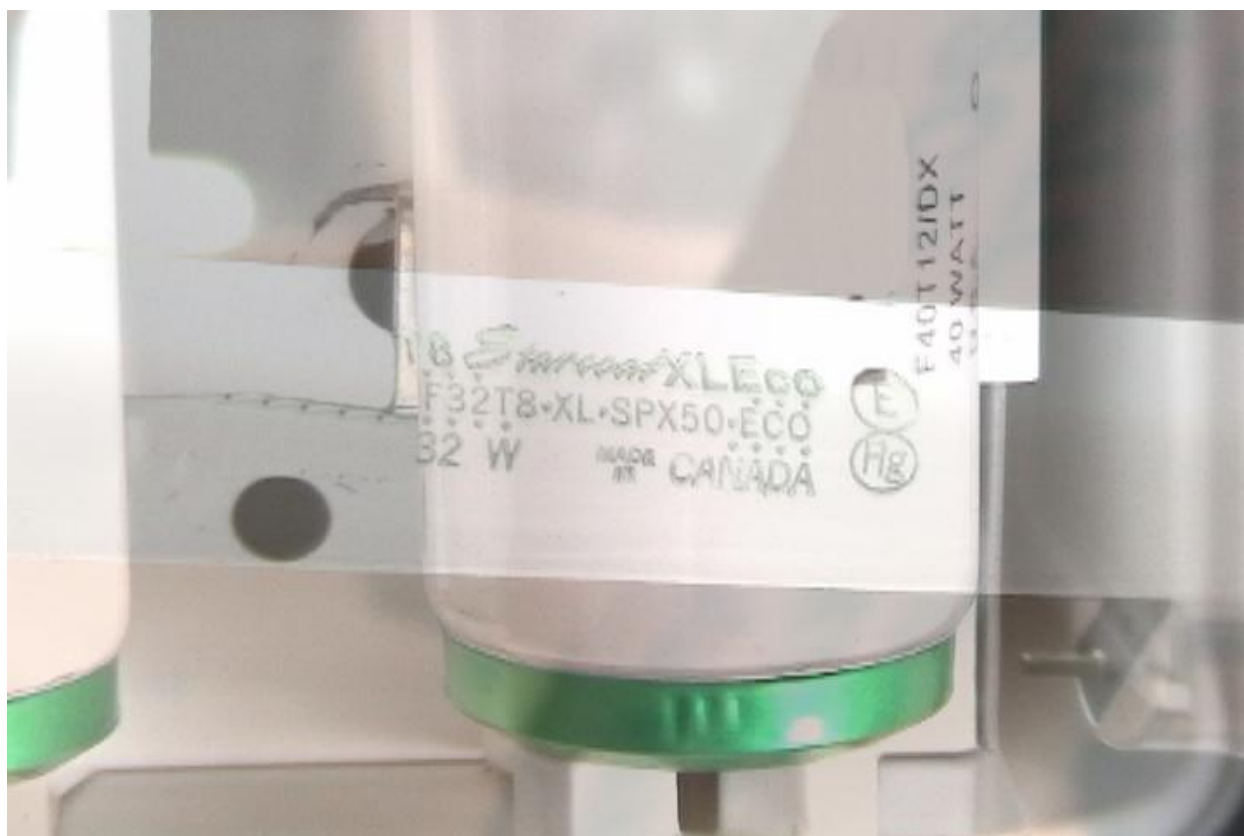


Tribal Guide For Managing Waste Lamps



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Ohiarihko:wa/July 2006



Executive Summary

Mercury contamination has affected Indian Nations severely over the course of recent years. It has polluted the fish, wildlife, and people. Mercury does not disappear once it is released into the environment; it bioaccumulates, meaning it accumulates within the tissues of living organisms (i.e., wildlife such as birds and fish). Consequently, this bioaccumulative effect has led to high levels of mercury in wildlife.

Mercury enters the environment in many ways. Improper disposal of waste lamps (commonly called fluorescent lamps/lights) is a very important way that is commonly overlooked. All fluorescent lamps contain mercury. When they are thrown in the trash or improperly disposed of through open dumping, they will break and release mercury into the environment. Once in the environment, mercury bioaccumulates and eventually pollutes the food we eat.

Recycling waste lamps is one method that keeps mercury from entering the environment. There are numerous recyclers around the country that will accept waste lamps and recycle components found within them. The recycling process crushes the waste lamps and separates the metal end caps, glass, and mercury-containing phosphor powder. The metal and glass is then sent on to recycling facilities. The mercury-containing phosphor powder undergoes a retorting process that separates the mercury from the phosphor powder. Once separated, the mercury and phosphor powder are also sent to facilities for recycling.

Establishing a waste lamp collection and recycling program in Tribal communities is feasible whether the Tribe does or does not have an established solid waste management program. Many waste lamp recycling facilities will deal directly with Tribal generators of waste lamps, thus allowing the Tribe to act as a liaison between the generators and the recycling facility. If the Tribe does have an established solid waste management program, it may be more profitable for the Tribe to collect, store, and package the waste lamps from the generators. The Tribe can then make arrangements with the lamp recycling facility to pick them up.

Recycling waste lamps helps preserve traditional lifeways (reliance on fish and game as a major food source) and cultural practices (harvesting and utilizing plants and animals) of people from Indian Nations by minimizing the release of mercury into the environment.



Acknowledgements

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The US EPA for providing funding for the development of this manual.*

* See Appendix 4.2 for EPA’s list of Mercury-Lamp Recycling Outreach Project Participants



Table of Contents

Section 1

1.1	Glossary of Terms.....	6
1.2	List of Acronyms.....	7

Section 2 – Background Information

2.1	Mercury Species.....	9
2.2	Why Mercury is Harmful.....	10
2.3	Mercury in Lamps.....	12
2.4	Lamp Types that Contain Mercury.....	13
2.5	Disposal Classifications	14
2.6	Ways to Treat Waste Lamps	15
2.7	How Recycling Works... ..	16
2.8	Projected Benefits of Recycling.....	18
2.9	“Cradle to the Grave” Documentation.....	19
2.10	Endnotes.....	21

Section 3 – Community Specific Information for Establishing a Collection and Recycling Program

3.1	Introduction.....	23
3.2	We do not have a Solid Waste Program.....	24
3.3	We Have a Current Solid Waste Program.....	25
3.4	Projected Cost of Recycling.....	26
3.5	How to Handle <u>Intact</u> Fluorescent Lamps.....	27
3.6	How to Handle <u>Broken</u> Fluorescent Lamps.....	28
3.7	Traditional Lifeways.....	29
3.8	Endnotes.....	30

Section 4 - Appendices

4.1	List of Waste Lamp Recyclers.....	32
4.2	EPA Mercury-Lamp Recycling Outreach Project Participants.....	33
4.3	SRMT Waste Lamp Pricing List.....	35



Section 1



1.1 Glossary of Terms

Bioaccumulative – the process where a substance, often toxic, accumulates within the tissues of living organisms. *Mercury is bioaccumulative in fish and humans.*

Drum-top crushing – a process designed to volume-reduce waste fluorescent lamps by crushing them in a contained environment.

Hazardous waste – a waste with properties that make it dangerous or capable of having a harmful effect on human health or the environment. (RCRA Orientation Manual III-5)

Incineration – the process where general wastes (including organic [carbon-based] material) containing more than 260 milligrams/kg of total mercury are heated enough to separate and recover the mercury from the rest of the waste.

