STATE OF CALIFORNIA
California Environmental Protection Agency
Department of Toxic Substances Control

WASTE MANAGEMENT OPTIONS: FOR MERCURY – CONTAINING SWITCHES IN VEHICLES AND MAJOR APPLIANCES

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Background

Mercury is a naturally occurring element that is poisonous and can accumulate in the tissues of animals and humans, causing birth defects, nervous disorders, permanent brain damage, and even death through prolonged exposure. It is a highly toxic and persistent metal that is used in light switches, tilt switches, and flame sensors (hereafter, "mercury switches") in vehicles and major appliances. Vehicles include domestic and foreign cars and trucks. "Major appliance" means "any domestic or commercial device, including, but not limited to a washing machine, clothes dryer, hot water heater, dehumidifier, conventional oven, microwave oven, stove, refrigerator, freezer, air-conditioner, trash compactor, and residential furnace," as defined in California Public Resources Code, section 42166 (Pub. Resources Code, § 42166). In switches, mercury is present in amounts of one to two grams (approximately one to two drops). Considering the large number of vehicles and appliances that are scrapped each year, these switches, if improperly managed, present a significant source of mercury releases to the environment.

Prior to recent changes to California laws and regulations, all mercury switches removed from vehicles and major appliances were classified as hazardous waste and had to be managed as hazardous waste. This was because the total mercury concentrations in mercury switches exceed the threshold of 20 milligrams of mercury per kilogram of waste material as listed in the California Code of Regulations, title 22, section 66261.24 (Cal. Code Regs., tit. 22, § 66261.24). In addition, since 1997, the Metallic Discards Act (Pub. Resources Code, §§ 42160-42185) has required that mercury found in switches and temperature control devices (as well as other hazardous materials including polychlorinated biphenyls (PCBs), chlorofluorocarbons (CFCs), and used oil) be removed from major appliances before they are crushed for recycling or transferred to a baler or shredder for recycling. Since passage of the Metallic Discards Act, however, mercury switches have not always been properly removed from discarded appliances and managed as hazardous waste.

To better capture and manage all mercury switches in a coordinated manner, in 2001 the California Legislature enacted Senate Bill 633 (Chapter 656, Statutes of 2001), which included separate provisions aimed at both major appliances and vehicles. For appliances, SB 633 requires the Department of Toxic Substances Control (DTSC) and local enforcement agencies to incorporate into their existing inspection and enforcement programs, the requirement that mercury switches and other hazardous materials be removed before appliances are crushed or shredded. For vehicles, SB 633 added Article 10.2 to Chapter 6.5 of Division 20 of the Health and Safety Code (Health & Saf. Code). Section 25214.6, which is part of the new Article 10.2, expanded the scope of the Universal Waste Rule (UWR) to include "mercury-containing motor vehicle light switches." This law allows removed mercury switches to be managed under the streamlined requirements of the UWR.

Universal wastes are common household or business waste items that require special care in disposal to prevent harm to people or the environment. California's universal waste regulations allow individuals and businesses that use, collect, transport, and recycle universal wastes to follow reduced requirements compared to those for most hazardous wastes.

In March 2003, DTSC adopted the Mercury Waste Classification and Management (MWCM) regulations, which include specific universal waste management standards for mercury switches removed from the hoods and trunks of discarded vehicles and from discarded major appliances. The MWCM regulations streamline waste management by allowing certain widely generated hazardous wastes to be managed under reduced handling and transportation requirements. Reduced requirements apply during handling and transportation of universal waste, but all hazardous wastes, including universal wastes, must ultimately be sent to a destination facility that has a permit to treat, store, dispose, or recycle that type of hazardous waste.

In addition to providing universal waste management standards for mercury switches that are removed from vehicles and appliances, under the MWCM regulations the removal of mercury light switches from scrapped vehicles will be required in the near future. Effective January 1, 2005, any vehicle, or portion of a vehicle, from which mercury-containing vehicle light switches have not been removed will be considered a listed hazardous waste (California Hazardous Number M001) on the date any person decides to crush, bale, shear or shred it. Consequently, all mercury-containing vehicles light switches in the hoods and trunks of discarded vehicles should be removed before the vehicles are crushed; otherwise the dismantler would be required to handle the discarded vehicle as a hazardous waste.

Unlike mercury switches in vehicles, mercury switches in discarded major appliances already are required to be removed prior to crushing or shredding, pursuant to the Metallic Discards Act of 1997. Effective February 9, 2006, scrapped appliances that contain mercury switches will also be regulated as hazardous waste (California Hazardous Number M002).

For additional information on SB 633, refer to the DTSC fact sheet "SB 633: California's Mercury Reduction Act of 2001" (www.dtsc.ca.gov/Schools/EA_FS_SB633.pdf). For more information on the M001 and M002 hazardous waste listings, refer to the DTSC fact sheet "Changes to California's Universal Waste Regulations" (www.dtsc.ca.gov/HazardousWaste/Mercury/HWMP_FS_UWRChanges.pdf). For information on the requirements for managing universal waste, refer to the DTSC fact sheet "Managing Universal Waste in California" (www.dtsc.ca.gov/PublicationsForms/HWM_FS_UWR.pdf).

Regulatory Overview

The objective of the Resource Conservation and Recovery Act (RCRA) [42 United States Code, (U.S.C.) § 6901 et seq.]; Code of Federal Regulations (CFR), Title 40, Parts 260-279; and the California Hazardous Waste Laws and Regulations (Health & Saf. Code,

§ 25100 et seq., and Cal. Code Regs., tit. 22, §§ 66260–66279) is to minimize the generation and subsequent land disposal and environmental release of hazardous waste by encouraging appropriate waste management measures. Because of the UWR and MWCM regulations, mercury switches may be managed either as hazardous waste or as universal waste. Both management methods are discussed below. Handling and transporting costs, destination facility requirements, and off-site shipping options are also discussed.

