

# How to Remove Mercury Switches from Major Appliances

## A Guide for Appliance Recyclers

Please note: Formatting has been altered to meet accessibility standards for State documents (Section 11546.7 of the California Government Code).

**State of California**



California Environmental Protection Agency  
Department of Toxic Substances Control  
May 2005

# How to Remove Mercury Switches from Major Appliances

## A Guide for Appliance Recyclers

This manual tells you how to find, remove and recycle mercury switches in major appliances. It also tells you about the laws for handling mercury switches and what to do in case of a spill.

*Note:* This manual supersedes the June 2004 manual and includes reference to recent legislation that changes appliance recycler requirements. If anything in this guide is inconsistent with California's laws and regulations, you **must** follow the current laws and regulations.

**Warning!** Do not remove mercury switches from a major appliance that is still in use. Never use a major appliance after the mercury switches are removed. It can be dangerous, and the appliance may not work.

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# About Mercury

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## What is mercury?

Mercury is a metal with special properties. It is liquid at room temperature and conducts electricity. This makes it ideal for use in switches and sensors in major appliances.

## Is mercury dangerous?

Yes. Mercury is poisonous. If it is not disposed of safely, it can be released to the environment and harm people and wildlife. Contact with mercury can cause:

- birth defects
- nerve disorders
- brain damage
- death

## How do people come into contact with mercury?

Mercury can be:

- inhaled
- absorbed through the skin
- eaten (in contaminated food)

Mercury builds up in animal tissue. So, larger animals that eat other animals usually have more mercury in their tissues than smaller animals. Most people are exposed to mercury when they eat contaminated fish.

## What is methyl mercury?

When mercury is in water, bacteria can turn some of it into methyl mercury. Methyl mercury is a very poisonous type of mercury often found in many fresh and saltwater fish. Some fish in California contain dangerous levels of methyl mercury.

The California Office of Environmental Health Hazard Assessment (OEHHA) has recommendations about how much fish contaminated with mercury you can eat safely. Women of childbearing age and children should be especially careful. Children and unborn babies are the most sensitive to methyl mercury.

To learn more, visit [OEHHA's](#) web site.

## How does mercury get into the environment?

Most of the mercury in the environment is put there by humans. It comes from:

- legacy wastes from abandoned mines,
- spills,
- emissions from coal-burning plants, or
- mercury products that are incinerated or sent to landfills

Mercury can evaporate at room temperature, and even more so when heated. After it

gets into the air it can fall back to the ground in rain and snow and get into lakes, rivers, and watersheds.

Many major appliances are thrown out every year. If we do not remove mercury switches in these appliances, mercury can get into the environment when they are shredded and melted to make new steel. Major appliances in landfills can also release mercury into the environment. Used appliance dealers, appliance recyclers, and scrap metal recyclers can keep this mercury from getting into the environment.

### What is a mercury switch?

A mercury switch is a sealed container that holds mercury. It can be used for turning lights and motors on and off, like a chest freezer light, or as a flame sensor in some gas appliances. Mercury switches are relatively small and come in various shapes and sizes, including bullet-shaped capsules and pellets, elongated bulbs and probes, and thin capillary tubes. Mercury switches can be made of steel, plastic or glass.

### Are there different types of mercury switches?

Yes. There are two types of mercury switches in major appliances.

- **Tilt, or positional switches.** These switches turn on or off a light, motor, or pump when they are “tilted.” The mercury inside the pellet responds to changes in position and will either complete or break an electrical circuit.
- **Thermoelectrical or safety valve switches (mercury flame sensors).** These are used in flame sensors in major appliances that run on gas. Mercury expands when heated and contracts when cooled. When the pilot light is on, the flame heats the mercury and opens the valve to let gas flow. If the pilot light goes out, the mercury cools and closes the gas valve.

### Who makes mercury switches?

Robertshaw and Harper-Wyman make mercury probes for cooking appliances. White-Rodgers makes devices for furnaces and heaters.

**Note:** DTSC does not endorse or recommend these companies.

### What are major appliances?

A major appliance is a machine you have in your home or business, like a washer or dryer, water heater, dehumidifier, oven, stove, microwave, refrigerator, freezer, air-conditioner, or trash compactor.

### Why don't they stop putting mercury switches in major appliances?

Most manufacturers use mercury-free switches in new products. But there are already many major appliances with mercury that are in use or have been discarded.

## Are there laws for handling mercury switches?

Yes. In 1997, California passed a law called the Metallic Discards Act (AB 847). This law says mercury switches must be removed from discarded major appliances before they are crushed, baled, sheared or shredded for recycling.

For more information on this law, see **AB 847** (Assembly Bill 847). Or read Public Resources Code, sections 42160-42185

In 2001, California passed a law called California's Mercury Reduction Act of 2001 (SB 633) and in 2003, DTSC adopted the Mercury Waste Classification and Management regulations (MWCM). For information on these laws and regulations, see:

- **SB 633 (Senate Bill 633):** Read "[California's Mercury Reduction Act of 2001](#)"
- **MWCM:** Read California Code of Regulations, Title 22 (Cal. Code Regs, Tit.22), section 66273.1 et seq.

These laws and regulations say you must remove mercury switches from major appliances that have been discarded before they are crushed, baled, sheared or shredded for recycling. You must handle the mercury switches as hazardous or universal waste. You cannot send them to a regular landfill.

Starting February 9, 2006, any discarded major appliance with one or more mercury switches will be considered hazardous waste. But you can handle them as universal waste

Starting January 1, 2006, there will be more requirements for appliance recyclers. DTSC will revise this guide to let you know about those requirements. For more information now, see Assembly Bill 2277, which was passed in 2004.

## What is universal waste?

Universal waste is a type of hazardous waste. The rules for universal waste are simpler than the rules for other hazardous waste.

See pages 29–31 to learn about the requirements for hazardous and universal waste.

To learn more about universal waste, read "[Managing Universal Waste in California](#)"

# How to Remove, Handle and Recycle Mercury Switches

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Under the current law, you **must** remove the mercury switches from a major appliance that has been discarded before it is crushed, baled, sheared or shredded. You must either handle the mercury switches as universal or hazardous waste. You cannot throw them in a regular landfill.

*Remember:* Starting February 9, 2006, any discarded major appliance with one or more mercury switches will be considered hazardous waste. But you can handle them as universal waste.

The best time to remove mercury switches is as soon as you get the major appliance, or at the same time you remove any chlorofluorocarbons (CFCs) and polychlorinated biphenyls (PCBs). If you do not remove them before you crush, bale, shear or shred the major appliance, you are breaking the law.

## Is it hard to remove mercury switches?

It depends. Switches in lights and other tilt switches may be easy to remove. It may only take a few minutes. But you need special training to remove switches from gas appliances. It can be dangerous and take from 2-10 minutes.

Before you try to remove mercury switches, make sure:

- You are properly trained,
- You have proper equipment,
- You have personal protection and safety measures in place, and
- You have a storage container for the mercury switches.

