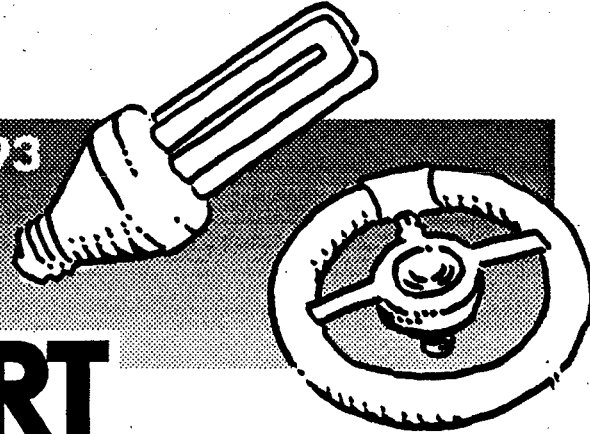
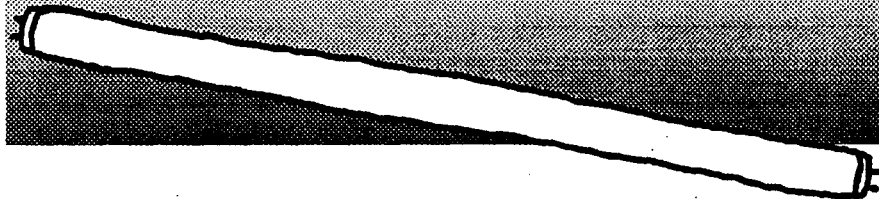


November 1993



REPORT

on Collection of Mercury-Containing Lamps from Households and Small Businesses



Minnesota Office of Waste Management



Report on

Collection of Mercury-Containing Lamps from Households and Small Businesses

Presented to the Legislative Commission on Waste Management

November 1993



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Executive Summary

Introduction

The 1993 Minnesota Legislature passed a law that prohibits disposal of spent fluorescent and high-intensity discharge (HID) lamps in solid waste. The law went into effect August 1, 1993, for lamps discarded by businesses. The requirement will apply to lamps from households effective August 1, 1994.

The law requires the Northern States Power Company (NSP) to collect lamps from households and small businesses in its service area. The Minnesota Office of Waste Management (OWM) was charged with conducting a study concerning the collection of lamps from households and small businesses located outside the area served by NSP.

The report makes recommendations regarding:

- Collection and recycling of fluorescent and HID lamps from households and small businesses.
- An implementation plan that includes provisions for technical assistance to parties that collect lamps.

Overview of report

Chapter 1 provides an overview of the report and the process for consulting with identified stakeholders.

Chapter 2 provides background information on the following topics: the benefits of energy-efficient lighting,

mercury contamination, the number of lamps generated, cost of lamp recycling and utility service areas.

Chapter 3 identifies the elements of an effective collection system, discusses barriers to effective collection and evaluates options for collection.

Chapter 4 evaluates alternative methods of paying for lamp collection and recycling.

Chapter 5 presents recommendations.

Findings

Mercury emissions from energy-efficient lamps

■ Lamps that contain mercury include fluorescent lamps and high intensity discharge (HID) lamps. Both of these types of lamps are energy-efficient lamps.

■ The OWM estimates that fluorescent lamps from households and small businesses contribute a maximum of 120 pounds or one percent of the mercury emitted from human activities in 1992.

■ Energy-efficient lamps are different from many other types of household hazardous wastes in one important respect: Using energy-efficient lamps results in a decrease in emissions of mercury and other pollutants. On average, the amount of mercury emitted to the environment in order to produce the same amount of lighting would be 40 percent less with a compact fluorescent light than an incandescent bulb, even after accounting

for the additional mercury in the fluorescent lamp.

■ The advantages of using energy-efficient lamps clearly outweigh the disadvantages. The challenge facing policy makers is to design programs and laws that work toward two goals simultaneously:

- 1) Increasing the use of energy-efficient lamps.
- 2) Recovering mercury from energy-efficient lamps for recycling.

Cost of lamp recycling

■ Based on information on lamp sales provided by the National Electrical Manufacturers Association, the OWM estimates that 1,267,200 lamps were sold to households and small businesses in 1992. Lamps sold in 1992 are expected to be discarded between 1997 and 2012.

■ NSP serves approximately 50 percent of the residential customers in Minnesota. Therefore, approximately 633,600 lamps were sold to customers outside of NSP's service area.

■ The estimated cost of transporting and recycling all lamps discarded by households and small businesses statewide ranges from \$700,000 to \$1 million. The cost of recycling only lamps outside of NSP's service area is estimated to cost between \$350,000 and \$522,720. These figures do not include the costs of administration, education, collection, storage and financial incentives.

■ The cost of recycling should not deter a consumer from purchasing energy-efficient lamps. However, the costs of recycling and

transportation are only part of the cost of lamp collection. There are additional costs for administration, education, storage and possibly financial incentives. These additional costs will vary with the type of system selected. Moreover, unlike businesses, many consumers do not calculate the full life-cycle cost of using energy-efficient lamps when making decisions. The collection and funding system should be designed to minimize costs so that incentives for purchasing energy-efficient lamps are maintained.

Development of an effective collection system

The collection system should be designed so that it does not discourage the sale or purchase of energy-efficient lamps. This is essential to achieve the maximum net reduction in mercury emissions. The following are key elements of an effective collection system:

- Public awareness.
- Convenience.
- Safety.
- Environmental protection.
- Cost-effectiveness.
- Incentives for participation.
- An infrastructure for collection, storage, transportation and recycling.

The OWM evaluated the following options for collecting lamps from households and small businesses:

- Public household hazardous waste facility.
- Special collection events.
- Existing public or private recycling drop-off centers.
- Curbside collection with recyclables.

- Special collection by waste hauler.
- Mandatory retail take-back.
- Voluntary retail collection.
- Utility service centers.
- Collection of employees' lamps by business generators.

Evaluation of funding options

The OWM identified and evaluated several alternative funding mechanisms:

- Manufacturer responsibility.
- SCORE tax.
- New fees on sale of lamps.
- Utility demand-side management funds.
- Fee on residential electricity use.
- Generator fee.

All of the funding mechanisms considered are tied in some way to the generation of waste or the use of energy. The following additional criteria were considered in evaluating each funding mechanism:

- Low administrative costs.
- Provides an incentive for toxicity reduction.
- Does not adversely affect participation in the collection program.
- Does not discourage use of energy-efficient lighting.
- Equitable.

Recommendations

Recommendations of stakeholders

The OWM conducted five public meetings and also solicited written comments on a draft report. Three themes emerged

consistently in these comments. These themes are summarized below.

■ The state should place the highest priority on controlling the largest sources of mercury. In particular, the state should focus its efforts on sources of mercury that are the most cost-effective to control. Household lamps are estimated to contribute approximately one percent of the mercury emitted from human activities. Some participants believe collection of household lamps is not worthwhile. Others argue that household lamps should be collected, but the state should not strive for a 100-percent recovery rate. All participants agreed that the greatest emphasis should be placed on business lamps, since they represent the majority of lamps sold and discarded.

■ A collection system for household lamps should use existing collection mechanisms rather than establishing an elaborate new collection program.

■ The best option for collection of household lamps varies according to location. The system should be flexible in order to allow the use of collection mechanisms that are best suited to local conditions.

Recommended collection system

At meetings held in St. Paul on September 2 and September 22, there was broad support for the collection system described below.

■ The state, counties and utilities would facilitate the development of voluntary collection programs. The following types of collection mechanisms would be encouraged where appropriate:

- Special collection events where transporters collect lamps from all types of generators.
- Public or private recycling drop-off centers.
- Special collection by waste haulers.
- Retail collection.
- Collection of employees' household lamps by business generators.
- Utility service centers.
- Household hazardous waste facilities.

The party responsible for collection could either charge the generator or subsidize the cost of collection.

Manufacturers would be encouraged to participate in the collection-system through promotional activities or by sponsoring collection events.

Utilities are already required to promote the use of energy-efficient lighting and to educate their customers about proper lamp disposal. Utilities should provide information to customers on dates, times and locations of lamp collections within their service area.

Counties would also educate the public regarding proper lamp disposal. The education program would include information on locations, dates and times of lamp collection opportunities within each county. Counties would be required to report on lamp collection activities within the county in annual SCORE reports submitted to the OWM. Recycled lamps will be counted toward the county recycling goal.

State agencies would educate the public, monitor collection and recycling activities and provide technical assistance in the

development of collection programs. An implementation plan for technical assistance is presented in the next section.

The OWM would report to the Legislature on opportunities for lamp recycling in the annual report on SCORE programs. The OWM would make recommendations for additional requirements if opportunities do not develop.

Participants in the study recommended that the effective date of the disposal ban for lamps from households be extended to August 1, 1995. The purpose of extending the effective date would be to allow resources to be focused on promoting proper management of business lamps. This would also allow time to ensure that a collection system for household lamps is in place by the time the disposal ban is effective.

