Fact Sheet
March 2005

How to Handle Mercury Switches in Major Appliances

DEPARTMENT OF TOXIC SUBSTANCES CONTROL

For: Scrap metal recyclers

DTSC is one of six Boards and Departments within the California Environmental Protection Agency. The Department's mission is to restore, protect and enhance the environment, to ensure public health, environmental quality and economic vitality, by regulating hazardous waste, conducting and overseeing cleanups, and developing and promoting pollution prevention.

State of California

California Environmental Protection Agency

This fact sheet explains how to remove and handle mercury switches before you crush or shred a major appliance. It supersedes the June 2004 fact sheet and includes reference to recent legislation that changes appliance recycler requirements.

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 is there mercury in major appliances?

Mercury is a metal with special properties.

- It is liquid at room temperature and conducts electricity. This makes it work well in tilt switches that control motors and pumps. The mercury is inside a small capsule that can shut off a major appliance or a light when it is tilted.
- It expands when heated. This makes it perfect to use in flame sensors for pilot lights that are found in many major gas appliances. The mercury is in a wire tube close to the pilot light. If the pilot light goes out, the mercury cools and closes the gas safety valve.

How much mercury is in a major appliance?

It depends on the type of switch. A tilt switch in a chest freezer or washing machine has a drop or two of mercury. A flame sensor in a gas oven, gas furnace, or water heater has about two drops of mercury.

Is mercury dangerous?

Mercury is poisonous. If mercury is not disposed of safely, it can be released into the environment and harm people and wildlife.

Contact with mercury can cause:

- birth defects,
- nerve disorders,
- brain damage, or
- death.

How do people come in contact with mercury?

Mercury can be inhaled, absorbed through the skin, or eaten (in contaminated food).

Do I have to remove mercury switches from major appliances?

Yes. The law says you must remove mercury switches and other hazardous materials from discarded major appliances before you crush, bale, shear or shred them. If you do not, you are breaking the law.

What are the new rules for mercury switches in major appliances?

In 2003, DTSC adopted the "Mercury Waste Classification and Management regulations." If you handle discarded major appliances with mercury switches, the new rules affect you in two ways:

1. Starting February 9, 2006, all discarded major appliances with mercury switches will be hazardous waste.
2. Mercury switches that were removed from discarded major appliances used to be considered regular hazardous waste. Now, they may be handled as *universal waste*.

In 2004, Assembly Bill 2277 changed the requirements for appliance recyclers beginning 2006. DTSC will issue a separate fact sheet to address the requirements of the bill.

What is universal waste?

Universal waste is a type of hazardous waste in which the rules for handling universal waste are simpler than for hazardous waste.

Am I affected by the new rules?

Yes, if you are a scrap metal recycler who accepts discarded major appliances. A scrap metal recycler is:

- a used appliance dealer,
- an appliance recycler,

a scrap metal yard, or

- anyone who handles a major appliance after it is no longer used.

Scrap metal recyclers must verify that the mercury switches have been removed from the major appliances before crushing, baling, shearing or shredding them.

Warning: Mercury is dangerous. Do not try to remove a mercury switch unless you have the right training and equipment!

Where can I learn more about these rules?

To learn more, read these fact sheets:

- *Managing Universal Waste in California* www.dtsc.ca.gov/PublicationsForms/HWM_FS_UWR.pdf
- *Changes to California's Universal Waste Regulations* www.dtsc.ca.gov/HazardousWaste/Mercury/HWMP_FS_UWRChanges.pdf
- *Summary of Universal Waste Handler Requirements* www.dtsc.ca.gov/HazardousWaste/Mercury/HWM_REP_UW-Requirements.pdf

Which major appliances have mercury switches?

Mercury switches can be in:

- **Chest Freezers**
  If the lid has a light and there is no plastic tab or button that turns the light on and off, the freezer may have a mercury tilt switch. But, freezers made after January 1, 2000 do not have mercury switches.
- **Washing Machines**
  Some washing machines may have 2 mercury tilt switches. One switch is used for switching off the power when the lid is raised. If a washing machine does not have a plastic tab or button in the lid to switch off the power, it probably has a mercury switch. The second switch is used for switching off the power if the load is not balanced. This switch is attached to the back wall inside the washing machine. Some washing machines built before 1980 may have mercury switches.

- **Gas Ovens**
  Mercury flame sensors that are used in some gas ovens are located near the back wall inside the broiler cavity. If there is a thin metal wire in the back of the broiler cavity, and it is connected to the pilot light assembly, it may be a mercury flame sensor. The thin metal wire is actually hollow and contains mercury. If you see insulated wires instead of a thin metal wire, it is not a mercury flame sensor. Ovens with lights that do not have an on/off switch may have mercury tilt switches.
- **Electric or Gas Space Heaters**
  These may have mercury switches and flame sensors.
- **Commercial Gas Water Heaters**
  Water heaters that hold 100 gallons or more may contain mercury flame sensors. If the water heater has a gas valve with a very thin metal wire plugged into it, it may have a mercury flame sensor. The metal wire is actually hollow and contains mercury.
- **Gas Furnaces**
  Like commercial gas water heaters, gas furnaces may have mercury flame sensors. The flame sensors may either be plugged directly into the gas valve or into a control box near the gas valve.
- **Other Commercial or Home Appliances**
  Like boilers, gas refrigerators, gas air conditioners, dryers, and microwave ovens may have tilt switches and flame sensors with mercury.