## How do I remove mercury switches?

This section of the guide will tell you how to remove mercury switches from:

- Chest freezers,
- Washing machines,
- Gas ranges, and
- Gas water heaters.

You may be able to use these instructions for other major appliances. If you have any questions, it is best to contact the manufacturer.

## Which major appliances have mercury switches?

Mercury switches can be in:

- **Chest Freezers** — If a light goes on when you open the lid, the freezer may have a mercury tilt switch.
- **Washing Machines** — If a washing machine does not have a plastic tab in the lid to switch off the power, it probably has a mercury tilt switch. Some washing machines built before 1980 may have mercury switches.
- **Gas Ranges, Ovens, and Stoves** — If there is a pilot light in the broiler section that is always on, there may be a mercury flame sensor. Ovens with lights that turn on when you open the door may have mercury tilt switches. Ovens, ranges and stoves from the 1960s to the present may have mercury switches.
- **Electric or Gas Space Heaters** — These may have mercury tilt switches and flame sensors.
- **Commercial Gas Water Heaters** — Water heaters that hold 100 gallons or more may contain mercury flame sensors. Smaller gas and electric water heaters typically do not contain mercury flame sensors. But, check the smaller gas water heaters for mercury flame sensors because they may have been added as a replacement part.
- **Gas Furnaces** — Gas furnaces use the same mercury flame sensors that are found in water heaters.
- **Other Appliances** — Boilers, gas refrigerators, gas air conditioners, dryers, and microwave ovens may have mercury switches and flame sensors.

See page 27 for a list of major appliances that are known to contain mercury switches. This list is based on the information available now and will be updated as more information becomes available.

You may also contact the appliance manufacturer to ask if it contains mercury. Or, use a magnet to see if a flame sensor contains mercury. (Mercury flame sensors are magnetic.)

## How do I handle the mercury switches I remove?

You have a choice. You can handle them as universal waste or as hazardous waste. Keep in mind that the rules for universal waste are simpler than the rules for hazardous waste. This manual tells you how to handle the mercury switches as universal waste.

See pages 29–31 to learn about the requirements for hazardous and universal waste.

To learn more about universal waste, read “[Managing Universal Waste in California](#)”

## Do I have to keep records of the mercury switches I remove?

Yes. You must keep paper or electronic records of the following for at least **3 years**:

- The total number of major appliances destined for shredding;
- The total number of major appliances destined for crushing, baling, shearing or shredding that contained 1 or more mercury switches; and
- The number of mercury switches you removed from these major appliances.

See page 28 for a sample form for keeping track of mercury switches.

## Where should I keep mercury switches before I send them off for recycling?

- Place removed switches in a heavy plastic container. It must be in good condition and not leak. Use a container with a tight fitting lid.
- Do not use tin or aluminum containers. Mercury can react with the metal and leak through the seams.
- Use packing material, like bubble wrap, to fill-in the empty space inside the container to keep the mercury switches from breaking or leaking.
- Label the container. Write “Universal Waste – Mercury Switches,” “Waste Mercury Switches,” or “Used Mercury Switches.”
- Keep the container in a storage area where it will not be disturbed.
- **Do not dispose of removed mercury switches with non-hazardous waste.**

## How long can I keep mercury switches?

If you handle them as universal waste, you can keep mercury switches for up to 1 year.

If you handle the switches as hazardous waste, you can keep them from 90 to 270 days. It depends on how much hazardous waste you have every month. See pages 29–31 for more information.

## Who can ship the mercury switches?

You can ship them yourself as long as you handle them as universal waste, and the container you are using to transport the switches is properly labeled and contains less than a pound of mercury.

You can also use a commercial ground carrier that accepts universal waste. Make sure you contact the carriers first to find out what their policies are for transporting universal waste.

Or hire a hazardous waste hauler to pick up the mercury switches from your facility, and ship them to a destination facility for you. You can also check to see if your current hazardous waste hauler you may already be using will accept mercury switches.

Page 32 lists companies that handle and transport mercury switches from California.



## Do I need a hazardous waste manifest to transport mercury switches?

If you handle the switches as universal waste, you do not need a manifest unless you ship more than 1 pound of mercury. There can be 1 to 2 drops of mercury inside a mercury switch. It takes about 200-450 switches to get to 1 pound of mercury, depending on the kinds of mercury switches you have.

A universal waste transporter can transport them by ground with a bill of lading.

## Do I have to follow federal regulations for transporting hazardous materials?

It depends on how you ship the mercury and how much mercury you ship.

- If you ship mercury switches by **air or water**, you must follow the U.S. Department of Transportation (DOT) regulations for transporting hazardous materials.
- If you use **ground** shipment, you only have to follow the DOT regulations for transporting hazardous materials if the package of mercury switches that you are shipping contains more than 1 pound of mercury.

## What if the mercury switches are transported to another state?

Make sure the transporter follows the regulations of California and the state(s) through which he travels.

## Where do I ship mercury switches to?

They must go to an authorized “destination facility.” This is where the mercury is removed from the switches and recycled. You can ship the switches to the recycler directly or to a universal waste handler who later sends them to a recycler.

See page 32 for a list of companies that handle and transport mercury switches from California. You can also check to see if the hazardous waste hauler you may already be using will accept mercury switches.

Page 33 lists companies that recover and recycle mercury switches from California.

## Do I have to keep records of the mercury switches I ship?

Yes. If you handle the switches as universal waste, keep a record (like a log, invoice, bill of lading, or other shipping document) for at least **3 years** after the mercury switches leave your shop. Keep track of the amount of mercury switches you ship, the date of shipment, and the name and address of where they were shipped.

## Do I have to keep records of the mercury switches I receive?

If you receive mercury switches from other universal waste handlers, then you must also keep records for at least **3 years** from the day you received the shipment, including the name and address of the universal waste handler that sent you the mercury

switches, the amount of mercury switches received, and the date you received them.

See page 34 for a sample shipping/receiving record.

## Chest freezers

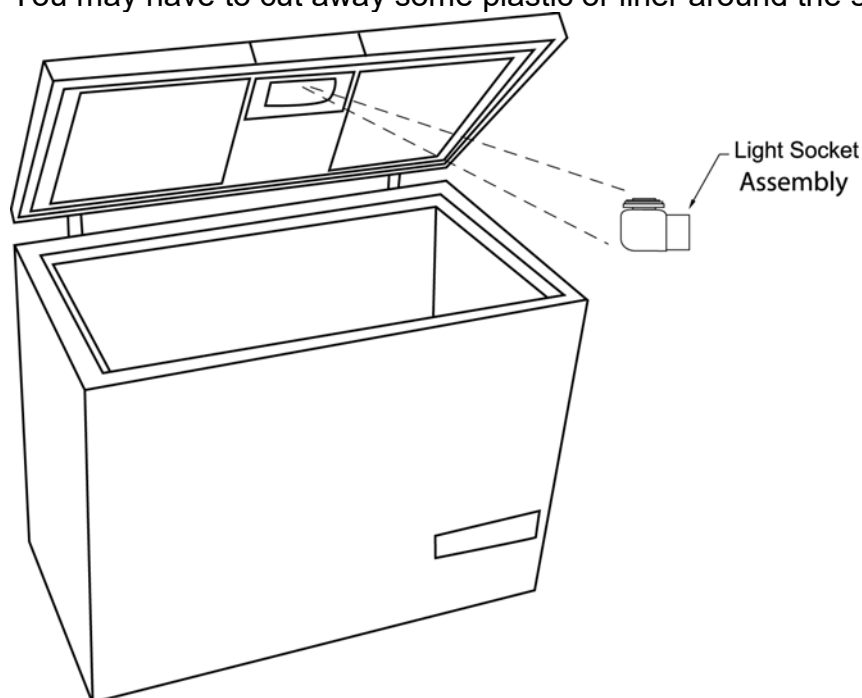
### Freezers were made with mercury switches until January 1, 2000.

