A Guide for School Administrators and Maintenance Personnel

Proper Maintenance, Removal, and Disposal of PCB-Containing Fluorescent Light Ballasts

Introduction

The purpose of this website is to provide information to school administrators and maintenance personnel on the risks posed by polychlorinated biphenyls (PCBs) in light ballasts, how to properly handle and dispose of these items, and how to properly retrofit the lighting fixtures in your school to remove potential PCB hazards. The U.S. Environmental Protection Agency (EPA) recommends removal of all pre-1979 fluorescent light ballasts in schools to prevent accidental exposure of students, teachers, and other school personnel to PCBs through fires or leaks. Removal of PCB-containing light fixtures, when done in conjunction with lighting upgrades, is an investment that pays off with long-term benefits to students, school staff, the community, and the environment.

An intact ballast from a typical pre-1979 fluorescent light fixture.

Why Should I be Concerned about PCBs in My School?

Many schools in the U.S. have light ballasts containing PCBs. The PCBs are contained within the light ballasts' capacitors and in the ballasts' potting material, which is used for insulation. Until the late 1970s, PCBs were commonly used as insulators in electrical equipment because they have high tolerance to heat, do not burn easily, and are non-explosive.

This ballast sparked a fire at a Southern California school in 1999.

The EPA banned the manufacture of PCBs to the U.S. in 1979 because of their toxic effects. EPA also banned the processing or use of PCBs, except in totally enclosed equipment. However, a large number of fluorescent light ballasts were installed prior to these bans may contain PCBs and may still be in use in U.S. schools.

Intact, operational ballasts where PCBs remain in the ballasts and potting material, may not pose a health risk or environmental hazard. However, as they age, the ballasts degrade, increasing the risk of leaks or even fires, which would pose a health and environmental hazard. The hazard can be worsened by mishandling the incident. A ballast that has been damaged or mishandled in such an incident can expose students and school personnel to PCBs.

What Are the Health Effects of PCBs?
The most likely way that people may become exposed to PCBs from light ballasts is through breathing contaminated air or touching PCB oil or PCB-contaminated materials after a ballast leak or fire. The EPA has classified all PCBs as probable human carcinogens (cancer-causing substances). Evidence suggests a possible association between PCB exposure and liver cancer. PCBs also have significant human health effects other than cancer. Learn more about the health effects of PCBs at http://www.epa.gov/wastes/hazard/tsd/pcbs/pubs/effects.htm.

Long-term effects can occur at any time after exposure and may last for months or years. They include: effects to the nervous and reproductive system, immune system suppression; hormone disruption; respiratory tract symptoms; gastrointestinal and liver effects. Short-term effects include irritation of the skin and eyes such as chloracne and skin rashes. Infants of mothers exposed to PCBs can experience developmental effects impairing movement, visual recognition memory, and short term memory. PCBs may also be passed onto infants through their pregnant or nursing mothers.

Do My Fluorescent Light Ballasts Contain PCBs?
- Ballasts manufactured through 1979 may contain PCBs.
- Ballasts manufactured between 1979 and 1998 that do not contain PCBs are labeled "**No PCBs**" If a ballast is not labeled "**No PCBs**", it is best to *assume* it contains PCBs.

