



LIGHTING WASTE DISPOSAL

LIGHTING UPGRADE MANUAL
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U.S. EPA Green Lights Program

CONTENTS

- ACTION CHECKLIST
- PCB CONTAINING BALLASTS
- MERCURY-CONTAINING LAMPS
- DEHP-CONTAINING BALLASTS
- EVALUATING DISPOSAL OPTIONS
- WORKING WITH CONTRACTORS
- DEFINITIONS
- INFORMATION RESOURCES

Upgrading a lighting system will likely involve the removal and disposal of lamps and ballasts. Some of this waste may be hazardous, and you must manage it accordingly. This document provides an overview of issues relating to the disposal of lamps and ballasts. For project-specific assistance, please refer to the information resources provided at the end of this document.

Note: The information in this document is believed to be correct as of March 1995. EPA does not provide legal advice, nor does this document. Generators of lighting wastes should check with local, state and regional authorities for the most up-to-date information.

ACTION CHECKLIST

DISPOSAL OF PCB-CONTAINING BALLASTS AND MERCURY-CONTAINING LAMPS

If you have not tested your mercury-containing lamp wastes to show that they are not hazardous, then assume they are hazardous and dispose of them as hazardous waste.

- Mercury-containing lamps that test hazardous must be handled in compliance with hazardous waste regulations.
- Maintain permanent records of mercury-containing lamps that are disposed as hazardous waste.

[Back to the Table of Contents](#)

PCB-CONTAINING BALLASTS

The primary concern regarding the disposal of used fluorescent ballasts is the health risk associated with polychlorinated biphenyls (PCBs). Human exposure to these possible carcinogens can cause skin, liver, and reproductive disorders. Fluorescent and high-intensity discharge (HID) ballasts contain a small capacitor that may contain high concentrations of PCBs (greater than 90% pure PCBs or 900,000 ppm). These chemical compounds were widely used as insulators in electrical equipment such as capacitors, switches, and voltage regulators through the late 1970s.

The Toxic Substances Control Act (TSCA) was enacted in 1976, and subsequently banned the production of PCBs in the United States. The specific regulations governing the use and disposal of PCBs are found in Volume 40 Code of Federal Regulations (CFR) Part 761.

The proper method for disposing used ballasts depends on several factors, such as the type and condition of the ballasts and the regulations or recommendations in effect in the state(s) where you remove or discard them. TSCA specifies the disposal method for ballasts that are leaking PCBs. In addition, generators of PCB-containing ballast wastes may be subject to notification and liability provisions under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) (also known as "Superfund." To select the appropriate disposal method for PCB-containing ballasts, refer to the decision flow chart on the following page.

Because disposal requirements vary from state to state, check with regional, state, or local authorities for all applicable regulations in your area. For your convenience, information resources are listed at the end of this document.

Identifying PCB Ballasts

- Use the following guidelines to identify ballasts that contain PCBs.
- All ballasts manufactured through 1979 contain PCBs.
- Ballasts manufactured after 1979 that do not contain PCBs are labeled "No PCBs."
- If a ballast is not labeled "No PCBs," assume it contains PCBs.
- It is extremely important to find out if a ballast containing PCBs is leaking before you remove it from the fixture, so that you can handle it properly.

Federal Requirements

Non-Leaking PCB Ballast Disposal

TSCA regulates ballasts that contain PCBs (40 CFR 761.60(b)(2)(ii)). Under TSCA, intact fluorescent and HID

and sealing the intact ballasts in 55 gallon drums. <http://www.epa.gov/docs/gcdcar/waste.html> Green Lights also encourages its participants to dispose of PCB-containing ballast wastes responsibly, and recommends high-temperature incineration, recycling, or a chemical or hazardous waste landfill.

In addition, CERCLA regulates the disposal of non-leaking PCB-containing ballasts. CERCLA requires building owners and waste generators to notify the National Response Center at (800) 424-8802. They must notify when disposing a pound or more of PCBs (roughly equivalent to 12-16 fluorescent ballasts) in a 24-hour period.

As a generator of PCB-containing ballast wastes, you could be liable in any subsequent Superfund cleanup at a municipal, hazardous, or chemical land disposal site, incinerator, or recycling facility.

EPA encouraged proper disposal of PCB-containing ballasts in the preamble to the 1979 PCB Ban Rule (44 FR 31514) and in the preamble to the final rule on August 25, 1982 (47 FR 37342).

"The EPA encourages commercial and industrial firms that use and dispose of large quantities of small PCB capacitors to establish voluntarily a collection and disposal program that would result in the waste capacitors going to chemical or hazardous waste landfills or high-temperature incinerators."

Leaking PCB Ballast Disposal

A puncture or other damage to ballasts in a lighting system exposes an oily tar-like substance. If this substance contains PCBs, the ballast and all materials it contacts are considered PCB waste, and are subject to TSCA requirements. Leaking PCB-containing ballasts must be incinerated at an EPA-approved high-temperature incinerator. (See last section for a list of incinerators).

It is very important that you remove, handle, and dispose PCB-containing ballasts properly. Take precautions to prevent exposure of the leaking ballast, since all materials that contact the ballast or the leaking substance are also PCB waste. Use trained personnel or contractors to handle and dispose leaking PCB-containing ballasts.

For proper packing, storage, transportation, and disposal information call the TSCA assistance information hotline at (202) 554-1404.

State Requirements

Non-Leaking PCB Ballast Disposal

Many states have developed regulations governing the disposal of non-leaking PCB-containing ballasts that are more stringent than Federal regulations. In addition, some EPA Regional offices published policies specifying ballast disposal methods adopted by individual states.

State standards can take several forms (e.g., written regulations, regional policies, written and verbal recommendations, transportation documentation). Some states do not regulate PCB-containing ballasts as toxic waste, but prohibit their disposal in municipal solid waste landfills. The table on the next page provides a listing of state regulations and recommendations. The last section of this document lists solid and hazardous waste agencies for states and EPA Regions.

All generators of PCB-containing ballasts should thoroughly investigate their state's regulations and follow local requirements.

Green Lights recommends three methods for disposing of non-leaking PCB-containing ballasts: high-temperature incineration, recycling, and chemical or hazardous waste landfill. <http://www.epa.gov/docs/gcdoar/waste.html>

When upgrading lighting, make sure your contractor removes all disconnected PCB-containing ballasts from the lighting fixtures. Non-leaking PCB-containing ballasts may still be hazardous if left in upgraded fixtures, especially in case of fire.