Some freezers with a lid light have a mercury switch in the light socket.

Others have a mercury-free mechanical light switch. If the freezer has a light in the cover and no visible push-button, it probably contains a mercury switch. Upright and smaller freezers do not have mercury switches.

It takes about 1-5 minutes to remove these switches. It is easier to remove them from newer models.

You may have to cut away some plastic or liner around the switch in older models.



*Location of Mercury Switches in Lid Light of Chest Freezers*

### Mercury switches can look like this:



*Chest freezer light socket housings that have mercury switches inside.*



*A chest freezer light with an in-line mercury switch.*

## Remove mercury switches from chest freezers

Follow these steps:



1. Open the freezer lid. Look for a mechanical switch. If there is no light or if you find a mechanical switch, then it does not have a mercury switch and you can handle the freezer like scrap metal after you remove all other hazardous material like CFCs and PCBs.



2. Find the light under the lid.



3. Remove the light dome fixture or plastic insulation cover in the lid, if there is one.



4. Remove the light bulb. Discard properly.



5. Pull the light socket housing out of its mounting bracket. Some lights have a glass capsule hidden by insulation. You may have to cut away some of the plastic or metal to get to the switch.  
**Be careful when you remove and handle glass switches.**



6. The housing is shaped like a boot and is made of plastic or rubber. The mercury switch is inside the housing. Some of the housings are marked "Hawkeye."



7. Cut or remove the wires connected to the light socket.



8. Remove of the entire light socket and, follow the directions for disposal on pages 6 and 29–31.

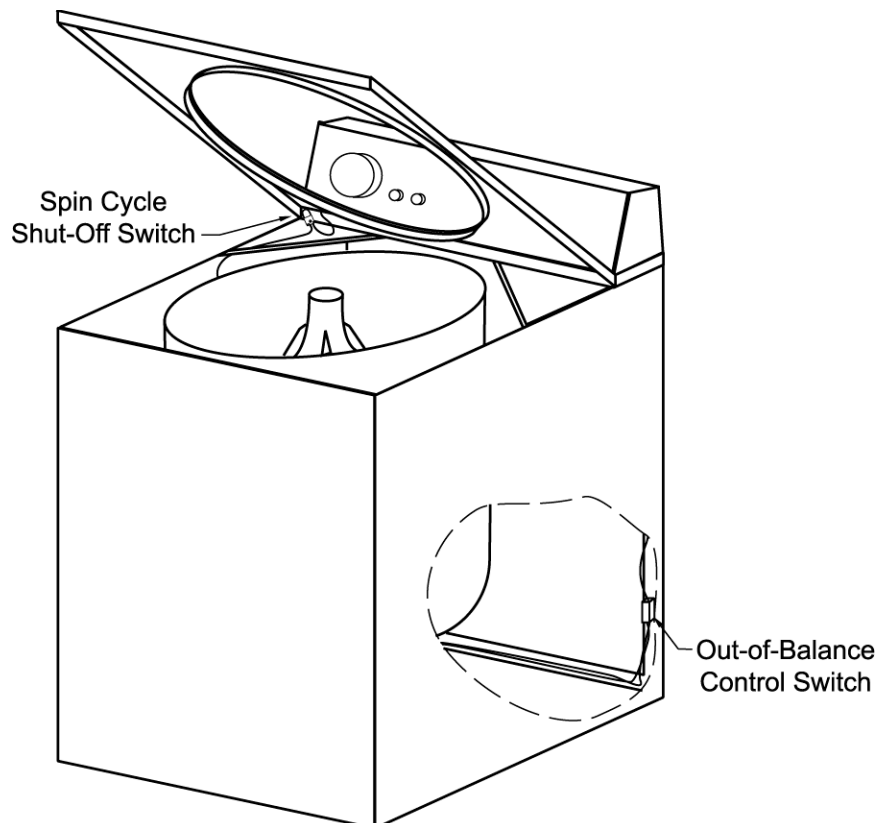
# Washing Machines

## Washing machines were made with mercury switches before 1980.

Mercury switches were used for two reasons:

1. In the lid, to stop the washer when you open the lid, and
2. At the back, to turn off the washer when it gets out of balance. You can only tell if this type of switch is a mercury switch after you remove it.

It takes about 2-10 minutes to remove these switches.



*Location of Mercury Switches in Washing Machines*

## Remove a mercury switch in the lid of a washing machine

Follow these steps:

1. Open the lid. Look for a plastic tab or button along the rim of the lid. If you find a tab or button, then the washing machine has a mechanical switch. If you find a mechanical switch, there is no mercury switch.

*Non-mercury mechanical switch examples:*



Back tab switch



Front tab switch

2. Remove the top of the washer, including the lid. Cut away the wires, and pry loose the spring clips or screws that connect the top to the washer.



3. The mercury switch is on the underside of the washer top. It is attached to the lid-mounting rod. It is usually a blue or black plastic cylinder about a half-inch thick and 1½ inches long with 2 wires. Or, it can be glass.



4. Remove the switch from the bracket



5. Cut or remove any wires.



6. Follow the disposal directions on pages 6 and 29–31.





## Remove a mercury switch at the back of a washing machine

Follow these steps:

1. Find the out-of-balance control switch at the back of the machine.



2. Remove the fastening bolts.



3. Disconnect the wires. Examine the switch. The mercury switch usually is made of glass, so you can see the mercury inside



4. Follow the disposal directions on pages 6 and 29–31.





## Gas ranges

Gas ranges use an electronic ignition system or a pilot light. Many gas ranges with pilot lights have a mercury flame sensor. The mercury flame sensor contains mercury to shut off the gas when the pilot light goes out. The mercury flame sensor is attached to the gas burner, under the oven in the broiler cavity.

The mercury flame sensor has three parts:

- A safety valve sensor probe (“probe”),
- A safety valve capillary tube (“capillary tube”), and
- A gas safety valve control (“safety valve”).