Large quantity handler of universal waste – a handler who accumulates 5,000 kilograms or more total of universal waste at any time throughout a given calendar year.

Leachate – the solution or product obtained by filtering out soluble parts.

Recycling (of waste lamps) – a process where waste fluorescent lamps are sent to a company that extracts the mercury from the lamps, separating the glass, mercury, and aluminum parts as much as possible.

Retorting – the process where general wastes containing more than 260 milligrams/kg of total mercury are heated enough to separate and recover the mercury from the rest of the waste.

Small quantity handler of universal waste – a handler who does not accumulate 5,000 kilograms or more total of universal waste at any time.

Stabilization – a process that reduces the toxicity level of materials containing less than 260 milligrams/kg of mercury. This process involves mixing hazardous waste with a chemical bonding material (such as Portland cement).



1.2 List of Acronyms

CFR – Code of Federal Regulations
CFL – Compact Fluorescent Lamp
CNS – Central Nervous System
DEC – Department of Environmental Conservation
EPA – Environmental Protection Agency
FDA – Food and Drug Administration
GAO – Government Accountability Office
HID's – High Intensity Discharge (lamps)
MSW – Municipal Solid Waste
NEWMOA – Northeast Waste Management Officials' Association
OSHA – Occupational Safety and Health Administration
RCRA – Resource Conservation and Recovery Act
SWANA – Solid Waste Association of North America
TCLP – Toxicity Characteristic Leaching Procedure
TSDF – Treatment, Storage, and Disposal Facility
UV – Ultra Violet (light)



Section 2

Background Information



2.1 Mercury Species

2.1.1 Mercury in the Environment

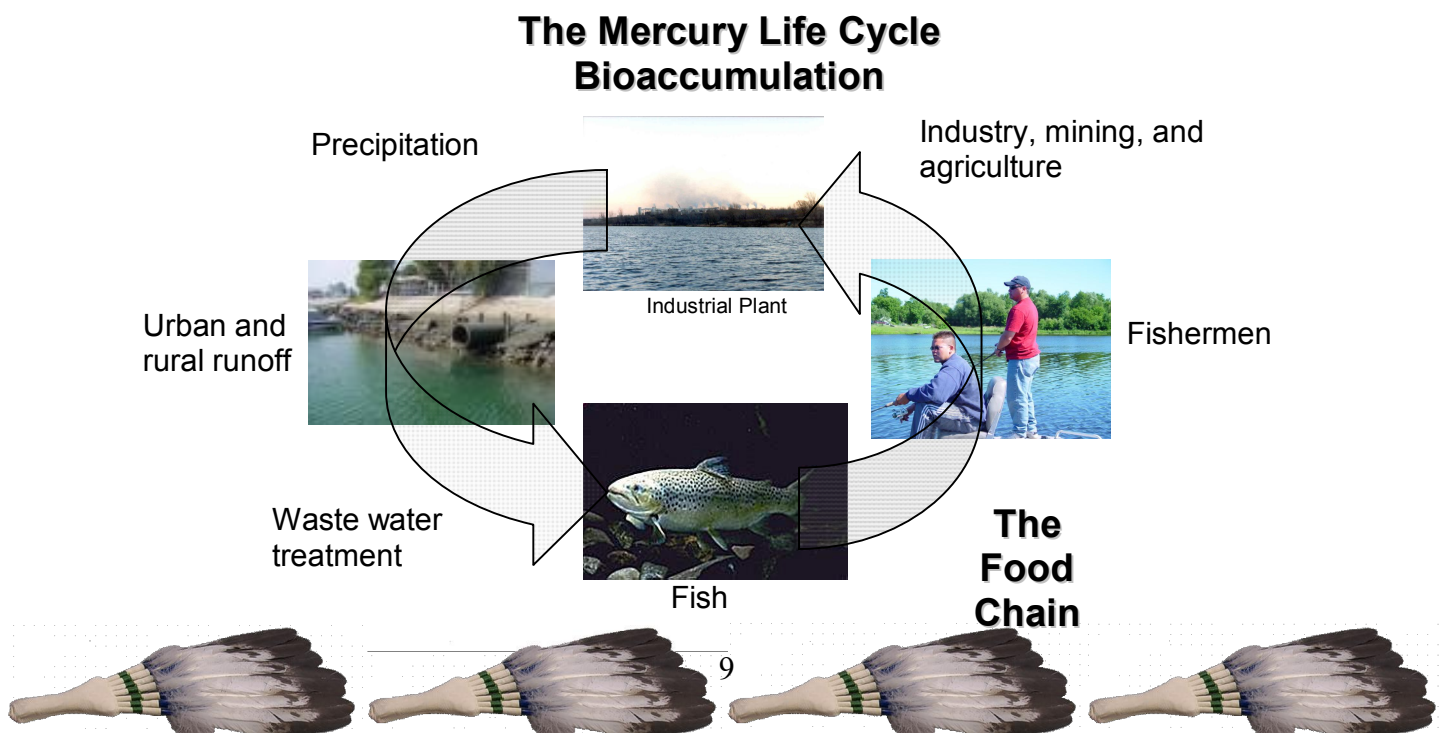
Mercury can be found in our environment in many different forms and concentrations. Each form and concentration affects human health to a different degree. For example, liquid elemental mercury (Hg^0) is relatively harmless to humans. However, if the gaseous form of elemental mercury accumulates within a person, it can enter the bloodstream from the lungs and cross the blood-brain barrier, thus becoming moderately toxic.¹ Inorganic mercury (Hg(II)) is also relatively harmless to humans.

That brings us to the most toxic form of mercury – organic mercury, specifically methylmercury (CH_3HgX). It is capable of crossing the blood-brain barrier and the human placental barrier. Rather than accumulating in a specific organ, it is distributed throughout the body which makes it more toxic. Methylmercury has a long in vivo (in the body) half-life; it takes a long time to break down in living organisms. This form of mercury primarily targets the brain where it attacks the central nervous system.²

2.1.2 Mercury and Bioaccumulation

Mercury does not break down or biodegrade in the environment; it is bioaccumulative, meaning that it builds up and remains within the tissues of living organisms. Although most of the mercury released into the environment is in its airborne elemental form, methylmercury is the form predominantly present in the food chain. Since this highly toxic form of mercury dissolves in water, it bioaccumulates in fish, thus especially impacting native people from Indian Nations when they eat the mercury-containing fish.³

The following diagram shows the cycle of bioaccumulation:



2.2 Why Mercury is Harmful

2.2.1 Mercury Harms the Environment

As mentioned briefly in the last section, we've established that mercury, specifically methylmercury, is harmful. This is true in two primary ways – methylmercury harms the environment and people from Indian Nations (mainly through the consumption of mercury-containing fish). First, we will look at the effect of mercury on the environment.

