

For more information, please visit the U.S. Department of Labor – Occupational Safety & Health Administration website: http://www.osha.gov/SLTC/molds/.

2) Do not allow cars to idle their engines near the facility.

Idling vehicles create air pollution and waste gas and money. Car exhaust releases pollutants that are harmful to health (especially to children) and the environment. Pollution from idling vehicles can also enter a facility. According to the California Energy Commission, for every two minutes a car is idling, it uses about the same amount of fuel it takes to go about one mile. Research indicates that the average person idles his or her car five to 10 minutes a day.

Idling pollutes the air and harms health. Idling cars emit the same pollutants as moving cars. Nitrogen oxide, particulate matter, carbon monoxide and volatile organic compounds are the main health-harming pollutants in vehicle emissions. Idling is a significant contributor to the creation of smog, seen especially in urban areas, due to high concentrations of people and their vehicles. Diesel engines emit more than 40 hazardous air pollutants. These chemical pollutants have been linked to asthma, heart disease, chronic bronchitis and cancer. Children are especially vulnerable to health effects from vehicle exhaust.

Pollution from idling contributes to global warming and acid rain. Idling cars and trucks emit carbon dioxide (CO_2), a main heat-trapping gas. If every parked vehicle

in New York City stopped idling, this would prevent as much global warming pollution as removing over 12,800 cars entirely.[25] Cars also emit pollutants that cause acid rain.

Idling wastes fuel and money. An idling car uses between 1/5 and 7/10 of a gallon of fuel an hour — that's like burning through $0.80 to $2.80 just to sit around (based on a gallon of gasoline at $4.00).[26] Every day, Americans waste over 3.8 million gallons of gasoline idling their cars.

3) Do not use candles, air fresheners or products with fragrances.

The fragrances in scented candles and air fresheners release particles that can trigger asthma attacks. In addition, the fragrances used in scented products may contain potentially harmful chemicals such as formaldehyde, phthalates, and benzene. Because fragrances are considered proprietary information, companies are not required to disclose the ingredients. Visit http://www.cosmeticsdatabase.com/ for more information on the chemicals in your personal care products and which ones you may want to avoid.

There are many preferred air freshening methods. For example, you can boil apples and/or cinnamon on your stove top, or use baking soda in "smelly" areas to absorb odors naturally. Child care providers with children who have asthma should be particularly careful when introducing any fragrance or air freshener because many products that smell can set off an asthma attack.

The best and most effective air freshener is to find and remove the cause of odors and ventilate the room.

In general, child care providers should be discouraged from wearing perfume or products with fragrances while caring for children. Facilities can even consider establishing a policy to be 'fragrance free.'

4) Do not permit smoking anywhere on the premises, in cars or near children.

The dangers of exposing children to smoking are well known and understood. Potential health affects related to smoking include heart disease, cardiac arrest, asthma, and cancer. For more information, see the "Information on the Dangers of Smoking from the American Lung Association" text box below. We strongly encourage child care professionals who choose to smoke to wear a smoking jacket while smoking, remove it upon entering buildings, and wash hands immediately.

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[25] Environmental Defense Fund. Transportation. http://www.edf.org/page.cfm?tagID=22292, Accessed June 14, 2008.
[26] Environmental Defense Fund. Transportation. http://www.edf.org/page.cfm?tagID=22292, Accessed June 14, 2008.

Do not allow employees to smoke on child care facility grounds or within the sight of children. In addition to exposure to tobacco smoke, children also learn from adult behavior. Adults should not model smoking behavior -- even e-cigarette smoking -- in front of children.

5) Ensure all solvents, adhesives, paints, and art supplies are stored in a well-ventilated area.

Products should be sealed tightly and stored in their original containers out of the reach of children. Dispose of anything that is not being used by taking it to a hazardous waste facility. To find one nearest you, visit www.earth911.org .

6) Remove classroom pets.

Pet allergens (fur or feathers) can trigger allergic reactions and asthma. Turtles and other amphibians can carry salmonella.

7) Use low or no VOC (Volatile Organic Compounds) paint.

When painting, allow 24 hours of ventilation before re-entering the area.

8) Prevent Carbon Monoxide (CO) exposure.

Purchase and install a carbon monoxide detector. Gas stoves (stove top and ovens) can be a significant source of carbon monoxide. Install and always use a stove hood that vents to the outdoors to ensure adequate ventilation.

9) Know Your Air Quality.

Check your local daily air quality index (AQI), usually found in your weather forecast, or visit www.airnow.gov. If the forecast is for a Code Orange day (unhealthy for sensitive populations) or above, minimize strenuous outdoor activities or keep children indoors. In some areas, you can sign up for electronic updates; visit www.enviroflash.info to find out more.

Information on the Dangers of Smoking from the American Lung Association

Cigarette smoking has been identified as the most important source of preventable morbidity and premature mortality worldwide. Smoking-related diseases claim an estimated 438,000 American lives each year, including those affected indirectly, such as babies born prematurely due to prenatal maternal smoking and victims of "secondhand" exposure to tobacco's carcinogens. Smoking costs the United States over $167 billion each year in health-care costs, including $92 billion in mortality-related productivity loses and $75 billion in direct medical expenditures or an average of $3,702 per adult smoker.

- Cigarette smoke contains over 4,800 chemicals, 69 of which are known to cause cancer. Smoking is directly responsible for approximately 90% of lung cancer deaths and approximately 80 to 90% of COPD (emphysema and chronic bronchitis) deaths.
- Smoking is also a major factor in coronary heart disease and stroke; may be causally related to malignancies in other parts of the body; and has been linked to a variety of other conditions and disorders, including slowed healing of wounds, infertility, and peptic ulcer disease. The Surgeon General now includes pneumonia in the list of diseases caused by smoking.
- Smoking during pregnancy accounts for an estimated 20 to 30% of low-birth weight babies, up to 14% of preterm deliveries, and some 10% of all infant deaths. Even apparently healthy, full-term babies of smokers have been found to be born with narrowed airways and curtailed lung function.
- Smoking by parents is also associated with a wide range of adverse effects in their children, including exacerbation of asthma, increased frequency of colds and ear infections, and sudden infant death syndrome. Secondhand smoke causes an estimated 150,000 to 300,000 cases of lower respiratory tract infections in children less than 18 months of age, resulting in 7,500 to 15,000 annual hospitalizations.
- Tobacco advertising also plays an important role in encouraging young people to begin a lifelong addiction to smoking before they are old enough to fully understand its long-term health risk. Approximately 90% of smokers begin smoking before the age of 21.
- Employers have a legal right to restrict smoking in the workplace, or implement a totally smoke-free workplace policy. Exceptions may arise in the case of collective bargaining agreements with unions.
- Nicotine is an addictive drug, which when inhaled in cigarette smoke reaches the brain faster than drugs that enter the body intravenously. Smokers not only become physically addicted to nicotine; they also link smoking with many social activities, making smoking a difficult habit to break.

For more information and help quitting please visit www.lungusa.org.

Household Chemicals: Why and Where

Why We Worry About Chemicals in Cleaning Products:

Household chemicals can be toxic to our health and to the environment. Of the 85,000 synthetic chemicals in commercial use today, only a small fraction has been individually tested for toxicity on human health. A wide variety of toxic or hazardous chemicals are routinely used as ingredients for cleaning products. Household chemicals can make indoor air unhealthy to breathe, irritate the skin and eyes, harm the respiratory tract and endocrine system, and pollute the natural environment. Children are especially vulnerable to toxic chemicals because their bodies and organs are still developing.

Children are exposed in four ways:

- **Inhalation:** Children breathe in the different chemicals of cleaning supplies including dust, fumes and vapors which can damage their sensitive, developing lungs.
- **Skin and Eye Contact:** Through touching or being splashed cleaners, children may have skin irritation and burns.
- **Ingestion:** Children are more likely to accidentally drink or place products into their mouth, as they are unaware of the dangers.
- **Fetal Exposures:** Children are also exposed to chemicals in utero. Researchers have found that many chemicals readily cross the placenta to the fetus.

Aerosols

Keep aerosol spray away! Aerosol sprays - such as deodorants, hair sprays, carpet cleaners, furniture polish and air fresheners - spew invisible droplets of chemicals into the air. The invisible droplets are inhaled by children and can trigger both asthma and allergies.

Paints and Finishes

Indoor air can be more polluted than outdoor air. Off-gassing from paints and finishes is one of the main sources of poor indoor air quality. For years after paint is applied, low-level toxic fumes are released into the air. Volatile Organic Compounds (VOCs) are the source of these toxic emissions, and until recently, these chemicals were always used in paint and finish. Low-VOC paints can now easily be found in local stores.

Fragrances

Some children and adults have allergic or hypersensitivity reactions to scented chemicals. Allergic and asthmatic children are at especially high risk. That's why we discourage the use of air fresheners, scented products, and fragrances indoors. See the plastics section of this manual for more information about phthalates, a class of chemicals often used in fragrances and scented products.

What is the difference between cleaning, sanitizing and disinfecting?

- Routine ***cleaning*** with detergent and water is the most useful method for removing germs from surfaces in the child care setting.
- A ***sanitizer*** is a product that reduces germs on inanimate surfaces to levels considered safe by public health codes or regulations. A sanitizer may be appropriate to use on food contact surfaces, toys that children may place in their mouths, and pacifiers.
- A ***disinfectant*** is a product that destroys or inactivates germs on an inanimate object. A disinfectant may be appropriate to use on non-porous surfaces such as diaper change tables, counter tops, door and cabinet handles, and toilets and other bathroom surfaces.

Household Chemicals: Recommendations

What To Recommend to Child Care Providers:

1) Use unscented, biodegradeable, non-toxic cleaning products and least-toxic sanitizing and disinfecting products.

Safer cleaning products are not only less-toxic and environmentally safe, but they also often cost the same as conventional cleaners.

- Choose Environmentally Preferable Products (EPP) to protect human health and the environment. These products are found to be less polluting and have less of an impact on health. (Visit http://www.epa.gov/epp/pubs/products/cleaning.htm).
- Choose products that are readily biodegradable (they break down easily) and do not have to be disposed of as hazardous waste.
- Choose products that are non-irritating and do not list any short term or long term health effects.
- Choose products that contain little or no Volatile Organic Compounds (VOCs). VOCs are generally toxic and can cause irritation of eyes, ears, nose and throat.
- AVOID flammable products, as well as products likely to have other dangerous reactions.
- AVOID aerosol or spray cans.
- Choose products that can be used for many different tasks (soap and water, baking soda).

> One of the resources you can access electronically is the *Green Cleaning, Sanitizing, and Disinfecting: A Toolkit for Early Care and Education,* a comprehensive resource that provides a wide range of advice and information on healthier cleaning.