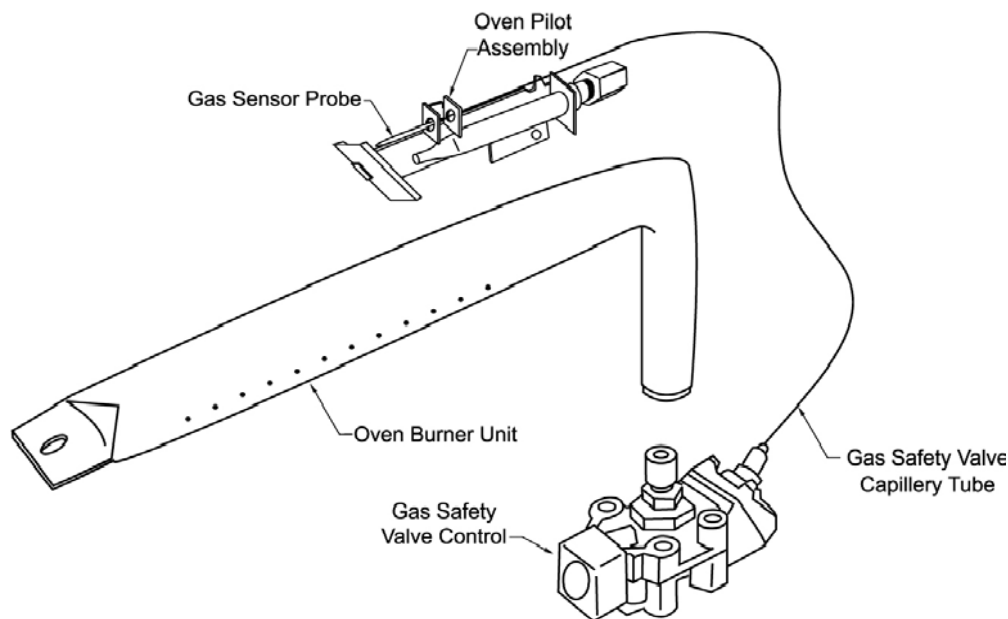
The probe usually sticks out into the pilot-light area. It is connected to the capillary tube, which is connected to the safety valve. The safety valve usually is attached to the back wall of the broiler cavity, and is also connected to the base of the oven burner unit.

There is mercury in the probe and capillary tube. To keep mercury from leaking, remove the entire mercury flame sensor **in one piece**. It will take about 1-5 minutes to remove.

Some gas ranges have a mercury-free thermocouple instead of a mercury flame sensor. You can use a magnet to tell if there is a mercury sensor. Mercury switches are usually magnetic.

Newer gas ranges have electronic ignitors or electronic flame sensors. If you see a safety valve that is missing a capillary tube, and instead has wires attached to it, then it probably has an electronic ignitor or electronic flame sensor. It does not contain mercury.

Some gas ranges may also have probes and capillary tubes that are found inside the oven cavity. These do not contain mercury.



*Mercury Flame Sensor, Gas Burner and Pilot Light Assemblies*

## Remove a Mercury Switch from a Gas Range

Follow these steps:

1. Put the oven on a protected surface, like a plastic tarp.
2. Remove the broiler pan drawer at the bottom of the oven.



3. If you find a small capillary tube near the back wall of the broiler cavity, the range probably has a mercury flame sensor. You must remove the gas burner assembly, safety valve, and all attached gas fittings.



**Note:** Electronic flame sensors and electronic ignitors have wires connected to the safety valve instead of a capillary tube. If there is a bracket covering the flame sensor, bend it out of the way to look for the wires. If there are wires it is not a mercury flame sensor, and you can process the range for scrap metal after you remove other hazardous materials like PCBs and fluorescent lights.



4. Remove the key (can be a screw or a pressure-fit tab) that holds the gas burner in place.



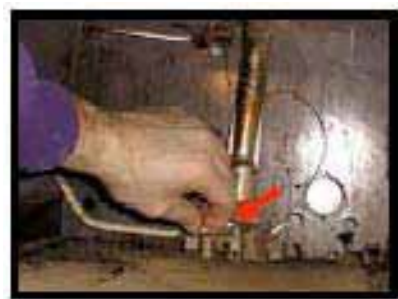
5. Use a crescent wrench to disconnect the gas feed line from the safety valve. Or, cut the gas line. Then, disconnect the safety valve from the gas burner.



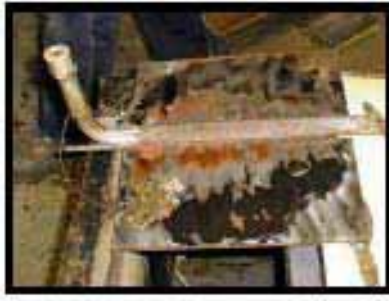
6. Loosen or cut the gas feed line to disconnect it from the pilot light assembly. If there are two feed lines disconnect them both.



7. Unscrew the safety valve from the back wall of the broiler cavity.



8. Remove the gas burner assembly and the mercury flame sensor assembly together.



9. Remove the screw or spring clip that connects the mercury flame sensor assembly to the pilot light assembly.



10. Carefully pull the capillary tube and probe out of the bracket.



11. Follow the instructions on page 6 and pages 29–31 to dispose of the entire mercury flame sensor assembly.



*This is how a flame sensor assembly looks:*



**Note:** If there is a light inside a gas stove, there may be a mercury tilt switch inside the oven door. Disassemble the oven door and disconnect the lead wires to remove the mercury capsule. Put it in a heavy plastic container with a tight-fitting cover. Label the container properly.

## Commercial Gas Water Heaters

Water heaters that hold 100 gallons or more of water may have a mercury flame sensor. It takes 1-5 minutes to remove the mercury flame sensor. There are some water heaters that have a either copper (or aluminum) thermocouples, wire thermopiles, electronic flame sensors or electronic ignitors. These do not have mercury in them.

Follow these steps:

1. Find the temperature control unit.



2. Check to see if there is a gas valve attached to the temperature control unit.



3. Check to see if there is a mercury flame sensor plugged directly into the gas valve.

If there is a mercury flame sensor, follow the capillary tube attached to it until you reach the probe, which can be found near the pilot light under the water heater.



Mercury flame sensors have three prongs like an electrical plug with a metal capillary tube connected to it.



4. Remove the bottom of the heater. Find the pilot light assembly and remove the spring clip or screw that connects the probe to the light assembly. Carefully remove the probe.



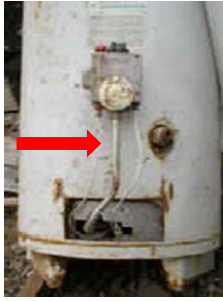
5. Unplug the mercury flame sensor from the gas valve and dispose the entire unit as one piece.



6. Follow the instructions on pages 6 and 29–31 to dispose of the entire mercury flame sensor assembly.







Gas water heaters that do not have gas valves usually do not have mercury flame sensors. Instead, they have copper, or aluminum, thermocouples attached to the temperature control unit.