It should be noted that some participants did not attend the meetings held in St. Paul where a consensus developed around the option presented above. Some participants attended other meetings or provided written comments that indicated support for other options including retail take-back, manufacturer responsibility, collection by counties, and collection by those utilities that serve a population greater than a specified size.

The OWM has concerns about the option presented above because it relies on the willingness of residents and small businesses to pay the cost of recycling. Low participation rates and illegal dumping are potential drawbacks of this option. Therefore, the OWM is recommending a collection system that is similar to the one supported by

participants in the process, but has also added some additional requirements in order to ensure that there is a source of funding for lamp recycling. This recommendation is presented below.

Recommendation of the Office of Waste Management

The OWM recommends that the responsibility for ensuring that lamps from households and small businesses are collected and recycled be shared by lamp manufacturers, utilities, counties and state agencies. The responsibilities would be shared as follows:

■ **Utilities** are already required to promote the use of energy-efficient lighting and to educate their customers about proper lamp disposal. Utilities should provide information to customers on dates, times and locations of lamp collections within their service area.

■ **Counties** would also educate the public on proper lamp disposal. The education program would include information on locations, dates and times of lamp collection opportunities within each county. Counties would report on lamp collection activities within the county in annual SCORE reports submitted to the OWM. Recycled lamps will be counted toward the county recycling goal.

■ **Manufacturers** would be required to pay for recycling and transportation of lamps from households and small businesses in order to sell their lamps in the state of Minnesota. Manufacturers should be allowed to collaborate for this purpose. This will eliminate the need to identify the manufacturer of each lamp.

Manufacturers would choose how to pay for recycling. Some counties, utilities, retailers and private collection businesses have indicated a willingness to collect lamps. Manufacturers could develop agreements with any of these entities where the manufacturers would pay for recycling and transportation of the collected lamps.

■ **State agencies** would educate the public, monitor collection and recycling activities and provide technical assistance in the development of collection programs. An implementation plan for technical assistance is presented in the next section.

The OWM recommends that the effective date of the disposal ban for households be changed to August 1, 1995 and that manufacturers be required to pay for recycling and transportation of lamps discarded on or after that date.

New legislation would be required to implement this proposal. The following is a list of new requirements or changes to existing requirements that should be addressed in legislation:

■ **Require manufacturers of fluorescent and high-intensity discharge lamps to be responsible for the costs of transporting and recycling (or disposal in a hazardous waste facility), effective August 1, 1995.**

■ **Prohibit sale of lamps produced by manufacturers that do not comply with the previous requirement after August 1, 1995.**

■ **Provide an exemption from state antitrust laws for manufacturers that choose to collaborate in order to establish a lamp recycling system.**

■ Permit manufacturers or organizations of manufacturers to contract with counties, utilities or other entities in order to fulfill their responsibilities.

■ Require lamp manufacturers to ensure that: a) residents and small businesses in counties with a population of 50,000 or greater have the opportunity to recycle their lamps at least one time per quarter; and b) residents and small businesses in counties with a population of less than 50,000 have the opportunity to recycle their lamps at least one time per year.

■ Require the OWM to report to the Legislature on lamp collection activities in the annual report on SCORE programs required pursuant to Minn. Stat. § 115A.551, subd. 4.

■ Amend Minn. Stat. § 115A.932, subd. 1, to change the effective date of the disposal ban for lamps generated by households from August 1, 1994, to August 1, 1995.

■ Amend Minn. Stat. § 116.92, subd. 3, to add fluorescent and high-intensity discharge lamps to the list of mercury-containing products that must be labeled to provide information about proper disposal, effective August 1, 1995. The law should allow the required information to be included in a package insert or on the package in lieu of labeling the actual lamp. Include a provision that allows for a comparable federal law to preempt the requirement in Minnesota law.

Implementation plan

The MPCA will provide technical assistance to utilities, local governments, retailers, lamp recycling and transporting

businesses, manufacturers and other parties that wish to develop collection systems for lamps from households and small businesses. The MPCA will also continue to provide assistance to household and small business generators regarding proper lamp management. The Minnesota Technical Assistance Program (MnTAP) also provides information to business generators. The Department of Public Service provides technical assistance with activities to promote the use of energy-efficient lighting.

The MPCA plans to undertake the following activities in order to address technical assistance needs that have been identified by the MPCA and participants in the study:

■ Facilitate the development of partnerships among manufacturers, utilities, local governments, retailers and other parties for the purpose of developing lamp collection and recycling systems.

■ Continue to educate business generators regarding proper lamp management. Small business generators will be targeted.

■ Educate residents about the disposal ban and lamp recycling opportunities.

■ Work with businesses that generate small quantities of lamps (less than 100) to identify opportunities for consolidation with other businesses in order to reduce transportation pick-up costs.

■ Develop informational materials that provide a step-by-step guide to lamp collection and management and that provide detailed information on compliance with worker safety

requirements as well as hazardous waste regulations.

■ Provide potential lamp collectors with criteria for selecting lamp transporters and recyclers.

■ Establish an ad hoc work group to address problems associated with lamp management. The MPCA and OWM have organized similar groups for other problem materials. Participants can share expertise and work together to solve problems. This group would also provide a forum for increasing familiarity with regulations and for addressing regulatory barriers. The focus of this group need not be limited to lamps from households.

■ Collect information on pilot programs and existing collection systems. The information will be used to provide information to generators on lamp collection opportunities, evaluate the effectiveness of alternative collection methods and develop guidelines for collection programs.

■ Encourage participants in the MPCA's regional household hazardous waste program to collect lamps, where feasible. Lamp recycling will be included in the MPCA's contract for household hazardous waste programs. This will result in the MPCA sharing in the liability and will reduce administrative costs associated with contracting with a lamp recycler.

Chapter 1: Introduction

Introduction

The 1993 Minnesota Legislature passed a law that prohibits disposal of spent fluorescent and high-intensity discharge (HID) lamps in solid waste. The law went into effect August 1, 1993, for lamps discarded by businesses. The requirement will apply to lamps from households effective August 1, 1994.

The law requires a public utility that provides electric service to 200,000 or more customers to collect lamps from households and small businesses. The Northern States Power Company (NSP) is the only public utility in the state of Minnesota that meets this definition. The Minnesota Office of Waste Management (OWM) was charged with conducting a study concerning the collection of lamps from households and small businesses located outside the area served by NSP. The study was to be conducted in consultation with identified stakeholders. The process for consulting with these stakeholders is described in the following section.

The report must make recommendations regarding:

- Collection and management systems for spent lamps from households and small businesses.
- An implementation plan that includes provisions for technical assistance to parties that collect lamps.

The full text of the laws governing management of mercury-containing lamps

from households and small businesses is provided in Appendix A.

Overview of report

In January 1993 the OWM published the *Report on the Management of Mercury-Containing Lamps*. That report covered the following topics:

- Environmental considerations related to mercury.
- Alternatives for management of lamps.
- Regulatory issues related to management of lamps.
- A proposed lamp management system.

The report made recommendations regarding toxicity reduction, collection, management after collection, recycling and financing. Key recommendations from the January 1993 report are presented in Appendix B. Since the vast majority of the fluorescent lamps sold are used by businesses and institutions, the first report emphasized management of lamps from those generators. This report takes the next step and examines the issue of developing and funding collection systems for lamps from households and small businesses.

Chapter 2 provides background information on the following topics: the benefits of energy-efficient lighting, mercury contamination, the number of lamps generated, cost of lamp recycling and utility service areas.

Chapter 3 identifies the elements of an effective collection system, discusses barriers to effective collection and evaluates options for collection.

Chapter 4 evaluates alternative methods of paying for lamp collection and recycling.

Chapter 5 presents recommendations.

Overview of process for development of this report

The law required that the following stakeholders be consulted in the development of recommendations for lamp management:

- Legislative Commission on Waste Management.
- Public utilities.
- Municipal utilities.
- Electric cooperative associations.
- Transporters.
- Distributors.
- Wholesalers.
- Retailers.
- Manufacturers.
- Local governments.
- Lamp recyclers.
- Minnesota Technical Assistance Program (MnTAP).
- Minnesota Pollution Control Agency.
- Department of Public Service.
- Residential, commercial and industrial power consumers.

Two initial meetings were held in August, one in St. Paul and one in Alexandria. The purpose of these meetings was to bring stakeholders together to evaluate collection options, discuss barriers to

collection and identify potential funding mechanisms.

A draft report was distributed in late August. The draft report was presented at two meetings held in September in Mankato and St. Paul. The OWM also solicited written comments. The OWM held a final meeting in late September to focus discussion on three options that were developed based on comments received on the draft report. Comments and recommendations that received broad support from participants in the study are identified in Chapter 5.

OWM staff also made presentations to and solicited comments from organizations interested in lamp recycling.

