



# **Compact Fluorescent Bulb Recycling: Program Case Studies and Recommendations**

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for

# **Portland General Electric**

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## Executive Summary

Fluorescent bulbs use less energy to produce light than do standard incandescent bulbs. This helps to reduce the amount of coal burned to provide light and thus reduces mercury emissions from burning coal. Fluorescent lights themselves contain mercury though, and are the second largest source of mercury in our landfills. This paper provides case studies of programs that collect and recycle fluorescent bulbs to keep mercury from being emitted to the environment.

Oregon law requires that large generators of fluorescent waste manage their waste and not send it to solid waste. Oregon classifies fluorescent bulbs as universal waste, which allows generators to collect fluorescent lights generated by themselves or others for collection before they are recycled or disposed of. Households and conditionally exempt generators however are allowed to put fluorescent bulbs in solid waste. Several companies that collect or collect and recycle fluorescent bulbs have a presence in PGE' s service area. These recyclers are interested in creating a more expansive collection program.

There are two basic models of fluorescent bulb recycling programs. One is the type run by county or municipal governments to collect household and conditionally exempt generator bulbs. Two examples of this program model are found in Brown County, Wisconsin and Marion County, Oregon. Both programs collect fluorescent bulbs at one site from households free of charge.

The other model uses local retail stores as collection sites for household fluorescent bulbs. Examples of these programs are found in Minnesota and Allan County, Indiana. Minnesota has a number of hardware stores that collect fluorescent bulbs and send them to a recycler. Xcel Energy, a Minnesota electric utility, supports this program. Allan County uses a Sears store as a collection site for fluorescent bulbs. The State of Indiana and the Allan County Solid Waste Department support this program.

From these examples, the convenience of recycling locations, the amount of the recycling fee and the advertisement of the program appear to be three major factors that affect how many bulbs are collected. Having a broad network of retail stores brings in more bulbs than having one facility or collection event. Keeping the price of recycling the bulb low is also a factor, especially when generators have the option of placing them in solid waste for no fee. Advertising is a common element among all the programs, to raise awareness about the need for recycling and to promote the program itself.

Considering the examples from other programs and the circumstances in Oregon, PGE could readily start a retail collection fluorescent bulb recycle program in partnership with retail outlets, a local mercury recycler and possibly the support of county and municipal governments and waste authorities. A benchmark cost for a similar program in Minnesota was \$300,000 per year.

## I. Background

Fluorescent bulbs are known to use less energy than standard incandescent bulbs for the number of lumens per watt. Recent improvements in lighting technology have produced compact fluorescent bulbs that can be used in place of standard incandescent bulbs. There are significant energy savings to be had by encouraging the replacement of standard incandescent bulbs with compact fluorescent bulbs. According to the EPA, compact fluorescent light bulbs use 75% less energy than standard incandescent bulbs and will last up to ten times longer. One negative impact of compact fluorescent bulbs and regular fluorescent bulbs is that they contain small amounts of mercury, and are estimated to be the second largest source of mercury in landfills nationwide. The Oregon Department of Environmental Quality lists mercury-containing lamps as the largest source of mercury in Oregon's solid waste stream. Once in the landfill the mercury in these bulbs is often released, which contaminates the air, soil and water. Mercury is a highly toxic element that stays in the environment for decades and increases in concentration as it moves up the food chain. Even in small quantities, mercury causes significant health and ecological problems, including learning disabilities in children. Mercury is most dangerous to children and pregnant women.

The total amount of mercury released into the environment due to a light bulb depends on whether the light bulb itself contains mercury and the source of the energy used to illuminate the bulb. Incandescent bulbs contain no mercury, but fluorescent bulbs contain a few milligrams that can be released if the bulb is broken. Coal is commonly the energy source for electricity. Coal usually contains some amount of mercury, and burning coal for power emits the mercury into the environment. By using less energy and therefore requiring less coal to be burned, fluorescent bulbs reduce emissions of mercury from coal burning. This reduction in mercury emissions is greater than the potential emissions from a broken fluorescent bulb, and so fluorescent bulbs reduce the total amount of mercury released into the environment. It is still imperative though to keep as much mercury out of the environment as possible. Fortunately, mercury recyclers can recover mercury from fluorescent tubes and compact fluorescent bulbs, further reducing the amount of mercury that fluorescent lighting puts into the environment.