High-Temperature Incineration

High-temperature incineration is the method preferred by many companies because it destroys PCBs, removing them from the waste stream permanently and removing the potential for future CERCLA liability. Incinerating a PCB-containing ballast costs more than sending it to a hazardous waste landfill, but this additional cost is one many organizations are willing to absorb.

Recycling Ballasts

Recyclers remove the PCB-containing materials (i.e., the capacitor and possibly the asphalt potting material surrounding the capacitor) for incineration or land disposal. Metals, such as copper and steel, can be reclaimed from the ballasts for use in manufacturing other products. You may recycle used non-leaking ballasts despite PCBs. The last section of this document contains a list of companies that recycle ballasts.

Chemical or Hazardous Waste Landfill

PCB-containing ballasts may also be disposed in a chemical or hazardous waste landfill. Landfill disposal is less expensive than high-temperature incineration or recycling, but does not eliminate PCBs from the waste stream permanently. While chemical or hazardous waste landfill disposal is an acceptable, regulated disposal method, your organization may be legitimately concerned about potential future CERCLA liability using this method.

Packing PCB Ballasts for Disposal

Despite the disposal method selected, ballasts are packed (according to PCB regulations (in 55-gallon drums for transportation.

- One drum holds 150 to 300 ballasts depending on how tightly the ballasts are packed.
- Fill void space with an absorbent packing material for safety reasons.
- Label drums according to Department of Transportation regulations.
- Note that tightly packed drums may weigh more than 1,000 pounds, which may present a safety risk, particularly when moving the drum for loading or unloading.

PCB Ballast Disposal Costs

High-temperature incineration and chemical or hazardous waste landfill costs can vary considerably. Disposal prices vary according to the following.

- quantity of waste generated
- location of removal site
- proximity to an EPA-approved high-temperature incinerator or chemical or hazardous waste landfill

When shopping for ballast disposal services, request cost estimates in terms of both pounds and number of ballasts. Typical F40 ballasts weigh about 3.5 lbs., and F96 ballasts weigh about 8 lbs. Negotiate with hazardous waste brokers, transporters, waste management companies, and disposal sites to obtain the lowest fees.

High-Temperature Incineration Costs

Incineration costs are calculated by weight.

- Costs range from \$0.55/lb. to \$2.10/lb.
- Average cost is \$1.50/lb., which equals approximately \$5.25 per ballast.

Note: Estimated costs do not include packaging, transportation, or profile fees.

Recycling Costs

When recyclers remove the PCB-containing capacitor, the volume and weight of the ballast are reduced. This change results in lower packing, transportation, and incineration or disposal costs.

Recycling costs are calculated by weight.

- Costs range from \$0.75/lb. to \$1.75/lb.
- Average cost is \$1.00/lb., which equals approximately \$3.50 per ballast.

Note: Recycling cost can range from \$1.25 per ballast (if the PCB wastes are sent to a chemical or hazardous waste landfill) to approximately \$3.50 per ballast (if the PCB wastes are high-temperature incinerated). Estimated costs do not include packaging, transportation, or profile fees.

Chemical or Hazardous Waste Landfill Costs

Chemical or hazardous waste landfill costs are calculated per 55-gallon drum.

- Costs range from \$65/drum to \$165/drum.
- Average cost is \$100/drum, which equals approximately \$0.50/ballast.

Note: Estimated costs do not include packaging, transportation, or profile fees.

Transportation Costs

Transportation fees are calculated as cents per pound per mile. They vary according to (1) the number of drums removed from the site, and (2) the distance from your location to the location of the high-temperature incinerator, chemical or hazardous waste landfill, or recycler.

Transporters may need to be registered or licensed to move hazardous wastes in certain states. Documentation of the movement of hazardous waste may be required even if a state does not regulate disposal or **Fees** require the use of a licensed transporter.

Operators of the high-temperature incinerator or chemical or hazardous waste landfill may charge a profile fee to document incoming hazardous waste. Profile fees vary depending on the volume of waste materials generated.

- Profile fees range from \$0 to \$300 per delivery.
- Fees may be waived if a certain volume or frequency of deliveries is assured or a working relationship has been established with a waste management broker, lighting management company, or other contractor.

Record Keeping

To track transported TSCA or hazardous waste, EPA requires generators to prepare a Uniform Hazardous Waste Manifest. The hazardous waste landfill, incinerator, or recycler that you use can provide this one-page form. The manifest identifies the type and quantity of waste, the generator, the transporter, and its ultimate destination.

The manifest must accompany the waste wherever it travels. Each handler of the waste must sign the manifest and keep one copy. When the waste reaches its destination, the owner of that facility returns a copy of the manifest to the generator to confirm that the waste arrived. If the waste does not arrive as scheduled, generators must immediately notify EPA or the authorized state environmental agency (see the last section), so that they can investigate and act appropriately.

In addition, require your contractor to provide you with documents verifying the disposal method, whether the PCBs are incinerated at high-temperatures or disposed in a chemical or hazardous waste landfill.

[Back to the Table of Contents](#)

DEHP-CONTAINING BALLASTS

Di (2-ethylhexyl) phthalate (DEHP) is a substance that was used to replace PCBs in certain ballast capacitors beginning in 1979. DEHP in its pure form is listed as a hazardous waste under the Resource Conservation and Recovery Act (RCRA). However, once it has been used in a lighting ballast, it is no longer hazardous as defined by RCRA. (See 40 CFR 261.33, Part 261 Appendix VII, Section 268.34, and Section 268.43.)

DEHP is regulated under CERCLA--the Superfund law. The "Reportable Quantity" (RQ) of DEHP under CERCLA is 100 pounds. (See 40 CFR, Section 302.4.) This means that if you are disposing of 100 pounds or more of the material in a 24 hour period (approximately 1,600 fluorescent lighting ballasts), you are required to notify the National Resource Center at (800) 424-8802. It also means that parties involved with the disposal of DEHP ballasts may be held liable under Superfund if clean up of the DEHP is required.

DEHP has been found in ballasts designed for the following lighting fixtures: four foot fluorescent fixtures manufactured between 1979 and 1985; eight foot fluorescent fixtures manufactured between 1979 and 1991; and high intensity discharge (HID) fixtures manufactured between 1979 and 1991. Some ballasts manufactured during these periods may contain dry capacitors or substances other than DEHP. To make sure your ballasts do not contain DEHP, contact the manufacturer or send the capacitor to a laboratory for testing.