Chapter 2: Background Information

Mercury contamination

Mercury is a heavy metal that can accumulate in living tissue and cause adverse health effects. A recent study shows that mercury deposition in Minnesota lakes has risen to 3.7 times background levels over the last 140 years. The authors conclude that mercury emissions from human activities have resulted in an average increase in deposition rates of two percent per year during this time.¹

Mercury contamination of fish in many of Minnesota's lakes has resulted in the need to advise citizens to reduce their consumption of fish from those lakes. Fish-eating wildlife are also affected. A recent study suggests that mercury contamination may threaten loon populations in Minnesota. All of the loons collected for the study had mercury concentrated in their livers at levels high enough to impair reproduction.² Even very small amounts of mercury can cause problems due to bioaccumulation. Mercury becomes concentrated as it moves up the food chain.

Table 1 shows the sources and estimated quantities of mercury emissions in Minnesota. It is important to note that some sources have not been identified, and there is a high degree of uncertainty associated with some estimates. Paint is estimated to be the largest source of mercury. However, mercury compounds have not been added to interior paints since 1990 or exterior paints since 1991.³ Municipal solid waste incineration and land disposal combined are estimated to

be the second largest source of mercury, followed by coal combustion.

The OWM estimates that fluorescent lamps from households and small businesses contribute a maximum of 120 pounds or one percent of the mercury emitted from human activities in 1992.⁴ This estimate is based on the assumption that all of the mercury contained in lamps sold in 1992 is emitted to the atmosphere. This is not likely. The actual amount of mercury emitted from lamps discarded by households and small businesses is probably less than 120 pounds.

Over the long term, several factors will affect the total mercury emitted from lamps discarded by households and small businesses, as well as the relative significance of this source of mercury. Sales of energy-efficient lamps are likely to increase. At the same time, lamp manufacturers have been reducing the amount of mercury used in lamp production. Other sources of mercury, including batteries, paints and fungicides, will eventually be nearly eliminated due to new laws and regulations.

Energy-efficient lamps are different from many other types of household hazardous wastes in one important respect: Using energy-efficient lamps results in a decrease in emissions of mercury and other pollutants. The benefits of using energy-efficient lamps are outlined in the following section.

Table 1: Estimated Atmospheric Mercury Emissions in Minnesota

Emission Source	Confidence of Estimate	Mercury Emissions (lb/yr)	Percent of Total
Fuel Combustion			
Coal	medium	2,007	19
Oil	medium	514	5
Natural gas	low	562	5
Wood	low	615	6
Incineration			
Municipal solid waste	high	1,497	14
Medical waste	high	516	5
Sewage sludge	high	360	4
Cremation	high	56	<1
Non-Combustion			
Petroleum refining	medium	87	<1
General industrial activity	low	200	2
Landfills	low	881	8
Dentists, hospitals, labs	low	11	<1
Fluorescent lamp breakage	medium	330	3
Paint	low	3,000	28
Fungicides	low	86	<1
TOTAL		10,722	100

Source: White, D.M. and A.M. Jackson. December 1992. *Technical Work Paper on Mercury Emissions from Waste Combustors*. St. Paul: Minnesota Pollution Control Agency.

Benefits of energy-efficient lighting

Use of fluorescent and HID lamps has been increasing due to their benefits in terms of energy efficiency. For example, a compact fluorescent bulb uses 75 percent less energy than the standard incandescent bulb that is most commonly used in homes. Use of energy-efficient lamps is an energy conservation measure that results in reduced emissions from fossil fuel-fired power plants.

Nearly 70 percent of the electricity generated in Minnesota comes from coal-burning plants. If a 28-watt compact fluorescent bulb were substituted for an incandescent lamp in a home served by a coal-burning power plant, the following benefits would result:

- On average, the amount of mercury emitted to the environment in order to produce the same amount of lighting would be reduced by approximately 40 percent, even after accounting for the additional mercury in the bulb.⁵
- Emissions of carbon dioxide, a gas that theoretically contributes to global warming, would be reduced by 1,020 pounds.
- Emissions of nitrous oxide would be reduced by three pounds.
- Additional environmental impacts caused by disposal of wastes associated with power generation would also be reduced.
- When combined with the energy-saving activities of other customers, this energy conservation measure could reduce the

need for electric generating capacity, resulting in cost savings for ratepayers.

The advantages of using energy-efficient lamps clearly outweigh the disadvantages. The challenge facing policy makers is to design programs and laws that work toward two goals simultaneously:

- 1) Increasing the use of energy-efficient lamps.
- 2) Recovering mercury from energy-efficient lamps for recycling.

Utility service areas

There are three types of utilities that provide electric service to retail customers: investor-owned utilities, municipal utilities and electric cooperatives. There are:

- Five investor-owned utilities serving 1.7 million customers.
- 47 rural electric cooperatives serving 509,620 customers.
- 126 municipal utilities serving 283,616 customers.

There are a total of 178 utilities serving customers in Minnesota. The smallest municipal utility serves a community with a population of 100; in contrast, the Northern States Power Company (NSP) serves nearly 900,000 residential customers.

This report is to address collection of lamps outside of NSP's service area. NSP serves approximately 50 percent of the residential electric customers in the state. A list of communities served by NSP is provided in Appendix D.

Number of lamps from households and small businesses

The National Electrical Manufacturers Association (NEMA) estimates that 10,560,000 mercury-containing lamps were sold in Minnesota in 1992.⁶ NEMA estimates that 12 percent of these lamps (1,267,200) are sold to households and small businesses. Assuming that the distribution of lamp sales parallels the distribution of population, 633,600 lamps are sold to customers outside of NSP's service area. The quantity of fluorescent lamps sold to households and small businesses is likely to increase due to promotional efforts.

Cost of lamp recycling

The following assumptions were used to develop an estimate of the cost of recycling lamps from households and small businesses.

- Costs for transportation and recycling of four-foot lamps range from 50 cents per lamp to 75 cents per lamp, depending on the quantity collected and the distance from the recycling facilities. All four Minnesota recycling processing facilities are located on the eastern side of the state, in or close to the Twin Cities Metropolitan Area.

- Five percent of the lamps are broken. On average, recycling of broken lamps costs three times more than recycling of whole lamps.

- Households and small businesses purchased 1,267,200 lamps in 1992. NEMA reports that nearly all of the lamps sold to households and small businesses

are fluorescent lamps. Household hazardous waste program managers report that most of the lamps currently collected are four-foot tubes. For the purposes of this analysis, it is assumed that all discarded lamps are four-foot tubes.

- Lamps sold in 1992 are expected to be discarded between 1997 and 2012.

- Recycling and transportation of compact, circular and u-shaped lamps costs slightly more per lamp. Relatively few of these lamps are being discarded now. However, the quantity of compact, circular and u-shaped lamps is projected to increase.

- One hundred percent of the lamps are recovered. This is unlikely. For example, Germany, which has the highest lamp collection rate for European countries, is reported to collect 40 percent of its lamps for recycling.⁷

The estimated cost of transporting and recycling all lamps discarded by households and small businesses statewide ranges from \$700,000 to \$1 million. The cost of recycling only lamps outside of NSP's service area is estimated between \$350,000 and \$522,720. These figures do not include the costs of administration, education, collection, storage and financial incentives.

Even when the costs of recycling and transportation are included, a compact fluorescent lamp is less costly than a standard incandescent bulb. The price of a 15-watt compact fluorescent lamp, including recycling, ranges from \$15 to \$25.⁸ Many utilities offer substantial subsidies or rebates for the purchase of fluorescent lamps. For example, NSP sells

a 15-watt compact fluorescent lamp for \$6.⁹ When energy savings are factored in, the cost of using 10 comparable standard 60-watt incandescent lamps is approximately \$35.¹⁰ It should be noted that if the cost of waste disposal was factored in, the cost of the incandescent lamps would be even higher.

The cost of recycling should not deter a consumer from purchasing energy-efficient lamps. However, the costs of recycling and transportation are only part of the cost of lamp collection. There are additional costs for administration, education, storage and possibly financial incentives. These additional costs will vary with the type of system selected.

Moreover, unlike businesses, many consumers do not calculate the full life-cycle cost of using energy-efficient lamps when making decisions. The collection and funding system should be designed to minimize costs so that incentives for purchasing energy efficient lamps are maintained.

Endnotes

1. Edward B. Swain, Daniel Engstrom, Mark E. Brigham, Thomas A. Henning, Patrick L. Brezonik, "Increasing Rates of Atmospheric Mercury Deposition in Midcontinental North America, *Science*, August 7, 1992.
2. Karen L. Ensor, Daniel D. Helwig, and Lauren C. Wemmer, "Mercury and Lead in Minnesota Common Loons," Minnesota Pollution Control Agency, April 1992.
3. David M. White and Anne M. Jackson, "Technical Work Paper on Mercury Emissions from Waste Combustors," MPCA, December 1992, p. 2-13.
4. This estimate is based on the following assumptions:
 - 10,560,000 fluorescent lamps were sold in Minnesota in 1992.
 - 12 percent (1,267,200) were sold to households and small businesses.
 - These lamps were primarily 4-foot tubes containing an average of 42 mg of mercury per lamp.