Water heaters that have an insulated wire instead of a capillary tube may either have an electronic flame sensor, electronic ignitor, or wire thermopile. None of these have mercury. This picture shows an electronic flame sensor.



## Gas Furnaces

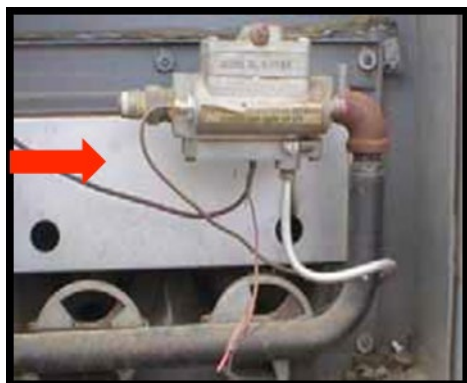
Gas furnaces and gas water heaters use the same types of gas valves and mercury flame sensors. There are two ways mercury flame sensors can be installed in gas furnaces.

1. If the mercury flame sensor is attached directly to the gas valve, follow the removal instructions for the gas water heater.
2. Some gas furnaces have mercury flame sensors that are attached directly to a control box that is separate from the gas valve. These mercury flame sensors also have capillary tubes with probes that are near the pilot light. Be sure to remove the entire mercury flame sensor unit in one piece.



It takes about 1-5 minutes to remove the mercury flame sensors. Follow the instructions on pages 6 and 29–31 to dispose of the entire mercury flame sensor.

### Thermocouples and thermopiles that do NOT have mercury:



Thermocouples that:

- Are made of copper or aluminum,
- Screwed directly to gas valve, and
- Do not have a safety valve control at the end.



Wire thermopile that:

- Are not hollow,
- Are wrapped in metal or plastic jacket, and attached directly to the gas valve with spade connectors, and
- Do not have a safety valve control at the end.

## Electric Space Heaters

Some electric space heaters use mercury switches to turn off the heater if it tips over. It takes 3-4 minutes to remove a switch from a space heater.

To remove the mercury switch, unscrew the plastic base of the heater. Find the two power supply wires and follow them to the mercury switch mounted near the thermostat.

Unscrew the metallic disk-shaped mercury switch. Remove the mercury switch and the small piece of black plastic in one piece.

Follow the disposal instructions on page 6 and pages 29–31.

## Other Appliances

Examine appliances closely to see if they contain a mercury switch, especially major appliances that have automatic shut-off features.

For specific instructions, contact the manufacturer.

# Mercury Safety and What to Do After a Spill

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Mercury can be dangerous. So follow safety procedures at all times!

## Have a written safety plan

Write a plan of what to do if there is a mercury spill. The plan should talk about:

- Personal protective equipment,
- How to clean up a spill,
- How to manage waste,
- First aid,
- When to get emergency help (like the fire department's hazardous materials team), and
- How to dispose of mercury and clean-up residues.

Check with the fire department when you write your plan to make sure you have all the equipment you need to handle a spill, like spill clean-up kits and containers.

**NOTE:** When you handle mercury, have protective equipment and a mercury spill kit nearby. Make sure all employees know how to use them and what to do if there's a spill.

## What NOT to do after a mercury spill

- DO NOT sweep up mercury with a broom.
- DO NOT vacuum a mercury spill.
- DO NOT wash contaminated clothes in a washing machine. Put the clothes in double garbage bags. Tie each bag separately. Dispose of the bag as hazardous waste.

## What do I do if someone is exposed to mercury?

**Mercury on the skin** — Wash the skin with soap and water. Remove all clothes that touched the mercury. Seal the clothes in a plastic bag. Dispose of the bag as hazardous waste. See a doctor right away!

**Mercury in the eye** — Flush eyes with water for at least 15 minutes. See a doctor right away!

**Inhaled mercury** — Let the person breathe fresh air. See a doctor right away!

**Swallowed mercury** — Get medical help right away!

To learn more, contact a poison control center or talk to your doctor.

## Where can I get more information?

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To learn more about mercury and the laws for handling mercury switches, call the regional Public and Business Liaisons at:

**(800) 72 TOXIC** (1-800-728-6942)

Or, go to: **[www.dtsc.ca.gov](http://www.dtsc.ca.gov)**

Or, contact the DTSC office nearest you.

### **DTSC Headquarters**

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### **Berkeley Office**

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Berkeley, CA 94710  
(510) 540-3739

### **Chatsworth Office**

9211 Oakdale Ave  
Chatsworth, CA 91311-6505  
(818) 717-6500

### **Clovis Office**

1515 Tollhouse Road  
Clovis, CA 93611-0522  
(559) 297-3901

### **Commerce Office**

6119 E. Washington Blvd, #120  
Commerce, CA 90040

### **Cypress Office**

5796 Corporate Avenue  
Cypress, CA 90630  
(714) 484-5400

### **San Diego Office**

2375 Northside Drive, Suite  
100  
San Diego, CA 92108  
(619) 516-1963

For general information about mercury and mercury switches:

### **U.S. EPA - RCRA, Superfund & EPCRA Call Center**

800-424-9346, or  
[www.epacallcenter@bah.com](mailto:www.epacallcenter@bah.com)

### **U.S. EPA**

[www.epa.gov/mercury/](http://www.epa.gov/mercury/)

### **U.S. EPA-Region 5**

<https://www.epa.gov/aboutepa/epa-region-5>

### **Association of Municipal Recycling Coordinators**

[www.amrc.guelph.org](http://www.amrc.guelph.org)  
(Broken link)

### **Appliance Recycling Information Center**

<https://www.aham.org/>

### **Disclaimer:**

This guide does not replace or supersede statutes and regulations. Always review the most current statutes and regulations. The Department of Toxic Substances Control does not endorse or recommend any product or brands mentioned in this guide.

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*Ontario White Goods Collection & Mercury Switch/Sensor Removal Pilot – Final Report.* Association of Municipal Recycling Coordinators. Prepared for Environment Canada. March 2002.

*Pre-Demolition Environmental Checklist and Guide: Mercury.* Minnesota Pollution Control Agency. December 2000.

*Purchasing for Pollution Prevention*. INFORM, Inc. 2001.

The photos and illustrations in this guide are from:

*Vermont Agency of Natural Resources, Environmental Assistance Division*  
([www.anr.state.vt.us/dec/ead/mercury/appman.pdf](http://www.anr.state.vt.us/dec/ead/mercury/appman.pdf)), and

*Geomatrix Consultants, Inc.*

## Major Appliances that have Mercury Tilt Switches

### Chest Freezers

All freezers listed below that were made before 2000 have the switch in the light socket in the lid.

Amana	FHH8	Montgomery Ward
Baycrest	Franklin	Norseman
Beatty	Frigidaire	RCA
Belwood	GE*	Sears Coldspot
Bradford	General Freezer	Simpson Sears
Cdn. Appliance Manu.	Hotpoint	Supreme
Continental	Kelvinator	Viking
Coronado	Kenmore	Westinghouse
Deep Freeze	McCleary	Wood
Derby/Denby	McGraw-Edison	Zenith

\*New models of these brands may also have mercury switches.