Even though fluorescent bulbs can be recycled, many are being added to the landfill. The public is generally not aware that fluorescent and compact fluorescent lamps contain mercury and are is aware of the importance of recycling them. There are several programs across the country that have been set up to encourage fluorescent and compact fluorescent bulb recycling. This paper provides descriptions of some of these programs and will make general recommendations for how Portland General Electric might structure a fluorescent recycling program.

PGE is promoting the use of compact fluorescent bulbs because they easily replace regular incandescent bulbs. Fluorescent tubes are different from compact fluorescent bulbs, but almost all recyclers of mercury containing bulbs will handle both types. For the purpose of this paper, the term 'fluorescent bulbs' will refer to both compact fluorescent bulbs and fluorescent light tubes. There is a difference in the cost between compact bulb

recycling and fluorescent tube recycling, but the question of whether to include both types of bulbs is not considered in this paper.

## **II. Fluorescent Light Bulb Waste Management in Oregon**

People who generate mercury-containing lamps in Oregon have several options for disposal of lamps. There are no regulations regarding the disposal of household hazardous waste as solid waste. This means that households can dispose of fluorescent bulbs in their weekly garbage collection. Local waste authorities however may have limit the amount that one household may dispose of each week. Metro, for example, will not allow a household to dispose of more than 25 fluorescent bulbs in one collection. A household who disposes of more than 25 can either arrange to take them to the Metro hazardous waste facilities, or take them to a local fluorescent bulb recycler. The major Metro transfer station in northwest Portland will take small amounts of fluorescent bulbs free of charge from individual households. These bulbs are collected and sent to a local fluorescent bulb recycler.

Businesses that generate fluorescent bulb waste face different management requirements. A business that is a conditionally exempt generator (CEG) may dispose of fluorescent bulb in the solid waste landfill. A conditionally exempt generator produces less than 220 pounds of hazardous waste, including fluorescent bulbs, each month and does not accumulate more than 2200 pounds at one time. Conditionally exempt generators are subject to the rules of local waste authorities, such as Metro's limit of 25 fluorescent bulb per solid waste load. If they do have a large load, conditionally exempt generators can take their fluorescent bulbs to the Metro transfer station to be collected for recycling, but they must make prior arrangements and must pay a fee to Metro. They are encouraged to make private arrangements with local fluorescent bulb recyclers to handle their fluorescent bulbs.

Oregon allows fluorescent bulbs to be managed under the Universal Waste Rule, which encourages the collection and proper disposal of certain hazardous wastes by streamlining the regulation and handling requirements for them. A Universal Waste handler is a person who generates or receives universal waste for the purpose of consolidation. Fluorescent bulbs are classified as universal waste and waste lamps must be sent to a universal waste destination facility for recycling or disposal. Handlers that generate universal waste may keep the fluorescent bulb on site for one year, unless they can demonstrate that more time is needed to generate quantities needed for proper recovery or disposal. Handlers that receive fluorescent bulbs from off site and accumulate more than 2,200 pounds cannot keep the universal waste for longer than 6 months without permission from Oregon Department of Environmental Quality. When the bulbs are disposed of, they are ultimately subject to hazardous waste requirements. Fluorescent bulbs can be sent to a hazardous waste facility, universal waste off-site collection site, or a universal waste destination facility.

There are some fluorescent bulbs in use that have low mercury content. These bulbs may be treated as solid waste if the manufacturer provides documentation that the bulb does

exhibit hazardous waste characteristics or if the leachate from the Toxicity Characteristic Leaching Procedure (TCLP) does not exceed 0.2 milligrams per liter.

### **Fluorescent Light Bulb Recycling in the PGE Service Area**

There are several firms that recycle fluorescent lights who serve the Portland area. Metro recycling hotline lists three companies that collect fluorescent bulb for recycling. Earth Protection Services, Inc. and EcoLights Northwest are lamp processors that have offices in the Portland area. These companies collect fluorescent bulbs and send them to be recycled at other locations by their respective companies. Northwest Fire Fighters Environmental based in Springfield, acts more as a hazardous waste broker that takes fluorescent bulb from businesses and households and sends them to another company to be recycled. These are the three major companies that provide collection services for fluorescent bulbs within the Portland area and through the Willamette valley.