These assumptions are based on information provided by the National Electrical Manufacturers Association (NEMA). Correspondence from Martin Wikstrom, NEMA, to Emily Moore, OWM, June 18, 1992. Correspondence from Richard Robinson, NEMA, to Kevin Johnson, OWM, received September 22, 1993.

5. This calculation is based on the following assumptions:

- The compact fluorescent lamp contains 15 mg of mercury.
- 69 percent of the state's electricity is generated by coal-burning plants.
- The concentration of mercury in coal is 0.2 mg/kg.
- 0.35 kg of coal are consumed per kilowatt-hour.
- The compact fluorescent lamp will last 10,000 hours.
- The incandescent bulb will last 1,000 hours.

The actual reduction in mercury emissions depends on these assumptions. For example, the mercury content of coal ranges from .01 to 8.0 parts per million (ppm), with an average of about 0.2 ppm. When low-mercury coal is burned, the reduction in mercury emissions due to use of energy-efficient lighting will be less than 40 percent.

6. Correspondence from Martin Wikstrom, National Electrical Manufacturers Association to Emily Moore, Minnesota Office of Waste Management, June 18, 1992.
7. Christer Sundberg, "Europe Downs the Tubes," *Household Hazardous Waste Management News*, March 1993.

8. Prices are from "Bright Ideas in Light Bulbs," *Consumer Reports*, October 1992. The cost of recycling a compact fluorescent lamp (prices range from 60 to 80 cents per lamp) was rounded off to one dollar.

9. NSP Energy-Efficient Lighting Catalog.

10. The average cost of a standard incandescent lamp is 61 cents per lamp. Source: "Environmental and Economic Considerations of Incandescent Lamp Standards," Minnesota Department of Public Service, September 21, 1993.

Chapter 3: Development of an Effective Collection System

Introduction

This chapter identifies the elements of an effective collection system, discusses barriers to lamp collection and evaluates alternative collection systems.

Elements of an effective collection system

This report addresses the collection of lamps from households and small businesses. The population targeted for participation consists of a large number of generators, each of which uses a small number of lamps. Due to the characteristics of the population, it is not feasible to rely on enforcement to ensure compliance with the disposal ban. Therefore, the collection system must be convenient for the user in order to ensure participation. The collection system should be designed so that it does not discourage the sale or purchase of energy-efficient lamps. This is essential to achieve the maximum net reduction in mercury emissions.

The following are key elements of an effective collection system:

- Public awareness.
- Convenience.
- Safety.
- Environmental protection.
- Cost-effectiveness.
- Incentives for participation.
- An infrastructure for collection, storage, transportation and recycling.

These elements are discussed in more detail below.

Public awareness

It is essential that potential participants are aware of the following:

- The benefits of using energy-efficient lamps.
- The benefits of collecting and recycling lamps.
- The ban on disposal of lamps in solid waste.
- Locations, times and procedures for collection.
- Proper storage and handling methods to minimize breakage.

An overriding concern is that citizens understand that energy-efficient lamps are beneficial. Recent concern over proper disposal of lamps has caused confusion among consumers. Some consumers have the misconception that fluorescent lamps should be avoided because they contain mercury. Any educational program should include information about the benefits of using energy-efficient lamps.

Although education of consumers presents a challenge, the state has a well developed network for waste education. The primary challenge lies in providing consistent and up-to-date information.

Convenience

Convenience is key to participation in recycling programs. Factors that affect convenience to residents include: location, hours of operation, the level of record-keeping required and handling requirements.

A key difference between lamps and most other recyclables is the rate of generation. The National Electrical Manufacturers Association (NEMA) reports that household lamps have a life-span ranging from five to 20 years. Residents may be more willing to store lamps until it is convenient to take them to a drop-off site than they are to store recyclables that are discarded more frequently (e.g., beverage containers).

Participation in the collection system should be convenient for the party operating the collection site as well. Excessive record-keeping requirements and expenses that cannot be recovered are barriers to voluntary operation of a collection program.

Safety and environmental protection

The primary hazard associated with lamp collection is breakage. Program managers report receiving a significant number of broken lamps. Some lamps are also broken during handling at the collection site. Some of the mercury in the lamp is released to the environment when it is broken.

Lamps must be handled with care to avoid breakage and must be stored in a container that prevents crushing during storage or transportation. Broken lamps should be stored in a sealed, lined and leakproof container. Taking precautions to minimize breakage will improve the cost-effectiveness of the program, since broken lamps are more costly to manage. Workers should be trained in handling broken lamps and in spill clean-up.

The Minnesota Pollution Control Agency (MPCA) has developed guidelines specific

to the management of mercury-containing lamps. These guidelines are designed to ensure environmentally sound waste management, while at the same time providing a more streamlined approach than traditional hazardous waste regulations. An overview of the guidelines is provided in Appendix C. In addition, the Minnesota Department of Transportation (Mn/DOT) regulates transportation of waste lamps.

Questions have been raised regarding the measures that should be taken to protect the health and safety of workers. Broken glass can result in injuries and there is a potential for exposure to mercury. The Occupational Safety and Health Administration (OSHA) has oversight over worker health and safety issues.

Incentives for participation

The knowledge that lamp recycling is good for the environment will be enough incentive for some people to participate. It is important that educational programs provide information about the environmental benefits of lamp recycling. Many Minnesotans take pride in the state's more than 10,000 lakes. The knowledge that many of these lakes are homes to fish and loons that are contaminated by mercury may motivate some residents to keep lamps out of the trash. Others will be motivated by the knowledge that it is illegal to dispose of lamps in the trash.

Significant financial incentives would also increase the participation rate. Three types of financial incentives have been suggested: deposits, surcharges and coupons.

With a deposit system, the customer pays a fee when a lamp is purchased and the same amount is rebated when the lamp is returned. Deposits are effective in motivating participation if the amount of the deposit is adequate and the collection system is convenient. Deposit systems have been used successfully with beverage containers. A key difference between a beverage container and a lamp is that the former is a package and the latter is a product. One drawback of using a deposit system with a product is that people may steal functioning lamps in order to get the deposit money.

A surcharge is similar to a deposit. The consumer pays a fee when purchasing the new product unless the old one is returned. The primary difference between this system and a deposit system is that consumers are not reimbursed for old lamps unless a new purchase is made. This serves to minimize the possibility of theft of functioning lamps in order to get the deposit. A disadvantage of a surcharge is that the state and utilities hope to increase the use of energy-efficient lamps. If lamp promotion activities are successful, many new customers would not have a lamp to return and the surcharge would be regarded as a penalty. Either a surcharge or a deposit could discourage the purchase of energy-efficient lamps.

Coupons or merchandise checks to be used for the purchase of a new lamp or another unrelated product could be used as an incentive for participation. A discount on the purchase of a new lamp would also further the goal of increasing use of energy-efficient lighting.

While all of these financial incentives can be expected to increase participation, use

of financial incentives would significantly increase the cost of the program. The cost of the financial incentives as well as costs of administration of the financial incentive program would have to be added to the costs of recycling, collection and transportation.

Cost-effectiveness

The cost-effectiveness of a given collection option should be compared not only with other types of lamp collection programs, but with other ways of reducing mercury emissions. Lamps from households and small businesses contribute approximately one percent of the mercury emitted to the atmosphere from human activity in Minnesota. Many stakeholders have questioned the cost-effectiveness of collection of lamps from households. They question whether it would be more cost-effective to remove mercury from the waste stream by focusing on collection of lamps from businesses and/or collecting other mercury-containing wastes.

Collection, storage, transportation and recycling costs can be expected to be higher for lamps from households and small businesses than for lamps from larger businesses because the former are more widely dispersed.

Another consideration is the cost-effectiveness of recycling compact fluorescent lamps which are increasingly being used in households. Each compact fluorescent lamp contains approximately one-fourth of the amount of mercury contained in a four-foot fluorescent lamp.¹ However, it costs at least as much to recycle a compact fluorescent lamp as a four-foot tube. Therefore, it costs at least four times as much to recycle a milligram of mercury from a compact fluorescent

than it costs to recycle the same amount of mercury from a four-foot tube.

This issue needs to be taken into consideration in determining the level of service that will be offered. A program that involves financial incentives would likely recover more household lamps than one without these incentives. However, many participants in the study agreed that the state should consider whether the additional money for financial incentives could be better spent on controlling other sources of mercury.

The following measures will enhance the cost-effectiveness of lamp collection programs:

- Minimize administrative costs associated with collecting and distributing money or record-keeping.
- Use the existing expertise of private and public sector waste collectors and waste managers.
- Minimize lamp breakage, since recycling of broken lamps is significantly more expensive.
- Consolidate household lamps with lamps collected from larger businesses in order to achieve economies of scale.

Infrastructure

The recycling infrastructure requires the following components:

- A collection site that accepts lamps from the generator.