Since methylmercury dissolves in water, it bioaccumulates in fish. This causes fish to contain high levels of mercury, and consequently, wildlife that depends on fish as their main diet often suffers from methylmercury poisoning. According to the US Geological Survey, in several areas of the United States, concentrations of mercury in fish are high enough to be a risk to wildlife. Mercury can cause deformities in developing animals and analyses indicate that mercury is adversely affecting diving ducks from the San Francisco Bay, herons and egrets from the Carson River, Nevada, and heron embryos from colonies along the Mississippi River.⁴

2.2.2 Mercury Harms People from Indian Nations

Despite the attempts to lessen our intake of methylmercury, it *can* build up within a person. When this happens, its primary target organ is the central nervous system. In low concentrations, mercury can cause trembling hands, minor numbness, weariness, and irritability. In higher concentrations, mercury can cause loss of coordination, vision, hearing, and speech, and lessened muscle strength.⁵ These neurological problems (in worst case scenarios) can frequently lead to coma and death.⁶

Since methylmercury easily crosses the placenta, the US Food and Drug Administration found that mercury concentrations can rise to 30% higher in fetal red blood cells than in those of the mother.⁷ This puts children with developing nervous systems (fetuses and young children) at particular risk. Low levels of mercury in pregnant women can cause severe brain damage and even death to the developing child.⁸

Case studies have been completed on the harmful affects of mercury levels during pregnancy. In a St. Lawrence River community, mercury levels during pregnancy were related to fish consumption. This study observed a strong correlation between the frequency of fish consumption before and during pregnancy and mercury exposure in mothers and newborns.⁹ Results from a local fishing derby on the St. Regis Mohawk Reservation led to the conclusion that “mercury is a contaminant of concern in the St. Lawrence River Basin. Developing children and women who plan on having children should not consume locally caught smallmouth bass.”¹⁰

Methylmercury can also adversely affect others. Some solid wastes contain mercury and when workers handle contaminated wastes they are faced with inhalation hazards. This contaminated solid waste can also leak and when it reaches the solid waste stream it has the potential to



contaminate leachate (a product obtained by filtering out soluble parts) and increase mercury emissions.¹¹

2.2.3 Mercury More Quickly Affects People From Indian Nations

Since we as a people depend on the Mother Earth to provide for us and sustain us, when she is polluted, we are affected. When mercury enters rivers, streams, and oceans, it contaminates the fish we used to eat so often. We now have to limit our fish intake; the diet that had sustained our people for thousands of years has been critically altered and we need to take action against this problem.

For example, Barry Dana, Chief of Maine's Penobscot Nation, says the Penobscot River's increasing pollution changed his culture. "It's ingrained in our culture that we live off the land," he said. "Once we warmed up to the fact that the river was extremely polluted we had to make a conscious decision of turning our backs from sustaining our diet from fish."¹²

And as Ken Jock, Director of the St. Regis Mohawk Tribe's Environment Division, quoted, "we usually eat more fish than average Americans. If we stop eating fish, this has other health impacts because we replace a naturally good, low-fat protein source with unnatural processed flour and sugar products that contribute to more obesity, heart disease, and diabetes in Native Communities."¹³



2.3 Mercury in Lamps

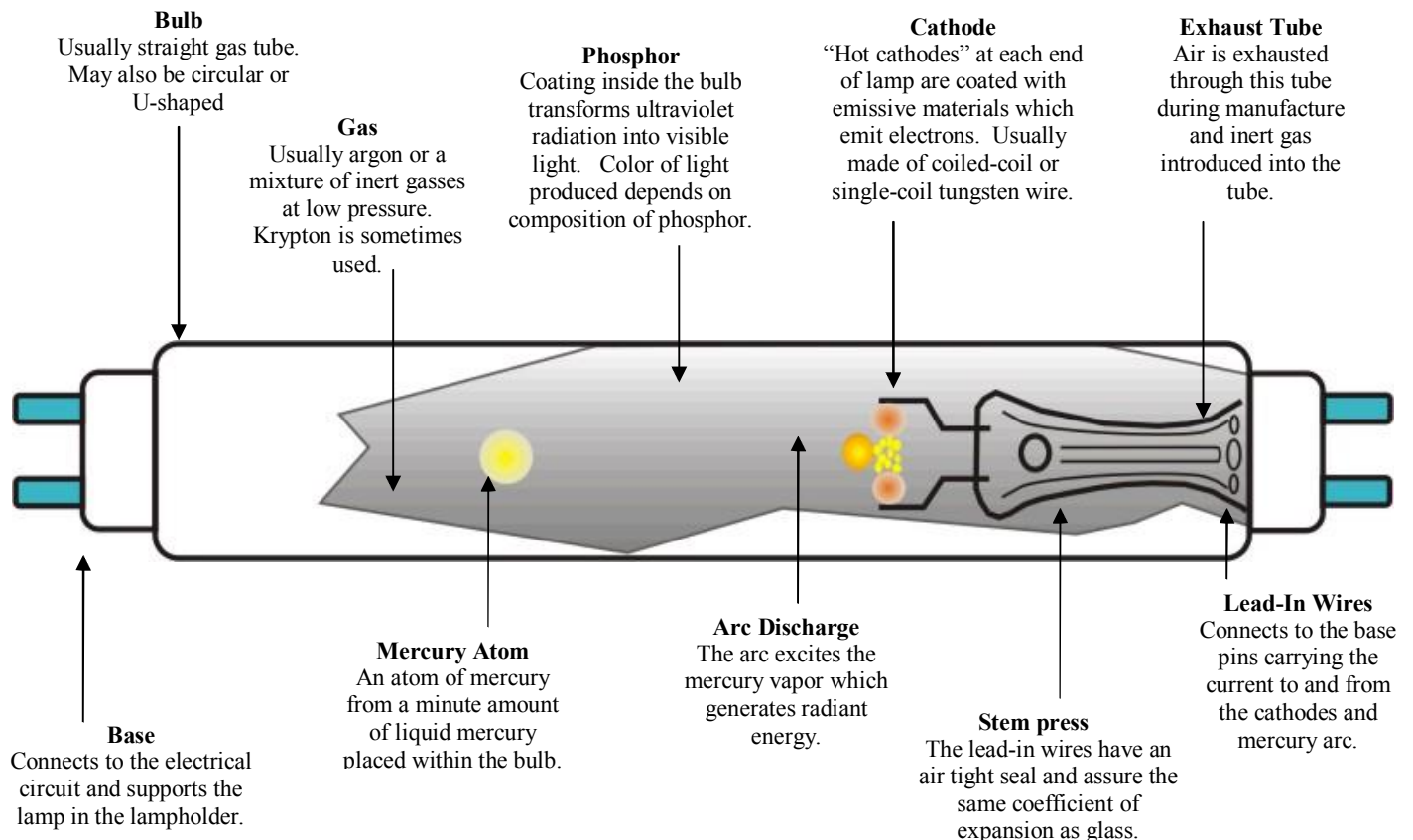
2.3.1 How Mercury Enters the Environment

Mercury enters the environment in many different ways. Volcanic activity, naturally-occurring mercury salts, coal-fired power plants, and waste incinerators are just a few. Mercury also enters the environment when we dispose of mercury-containing devices such as mercury switches, thermometers, and fluorescent lamps.

2.3.2 Fluorescent Lamps Contain Mercury

Most people are unaware that fluorescent lamps contain mercury. Fluorescent lamps consist of an inert gas and a small volume of elemental mercury (on average less than 20 mg) sealed within a glass tube. When switched “on,” electricity charges the electrons of the inert gas, in turn partially vaporizing the liquid mercury. These, now gaseous, mercury atoms are charged and jump to higher energy levels. To return to their original stable energy level, the mercury atoms release a photon of light energy. The light emitted by the mercury atom is ultraviolet (UV) light. A phosphor coating on the inside of the sealed tube converts the UV light to useful visible light.¹⁴

The following diagram shows an in-depth explanation of the parts of a common fluorescent lamp.