Not sure which cleaning products are really less-toxic? *Green Seal* and *EcoLogo* are non-profit companies that research and certify products that are biodegradable and environmentally friendly. Visit www.greenseal.org and/or www.ecologo.org to verify whether the products you use are safe, healthy and effective.

One source of information about chemicals used in a facility are Safety Data Sheets, or SDS (formerly MSDS), which are designed to communicate to workers the hazards of chemical products used in the workplace. While an important resource, the SDS should not be the sole source of product information. The SDS for some chemicals have been

found to be inaccurate or incomplete.[27] Additionally, the focus of the SDS is on adult workplace exposures, not on pediatric health risks or exposures.

2) Store cleaning products, paints, and other household chemicals where children cannot reach them.

3) Use chlorine bleach only when and where it is required or recommended by the state and local authorities. Use it prudently, at the correct dilutions, and never more than necessary.

Properly diluted unscented regular strength household bleach is commonly used to sanitize and disinfect in child care, as it is easily accessible and affordable. Household bleach is now being sold in a variety of concentrations. It is very important to identify the concentration of sodium hypochlorite in the product you purchase so that you can mix the correct amount of bleach and water. The higher the percentage of sodium hypochlorite, the stronger the bleach is.

Mixing an effective yet safe ratio of bleach to water is important. If too much bleach is used, it can negatively affect the breathing of some children and staff; if too little bleach is used, the solution will not properly sanitize or disinfect.

Sanitization and disinfection solutions of bleach and water lose their strength very quickly and easily. The solutions are weakened by organic material, evaporation, heat, and sunlight. Therefore, bleach solutions should be mixed fresh each day to make sure they are effective. Any leftover solution should be discarded at the end of the day. Keep the bleach solution you mix each day in a cool place out of direct sunlight. Always ensure that chlorine bleach solutions are out of the reach of children, as bleach can cause severe damage to eyes and skin, and may be harmful if swallowed.

Keep in mind that there are safe, effective alternatives to chlorine bleach. Healthier options are peroxide-based bleach products that are registered by EPA for use in sanitizing and disinfecting. Remember to always use the least toxic cleaner, sanitizer or disinfectant. For a partial list of EPA-registered sanitizers and disinfectants, visit: www.epa.gov/oppad001/chemregindex.htm. Bleach that does not have an EPA registration number on the label may not be an effective disinfectant.

Read the label to find the concentration of sodium hypochlorite (bleach) in the product to make sure you are using the right amount of bleach and water.

For an 8.25% sodium hypochlorite (bleach) solution, follow this helpful guidance offered by the National Resource Center for Health and Safety in Child Care and Early Education: http://cfoc.nrckids.org/Bleach/Bleach.cfm.

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[27] Nicol AM, Hurrell AC, Wahyuni D, McDowall W, Chu W, "Accuracy, comprehensibility, and use of material safety data sheets: a review." *Am J Ind Med.* 2008 Nov;51(11):861-76., www.ncbi.nlm.nih.gov/pubmed/18651574

- Use only an EPA-registered, unscented product. The product you purchased should have a label that says EPA Reg# and lists the number.
- Follow the manufacturer's instructions.

For a 5.25-6% sodium hypochlorite (bleach) solution, continue to follow the dilution and contact time instructions provided in Appendix J of *Caring for Our Children,* available at:
http://cfoc.nrckids.org/WebFiles/AppedicesUpload/AppendixJ.pdf

4) Talk with your licenser and local authorities about using alternative sanitizers and disinfectants that have been vetted by the EPA.

In order for a disinfectant to work properly, it must contain some toxic properties. However, we can minimize the risk of exposure by choosing some safer alternatives.

5) Do not use aerosol sprays.

6) Choose low- or no-VOC latex paints and do not paint when children are present.

7) Ventilate and use fans in all areas in which you have used potentially toxic product.

8) Take steps to keep the dirt out:

Tips on Keeping Child Care and Preschool Settings Clean and Healthy

- Remember to WASH HANDS for 20 seconds (under nails, between fingers, and on both sides of hands) before and after eating, after using the restroom, and after touching a public space.
- Place floor mats near each entrance of buildings to limit dirt and germs carried indoors.
- Keep eating and drinking to assigned areas.
- Do NOT allow providers and/or teachers to bring in cleaning supplies from home. Use HEPA vacuum attachments, microfiber mops and rags, and similar products that require fewer chemicals for cleaning.

9) Update and maintain equipment.

Lead: Why and Where

Why We Worry About Lead:

Lead is a naturally occurring, odorless, colorless, heavy metal found in the environment. There is no safe level of lead exposure. Lead is a neurotoxicant. It is measured in blood and accumulates in bones, muscles and fat, creating a long-term source of low level exposure inside the body. Children exposed to lead can experience headaches, abdominal pain, constipation, hearing problems, delayed growth, decreased IQ, behavioral and learning problems, and damage to the brain and nervous system. At high levels, it can be fatal. Adult exposure can lead to reproductive problems, muscle and joint pain, decreased reaction time, memory loss, kidney problems, and nerve disorders.

Because children's brains and nervous systems are still developing, they are more sensitive to the neurotoxic effects of lead than adults. Infants and young children are especially sensitive to even low levels of lead. Lead can damage the brain and nerves in fetuses and young children, resulting in learning deficits and lowered IQ[28] (losing even one IQ point can mean a 2.4% reduction in lifetime earnings[29]). Pregnant women exposed to lead have a higher risk of bearing children with birth defects. Adults exposed to lead may have decreased reaction time, affected memory, weakness in the fingers, wrists or ankles, anemia and increased blood pressure. Lead has also been linked to reduced sperm count in men.

Young children are at a greater risk of lead poisoning for several reasons. First, they often put their hands and other objects in their mouths – these objects may have lead dust on them. If they live or go to school in a place with high levels of lead, in the paint or dust, their bodies can easily absorb the lead. Children sometimes eat lead-based paint because it can have a sweet taste. A child's body reacts differently to lead, as compared to an adult's body. Lead substitutes for calcium; young bodies need calcium, so children can absorb 50% of the lead they ingest, while adults only absorb 10%. Children also absorb more lead if they are deficient in calcium and iron.

Historically, lead has been found in a number of consumer products, such as paint, plumbing, and gasoline. It is currently used in the production of certain batteries, metal and PVC (polyvinyl chloride) piping, electronic products, art supplies, ceramics and other common and industrial items. Due to health concerns, lead has been significantly reduced in paint, ceramic products, caulking, and pipe solder. The federal government banned lead-based paint from housing in 1978 but older houses can still have lead paint (both inside and outside). Lead can still be found in many products including play jewelry, art supplies, PVC toys, paint, ceramic pottery, and piping. Many urban areas have high levels of lead in their soil.

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[28] Health and Environmental Impacts of Lead (Environmental Protection Agency, 2003) (http://www.epa.gov/air/urbanair/lead/hlth.html).

[29] S.D. Grosse, et al., "Economic gains resulting from the reduction in children's exposure to lead in the United States," *Environmental Health Perspectives* 2002: 110(6):563-569.

People can be exposed to lead by ingesting it from peeling paint or paint dust. Homes painted before 1978 likely were painted with lead-based paint. Lead is also found on vinyl, non-glossy miniblinds and in under-fired terra cotta pottery and Mexican folk remedies such as Azarcon and Greta. Lead in the atmosphere comes primarily from hazardous waste sites or heavy automobile traffic.

Although lead was removed from gasoline in the 1970s, homes near freeways or in urban areas may still have lead in the soil. It is also released from certain industrial processes and burning fossil fuels.

Neurobehavioral Disorders

Neurobehavioral disorders, which include attention deficit hyperactivity disorder (ADHD), autism, and a variety of learning disabilities, affect 3-8% of U.S. children. Exposure to metals such as lead, mercury, and cadmium, as well as certain pesticides and organic solvents during pregnancy and childhood can impact normal brain development and function.

Lead: Recommendations

What to Recommend to Child Care Providers:

1) If your facility was built before 1978, guard against chipping or flaking paint and pay special attention to high-use painted surfaces, such as window frames and doors.

Lead dust from paint is a primary source of lead poisoning. Pay close attention to areas where paint is more likely to flake, such as the frames of doors and windows. Another area of concern is the outside of your house or facility, especially on surfaces that have high sun exposure.

2) If your facility was built before 1978, regularly wash all areas around windows and doors to prevent the build-up of dust that may contain lead.

Vacuum often. Clean floors, window frames, and window sills weekly. Use a mop, sponge or paper towel with warm water and a general all-purpose cleaner. Dusting and regular washing of high use areas, such as around doors and windows, can help collect lead dust as it forms. If you are able, it is also recommended that you use HEPA filter vacuums in homes with lead paint. HEPA filters capture small, easily inhaled lead particles that regular vacuums cannot capture.

3) Use only cold water for drinking, cooking, and making baby formula. If water has been sitting in the pipes for 6 hours or more, flush cooking and drinking outlets before using the water.

Clean debris from tap water outlet screens or aerators regularly. If you suspect that there could be lead in your drinking water, test the water. If appropriate, use water filtration devices that have been certified to remove lead for additional treatment of drinking water at the outlet.

Lead can get into drinking water from plumbing materials and fixtures. Hot water increases the amount of lead that leaches, or gets into, water. By using cold water you discourage the leaching of lead from pipes.

4) Place a mat at the entrance of your facility, or go shoe free inside the facility.

Lead dust from paint and particles from pre-1970 gasoline frequently contaminate soil. This soil can be tracked inside and inhaled by children, especially toddlers and infants who spend more time on the floor. A mat at your facility entrance can help reduce the lead particles that are tracked in. Another option is to be a shoe-free facility and have all visitors and children remove their shoes at the child care entrance.

5) Frequently wash hands, especially after coming inside, and before eating.

Also wash toys and pacifiers. Hands and toys can become contaminated with lead from household dust and exterior soil.

6) Refer families with high risk factors to their physician for lead testing

Or, find a testing location by visiting www.cdc.gov/nceh/lead. Unfortunately, thousands of U.S. children still have elevated – and unrecognized -- blood lead levels.

7) Before you paint, renovate or remodel a child care facility built before 1978, make sure you and your contractor follow lead-safe practices.

Projects that disturb lead-based paint can create dust and endanger you and your family. If you are planning to paint, renovate or remodel a child care facility built before 1978, make sure the contractor you hire is from a 'Lead-Safe Certified Firm.' Be sure the professional follows the work safe practices as outlined in EPA's brochure, "The Lead-Safe Certified Guide to Renovate Right."

8) Keep metal costume jewelry away from children.

Costume jewelry and jewelry sold in vending machines often contain lead.

9) Avoid imported painted toys (especially those with bright red paint) and children's vinyl products.