### Washing Machines

Kenmore	Maytag	RCA Whirlpool
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For pre-1990 models, the switch is in the arm on the lid under left side of cover. Models manufactured before 1972 may also have a mercury switch mounted to the inside face of the back wall.

### Major Appliances with Mercury Flame Sensors\*

#### Appliance – Ranges/Ovens/Stoves (With or Without Electric Connections)

Manufacturer	Switch Location
Cholson/Colson	Front of Broiler
Coloric	Rear of Burner
GE	Rear of Broiler
Glenwood	Rear of Broiler
Magee	Rear of Broiler
Magic Chef	Broiler Burner
Preway	Burner
Sears	Rear of Burner
Whirlpool	Rear of Burner

#### Gas Ranges with Space Heater

Manufacturer	Switch Location
Coloric	Heater Burner
Magee	

### **Space Heaters**

<b>Manufacturer</b>	<b>Switch Location</b>
Presto	Inside bottom
Thermo Pride	On burner

### **Commercial Water Heaters**

<b>Manufacturer</b>	<b>Switch Location</b>
GE	On burner
Rheem	On burner

### **Furnaces & Boilers**

<b>Manufacturer</b>	<b>Switch Location</b>
Thermo Pride	On burner
White Rodgers	

### **Gas Refrigerators / Gas Air Conditioners**

<b>Manufacturer</b>	<b>Switch Location</b>
All except Norcold 1082, 600, 900, 1200	On burner

*Disclaimer: Mention of product names is not to be construed as an endorsement of that product.*



# Sample Log for Mercury Switch Removal

Date	# of Appliances to be shredded	# of Appliances to be crushed, baled, sheared or shredded that have one or more mercury switches	# of Mercury Switches Removed

## Requirements for Handling, Transporting and Recycling Universal Waste<sup>1</sup>

Requirements	Large Quantity Handler <sup>2</sup>	Small Quantity Handler <sup>2</sup>	Conditionally Exempt Small Quantity Generator <sup>2</sup>	Transporter (Transfer Facility)
<b>Maximum Generation Rate</b>	None	None	Less than 220 lbs. of hazardous waste and less than 2.2 lbs. of "acutely hazardous waste" per month	None
<b>Required Permits, Approvals and Notifications</b>	EPA identification number	None	None	Must follow Hazardous Materials Regulations if you transport a package that contains more than 1 lb. of mercury.
<b>Labeling &amp; Marking</b>	Mark as universal waste. Write the date you received or removed it.	Mark as universal waste. Write the date you received or removed it.	None	Make sure it is correctly marked.
<b>On-site Storage Limit</b>	No limit	Less than 11,000 lbs.	Less than 2,200 lbs. of hazardous waste or less than 2.2 lbs. of "acutely hazardous waste"	None
<b>Storage Time Limit</b>	1 year. Unless you can show that you need more time to recover, treat or dispose of it properly.	1 year. Unless you can show that you need more time to recover, treat or dispose of it properly.	None	10 days if transfer facility is in an industrial zone. 6 days if it is not in an industrial zone.
<b>Training</b>	Teach employees responsibilities: <ul style="list-style-type: none"> <li>• What to do after a spill and</li> <li>• Emergency procedures</li> </ul>	Teach employees responsibilities: <ul style="list-style-type: none"> <li>• What to do after a spill and</li> <li>• Emergency procedures</li> </ul>	None	None
<b>Records</b>	Keep basic records for 3 years: <ul style="list-style-type: none"> <li>• log,</li> <li>• invoice,</li> <li>• bill of lading, or</li> <li>• other shipping document.</li> </ul>	Keep basic records for 3 years: <ul style="list-style-type: none"> <li>• log,</li> <li>• invoice,</li> <li>• bill of lading, or</li> <li>• other shipping document.</li> </ul>	None	Keep records of all waste received for 3 years.

Requirements	Large Quantity Handler <sup>2</sup>	Small Quantity Handler <sup>2</sup>	Conditionally Exempt Small Quantity Generator <sup>2</sup>	Transporter (Transfer Facility)
<b>Transport</b>	Transport yourself or use common carrier. Make sure waste is sent to appropriate handler or facility. Must comply with Hazardous Materials Regulations if you transport more than 1 lb. of mercury in 1 package	Transport yourself or use common carrier. Make sure waste is sent to appropriate handler or facility. Must comply with Hazardous Materials Regulations if you transport more than 1 lb. of mercury in 1 package	Transport yourself or use common carrier. Make sure waste is sent to appropriate handler or facility. Must comply with Hazardous Materials Regulations if you transport more than 1 lb. of mercury in 1 package	Transport yourself or use common carrier. Make sure waste is sent to appropriate handler or facility. Must comply with Hazardous Materials Regulations if you transport more than 1 lb. of mercury in 1 package
<b>Treatment</b>	Not allowed except for removing mercury switches and cleaning up a release.	Not allowed except for removing mercury switches and cleaning up a release.	Not allowed except for removing mercury switches and cleaning up a release.	Not allowed except for removing mercury switches and cleaning up a release.
<b>Reporting</b>	Notify the EPA that you are managing universal waste unless you have an EPA ID number.	None	None	None

<sup>1</sup> Universal waste requirements apply only for handling and transporting hazardous waste.

<sup>2</sup> Large quantity, small quantity and conditionally exempt universal waste handlers/generators can be consolidators and collectors. A person who collects mercury switches from other people can also be a universal waste handler.

For more complete information, see: [Title 40 of the Code of Federal Regulations in part 273.](#)

## Requirements for Handling, Transporting and Recycling Hazardous Waste

Requirements	Large Quantity Generator	Small Quantity Generator	Conditionally Exempt Small Quantity Generator	Consolidator/Collector	Transporter	Destination Facility
<b>Quantity Handled</b>	<ul style="list-style-type: none"> <li>Generates 2,200 lbs. or more of hazardous waste per month, or</li> <li>Generates 2.2 lbs. or more of acutely hazardous waste per month, or</li> <li>Has 13,200 lbs. or more of hazardous waste on site at any time</li> </ul>	<ul style="list-style-type: none"> <li>Generates less than 2,200 lbs. of hazardous waste per month, or</li> <li>Generates less than 2.2 lbs. of acutely hazardous waste per month, or</li> <li>Never has 13,200 lbs. of hazardous waste on site at any time</li> </ul>	Generates no more than 220 lbs. of RCRA hazardous waste per month	No limit	No limit	No limit
<b>Required Permits, Approvals, &amp; Notifications</b>	EPA identification number	EPA identification number	EPA identification number	EPA identification number; Full or Standardized permit	EPA identification number and DTSC registration	EPA identification number and Full or Standardized permit
<b>Labeling &amp; Marking</b>	<p>Write on the container:</p> <ul style="list-style-type: none"> <li>"Hazardous Waste,"</li> <li>Date you first put waste in the container,</li> <li>Physical state of waste,</li> <li>Hazards,</li> <li>Your name and address</li> </ul>	<p>Write on the container:</p> <ul style="list-style-type: none"> <li>"Hazardous Waste,"</li> <li>Date you first put waste in the container,</li> <li>Physical state of waste,</li> <li>Hazards,</li> <li>Your name and address</li> </ul>	Label, mark, & pack as hazardous waste. Follow DOT regulations	Make sure waste is properly labeled	Make sure waste is properly labeled	Make sure waste is properly labeled