- Storage space at the collection site or another, larger location used to consolidate lamps.²

- A transporter to take lamps from the collection site to the storage site and the recycling processing facility.

- A recycling processing facility that separates lamps into marketable components.

- End markets for the glass, mercury and metal endcaps.

Barriers

The following factors are most frequently named as barriers to operation of an effective and efficient lamp collection program:

- Liability.
- Cost of transportation.
- Lack of storage space.
- Overall cost.
- Regulations.
- Lack of public awareness.

These factors are discussed in more detail below.

Liability

Under state and federal law, anyone associated with the management of hazardous waste can be held liable for clean-up costs. This is a significant barrier to participation in lamp collection efforts. Parties who might otherwise be willing to participate in a collection program are reluctant to expose themselves to liability, particularly if they have significant

financial resources and may be regarded as a "deep pocket."

The potential clean-up costs resulting from mismanagement of mercury-containing lamps sent to a recycling facility are not likely to be nearly as high for lamps as for traditional hazardous wastes. However, there are no guarantees that costs would be limited to a certain amount.

The threat of liability provides an incentive for all parties involved in hazardous waste management to take precautions to ensure proper waste management. A disadvantage of this incentive is that all parties also feel compelled to become experts in waste management. The threat of liability makes it difficult for one party in the waste management system to delegate decision-making to another. This results in duplication of effort and increased costs over the short term.

Transportation

Participants in the study expressed concern that if lamp collectors were required to use a hazardous waste transporter, the cost of the collection system would increase. Mn/DOT regulates transportation of hazardous materials. The MPCA has been working with Mn/DOT to determine the appropriate regulatory requirements for fluorescent and HID lamps and other special wastes. MPCA guidelines do not require the use of a hazardous waste transporter or a manifest when lamps are transported to a recycler in Minnesota.

The cost of transportation remains a concern, particularly for collection programs located a long distance from the Twin Cities Metropolitan Area.

Storage space

Suggested storage methods are described in the fact sheet provided in Appendix C. The cost per lamp for transportation and storage decreases as the number of lamps collected increases. However, a party collecting 1,000 lamps or more from other generators must enter into a compliance agreement with the MPCA and must meet financial assurance requirements. Several participants in the study noted that the financial assurance requirements presented a barrier to participating in the lamp collection system.

Storage of household lamps presents a special challenge, since these lamps come in a variety of shapes and sizes, in addition to the standard "tube." Stacking of boxes in an assortment of shapes and sizes is not as efficient as it is for the more uniform tubes commonly used in the business and institutional sectors.

Lack of adequate storage space may make it difficult for some existing facilities to participate in a collection system.

Costs

Costs of lamp collection were presented in Chapter 2. Many parties from both the public and private sectors would be willing to collect lamps if they could be reimbursed for the costs. Potential funding mechanisms are discussed in Chapter 4.

Regulations

There is a great deal of confusion about the regulations governing collection and management of lamps. Several factors contribute to this:

■ Although lamps are technically a hazardous waste, they are very different from traditional hazardous wastes.

■ Many parties involved in lamp management are not experienced in hazardous waste management and hazardous waste regulations.

■ There are several sets of policies and regulations governing the collection and management system. Although the fact sheet presented in Appendix C provides an overview of the regulatory framework, there is no single document that lays out all the requirements, including those governing worker safety, and how they could or should be implemented.

The need for public education to address a lack of public awareness was discussed in the previous section.

Other issues

Definition of a small business

The term "small business" was not defined for the purposes of this report. The definition applicable for the collection system to be established by NSP is a small business (as defined in Minn. Stat. § 645.445) that generates an average of fewer than 10 spent lamps per year.

Distinguishing between small businesses and other businesses will present a challenge to the lamp collector. The program should be designed to strike the proper balance between minimizing costs and maximizing participation by businesses that might otherwise discard their lamps in the trash.

Tracking the number of lamps that each business brings to a facility in a year would be onerous. An alternative approach is to set a limit on the number of lamps that can be disposed at one time. It would be possible for a larger business to "cheat" by making several trips to drop off the maximum allowable number of lamps; however, the need to store the lamps and make several trips would likely discourage businesses from using this practice.

Many participants in the study agreed that the most simple way to address the concern about identifying small businesses is to require all businesses to pay for lamp disposal. Small businesses that take their lamps to a collection site would benefit from paying a lower price per lamp recycled than if they were to arrange for their own transportation to a recycler. Simply paying a recycling fee may be less onerous than the recordkeeping required to establish that a business is eligible.

Most transporters assess a pick-up charge to collect lamps in quantities of less than 100 lamps. Businesses that need to recycle more than 10 and fewer than 100 lamps would not be served by this system, but will face higher total costs per lamp for recycling.

Businesses in this category would benefit from consolidating their lamps with other similar businesses. The state and local governments should facilitate cooperation among these businesses.

Utility service area boundaries

Utility service area boundaries are different from any boundaries currently associated with waste management.

Current law requires NSP to establish a collection system in its service area. This report is to recommend a collection system for the region outside of NSP's service area. A list of communities served by NSP is provided in Appendix D. Although NSP serves a majority of the residents in the Twin Cities Metropolitan Area, significant portions of four Metropolitan Area counties are not served by NSP. NSP also serves a number of communities in Greater Minnesota.

There are a total of 178 utilities serving residents of Minnesota. A system based on utility service areas could result in confusion for citizens who have been educated to consult the county or city regarding recycling and waste disposal. Utilities would need to establish a tracking system in order to ensure that their ratepayers were not paying for more than their share of lamp recycling costs.

Evaluation of options for collection

Collection of lamps from households is still in its infancy. Many programs are just now getting started. What follows is a preliminary evaluation of alternative options for collection.

Public household hazardous waste facility drop-off

State law requires counties to implement household hazardous waste programs (Minn. Stat. § 115A.96). Currently 77 counties are served by 20 household hazardous waste collection facilities. Two mobile facilities are included in this number. Special collection events are held in the counties without facilities. Greater

Minnesota counties receive financial assistance from the MPCA. In addition, all counties can use SCORE block grants to pay for costs of operating these programs. However, counties must contribute money from their own revenue sources. The share of the cost contributed by the state has steadily decreased over time as the number of counties participating in the program has grown.

Counties participating in the MPCA's regional household hazardous waste programs can use the MPCA's generator identification number for disposal of wastes from households and up to 100 pounds per year of wastes from very small quantity business generators. Consequently, the state shares liability with counties participating in this program.

Some household hazardous waste facilities are already collecting lamps. Others would collect lamps if another party would pay for it. Many facilities were designed to collect a more limited group of traditional hazardous wastes, such as paint, pesticides, aerosol containers, solvents and other household chemicals. Some facilities do not have adequate space for lamp storage and face significant barriers to expansion. Some program managers would prefer to target other hazardous wastes, focusing on those that represent a larger quantity of toxic substances.

Arguments in favor of collection of lamps through the household hazardous waste collection programs include the following:

- It makes use of the expertise and infrastructure associated with an existing system. Making use of an existing system should enhance cost-effectiveness.

■ All household hazardous waste programs are already required to have education programs; information about lamp management could be incorporated into these existing programs.

■ Personnel are already trained in measures designed to ensure safety and environmental protection. (Although additional training regarding the special hazards associated with lamps would be required, the time needed for this would be minimal.)

■ Some residents are already aware that lamps require special management and are expecting these facilities to handle such wastes.

Arguments against using household hazardous waste facilities to collect lamps include the following:

■ This option is not as convenient to the participant as many of the alternatives. Residents must bring their waste to one location in the county that is open limited hours or save the lamps for a special collection event.

■ Household hazardous waste facilities are designed to handle traditional hazardous wastes that have more stringent handling requirements. Collection of lamps would shift some space and staff time to an activity that could be done at a facility that meets lesser requirements.

Special collection events

Many communities already host special collection events for problem materials, such as major appliances, tires and lead-acid batteries. Lamps may be a good

candidate for special collection events, since lamps are discarded infrequently. Residents may be willing to store the lamps until the event is held.

Some communities have already worked with private transporters and recyclers to host successful event collections for business lamps. Household lamps could be collected at these events, if a mechanism were established for reimbursement of expenses. For example, promotional literature could be mailed to residents with a coupon for lamp disposal. Lamp retailers or shopping centers may also want to host collection events as a service to the community. Volunteers or temporary employees would have to be trained in the proper handling of lamps.

Advantages of event collections include the following:

■ Collecting a large quantity of lamps at one time will result in reduced costs per unit for handling, storage and transportation.

■ Publicity around the event will increase public awareness about lamp management.

The primary disadvantage of event collection is that the opportunity for recycling is not available when the homeowner wants to dispose of the lamp. Unlike the materials traditionally collected during event collections, compact fluorescent lamps are relatively small. Residents may choose to discard lamps in the trash rather than wait for a collection event.

Existing public or private recycling drop-off centers

In 1992, there were 1,111 recycling drop-off centers in the state. These facilities could offer a convenient opportunity for collection of lamps. Some rural counties have been very successful with collection of other types of problem materials at attended recycling centers. At least one private recycling redemption center in Greater Minnesota collects lamps from customers for a fee.