Many children's painted toys and vinyl products (rubber duckies, bath books, dolls, beach balls, rain coats) contain high levels of lead. *See Plastics & Plastic Toys fact sheet.*

Other vinyl products of concern include: vinyl blinds, vinyl lunch boxes, flexible plastic toys, inflatable swimming pools, garden hoses, raincoats, wall paneling and flooring, cosmetics, shower curtains, crib bumpers, imitation leather, and food packaging. Subscribe to the Consumer Product Safety Commission's recall list serve for contaminated toy recalls at *www.cpsc.gov/*.

10) Reduce lead absorption by eating well.

Avoid nutrient deficiencies by eating a balanced diet high in calcium (e.g. milk, cheese, yogurt) and iron (e.g. lean red meat, chicken, spinach, broccoli).

11) Avoid using old or handmade pottery to cook, store, or serve food.

Lead that has been incorporated into ceramic glazes can contaminate food. Old, handmade, and/or imported pottery is more likely to contain lead . Check with your health department for more information.

12) Use caution when considering traditional remedies.

Traditional medicines manufactured outside of the U.S. can contain dangerously high levels of lead. Avoid use of azarcon.

13) Avoid imported candies, such as tamarind candy, which can contain high levels of lead.

14) Use caution when purchasing artificial turf.

Ensure children wash hands and shoes after playing on artificial turf. Some artificial turf/grass contains lead.

Mercury: Why and Where

Why We Worry about Mercury:

Mercury is a heavy metal which enters the environment through multiple routes—including natural geological sources, coal-fired power plants, cement manufacturing plants, abandoned mines, and consumer products. Mercury is also released into the environment when mercury-containing items such as batteries, fluorescent light bulbs (including compact fluorescent light bulbs) and mercury thermometers are thrown away improperly. Mercury is a naturally occurring element that has no nutritional value and is a potent neurotoxicant. This means that it interferes with the nervous system and brain. Mercury's dangers have been established for centuries—noted by both the ancient Romans and Incas. Despite this, mercury is used in, and is a byproduct of, many industrial processes and consumer products.

Once released into the environment, mercury circulates in the atmosphere and falls on land and water. Mercury entering water can be transformed into methylmercury, a highly toxic form of mercury that bioaccumulates in the muscle tissue of fish and biomagnifies in animals (including humans) that eat fish. When a substance biomagnifies, its concentration increases as it moves up the food chain. The most common way people are exposed to mercury is by eating fish containing methylmercury.[30] Just one gram of mercury (the amount in just two typical mercury thermometers) can make the fish in a 20-acre lake unsafe to eat.

Many adverse health effects are associated with the accumulation of mercury in the body.

Methylmercury, the most common form of mercury to which people are exposed, interferes with brain development. Once in the brain it interferes with nerve cell differentiation, cell division, and migration of cells in the developing brain.[31] Exposure to lower levels of airborne mercury, another form of mercury, for prolonged periods of time may produce subtle effects, such as irritability, sleep disturbances, excessive shyness, tremors, coordination problems, changes in vision or hearing, and deficits in cognitive thinking, memory, attention, language, and fine motor and visual spatial skills. Exposure to very high levels of metallic mercury vapor can cause brain, kidney, and lung damage, nervous and digestive system damage and may seriously harm a developing fetus. Harmful effects include blindness, seizures, brain damage, and inability to speak.

Young children and fetuses are more sensitive to methylmercury than adults.[32] Mercury in the mother's body passes to the fetus and may accumulate there. It can also pass to a nursing infant through breast milk. Children exposed to methylmercury in utero show

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[30] Mercury in the Environment. (2000, October). U.S. Geological Survey. Fact Sheet 146-00. Retrieved October 14, 2007, from http://www.usgs.gov/themes/factsheet/146-00.
[31] Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for mercury. Atlanta, G A: U.S. Department of Health and Human Services, Public Health Service.
[32] Agency for Toxic Substances and Disease Registry (ATSDR). 1999. Toxicological profile for mercury. Atlanta, G A: U.S. Department of Health and Human Services, Public Health Service.

irreversible damage to their central nervous systems: numbness and tingling around mouth, fingers and toes; a clumsy stumbling gait; difficulties swallowing and speaking; general weakness and fatigue; vision and hearing loss; spasticity and tremor; and seizures. Prenatal mercury exposure has also recently been implicated in preterm birth.[33] According to the Centers for Disease Control and Prevention, 8% of U.S. women of childbearing age have enough mercury in their blood to pose a threat of neurological damage to the fetus.[34]

Chronic exposure to methylmercury in adults may produce cardiovascular problems,[35] though studies have not yet determined a reference dose for the level of exposure that might trigger these effects. There is some evidence that methylmercury may function as a hormone disruptor and may play a role in diseases such as breast cancer.[36]

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[33] Xue, F., Holzman, C., Rahbar, M.H., Trosko, K., & Fischer, L. (2007). Maternal fish consumption, mercury levels and risk of preterm delivery. *Environmental Health Perspectives*, 115(1): 42-47.
[34] Schober, S.E., Sinks, T.H., Jones, R.L., Bolger, P.M., McDowell, M., Osterloh, J., ES Garrett, E.S., et al. (2003). Blood mercury levels in US children and women of childbearing age, 1999-2000. *Journal of the American Medical Association* 289:1667-1674.
[35] Virtanen, J.K., Voutilainen, S., Rissanen, T.H., Mursu, J., Tuomainen, T., Korhonen, M.J., Valkonen, V., et al. (2005). Mercury, fish oils, and risk of acute coronary events and cardiovascular disease, coronary heart disease, and all-cause mortality in men in eastern Finland. *Arteriosclerosis, Thrombosis, and Vascular Biology* 25:228.
[36] Sukocheva, O.A., Yang, Y., Gierthy, J.F., & Seegal, R.F. (2005). Methyl mercury influences growth-related signaling in MCF-7 breast cancer cells. *Environmental Toxicology* 20(1): 32-44.

Mercury: Recommendations

What to Recommend to Child Care Providers:

1) Be aware of products in your facility that contain mercury and be sure that you securely store and dispose of them properly.

Products in your house that may contain mercury include fluorescent light bulbs (including the newer energy-efficient compact fluorescent light bulbs), batteries, older thermometers and thermostats, and electronic equipment. **Ideal disposal is at a hazardous waste collection facility (visit www.earth911.org).**

Keep mercury out of landfills and incinerators by recycling batteries and mercury-containing, wall-mounted thermostats. Exchange mercury-containing thermometers for digital versions. Recycle regular fluorescent and compact fluorescent light bulbs (CFLs) appropriately at hazardous waste facilities. While compact fluorescent light bulbs do contain a small amount of mercury, overall, they reduce mercury emissions because they are far more efficient than incandescent bulbs and reduce the amount of coal burned to power our homes. Call 1-800-RECYCLE to find a nearby recycling or hazardous waste facility that accepts products that contain mercury, or visit www.earth911.com; enter your item and zip code and locations will be provided.

Avoid purchasing and using consumer products that contain mercury. The most common household items that may contain mercury include thermostats, barometers, manometers and thermometers. Buy digital or mechanical thermostats and digital or alcohol-based thermometers, all of which are free of mercury. Encourage local businesses to carry mercury-free items whenever possible and to offer recycling for mercury-containing products in their stores.

2) Be aware of your children's fish consumption and choose fish that are less likely to contain mercury. See tables below for recommendations.

Fish species that are known to be high in mercury are long-lived, large predators. Examples include tuna, shark, king mackerel, tilefish, swordfish, orange roughy, and marlin. Limit consumption of tuna, especially steaks and canned "white" albacore. Choose light tuna over white albacore tuna because it is likely to have lower levels of mercury. In a recent study, 100% of tested canned tuna contained methylmercury.[37] The range of contamination was wide, but a pregnant or nursing woman could eat only one can of the most-contaminated tuna every 98 days without risking damage to her baby. Lower-mercury choices include wild salmon, sardines, anchovies, Atlantic herring, Dungeness crab, Pacific cod, Alaskan black cod, farmed striped bass, tilapia, farmed catfish, clams, mussels, and Pacific oysters.

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[37] Bender, M.T. (2003). Can the Tuna: FDA's Failure to Protect Children from Exposure to Mercury in Albacore "White" Canned Tuna. The New England Zero Mercury Campaign. Retrieved June 20, 2007, from http://www.mercurypolicy.org/new/documents/CanTheTuna061903.pdf.

Advice from experts differs; see tables on the next page for recommendations from the U.S. Food & Drug Administration/U.S. EPA and Consumers Union.

The EHCC Mercury Fact Sheet and the document "Additional Resources from CEHN Website" offer many resources offering additional guidance on fish choices.

3) Safely Clean Up Mercury Spills

Soon most, if not all, light fixtures will be using fluorescent bulbs; fluorescent bulbs (including compact fluorescent light bulbs or CFLs) contain mercury. Other common sources of liquid mercury are some thermostats and thermometers. Thus, every child care facility probably needs at least one mercury spill kit -- and possibly more than one.

The number and the type of kits will depend upon the facility. One type of spill kit is for very small mercury releases, such as a broken CFL. Another type is for cleaning up a slightly larger spill, such as a broken mercury thermometer. The mercury spill kit should be labeled and include instructions and tools to clean up the spill. Your electronic EHCC training resources include instructions and resources for creating these two types of spill kits, how to clean up spills, and additional resources.

Facility owners or managers should survey their facility to determine a) how many kits they need for CFL breakage (eg, one per room or every two rooms) and b) if they have mercury-containing thermostats or other equipment and thus for spill kit(s) for these larger potential spills.

Mercury released from a broken CFL will not be visible, while drops from something like a broken thermometer will be visible.

For any spill: Remove children and pets from the room, turn off the heating or air conditioning and air out the room for 5-10 minutes before cleaning. Never use a vacuum cleaner as it will spread the mercury. Never pour mercury down a drain.

For more information, consult your mercury spill kit training resources. You may want to call the national poison center: the national toll free number is 1-800-222-1222.

4) Choose Green Energy

A primary source of mercury in the environment is pollution from coal-fired power plants. By using less electricity, choosing your power utility's green energy option, and supporting tighter emissions standards on coal-fired power plants, you will help decrease the amount of mercury that is emitted into the atmosphere.

FDA/EPA Recommendations on Fish Consumption for Children & Women of Child-Bearing Age				
	Shark Swordfish King mackerel Tilefish	Albacore ('White') Tuna	Other fish species	Locally-caught fish
Women	Do not eat	No more than 6 ounces (one average meal) per week	No more than 12 ounces (2 average meals) per week; only 6 ounces (one average meal) per week if also eating one meal of Albacore tuna	Check local advisories. If advice is not available, no more than 6 ounces (one average meal) per week and no other fish during that week.
Young children	Do not eat	Same recommendations "but serve smaller portions"		

From: *What You Need to Know About Mercury in Fish and Shellfish, Advice for Women Who Might Become Pregnant/ Women Who are Pregnant/ Nursing Mothers/ Young Children,* brochure from the U.S. Food and Drug Administration and the U.S. Environmental Protection Agency

Consumer Reports Recommendations on Tuna Consumption			
	Light Tuna	White Tuna	
Pregnant women	None	None	
Children > 45 lbs	12.5 oz	4 oz	Per week
Children < 45 lbs	<4 oz	<1.5 oz	Per week

Furniture and Carpets: Why and Where

Why We Worry About Materials in Furniture and Carpets

Brominated Flame Retardants (aka Toxic Flame Retardants)

Brominated flame retardants are chemicals added to consumer goods, such as computers, TV sets, car seats and furniture, to make them difficult to burn. There are no known natural sources of brominated flame retardants, but they have been found worldwide in house dust, indoor air, rivers and oceans, and in human tissue. One common class of flame retardants – polybrominated diphenyl ethers (PBDEs) – are of most concern.