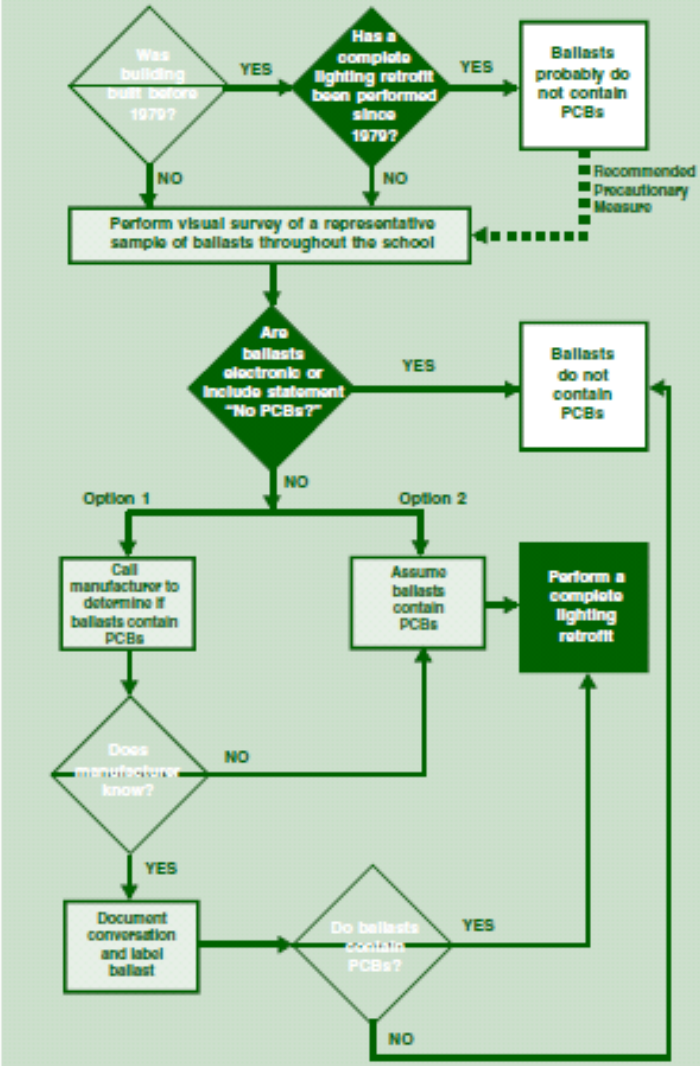
If the ballast does contain PCBs, they are located inside the small capacitor or in the surrounding potting material. There would be approximately 1 to 1½ ounces of PCBs in the capacitor itself and lower levels in the potting compound, a black, tar-like substance that encapsulates the internal electrical components. Leaks of PCBs from ballasts typically take two forms: a clear to yellow, oily liquid, the PCB oil itself, or the liquefied potting material. If the ballast fails or overheats, the capacitor may break open and both its oil and the potting material may be released from the fixture. The capacitor does not always leak when the ballast fails, but measures should be taken to limit or avoid personal exposure in all cases.

Should the Light Ballasts in My School be Removed?
Your school was built before 1979.
Your school has not had a complete lighting retrofit since 1979.

If these statements apply to your school, then the answer is yes, your light ballasts probably contain PCBs and should be removed. PCB-free light ballasts manufactured between 1979 and 1998 were required to mark the ballast "No PCBs". Any building built before that time is likely to have PCB-containing ballasts if it has not undergone a complete lighting retrofit (all light fixtures in the school were upgraded) after 1979. Also, some PCB-containing light ballasts that were manufactured before the 1979 ban were used in some fluorescent light fixtures installed after 1979. Thus, even some schools built after 1979 that have not undergone a complete lighting retrofit could have PCB-containing ballasts in their fluorescent light fixtures as well. To determine whether your school has PCB-containing ballasts, conduct a visual inspection of a representative number of light fixtures (not just the bulbs).

Figure 1 can help you determine whether there may be PCB-containing ballasts in your school. The ballasts are contained within the light fixture (see photos on page 1). Because you may need to remove the fixtures to view the ballasts, select a representative number of ballasts throughout the school to inspect first. Inspection may also be accomplished by removing a portion of the fixture, such as the metal panel covering the ballast. Expand your inspection if you find PCB ballasts. To prevent exposure if leaking ballasts are discovered, wear protective clothing, including chemically resistant gloves, boots, and disposable overalls. Make sure the survey is performed in a well-ventilated area, or provide supplemental ventilation or respiratory protection if necessary to reduce the potential for breathing in fumes. Be sure to keep a record of the areas (e.g., classroom 101) and location of the lights surveyed.

Figure 1: How to Identify PCB-containing Ballasts



If the ballasts do not have the statement "No PCBs," you have two options:
1. Assume that the ballasts contain PCBs, OR
2. Contact the manufacturer to determine whether the ballasts contain PCBs. If the manufacturer is not sure whether the ballasts contain PCBs, assume that they do.

What Should I Do if My Fluorescent Light Ballasts Contain PCBs?

To eliminate the potential hazard posed by PCB-containing light ballasts in the most efficient manner, EPA recommends removing PCB-containing ballasts as part of a complete lighting retrofit. A complete lighting retrofit includes removing old fluorescent tubes as well as ballasts and replacing the entire lighting fixture with newer, more energy efficient fixtures. A complete lighting retrofit not only eliminates the hazard, it also increases energy efficiency. (See the Energy Star website at http://www.energystar.gov/index.cfm?c=business.EPA_BUM_CH6_Lighting for more detailed information.) It's an investment that pays off with long-lasting returns to your students, your community, and the environment. Even if the ballasts in your school are labeled "No PCBs," a lighting retrofit is recommended because of energy saving benefits.