Due to concerns about breakage, only staffed facilities should be used for lamp collection. It is not known how many of the 1,111 centers are staffed. Some facilities would not have adequate storage space to manage lamps.

Advantages of collection of lamps at recycling centers include the following:

- The infrastructure is developed. A minimal amount of training would be required to add lamp collection. This would enhance the cost-effectiveness of the program.
- The facilities are relatively convenient for residents.
- Collection at a recycling facility may reduce the stigma associated with household hazardous waste and may leave customers with the impression that lamps are a "good" product.

Disadvantages of using recycling facilities for collection of lamps include:

- Owners and operators of these facilities would share in any liability resulting from improper management of the lamps.

Owners and operators of some recycling facilities may not be familiar with management of hazardous materials. It may be necessary to acquire additional expertise in order to select appropriate transporters and recycling and/or disposal facilities.

Curbside collection with recyclables

Lamps could potentially be collected from residences along with other recyclables. In 1992 there were 651 residential curbside recycling collection programs providing service to more than 3.2 million people in Minnesota.

Lamp breakage is a major barrier to curbside collection. There is a risk that children will play with the lamps resulting in breakage and possibly injury. Recycling collection workers would have to take extra care to handle the lamps and additional storage space would have to be added to collection vehicles. Special boxes have been manufactured that could be used to collect tubes. However, household lamps are sold in a variety of sizes and shapes. Boxes would have to be distributed to homeowners in the appropriate size.

Advantages of curbside collection include the following:

- It is convenient to residents. Curbside collection programs generally have a high participation rate.
- It is least confusing to residents if they can take care of all of their recyclables at one time and in one place.
- Collecting lamps with other recyclables would reduce the stigma associated with hazardous products.

Disadvantages of curbside collection include the following:

- There is a high potential for breakage.
- The need for special handling could make this program very costly.

Special collection by waste hauler

Some waste haulers will pick up special wastes, such as used motor oil and spent lead-acid batteries, when mixed waste is collected. These special wastes are stored in a separate area from the mixed waste. Some haulers require residents to call in advance to request a pick-up. If residents were required to contact the hauler in advance, the hauler could ensure that the lamp was placed in an appropriate container.

Some waste haulers are not set up to collect wastes in a separate compartment. In addition, the special handling requirements could add a significant amount of time to the collection route.

Advantages of collection by waste haulers include the following:

- It is convenient to residents.
- Arrangements could be made for special handling.

Disadvantages include the following:

- Not all haulers would be able to collect lamps. This option would have to be supplemented with other options.
- It may be difficult to achieve public awareness of this collection option, since

some haulers would collect lamps and others would not.

Mandatory retail take-back

Under current law, a retailer who sells lead-acid batteries must accept up to five lead-acid batteries from each consumer. In addition, the retailer must assess a \$5 surcharge when a new battery is sold unless the old battery is returned. The \$5 must be refunded to the consumer if the old battery is returned within 30 days. This system works well for car batteries. However, there are some key differences between car batteries and lamps.

The retailer does not have to pay a fee for recycling lead-acid batteries. Since there is a fee for lamp recycling, there would have to be a mechanism for reimbursing the retailer or otherwise ensuring that the costs of transportation and recycling are paid. Another key difference is that while lead-acid batteries are standard equipment for motor vehicles, there are alternatives to fluorescent lamps for household use. If a deposit were only required for fluorescent lamps, consumers might choose to buy incandescent bulbs instead.

Relatively few retailers sell energy-efficient bulbs. In order to achieve the overall goal of reducing mercury emitted to the environment, it is desirable to expand the number of retail stores that sell fluorescent bulbs so that it is more convenient for consumers to purchase them. For example, many grocery stores sell incandescent bulbs, but not more efficient tungsten-halogen or compact fluorescent lamps. Stores may not be willing to add energy-efficient lighting to their inventory if a take-back program is required. Since

increasing the use of energy-efficient lighting offers a much greater potential for reduction in mercury contamination than recycling lamps alone, this option may not be prudent.

Lack of storage space is a barrier to retail collection. Staff would have to be trained in proper waste management methods.

Advantages of mandatory retail collection include the following:

- It is convenient for the consumer.
- Consumers could be educated about the need for proper lamp management at the time they purchase new lamps.
- Using the same collection mechanism statewide would result in less confusion to consumers.

Disadvantages of mandatory retail collection include the following:

- The requirement would provide a strong disincentive for sale of energy-efficient lighting.
- Retail personnel would have to be trained in proper waste handling techniques.

Voluntary retail collection

Some lighting stores already offer lamp recycling services to their customers. Stores that sell relatively large quantities of energy-efficient lamps may want to collect lamps as a way of gaining business. Other stores or shopping centers could choose to participate in a lamp collection program as a promotional effort. This

option has all of the advantages of the previous option.

In order to minimize problems associated with breakage, store staff would have to monitor collection of lamps and be trained in proper waste handling techniques.

Utility service centers

In some cases, existing utility service centers could be used as drop-off collection sites. This would be convenient for utilities that are offering collection programs, if adequate storage space is available. The level of participation would depend on how convenient centers are to consumers. Convenience to the residents would vary in different communities.

Collection of employees' lamps by business generators

Businesses that generate lamps could collect household lamps from their employees. The lamps could be transported to a recycler along with the business lamps. Recycling of larger quantities of lamps at one time helps to keep the costs down. This option would be very convenient for workers. It would not be feasible for all businesses. Some businesses have contractors to change their lamps. These businesses would not be able to collect lamps from households unless they have storage space available.

Conclusions

Participants in the study agreed that several collection options could be utilized. The system should be flexible in order to allow the use of collection mechanisms

that are best suited to local conditions. The following types of collection mechanisms would be encouraged where appropriate:

- Special collection events where transporters collect lamps from all types of generators.
- Public or private recycling drop-off centers.
- Special collection by waste haulers.
- Retail collection.
- Collection of employees' household lamps by business generators.
- Utility service centers.
- Household hazardous waste facilities.

Many participants expressed reservations about the feasibility of curbside collection but indicated this option should not be prohibited. Several participants indicated that mandatory retail take-back would be the most effective mechanism for collecting a high percentage of lamps. Some stores that sell energy-efficient lighting are already collecting lamps for recycling. The OWM hopes that more retailers will do so in order to gain a market advantage from providing this service. However, the OWM believes that establishing a mandatory retail take-back requirement would work against the goal of increasing the use of energy-efficient lighting because many retailers would choose not to sell energy-efficient lighting rather than establish a take-back program.

Endnotes

1. The average compact fluorescent contains 10 milligrams or less of mercury. The standard 4-foot fluorescent lamp contains 41.6 milligrams. Correspondence from Martin Wikstrom, National Electrical Manufacturers Association to Emily Moore, Minnesota Office of Waste Management, June 18, 1992.
2. The need for storage space can be avoided if a lamp transporter collects lamps in a truck or trailer and transports them directly to the recycling processing facility. It would be necessary to make prior arrangements with the recycling processing facility since these facilities are not permitted to store lamps for more than 24 hours.

Chapter 4: Evaluation of Funding Options

Introduction

This chapter identifies and evaluates several alternative funding mechanisms. All of the funding mechanisms considered are tied in some way to the generation of waste or the use of energy.

The following additional criteria should be considered in evaluating each funding mechanism.

- Has low administrative costs.
- Provides an incentive for toxicity reduction.
- Does not adversely affect participation in the collection program.
- Does not discourage use of energy-efficient lighting.
- Is equitable.

Manufacturer responsibility

Manufacturers could be responsible for ensuring that a lamp collection and management system is developed. This option is based on the concept of "product stewardship." Simply stated, many stakeholders feel that manufacturers should be responsible for cradle-to-grave management of their product. This provides an incentive for manufacturers to take into consideration the entire life-cycle during product design.

For example, manufacturers would have an incentive to design their product to maximize recyclability and minimize mercury content. Manufacturers would

also have an incentive to foster the development of end-markets for recyclable products. A manufacturer responsibility program could include a provision that exempts lamps that meet toxicity reduction standards. NEMA has stated that it is working with the U.S. Environmental Protection Agency (EPA) to establish nationwide toxicity reduction standards.

Manufacturers could choose to use the existing collection system by entering into contracts with public or private collection facilities and/or retailers.

Minnesota already has a manufacturer responsibility program for rechargeable batteries. Minn. Stat. § 115A.9157 requires manufacturers of rechargeable batteries to implement collection programs designed to recover 90 percent of the rechargeable batteries generated in the state by April 15, 1994.

The law permits manufacturers to work together as an association to implement this law. Manufacturers may contract with the state, counties or other political subdivisions for collection services, but manufacturers are responsible for paying the costs of collection and management. The law provides for the Minnesota Pollution Control Agency (MPCA) to grant an exemption for new types of rechargeable batteries if they are not hazardous.