See page 5 for a list of the major brand names of these appliances. Mercury flame sensors in commercial gas water heaters and gas furnaces are similar. These parts may be used on models that do not typically use mercury flame sensors.

How do I remove a mercury switch?

To learn how to remove mercury switches from appliances, read: *Self-Training Manual for Removing Mercury Switches from Major Appliances*. Download it at: www.dtsc.ca.gov.

Is it hard to remove a mercury switch? How long does it take?

It depends on the major appliance. Some switches only take a minute to remove. Others can take longer. For example, it will take you longer to remove a switch from a gas stove than from a chest freezer. If the appliance is rusty or greasy, etc. it may be harder.

When should I remove switches from major appliances?

The best time to remove the switches is as soon as you get the appliance, when you remove any CFCs or PCBs.

What do I do with mercury switches after I remove them?

You can handle mercury switches as hazardous waste *or* as universal waste. Handling mercury switches as universal waste is simpler and easier than handling them as hazardous waste.

To handle mercury switches as universal waste, see the rules in the Calif. Code of Regulations, Title 22, Chapter 23, Article 2. Or, read "Managing Universal Waste in California" at: www.dtsc.ca.gov/PublicationsForms/HWM_FS_UWR.pdf

How do I store mercury switches?

1. Keep the mercury switches in a closed container in good condition.
2. Do not use a metal container. Mercury can react with metal or leak through the seams.
3. Wrap the switches in padding, like bubble wrap, so they won't break.
4. Keep the containers where they won't be disturbed.
5. Mark the container. Write on the label:
   "Universal Waste – Mercury," or
   "Waste – Mercury Switches," or
   "Used Mercury Switches"

How long can I keep mercury switches?

If you handle them as universal waste, you can keep mercury switches for up to a year. Write the date on the container when you first store a mercury switch in it. That way you can show an inspector that you have not kept mercury switches for more than a year.

Do I need an EPA identification number to handle mercury switches as universal waste?

You do not need an EPA ID number unless you have more than 11,000 pounds of universal waste at one time. But, you still have to:

- Have a system for cleaning up mercury, and
- Train employees on how to handle switches and what to do in an emergency.

Do I need a special carrier to transport mercury switches?

No. If you handle them as universal waste. You can transport the switches yourself. They have to be in sealed containers. If a switch is broken or damaged, put it in a sealed plastic bag inside the container. You do not have to use a hazardous waste manifest or a registered hazardous waste transporter.

If you handle other hazardous wastes, you can use your hazardous waste hauler to transport your mercury switches. You can also hire a commercial carrier that takes universal waste. Make sure the carrier knows and follows the rules for transporting universal waste.

If you ship packages of mercury switches by **air or by water**, you must follow the U.S. Department of Transportation (DOT) regulations for transporting hazardous materials. If you use **ground** shipment, your package must meet the DOT regulations only if it contains more than one pound of mercury.

Where can I ship mercury switches?

You have to ship mercury switches to an authorized mercury recycling facility. You can take your mercury switches to a recycler or to a universal waste handler who collects switches before sending them to a recycler.

See page 7 for a list of mercury switch handlers and transporting facilities in California.

See page 8 for a list waste destination facilities in California.

Do I have to keep any records?

Yes. If you choose to manage mercury switches as universal waste, then you must keep the following records for at least three years:

- The total number mercury switches you remove,
- The total number of major appliances destined for crushing, baling, shearing or shredding, and
- The total number of major appliances you found to contain one or more mercury switches.

What if there is a mercury spill?

Be very careful! It is dangerous to inhale, swallow, or handle mercury. If you see a broken, leaking, or damaged mercury switch, put it in a sealed plastic bag and then into a container.

Do not try to vacuum a mercury spill! Vacuuming spreads mercury vapors into the air. It can do more harm than good.

Write a plan of what to do if there's a mercury spill. Keep personal protective equipment and a mercury spill kit nearby when you remove mercury switches. Make sure that the staff knows exactly how to use them. You can get affordable spill kits from laboratory and safety supply stores.

What 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. Put the plastic bag in a hazardous waste container. See a doctor right away!

Mercury in the Eye
Flush eyes with water for 15 minutes. See a doctor right away!

Swallowed Mercury
Get medical help right away! Call poison control or your doctor for more information.

Where can I get more information?

For information about mercury, how to handle mercury switches, and regulatory requirements, contact a DTSC Public and Business Liaison. Call: 1-800-728-6942. Or, go to www.dtsc.ca.gov

For general information about mercury and mercury switches:

U.S. EPA - RCRA, Superfund & EPCRA Call Center
800-424-9346, or
www.epacallcenter@bah.com

U.S. EPA
www.epa.gov/mercury/

U.S. EPA-Region 5
www.epa.gov/region5/air/mercury/mercury.html

Association of Municipal Recycling Coordinators
www.amrc.guelph.org

Appliance Recycling Information Center
www.aham.org/aric/aric.cfm

Disclaimer

This fact sheet was prepared in March 2005 and is based on the statutes and regulations in effect at that time. You should always review the most current statutes and regulations. Mention of product names in this fact sheet is not to be construed as an endorsement of that product.