Handling and Transporting

The UWR allows mercury switches to be handled and transported as universal waste. Handlers and transporters may include brokers, dealers, processors, and other vendors who collect and deliver mercury wastes to an appropriate destination facility. However, at the generator's option, these wastes may still be handled and transported under the more stringent hazardous waste regulations. Accordingly, requirements for both universal waste and hazardous waste are outlined below.

Universal Waste Requirements

Federal universal waste standards are found in 40 CFR, Part 273; California requirements are listed in California Code of Regulations, title 22, section 66273 et seq. As noted above, regulatory requirements for handling and transporting universal wastes are simpler and less expensive than those for hazardous waste. The universal waste approach provides simple management standards to encourage increased recycling, thereby reducing the quantity of waste that ends up in solid waste or hazardous waste landfills. The primary requirements for handlers and transporters of universal waste are highlighted below. Detailed summaries of the requirements are provided in Appendix A. Under DTSC's regulations, handlers include both the generators of universal waste (for instance, auto dismantlers, scrap metal recyclers and auto repair shops) and persons who consolidate and accumulate universal waste generated by others. (Scrap metal recyclers include used appliance dealers, appliance recyclers, and scrap metal recyclers.) A universal waste transporter is any person who transports universal waste in compliance with the regulations, either from one handler to another or from a handler to a destination facility.

<u>Handlers</u>

Large Quantity Universal Waste Handlers (LQUWHs) are persons who generate or accumulate 5,000 kilograms (about 11,000 pounds) or more of universal waste at any one time. These handlers are required to obtain a United States Environmental Protection Agency (EPA) identification number before meeting or exceeding 5,000 kilograms.

Small Quantity Universal Waste Handlers (SQUWHs) are persons who generate or accumulate less than 5,000 kilograms of universal waste at any one time. Unlike LQUWHs, these handlers are not required to obtain an EPA identification number.

Both LQUWHs and SQUWHs are subject to the following requirements.

- They may accumulate universal waste without a permit for up to one year from the date the universal waste is generated or received from another handler. Longer accumulation may be allowed if the handler can prove it is necessary to facilitate proper recovery, treatment, or disposal.

- They must store removed mercury switches in a closed, leak-proof container marked with the words: "Universal Waste—Mercury Switches," "Waste—Mercury Switches," or "Used Mercury Switches."
- They must keep records of the removal of mercury switches for at least three years from the date of removal.
- They must pack mercury switches in a closed, non-leaking container that is in good condition, with packing materials adequate to prevent breakage during handling, storage, and transporting.
- They may ship universal waste switches only to another universal waste handler or to a destination facility.
- They must keep records of each shipment of universal waste received and/or sent to an off-site facility for at least three years from the date the shipment was received or sent.
- They may ship universal waste using a common carrier on a bill of lading (shipping). A manifest is not required.

Conditionally Exempt Small Quantity Universal Waste Generators (CESQUWGs) are persons who generate less than 100 kilograms (220 pounds) of RCRA hazardous waste, including all universal waste (except cathode ray tube materials), and no more than 1 kilogram (2.2 pounds) of acutely hazardous waste per calendar month. CESQUWGs are exempt from the time limitations imposed on storing accumulated universal waste and most of the other waste management requirements for universal waste handlers. CESQUWGs may not accept universal waste from off-site sources, nor may they treat or dispose of mercury switches or most other universal waste. A CESQUWG's universal waste may be transported only to another universal waste handler or to a destination facility.

Some facilities that recover mercury switches may not generate 100 kilograms (220 pounds) or more of RCRA hazardous waste per month, and therefore, qualify as CESQUWGs.

Transporters

A universal waste transporter is a person who transports universal waste off site by air, rail, highway or water. Transporters of universal waste are not required to obtain an EPA identification number, nor are they required to register with DTSC (Cal. Code Regs., tit. 22, § 66273.52). Mercury switches that are transported as universal waste in California are not considered hazardous waste under U.S. Department of Transportation (DOT) Hazardous Materials Regulations (HMR) because they are not subject to the hazardous waste manifest requirements specified in 40 CFR, Part 262. Consequently, universal wastes transported within California are not covered under DOT hazardous waste transportation regulations. Mercury switches that are transported out of California may be

fully regulated as hazardous waste in other states (i.e., not as universal wastes), in which case they may be subject to the hazardous waste transportation laws of the state(s) through which the shipment passes. Likewise, the DOT regulations for transporting hazardous wastes may apply in states in which mercury switches are fully regulated as hazardous waste.

The California DOT defines mercury switches as manufactured articles that are not specifically regulated as hazardous substances. Mercury and mercury switches that are transported in California, however, may be considered hazardous substances and/or hazardous materials depending on the amount shipped (DOT regulations 49 CFR, Parts 171.8 and 172.101). A hazardous substance as defined by DOT is a package containing more than the Reportable Quantity (RQ) for a material (49 CFR, Part 173.164). When the shipping package contains less than the RQ for mercury (0.45 kilogram [1 pound]), and the package is transported by ground, the package is not regulated as a hazardous substance. Mercury and mercury switches are, however, considered hazardous substances if the net weight of mercury in each package that is being transported exceeds the RQ, or if the mercury switches are transported by aircraft or vessel. Commercial carriers transporting mercury under these conditions would be subject to the HMR for packaging, reporting, and transporting hazardous materials.

Universal waste transporters may store universal waste at a universal waste transfer station for a maximum of 10 days if the transfer station is located in an area that is zoned industrial and for a maximum of 6 days if it is not. If these storage limits are exceeded, the transfer station becomes a small quantity handler and is subject to all associated requirements.