Lighting retrofits to eliminate PCB-containing light ballasts should be considered as a component of any remodeling efforts.

Is It Really Necessary to Retrofit the PCB-Containing Fluorescent Light Ballasts in My School?

Depending on the number of operating hours, the typical life expectancy of a fluorescent light ballast is between 6 and 12 years. The failure rate prior to the end of the useful life of ballasts is about 10%. After

this typical life expectancy, ballast failure rates increase significantly. As PCB-containing light ballasts age, the chance that they will leak or catch fire increases. This risk is compounded by the fact that there is virtually no way to detect whether ballasts are leaking or about to catch fire by simply looking at a light fixture. For example, one school found this out the hard way when a light ballast leaked PCB-containing oil over books, desks, and other school equipment. After EPA became aware of this incident, they examined other lighting fixtures in the school and found more leaking ballasts exposing students and staff to PCBs. During the inspection, EPA also learned that the school district was in the process of remodeling and upgrading light fixtures district wide.

Unaware that the old fixtures contained PCBs, the district had been taking them to another local school to be dismantled. The EPA discovered that the old fixtures were not being handled properly, and that the leaking PCB ballasts were actually being stored on the school's playground. In addition, the workers handling the leaking ballasts were not trained in the proper handling of PCB waste materials. Lack of awareness of the problem and mishandling of the response needlessly exposed students, staff, and maintenance workers to PCBs.

An old ballast that exploded unexpectedly.

Although a fluorescent lighting fixture retrofit might seem like a low educational priority in some schools when compared with other priorities, school administrators should take into account this one school's example and what they might unexpectedly have to address if a ballast leaks or catches fire.

What Are the Risks and Potential Costs of Not Replacing the PCB-Containing Fluorescent Light Ballasts in My School?

A ballast leak or fire could happen at any time, without warning. If it happens in a busy classroom in the middle of the day, it could cause health impacts for many of its students and staff. Even a small, isolated leak may pose health issues for the staff or students who are exposed.

In such a case the affected area, classroom, hallway, cafeteria, or auditorium would be off-limits during cleanup and decontamination. It might take several weeks before the area could be declared "clean" for use again. The school would need to find appropriate temporary quarters for students and staff and many school programs and functions might be disrupted.

Significant costs could be incurred to cover, at a minimum:

- Hiring properly trained and qualified cleanup personnel;
- Cleanup and decontamination of contaminated equipment and surfaces;
- Analytical testing of contaminated equipment and surfaces for PCBs;
- Compliance with environmental regulations for proper storage and disposal of contaminated equipment and cleanup materials;
- Retesting of equipment and surfaces to ensure that they are free of PCBs and other contaminants; and
- Replacement of leaking or burned fixtures and any other contaminated materials

Postponing a lighting retrofit and betting on the structural integrity of old ballasts may result in health and educational impacts for your students and staff and serious cost impacts for your budget.

What Are the Special Procedures for Cleanup and Decontamination after a Ballast Leak or Fire?
Detailed cleanup and decontamination procedures for a leak, including management and disposal of wastes from PCB-containing ballast, are outlined on EPA's website at www.epa.gov/pcb. Due to the hazards associated with PCBs, an experienced contractor should be retained. The procedures for cleaning up and decontaminating after a fire are essentially the same as after a leak. However, after a fire, there may be other hazards or cleanup requirements not addressed in this document.

Federal law requires disposal of leaking PCB-containing ballasts and any PCB-contaminated materials at an EPA-approved facility. For a list of approved facilities, please call the TSCA information hotline at (202) 554-1404, or refer to the PCB web site at www.epa.gov/pcb.

How Do I Retrofit the PCB-Containing Fluorescent Light Ballasts in My School?
An experienced contractor should perform the lighting retrofit. Suggested responsibilities include:

- Disconnecting all power to and de-energizing all electrical equipment to be retrofitted under the supervision of a licensed electrician.
- Once you have determined you likely have PCB-containing light ballasts, inspecting all fluorescent light fixtures to determine if each individual ballast should be assumed to contain PCBs or is potentially leaking.
- Disconnecting and removing all ballasts, incidental PCB-contaminated items, and fluorescent tubes from the lighting fixture housings and compartments.
- Providing the appropriate containers and packing materials for packaging and storing the four possible types of waste streams:
    1. Intact, non-leaking, PCB-containing ballasts;
    2. Leaking PCB-containing ballasts and cleanup wastes generated by handling and decontaminating areas where leaking ballasts were discovered;
    3. Ballasts that contain no PCBs; and
    4. Fluorescent light bulbs.
- Maintaining a record for each area (e.g., classroom, hallway) where lighting fixtures are removed including how many leaking vs. non-leaking PCB-containing ballasts were removed from each area.
- Maintaining a record for each drum used to store PCB-containing ballasts including:
    1. The number of ballasts in the drum;
    2. The condition of the ballasts - leaking or non-leaking;
    3. The date the first ballasts were placed in the drum;
    4. The destination of the ballasts;
    5. The name of the contractor packing the drum; and
    6. The name and address of the waste generator (e.g., the school's name).
- Packaging and labeling the drums according to federal, state, and local regulations. Storing the drums according to federal, state, and local regulations until a transporter currently licensed for transportation of PCB waste removes them to the appropriate disposal facility for each type of waste stream.
- Preparing manifests and other related documentation for the removal, transportation, storage, and disposal of PCB wastes and ensuring submittal to appropriate authorities.
- Handling any federal, state, and local recordkeeping or reporting requirements.

What Type of Waste will be Associated with a Retrofit and How Do I Handle It?

Different types of waste, both PCB and non-PCB, will be produced during a school lighting retrofit or if you are addressing leaking ballasts. Specific notification, packing, reporting, storage, transportation and disposal requirements are necessary for the four types of wastes. It is critical to check with state solid and hazardous waste agencies to ensure that wastes are handled properly. Some states have adopted stricter requirements than Federal regulations. Contact your state hazardous waste program for information on the rules that apply in your area. Get more information on disposal requirements for fluorescent light ballasts at http://www.epa.gov/epawaste/hazard/tsd/pcbs/pubs/ballastchart.pdf.

Also, in conducting a retrofit, fluorescent bulbs, many containing mercury, may be present. Like the ballasts, ensure that the bulbs themselves are managed to avoid breaking them and releasing additional contaminants into the environment. More information on fluorescent bulb disposal requirements may be obtained from your state solid and hazardous waste agencies.

Schools also should be aware that, as generators of PCB-containing ballast wastes, they are responsible under federal law for ensuring the proper disposal of PCB waste

What Are the Cost Savings Associated with a Retrofit?
Replacement of existing PCB-containing lighting fixtures with new high efficiency lighting will result in cost savings that will repay the investment in new lighting. The cost of replacing these fixtures can be recouped in 3 to 4 years by savings in cost of energy used. Detailed information on the savings that may be achieved through an investment in new lighting is available at the Energy Star website: http://www.energystar.gov/index.cfm?c=business.EPA_BUM_CH6_Lighting

The Energy Star website also provides information about funding that may be available for the replacement of old fixtures.

What if a Retrofit is not Feasible in My Current Budget?
In most states, there are several agencies with funding available to support energy efficiency projects such as lighting retrofits. There are a number of ways to obtain financial assistance for making a building more energy efficient, with some programs covering conversion to more energy efficient lighting. Additionally, many states, localities, and utility companies have programs for energy efficiency rebates, tax deductions or exemptions, and other benefits that sometimes include converting to more energy efficient lighting. You may access your state's individual programs at the Department of Energy's (DOE's) Database of State Incentives for Renewables and Efficiency (DSIRE) (http://www.dsireusa.org/summarytables/finee.cfm) In addition, both public utilities and private energy companies may offer such programs. Programs may include technical assistance, rebates, or other funding assistance to support lighting upgrade projects. Contact your local energy provider or state energy commission for more information.

Specific programs to consider for assistance include:
Energy Star Program – The U.S. Environmental Protection Agency's Energy Star Program supports schools, businesses, and organizations in installing energy-efficient lighting technologies. The program offers assistance through workshops and information services that can be accessed from the Internet. These include: Lighting Upgrade Technologies; Financing Your Upgrades; New Building Design Guidance; and Service and Product Providers. These materials are available at www.energystar.gov. EPA's Office of Pollution Prevention and Toxics also offers lists of approved storage and disposal facilities through its web page at www.epa.gov/opptintr/pcb.

State Programs – Many states provide additional incentives for lighting retrofits. Check with your state energy commission or with your local utility for more information.

Energy Providers – Both public utilities and private energy companies may offer programs to support energy efficiency improvements such as lighting upgrades. Programs may include technical assistance, rebates, or other funding assistance to support lighting upgrade projects. Contact your local energy provider for more information.