Requirements	Large Quantity Generator	Small Quantity Generator	Conditionally Exempt Small Quantity Generator	Consolidator/Collector	Transporter	Destination Facility
<b>On-site Storage Limit</b>	No limit	No more than 13,200 lbs.	Up to 2,200 lbs. of hazardous waste. OR, up to 2.2 lbs of acutely hazardous waste. Or 220 lbs. of spill residue from acutely hazardous waste	No limit	No limit	No limit
<b>Storage Time Limit</b>	90 days	180 to 270 days	None until you have 220 lbs. of hazardous waste or 2.2 lbs. of acutely hazardous waste. Then, for 180–270 days	10 days	6 days in transit. 10 days if transfer is in an industrial zone	90 days before treatment
<b>Training</b>	Formal training. Additional formal training every year. What to do after a spill and emergency procedures.	Informal training. What to do after a spill and emergency procedures.	Informal training. What to do after a spill and emergency procedures.	Initial and annual training. What to do after a spill and emergency procedures.	Initial and annual training. What to do after a spill and emergency procedures.	Initial and annual training. What to do after a spill and emergency procedures.

Requirements	Large Quantity Generator	Small Quantity Generator	Conditionally Exempt Small Quantity Generator	Consolidator/Collector	Transporter	Destination Facility
<b>Manifest Records</b>	Manifest required. Keep records for 3 years	Manifest required. Keep records for 3 years	No manifest required if you transport up to 5 gallons or 50 lbs. to a household hazardous waste collection facility or a TSDF.	Manifest required. Keep records for 3 years	Manifest required UNLESS you are transporting up to 5 gallons or 50 lbs. of hazardous waste to a TSDF, <b>OR</b> you are a “conditionally exempt small quantity generator” and transport up to 5 gallons or 50 lbs. of your waste to a household hazardous waste collection facility.	Manifest required. Keep records for 3 years

Requirements	Large Quantity Generator	Small Quantity Generator	Conditionally Exempt Small Quantity Generator	Consolidator/Collector	Transporter	Destination Facility
<b>Requirements for Transporting</b>	You must use a registered hazardous waste hauler and ship with a hazardous waste manifest.	You must use a registered hazardous waste hauler and ship with a hazardous waste manifest.	You must use a registered hazardous waste hauler and ship with a hazardous waste manifest, except if personally transporting up to 5 gallons or 50 lbs. of hazardous waste to a household hazardous waste collection facility.	You must use a registered hazardous waste hauler and ship with a hazardous waste manifest	You must be a registered hazardous waste hauler and ship with a hazardous waste manifest	You must use a hazardous waste hauler and a ship with a hazardous waste manifest
<b>Treatment</b>	Need authorization	Need authorization	Need authorization	Not allowed	Not allowed	Need authorization and in California, a hazardous waste facility permit.
<b>Contingency Plan &amp; Emergency Procedures</b>	Must have a written plan	Must have an emergency coordinator to: <ul style="list-style-type: none"> <li>• Respond to emergencies</li> <li>• Clean spills</li> </ul> Call fire dept. or put out fire Must post emergency contact information and make sure all employees are trained to handle spills.	None	None	Must respond to releases	Must have a plan

Requirements	Large Quantity Generator	Small Quantity Generator	Conditionally Exempt Small Quantity Generator	Consolidator/Collector	Transporter	Destination Facility
<b>Exception Reports</b>	Send DTSC an "exception report" if you do not get a copy of the hazardous waste manifest within 35 days of date transported.	Send DTSC an "exception report" if you do not get a copy of the hazardous waste manifest within 35 days of date transported.	Send DTSC an "exception report" if you do not get a copy of the hazardous waste manifest within 35 days of date transported.	None	None	None

For more complete information, see the [Hazardous Waste Generator Regulatory Summary](#) on the U.S. EPA website.



## Companies that Handle and Transport Mercury Switches in California

Company	Address	Contact
AERC-MTI (Advanced Environmental Recycling Co.– Mercury Technologies Int'l)	30677 Huntwood Ave. Hayward, CA 94555	Tel: 800-628-3675 Fax: 510-429-1498 <a href="http://www.aercrecycling.com">www.aercrecycling.com</a>
Chemical Waste Management	35251 Old Skyline Road Kettleman City, CA 93239	Tel: 550-386-9711
Clean Harbors Los Angeles, LLC Los Angeles Facility	5756 Alba Street Los Angeles, CA 90058	Tel: 323-277-2500 Fax: 323-277-2523 <a href="http://www.cleanharbors.com">www.cleanharbors.com</a>
Clean Harbors of San Jose, LLC San Jose Facility	1040 Commercial St., Suite 109 San Jose, CA 95112	Tel: 408-451-5000 Fax: 408-453-6045 <a href="http://www.cleanharbors.com">www.cleanharbors.com</a>
Kinsbursky Brothers, Inc.	1314 North Anaheim Blvd. Anaheim, CA 92801	Tel: 714-738-8516 Fax: 714-441-0857 <a href="http://www.kinsbursky.com">www.kinsbursky.com</a>
Kinsbursky Environmental Management	101 North Glover Ave., Suite B Chula Vista, CA 91909	Tel: 619-409-9292 <a href="http://www.kinsbursky.com">www.kinsbursky.com</a>
Lighting Resources, Inc. Ontario Branch	805 East Francis Street Ontario, CA 91741	Tel: 888-923-7252 Fax: 909-923-7510 <a href="http://www.lightingresourcesinc.com">www.lightingresourcesinc.com</a>
North State Environmental – Southern California	2776 South Lilac Ave Bloomington, CA 92316	Tel: 909-875-9288 Fax: 909-875-9813 <a href="http://www.north-state.com">www.north-state.com</a>
North State Environmental	5519 Clairemont Mesa Blvd. San Diego, CA 92117	Tel: 858-273-8669 Fax: 858-273-8678 <a href="http://www.north-state.com">www.north-state.com</a>
North State Environmental – Northern California	90 South Spruce Ave., Ste. C3 South San Francisco, CA 94080	Tel: 650-588-2838 Fax: 650-588-1950 <a href="http://www.north-state.com">www.north-state.com</a>
Onyx Environmental Services, Inc.	4227 Technology Drive Fremont, CA	Tel: 510-651-2964 Fax: 510-656-4926 <a href="http://www.onyxes.com">www.onyxes.com</a>
Onyx Environmental Services, Inc.	1704 West First Street Azusa, CA 91702	Tel: 626-334-5117 Fax: 626-334-4563 <a href="http://www.onyxes.com">www.onyxes.com</a>
Onyx Environmental Services, Inc.	5202 Oceanus Drive Huntington Beach, CA 92649	Tel: 714-379-6000 Fax: 714-379-6010 <a href="http://www.onyxes.com">www.onyxes.com</a>
Onyx Environmental Services, Inc.	1125 Hendey Street Richmond, CA 94801	Tel: 510-233-8001 Fax: 510-235-9427 <a href="http://www.onyxes.com">www.onyxes.com</a>
Recyclights, Inc.	2439 Industrial Parkway West Hayward, CA 94545	Tel: 800-884-8982 Fax: 510-782-8984
Safety-Kleen Systems, Inc. Cluster II, Building 3	5400 Legacy Drive Plano, TX 75024	Tel: 800-669-5740 Fax: 972-265-2000 <a href="http://www.safety-kleen.com">www.safety-kleen.com</a>
Thomas Gray & Associates, Inc.	1205 West Barkley Ave. Orange, CA 92868	Tel: 714-997-8090 Fax: 714-997-3561 <a href="http://www.tgainc.com">www.tgainc.com</a>