As previously mentioned, the regulatory requirements for handling and transporting universal waste are simpler and less expensive than the requirements for other hazardous waste in order to encourage recycling. Universal waste transporters are not subject to the major requirements that apply to transporters of other hazardous wastes: use of the Uniform Hazardous Waste Manifest (Health & Saf. Code, § 25160 et seq.) and possession of a valid registration issued by DTSC (Health & Saf. Code, § 25163 et seq.). By allowing handlers to accumulate universal wastes produced by other handlers without a permit, the UWR facilitates collection programs that streamline mercury switch management and recycling.

Hazardous Waste Requirements

Federal hazardous waste requirements are found in 42 U.S.C., section 6901 et seq. and 40 CFR; California requirements are found in California Code of Regulations, title 22, division 4.5; and in Health and Safety Code, chapter 6.5. The requirements for handlers (generators and consolidators) and transporters of hazardous waste are highlighted below and are presented in more detail in Appendix B.

Definitions of the roles involved in managing mercury switches as hazardous waste are as follows:

1. “Generator” is defined in California Code of Regulations, title 22, division 4.5, section 66260.10 as “any person, by site, whose act or process produces hazardous waste identified or listed in chapter 11 of this division or whose act first causes a hazardous waste to become subject to regulation.” An auto dismantler, scrap recycler, or auto repair shop that removes mercury switches from scrapped vehicles would be the generator of a hazardous waste (removed switches).
2. “Hazardous waste facility” is defined in part, in California Code of Regulations, title 22, division 4.5, section 66260.10 as “all contiguous land and structures, other appurtenances, and improvements on the land used for the treatment, transfer, storage, resource recovery, disposal or recycling of hazardous waste.” A facility that consolidates, collects, accumulates, or stores mercury switches received from off site would be considered a hazardous waste facility. A hazardous waste facility must obtain a permit (through a lengthy and costly process) before accepting any hazardous waste.
3. "Transporter" is defined in California Code of Regulations, title 22, division 4.5, section 66260.10 as “a person engaged in the off-site transportation of hazardous waste by air, rail, highway or water.” In addition to carrying hazardous waste to a hazardous waste facility, a transporter may also provide interim storage at a transfer facility. A hazardous waste transporter must hold a valid registration from DTSC and must use the Uniform Hazardous Waste Manifest.

Generators

Large Quantity Hazardous Waste Generators (LQGs) are persons that generate 1,000 kilograms (2,200 pounds) or more of hazardous waste, or more than 1 kilogram (2.2 pounds) of acutely hazardous waste per month. They are subject to the RCRA generator standards. LQGs may accumulate hazardous waste on site for up to 90 days. Facilities that accumulate hazardous waste on site for more than 90 days are considered storage facilities and must obtain a hazardous waste facility permit. The accumulation time for a container of hazardous waste begins on the first day any hazardous waste is placed inside the container.

Small Quantity Hazardous Waste Generators (SQGs) are persons that generate less than 1,000 kg (2,200 pounds) of hazardous waste per month. They are afforded less rigorous accumulation, management, and training requirements than LQGs. SQGs can accumulate as much as 6,000 kilograms (13,200 pounds) of hazardous waste on site for as long as 180 days, and for 270 days if the waste is shipped off site by the generator, or if the waste is shipped beyond 200 miles for treatment and disposal.

Households and Conditionally Exempt Small Quantity Generators (CESQGs) are persons that generate less than 100 kilograms (220 pounds) of hazardous waste and/or 1 kilogram (2.2 pounds) of acutely hazardous waste per calendar month, or less than 100 kilograms of spill residue from acutely hazardous waste per calendar month. CESQGs may not

accumulate more than 1,000 kilograms (2,200 pounds) of hazardous waste on site at any time. CESQGs are afforded the same latitude as SQGs, except CESQGs are not subject to accumulation time limits until 100 kilograms of hazardous waste or 1 kilogram of acutely hazardous waste is accumulated (Cal. Code Regs., tit. 22, § 66273.8(b) and (c)).

Hazardous waste generators are required to:

- determine whether waste is hazardous.
- obtain an EPA identification number.
- comply with packaging and labeling requirements.
- comply with the Hazardous Waste Manifest Requirements (Cal. Code Regs., tit. 22, § 66262) for labeling and recordkeeping.
- accumulate and store removed mercury switches in appropriate containers.
- accumulate as much as 210 liters (55 gallons) of hazardous waste, or one liter (one quart) of acutely hazardous waste, at "satellite accumulation points" for up to one year after the hazardous waste is first generated. These accumulation points must be located close to where the hazardous waste is generated. The hazardous or acutely hazardous wastes must be shipped off site within three days or comply with the regulations regarding accumulation times when quantity limits are exceeded.
- provide that shipments of more than 23 kilograms (50 pounds) or 19 liters (5 gallons) are carried by transporters that have an EPA identification number and are registered with DTSC.

For detailed information on the requirements for accumulating hazardous waste on site, refer to the DTSC fact sheet "Accumulating Hazardous Waste at Generator Sites" (www.dtsc.ca.gov/PublicationsForms/HWM_FS_Accumulating_HazWaste_Generators.pdf).

Also, a more detailed summary of the requirements that apply to generators can be found in the DTSC fact sheet "Hazardous Waste Generator Requirements" (www.dtsc.ca.gov/PublicationsForms/HWM_FS_Generator_Requirements.pdf).