2.4 Lamps that Contain Mercury

2.4.1 Types of Lamps

Fluorescent and high intensity discharge lamps are the two most commonly found fluorescent lamps. Fluorescent lamps are often found in schools and businesses while high intensity discharge lamps are commonly used in security, outdoor, and warehouse lighting. All fluorescent lamps (i.e., linear, bug “zappers,” high output, tanning lamps, black lights, germicidal, and cold cathode) contain mercury and are therefore considered waste lamps. High Intensity Discharge lamps (i.e., metal halide, high pressure sodium, and mercury vapor lamps) are also considered waste lamps, as are compact fluorescent lamps, mercury short arc, capillary, and neon lamps.

The following diagram shows each type of lamp.¹⁵

Fluorescent Lamps

- Straight Fluorescent Bulbs (such as T8s and T12s) and Black Lights



- U-Style and Circular Fluorescent Bulbs



Compact Fluorescent Lamps (CFLs)



CFLs are commonly used in homes as energy saving lighting.

High Intensity Discharge (HID) Lamps

- Mercury Vapor Lamps
- High Pressure Sodium Lamps
- Metal Halide Lamps



HID lamps are commonly used in security, outdoor and warehouse lighting. HID lighting is also becoming popular for indoor use in commercial settings and in vehicle headlamps.

Neon lamps



Ultraviolet Lamps



UV lamps are frequently used for germicidal purposes, such as in water and air purifying. They are also used in tanning salons.

2.5 Disposal Classifications

2.5.1 Hazardous Waste

Mercury-containing waste lamps may be considered hazardous waste under the Resource Conservation and Recovery Act (RCRA) Subtitle C. To determine whether or not a waste lamp is considered a hazardous waste, the Toxicity Characteristic Leaching Procedure (TCLP) test for mercury is performed. TCLP is a laboratory procedure that is designed to estimate the leaching potential of a waste when it is disposed of in a municipal solid waste landfill. If the leachate produced by the TCLP test contains 0.2 mg/L of mercury, or more, the waste is considered hazardous by the Environmental Protection Agency (EPA). The level of 0.2 mg/L is the limit above which mercury containing waste could threaten human health and the environment by contaminating drinking water.

2.5.2 Universal Waste

The less stringent Universal Waste Rule, issued by the US EPA in 1995, is intended to reduce the amount of hazardous waste items in the municipal solid waste stream, encourage recycling and proper disposal of some common hazardous waste items, and reduce the regulatory burden on businesses that generate these wastes.¹⁶ Spent (used) mercury-containing lamps (waste lamps) were added to the lists of Universal Wastes in 1999.¹⁷ This means that as long as waste lamps are not broken or crushed, they can be recycled rather than disposed of as a hazardous waste. (In New York State, crushed lamps must be managed as hazardous waste which costs more than recycling of intact lamps.)¹⁸

In order to manage waste lamps as a Universal Waste, generators must follow the Federal regulations, 40 CFR 273 as well as any state and/or local regulations that apply.¹⁹ Consequently, disposal of mercury as municipal solid wastes (MSW) is not in compliance with 40 CFR Part 273.

2.5.3 Disposal on Indian Nations

With respect to their relationship to the US Government, Indian Nations are sovereign Nations with the right to self-governance. Therefore, state environmental and local environmental municipal laws do not apply to Indian Nations. Indian Nations must keep in mind, though, that haulers collecting materials from their Nations dispose of their wastes with the state or local municipalities; consequently they may have to comply with these laws to ensure the proper disposal of their waste lamps.



2.6 Ways to Treat Waste Lamps

2.6.1 Disposal

Mercury Containing waste lamps must be disposed of at the end-of-life through one of the following mechanisms:

(1) Treatment, Storage, and Disposal Facility

Waste lamps can be sent to a Treatment, Storage, and Disposal Facility (TDSF) where they are retorted, incinerated, or stabilized. The process for treatment of waste lamps may vary from state to state due to individual state regulations.*

(2) Recycling

Recycling is the best method for how to manage waste lamps. This occurs when waste fluorescent lamps are sent to a company that extracts the mercury from the lamps, recycling the glass, mercury, and aluminum parts as much as possible.

(3) Universal Waste Facility

One way to treat waste lamps is to send them to a facility that handles universal waste. These facilities handle waste lamps in accordance to the Universal Waste Rule.

(4) Drum-top Crushing

Drum-top crushing[†] is yet another way to dispose of waste lamps.²⁰ This is a process designed to volume-reduce waste fluorescent lamps by crushing them in a contained environment. Drum crushers fit on the top of a 55-gallon drum and approximately 600-800 lamps will fit into this drum when they are crushed. From there, drums filled with crushed waste lamps can be sent to a TSDF or to a recycling facility. The use of this mechanism can only be done so in accordance with authorized state programs. For more information specific to your state, consult your Tribal Environmental Department.

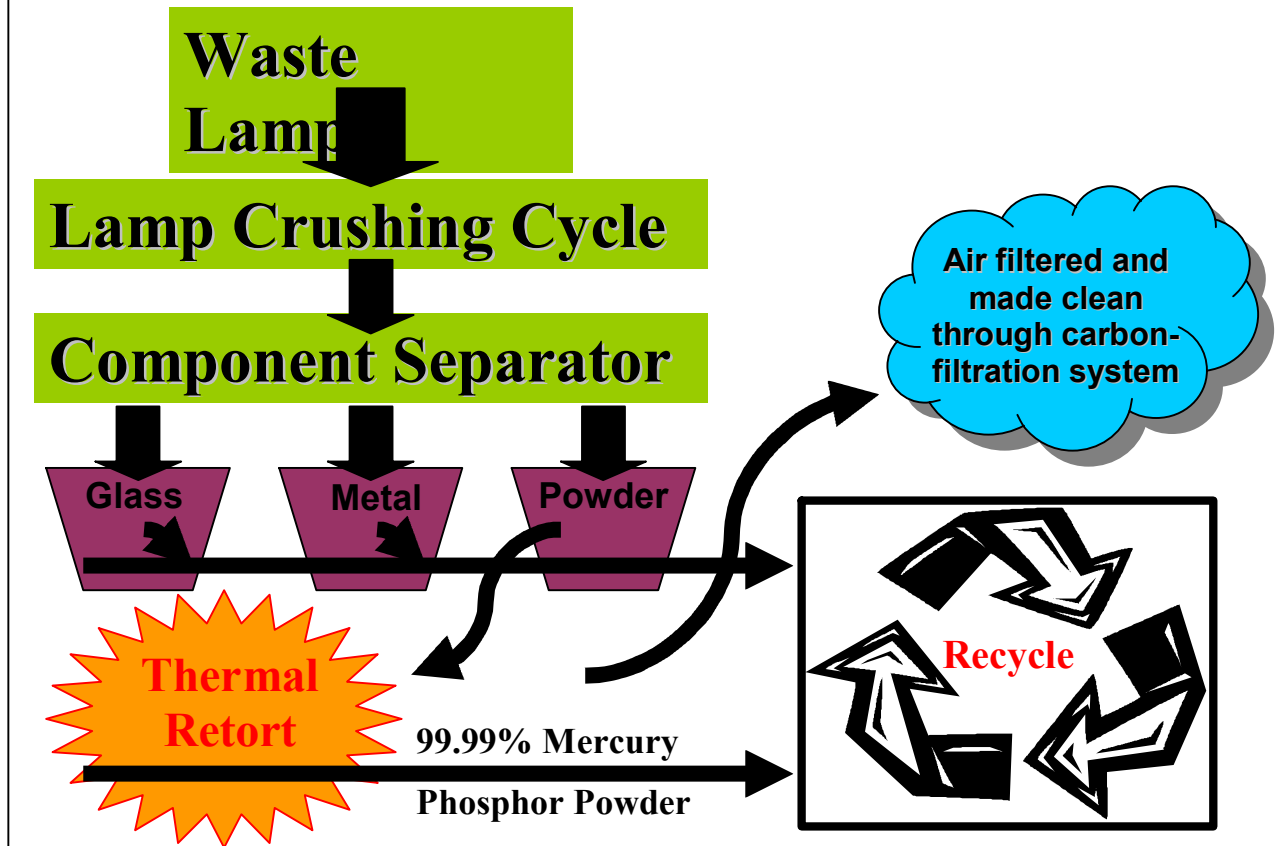
* See section 2.5.3 with regard to state regulations on Indian Nations.