All three companies will make arrangements with individual companies and households to collect their bulbs. Earth Protection Services Inc. (EPSI) will take up to 5 fluorescent bulbs from households for no charge. EPSI also has contracts set with Marion County Solid Waste Management and with Lane County to collect fluorescent bulbs brought to their facilities.

## **III. Fluorescent Light Bulb Collection Programs**

There are two basic models of programs that collect fluorescent light bulbs across the country. The first is collection programs run by municipal or county solid waste programs to collect fluorescent bulbs generated by households. The second is collection programs set up by either local government or private fluorescent bulb recyclers that use individual retailers as collection points for fluorescent bulbs.

### **County and Municipal Recycling Programs**

There are numerous programs across the country that are run by the solid waste division of local governments. These programs are run for the collection of fluorescent bulbs from households and sometimes small quantity generators as well, but typically exclude larger businesses from depositing their fluorescent bulbs. The collection of fluorescent bulbs, especially in more rural areas, tends to focus around special hazardous waste collection events that occur at scheduled times during the year. Areas with higher population more frequently have a facility, such as a transfer station or a special hazardous waste collection site, where residents can take their fluorescent bulbs year round. These solid waste or hazardous waste divisions typically have a contract with a company that handles or recycles fluorescent bulbs to pick-up these bulbs after collection events or at regularly scheduled times. The following case studies are two examples of how such local solid waste fluorescent bulb recycling programs are structured.

***Brown County, Wisconsin***

contact Wes Daniel 920-492-4950

Brown County has a permanent facility for fluorescent bulb recycling at their household hazardous waste facility. They contract with a local mercury recycler charges a fee to collect and recycle the bulbs. Residents of Brown County are allowed to dispose of their fluorescent bulbs free of charge, while non-residents and businesses are charged 25¢ for compact fluorescent bulbs and fluorescent tubes 4 foot and under, 35¢ for 8 foot bulbs and \$1.50 for all others.

Brown County also runs The Fluorescent Light Bulb Collection Day in conjunction with a local recycling company. It was partially funded through a grant from the Department of Natural Resources and Sustainable Green Bay. The initial grant ran for two years to fund the event as a demonstration project. The event is an opportunity for Brown County businesses to not only get rid of their used bulbs, but also recycle them. To date, 38,000 bulbs have been collected in this program. They expect 50-60 businesses to bring in another 20,000 bulbs this fall. All components of the collected bulbs are recycled: glass, metal and mercury. The reduced costs for disposal make this a popular event for area businesses. The contractor has waived their pick up fees and everyone is given bulk pricing for their bulbs. Brown County has decided to make this an annual fall event even though the grant funding ended after 1999. They are starting to see "regular customers" at these collections and anticipate collecting more than 30,000 bulbs annually as this program catches on. This day is part of the Pollution Prevention week in Brown County.

In support of this event the local Chamber of Commerce shared their mailing list of businesses to advertise this special collection day by postcard. The number of bulbs collected started at 7,500 one year, 12,000 next, 27,000 the next and then to 10,000 the last year. Advertising for the one day collection event was done mainly through a press release to the local media. A Brown County employee dubbed a billboard advertising campaign a 'disaster' since it cost a few thousand dollars and did not appreciably increase the turnout.

***Marion County Solid Waste Program, Marion County, Oregon***

Contact Jeff Bickford 503-588-0711 x5992

All types of fluorescent lights generated by households can be deposited at the Salem, Oregon primary transfer facility for no fee. They only take fluorescent bulbs on Fridays, Saturdays and Sundays due to staffing limitations. They keep the bulbs covered and in a locked box until EPSI collects them. The Salem facility is the only one in the county that handles fluorescent bulbs. They receive primarily long tubes, but get some CFL as well. EPSI takes them after 500-700 pounds are collected. They average 4-5 shipments to EPSI each year. Marion County has been advertising fluorescent bulb recycling for about one year. They do radio, cable TV and newspaper spots, and send out a tabloid style information letter twice a year. During this time they have seen fluorescent bulb recycling increase. Marion County has targeted mercury for recycling because of the waste to energy facility that burns most of their solid waste. This would put a portion of the mercury in the waste into the air.

## **Retail Collection Programs**

This type of fluorescent bulb recycling program is far less common than events or collection facility programs run by county or municipal solid waste divisions. Very few people seemed to know of any existing programs, and the two case studies here are the only two that were found for this report. EPSI is currently talking with Home Depot about this type of program, but discussion is still in the early stages.