Consolidators

Consolidators of hazardous waste must:

- obtain a permit from DTSC. (Depending on whether or not the waste is federally regulated, either a full RCRA permit or a standardized permit may be required. Household hazardous waste collection facilities may consolidate mercury-containing hazardous waste generated by households and CESQGs. These facilities do not require full or standardized permits; instead, they may operate under the less stringent Permit-by-Rule tier, pursuant to Cal. Code Regs., tit. 22, chapter 45.);

- comply with the waste accumulation limits (6 days, or 10 days if located on property zoned for industrial use); and
- comply with all packaging, documentation, and recordkeeping requirements listed for generators.

Transporters

Transporters of mercury-containing hazardous waste (that is not being managed as universal waste) are subject to the standards for hazardous waste transporters found in California Code of Regulations, title 22, chapter 13, and in Health and Safety Code, chapter 6.5, article 6. Hazardous waste transporters must keep a valid registration issued by DTSC in their possession while transporting hazardous waste. Prior to transporting hazardous waste, a registered transporter must obtain an EPA identification number and a registration certificate from DTSC. A transporter may only carry hazardous waste that is accompanied by a Uniform Hazardous Waste Manifest. The manifest must be signed by the generator and transporter and must be kept in the transporter's possession.

CESQGs that choose to manage mercury switches as hazardous waste may transport up to 50 pounds (23 kilograms) of their own switches to an authorized household hazardous waste collection facility without holding a valid transporter registration and without using the Uniform Hazardous Waste Manifest (Health & Saf. Code, §§ 25163(f) and 25218.5(b)). In some areas, the amount of mercury that a CESQG may transport to a household hazardous waste collection facility without a registration or manifest may be higher—up to 125 pounds (Health & Saf. Code, § 25218.5.1). Some hazardous waste collection programs may also transport hazardous waste from CESQGs in curbside and door-to-door collection programs (Health & Saf. Code, § 25218.5). These services usually are provided by counties and cities, in conjunction with the State, to facilitate and increase collection of hazardous waste generated by households and CESQGs.

A CESQG that transports up to 50 pounds (5 gallons) of hazardous waste to a permitted hazardous waste facility is also exempt from the registration and manifesting requirements (Health & Saf. Code, § 25163(c)).

As previously mentioned, DOT regulations (Title 49 CFR, Part 171.8) define hazardous waste as any material that is subject to the hazardous waste manifest requirements in 40 CFR, Part 262. Because they would be exempt from using a hazardous waste manifest, a CESQG transporting mercury switches to an authorized household hazardous waste collection facility or directly to a permitted hazardous waste facility (as discussed above) would be exempt from DOT hazardous waste transportation regulations; if the net weight of mercury being transported is less than the RQ, such a CESQG also may be exempt from the Hazardous Materials Regulations (HMR) (49 CFR, Part 173.164).

A generator who stores—in a container, at the site of generation—no more than 10 pounds (4.5 kilograms) of elemental mercury that is a non-RCRA hazardous waste is exempt from hazardous waste permitting requirements (Cal. Code Regs., tit. 22, § 66266.120(a)(1)).

Likewise, a transporter of 10 pounds or less of non-RCRA waste elemental mercury is exempt from registering with DTSC and from manifest requirements, provided the waste is transported to a facility where the mercury will be recovered from the waste (Cal. Code Regs., tit. 22, § 66266.120(a)(2)).

In summary, mercury switches that are managed as hazardous waste are generally subject to more stringent and numerous requirements than they would be if managed as universal waste. The generators of the switches must obtain an identification number from DTSC, may accumulate switches without a permit for up to 90 or 180 days (compared with a one-year limit for universal waste), must plan for emergencies, must formally train employees, etc. In general, a transporter of mercury switches that are being managed as hazardous waste must be registered with DTSC and must use the Uniform Hazardous Waste Manifest. A facility that consolidates hazardous waste mercury switches received from off site must first obtain a facility permit from DTSC.

Final Management at Destination Facility

As previously noted, destination facilities include businesses that treat, store, or dispose of hazardous waste and those that recycle hazardous waste. A destination facility may be permitted to treat, store, or dispose of hazardous waste and to recycle other types of hazardous waste.

The Land Disposal Restrictions (LDRs) (Cal. Code Regs., tit. 22, ch. 18) require that certain hazardous waste be treated to undergo physical or chemical changes so that they pose a lesser threat to the environment before the residual waste may be placed in a hazardous waste landfill. The LDR program includes waste-specific treatment standards, which are based on the best available demonstrated technology (BADT). The standards may require that waste be treated with a particular technology, or they may require treatment sufficient to achieve a specific concentration limit.

Under the LDR program, all recovered mercury switches would be categorized as “D009—Characteristic Mercury Wastes” and would be included in the “high mercury subcategory,” because individual mercury switches have a total mercury content that exceeds the 260 milligrams per kilogram threshold for that subcategory. The BADT for this subcategory of waste is treatment by incineration (IMERC), if organic components are present, and roasting or retorting treatment to reclaim elemental mercury of sufficient purity to be resold. Residual wastes that do not meet the numeric treatment standard for “low mercury waste” provided in 40 CFR, Part 268 undergo further processing to produce waste suitable for land disposal. Land disposal of recovered mercury that does not meet the numerical treatment standard is prohibited.

Off-Site Shipping Options

Mercury switch waste may be sent directly to an authorized destination facility that accepts mercury switches and recovers mercury. Currently, there are six destination facilities in the United States that accept mercury switches and recover mercury, but none of these facilities is located in California. Mercury switches that are sent to the destination facilities are subject to the hazardous waste management regulations of the state within which the destination facility is located. (A list of these facilities is provided in Appendix C.)

Generators may also send their mercury switch waste to a consolidation facility that ultimately sends them to a permitted destination facility. If the switches are being managed under the full hazardous waste management requirements, the consolidator must have a hazardous waste facility permit. If they are being managed as universal waste, the consolidator would be regulated as a universal waste handler and would not need a permit. Most of the hazardous waste transporters registered with DTSC will also provide pick-up services for mercury switch waste. Appendix D lists handling and transporting facilities that are located in California, accept mercury switches, and provide pick-up services. The facilities should be contacted directly for specific information about the services they provide and costs.