[Back to the Table of Contents](#)

MERCURY-CONTAINING LAMPS

Fluorescent and high-intensity discharge (HID) lamps contain a small quantity of mercury that can be harmful to the environment and to human health when improperly managed. Mercury is regulated under RCRA, which is administered by the US Environmental Protection Agency. Under current Federal law, mercury-containing lamps such as fluorescent and HID lamps may be hazardous waste. In addition, incandescent and HID lamps may contain small quantities of lead that can also be potentially harmful to human health and the environment. To prevent these toxic materials from contaminating the environment, dispose of used lamps responsibly.

Federal Regulations

Resource Conservation and Recovery Act (RCRA)

RCRA requires generators of solid wastes containing toxic constituents (such as mercury) to determine whether or not the waste is hazardous by using generator knowledge or testing representative samples of that waste. According to RCRA, generators of used fluorescent and HID lamps are responsible for determining whether their lamp wastes are hazardous. If you do not test used fluorescent and HID lamps and prove them non-hazardous, assume they are hazardous waste and dispose them accordingly.

Generator Knowledge

To use generator knowledge in making a hazardous waste determination, the generator must have information on possible hazardous constituents and their quantities in the waste. Sometimes manufacturers generate solid waste as part of their manufacturing process, and can use process knowledge to determine whether the waste exhibits a characteristic of hazardous waste. However, with expired lamp wastes the generator has little process knowledge on which to make a hazardous waste determination (since he is not the manufacturer). The generator could base a determination on data obtained from the manufacturer, or he could refer to EPA's study entitled "Analytical Results of Mercury in Fluorescent Lamps" (dated 5/15/92, available in EPA's RCRA docket).

Testing Lamps To Determine If They Are Hazardous Waste

The Toxicity Characteristic Leaching Procedure (TCLP) identifies whether a waste is toxic and must be managed as hazardous waste. The test attempts to replicate the conditions in a municipal landfill to detect the mercury concentration of water that would leach from the landfill. If the mercury concentration exceeds 0.2 milligrams per liter, the lamp fails the toxicity test and is managed as hazardous waste.

When mercury-containing lamps are tested using the TCLP, the test results can vary considerably, depending on the lamp manufacturer, the age of the lamp, and the laboratory procedures used. These lamps often fail the TCLP. If you do not use the TCLP to verify that your lamps are non-hazardous, you should (1) assume that they are hazardous waste, and (2) manage them as hazardous waste. Contact your state hazardous waste agency for information on laboratories in your state that conduct the TCLP test. The cost to test one lamp is approximately \$140. However, due to variability in TCLP testing for lamps, EPA recommends that more than one lamp be tested to make a hazardous waste determination.

For more information on RCRA regulations and waste identification, storage, transportation, and disposal,

Conditionally Exempt Small Quantity Generators

A conditionally exempt small quantity generator, as defined under RCRA, is a generator who disposes 100 kg or less of hazardous waste per month. Generators must add the weight of all the hazardous waste (lamps plus other hazardous wastes) that their business generates during a month. For lamp disposal, this quantity of waste includes the mercury in the lamp along with the glass, phosphors, and other materials (the weight of the entire lamp).

Conditionally exempt small quantity generators are excused from RCRA identification, storage, treatment and disposal regulations. To qualify as a conditionally exempt small quantity generator (if the only hazardous waste is mercury-containing lamps), a generator must dispose of fewer than 300-350 four-foot T12 fluorescent lamps or 400-450 four-foot T8 fluorescent lamps per month, depending upon the approximate weight of each lamp. EPA encourages all users of fluorescent and HID lamps to dispose of mercury-containing lamps responsibly to limit the release of mercury into the environment.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)

CERCLA also regulates the disposal of mercury-containing lamps. The law requires building owners and waste generators to notify the National Response Center at (800) 424-8802 under certain conditions. For example, they must notify if they dispose of a pound or more of mercury (roughly equivalent to 11,000 four-foot T12 fluorescent lamps) in a 24-hour period. All generators of mercury-containing lamp waste (large, small, and conditionally exempt small generators) could be held liable in any subsequent Superfund cleanup at a land disposal site, incinerator, storage site, or recycling or other treatment facility.

State Regulations

States may develop regulations that are more stringent than current Federal requirements. Several states are currently considering regulations that will affect the transportation, storage, and/or disposal of mercury-containing lamps. Check with your Regional EPA office or state agency to confirm the most current rules and information on fluorescent and HID lamp waste management in your state.

Disposal of Used Fluorescent and HID Lamps

The following sections outline the storage, packing, transportation and disposal options for used mercury-containing lamps discarded as hazardous waste.

Used lamps that test hazardous or are determined hazardous by the generator must be disposed of at a hazardous waste landfill or sent to a lamp recycling facility. Mercury-containing lamps should never be incinerated. Most municipal incinerators and solid waste combustors lack the necessary control technologies to effectively remove mercury from the flue gas before it is released into the atmosphere.

Hazardous Waste Landfill

A hazardous waste landfill also known as a RCRA Subtitle C facility is a landfill that is permitted under Subtitle C of RCRA and is engineered to contain hazardous waste. Incoming wastes are manifested by the facility and some incoming wastes are subject to treatment standards.

Recycling Fluorescent and HID Lamps

Any lamp may be recycled at permitted or licensed recycling facilities, regardless of whether the lamp tests hazardous. However, for lamps that are hazardous waste, generators must follow generation, transport, and storage requirements under RCRA Subtitle C. Recycling separates the toxic substances (such as mercury) from the glass, aluminum, and other lamp components, and all materials may be re-used in manufacturing other products. Some lamp recycling companies recycle HID lamps as well as fluorescent lamps. A list of companies that provide lamp recycling services is included in the last section.

Lamp Disposal Costs The costs for lamp disposal by recycling or hazardous waste landfill can vary considerably. Prices vary according to the following.

- quantity of waste generated
- location of disposal site
- proximity to a permitted hazardous waste landfill or recycling facility
- state and local taxes

Negotiate with hazardous waste brokers, transporters, waste management companies, and disposal sites to obtain lowest fees.

Recycling Costs

Recycling costs for fluorescent lamps are typically calculated by linear foot. HID lamp recycling costs are typically quoted on a per-lamp basis.