PBDEs have been widely used in furniture foam, carpet padding, back coatings for draperies and upholstery, plastics, computers, televisions, building materials, and electrical appliances. Research indicates that more than 80% of PBDE exposure is from house dust. PBDEs persist in the environment and accumulate in living things. They have been found in human blood, breast milk, and umbilical cord blood. Since PBDEs are merely mixed into plastics and do not bind to them, these chemicals escape from the products and enter workplaces, homes and the environment. Exposure to PBDEs likely comes from eating contaminated foods and/or breathing contaminated air, particularly indoor air. PBDEs show up in dust, rivers, lakes and even arctic mammals. In addition, when PBDEs are burned or incinerated, they break down to form dioxins, which are carcinogenic.

Exposure to low doses of PBDEs is suspected to cause neurological and developmental damage, including deficits in learning, memory and hearing, changes in behavior, and delays in sensory-motor development. A 2010 study found that children born with higher concentrations of PBDEs scored lower on tests of mental and physical development between the ages of 1 and 6.[38] PBDEs are potential carcinogens and also appear to disrupt the thyroid hormone. This is especially dangerous for fetuses, because women who in the first trimester of pregnancy have depressed levels of certain thyroid hormones are much more likely to give birth to a child with low IQ or even mild retardation.[39] Male rats exposed to low doses of PBDEs while in the womb have significantly decreased sperm counts.

Because of their smaller weight, children's intake of PBDEs per kilogram of body weight is greater than that of adults. PBDEs remain in the body for many years, stored in body fat. PBDEs have an affinity for and will concentrate in breast milk fat and, thus, children can be exposed through breastfeeding. Breastfeeding is still the ideal food to help

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[38] Eskenazi B, Chevrier J, Rauch SA, Kogut K, Harley KG, Johnson C, Trujillo C, Sjödin A, Bradman A. (2013) In Utero and Childhood Polybrominated Diphenyl Ether (PBDE) Exposures and Neurodevelopment in the CHAMACOS Study. *Environmental Health Perspectives,* Vol. 121 No. 2, February 2013, p. 257-262.

[39] Birnbaum L et al., "Brominated Flame Retardants: Cause for Concern?" *Environmental Health Perspectives* January 2004: Volume 112, Number 1 (http://ehp.niehs.nih.gov/members/2003/6559/6559.html).

developing bodies and brains grow. It has also been shown that PBDEs stored elsewhere in a mother's body can be released during pregnancy, cross the placenta and enter fetal tissue.[40]

Studies have found that the levels of PBDEs in the breast milk of U.S. women are substantially higher than those found in other countries such as Sweden and Japan.[41]

Formaldehyde

Another toxicant commonly found in furniture is formaldehyde. Formaldehyde is a flammable, colorless gas with a pungent odor. It is used in the production of paper, plywood, particle board and adhesives. Formaldehyde is used to add permanent-press qualities to fabrics like draperies, as a component of glues in particle-board furniture and plywood flooring, and as a preservative in some paints and coating products. It is also produced by combustion (burning), such as from car exhaust, cigarette smoke, and wood-burning stoves. When used in furniture, formaldehyde off-gases over years. This means small formaldehyde particles break off into the air and can be inhaled. For up to five years after their manufacture, furniture constructed from pressed composite wood products like plywood can give off formaldehyde gas. Formaldehyde has a wide range of additional uses from household products, such as antiseptics, medicines and cosmetics, to food preservatives, pesticides and as an agent in tobacco products. In addition, automobile exhaust, diesel and airplane engines, incinerators, and chemical smog all contribute formaldehyde to outdoor air.[42]

Whether it is from pressed wood furniture, flooring and other manufactured wood products, cigarette smoke, automobile exhaust or wood burning stoves, people are exposed to formaldehyde primarily by breathing it. People are exposed after application of certain paints, floor finishes, certain fabrics, household cleaners and the glue used to adhere carpets to the floor. People may also be exposed to formaldehyde by wearing cosmetics (some, like nail polish, can emit high levels of formaldehyde when wet) and wrinkle-free clothing or products made using urea formaldehyde resins.

Formaldehyde can be irritating to the eyes, skin, and mucous membranes. Off-gassing (the release of chemicals into the air) can cause headaches; nausea; burning of the eyes, nose, and throat; skin rashes; coughing; and chest tightness. Exposure to high levels of formaldehyde for an extended period of time (10-20 yrs) may cause cancer, especially in the nasal region and upper respiratory tract. Studies with animals indicate that formaldehyde exposure is linked to brain tumors, leukemia, lymphomas, and lung

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[40] Anita Mazdai, et al., "Polybrominated Diphenyl Ethers in Maternal and Fetal Blood Samples," *Environmental Health Perspectives* November 2003: Volume 111, Number 14. http://ehp.niehs.nih.gov/members/2003/6466/6466.html.
[41] Mothers Milk: Record Levels of Fire Retardants Found in American Mothers' Breast Milk, Environmental Working Group: September 2003 (http://www.ewg.org/reports/mothersmilk/).
[42] Lawrence H. Keith, et al., *Handbook of Air Toxins* (New York: Lewis Publishers, 1995).

cancer. Formaldehyde also acts as an asthma trigger in humans and is a suspected liver, reproductive and neurological toxicant.[43]

Children are more vulnerable to the toxic effects of pollutants such as formaldehyde because children's lungs are still developing, children are more active outdoors, and they breathe more air than adults per pound of body weight. Formaldehyde is a strong asthma trigger, which is a particular concern for children.

Carpets

Carpets create a soft floor for children to play on, but they also trap pesticide residues and lead dust, and off-gas other chemicals that can have negative impacts on children's developing bodies. Carpets can also trap moisture and be a hideout for mold and mildew. Children, especially young children, spend more time close to the ground and are more likely to breathe in the dirt, dust and mildew that accumulate in the carpet. This can be tough on lungs and can trigger asthma attacks.

Many chemicals of potential concern are also used in carpet production and installation. Styrene, formaldehyde, and vinyl acetate have all been detected in laboratory studies to be released from carpets. These chemicals are potential carcinogens and degrade indoor air quality. Volatile organic compounds (VOCs) are also released throughout the life of a carpet and degrade indoor air quality.

[43] ATSDR, "ToxFaqs for Formaldehyde," July 1999 (http://www.atsdr.cdc.gov/toxfaqs/tf.asp?id=219&tid=39).

Furniture and Carpets: Recommendations

What to Recommend to Child Care Providers:

1) Keep furniture in good condition without foam or inside stuffing exposed.

By keeping stuffing contained, you can help reduce children's exposure to foam dust, which may help reduce exposure to PBDEs. When seams rip or holes are made in furniture, be sure to patch them quickly. You can also choose natural stuffings (e.g., cotton or wool) instead of foam-filled furniture. Dispose of torn foam items (cushions, pillows, stuffed animals). Choose new items stuffed with polyester, down, wool, or cotton; these are unlikely to contain toxic fire retardants.

2) Choose furniture made from solid wood. Avoid use of pressed wood products that are made with glues that contain urea-formaldehyde resins (UF).

Select wood products that do not contain formaldehyde. Solid or antique wood, or second hand furniture are better choices. More and more manufacturers are offering formaldehyde-free cabinets and other furnishings. By choosing furniture made from solid wood or made without formaldehyde, you can reduce formaldehyde levels in your facility. In 2007, the European Union banned the use of formaldehyde in products due to its carcinogenic properties. California has also banned formaldehyde use in composite wood products.

3) When possible, avoid having wall to wall carpet.

Instead, choose hard flooring (wood, tile) or natural fiber or alternative surfaces such as linoleum, cork, or marmoleum. For areas where softer surfaces are desirable, choose area rugs made out of natural fibers such as wool, cotton, or hemp that are naturally fire-resistant and contain fewer chemicals. Clean area rugs with biodegradable cleaners. This recommendation is easiest to implement when child care providers are remodeling their facilities or moving into a new space.

4) Clean and vacuum daily and clean rugs twice a year using biodegradeable cleaners.

Keeping floor surfaces clean can help reduce the dirt, lead dust, and mildew spores that children inhale.

Visit EcoLogo at www.ecologo.org or Green Seal at www.greenseal.org to find cleaning products that are certified as biodegradable and environmentally healthy. These third-party certification systems ensure that products claiming to be green meet health and environmental impact standards. Using a HEPA filter vacuum can also help capture dirt and dust particles and improve indoor air quality.

5) Have children was their hands frequently with soap and water.

6) Keep dust levels down by damp dusting and mopping.

7) Ventilate often, and especially while cleaning.

8) Remove shoes prior to going indoors.

Recipes for Cleaning Furniture & Carpets:

Carpet Spot Remover

Blot immediately with water. Sprinkle with baking soda or cornstarch and let dry. Wash with club soda and vacuum.
** If a rug or carpet is contaminated by bodily fluids: Blot to remove the fluid as quickly as possible, then disinfect by spot-cleaning with a detergent-disinfectant (adapted from Caring For Our Children, 3rd edition).*

Wood Cleaner

¼ cup white vinegar
¼ cup water
½ tsp. liquid soap
A few drops of olive oil
Combine the ingredients in a bowl and wash the area. The vinegar smell will dissipate.

All Purpose Cleaner

¼ cup white vinegar
2tsp. baking soda
3 ½ cups hot water
¼ cup liquid dish soap
Mix ingredients in a 32 oz. spray bottle, adding dish soap last. Wash surfaces. The smell of vinegar will dissipate.

Window Cleaner
¼ cup white vinegar
½ tsp. liquid soap or detergent
2 cups water

Art Supplies: Why and Where

Why We Worry About Art Supplies:

Art and craft supplies can contain toxic ingredients that, when used or stored in a play area, create a risk to the health and well-being of children. Lead, asbestos and organic solvents are sometimes used to enhance pigmentation, preserve art products, and to improve application. These toxic ingredients can trigger asthma, allergies, headaches and nausea, especially if used in a poorly ventilated area. Research has shown that some inks, adhesives, pigments and clay may contain chemicals that can cause adverse health effects in adults after occupational exposures. While no studies have shown these negative health effects to occur in children with their limited exposures, care is needed if these supplies are used.