In some cases, generators and handlers may export their mercury switch waste. Mercury switches that are exported to member nations of the Organization for Economic Cooperation and Development (OECD) are subject to regulations specified in California Code of Regulations, title 22, article 8 of chapter 12. If mercury switches are exported to a foreign destination other than nations that are members of the OECD, a copy of the EPA Acknowledgement of Consent must accompany them (Cal. Code Regs., tit. 22, § 66273.56).

Transporting and Recycling Costs

Destination facilities and collection and transportation facilities that accept mercury switch waste were contacted to obtain pricing information for transporting and recycling mercury switches. Transporting and recycling costs for mercury switches vary greatly, and can be affected by waste quantity and weight, percentage of non-mercury material in the waste stream, transportation distance, service agreement (one-time versus ongoing), and market forces. The ranges in service costs, which are generally provided in cost per switch, pound, or specified container (shipping container, pail, or drum), are shown in the following table. These costs tend to fluctuate, and represent a wide range of services that are provided by hazardous waste transporters, transfer stations, permitted treatment, storage and disposal facilities, and destination facilities that recover mercury. The prices quoted by the destination facilities do not include transportation costs.

Per Switch	Per Pound of Mercury	Per 5-Gallon Pail	Per 55-Gallon Drum
$0.004-$1.00	$1.80-$15	$200-$515	$750-$2000

Some facilities may apply a surcharge to mercury switches that are handled and transported as hazardous waste because of more stringent recordkeeping and shipping requirements. Most of the facilities, however, charge the same price for transporting and recycling mercury switches that are handled as hazardous or universal waste. Many facilities charge a minimum service fee of $50 to $350, which is within the price range for recycling a five-gallon pail of mercury switches. Many facilities provide prepaid mailer packages that help standardize costs.

Management Options

The flexibility inherent in the universal waste regulations provides generators of mercury switches with a variety of options for managing this waste stream. In order to comply with the regulatory requirements, generators may want to consider some or all of the suggestions enumerated below:

1. Develop a written plan or standard operating procedure (SOP) for managing mercury switches and other hazardous waste and complying with the administrative requirements of the regulations. The plan might specify:
   a. who will remove mercury switches;
   b. when the switches will be removed;
   c. where removed switches will be accumulated;
   d. how compliance with accumulation time requirement will be demonstrated;
   e. how employees will be trained (the training process, frequency of training, documentation, etc.); and
   f. how employees will respond if a switch leaks or breaks.

2. Develop standardized procedures for transporting the removed switches and other hazardous waste. Decide in advance:
   a. where switches will be transported (directly to a recycler? to a consolidator?), and
   b. how they will be transported (self-transport? package service? pick up by a mercury recycler or hazardous waste hauler?)

3. Transport mercury switches by ground, in pre-paid packages weighing less than one pound.

4. Contact numerous handlers, transporters, and destination facilities to confirm services and costs.

5. Partner with handlers, transporters, and destination facilities to develop standardized pricing and shipping materials for mercury switches.

References

Advanced Environmental Recycling Co. – Mercury Technologies International. 5 August 2003 < www.aercrecycling.com>.

Association of Lighting and Mercury Recyclers. April 2003 <www.almr.org/members.htm>.

Bethlehem Apparatus, Inc. 5 August 2003 < www.bethlehemapparatus.com>.

California Department of Toxic Substances Control., Fact Sheet: Accumulating Hazardous Wastes at Generator Sites. State of California, January 2002.

California Department of Toxic Substances Control. Fact Sheet: Hazardous Waste Generator Requirements. State of California, January 2002.

California Department of Toxic Substances Control. Fact Sheet: Hazardous Waste Transporter Requirements. State of California, November 2001.

California Department of Toxic Substances Control. Mercury Report - Final. State of California, 2002.

California Department of Toxic Substances Control. Fact Sheet: SB 633: California's Mercury Reduction Act of 2001. State of California, May 2002.

California State Assembly, 1997-98 Session.
AB 847, An act to add Article 10.1 (commencing with section 25211) to the Health and Safety Code, Division 20, Chapter 6.5 and to amend the Public Resources Code, sections 42167 and 42175, and add section 42175.1 relating to hazardous materials.

California State Senate, 2001-02 Session. SB 633, A Bill to Enact the California Mercury Reduction Act of 2001.

Corbett, Thomas (Environmental Chemist, Division of Solid and Hazardous Materials, New York State Department of Environmental Conservation, Region 9). Letter to Delmer F. Billings (Chief Regulations Development, Office of Hazardous Materials Standards, U. S. Department of Transportation). 25 January 2001.

Clean Harbors Environmental Services, Inc. 5 August 2003. < www.cleanharbors.com>.

Environmental Health Standards for the Management of Hazardous Waste, Title 22, California Code of Regulations, sections 66260-66279 (2003).

Elliot, John F., and David J. Weisenhoff. Hazardous Materials Program Commentary: California. Canada: Specialty Technical Publishers, 2001.

Environmental Protection, Title 40, Code of Federal Regulations, Part 260 et seq. (2003).

Gale, John A. (Transportation Regulations Specialist, Special Programs Administrations, U. S. Department of Transportation). Letter to Thomas Corbett Environmental Chemist, Division of Hazardous Materials, New York State Department of Environmental Conservation, Region 9). 13 April 2001.

Hazardous Waste Control, California Public Resources Code, section 42160 et seq. (2003).