- fluorescent recycling costs range from \$0.06/ft to \$0.15/ft
- average cost is \$0.10/ft
- approximately \$0.40 per F40 lamp
- HID recycling costs range from \$1.25/lamp to \$4.50/lamp
- average cost is \$2.50/lamp

Note: Estimated costs do not include packaging, transportation, or profile fees.

Chemical or Hazardous Waste Landfill Costs

Disposal costs for fluorescent lamps at a hazardous waste landfill range from 25-50 cents per 4-foot tube, not including costs for packaging, transportation, or profile fees.

Packing Lamps for Disposal To prevent used fluorescent and HID lamps from breaking, lamps should be properly packed for storage and transportation. When lamps are removed and replaced with new lamps (e.g., during group relamping), the used lamps should be packed in the cardboard boxes that contained the replacement lamps. The boxes containing the hazardous waste must be properly labeled. Pre-printed labels or rubber stamps that meet Department of Transportation regulations are recommended for high-volume disposal.

Storing Lamps for Disposal RCRA sets storage requirements for generators depending on how much hazardous waste they dispose each month.

- Small quantity generators dispose 100 kg or less of hazardous waste per month (which roughly corresponds to 350 to 3,600 four foot lamps), and can store hazardous waste up to 180 days.
- Large quantity generators dispose over 1,000 kg of hazardous waste per month (more than 3,600 four foot lamps), and can store hazardous waste up to 90 days.
 - Conditionally exempt small quantity generators dispose 100 kg or less of hazardous waste per month and are exempt from RCRA storage requirements.

In addition to proper packing, care should be taken when stacking the boxes of used lamps for storage to avoid crushing the bottom boxes under the weight of the boxes on top. If you work with a contractor to maintain your lighting system, you may want to specify a safe storage arrangement in your contract. This approach ensures that your used lamps are not accidentally broken or crushed before they are sent to a disposal facility.

Some organizations crush their used lamps before disposal. This option should be pursued with care. The crushing equipment should have the approval of state and local authorities, and crushing methods should be evaluated carefully. The lamp should be crushed entirely inside the drum or storage unit so that no mercury vapor enters the atmosphere. There should also be adequate ventilation in the space where the crushing occurs. Under current EPA hazardous waste regulations, crushing lamps before sending them to a hazardous waste landfill may be considered treatment. Therefore, a RCRA treatment permit may be required.

Transportation Registered haulers and other transporters of hazardous waste calculate transportation fees as cents per pound per mile. The costs will vary according to the number of lamps, drums, or other containers to be removed from the site and the distance from your location to the location of the hazardous waste landfill or recycling facility.

Profile Fees Operators of chemical or hazardous waste landfills may charge a profile fee to document incoming waste. Profile fees vary depending on the volume of waste materials generated and may be waived if a certain volume or frequency of deliveries is assured. Establishing a working relationship with a lighting management company or lighting maintenance contractor who assists with the maintenance of your lighting system can reduce your disposal costs.

Record Keeping To track transported waste, EPA requires generators to prepare a Uniform Hazardous Waste Manifest. This one-page form can be provided by the recycler or hazardous waste landfill where you dispose of your used fluorescent or HID lamps. The manifest identifies the type and quantity of waste, the generator, the transporter, and the facility to which the waste is being shipped.

The manifest must accompany the waste wherever it travels. Each handler of the waste must sign the manifest and keep one copy. When the waste reaches its destination, the owner of that facility returns a copy of the manifest to the generator to confirm that the waste arrived. If the waste does not arrive as scheduled, generators must immediately notify EPA or the authorized state environmental agency (see the last section), so that they can investigate and take appropriate action.

In addition, require your contractor to provide you with documentation verifying that the lamps were properly recycled or disposed in a hazardous waste landfill.

Municipal Solid Waste Landfill Lamp wastes generated in small quantities (see "Conditionally Exempt Small Quantity Generators" in the previous section) and used fluorescent and HID lamps that do not test hazardous under RCRA may be disposed in a properly managed municipal solid waste landfill (RCRA Subtitle D facility). The municipal landfill may impose restrictions or regulate incoming wastes in accordance with local rules or company

guidelines. Disposal costs for lamps at a municipal solid waste landfill are approximately 2-3 cents per 4-foot lamp.

Generators may be legitimately concerned about potential future Superfund liability in connection with this disposal method. All generators of mercury-containing lamp waste, regardless of size, could be held liable in any subsequent Superfund cleanup at a municipal solid waste landfill.

[Back to the Table of Contents](#)

EVALUATING DISPOSAL OPTIONS

Liability Issues Under CERCLA, owners and operators of facilities and persons disposing hazardous substances may be held liable for response costs, if there is a release or threat of a release of a hazardous substance into the environment. Liability under CERCLA is broad and potentially costly, and can apply retroactively. All generators may incur Superfund liability for disposing mercury-containing lamps or PCB-containing ballasts in a dumpster, local landfill, or recycling, storage, or treatment facility. Disposal of mercury wastes or PCBs in an environmentally sound manner, however, will help to minimize the potential for environmental contamination and thus also minimize the potential for liability.

Impact of Lamp Disposal Cost on Profitability

The overall impact of lamp disposal on the profitability of typical Green Lights lighting upgrade projects is minimal. The example on the next page shows the impact of various lamp recycling costs on the internal rate of return (IRR) and the net present value (NPV) of a typical lighting upgrade project. The assumed project consists of upgrading a 4-lamp standard fluorescent system that uses magnetic ballasts and 40-watt lamps with a 4-lamp T8/electronic system and occupancy sensors. Without considering the cost of lamp disposal, the IRR and NPV were calculated at 47.1% and \$52,242, respectively. Note that even when assuming lamp disposal costs of \$1.50 per lamp three times the average recycling cost the IRR and NPV values decreased only slightly to 44.8% and \$51,642, respectively. These results were obtained using the Green Lights analysis tool Quikalc.

The total cost of disposing of a lamp as a hazardous waste either by recycling or using a hazardous waste landfill can be put into perspective in three additional ways.

First, the cost of operating a lamp (including ballast losses) for its 20,000-hour life is \$64 at the national average electric rate of 7 cents per kilowatt-hour. The 50-cent disposal cost is quite modest in comparison.