Children are uniquely vulnerable; it is important to purchase and use supplies that are certified as non-toxic. In addition, young children are more likely to have contact with products on skin, hair, mouth and eyes. Children in grade six and lower should only use non-toxic art and craft materials. Adult supervision is always recommended when young children are using any art supplies.

How Are Children Exposed?

Inhalation: The dusts and vapors from art and craft materials can be inhaled, and can damage developing lungs.

Ingestion: Children are especially likely to ingest chemicals from art supplies as they regularly put their hands into their mouths.

Skin Contact: Children tend to get art and craft materials on their skin during their creative play. Chemicals in art supplies can be irritating to the skin. Also, children's skin is more permeable than that of adults. Therefore, it is important to wash these products off of children's skin immediately after use.

Art Supplies: Recommendations

What to Recommend to Child Care Providers:

1) Use only non-toxic art supplies approved by the Art & Creative Materials Institute, Inc. (www.acminet.org). Look for the **ACMI seal "AP."**

2) Read labels and identify precautions.

3) Keep the workspace ventilated with open windows and fans, or work outside.

4) Do not allow children to eat or drink while using art and craft materials.

5) Ensure children wear protective smocks and wash their hands thoroughly after using art and craft supplies.

6) Closely supervise children when they are using household supplies as art materials to avoid ingestion/improper use (e.g., liquid starch, shaving cream).

Products to Avoid:

1. Solvent Based Products (markers, oil-based paints and cements); these may be extremely flammable and release toxic vapors
2. Products that contain lead and other heavy metals (some paints, glazes and enamels)
3. Products that can be inhaled, or get into children's eyes, such as: clay in dry form, powdered paints, wheat paste, and aerosols (spray paint, hair spray)
4. Commercial Dyes
5. Products that are not in original container or without proper labeling (including donated items).
6. Instant Papier-mâché (may contain asbestos fibers, lead or other metals from colored printing ink)
7. Permanent felt tip markers or scented markers (hazardous if inhaled or ingested)

Plastics and Plastic Toys: Why and Where

Why We Worry about Plastics:

Plastics have made lives easier since the 1950s. However, plastics are petroleum-based products which increasingly end up in landfills, waterways, oceans, and wildlife. Certain plastics are known to contain toxic chemicals which have negative impacts on human health. Children are particularly vulnerable to these toxic chemicals since their systems and organs are still developing; their bodies are small, so a small exposure is a big dose with big effects. Young children are also at greater risk since they often insert plastic objects into their mouths. Baby bottles, sippy cups, teething rings, and toys are often made with phthalates and Bisphenol A (BPA). These two toxic ingredients in plastics are of particular concern, as research increasingly shows that these chemicals mimic or suppress hormones (e.g., estrogen and testosterone) and disrupt normal development and growth. Not all plastic products contain these chemicals. See the recommendations section to learn more about the types of plastic products of greatest concern.

Plastics labeled #3: Polyvinyl Chloride (PVC) or vinyl

Products made from PVC or vinyl often contain lead and plasticizers called phthalates (pronounced THAL-ates), which are added to make the PVC more pliable. Phthalates are a versatile class of about 25 chemicals widely used in consumer products to soften plastics, carry fragrances, and act as solvents and fixatives. PVC, the second most commonly used plastic worldwide, is found in toys, rain coats and rain boots, car interiors, medical devices like IV bags and tubing, vinyl flooring, vinyl wallpaper, and vinyl shower curtains.[44] Phthalates are also present in personal care products, detergents and soaps, pesticides, and some clear food wrap.[45] In cosmetics and personal care products, phthalates are used to disperse fragrances, stabilize the cosmetic on the skin, and provide flexible hold in nail polish and hair care products. The production or destruction of PVC releases cancer-causing dioxins into the environment.

Human exposure to phthalates occurs through inhalation by breathing in fragrances, or fumes from solvents and fixatives, ingestion by chewing on plastic toys which creates small openings in the plastic providing an avenue for leaching of chemicals from the toy into a child's mouth, and skin absorption through lotions, perfumes, and deodorants.

Phthalates are widely detected in human blood and urine samples. According to the Centers for Disease Control and Prevention (CDC), phthalates are found in Americans of all ages, sizes, and races. The latest exposure study from the CDC indicates that women

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[44] Center for Health, Environment, and Justice (CHEJ). (2004). PVC: Bad News Comes in 3s. The Environmental Health Strategy Center.
[45] Environmental Working Group. (2003). Body Burden: The Pollution in People. Washington DC, Environmental Working Group. Retrieved July 15, 2007, from http://www.ewg.org/reports/bodyburden1/.

are slightly more exposed than men, and younger children (ages 6-11) are more exposed than older children (ages 12-19 or 20).[46]

Phthalates disrupt hormones and threaten reproductive health in humans. Scientists have suspected for years that exposure to phthalates can lead to health problems in humans. In laboratory animals, fetal exposure to phthalates causes significant developmental toxicity, especially of the male reproductive system. Effects in male animals include small testes, hypospadias (abnormal urinary openings), and undescended testes.[47] In adult animals, phthalates damage the reproductive organs, adrenal glands, liver, and kidneys.[48] These effects occur at exposure levels higher than those expected for people today. However, the people who are the most highly exposed to these chemicals have phthalate levels that exceed the level thought to be safe.

In humans, phthalates cross the placenta and reach the growing fetus. In utero, exposure to phthalate metabolites is associated with marked changes in the reproductive systems of baby boys. A landmark 2005 study found that baby boys whose mothers had higher levels of phthalates in their urine were more likely to have altered genital development, smaller average penis size, and a higher frequency of undescended testicles.[49] Phthalate metabolite levels in urine associated with these health effects were not extreme, but rather were typical for about one-quarter of all U.S. women.[50]

These effects are consistent with a "phthalate syndrome" observed in male rodents with phthalate-induced feminized traits. Researchers think that phthalates that have these effects, such as DEHP and DBP, act by reducing levels of testosterone and important growth factors in males. In adult males, phthalate exposure has been linked to lower sperm counts, reduced sperm motility, and damaged sperm.[51] Phthalate exposure has also been linked with a number of other adverse health effects. These include: reduced female fertility, liver and kidney damage, and asthma.[52]

Animal research and one recent human study show that prenatal exposure to DBP disrupts development of the male reproductive system in ways that may increase the

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[46] Centers for Disease Control and Prevention (CDC). (2009). Fourth National Report on Human Exposure to Environmental Chemicals. Atlanta, G A. Retrieved February 14, 2011, from http://www.cdc.gov/exposurereport/.

[47] Gray, L.E., Ostby, J., Furr, J., Price, M., Rao Veeramachaneni, D.N., & Parks, L. (2000). Phthalates and male sexual differentiation. *Toxicological Sciences*, 58: 350-365.

[48] Center for the Evaluation of Risks to Human Reproduction (CERHR). (2000). NTPCERHR expert panel report on di (2-ethylhexyl) phthalate (DEHP).

[49] Swan, S.H., Main, K.M, Liu, F., Stewart, S.L., Kruse, R.L., Calafat, A.M., et al. (2005). Decrease in anogenital distance among male infants with prenatal phthalate exposure. *Environmental Health Perspectives*, 113(8): 1056-1061.

[50] Marsee, K., Woodruff, T.J., Axelrad, D.A., Calafat, A.M., & Swan, S.H. (2006). Estimated daily phthalate exposures in a population of mothers of male infants exhibiting reduced anogenital distance. *Environmental Health Perspectives,* 114(6): 805-809.

[51] Duty, S. M., Calafat, A.M., Silva, M.J., Brock, J.W., Ryan, L., Chen, Z., et al. (2004). The relationship between environmental exposure to phthalates and computer-aided sperm analysis motion parameters. *Journal of Andrology*, 25(2):293-302.

[52] Hauser, R., & Calafat, A.M. (2005). Phthalates and human health. *Occupational and Environmental Medicine*, 62:806-818.

risk of testicular cancer.[53] Cancer studies also suggest cause for concern among females. The phthalate DBP promotes the growth of breast cancer cells in culture and has been shown to decrease the sensitivity of these cancer cells to chemotherapy drugs.[54]

Plastics labeled #6: Polystyrene (PS, commonly known as Styrofoam)

Toxic styrene can leach from polystyrene plastic. Products that contain polystyrene include: packaging "peanuts", toys, as well as: disposable coffee cups and lids, carry-out containers, food trays, cutlery, and packaging for meats, cheeses, and fish. Polystyrene is a neurotoxicant and a known carcinogen.

Plastics labeled #7: Bisphenol A (BPA)

Bisphenol A (BPA) can leach from polycarbonate plastic and act as a hormone disrupter. However, not all #7 plastics contain BPA. More and more #7 plastics are being made with compounds that are BPA-free. If so, they will be labeled "BPA-free" or something similar. Otherwise, avoid plastics labeled #7. BPA products tend to be very hard and rigid (they cannot be flexed by the hand) and are generally see-through.

BPA is a chemical used to make reusable plastic water bottles and baby bottles, the linings in metal food cans, and dental sealants. Animal studies have linked BPA to reduced fertility, breast cancer, prostate cancer, and obesity. Scientific studies have shown that even low-dose exposure can have negative health effects.

Over six billion pounds of BPA is manufactured each year. BPA is most commonly used as the building block of polycarbonate plastic for products such as reusable water bottles, plastic utensils, compact discs, certain microwaveable plastic containers, and epoxy resins (coatings that line food containers). It is also an additive in a variety of consumer products, including plastic toys, dyes, enamels, varnishes, flooring, adhesives, fungicides, antioxidants, dental sealants, and artificial teeth.

Human exposure to bisphenol A results from its use in the clear lining of metal food and drink cans, baby bottles, infant chewing toys, reusable water bottles, and from some dental sealants and composite dental fillings. Over time, bisphenol A migrates from cans into food[55] and leaches from polycarbonate plastic bottles, especially when the plastic is heated or as it ages.[56] As evidence of the chemical's "leaky" nature, BPA has been found in 40% of stream water samples surveyed by the U.S. Geological Survey.[57] Humans are

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[53] Ohlson, C.G., & Hardell, L. (2000). Testicular cancer and occupational exposures with a focus on xenoestrogens in polyvinyl chloride plastics," *Chemosphere*, 40 (May-June): 1277-1282.
[54] Kim, I.Y., Han, S.Y., & Moon, A. (2004). Phthalates inhibit tamoxifen-induced apoptosis in M CF-7 human breast cancer cells. *Journal of Toxicology and Environmental Health*, 67(23-24):2025-35.
[55] Brotons, J.A., Olea-Serrano, M.F., Villalobos, M., Pedraza, V., & Olea, N. (1995). Xenoestrogens released from lacquer coating in food cans. *Environmental Health Perspectives*, 103:608-612.
[56]Krishnan, A.V., Stathis, P., Permuth, S.F., Tokes, L., & Feldman, D. (1993). Bisphenol-A: an estrogenic substance is released from polycarbonate flasks during autoclaving. *Endocrinology*, 132:2279-2286.
[57] Kolpin, D.W., Furlong, E.T., Meyer, M.T., Thurman, E.M., Zaugg, S.D., Barber, L.B., & Buxton, H.T. (2002). Pharmaceuticals, hormones, and other organic wastewater contaminants in U.S. streams, 1999-2000: A national survey. *Environmental Science and Technology*, 36:1202-1211.

exposed through ingesting contaminated food, liquids, and breast milk, sucking/mouthing plastics, skin contact, and during some dental procedures. Traces of BPA can be found in more than 90% of the U.S. population.