[†] This method may not be approved in all states – please see state-by-state regulations.



2.7 How Recycling Works...

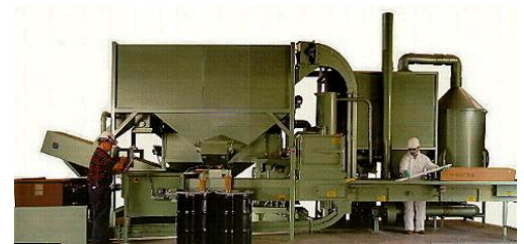
Lamp Recycling Process



2.7.1 Separation of Materials

The above diagram shows the process of waste lamp recycling.²¹

When waste lamps are recycled they must be sent to a facility equipped to handle such a process.* Once at the facility, bulbs are put through a recycling unit such as the model to the right. During this process waste lamps are first crushed and separated into metal end caps, glass, and mercury-containing phosphor powder. The metal and glass is then sent on to recycling facilities while the mercury-containing phosphor powder is sent to retort. With the application of heat, the mercury vaporizes free from the powder and condenses back into a liquid. The mercury and phosphor powder are also sent to other facilities to be recycled. For example, this 99.99% pure



Model LSS1 Recycling Unit

* See Appendix 4.2 for a list of waste lamp recyclers



mercury can be sold to companies that manufacture mercury salts and/or mercury-containing devices, or it can be utilized in electronics and various research and development applications.



2.8 Projected Benefits of Recycling

2.8.1 Tradition

Recycling reinforces traditional culture and practices of preserving the environment for the next generation. We are entrusted to protect the land, air, water, vegetation, and animal life for future generations from the detrimental effects of improper disposal of waste.²² This is especially true when it comes to ridding the environment of hazardous mercury found within waste lamps.

2.8.2 Health

Recycling waste lamps proves to be a much healthier option than disposing of them.²³ Through recycling, mercury-containing products are kept out of inappropriate waste disposal streams, thus keeping the environment better protected and less polluted. This is especially true with incineration since the gases released during this process can contaminate the air, negatively impacting land, water, and humans.

2.8.3 Liability

Recycling is also beneficial because it can limit user's superfund liability and simplify enforcement of waste lamp management.

On a state-by-state basis, recycling can be the preferred disposal method for waste lamps. Recycling is also consistent with solid waste disposal bans and partial bans in some states.*

* For state-specific information visit the following site and click on your home state
<http://www.nema.org/lamprecycle/contacts/>



2.9 “Cradle to the Grave” Documentation

2.9.1 Tracking Waste Lamps

Due to the nature of mercury (the fact that it is a hazardous waste), it must be tracked meticulously when disposing of it or recycling it. This process is often referred to as “cradle to the grave” documentation.

Specific documentation will vary from state to state, but since most regulations are similar, the information from New York State is provided here as a reference.^{24*}

2.9.2 Two Categories

There are two main categories when determining how to document waste lamp recycling. A facility can be considered either a “large quantity handler of universal waste” (the handler accumulates 5,000 kilograms or more total of universal waste at any time throughout a given calendar year) or a “small quantity handler of universal waste” (the handler does not accumulate 5,000 kilograms or more total of universal waste at any time).

That said, the documentation for each group of handlers differs. A small quantity handler is not required to keep records of shipments of universal wastes.[†] A large quantity handler, however, is required to track and keep record of all universal waste shipments. This information falls into three categories – receipt of shipments, shipments off-site, and record retention.

2.9.3 Specific Documentation

Receipt of shipments

A large quantity handler must keep a record of each shipment received at the facility. This record may take the form of a log, invoice, manifest, bill of lading, or other shipping document. This shipping receipt must include the following information:

1. the name and address of the originating universal waste handler
2. the quantity of each type of universal waste received
3. the date of receipt of the shipment of universal waste

* State regulations, laws, and recycling opportunities may vary. Although environmental laws may not apply directly to a reservation, many haulers collecting materials from a reservation dispose of their wastes within the state; consequently they may have to comply with the state’s environmental laws.

[†] Keep in mind this is for NYS – states will have differing regulations and some states have not adopted the Federal Universal Waste Program.



Shipments off site

A large quantity handler must keep a record of each shipment sent from the handler to other facilities. This record may also take the form of a log, invoice, manifest, bill of lading, or other shipping document. This shipping receipt must include the following information:

1. the name and address of the universal waste handler and/or destination to whom the universal waste was sent
2. the quantity of each type of universal waste sent
3. the date the shipment of universal waste left the facility

Record Retention

A large quantity handler must retain the records mentioned above for at least three years from the date of receipt of a shipment and three years from the date a shipment left the facility.

In addition, the quantity of on-site universal wastes also needs to be logged and clearly labeled with the phrase “Universal Waste-Lamps.” This is because handlers have accumulation time limits – universal waste may accumulate no longer than one year from the date the universal waste is generated or received from another handler. The only exception to this rule is if such activity necessitates proper recovery, treatment, or disposal of universal waste. However, the handler bears the responsibility of proving such activity.



2.10 Endnotes

- ¹ Demers, Hall & Swensen. "Mercury Lamp Recycling Programs – A Guide for Solid Waste Managers." Table 1: Health Effects on Mercury Species. 1.
- ² Demers, Hall & Swensen. "Mercury Lamp Recycling Programs – A Guide for Solid Waste Managers." Table 1: Health Effects on Mercury Species. 1.
- ³ Demers, Hall & Swensen. "Mercury Lamp Recycling Programs – A Guide for Solid Waste Managers." 2.
- ⁴ US Department of the Interior. US Geological Survey. "Mercury in the Environment." 2.
- ⁵ Demers, Hall & Swensen. "Mercury Lamp Recycling Programs – A Guide for Solid Waste Managers." 1.
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- ⁹ US Environmental Protection Agency. "Fish Advisory News – August 2004." Originally printed in The Associated Press, July 29, 2004. 29 July 2006. <<http://map1.epa.gov/html/newsaug04.htm>>.
- ¹⁰ David, Tony. "Fish Derby Report: Contaminant Results from Noah Thompson Memorials Fishing Derby." Iroquois Environmental Newsletter. 26. Spring/Summer 2006. 4,12.
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 "Neon lights" graphics gathered from: http://www.cssauction.com/pimages/NLM613636_PRODUCT_VIEW_1.jpg and
<http://commod.ru/images/min/1007.gif> respectively.
- ¹⁶ Demers, Hall & Swensen. "Mercury Lamp Recycling Programs – A Guide for Solid Waste Managers." 3.
- ¹⁷ Demers, Hall & Swensen. "Mercury Lamp Recycling Programs – A Guide for Solid Waste Managers." 3.
- ¹⁸ Northeast Waste Management Officials' Association. "How to Recycle Mercury Lamps in 8 Easy Steps." New York State Department of Environmental Conservation. 9 November 2005.
 <<http://www.dec.state.ny.us/website/dsh/hzwstman/8steprec.html>>.
- ¹⁹ Demers, Hall & Swensen. "Mercury Lamp Recycling Programs – A Guide for Solid Waste Managers." 3.
- ²⁰ Helms, Gregory. "Drum-Top Crushing of Mercury Lamps." US EPA Office of Solid Waste. PowerPoint Printout. 22 February 2006.
- ²¹ Information gathered from SWANA. "Promoting Mercury-Containing Lamp Recycling – A Guide for Waste Managers." 48.
 AERC Recycling Solutions. "Fluorescent Lamps Process Description."
 <<http://www.aercycling.com/lamps/process/lamp.html>>.
- ²² St. Regis Mohawk Tribe. "Comprehensive Final Report." Comprehensive Integrated Solid Waste Management Project. Section 3.1.1.
- ²³ National Electrical Manufacturers Association. "What are the Benefits of Recycling?" 1 June 2006.
 <<http://www.nema.org/lamprecycle/benefits.html>>.
- ²⁴ New York State Department of Environmental Conservation Division of Solid and Hazardous Materials. "6 NYCRR Subpart 374-3, Standards for Universal Wastes." 2005. 3-11.