*Note: Most hazardous waste transporters registered with DTSC handle and transport mercury switches.*

*Disclaimer: This list includes commercial firms found to offer mercury-containing switch handling services. DTSC does not endorse or recommend any specific vendor. In addition, this list is for informational purposes only and is not meant to be a complete or up-to-date list of companies that provide mercury-handling and recycling services in California. Contact companies directly to obtain information regarding services provided, company-specific packaging and labeling requirements, and costs.*

## Waste Destination Facilities that Accept Mercury Switches from California <sup>1</sup>

Company	Address	Contact
AERC-MTI (Advanced Environmental Recycling Co. – Mercury Technologies Int'l)	2591 Mitchell Avenue Allantown, PA 18103	Tel: 800-554-2372 Fax: 610-791-7696 <a href="http://www.aercrecycling.com">www.aercrecycling.com</a>
Bethlehem Apparatus Company, Inc.	890 Front Street, PO Box Y Hellerton, PA 18055	Tel: 610-838-7034 Fax: 610-838-6333 <a href="http://www.bethlehemapparatus.com">www.bethlehemapparatus.com</a>
Lighting Resources, Inc.	498 Park Drive Greenwood, IN 46143	Tel: 317-888-3889 Fax: 317-888-3890 <a href="http://www.lightingresourcesinc.com">www.lightingresourcesinc.com</a>
Mercury Waste Solutions, Inc. National Processing Center	21211 Durand Avenue Union Grove, WI 53182-9711	Tel: 800-741-3343 Fax: 262-878-2699 <a href="http://www.mercurywastesolutions.com">www.mercurywastesolutions.com</a>
NSSI Sources and Services, Inc.	P.O. Box 34042 Houston, TX 77234	Tel: 713-641-0391 Fax: 713-641-6153 <a href="http://www.nssihouston.com">www.nssihouston.com</a>
Onyx Environmental Services, Inc. (dba: Onyx Special Services, Inc.)	5736 West Jefferson Street Phoenix, AZ 85043	Tel: 800-556-5267 <a href="http://www.superiorserv.com">www.superiorserv.com</a> (Broken Link)

*Disclaimer: This list includes commercial firms that were found to offer mercury-containing switch recovery services as of **May 2005**. The Department of Toxic Substances Control does not endorse or recommend a specific vendor. In addition, this list is for informational purposes only and is not meant to be a complete or up-to-date list of vendors that provide mercury recovery services in California. Contact companies directly to obtain information regarding services provided, company-specific packaging and labeling requirements, and costs.*

<sup>1</sup> These facilities have a mercury retort to recover mercury from switches.

## Sample Shipping/Receiving Log for Mercury Switches

[illegible]

## Where to Buy Mercury Spill Kits

Company	Address	Contact
Abatix Environmental Supply	3011 East Broadway, Suite #300 Phoenix, AZ 85040	Tel: (602) 323-1941 Toll-free: (800) 889-5186 <a href="http://www.abatix.com">www.abatix.com</a>
Advanced Environmental Solutions	204 First Avenue South, Third Floor Seattle, WA 98104	Tel: 206-652-2323 Toll-free: 800-275-3549 <a href="http://www.advenvironmental.com">www.advenvironmental.com</a> (Links redirects to Liquidsafety.com)
Bel-Art Products	6 Industrial Rd. Pequannock, NJ 07440-1992	Tel: (973) 694-0500 <a href="http://www.bel-art.com">www.bel-art.com</a>
Bethlehem Apparatus Co. Inc. Resource Recovery & Recycling Division	890 Front St., P.O. Box Y Hellertown, PA 18055	Tel: (610) 838-7034 <a href="http://www.mercuryrecycling.com">www.mercuryrecycling.com</a>
Fisher Scientific	2000 Park Lane Pittsburgh, PA 15275	Toll-free: (800) 772-6733 <a href="http://www.fishersci.com">www.fishersci.com</a>
Flinn Scientific, Inc	P.O. Box 219 Batavia, IL 60510	Toll-free: (800) 452-1261 <a href="http://www.flinnsci.com">www.flinnsci.com</a>
Lab Safety Supply	P.O. Box 1368 Janesville, WI 53547-1368	Toll-free: (800) 356-0783 <a href="http://www.labsafety.com/home.htm">www.labsafety.com/home.htm</a> (Links redirects to Grainger.com)
Lamp Recyclers of Louisiana, Inc.	46257 Morris Road Hammond, LA 70404-2962	Tel: (985) 345-4147 <a href="http://www.i-55.com/lamprecycler">www.i-55.com/lamprecycler</a> (Broken Link)
Mallinckrodt Baker, Inc.	222 Red School Lane Phillipsburg, NJ 08865	Toll-free: (800) 582-2537 <a href="http://www.mallbaker.com">www.mallbaker.com</a> (Broken Link)
Sanderson Safety Supply	1101 SE 3rd Ave. Portland, OR 97214	Toll-free: (800) 547-0927 <a href="http://www.sandersonsafety.com">www.sandersonsafety.com</a> (Links redirects to Mallory.com)
Thomas Scientific	99 High Hill Rd. (near Route I-295) P.O. Box 99 Swedesboro, NJ 08085	Toll-free: (800) 345-2100 <a href="http://www.thomassci.com">www.thomassci.com</a>
VWR Scientific Products	5 Marway Circle Rochester, NY 14624	Tel: (716) 247-0613 Toll-free: (800) 932-5000 <a href="http://www.vwrsp.com">www.vwrsp.com</a> (Broken Link)

**Disclaimer:** This list includes commercial firms known to sell mercury spill kits as of **May 2005**. The Department of Toxic Substances Control does not endorse or recommend a specific vendor. In addition, this list is for informational purposes only and is not meant to be a complete or up-to-date list of companies that provide spill kits. Contact companies directly to obtain further information.