Second, replacing an old fixture with a new one usually costs about \$100-\$150, including installation. Disposing of an old fixture's lamps will cost approximately \$2, depending on market conditions and disposal services purchased. If the new fixture uses half the electricity of the old fixture (as is typical with Green Lights upgrades), then the electric bill savings will pay for the cost of disposing of the old lamps after 310 hours of operation about one month for most businesses. Essentially, lamp disposal will extend the payback of a project by approximately one month.

Third, the cost of disposing of a lamp as hazardous waste either by recycling or using a hazardous waste landfill represents only a small fraction of the total life-cycle operating costs of a lighting system. If operating a 2-lamp T8/electronic system, disposal as a hazardous waste represents only about 1 percent of total

Mercury Emissions and the Environment

The largest man-made sources of mercury in the atmosphere are fossil fuel combustion (58% of total) and municipal solid waste incineration (37% of total). When the mercury in a fossil fuel is heated in a combustor, it turns into a vapor. In vapor form, mercury is difficult to remove from the flue gas and easily escapes into the atmosphere. When moisture vapor in the atmosphere turns to rain, mercury returns to the earth and is deposited in streams, lakes, and other waterways.

The mercury that is released into the atmosphere by burning fossil fuels can be substantially minimized using efficient lighting technologies.

On average, fossil-fueled power plants emit 0.04 milligrams of mercury per kilowatt-hour sold. By maximizing the efficiency of your lighting system, you can minimize mercury emissions from the power plants that provide your electricity.

The amount of mercury emitted into the atmosphere through solid waste incineration and resource recovery facilities (which burn solid waste to produce energy) can be minimized if you adopt a sound lamp disposal practice. EPA will be proposing mercury emission limits for new and existing municipal solid waste incinerators in 1994.

[Back to the Table of Contents](#)

WORKING WITH CONTRACTORS

Your lighting upgrade project specification should include provisions for proper handling and safe disposal of lamps, ballasts, and other hazardous materials that may be associated with the project.

Here are some general guidelines.

- Investigate your disposal options thoroughly.
- Do not expect your contractor to be well-versed in all disposal requirements and options.
- Ask your lighting or electrical contractor to provide disposal services (either directly or through a sub-contractor) as part of their contract.
- Be specific in your disposal requests (e.g., request high-temperature incineration of PCB-containing ballasts at an EPA-approved incinerator).
- Ask for certifications, licenses, and references from all subcontractors providing waste disposal services.

[Back to the Table of Contents](#)

DEFINITIONS

CERCLA

The Comprehensive Emergency Response, Compensation and Liability Act of 1980. CERCLA referred to also as "Superfund" established cleanup and emergency response guidelines for releases of hazardous substances into the environment. A release of a hazardous substance in an amount equal to or greater than its "reportable quantity" (one pound for mercury and PCBs) in a 24-hour period triggers CERCLA notification requirements. CERCLA applies to any size generator.

Chemical Waste Landfill

A TSCA permitted landfill that accepts hazardous substances and extremely hazardous waste. These facilities must meet different engineering requirements than RCRA Subtitle C (hazardous waste) landfills.

Conditionally Exempt Small Quantity Generator (SQG) A generator who generates 100 kilograms or less a month of a hazardous waste. Under RCRA, small quantity generators are exempt from RCRA regulations for the transportation, storage, treatment, and disposal of that hazardous waste.

Hazardous Waste Landfill See Subtitle C landfill.

RCRA The Resource Conservation and Recovery Act which regulates the management of solid (hazardous and non-hazardous) wastes. Under RCRA, generators of solid wastes are responsible for determining whether the solid wastes are hazardous and following RCRA transportation, storage, treatment, and disposal requirements for those wastes.

RCRA Subtitle C Landfill A landfill containing hazardous wastes that is permitted under Subtitle C of RCRA. Land disposal of hazardous wastes is restricted to permitted RCRA Subtitle C disposal facilities.

RCRA Subtitle D Landfill A municipal solid waste landfill containing non-hazardous wastes permitted under Subtitle D of RCRA.

TSCA The Toxic Substances Control Act of 1976 which regulates the handling, storage, transportation and disposal of polychlorinated biphenyls (PCBs).

INFORMATION RESOURCES

EPA Regional Offices

REGION I (ME, VT, NH, MA, CT, RI)

Environmental Protection Agency
John F. Kennedy Federal Building
Room 2203
Boston, MA 02203
(617) 565-3420

REGION II (NY, NJ, PUERTO RICO, VIRGIN ISLANDS)

Environmental Protection Agency
Jacob K. Javits Federal Building
26 Federal Plaza
New York, NY 10278
(212) 264-2657

REGION III (PA, WV, VA, MD, DE, WASHINGTON DC)

Environmental Protection Agency
841 Chestnut Building
Philadelphia, PA 19107
(215) 597-9800

REGION IV (TN, KY, NC, SC, GA, AL, MS, FL)

Environmental Protection Agency
345 Courtland Street, NE
Atlanta, GA 30365
(404) 347-4727

REGION V (IL, WI, IN, MI, MN, OH)

Environmental Protection Agency
77 West Jackson Boulevard
Chicago, IL 60604-3507
(312) 353-2000

REGION VI (NM, TX, OK, AR, LA)

Environmental Protection Agency
First Interstate Bank Tower at Fountain Place
12th Floor/Suite 1200
1445 Ross Avenue
Dallas, TX 75202-2733
(214) 665-6444

REGION VII (NE, KS, MO, IA)

Environmental Protection Agency
726 Minnesota Avenue
Kansas City, KS 66101
(913) 551-7000

REGION VIII (MT, WY, ND, SD, UT, CO)

Environmental Protection Agency
Suite 500

999 18th Street
Denver, CO 80202-2405
(303) 293-1603

<http://www.epa.gov/docs/gcdoar/waste.html>

REGION IX (CA, NV, AZ, HI, AMERICAN SAMOA, GUAM)

Environmental Protection Agency
75 Hawthorne Street
San Francisco, CA 94105
(415) 744-1305

REGION X (WA, OR, ID, AK)

Environmental Protection Agency
1200 Sixth Avenue
Seattle, WA 98101
(206) 553-4973

State Solid and Hazardous Waste Agencies

ALABAMA

Department of Environmental Management
Land Division (Solid/Hazardous Waste
1751 Federal Drive
Montgomery, AL 36130
(205) 271-7761/7735

ALASKA

Steve Willingham
Manager, Solid Waste Program
State of Alaska
Department of Environmental Conservation
410 Willoughby Avenue
Juneau, Alaska 99801-1795
(907) 465-5158