Section 3

Community Specific Information for Establishing a Collection and Recycling Program



3.1 Introduction

3.1.1 Tradition and Culture

Although traditional and cultural beliefs of Indian Nations may differ from Nation to Nation, there seems to be a common thread among them all:

All aspects of life are interconnected and any advancement of environmental programs must meet the needs of the present generation without compromising the lives of future generations.

Developing and implementing solid waste management programs consistent with the traditional and cultural beliefs of Indian Nations will help to instill community ownership of the program and will lead to good community decisions with respect to management of solid waste.²⁵

3.1.2 Variety

Surveying the solid waste management programs in Indian Nations shows a wide variation of program development. Some Nations have complete systems in place and are successfully managing their solid wastes, while others Nations have no programs and experience problems with disposing of their solid wastes. The majority of Nations are somewhere between these two extremes and are looking for ways to make improvements.²⁶

The same principle applies to waste lamp management. Some Nations are equipped with facilities that would allow them to collect, store, and transfer waste lamps. Other Nations do not have such facilities and therefore find it difficult to set up their own waste lamp recycling program. Most Nations fall somewhere in the middle.

That said, this section of the manual will cover both extremes, allowing Nations to glean from both models depending on their presence or lack of facilities. This section is intended to provide practical information that will help Indian Nations refine or build programs that allow them to manage waste lamps in a manner that combines and sustains environmental protection, economic prosperity, and community well-being.²⁷

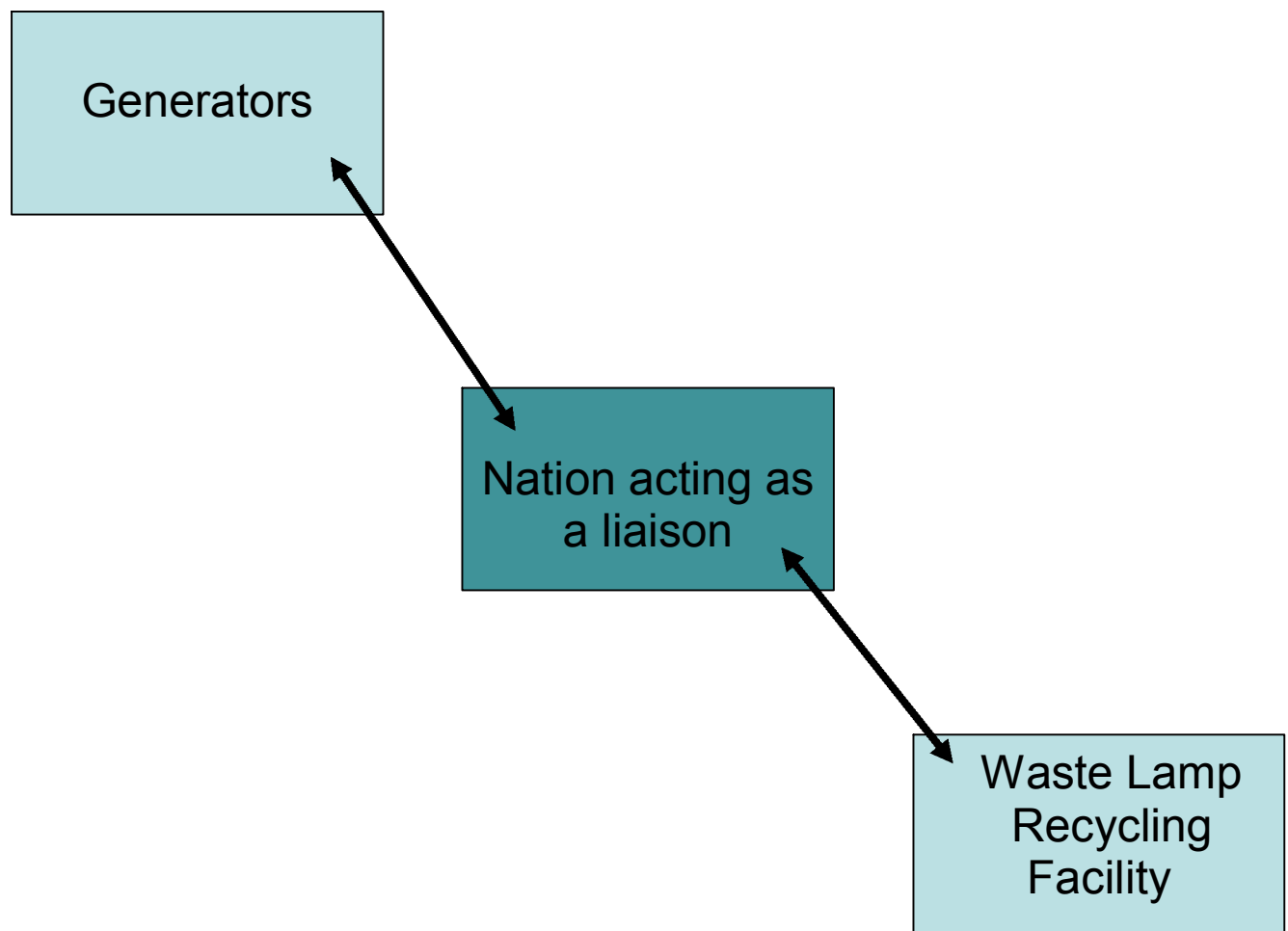


3.2 We do not have a Solid Waste Program

3.2.1 Acting as a Liaison

If an Indian Nation does not have a current solid waste program, there are still many feasible options available that will help preserve the environment from the harmful effects of waste lamps.

Since many waste lamp recycling facilities will deal directly with generators, a Nation without an established solid waste program can act as a liaison between generators and recycling facilities. This might entail setting up pricing charts for lamps (as will be discussed later in this section), making calls regarding pick-up and drop-off shipments, and creating or modifying a facility that allows for the safe storage of waste lamps.



3.3 We Have a Current Solid Waste Program

3.3.1 Acting as a Liaison

If an Indian Nation has a current solid waste program, there are many options available that will help preserve the environment from the harmful effects of waste lamps.