The rechargeable battery manufacturers have joined together to form an association, the Portable Rechargeable Battery Association (PRBA). The PRBA has worked with counties to implement

pilot collections in the state. The PRBA has also established a retail collection system that will be available nationwide.

The PRBA encountered barriers that made implementation of this program difficult. Major barriers include:

- Hazardous waste regulations.
- Lack of management capacity in Minnesota.
- Conflicts over the distribution of costs between battery manufacturers and battery-powered product manufacturers.
- Liability.

Most of these barriers have been addressed or do not exist for lamps. However, representatives of lamp manufacturers have expressed significant concerns about these issues. These barriers are discussed further below.

Hazardous waste regulations

The MPCA has developed a policy governing management of mercury-containing lamps that eliminates many regulatory barriers while still maintaining environmental protection measures. However, this policy is not a rule or a law. Some question the applicability of a policy in the case of a legal dispute. Business generators and representatives of lamp manufacturers have expressed concern that enforcement action could be taken if they are not in compliance with the more stringent hazardous waste rules. State law (Minn. Stat. § 216 B.241) prohibits the MPCA from requiring utilities or municipalities from managing lamps according to hazardous waste regulations, as long as they are recycled. This provision could be extended to include

manufacturers and other parties interested in lamp collection.

Business generators and representatives of lamp manufacturers have also expressed concern that if they manage lamps according to the MPCA's policy, they will not be in compliance with the federal requirements established under Subtitle C of the Resource Conservation and Recovery Act (RCRA). This is only a concern for lamps from businesses. Lamps from households and businesses that generate less than 100 kilograms of hazardous waste per month are exempt from federal requirements. This exemption would cover the vast majority of businesses that generate, on average, fewer than 10 spent lamps per year.

This concern could be addressed in two ways. First, the EPA is considering two alternatives to management of mercury-containing lamps according to strict Subtitle C requirements. EPA is considering allowing lamps to be managed according to proposed universal waste rules. This approach would be similar to the MPCA's lamp management policy. The OWM strongly supports inclusion of lamps in the universal waste rules. Alternatively, EPA is considering an exemption that would allow disposal of lamps in permitted municipal solid waste landfills. If EPA granted the latter exemption, it would still be illegal to dispose of lamps generated in Minnesota in municipal solid waste landfills. However, lamps would not have to be managed in accordance with federal hazardous waste regulations. If EPA does not act, this concern could be addressed by requiring manufacturers to collect only lamps from households.

Recycling capacity

Lamp recycling facilities that are in compliance with MPCA and county requirements are already operating in the state (see Appendix C). However, these facilities do not have a state license or permit. Some participants in the study indicated that they would be reluctant to send lamps to a facility that did not have a license or permit. Lamp generators and parties who collect lamps want to ensure that the lamps and lamp byproducts are properly managed at recycling processing facilities. A law enacted during the 1993 legislative session requires lamp recycling facilities to obtain a license or permit. Until the MPCA finishes the necessary rulemaking procedures, these facilities are required to enter into a compliance agreement (Minn. Stat. § 116.93).

Cooperation among manufacturers

It should be relatively easy for lamp manufacturers to form an association, since there are only a handful of lamp manufacturers in the country. All of the major U.S. lamp manufacturers are members of the National Electrical Manufacturers Association (NEMA). However, representatives of manufacturers have expressed concerns about violating antitrust laws. The Minnesota Legislature could amend state law to provide an exemption from state antitrust laws; however, federal antitrust laws remain a concern.

Liability

Liability remains a significant barrier for any collection program. By participating in a lamp collection program, manufacturers would be exposing themselves to liability for environmental harm resulting at any point in the lamp collection and

management system, until the mercury is converted into a new product. Manufacturers would be taking a financial risk by participating in a collection system.

Impact on energy-efficient lighting

Some argue that a manufacturer responsibility program would result in an increase in the price of lamps that would discourage use of energy-efficient lighting. The cost analysis presented in Chapter 2 indicates that energy-efficient lighting should be favored even if the cost of recycling is included. Manufacturers could choose to recover the costs by increasing the price of less efficient lights or by spreading the cost over all types of lighting. Manufacturers working together should be able to achieve economies of scale that will lower the cost of a lamp collection and recycling system.

It should be noted that the success of this approach depends upon the participation of the manufacturers. If all lamp manufacturers chose not to pay for recycling costs and not to sell energy-efficient lamps in the state, then the goals of increasing the use of energy-efficient lighting and recovering the mercury from spent lamps would not be achieved.

Arguments for a manufacturer responsibility program include the following:

- A manufacturer responsibility program provides the maximum incentive for manufacturers to design their product in such a way that the costs of waste management are minimized.
- The state would not incur administrative costs associated with collecting a fee.

■ Manufacturers benefit from laws that require utilities to promote the use of lamps, and many utilities are providing substantial subsidies. It is appropriate that manufacturers subsidize recycling costs.

■ A manufacturer responsibility program would avoid the stigma of a fee since the cost of recycling could be incorporated into the price of the product.

Arguments against a manufacturer responsibility program include the following:

■ Use of energy-efficient lighting would be discouraged if manufacturers chose to substantially increase the price of the product or to discontinue sales in Minnesota.

■ If the state of Minnesota were to require manufacturer responsibility for a wide array of materials and each manufacturer developed a different collection system, consumers would be confused as to where to take their waste.

SCORE tax

In 1989, the Minnesota Legislature extended the sales tax to garbage collection service in order to raise revenue for source reduction, recycling and problem materials management programs. Each year approximately \$14 million is distributed to counties in the form of block grants; counties are required to match this amount with local revenue equal to 25 percent of the block grant. In aggregate, county contributions have exceeded the required match.

The OWM distributes additional funds (\$1.5 million in fiscal year 1993) to governments, institutions and private businesses in the form of grants or loans. The MPCA provides financial assistance to Greater Minnesota household hazardous waste programs (nearly \$700,000 in fiscal year 1993). Additional funding is provided to the OWM and the MPCA for technical assistance programs.

Many stakeholders believe the appropriation for SCORE programs is less than the amount of money raised by the tax. They argue that no new taxes should be established to pay for SCORE programs until the full amount raised by the SCORE tax has been appropriated. They raise the concern that if the state establishes another tax to pay for fluorescent lamp management, only a portion of the revenue raised will be appropriated for lamp collection programs, and counties or other responsible parties will have to make up the difference.

Currently, the revenue from the first two percent of taxable sales goes into the local government trust fund; the remaining revenue (4.5 percent) goes into the general fund. General fund money is appropriated for various programs. In order to appropriate additional funds for SCORE programs, one of the following would have to occur:

- Cuts would have to be made in other programs receiving money from the general fund; or
- Money would have to be diverted from the local government trust fund; or
- Additional revenue would have to be raised.

Revenue raised through the SCORE tax is not currently being tracked. In April 1993 the Department of Revenue estimated that the SCORE tax would raise between \$26.9 and \$28.5 million in fiscal year 1994.¹ Approximately 30 percent of this amount goes into the local government trust fund. Therefore, based upon the Department of Revenue estimate, between \$18.6 and \$19.7 million will be left from the revenue raised by the SCORE tax in fiscal year 1994.

Current SCORE spending by state agencies, including the \$14 million distributed to counties in block grants, is approximately \$18 million per year. If the Department of Revenue's estimates are correct, the appropriations for SCORE programs are not significantly less than the revenue raised after money has been allocated to the local government trust fund. Better information will be available when the Department of Revenue starts tracking the SCORE tax separately in fiscal year 1995.

It is important to note that the estimated revenue raised by the SCORE tax would not be sufficient to pay for all SCORE programs, based on current expenditures. Counties spent \$39 million on SCORE programs in 1992 and costs are expected to increase, particularly costs for problem materials management. If counties were to be responsible for management of problem materials and for meeting recycling goals, the state or counties would have to establish additional revenue sources.

An alternative approach is for the state to revise its priorities for use of SCORE funds. The bulk of SCORE funds is spent

on recycling of relatively benign materials. Recycling yields clear benefits by conserving energy and resources, reducing operational problems associated with resource recovery programs and preserving landfill space. However, some argue that problem materials management programs would yield a greater environmental benefit by preventing environmental contamination associated with disposal of hazardous materials.

Arguments in favor of using the SCORE tax include the following:

- No additional administrative expenses would be incurred.
- The tax would not affect the sales of energy-efficient lighting.

Arguments against using the SCORE tax include the following:

- The amount of funding available would not be sufficient to cover the cost unless program goals and requirements were revised.
- It does not provide an incentive for manufacturers to minimize the costs of managing their products.

New fees on sale of lamps

Several options for new fees that could raise revenue to cover the costs of lamp management are identified below. There is no advantage to levying the fee at the time of sale, since the state wants to encourage and not discourage the sale of energy-efficient lamps. Therefore, the fee should be assessed at the first in-state point of

distribution. In some cases, this is the retailer, but the retailer would not be required to itemize the charge on the sales receipt.