Hazardous Waste; Subtitle C of RCRA. 13 May 2003. United States Environmental Protection Agency. 14 May 2003 < www.epa.gov/epaoswer/osw/hazwaste.htm>.

Kluetzman, Jennifer (Mercury Waste Solutions, Inc.). Letter. 14 August 2003.

Laws, Regulations and Policies. 2000. California Department of Toxic Substances Control. May 2003 < www.dtsc.ca.gov/LawsRegulationsPolicies/index.html>.

Lighting Resources, Inc. 2002. 5 August 2003 < www.lightingresourcesinc.com>.

Managing Hazardous Waste. 2000. California Department of Toxic Substances Control. May 2003 <www.dtsc.ca.gov/HazardousWaste/index.html>.

Mercury Waste Solutions, Inc. 15 October 2002. 5 August 2003 < www.mercurywastesolutions.com>.

Metallic Discards, California Health and Safety Code, sections 25100 et seq. (2003).

National Electric Manufacturers Association. April 2003 <www.nema.org>.

North State Environmental. 6 August 2003 <www.north-state.com>.

NSSI Solutions and Services, Inc. 5 August 2003 < www.nssihouston.com>.

Onyx Environmental Services, Inc. 22 August 2003. 24 August 2003 < www.onyxes.com>.

Resource Conservation and Recovery Act, Title 42 United States Code, section 6901 et seq. (1976).

Safety-Kleen Systems, Inc. 6 August 2003 <wwwsafety-kleen.com>.

The Mercury Workshop Planning Committee. Mercury in the Environment – States Respond to the Challenge: A Compendium of State Mercury Activities. Washington, DC: Clean Air Network & Environmental Council of States, January 2001.

Thomas Gray & Associates, Inc. 6 August 2003 <www.tgainc.com>.

Transportation, Title 49 Code of Federal Regulations, Part 105 et seq. (2003).

Traverse, Leo (New Hampshire Department of Environmental Services, Universal Waste Rule Advisory Committee). Letters to Hattie L. Mitchel (Chief, Exemptions and Regulations Terminations, Office of Haz Mat Standards, United States Department of Transportation). 19 January 2000.

APPENDIX A: SUMMARY OF UNIVERSAL WASTE HANDLING, TRANSPORTING AND RECYCLING REQUIREMENTS[1]

Waste Management Requirements	Large Quantity Universal Waste Handler[2]	Small Quantity Universal Waste Handler[2]	Conditionally Exempt Small Quantity Universal Waste Generator[2]	Transporter (Transfer Facility)
Generation Rate	Not applicable	Not applicable	<100 kg (220 lb) of hazardous waste and <1 kg (2.2 lb) of acutely hazardous waste generated on site per calendar month	None
Required Permits, Approvals, & Notifications	EPA identification number	None	None	Must comply with the HMR[4] (49 CFR 171-185) if above the RQ[5]
Labeling & Marking	Mark as universal waste and date received and/or generated	Mark as universal waste and date received and/or generated	Not required	Verify that existing marking is correct
On-site Accumulation Limit	No quantity limit	< 5,000 kg (11, 000 lb)	<1,000 kg (2,200 lb) of hazardous waste or <1 kg (2.2 lb) of acutely hazardous waste	None
Storage Time Limit	One year—unless documentation indicating that such activity is being held for proper recovery, treatment, or disposal	One year—unless documentation indicating that such activity is being held for proper recovery, treatment, or disposal	None	10 days if transfer facility is located in area that is zoned industrial, and 6 days if transfer facility is not.
Training	Basic training—geared toward employee responsibilities, spill response, and emergency procedures	Inform employees; basic training in spill response and emergency procedures for responsible employees	None	Nothing specific required

1. Universal waste requirements apply only during handling and transport of hazardous waste. Destination facility requirements are the same as those for other hazardous wastes.

2. Includes consolidators and collectors.

3. Specific treatment exceptions include removing mercury switches from products, and cleaning a release. Contact DTSC for additional information.

4. Hazardous Materials Regulations.

5. Reportable Quantity.

NOTE: A similar table that gives complete universal waste management requirements and appropriate federal code citations is provided at: http://www.epa.gov/epaoswer/hazwaste/id/univwast/tecreq.htm

APPENDIX A: SUMMARY OF UNIVERSAL WASTE HANDLING, TRANSPORTING AND RECYCLING REQUIREMENTS[1] (CONTINUED)

Waste Management Requirements	Large Quantity Universal Waste Handler[2]	Small Quantity Universal Waste Handler[2]	Conditionally Exempt Small Quantity Universal Waste Generator[2]	Transporter (Transfer Facility)
Recordkeeping	Keep basic records, such as log, invoice, bill of lading, or other shipping document, for three years	Keep basic records, such as log, invoice, bill of lading, or other shipping document, for three years	Not required	No manifest required; keep records of all wastes received for three years
Transporting	Self-transport or use common carrier—ensure sent to appropriate waste handler or destination facility; must comply with HMR[4] if transporting universal waste above RQ[5]	Self transport or use common carrier – ensure sent to proper waste handler or destination facility – must comply with the HMR[4] if transporting universal waste above RQ[5]	Self transport or use common carrier – ensure sent to proper waste handler or destination facility– must comply with the HMR[4] if transporting universal waste above RQ[5]	Transporter may be common carrier; send to proper waste handler or destination facility – must comply with the HMR[4] if transporting universal waste above RQ[5]
Treatment	Generally not allowed (specific exceptions[3])	Generally not allowed (specific exceptions[3])	Generally not allowed (specific exceptions[3])	Not allowed (except by responding to releases)
Reporting	One-time written notification to U.S. EPA of universal waste management unless you already have a U.S. EPA identification number	Not required	Not required	Not required

1. Universal waste requirements apply only during handling and transport of hazardous waste. Destination facility requirements are the same as those for other hazardous wastes.