Many waste lamp recycling facilities will deal directly with generators; therefore, a Nation must decide whether or not this offer is in the best interest of the Tribe. Since shipments of waste lamps are often charged according to a “per stop” basis, it may be more advantageous and financially wise to coordinate a collection and storage facility for the waste lamps. If a Nation decides not to do this, they still have the option of acting as a liaison as mentioned in the previous chapter.

3.3.2 Setting up a Recycling Program

If a Nation has a current solid waste program, they also have the option of setting up a waste lamp recycling program. As part of this program, a specific section of the Tribe will set up collection, storage, and transfer regulations. For example, the St. Regis Mohawk Tribe (SRMT) is setting up a waste lamp recycling program. In order to do this, they first created informational and promotional materials that will help the Tribe understand the negative impact of mercury on the environment and to humans. The materials also explain how important it is to recycle waste lamps in order to maintain and preserve the environment for future generations.

The SRMT then used these materials to inform businesses and individuals about the option of recycling of waste lamps. This led to the collection of waste lamps. Since the SRMT has a current solid waste program and facility, they merely designated an area of their facility to be a storage place for incoming waste lamps.

After this step, a tribe should decide how much to charge businesses and individuals when they drop off waste lamps (this will be discussed more in a later chapter). Once a price is set, the storage area designated, and the people informed, the program is ready to begin collection.

When enough waste lamps accumulate to be shipped, the Tribe then needs to coordinate a shipment with a recycling facility. This often entails specific details pertaining to specific states and recycling facilities. For more information contact a recycling facility near you and ask them for specifics. Also remember to keep proper documentation (as mentioned in the previous section) as necessary on a state by state basis.



3.4 Projected Cost of Recycling

3.4.1 The Cost is Worth It

Recycling waste lamps costs money; however, the cost is small compared to the savings from using energy efficient lighting. Fluorescent lamps are generally four to five times more efficient than incandescent lamps.²⁸ They use 75% less energy than incandescent lamps and last at least six times longer.²⁹ As well, the cost of recycling waste lamps is often considerably cheaper than disposing of them as hazardous waste. Therefore, recycling is a better option both financially and for the environment.³⁰

3.4.2 Average Cost

Costs for recycling waste lamps will vary from reservation to reservation. On average though, the cost for waste lamp recycling ranges from \$0.03 - \$0.12 per linear foot or \$0.25-\$0.40 per four foot lamp.³¹ This is the recycling cost that companies charge facilities. In order to determine the cost of recycling for a business or individual user, a flat rate is determined based on the average cost to the waste lamp handler.

3.4.3 Specific Example

For example, the St. Regis Mohawk Tribe worked with a company that charged \$.06/linear foot and \$.45 per U-tube, compact, or circular tube. After transportation, shipping, and transfer fees, the Tribe found it necessary to charge businesses and individuals \$1.00 per straight lamp and \$.60 for Utubes, compact and circular lamps.*

Each Tribe will need to decide what to charge their businesses and individuals depending on the cost involved to the handler. Some facilities may be equipped to cover part of the cost, while other facilities may not be able to do so. This will need to be determined on a case-specific basis.

* See Appendix 4.3 for an example of the SRMT's Waste Lamp Pricing List



3.5 How to Handle Intact Waste Lamps

3.5.1 Prevention

If a facility is equipped to directly handle waste lamps, it needs to know how to handle them properly in order to prevent breakage and contamination to the environment. The following list is a compilation of measures to take when collecting, storing, and transferring waste lamps.

Do:³²

- Put spent lamps in original cartons or specially designed boxes for waste lamps if possible with no packing material
- Contact a recycling facility and store waste lamps in their regulated boxes if the original ones are not available
- Keep cartons closed
- Pack cartons in a way to prevent breakage
- Store cartons in a dry low traffic area
- Stack cartons neatly on pallets
- Shrink-wrap them if possible
- Label boxes with contents (“Universal Waste-Lamps”) and dates of accumulation

Do Not:³³

- Tape lamps together
- Store or package waste lamps in un-approved containers
- Place broken lamps in the same packaging/carton as intact lamps (please see section 3.6 on how to handle broken lamps properly)

When handling intact waste lamps, it is important to collect, store, and transfer them in a way that prevents leakage, spillage, or damage that could cause mercury to leak back into the environment, thus leading to the adverse effects we are trying to protect the environment and future generations from.³⁴



3.6 How to Handle Broken Waste Lamps

3.6.1 Handle with Care

If a facility is equipped to directly handle waste lamps, it needs to know how to handle broken lamps properly in order to prevent contamination to the environment. The following list is a compilation of measures to take when handling broken waste lamps.

Do:³⁵

- Wear gloves
- Use a damp cloth to pick up and place shards and spilled powder in a puncture-resistant, sealed, plastic bag or bucket
- Place all clean-up materials in a separate sealed container
- Keep the sealed container and send it to a recycling facility
- Air out the room for at least 15 minutes

Do Not:³⁶

- Vacuum lamps since this spreads mercury vapor
- Throw them in the trash since the same facility may recycle broken lamps

Just as with intact lamps, it is vital to handle broken waste lamps in a way that prevents leakage, spillage, or damage that could cause mercury to leak back into the environment, thus leading to the adverse effects we are trying to protect the environment and future generations from.³⁷



3.7 Traditional Lifeways

3.7.1 Traditional Practices

It is the tradition of people from Indian Nations to look generations forward in planning. It is with this foresight that this document is intended.

Current waste lamp disposal practices are not in good harmony with Mother Earth and these practices will have an adverse affect on the future generations that are going to inherit this land.³⁸ By implementing a waste lamp recycling program, we can help protect the land, air, water, vegetation, and animal life, and in the process, we can avoid the harmful effects of mercury.

Recycling waste lamps also helps preserve our traditional lifeways and cultural practices. Since much of our economic reliance is based on fish, game, and edible plants, bioaccumulation and frequency of use can cause disproportionate effects among Indian Nation peoples.³⁹ When we do all we can to properly recycle waste lamps, we are maintaining the practices and values of our culture.