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.

Baycrest	Franklin	Norseman
Beatty	Frigidare	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
FHH8	Montgomery Ward	

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

Washing Machines

Kenmore	Maytag	RCA Whirlpool

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 Switches in Flame Sensor or Safety Valve*

Appliance	Manufacturer	Switch Location
Ranges/Ovens/ Stoves (With or Without Electric Connections)	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 broiler
	Whirlpool	Rear of broiler
Gas Ranges w/Space Heater	Coloric	Heater burner
	Magee	
Space Heaters	Presto	Inside bottom
	Thermo Pride	On burner
Commercial Water Heaters	GE	On burner
	Rheem	On burner
Furnaces & Boilers	Thermo Pride	On burner
	White Rodgers	
Gas Refrigerators **Gas Air Conditioners**	All except Norcold 1082, 600, 900, 1200	On burner

Sources:
Guide for Identifying Mercury in Household Applications. Burlington Board of Heath. December 2000.
Mercury Switches in Appliances: Final Report. Prepared for Massachusetts Department of Environmental Protection by Franklin County Solid Waste Management District
Ontario White Goods Collection & Mercury Switch/Sensor Removal Pilot – Final Report
Association of Municipal Recycling Coordinators. Prepared for Environment Canada, March 2002

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

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 www.aercrecycling.com
Chemical Waste Management	35251 Old Skyline Road Kettlemen 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 www.cleanharbors.com
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 www.cleanharbors.com
Kinsbursky Brothers, Inc.	1314 North Anaheim Blvd. Anaheim, CA 92801	Tel: 714-738-8516 Fax: 714-441-0857 www.kinsbursky.com
Kinsbursky Environmental Management	101 North Glover Ave., Suite B Chula Vista, CA 91909	Tel: 619-409-9292 www.kinsbursky.com
Lighting Resources, Inc. Ontario Branch	805 East Francis Street Ontario, CA 91741	Tel: 888-923-7252 Fax: 909-923-7510 www.lightingresourcesinc.com
North State Environmental – Southern California	2776 South Lilac Ave. Bloomington, CA 92316	Tel: 909-875-9288 Fax: 909-875-9813 www.north-state.com
North State Environmental	5519 Clairemont Mesa Blvd. San Diego, CA 92117	Tel: 858-273-8669 Fax: 858-273-8678 www.north-state.com
North State Environmental – Northern California	90 South Spruce Ave., Ste. C3 South San Francisco, CA 94080	Tel: 650-588-2838 Fax: 650-588-1950 www.north-state.com
Onyx Environmental Services, Inc.	4227 Technology Drive Fremont, CA 94538	Tel: 510-651-2964 Fax: 510-656-4926 www.onyxes.com
Onyx Environmental Services, Inc.	1704 West First Street Azusa, CA 91702	Tel: 626-334-5117 Fax: 626-334-4563 www.onyxes.com
Onyx Environmental Services, Inc.	5202 Oceanus Drive Huntington Beach, CA 92649	Tel: 714-379-6000 Fax: 714-379-6010 www.onyxes.com
Onyx Environmental Services, Inc.	1125 Hendey Street Richmond, CA 94801	Tel: 510-233-8001 Fax: 510-235-9427 www.onyxes.com
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 www.safety-kleen.com
Thomas Gray & Associates, Inc.	1205 West Barkley Ave. Orange, CA 92868	Tel: 714-997-8090 Fax: 714-997-3561 www.tgainc.com

***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 [1]

Company	*Address*	*Contact*
AERC-MTI (Advanced Environmental Recycling Co. – Mercury Technologies Int'l)	2591 Mitchell Avenue Allentown, PA 18103	Tel: 800-554-2372 Fax: 610-791-7696 www.aercrecycling.com
Bethlehem Apparatus Company, Inc.	890 Front Street, PO Box Y Hellerton, PA 18055	Tel: 610-838-7034 Fax: 610-838-6333 www.bethlehemapparatus.com
Lighting Resources, Inc.	498 Park Drive Greenwood, IN 46143	Tel: 317-888-3889 Fax: 317-888-3890 www.lightingresourcesinc.com
Mercury Waste Solutions, Inc. National Processing Center	21211 Durand Avenue Union Grove, WI 53182-9711	Tel: 800-741-3343 Fax: 262-878-2699 www.mercurywastesolutions.com
NSSI Sources and Services, Inc.	P.O. Box 34042 Houston, TX 77234	Tel: 713-641-0391 Fax: 713-641-6153 www.nssihouston.com
Onyx Environmental Services, Inc. (dba: Onyx Special Services, Inc.)	5736 West Jefferson Street Phoenix, AZ 85043	Tel: 800-368-9095 www.superiorserv.com

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[1] These facilities have a mercury retort to recover mercury from switches.