### ***Allan County, Fort Wayne, Indiana***

Contact Stacie Perkowskie 219-449-7878

In 1998, the Governor of Indiana created a voluntary hazardous waste initiative for the 62 solid waste districts, and 6 jurisdictions were chosen to be hubs. The hubs are collection sites for the smaller counties in the program, and the initiative deals with all types of hazardous waste. Allan County solid waste serves as a hub for one of the northern parts of Indiana and has a hazardous waste storage facility there.

The fluorescent recycling program is run in partnership with one local Sears store in the county, with another one to be added soon. The program is for residents only, although businesses have illegally dumped their fluorescent bulbs on the program. The Sears store has a cylindrical holder for people to place their old bulbs, and Sears holds the bulbs until they collect enough to fill two pallets. The program takes bulbs up to 4 feet, and anything longer has to go to the county storage facility. Bulbs from Sears are sent to the Allen County hazardous waste storage facility, where they are stored until they are sent to Global Recycling in Stoughton, Massachusetts. The program is free of charge to the residents, and the Sears store is a good location because the mall security can monitor the bulbs that are brought in to prohibit use by businesses. The program is very successful and is getting 1,100 bulbs per month, which extrapolates to about 13,200 bulbs per year.

The cost of the program is 6.5 ¢ per foot of bulb. The cost of one trip of 23 pallets to go to Massachusetts is \$800. Bulbs from other hubs are combined to gather enough pallets to make a full load. The program is currently looking for a recycler that is more local. The State of Indiana supports the program and now pays for 75% of the cost statewide. Sears is the only store in the program currently, although Allan County has been contacted by regional representatives from other home improvement stores. The program may eventually include these partners, but Allan County does not have the number of employees necessary to collect bulbs from more than two collection sites.

The program was advertised through news releases and TV advertisements. Ads were run heavily for a time and then decreased in intensity. The program was also advertised in newspapers and "Waste Watcher". The advertising is paid solely by Allan County and not by the state grant or by Sears.

The State made the program easier by putting out a request for proposals to handle the fluorescent bulbs for the whole state. Sears happens to use the same recycling provider, but does not bundle their lights. One benefit to Sears is the possibility of increased sales.

Case studies show that 50% of the people who recycle bulbs buy new ones on site (<http://www.bogfrog.com/lightbulbpromo.htm>). This recycling program has won several awards and was scheduled to win an award from the Governor on May 7, 2001. The program has been so successful that it will soon be statewide and involve sixteen other Sears stores.

### ***Xcel Energy Recycling Program***

Contact: Gene Hammer 612-330-5871 or  
Sue Yarusso of Mercury Technologies 800-864-3821

This is the only example of an electric utility involved in a fluorescent bulb recycling program to be found. Xcel Energy has been mandated by the state of Minnesota to spend a part of the rate base on conservation improvement programs, which includes their CFL recycling program. The mandate started in 1993 and the program collects about 150,000 bulbs per year, at a cost of about \$300,000 to Xcel. Xcel Energy serves four states, but runs this program only Minnesota due to its ban on fluorescent bulbs in solid waste.

There are two avenues through which the fluorescent bulbs are recycled. One is the hardware store return program. Once each year in the local newspapers Xcel distributes a sheet of ten 50¢ coupons for CFL recycling at local hardware stores. The customers can then use these to receive 50¢ off the price of the CFL recycling fee. The program is targeted at households and small businesses. Xcel customers can also request additional sheets at no charge. This practice is not advertised and is not closely monitored either, although they do periodically watch for abuse of the extra sheets by businesses.

Customers are able to take their bulbs to a number of hardware stores in Minnesota and pay to have them recycled. The stores each have individual contracts with the mercury recycler Mercury Technologies in Pine River, Minnesota. The hardware store packages and prepares the bulbs to be picked up by Mercury Technologies, which then recycles them. The fee for recycling is set by the individual stores and ranges from 50¢ to \$1 per bulb. The major role of Xcel in this process is to provide the coupon to encourage people to recycle their bulbs.