3.8 Endnotes

- ²⁵ Weber, Laura. Solid Waste Handbook. Section 2.1.
- ²⁶ Weber, Laura. Solid Waste Handbook. Section 1.1.2.
- ²⁷ This is based on the St. Regis Mohawk Tribe's Environment Division Solid Waste Handbook. Weber, Laura. Solid Waste Handbook. *Executive Summary*.
- ²⁸ Demers, Hall & Swensen. "Mercury Lamp Recycling Programs – A Guide for Solid Waste Managers." 4.
- ²⁹ US EPA. "FACT SHEET: Mercury in Compact Fluorescent Lamps (CFL's)."
- ³⁰ Demers, Hall & Swensen. "Mercury Lamp Recycling Programs – A Guide for Solid Waste Managers." 4.
- ³¹ Northeast Waste Management Official's Association. "How to Recycle Mercury Lamps in 8 Easy Steps." New York State Department of Environmental Conservation. 9 November 2005.
<<http://www.dec.state.ny.us/website/dshm/hzwstman/8steprec.html>>.
- ³² Demers, Hall & Swensen. "Mercury Lamp Recycling Programs – A Guide for Solid Waste Managers." 6.
New York State Department of Environmental Conservation Division of Solid and Hazardous Materials. "6 NYCRR Subpart 374-3, Standards for Universal Wastes." 2005. 9.
- ³³ AERC. "AERC Recycling Solutions, Guidelines for Packing and Shipping Fluorescent Lamps using a Straight Bill of Lading (BOL)." <<http://www.aercrecycling.com/lamps/pack/lampbol.html>>.
- ³⁴ New York State Department of Environmental Conservation Division of Solid and Hazardous Materials. "6 NYCRR Subpart 374-3, Standards for Universal Wastes." 2005. 9.
- ³⁵ New York State Department of Environmental Conservation Division of Solid and Hazardous Materials. "6 NYCRR Subpart 374-3, Standards for Universal Wastes." 2005. 9.
Northeast Waste Management Official's Association. "How to Recycle Mercury Lamps in 8 Easy Steps." New York State Department of Environmental Conservation. 9 November 2005.
<<http://www.dec.state.ny.us/website/dshm/hzwstman/8steprec.html>>.
- Arner, Rob. "Mercury Lamp and E-waste Recovery in Northern Virginia." Final Draft for MSW Mgmt Magazine 2006. 2 December 2005. 5.
- ³⁶ New York State Department of Environmental Conservation Division of Solid and Hazardous Materials. "6 NYCRR Subpart 374-3, Standards for Universal Wastes." 2005. 9.
Northeast Waste Management Official's Association. "How to Recycle Mercury Lamps in 8 Easy Steps." New York State Department of Environmental Conservation. 9 November 2005.
<<http://www.dec.state.ny.us/website/dshm/hzwstman/8steprec.html>>.
- Arner, Rob. "Mercury Lamp and E-waste Recovery in Northern Virginia." Final Draft for MSW Mgmt Magazine 2006. 2 December 2005. 5.
- ³⁷ New York State Department of Environmental Conservation Division of Solid and Hazardous Materials. "6 NYCRR Subpart 374-3, Standards for Universal Wastes." 2005. 9.
- ³⁸ St. Regis Mohawk Tribe. "Comprehensive Final Report." Comprehensive Integrated Solid Waste Management Project. Section 1.1.
- ³⁹ EPA. "US Environmental Protection Agency National Pollution and Toxics Advisory Committee." (PowerPoint Presentation.) 14 July 2004.



Section 4

Appendices



4.1 List of Waste Lamp Recyclers

AERC Recycling Solutions

Offices in Florida, Georgia, Massachusetts, California, Pennsylvania, and Virginia – see the following website for contact information:

- <http://www.aercrecycling.com/>

National Electrical Manufacturers Association List of Lamp Recyclers

- <http://www.nema.org/lamprecycle/recyclers.html>

Northeast Lamp Recycling Inc., Corporate

250 Main Street

East Windsor, CT 06088

Toll Free: 888-657-5267

Fax: 860-292-1114

<http://www.nlr lamp.com/index.html>

NYS Department of Environmental Conservation List of Lamp Recyclers

- <http://www.dec.state.ny.us/website/dshm/hzwstman/lamprecy.htm>



4.2 EPA Mercury-Lamp Recycling Outreach Project Participants

LIST OF COOPERATIVE AGREEMENT RECIPIENTS FOR THE EPA NATIONAL LAMP RECYCLING OUTREACH PROGRAM

ORGANIZATION	STREET ADDRESS	CONTACT NAME(S)/INFORMATION
Association of Lighting and Mercury Recyclers	2436 Foothill Blvd., Suite B Calistoga, California 94515	Paul Abernathy Phone: (707) 942-2197 Fax: (707) 942-2198 E-mail: mail@almr.org
CA Department of Toxic Substances Control	1001 "I" Street, 11 th Floor P.O. Box 806 Sacramento, California 95812-0806	Karl Palmer Phone: (916) 445-2625 Fax: (916) 327-4495 E-mail: kpalmer@dtsc.ca.gov
	8800 Cal Center Drive Sacramento, California 95826	Matthew Peterson Phone: (916) 255-3626 Fax: (916) 255-3595 E-mail: mpeters2@dtsc.ca.gov
Center for Ecological Technology	26 Market Street Northampton, Massachusetts 01060	Lorenzo Macaluso Phone: (413) 218-1543 Fax: (413) 586-7351 E-mail: lorenzom@cetonline.org
Hawaii Department of Health	P.O. Box 3378 Honolulu, Hawaii 96801	Grace Simmons Phone: (808) 586-4226 Fax: 808-586-7509 E-mail: gsimmons@cha.health.state.hi.us
Northeast Waste Management Officials' Association	129 Portland Street, Suite 602 Boston, Massachusetts 02114	Meg Wilcox Phone: (617) 367-8558 Ext. 305 Fax: (617) 367-0449 E-mail: mwilcox@newmoa.org



LIST OF COOPERATIVE AGREEMENT RECIPIENTS FOR THE EPA NATIONAL LAMP RECYCLING OUTREACH PROGRAM CONTINUED...

Pacific Northwest Pollution
Prevention Resource Center

513 First Avenue West
Seattle, Washington 98119

Christine Guiao
Phone: (206) 352-2050
Fax: (206) 352-2049
E-mail: cguiao@pprc.org

Chris Wiley
Phone: (206) 352-2050
Fax: (206) 352-2049
E-mail: cwiley@pprc.org

St. Regis Mohawk Tribe

412 State Route 37
Akwesasne, New York 13655

Laura Weber
Phone: (518) 358-5937 Ext.132
Fax: (518) 358-6252
E-mail: laura_weber@srmtenv.org

University of South Carolina

USC-ISPR
1600 Hampton Street, Suite 411A
Columbia, South Carolina 29208

Jeff Beacham
Phone: (803) 777-5522
Fax: (803) 777-4575
E-mail: jeffbeacham@bellsouth.net

VT Department of Environmental
Conservation

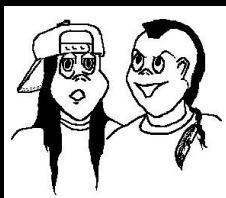
103 South Main Street
Waterbury, Vermont 05671-4911

Gary Gulka
Phone: (802) 241-3626
Fax: (802) 241-3273
E-mail: gary.gulka@state.vt.us



4.3 SRMT Waste Lamp Pricing List

ST. REGIS MOHAWK TRIBE ENVIRONMENT DIVISION



Waste Lamp Pricing List

Type of lamp	Price
Straight Lamp	\$1.00/lamp
Utube, Compact & Circular Lamps	\$0.60/lamp
High Intensity Discharge Lamps	\$1.20/lamp
Shattershields/Coated Lamps	\$1.20/lamp
Halogen & Incandescent Lamps	\$0.20/lamp
PCB Ballast	\$0.60/lamp
Non-PCB Ballast	\$0.45/lamp
Broken Lamps	\$1.50/lamp

* Broken lamps must be brought in a sealed, puncture-resistant container.

Please:

- Store waste lamps/cartons in a dry area
- Keep cartons closed
- Bring waste lamps in original cartons with no packing material
 - ♦ If you do not have the original carton, bring lamps separately
- Take care not to break waste lamps while storing them or transporting them

Please Do Not:

- Tape lamps together
- Store or package waste lamps in un-approved containers
- Place broken lamps in the same packaging/carton as intact lamps

Please contact Laura Weber, Director - Solid Waste Management, at the office or transfer station with any questions or concerns. Thank you.

St. Regis Mohawk Tribe
Solid Waste Management Program
412 State Route 37
Akwesasne, NY 13655

Office Phone: 518-358-5937
Fax: 518-358-6252
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