ARIZONA

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Arizona Department of Environmental Quality
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3033 North Central Avenue
Phoenix, AZ 85012
(602) 207-4160

ARKANSAS

Tom Ezell
Manager, Programs Branch
Department of Pollution Control and Ecology
Hazardous Waste Division
PO Box 8913
Little Rock, AR 72219-8913
(501) 562-7444
Fax (501) 562-6532

CALIFORNIA

Mardis Coers
Department of Toxic Substances Control
PO Box 806
Sacramento, CA 95812-0806
(916) 322-0712

COLORADO

Scott Klarich
Environmental Compliance Officer
Monitoring and Enforcement Section
Hazardous Materials and Waste Management Division
Colorado Department of Health and Environment
Mail Code: HMWMD-HWC-B2
4300 Cherry Creek Drive South
Denver, CO 80222-1530
(303) 692-3369

CONNECTICUT

Department of Environmental Protection
Waste Management Bureau
79 Elm Street
Hartford, CT 06106
(203) 566-8476

DELAWARE

Department of Natural Resources and Environmental Control
Division of Environmental Control
Solid Waste/Hazardous Waste Section
Edward Tatnall Building
PO Box 1401
Dover, DE 19901

(302) 739-4403

<http://www.epa.gov/docs/gcdoar/waste.html>

Delaware Solid Waste Authority
PO Box 71
New Castle, DE 19901
(302) 736-5361

DISTRICT OF COLUMBIA

Department of Consumer and Regulatory Affairs
Environmental Regulation Administration
Pesticides, Hazardous Waste and Underground Storage Tank Division
Hazardous Waste Management Branch (Hazardous Waste Disposal)
2100 Martin Luther King, Jr. Ave. SE, Suite 203
Washington, DC 20020
(202) 404-1167

Department of Public Works
Public Space Maintenance Administration
Bureau of Sanitation Services (Solid Waste Disposal/Recycling)
2750 South Capitol St., SE
(202) 767-8512

FLORIDA

Raoul Clarke, Environmental Administrator
Bureau of Solid and Hazardous Waste
Department of Environmental Protection
2600 Blair Stone Road
Tallahassee, Florida 32399-2400
(904) 488-0300

GEORGIA

Vern George
Environmental Protection Agency
Toxics Branch
345 Courtland St., NW
Atlanta, GA 30334
(404) 347-1033

Department of Natural Resources
Environmental Protection Division
Land Protection Branch
205 Butler Street, SE
Suite 1154
Atlanta, GA 30334
(404) 656-2833

HAWAII

State of Hawaii
Department of Health
Environmental Management Division
Clean Air Branch
Asbestos Abatement Office
PO Box 3378
Honolulu, HI 96801-3378
(808) 586-8144

IDAHO

William Fritell
Department of Health and Welfare
Division of Environment
Bureau of Hazardous Materials
450 W. State Street
Boise, ID 83720
(208) 334-5879

ILLINOIS

Clarence L. Smith
State of Illinois
Environmental Protection Agency
2200 Churchill Road
Springfield, IL 62794-9276
(217) 524-3300

INDIANA

Robert Snodgrass
Solid Waste Permit Section
105 South Meridian Street
Indianapolis, IN 46206-6015
(317) 232-5976

IOWA

Lavoy Haage
Department of Natural Resources
Solid Waste Section
Land Quality Bureau
Wallace State Office Building
900 East Grand Avenue
Des Moines, IA 50319

KANSAS

Ron Smith
Department of Health and Environment
Solid Waste Management Division
Forbes AFB Bldg. No. 740
Topeka, KS 66620
(913) 296-1500

KENTUCKY

Abby Myer
Department for Environmental Protection
Division of Waste Management
Ft. Boone Plaza
14 Reilly Road
Frankfort, KY 40601
(502) 564-6716 x242

LOUISIANA

Department of Environmental Quality
Office of Solid and Hazardous Waste
Solid Waste Division
PO Box 44307
Baton Rouge, LA 70804
(504) 765-0355

MAINE

Department of Environmental Protection
Bureau of Oil & Hazardous Materials Control
State House Station 17
August, ME 04333
(207)287-2651

Waste Management Agency
State House Station 154
August, ME 04333
(207)287-5300

MARYLAND

Ed Hammerburg
Department of Environment
Toxic Operations Program

2500 Boening Highway
Baltimore, MD 21224
(410) 631-3345

<http://www.epa.gov/docs/gcdoar/waste.html>

MASSACHUSETTS

Victoria Phillips, Environmental Analyst
Office of Hazardous Waste
Enforcement Division
1 Winter Street
Boston, MA 02108
(617) 292-5812

MICHIGAN

Department of Natural Resources
Hazardous Waste Division
PO Box 30241
Lansing, MI 48909
(517) 373-2730

MINNESOTA

Nancy Ellefson
Minnesota Pollution Control Agency
Solid or Hazardous Waste Division
520 Lafayette Road North
St. Paul, MN 55155
(612) 296-6300

MISSISSIPPI

Russell Smith
Department of Environmental Quality
Office of Pollution Control
PO Box 10358
Jackson, MS 39209
(601) 961-5171

MISSOURI

Department of Natural Resources
Division of Environmental Quality
Waste Management Program
Jefferson State Office Building
205 Jefferson Street
PO Box 176
Missouri Boulevard

Jefferson City, MO 65102
(314) 751-3176

<http://www.epa.gov/docs/gcdoar/waste.html>

MONTANA

Don Vidrine
Department of Health and Environmental Sciences
Environmental Sciences Division
Solid and Hazardous Waste Bureau
PO Box 200901
Helena, MT 59620-0901
(406) 444-1430

NEBRASKA

Department of Environmental Control
PO Box 94877
State Office Building
Lincoln, NE 68509
(402) 471-2186

NEVADA

Colleen Crips
Bureau of Hazardous Waste
333 West Nye Lane
Carson City, NV 89710
(702) 687-5872

NEW HAMPSHIRE

Robert C. White, Chief
PCB Section
Department of Environmental Services
Air Resources Division/Toxics Management Bureau
64 N. Main St., Caller Box 2033
Concord, NH 03302-2033
(603) 271-1370

Department of Environmental Services
Waste Management Division/Compliance Bureau
6 Hazen Drive
Concord, NH 03301
(603) 271-2942