2. Includes consolidators and collectors.

3. Specific treatment exceptions include removing mercury switches from products, and cleaning a release. Contact DTSC for additional information.

4. Hazardous Materials Regulations.

5. Reportable Quantity.

NOTE: A similar table that gives complete universal waste management requirements and appropriate federal code citations is provided at: http://www.epa.gov/epaoswer/hazwaste/id/univwast/tecreq.htm

APPENDIX B: SUMMARY OF HAZARDOUS WASTE HANDLING, TRANSPORTING AND RECYCLING REQUIREMENTS

Waste Management Requirements	Large Quantity Generator	Small Quantity Generator	Conditionally Exempt Small Quantity Generator	Consolidator/ Collector	Transporter	Destination Facility
Quantity Handled	≥ 1,000 kg/mo (2,200 lb/mo); 1 kg/mo (2.2 lb/mo) acutely hazardous waste	< 1,000 kg/mo (2,200 lb/mo)	≤ 100 kg/mo (220 lb/mo); 1 kg/mo acutely hazardous waste			No limit
Required Permits, Approvals, & Notifications	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
Labeling & Marking	Label container/tank with the date accumulation begins, the words "hazardous waste," composition/physical state, hazards, generator's name/address (title 22, Cal. Code Regs., § 66262.34).	Label container/tank with the date accumulation begins, the words "hazardous waste," composition/physical state, hazards, generator's name/address (title 22, Cal. Code Regs., § 66262.34).	Label, mark, & pack as hazardous waste in accordance with U.S. DOT under 49 CFR, Part 172	Confirm proper labeling	Confirm proper labeling	Confirm proper labeling
On-site Accumulation Limit	No quantity limit	< 6,000 kg (13, 200 lb)	≤ 1,000 kg (2,200 lb) hazardous waste; 1 kg (2.2 lb) acutely hazardous waste; or 100 kg (220 lb) spill residue from acutely hazardous waste	No limit	No limit	No limit
Storage Time Limit	90 days	180 or 270 days	None until 100 kg (220 lb) of hazardous waste or 1 kg of acutely hazardous waste is generated, then 180 to 270 days	10 days	In transit - 6 days or 10 days if transfer area zoned industrial	90 days prior to treatment

APPENDIX B: SUMMARY OF HAZARDOUS WASTE HANDLING, TRANSPORTING AND RECYCLING REQUIREMENTS (CONTINUED)

Waste Management Requirements	Large Quantity Generator	Small Quantity Generator	Conditionally Exempt Small Quantity Generator	Consolidator/ Collector	Transporter	Destination Facility
Training	Initial and annual formal training; and spill response and emergency procedures; and comply with California Code of Regulations, title 22, section 66265.16	Initial informal training; spill response and emergency procedures; and comply with 40 CFR, part 262.34(d)(5)(iii)	Initial informal training; spill response and emergency procedures	Initial and annual training; spill response and emergency procedures	Initial and annual training; spill response and emergency procedures	Initial and annual training; spill response and emergency procedures

APPENDIX B: SUMMARY OF HAZARDOUS WASTE HANDLING, TRANSPORTING AND RECYCLING REQUIREMENTS (CONTINUED)

Waste Management Requirements	Large Quantity Generator	Small Quantity Generator	Conditionally Exempt Small Quantity Generator	Consolidator/ Collector	Transporter	Destination Facility
Manifest/ Recordkeeping	Manifest required; keep records for three years	Manifest required; keep records for three years	No manifest required if self-transporting ≤19 L (5 gal) or 23 kg (50 lb) to a household hazardous waste collection facility or a TSDF. Otherwise, manifest is required; keep records for three years.	Manifest required	Manifest required. Manifest not required if the transporter is the CESQG[1] that generated the hazardous waste	Manifest required; keep records for three years
EPA ID Number/ Transporting	Provide transporter with EPA identification number and DTSC reg. Must comply with HMR[2] if transporting hazardous waste above RQ[3]	Provide transporter with EPA identification number and DTSC reg. Must comply with HMR[2] if transporting hazardous waste above RQ[3]	Provide transporter with EPA identification number and DTSC registration. Must comply with HMR[2] if transporting hazardous waste above RQ[3]. Self transporting ≤ 19 L (5 gal) or 23 kg (50 lb) to household hazardous waste collection is permissible under HSC, section 25218.5(b)(1)(A)	Provide transporter with EPA identification number and DTSC reg.	Must comply with HMR[2] if transporting hazardous waste above RQ[3]	Provide transporter with EPA identification number and DTSC reg.
Treatment	Not allowed without authorization	Not allowed without authorization	Not allowed without authorization	Not allowed	Not allowed	Meeting LDRs[4] - IMERC/RMERC at treatment/storage/disposal or recycling facility
Contingency Plan/Emergency Procedure	Written plan required (Cal. Code Regs., tit. 22, ch. 15, art. 4)	Comply with 40 CFR, section 262.34(d)(5)	Comply with 40 CFR, section 262.34(d)(5)	Not required	Must respond to releases	Required
Reporting	Biennial, exception, and additional report	Exception and additional report	Exception and additional report	Not applicable	Not applicable	Not applicable

1. Conditionally Exempt Small Quantity Generator
2. Hazardous Materials Regulations
3. Reportable Quantity
4. Land Disposal Restrictions

NOTE: A similar table that compares hazardous and universal management requirements and appropriate federal code citations is provided at http://www.epa.gov/epaoswer/hazwaste/id/univwast/table.htm.