Bisphenol A is a potent endocrine-disrupting chemical in lab animals at very low doses.[58] A number of animal studies have concluded that low-dose BPA exposure is associated with a variety of adverse health effects, including reduced sperm count, impaired immune system functioning, increases in prostate tumor proliferation, altered prostate and uterus development, insulin resistance, alteration of brain chemistry, early puberty, breast cancer, miscarriages, birth defects, hyperactivity and aggressiveness.[59] Very low doses of BPA have been shown to cause chromosomal aberrations, referred to as aneuploidy in mice during cell division.[60] Aneuploidy in humans is responsible for 10-20% of all birth defects.

Controversy over the toxicity of bisphenol A exists between public health advocates and the plastics industry, which says there is little concern with human exposure levels. Between 1998 and 2005, 115 studies of BPA were published. None of the 11 studies funded by industry reported adverse effects at low-level exposures; whereas 94 of 104 independently-funded studies found statistically significant effects on animals. Adverse effects were found at levels to which many people in the U.S. are currently exposed, levels much lower than the level the EPA considers safe.[61]

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[58] Dodds, E.C. & Lawson, W. (1938). Molecular structure in relation to estrogenic activity: compounds without a phenanthrene nucleus. *Proceedings of the Royal Society of London.Series B, Biological Sciences*, 125(839):222-232.

[59] vom Saal, F.S., Cooke, P.S., Buchanan, D.L., Palanza, P., Thayer, K.A., Nagel, S.C., Parmigiani, S., & Welshons, W.V. (1998). A physiologically based approach to the study of Bisphenol-A and other estrogenic chemicals on the size of reproductive organs, daily sperm production, and behavior. *Toxicol Ind Health*, 14(1-2):239–260.

[60] Hunt, P.A., Koehler, K.E., Susiarjo, M., Hodges, C.A., Ilagan, A., Voigt, R.C., Thomas, S., Thomas, B.F., & Hassold, T.J. (2003). Bisphenol-A exposure causes meiotic aneuploidy in the female mouse. *Current Biology*, 13:546-553.

[61] vom Saal, F.S. & Hughes, C. (2005). An extensive new literature concerning low dose effects of Bisphenol-A shows the need for a new risk assessment. *Environmental Health Perspectives*, 113:926-933.

Plastics and Plastic Toys: Recommendations

Many plastic products have a recycling code which can be found imprinted on the bottom of the product. The number in the code indicates the type of plastic:

Types of Plastics			
Symbol	**Type**	**Full Name**	**Common Uses**
1 PETE	PETE	Polyethylene terephthalate ethylene	Soda bottles, juice, water and peanut butter containers
2 HDPE	HDPE	High-density polyethylene	Milk and water jugs, bleach, detergent, some plastic bags
3 V ***AVOID***	V, PVC	Polyvinyl chloride	Water pipes, detergent, cling wrap, some plastic squeeze bottles
4 LDPE	LDPE	Low-density polyethylene	Most plastic bags, most plastic wraps, some plastic bottles
5 PP	PP	Polypropylene	Most Rubbermaid brand containers, many clouded plastic containers, baby bottles, straws, long underwear
6 PS ***AVOID***	PS	Polystyrene	Styrofoam food trays, egg cartons, packaging "peanuts, disposable bowls and cups, opaque plastic cutlery
7 OTHER ***AVOID***	Other*	Usually polycarbonate, some bio-based plastics (e.g. made from corn instead of petroleum)	Most plastic baby bottles, clear plastic 'sippy' cups, 5-gallon water bottles, liners of metal food cans, clear plastic cutlery

*Not all #7 plastics contain BPA. More and more #7 plastics are BPA-free; if so, they will be so labeled.

What to Recommend to Child Care Providers:

1) Choose toys that are not made out of soft plastic vinyl or PVC. These products may be labeled with the #3 on the bottom and have a "rubber ducky" texture and feel.

Because of children's mouthing behaviors, buy only plastic toys for infants and toddlers that are labeled "phthalate-free" or "PVC-free." For more information on safe toys, check out http://www.healthystuff.org/departments/toys/ .

2) Do not microwave food in any type of plastic: a plastic container (even those labeled "microwave safe"); food covered by plastic wrap; or in a plastic bag.

Microwaving plastics causes chemicals in the plastics to leach out and contaminate foods and beverages. Choose glass or ceramic food and beverage containers instead of plastic when using the microwave. Use a paper towel instead of plastic wrap to cover food in the microwave.

3) Choose bottles and sippy cups that are not made out of hard, clear, polycarbonate plastic. These bottles and sippy cups are likely made out of bisphenol A. Instead, opt for milky, opaque, non-see through, glass bottles or bottles labeled "BPA Free." Encourage parents to do the same.

4) Avoid plastics with recycling code #3, #6, and #7.

Look at the recycling symbol (if available) on products when purchasing plastic products. Remember "Seven, six and three are not for me!" Use glass containers or plastic containers marked with recycling codes other than #3, #6, or #7 for food storage.

5) When mixing formula, heat the water before mixing. When warming breast milk, use a glass bottle.

6) Use PVC-free plastic wrap (buy plastic wrap and bags made with polyethylene).

7) Eat fresh produce. Minimize the use of canned foods and canned drinks as many are lined with BPA.

Until industry reformulates the lacquer lining of metal cans (as is being done in Japan), choose fresh or frozen foods or glass containers or bottles. One small study found that people who avoided storing and heating foods in plastics and avoided processed foods greatly lowered their exposure to BPA and phthalates in just three days.[62]

8) Discard all plastic food containers with scratches, especially baby bottles, sippy cups and infant feeding plates and cups.

9) Purchase fragrance-free and phthalate-free beauty products.

10) Ask your dentist for BPA-free sealants and composite fillings.

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[62] Rudel RA, Gray JM, Engel CL, Rawsthorne TW, Dodson RE, Ackerman JM, Rizzo J, Nudelman JL, Brody JG. Food Packaging and Bisphenol A and Bis(2-Ethyhexyl) Phthalate Exposure: Findings from a Dietary Intervention. *Environ Health Perspect*. 2011 July 1; 119(7): 914–920. Published online 2011 March 30.

More Information About Reducing Exposure to Phthalates

Products containing phthalates are ubiquitous in our society, but child care providers can reduce children's exposure to phthalates by avoiding PVC and purchasing products from companies that have eliminated phthalates. The FDA has banned some phthalates from some children's toys and products. However, phthalates are still present in a range of other products. When possible, providers should choose metal, glass, ceramic, wooden, or other natural non-PVC products.

Encourage child care providers to choose phthalate-free toys. Look for toys made from polypropylene or polyethylene or silicone or avoid plastic toys altogether.

Finally, child care providers should purchase fragrance-free and phthalate-free beauty products, and avoid nail polish, perfumes, colognes, and other scented products. Many scented products simply list "fragrance" as an ingredient, which often incorporates a number of different chemicals including phthalates. They should avoid these products, or do additional research. For more information on phthalate-free cosmetics and personal care products, visit the National Campaign for Safe Cosmetics (www.safecosmetics.org) and the Environmental Working Group (www.ewg.org), which maintains a database on cosmetic products, their ingredients, and toxicity.

More Information About Reducing Exposure to BPA

Bisphenol-A has been used as an ingredient in consumer products for a long time and is difficult to avoid. In some cases, alternatives are available.[63] In July 2012, the FDA banned BPA from baby bottles. Here is additional information about reducing BPA exposure:

Avoid reusable polycarbonate plastic water and baby bottles. As a general rule, avoid baby bottles labeled #7, which tend to be hard and clear, unless they are labeled "BPA-free" or something similar, and polycarbonate reusable water bottles. Leaching of bisphenol A can occur into formula, expressed breast milk, water and other liquids placed in these products. Choose polyethylene or metal bottles instead. Use glass baby bottles instead of plastic.

Avoid polycarbonate plastic food containers and tableware. These may be labeled "PC" underneath a plastic code #7 in the recycling triangle on the bottom of the container. (The #7 means "other", so you need to see the "PC" to confirm that the plastic is polycarbonate.)

You can find additional guidance on choosing plastic products, including baby bottles, food containers, and plastic utensils, at:
http://www.oeconline.org/resources/publications/kitsandtipsarchive/SmartPlastics

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[63] Moller, L., Helweg, C., Pratt, C.H., Worup, A., & Skak, C. (2002). Evaluation of Alternatives for Compounds under Risk Assessment in the EU, Bisphenol-A. Denmark: Danish Environmental Protection Agency.

Arsenic: Treated Wood & Water: Why and Where

Why We Worry about Arsenic in Treated Playground Equipment and Water

Arsenic is a toxic chemical element that occurs naturally in rock and soil. It is colorless, tasteless and odorless, and when it enters the body through ingestion or inhalation, it is readily absorbed and undetectable. The health effects related to long term, repeated arsenic exposure include irritation of the stomach and intestines, birth or developmental effects, skin cancer, lung cancer, bladder cancer, infertility and miscarriages.

Chromated Copper Arsenate (CCA): The wood in pre-2005 playground sets, picnic tables and decks can contain potentially hazardous levels of arsenic due to the use of Chromated Copper Arsenate (CCA) as a wood preservative and insecticide. This wood, designed for outdoor use, was treated to preserve the wood and to kill termites, thus protecting from decay. The EPA-registered CCA solution which is used to treat wood contains up to 30% arsenic. Due to health concerns, CCA was phased out for residential uses in 2004-2005.

Children who regularly spend time on treated structures built prior to 2005 could potentially be exposed to arsenic (e.g., by putting their hands in their mouths after playing on treated structures). A study published by the Environmental Working Group indicated that "An average five-year-old playing less than two weeks on a CCA-treated playset would exceed the lifetime cancer risk considered acceptable under federal pesticide law… [and] the lifetime increased risk of cancer for children regularly touching pressure-treated wood was as high as 1 in 1,000, a thousand times the risk deemed acceptable for pesticides under federal law."[64]

Of additional concern is the fact that CCA can leach into the ground and contaminate the soil around the treated wood.