NEW JERSEY

Sandor Juhasz

NJ Department of Environmental Protection and Energy <http://www.nj.gov/docs/gcdoar/waste.html>
Hazardous Waste Regulation Program
401 East State Street
CN 421
Trenton, NJ 08625
(609) 292-8341

NJ Department of Environmental Protection and Energy
Solid Waste Management Division
840 Bear Tavern Road
CN 44
Trenton, NJ 08625
(609) 292-8341

NEW MEXICO

New Mexico Environmental Department
Harold Runnels Building
PO Box 26110
Santa Fe, New Mexico 87502

Hazardous and Radioactive Materials Bureau
(505) 827-4308
Solid Waste Bureau
(505) 827-2775

NEW YORK

Sharon Rader
Division of Hazardous Substances Regulation
New York State Department of Environmental Conservation
50 Wolf Road
Albany, NY 12233
(518) 485-8988

NORTH CAROLINA

Department of Environment, Health, and Natural Resources
Solid Waste Management/Hazardous Waste Division
PO Box 27687
Raleigh, NC 27611
(919) 733-2178

NORTH DAKOTA

Neil M. Knatterud, Director
Health Department
Division of Waste Management

1200 Missouri Avenue
PO Box 5520
Bismarck, ND 58502-5520
(701) 328-5166

<http://www.epa.gov/docs/gcdoar/waste.html>

OHIO

Environmental Protection Agency
Office of Solid and Hazardous Waste
PO Box 1049
1800 Watermark Drive
Columbus, OH 43266-0149
(614) 644-2917

OKLAHOMA

Ellen Bussert
Oklahoma Department of Environmental Quality
Public Information and Education
1000 Northeast 10th Street
Oklahoma City, OK 73117-1212
(405) 271-7353

OREGON

Gary Galaba
Department of Environmental Quality
Waste Management Clean-up Division
811 S.W. 6th Avenue
Portland, OR 97204
(503) 229-5630

PENNSYLVANIA

Department of Environmental Resources
Bureau of Waste Management
PO Box 8471
Harrisburg, PA 17105-8471

PUERTO RICO

Environmental Quality Board
Solid and Hazardous Waste Bureau
PO Box 11488
Santurce, PR 00910
(809) 725-5140

RHODE ISLAND

Robert Nero
Department of Environmental Management
Air and Hazardous Materials
291 Promenade Street
Providence, RI 02908
(401) 277-2797

SOUTH CAROLINA

Board of Health and Environmental Control
Bureau of Solid and Hazardous Waste
2600 Bull Street
Columbia, SC 29201
(803) 896-4174

SOUTH DAKOTA

Department of Water and Natural Resources
Environmental Health Division
Joe Foss Building
Pierre, SD 57501
(605) 773-3153

TENNESSEE

Wayne Gregory, Technical Coordinator
Department of Environment and Conservation
Division of Solid Waste Management
5th Floor, C Tower
401 Church Street
Nashville, TN 37243-1535
(615) 532-0780

TEXAS

Alice Hamilton Rogers, P.E., Technical Consultant
Texas Water Commission
PO Box 13087
1700 North Congress Avenue
Austin, TX 78711-3087
(512) 463-7830

UTAH

Rusty Lundburg
Department of Environmental Quality
Division of Solid and Hazardous Waste

PO Box 144880
Salt Lake City, Utah 84114-4880

<http://www.epa.gov/docs/gcdoar/waste.html>

VERMONT

Stephen Simoes,
Hazardous Materials Coordinator
Department of Environmental Conservation
Hazardous Materials Management Division
103 South Main Street
Waterbury, Vermont 05671-0404
(802) 241-3888

VIRGINIA

Robert Lincoln, Waste Division
Virginia Department of Environmental Quality
Special Solid Waste Program
P.O. Box 10009
Richmond, VA 22240
(804) 527-5357

WASHINGTON

Vern Mainz, Environmental Engineer
Department of Ecology
Solid and Hazardous Waste Program
PO Box 47600
Olympia, WA 98504-7600
(206) 407-6753

WEST VIRGINIA

WV Division of Environmental Protection
Office of Waste Management
1356 Hansford Street
Charleston, WV 25301
(304) 558-5929

WISCONSIN

Department of Natural Resources
Bureau of Solid Waste Management
101 South Webster Street
Madison, WI 53707
(608) 266-1327

WYOMING

Department of Environmental Quality
Solid Waste Management Program
122 West 25th Street
(307) 777-7752

TSCA, RCRA, and CERCLA Information Phone Lines

Toxic Substances Control Act (TSCA) Assistance Information Hotline

(202) 554-1404

RCRA/CERCLA Hotline

(800) 424-9346

in the Washington, DC Metro Area

(703) 412-9810

CERCLA National Response Center (NRC) Hotline

(800) 424-8802

EPA-Approved Disposal Locations

Commercially permitted PCB INCINERATORS operating as of June 1993

Aptus, Inc.
PO Box 1328
Coffeyville, KS 67337
(316) 251-6380

Aptus, Inc.
Aragonite, UT
(801) 266-7787

Chemical Waste Management
PO Box 2563
Port Arthur, TX 77643
(409) 736-2821

Environmental Energy Group
Denton, TX
(817) 383-3632

Environmental Energy Group
PO Box 50764

Denton, TX 76206
(817) 898-1291

<http://www.epa.gov/docs/gcdoar/waste.html>

Rollins
PO Box 609
Deer Park, TX 77536
(713) 930-2300

Commercially permitted HAZARDOUS WASTE LANDFILLS operating as of June 1993

Chem-Security Systems Incorporated
Star Route, Box 9
Arlington, OR 98712
(503) 454-2643

Chemical Waste Management
Call 1-800-843-3604 for
information on CWM disposal
facilities nation-wide.