The other avenue for fluorescent bulb recycling is through household hazardous waste collection events run by Minnesota counties. Household hazardous waste days are run by the counties to collect many types of hazardous waste including fluorescent bulbs. Each county has their own contract with a fluorescent bulb recycler, which may or may not be Mercury Technologies, for the materials they collect. Xcel has negotiated to pay a percentage of the cost borne by the county to recycle the bulbs. In some places this is 100% of the bulb recycling cost and in others some lesser fraction. Once the county is billed for the light bulb recycling cost, the county invoices Xcel for the percentage agreed upon.

The most expensive part of the program is printing and sending the coupons to the customers. The coupons are added as an insert to newspapers as an advertising sheet in five major city newspapers in February. Xcel also sells lights and they advertise the

program in their catalog and as an insert in their bills. In 2000 the programs recycled 162,000 bulbs. Xcel's customer base is 1.4 million.

Xcel Energy was incorporated into this program after it was started. In 1993 the Minnesota Pollution Control Agency (MPCA) changed the policy for the storage of hazardous waste on site, which allowed hardware stores to keep up to 1000 lamps on site for collection service. Mercury Technologies set up contracts with individual hardware stores throughout rural Minnesota to collect fluorescent light bulbs because the twin cities had year round recycling facilities but rural Minnesota did not. When Minnesota banned fluorescent light bulbs from the waste stream, it became more difficult for rural Minnesota to recycle due to the infrequency of household hazardous waste collections. The hardware stores were eager to be part of this program because it brings in more foot traffic, increases fluorescent bulb sales and is positive for public relations. There are 200 stores that Mercury Technologies works with and they call every three months to see if bulbs should be picked up or the store calls them when they approach 1000 bulbs, the legal limit that a store can hold. Xcel Energy became a partner to the existing program by offering the coupons to encourage recycling. The hardware stores deal only with Mercury Technologies and not with Xcel. Mercury Technologies is starting this program with Great River Energy Co-Op, which has 29 member utilities. Coupons for fluorescent bulb recycling will be inserted in their bills. When a customer brings in a coupon, the hardware store keeps it and sends it to Mercury Technologies with the bulbs. Mercury Technologies then sends a bill to Xcel based on the number of coupons they receive. Mercury Technologies receives about \$5000 a year from Xcel for their recycling services.

#### **IV. Conclusion from the Program Case Studies**

Based on the examples above, there seem to be three major factors that influence success in a fluorescent bulb recycling program: convenience, price and advertising. The model of using retail stores for collection sites is more convenient than county recycling facilities and hazardous waste collection events. They are more convenient because there are simply more collection sites, so that urban areas have a greater number of collection sites and rural areas gain collection sites where there were none before. Retail collection sites also eliminate the need for a special trip to a hazardous waste collection facility so that fluorescent bulb recycling can be combined with other errands. The purchase of a new fluorescent bulb and the recycling of a used one can be combined. The advantage of convenience is that it presumably leads to a greater number of fluorescent bulbs being collected for recycling. Mercury Technologies claims that they collect far more bulbs through retail collection than they do through county facilities or events.

One advantage of local collection facilities or events is that they offer fluorescent bulb recycling at no cost to households and CEG in some cases. The recycling charges for retail programs depend on how they are structured. In Xcel's program, the coupon pays between 50% to 100% of the price the individual store charges for fluorescent bulb recycling. Mercury Technologies claims that some retailers are charging more than it costs them to offer the recycling. Allan County has combined the two program models by

using a retailer, Sears, as a collection site for a no fee fluorescent bulb recycling program paid for by the state and county governments. A retail based fluorescent bulb recycling program is most effective when the recycling cost to consumers is zero or very close to zero. This is especially true for Oregon where households and CEG can dispose of fluorescent bulb in solid waste for no fee.

Advertising is also an important factor in the success of a fluorescent bulb recycling program. There seems to be limited knowledge in the public at-large of the fact that fluorescent bulbs contain mercury, of the need to keep fluorescent bulbs out of the solid waste stream and that fluorescent bulb recycling exists. Both the county and municipal programs and the retail collection programs spent significant amounts of the program budgets on advertising. Xcel noted that printing and distributing coupons was the largest cost of the program. Whether it is done through newspaper inserts, TV and radio ads, print ads or any other type of media, raising public awareness about fluorescent bulb recycling and informing them about how they can recycle fluorescent bulbs through the program is necessary.