Arsenic in ground and surface water is the result of naturally-occurring minerals as well as from agricultural and industrial activities.

Exposure from arsenic in water is from ingestion of drinking water containing arsenic, not from showering, bathing or washing with contaminated water. Federal standards set the maximum level of arsenic permitted in drinking water at 10 parts per billion (ppb). Not all water systems are in compliance with this standard. Private wells, which are unregulated, can be a potential source of drinking water with dangerously high levels of arsenic.

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[64] Environmental Working Group. (2001). Poisoned Playgrounds: Arsenic in Pressure-Treated Wood. Retrieved August 26, 2008, from http://www.ewg.org/reports/poisonedplaygrounds.

Arsenic: Treated Wood & Water: Recommendations

What to Recommend to Child Care Providers:

1) Avoid using or having playground equipment made out of pre-2005 pressure-treated wood.

Choose naturally pest-resistant wood, like redwood or cedar; alternative pressure treatments; or plastic playground equipment. Visit the Healthy Building Network's website for a list of alternative products (www.healthybuilding.net/arsenic/hbn_wood_factsheet.html).

2) Have kids wash their hands after playing on older wood equipment.

Make sure children wash their hands with mild soap and water, and do not allow them to put their hands in their mouths after handling CCA-treated wood on playground equipment, picnic tables, benches, fences, and decks. Cover picnic tables with a tablecloth, and avoid contact of food and drink with CCA-treated wood. Do not store toys under CCA-treated wood decks.

3) If you have pressure-treated wood equipment, apply 2 coats of waterproof stain or sealant on CCA-treated wood at least once a year.

4) Handle it properly

If you have pre-2005 pressure treated wood, know how to handle and dispose of it properly:

1. Test for it*
2. Clean it properly: Do not power wash it or use harsh cleaning products, such as bleach or acidic cleansers. Use a mild soap and water solution and disposable cleaning supplies.
3. Replace it: Consider replacing wood that is frequently touched, like handrails on decks. If you decide to replace CCA-treated wood structures with alternative materials, see a list of these materials at www.healthybuilding.net/arsenic/.
4. Do not burn CCA-treated wood. Also, sanding or cutting CCA-treated wood creates toxic dust.
5. Dispose of it properly: take CCA-treated wood to your local hazardous waste site in order to prevent arsenic from leaching into our soil and waterways. Visit www.earth911.com; enter your item and zip code and hazardous waste locations will be provided.

5) Test well water for it, and filter if necessary.

If your water comes from a private well, call the U.S. Environmental Protection Agency's Safe Drinking Water hotline (800-426-4791) to find certified water-testing labs in your area.

Remove arsenic by treating your private well water to reduce the arsenic concentration to below 10 ppb. Contact your state or local public health department to request advice on the best treatment methodology for achieving this goal. Make sure the filtration system or unit has been certified by one of the 3 certifiers listed in "Resources." Follow the manufacturer's instructions on how to install, operate and maintain the water treatment unit to ensure levels of arsenic in your drinking water are safe.

*For more information, see the EHCC fact sheet on arsenic and the EHCC FAQ 'How can I reduce exposure to arsenic in CCA?' (www.cehn.org/ehcc/FAQs).

Radon: Why and Where

Why We Worry about Radon:

Radon is the leading cause of lung cancer among non-smokers, claiming approximately 20,000 lives annually. The U.S. Environmental Protection Agency (EPA) lists indoor radon as one of the most serious environmental health problems in the U.S.

Radon is a radioactive gas that you can't see, smell, or taste. It is produced by the natural breakdown of uranium in soil and water. Uranium is found in soils worldwide, with some areas having higher concentrations than others. According to the EPA, the average indoor radon level in the United States is about 1.3 picocuries per liter (pCi/L). (A picocurie is a measure of radioactivity.)

Any building can have a radon problem. Radon gets into a building by moving up through the ground and then through cracks and holes in the foundation. Buildings can trap radon, which can lead to harmful concentrations indoors. It is imperative that each child care facility test their building for radon to be sure children and staff are safe.

Radon and Children

- Children have smaller lungs and therefore higher breathing rates.
- Children spend up to 70% more time indoors than adults on average.
- Radon-related lung cancer is correlated with a person's total lifelong exposure.
- According to the EPA, a nationwide survey estimates that 1 in 5 schools has at least one schoolroom with a radon level that exceeds the recommended level of 4 picocuries per liter (pCi/L) or higher.

Radon: Recommendations

What to Recommend to Child Care Providers:

1) Test your child care facility (and home) every two years or following a significant renovation.

The EPA and the U.S. Surgeon General recommend that all homes be tested.

How to Test for Radon:

Common test kits are available at larger home improvement stores. They typically cost about $15. Test kits also can be ordered from online retailers, as well as from the National Radon Program Services. Visit www.sosradon.org or call 1-800-SOS-RADON.

There are different kinds of test kits:

- charcoal canisters are used for short periods (2-7 days)
- an "E-perm" can be used for short or long-term periods (2 days to 12 months)
- alpha track detectors measure radon over 3 months to one year
- charcoal liquid scintillation devices measure radon for short periods (2-7 days).

When using a radon test kit:

- Follow the directions of the kits closely since the length of time the kits can remain open varies.
- Place the test kit in the basement or lowest-lived-in level of a home, school, or child care.
- Ensure the test kit is placed midlevel, not too close to ground or ceiling (place on top of a book shelf or dresser).
- Be careful not to disturb the test kit until testing is finished.
- After the specified amount of time, mail the kit to the manufacturer to be analyzed.
- Since radon levels vary, a long-term test (90 or more days) provides the best measure of year-round radon levels. If levels need to be determined quickly, short-term tests (usually between 2 and 7 days) can be conducted. It is recommended that two short-term tests be done either at the same time or one after another to obtain an average.

2) If your average indoor radon level measures at or above 4.0 pCi/L, **take action to reduce it.**

Contact your state radon office www.epa.gov/radon/whereyoulive.html for assistance.

Fixing buildings to reduce radon exposure may entail sealing cracks in the foundation, ventilating the area, or depressurizing the soil.

Recycling and Garbage Storage: Why and Where

Why We Care about Recycling and Garbage Storage:

Americans generate trash at the astonishing rate of four pounds per day per person, which translate to 600,000 tons per day or 210 million tons per year. Electronic waste or "e-waste" (i.e., computers, televisions, VCRs, stereos, copiers, fax machines) alone is estimated to be 20-25 million tons per year globally. E-waste can contain many toxic elements and agents. While the most important way to save valuable resources is to use as few as possible in the first place, recycling and using recycled products is the next best step.

Recycling

There are many benefits to recycling. Recycling:

1) Conserves natural resources like trees, metal, oil, and minerals for future generations.

2) Lessens habitat destruction as a result of deforestation. Recycling reduces need for raw materials and helps preserve our forests.

3) Saves energy. A lot of energy is needed to make products from raw materials; recycling requires much less energy.

4) Prevents emissions of greenhouse gases and other pollutants, leading to cleaner air, cleaner water and a more stable climate.

5) Reduces the need for landfills and incinerators.

In addition, children learn at a young age to use resources wisely as they watch adults recycle.

Recycling and Garbage Storage: Recommendations

What to Recommend to Child Care Providers:

1) Recycle all paper/cardboard, glass, aluminum and plastic bottles.

Child care providers should check with their local garbage collection service to see what materials are collected and recycled. Encourage providers to find waste sites where they can drop off recyclables themselves. An excellent resource is Earth 911; visit www.earth911.org to find agencies that take all kinds of recyclables. Find additional tips for recycling at Global Stewards (www.globalstewards.org/ecotips.htm).

Remind providers to dispose of hazardous waste responsibly. Everyday items containing mercury, such as mercury thermometers and thermostats, batteries, and fluorescent and compact fluorescent light bulbs, should never go in the trash.

2) Keep garbage covered at all times to avoid attracting pests and to minimize odors.

Tips on Garbage Storage*

Keep garbage areas clean. Follow these suggestions to avoid pests and to minimize odors.

- Take the trash out regularly; don't let trash pile up!
- Clean empty trash cans and remove trash from inside the building at the end of the day.
- Make sure indoor garbage containers have tight-fitting lids and plastic linings.
- Keep outdoor garbage containers, including composting bins, covered tightly. Ensure the lids fit snugly to form a seal.
- Ensure all garbage areas are inaccessible to children.
- Keep garbage storage areas (large dumpsters/cans collected by trucks) at least 50 feet away from entranceways of the child care facility or play yard. These containers should be on pest-proof pavement such as concrete that can be cleaned regularly. Sticky spilled liquids attract pests.
- Promptly recycle all appropriate materials (glass, cardboard, plastic, paper and aluminum). Be sure to rinse and clean recyclables.

* Adapted from Integrated Pest Management: A Curriculum for Early Care and Education Programs (link at www.cehn.org/ehcc/resources).

21 Ways to Reduce, Reuse, & Recycle:

1. Recycle glass, paper, cardboard, aluminum and plastic.
2. Institute a recycling program that the children participate in and are responsible for. Children are never too young to learn to recycle.

3. Compost food scraps. Compost food (vegetable and fruit peels, egg shells, coffee grounds, tea leaves; do not compost meat). Start a worm bin or other composting system. Check with your health consultant as to how and where this may be done according to your state child care regulations.
4. Avoid using disposable plates, cups, and silverware.
5. Buy/sell used items (always check with the Consumer Product Safety Commission (CPSC) website for product recalls on used toys and equipment). Be especially vigilant about looking for lead and choking hazards.
6. Substitute rechargeable batteries for throw-away batteries.
7. Use reusable bags for shopping.
8. Reduce junk mail by canceling duplicates and asking to be removed from unwanted mailing lists.
9. Donate used books and magazines to your local library, school, hospital or nursing home.
10. Donate unwanted toys and clothing to your local charity or sell them at a local children's consignment shop.
11. Replace paper napkins and towels with cloth napkins and towels. Cloth hand towels and towels for cleaning may be used for "single use" only to prevent the spread of communicable disease.
12. Purchase toilet paper made from recycled content.
13. Choose recycled office paper for printing.
14. Buy in bulk; use your own reusable containers.
15. Reuse food jars for storage. Be sure to wash and sanitize reusable food containers before using for food storage again.
16. Donate old computers to schools or non profits.
17. Pick up books, CDs, and DVDs from your local library or used bookstore.
18. Properly recycle all electronic products.
19. Support 'Manufacturer Takeback Programs' – where manufacturers or retailers accept used electronic products back from their customers to recycle, reuse, or dispose of the product properly.
20. Return unused drugs to a pharmacy; do not flush remaining portions down the toilet.
21. Recycle items containing mercury (batteries, thermometers, thermostats and fluorescent light bulbs) by taking them to a hazardous waste facility. Visit www.earth911.org to find a location near you.