APPENDIX C: LIST OF MERCURY SWITCH WASTE DESTINATION FACILITIES THAT SERVE CALIFORNIA*

Advanced Environmental Recycling Co. – Mercury Technologies International (AERC-MTI) 2591 Mitchell Avenue Allentown, PA 18103 Ph: 800-554-2372 Fax: 610-791-7696 www.aercrecycling.com	Bethlehem Apparatus Company, Inc. 890 Front Street, P.O. Box Y Hellerton, PA 18055 Ph: 610-838-7034 Fax: 610-838-6333 www.bethlehemapparatus.com
Lighting Resources, Inc. 498 Park Drive Greenwood, IN 46143 Ph: 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 Ph: 800-741-3343 Fax: 262-878-2699 www.mercurywastesolutions.com
NSSI Sources and Services, Inc. P.O. Box 34042 Houston, TX 77234 Ph: 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 Ph: 800-368-9095 www.superiorserv.com

*These facilities operate a mercury retort on site to recover mercury from switches.

Sources: The list was compiled from information obtained from phone interviews and an internet survey of companies included on nationwide lists maintained by the Association of Lighting and Mercury Recyclers (www.almr.org); the National Electric Manufacturers Association (www.nema.org/lamprecycle/); the U.S. EPA's Office of Solid Waste and Emergency Response (www.epa.gov/epaoswer/hazwaste/id/univwast/where.htm); and several state resource agencies. A list of permitted commercial facilities that accept hazardous waste for a fee is also available at the DTSC Web site: www.dtsc.ca.gov/HazardousWaste/index/html.

Disclaimer: This list includes commercial firms that were found to offer mercury-containing switch recovery services. 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.

APPENDIX D: LIST OF MERCURY SWITCH WASTE HANDLING AND TRANSPORTING FACILITIES LOCATED IN CALIFORNIA*

AERC-MTI (Advanced Environmental Recycling Co. – Mercury Technologies International) 30677 Huntwood Avenue Hayward, CA 94555 Ph: 800-628-3675 Fax: 510-429-1498 www.aercrecycling.com	Chemical Waste Management 35251 Old Skyline Road Kettlemen City, CA 93239 Ph: 550-386-9711
Clean Harbors Los Angeles, LLC Los Angeles Facility 5756 Alba Street Los Angeles, CA 90058 Ph: 323-277-2500 Fax: 323-277-2523 www.cleanharbors.com	Clean Harbors of San Jose, LLC San Jose Facility 1040 Commercial Street, Suite 109 San Jose, CA 95133 Ph: 408-451-5000 Fax: 408-453-6045 www.cleanharbors.com
Kinsbursky Brothers, Inc. 1314 North Anaheim Boulevard Anaheim, CA 92801 Ph: 714-738-8516 Fax: 714-441-0857 www.kinsbursky.com	Kinsbursky Environmental Management 101 North Glover Avenue, Suite B Chula Vista, CA 91909 Ph: 619-409-9292 www.kinsbursky.com
Lighting Resources, Inc. Ontario Branch 805 East Francis Street Ontario, CA 91741 Ph: 888-923-7252 Fax: 909-923-7510 www.lightingresourcesinc.com	North State Environmental – Southern California 2776 South Lilac Avenue Bloomington, CA 92316 Ph: 909-875-9288 Fax: 909-875-9813 www.north-state.com
North State Environmental 5519 Clairemont Mesa Boulevard San Diego, CA 92117 Ph: 858-273-8669 Fax: 858-273-8678 www.north-state.com	North State Environmental – Northern California 90 South Spruce Avenue, Suite C3 South San Francisco, CA 94080 Ph: 650-588-2838 Fax: 650-588-1950 www.north-state.com

APPENDIX D: LIST OF MERCURY SWITCH WASTE HANDLING AND TRANSPORTING FACILITIES LOCATED IN CALIFORNIA (CONTINUED)*

Onyx Environmental Services, Inc. 4227 Technology Drive Fremont, CA Ph: 510-651-2964 Fax: 510-656-4926 www.onyxes.com	Onyx Environmental Services, Inc. 1704 West First Street Azusa, CA 91702 Ph: 626-334-5117 Fax: 626-334-4563 www.onyxes.com
Onyx Environmental Services, Inc. 5202 Oceanus Drive Huntington Beach, CA 92649 Ph: 714-379-6000 Fax: 714-379-6010 www.onyxes.com	Onyx Environmental Services, Inc. 1125 Hendey Street Richmond, CA 94801 Ph: 510-233-8001 Fax: 510-235-9427 www.onyxes.com
Recyclights, Inc. 2439 Industrial Parkway West Hayward, CA 94545 Ph: 800-884-8982 Fax: 510-782-8984	Safety-Kleen Systems, Inc. Cluster II, Building 3 5400 Legacy Drive Plano, TX 75024 Ph: 800-669-5740 Fax: 972-265-2000 www.safety-kleen.com
Thomas Gray & Associates, Inc. 1205 West Barkley Avenue Orange, CA 92868 Ph: 714-997-8090 Fax: 714-997-3561 www.tgainc.com	

*Most hazardous waste transporters registered with DTSC will provide waste hauling services to generators and handlers of mercury-containing switches and devices.

Sources: The list was compiled from information obtained from phone interviews and an internet survey of companies included on nationwide lists maintained by the Association of Lighting and Mercury Recyclers (www.almr.org); the National Electric Manufacturers Association (www.nema.org/lamprecycle/); the U.S. EPA's Office of Solid Waste and Emergency Response (www.epa.gov/epaoswer/hazwaste/id/univwast/where.htm); and several state resource agencies. A list of permitted commercial facilities that accept hazardous waste for a fee is also available at the DTSC Web site: www.dtsc.ca.gov/HazardousWaste/index/html.

Disclaimer: This list includes commercial firms found to offer mercury-containing switch handling services. The Department of Toxic Substances Control 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.