## **V. Recommendations for a PGE Program**

Oregon has several advantages for recycling fluorescent bulbs. Two fluorescent bulb recycling companies have expressed interest in having some type of program to recycle more fluorescent bulbs from households, and it appears that The Home Depot is also interested in participating. In addition to having two fluorescent bulb recyclers in Portland, Oregon Department of Environmental Quality also allows fluorescent bulb to be treated as universal waste. This lets retailers such as those mentioned in the programs above to collect fluorescent bulbs on site for recycling. The PGE service area also is generally an environmentally conscious population that would be receptive to fluorescent bulb recycling.

One disadvantage of Oregon's situation is that CEGs and households are allowed to dispose of fluorescent bulb as solid waste. Given that there is some cost associated with recycling fluorescent bulb, the least expensive option for these generators is to put them in solid waste. Minnesota has banned this option, and as a result has a very good statewide program set up for fluorescent bulb collection and recycling. A rule of this type in Oregon would encourage parties to form their own partnerships for fluorescent bulb recycling.

In light of the advantages and disadvantages above, combined with general conclusions from the case studies, it seems that PGE could partner with interested local retailers and a fluorescent bulb recycler to create a successful retail collection program. It will benefit retailers by increasing foot traffic, increasing light bulb sales and promoting an environmental public image. The fluorescent bulb recyclers will see their business grow from the increased amount of light bulbs recycled. PGE's role could be to facilitate the relationships between retailers and fluorescent bulb recyclers and to subsidize the recycling fee. Advertising for the program would need to be worked out between the partners. Although they are expensive, coupons are an effective method to enforce how

many bulbs can be recycled by one generator and to track bulbs that are recycled through the program for billing and other purposes.

The incorporation of municipal and county fluorescent bulb recycling programs is another option to consider. The counties could be left to do their own recycling independent of the retail collection program, or they could be paid by PGE for a percentage of the cost of the bulbs they recycle. Counties like Marion County have already invested resources into their fluorescent bulb recycling efforts in the form of facilities, contracts and advertising. Since citizens often turn to these agencies for recycling and waste information, municipal and county agencies could be very effective partners for the advertising and awareness aspect of a fluorescent bulb recycling program. A retail program would likely ease the financial burden on municipal and county programs as well as promote their goal of keeping mercury out of the landfill. The most effective way to bring in these agencies might be to pay for a percentage of their recycling costs at transfer facilities and collection events in return for their help in advertising the program.

Brown County is the only program to deal with fluorescent bulb recycling for large businesses. These businesses cannot discard their fluorescent bulb as solid. In an area like Portland where there are a number of fluorescent bulb recyclers, it seems unnecessary to have events for businesses to bring in their bulbs. Businesses could presumably bring their bulbs to retailers in a retail program and pay the full recycling fee without a coupon. Representatives from both retail collection programs above suspected that there is some abuse of the program by businesses, but it was not large enough to be a concern for either. Some monitoring of the coupons would still need to be done though to ensure that PGE was not paying for a businesses fluorescent bulb recycling.

The cost of the program can be benchmarked only against Xcel' s. Xcel' s Minnesota customer base is similar in size to PGE' s, so all other things being equal, Xcel' s cost could be similar to what a PGE program would cost. Costs can vary depending on the number of fluorescent bulbs recycled, whether or not PGE pays a percentage of municipal recycling costs, the prices charged by the recycler and other factors.

Overall, a fluorescent bulb recycling program could be very successful for PGE. The regulatory climate is not as well suited as in Minnesota, but Oregon' s adoption of fluorescent bulb as universal waste allows a retail program to be set up. Retail outlets across the country seem enthusiastic about being a part of such a program, and Oregon has a local fluorescent bulb recyclers that are also supportive. Some counties like Lane and Marion have contracts set up with EPSI to provide fluorescent bulb recycling for households and CEG. These and other municipalities have laid the groundwork for fluorescent bulb recycling with their collection facilities and events. This provides a good foundation for a partnership to build a program to promote the use of fluorescent bulbs to save energy and to facilitate fluorescent bulb recycling to minimize the release of mercury into the environment.

## **Appendix A- Information Resources**

Allen County Waste Watcher Fluorescent Light Bulbs Website. [http://www.acwastewatcher.com/hazardous\\_waste\\_pages/fluorescent\\_bulbs.php](http://www.acwastewatcher.com/hazardous_waste_pages/fluorescent_bulbs.php). Visited April 18, 2001.