The Eco-Healthy Child Care® Program

Eco-Healthy Child Care® (EHCC) is an award-winning, science-based national program that seeks to improve the environmental health of children by partnering with child care professionals to eliminate or reduce environmental health hazards found in child care facilities. Most recently, EHCC received the first-ever Innovation Award from the National Environmental Health Association in 2013.

EHCC creates healthier environments in and around child care facilities, and in doing so, creates healthier kids. Specific objectives include:

- Recognizing child care providers who are following specified environmentally-healthy best practices through an endorsement program.
- Educating child care providers on how to provide environmentally-healthy settings and services.
- Assisting child care providers in the implementation of changes in practices and purchasing.
- Promoting endorsed facilities to parents via the EHCC website (www.cehn.org/ehcc), earned media and paid advertisements.

EHCC is guided by the 30+ national and state child care and environmental health organizations who serve on the EHCC National Advisory Committee (www.cehn.org/ehcc/nac) and the experts who volunteer on the EHCC Science Task Force. CEHN is grateful to these volunteers for their unceasing efforts to assure that EHCC remains science-based, as well as practical.

As you've seen throughout this training manual, this program emphasizes low to no cost solutions to common environmental health hazards and empowers providers to maximize their children's potential. Providers learn that making simple changes can benefit the health and well-being of all children in their care.

That's why more than 2,200 child care providers have already participated in the EHCC endorsement program described below, thus providing healthier environments for thousands of children.

Endorsement

Child care providers apply to become endorsed by filling out the 30-item checklist (also available in Spanish). Child care providers who are interested in receiving a checklist should visit the EHCC Website, www.cehn.org/ehcc, or the EHCC microsite at www.eco-healthychildcare.org. The sites also provide additional information and resources as well as helpful tips for parents.

Facilities that meet EHCC requirements, which include complying with 24 of the 30 items on the checklist, receive a certificate and poster announcing their two-year Eco-

Healthy endorsement. Once endorsed, each facility's name, city and state are listed on the EHCC Website. The modest endorsement fee is based on the licensed capacity of the child care provider. (NOTE to trainers: this fee scale will be phased in in late 2014/2015; until then, the fee for all providers is $25).

To ensure that the Eco-Healthy Child Care® endorsement is meaningful and valuable to endorsed facilities, EHCC staff also conduct a limited number of random on-site assessments of endorsed facilities every year. The assessments are free and a selected facility would receive at least 48 hours prior notice. (To find out more about these assessments, visit http://www.cehn.org/onsite).

Thousands of parents visit our Website each year looking for endorsed Eco-Healthy Child Care® facilities. Parents are increasingly seeking child care facilities that provide a safe and healthy environment.

Benefits of Eco-Healthy Child Care® Endorsement

- Providers reduce the number of toxicants in their child care facility and, as a result, provide a healthier, safer and more environmentally friendly setting for children. In this way, they help prevent illnesses, diseases and disabilities linked to chemicals of concern.
- Providers are able to promote the extra health and safety steps they are taking to the families of the children they care for. This helps providers respond to increasing demand from parents looking for facilities that are providing a low-toxic environment.
- Eco-Healthy Child Care® endorsed facilities receive free marketing through an online directory and media stories.
- Endorsed facilities receive materials and educational resources to promote their eco-healthy practices to parents and other community members.
- Providers receive regular tips on how to continue improving the environmental health of their child care program. These tips can be shared with parents for how to be eco-healthy at home.

EHCC resources include fact sheets on the 11 areas covered by the Eco-Healthy checklist, fact sheets on 5 additional topics (Asbestos, The Built Environment, Healthier Celebrations, Noise Pollution, Nutrition & Physical Exercise), FAQs, and links to many additional resources. All of these resources are free and accessible on the Web.

EHCC is partnering with 30+ national and state child care and environmental health organizations to guide the EHCC program as it expands nationally through its National Advisory Committee (www.cehn.org/ehcc/nac).

The development, testing, evaluation and creation of this national program was supported, in part, by the U.S. Centers for Disease Control and Prevention, the U.S. Environmental Protection Agency, the U.S. Agency for Toxic Substances and Disease

Registry, the Cedar Tree Foundation, The Kresge Foundation, the W.K. Kellogg Foundation, The San Francisco Foundation, and California Wellness Foundation.

EHCC is a merger of the two premier U.S. programs that offered comprehensive environmental-health standards for child-care facilities. The Oregon Environmental Council (OEC) started Eco-Healthy Child Care® as an Oregon-based initiative in 2005. The Washington, DC-based Children's Environmental Health Network (CEHN) created the Healthy Environments for Child Care Facilities and Preschools program (HECCP) in 2004. In October 2010, EHCC became a program of CEHN.

For current information and resources about the EHCC program, please regularly check-in at www.cehn.org/ehcc.

For more information, please contact:

Eco-Healthy Child Care® Main Office:
202-543-4033 ext. 13
www.cehn.org/ehcc

Hester Paul, M.S.
EHCC National Director
503-646-8390
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EHCC East Coast staff (and CEHN Director of Training & Policy)
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Appendix A: Suggested Adult Learning Activities

Ideas for General Discussion and Interaction:

EHCC's 11 training topics provide many opportunities to ask participants to volunteer information in response to questions offered by the Instructor: "'why are children not just 'little adults,'" "where might you find [mercury, pesticides] at a child care facility?" "What are potential health impacts from [plastics, radon, air pollutants]?," etc.

Asking these questions leads to a sharing of information and experiences and further engagement of the participants and is a more effective learning method than lecture alone by the instructor.

Using EHCC Fact Sheets:

For a work shop or training session that is going to cover a variety of EHCC training topics: On a white board or poster board, the Instructor creates a large table with one line for each of the training topics to be covered, with 3 columns following, titled: "Where," "Why," and "What." For example, if a workshop is going to cover Air Quality, Pesticides, and Plastics, early in the session the Instructor presents a table like this:

Topic	Where	Why	What
Air Quality			
Pesticides			
Plastics			

The Instructor asks the participants a question along the lines of: "Who wants to know where we find air quality issues in a child care facility?" and then writes the name of the volunteer in Air Quality's 'where' column, then does the same for the other topics. The "why" question is "Who wants to know why we're concerned about Air Quality in the child care setting?" and a similar process is followed. The Instructor then asks "Who wants to know what we can do about Air Quality concerns in the child care facility?", etc.

Once all spaces are filled, the Instructor hands the relevant EHCC fact sheet to each of the 3 volunteers for each topic.*

The Instructor asks the volunteers to take a few minutes to review the fact sheets and then report to the full group the answer to their specific "Where," "Why," or "What" question.

*At this time, the Instructor could also distribute these fact sheets, or fact sheets on other topics not covered, to the other participants. If the Instructor distributed the same fact sheets to all, after having the volunteers report back, the rest of the participants can be asked if they had more to add -- did they see something else on the fact sheet that they felt everyone should know? Or was there something that really

surprised them? Or was there a best practice that they were already doing or will now try to do?

If the Instructor distributed fact sheets on other topics, after the original topics were discussed, a few minutes could be spent asking the rest of the participants if there was something they felt everyone should know? Or was there something that really surprised them? Or was there a best practice that they were already doing or will now try to do? That they wanted to share -- quickly -- with the group.

Another approach is for the instructor to hand out copies of the fact sheets (either randomly, or by asking questions such as those suggested above ("Does anyone want to know where to find arsenic at a facility?,") and then giving the individual the relevant fact sheet.) The participants are then given 5-10 minutes to review the fact sheet(s) (in a small group discussion or individually). At the end, participants are asked to share with the class one thing -- "something new that they learned," "the most important thing they read," "something that they feel their peers should know," etc., that was on the fact sheet. This information can be used by the instructor to further learning, such as by asking, "how many of you have encountered this?" or "what would you do if you encountered this?" or "where would you go for additional assistance?" The instructor can ask for a comment from every participant, or can ask just for comments from those who wish to share.

Household Chemicals Activity:

A. Have participants bring cleaning products used in their facility. Have them read the labels and share with the class whether or not ingredients were listed, what ingredients they saw that were of concern, or that allayed any concerns about health, and why. Ask participants to discuss terms such as "natural," "green," "biodegradable." Did any of the products include a "green" certification seal, such as Eco-logo?

B. Have participants bring new spray bottles; provide the ingredients, measuring utensils, labels (for bottles) and copies of instructions for participants to take with them. Participants will mix their own cleaning products. Discuss the relative costs of buying commercial/harsher cleaners versus making own cleaners.

Recipes (not for cleaning bodily fluids):

All Purpose Cleaner

¼ cup white vinegar
2tsp. baking soda
3 ½ cups hot water
¼ cup liquid dish soap

Mix ingredients in a 32 oz. spray bottle, adding dish soap last. Wash surfaces.

Window Cleaner
¼ cup white vinegar
½ tsp. liquid soap or detergent
2 cups water

Combine the ingredients.

Wood Cleaner
¼ cup white vinegar
¼ cup water
½ tsp. liquid soap
A few drops of olive oil

Combine the ingredients.

Plastics Activity:

The instructor can bring plastic bottles and products used by children and/or ask participants in advance to bring one or two such products. Distribute the plastics fact sheet. For each item, have participants identify and share with the class the type of plastic, and discuss whether or not it is a product to purchase/use in the early childhood setting, and why or why not.

One approach is for the Instructor to put their 'test' items in a 'grab bag' and walk around the class, having different participants pull out items.

Mercury Activity:

Bring, or have participants bring, the items needed to assemble mercury spill kits, including instructions, and something to hold each kit, such as a large sealable plastic bag. Have participants make up a spill kit for their facility, either for a broken fluorescent bulb for or a broken thermometer.

(See EPA documents with information and instructions and EHCC materials (template for 'do not vacuum' labels, the list of materials to be included in each kind of clean up kit, etc.) that are available for you to access .) These lists are to be checked off as the kit is being assembled and inserted in the kit; any materials the instructor is unable to provide are to be inserted by the participant after the session.

Art Supplies Activity:

Have participants bring materials from their art supply cabinet/closet -- at least one item that is labeled as a product to be used by children, and at least one item that is not sold as children's craft products but are used for crafts (eg, shaving cream, starch, plates). (An additional option is to have the participants bring the 'oldest' art supply

material they find.) Have participants look for the “AP” label and read the ingredients. Discuss if any products are not appropriate for children. (For example, some shaving creams, in addition to being aerosols and being labeled ‘keep out of reach of children,’ list harmful substances in their ingredients, such as propane, or fragrances.)

Air Quality, Plastics, or Household Chemicals Activity:

The Instructor brings a few examples of products with ‘fragrance’ in the ingredient list. Distribute these and ask participants review the label and share. Have participants go through their purses, briefcases and pockets for other examples of personal care items and review the labels on those items. Discuss how commonly the word is used and found and the extent of information provided or not provided on such labels.