Envirosafe Services Inc. of Idaho
PO Box 16217
Boise, ID 83715-6217
(800) 274-1516

US Ecology, Inc.
Box 578
Beatty, NV 89003
(702) 553-2203

US Pollution Control, Inc.
Grayback Mountain
8960N Hwy 40
Lake Point, UT 84074
(801) 531-4980

Recycling Resources

Lamp Recycling Services

Advanced Environmental Recycling Corp.
2591 Mitchell Avenue
Allentown, PA
(800) 554-2372 or (215) 797-7608

Allied Technology Group
47375 Freemont Boulevard

Freemont, CA 94538
(510) 490-3008

<http://www.epa.gov/docs/gcdoar/waste.html>

Alta Resource Management Services
88-B Industry Avenue
Springfield, MA 01104-9926
(800) 730-ALTA or (413) 734-3399

Bethlehem Apparatus
Hellertown, PA
(215) 838-7034

Dynex Environmental, Inc.
6801 Industrial Loop
Milwaukee, WI 53129
(800) 249-3310 or (414) 421-4959
4751 Mustang Circle
St. Paul, MN 55112
(800) 733-9639 or (612) 784-4040

Global Recycling Technologies, Inc.
PO Box 651
Randolph, MA 02368
(617) 341-6080

Light Cycle, Inc.
1222 University Avenue
St. Paul, MN 55104
(612) 641-1309

Lighting Resources, Inc.
386 S. Gordon Street
Pomona, CA
(800) 57-CYCLE

Luminaire Recyclers Inc.
2161 University Avenue, Suite 206
St. Paul, MN 55114
(612) 649-0079

Mercury Recovery Systems
2021 S. Myrtle Street
Monrovia, CA
(818) 301-1372

Mercury Refining Co., Inc.
Albany, NY
(518) 459-0820

Mercury Technologies International, LP <http://www.epa.gov/docs/gcdoar/waste.html>
Hayward, CA
(800) 628-3675
Los Angeles, CA
(310) 475-4684
West Melbourne, FL
(407) 852-1516

Mercury Technologies of Minnesota
Pine City Industrial Park
Pine City, MN 55063-0013
(612) 629-7888
(800) 864-3821

Nine West Technologies
Nashville, TN
(615) 399-1486

NSSI, Inc.
574 Etheridge Street
Houston, Texas 77087
(713) 641-0391

Recyclights
401 West 86th Street
Bloomington, MN 55420
1-800-831-2852 (This number also serves Recyclights facilities in Tallahassee, FL and Columbus, OH.)

Salesco Systems USA
5736 West Jefferson
Phoenix, AZ 85043
1-800-368-9095

Braintree, MA
1- 800-368-8878

Arlington Heights, IL
1- 800-881-6811

Dallas, TX
1-214-661-8819

San Diego, CA
1-619-222-5808

Flowery Branch, Georgia
1-770-965-9585

Superior Lamp Recycling, Inc.

Mineral Springs Facility
1275 Mineral Springs Drive
Port Washington, WI 53074
(800) 556-LAMP (5267)

<http://www.epa.gov/docs/gcdoar/waste.html>

USA Lamp and Ballast Recyclers
Call John Fortino at 1-800-778-6645
for information on disposal facilities.

USA Lights
2007 County Road, C-2
Roseville, MN 55113
(612) 628-9370

Ballast Recycling Services

Alta Resource Management Services, Inc.
88-B Industry Avenue
Springfield, MA 01104-9926
(800) 730-ALTA or (413) 734-3399

Dynex Environmental, Inc.
6801 Industrial Loop
Milwaukee, WI 53129
(800) 249-3310 or (414) 421-4959
4751 Mustang Circle
St. Paul, MN 55112
(800) 733-9639 or (612) 784-4040

Eastern Environmental Technologies
Portchester, NY
(914) 934-2100

Ensquare, Inc.
Newton Upper Falls, MA
(617) 776-7320

FulCircle Ballast Recyclers

168 Brattle Street
Cambridge, MA
(800) 775-1516

Baltimore, MD
(717) 932-1022

New York, NY
(800) 581-0857

San Francisco, CA
(916) 649-9194

Los Angeles, CA
(800) 775-1516

Atlanta, GA
(800) 775-1516

Chicago, IL
(708) 434-0593

Detroit, MI
(313) 651-6589

Global Recycling Technologies, Inc.
PO Box 651
Randolph, MA 02368
(617) 341-6080

Lighting Resources, Inc.
Pomona, CA
(714) 622-0881

Light Cycle, Inc
1222 University Avenue
St. Paul, MN 55104
(612) 641-1309

Luminaire Recyclers Inc.
2161 University Avenue, Suite 206
St. Paul, MN 55114
(612) 649-0079

S.D. Myers
180 South Avenue
Tallmadge, Ohio 44278
(216) 633-2666

Salesco Systems USA
5736 West Jefferson
Phoenix, AZ 85043
1-800-368-9095

Braintree, MA
1- 800-368-8878

Arlington Heights, IL

1- 800-881-6811

<http://www.epa.gov/docs/gcdoar/waste.html>

Dallas, TX
1-214-661-8819

San Diego, CA
1-619-222-5808

Flowery Branch, Georgia
1-770-965-9585

Transformer Service, Inc.
Concord, NH 03302
(603) 224-4006

Transtec Environmental
Niagara Falls, NY
(716) 283-6174

USA Lamp and Ballast Recyclers

Call John Fortino at 1-800-778-6645
for information on disposal facilities.

THIS IS NOT A COMPLETE LIST OF COMPANIES WHO PROVIDE RECYCLING AND DISPOSAL SERVICES THROUGHOUT THE UNITED STATES. COMPANIES LISTED IN THIS SECTION ARE NOT ENDORSED BY THE EPA OR THE GREEN LIGHTS PROGRAM. EPA DOES NOT SCREEN LISTED COMPANIES AND CANNOT CONFIRM THE METHODS THESE COMPANIES MAY USE IN THEIR RECYCLING PROCESS.

Lighting Waste Disposal is one of a series of documents known collectively as the *Lighting Upgrade Manual*. Click below to jump to other documents in the series.

Planning

- [Green Lights Program](#)
- [Implementation Planning Guidebook](#)
- [Financial Considerations](#)
- [Lighting Waste Disposal](#)
- [Progress Reporting](#)
- [Communicating Green Lights Success](#)

Technical

- [Lighting Fundamentals](#)
[Lighting Upgrade Technologies](#)

- The Lighting Survey

Appendices

- Green Lights for Federal Participants
-

GREEN LIGHTS: A Bright Investment in the Environment

For more information or to order other documents or appendices in this series, contact the Green Lights program office at:

Green Lights Program
US EPA
401 M Street, SW (6202J)
Washington, DC 20460

or call the **Green Lights Information Hotline** at (202) 775-6650, Fax (202) 775-6680. Look in the monthly **Green Lights & Energy Star Update** newsletter for announcements of new publications.

Energy Star Fax-Line System

phone: 202-233-9659

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