Brown County Bulb Collection Day Website. [http://www.co.brown.wi.us/Solid\\_Waste/new\\_page\\_5.htm](http://www.co.brown.wi.us/Solid_Waste/new_page_5.htm). Visited April 16, 2001.

Earth Protection Services, Inc. Website. <http://www.earthpro.com/>. Visited May 2, 2001.

EcoLights Northwest Website. <http://www.ecolights.com/>. Visited May 2, 2001.

‘Labeling and Collection of Mercury-Added Products.’ Land and Water Resource Council. Report to the Joint Standing Committee on Natural Resources, 119<sup>th</sup> Maine Legislature, January 1, 1999.

Marion County Solid Waste Management Recycling Depot Website. <http://www.open.org/~mswm/depots.htm>. Visited April 25, 2001.

“Mercury in the Environment.” Minnesota Department of Health. <http://www.health.state.mn.us/divs/eh/esa/hra/fishfact/mercuenv.html>.

Northern States Power Company Fluorescent Bulb Recycling Website. [http://www.nspco.com/fh/fh\\_epsp\\_br.htm](http://www.nspco.com/fh/fh_epsp_br.htm). Visited April 16, 2001.

Phone conversation with Wes Daniel of Brown County Waste Management, Brown County, Wisconsin. April 25, 2001.

Phone conversation with Metro Recycling Information Hotline, April 16, 2001.

Phone conversation with Gene Hammer of Xcel Energy, Minnesota, April 26, 2001.

Phone conversation with Stacie Perkowskie of Allen County Solid Waste District, Fort Wayne, Indiana, April 26, 2001.

Phone conversation with Sue Yarusso of Mercury Technologies, Pine River Minnesota, April 29, 2001.

Phone conversation with Jeff Bickford of Marion County Solid Waste Management, Salem, Oregon. April 30, 2001.

Phone conversation with John Chilcott of Earth Protection Services, Inc., Lake Oswego, Oregon, May 10, 2001.

Phone conversation with Jim Pursley of EcoLights Northwest, Portland, Oregon, May 10, 2001.

Phone conversation with Oregon Department of Environmental Quality, May 11, 2001.

“Universal Waste Mercury-Containing Lamp Management.” Oregon Department of Environmental Quality. <http://www.deq.state.or.us/wmc/hw/fsmerclampuwh.html>. Visited April 25, 2001.

US EPA Energy Star Program. Compact Fluorescent Light Information. <http://www.energystar.gov/products/cfls/>. Visited April 16, 2001.

Vopel, R. “Fact Sheet Waste Lamps and Ballasts.” Oregon Department of Environmental Quality. December 14, 2000.

The Water Foundation Light Bulb Recycling Promo Website. <http://www.bogfrog.com/lightbulbpromo.htm>, visited April 16, 2001.

**Appendix B** –from <http://www.deq.state.or.us/wmc/hw/fsmerc lampuw.html>

## **Universal Waste Off-Site Collection Sites and Hazardous Waste Brokers**

### **Earth Protection Services**

(universal waste handler, ballasts and lamps)

Lake Oswego, Oregon

(503) 620-2466

### **Philip Environmental**

(hazardous and universal waste handler)

Washougal, Washington

1-800-547-2436

### **Full Circle, Inc**

(ballasts and lamps)

Los Angeles, CA

(310) 455-0215

### **Safety-Kleen**

(hazardous and universal waste handler)

Clackamas, OR (503) 655-5798

Springfield, OR (541) 747-584

### **NFF Environmental**

(lamps)

Springfield, Oregon

(541) 726-8002

## **Lamp Processors**

### **Bethlehem Apparatus**

Hellertown, Pennsylvania

(610) 838-7034

### **MTI**

Hayward California

(510) 429-1129

### **Ecolights Northwest**

Seattle, Washington

(206) 343-1247

### **Recyclights**

Bloomington, Minnesota

1-800-831-2852

### **Earth Protection Services**

Phoenix, Arizona

1-800-414-0443

### **Nu-Life Industries**

Aldergrove, British Columbia

1-800-247-6724

### **HID Recycling (HIDs Only)**

Solon, Ohio

1-800-200-9716

### **Lighting Recyclers, Inc.**

Portland, Oregon

(503) 281-5270

### **Lighting Resources**

Phoenix, Arizona

(602) 276-4278

**Appendix C** please see “[xcel coupons.pdf](#)”