A disadvantage of all options that involve a fee on the sale of new lamps is that additional costs would be incurred for administration. Retailers and distributors would incur costs for record-keeping and the state would incur administrative costs for collecting and distributing the revenue and tracking spending. A case can be made that a dedicated fund should be established in order to avoid siphoning of the funding for other programs. If a dedicated fund were established, it would be necessary to track expenditures to ensure they were related to lamp management.

Fee on mercury-containing lamps

A fee on mercury-containing lamps would internalize the cost of managing the product. Lamps that meet toxicity reduction standards could be exempted. It is not known whether the additional administrative costs would result in a fee sufficient to discourage purchase of energy-efficient lighting. If the cost is going to be incorporated into the price of energy-efficient lighting, a manufacturer responsibility program would be preferable since the additional administrative costs could be avoided.

Fee on less-efficient lighting

A fee on incandescent lamps would not discourage use of energy-efficient lighting. However, incandescent lamps also contain toxic substances. A fee on incandescent lighting might be more appropriately used to promote energy-efficient lighting and to

pay for management of incandescent lamps.

Fee on all lighting

A fee on all lighting has two advantages over the previous options. First, it would not discourage use of energy-efficient lighting. Second, it would be easier to administer since the party responsible for collecting the fee would not have to distinguish among different types of lights.

Fee on hazardous household products

The fee on lighting could be incorporated into a fee on all hazardous household products. In the *1992 Solid Waste Policy Report*, the OWM recommended that a fee be assessed on problem materials. The revenue raised would be used to fund state and local problem materials management programs.

An advantage of this approach is that the costs of administering a fee could be spread over more products. Greater environmental protection could be achieved for each dollar spent on administration. The state already has established a household hazardous waste program and a mechanism for distributing funds to local governments. The fee could also be used to develop additional capacity for problem materials management by expanding the OWM's market development financial assistance program.

Arguments for a fee on hazardous household products include the following:

- The fee would serve to internalize the cost of managing hazardous consumer

products. Consumers who buy the products would pay for proper management.

■ It would not discourage use of energy-efficient lighting if all types of lighting were taxed.

■ The benefit per dollar of administrative cost would be greater than with other fee options.

Arguments against a fee on hazardous household products include the following:

■ Tracking and collecting the fee would place a burden on retailers and distributors.

■ A new fee entails additional administrative costs.

Utility demand-side management funds

State law requires utilities to spend a minimum amount of money each year on demand-side management activities. Investor-owned utilities are required to spend 1.5 percent of gross operating revenues on conservation improvement programs (CIPs) by 1995. The law allows the Department of Public Service (DPS) to require electric investor-owned utilities to spend more than their statutory spending requirement under the following conditions:

■ The utility's Advance Forecast indicates the utility will experience a capacity deficit of at least 100 megawatts within the next five year period; or

■ The conservation improvement will result in energy savings at a total cost to the utility of less than the utility's cost to produce or purchase an equivalent amount of energy.

Investor-owned utilities are required to submit biennial applications for proposed conservation programs for review and approval by DPS.

Rural electric cooperatives are expected to spend 1.5 percent of gross operating revenue on load management and conservation improvement programs, but are not regulated by DPS. The minimum expenditure by municipal utilities varies. The cooperatives and municipals are required to report on spending, but do not have to submit an application to DPS for approval.

The Minnesota Legislature amended state law (Minn. Stat. § 216B.241) in 1993 to require all public utilities, cooperative electric associations and municipal utilities that provide electric service to retail customers to implement programs to strongly encourage the use of fluorescent and HID lamps. Although NSP is the only utility that is required to collect lamps from households and small businesses, the law states that all costs incurred by investor-owned utilities, cooperatives and municipals for promotion and collection of lamps can be considered conservation improvement spending.

All utilities could be required to collect lamps from households and small businesses. Conservation improvement funds could be used for this purpose. The utilities could implement their own programs or contract with other entities,

such as counties or private collection facilities. The rationale behind this approach is that lamp recycling should be considered part of the cost of using energy-efficient lighting, which is an energy conservation measure.

Another perspective is that CIP funds would be diverted from energy conservation programs to lamp collection, which yields no benefit in terms of energy conservation. This would alter the purpose of the CIP program. For example, for the cost of recycling 5,000 compact fluorescent lamps (\$3,950) a utility would forego the following energy conservation opportunities:

- Energy savings of 37,835 kilowatt-hours (kWh) from a residential central-air rebate project.
- Energy savings of 124,606 kWh for a residential lighting project.
- Energy savings of 278,169 kWh from a commercial/industrial motor efficiency project.²

In order to avoid unintended adverse effects on energy conservation programs, the OWM recommends that the Legislature consult with the Department of Public Service before establishing additional requirements for CIP spending.

The small size of many municipals and cooperatives presents a barrier to implementation of lamp collection programs. For example, the average municipal utility serves 4,500 people. These small utilities could incur a significant increase in administrative costs if they were to implement a recycling and collection program.

Even if the utility were to contract with another party, the utility would have to devote staff time to oversight and administration of the contract. The utilities could form an association for implementation of a collection system. However, forming an association of 178 different utilities that range in size from 100 customers to more than 200,000 customers would present a formidable challenge.

Arguments for using demand-side management funds for lamp collection include the following:

- Lamp collection and recycling should be considered part of the overall cost of using energy-efficient lighting.
- This approach would not discourage participation in the collection program and would not provide a disincentive for use of energy-efficient lamps. Utilities could provide a financial incentive by offering a discount on purchase of energy-efficient lighting.

Arguments against this approach include:

- It would divert CIP funds from energy conservation programs.
- Administrative costs for utilities would be high.
- Utilities are already promoting lamps. They should not be required to bear the additional cost of lamp management.

Fee on residential electricity use

A fee could be assessed on all residential electricity use based on the amount of electricity consumed. In theory, this would provide an incentive to conserve electricity.

Arguments for this approach include the following:

- It could provide an incentive to conserve energy and use energy-efficient lighting.
- It would not discourage participation in the collection system, since the cost would be paid up front.

Arguments against this approach include the following:

- The fee would be difficult to administer since municipal utilities and cooperatives are not regulated.
- A fee designed to encourage energy conservation might be better spent on conservation programs.

Generator fee

Some problem materials management programs are funded by fees paid by the generator. For example, stores that sell tires are required to accept an equal number of tires for disposal. The store may charge a fee. Local governments and private recyclers often charge for recycling of major appliances.

A key difference between these types of problem materials and compact fluorescent lamps is that tires and major

appliances will not fit into most garbage cans. It would be difficult for the resident to avoid the disposal ban by hiding them in the trash. Haulers will not pick these materials up (unless they operate a special waste collection program) because they face the possibility of having their entire load rejected at the waste management facility. Compact fluorescents could easily escape detection in the trash. A fee would be likely to deter participation in the collection program.

It is not known whether or not the fee would discourage use of energy-efficient lighting. The price of recycling compact fluorescents ranges from three to six percent of the price of a new bulb. When cost savings due to energy conservation are considered, this should not deter consumers from purchasing energy-efficient lighting. However, many consumers do not calculate the life-cycle costs when making a purchase. An advantage of this option over an advance disposal fee is that the consumer will have already realized the economic benefits of energy-efficient lighting.

A mandatory fee to be collected by retailers would be similar to the mandatory retail collection option discussed in the previous chapter and would be subject to many of the same drawbacks:

- It would result in duplication of effort, since retailers would have to gain expertise in waste management and would likely have to acquire additional storage space for lamps.
- It would discourage other retailers from selling energy-efficient lamps.

- It could provide a disincentive for purchase of energy-efficient lamps.

Alternatively, a voluntary approach could be pursued where any party interested in lamp collection (retailers, counties, utilities, private recycling companies, waste haulers) could charge a fee to the generator. Some private recyclers are already doing this.

Arguments for this approach include the following:

- The state would not have to be involved in administering a fee.
- The disposal ban would be a sufficient incentive to motivate generators to recycle their lamps.
- Private recyclers would have an opportunity to compete for business.

The primary argument against this approach is that a significant number of generators may not be willing to take their lamps to a collection site and pay for recycling. If generators are not willing to pay, programs will not be established to collect the lamps.

Endnotes

1. Memorandum from Tom Ellerbe, Department of Revenue to Representative Loren Jennings re: SCORE Revenue Estimates, April 19, 1993.
2. Correspondence from Christopher T. Davis, Minnesota Department of Public Service to Mary Vandebosch, OWM, September 20, 1993. Figures are based on actual costs per kilowatt hour of energy conservation programs.

Chapter 5: Recommendations

Recommendations of stakeholders

The OWM conducted five public meetings and also solicited written comments on a draft report. Three themes emerged consistently in these comments. These themes are summarized below.

■ The state should place the highest priority on controlling the largest sources of mercury. In particular, the state should focus its efforts on sources of mercury that are the most cost-effective to control. Household lamps are estimated to contribute approximately one percent of the mercury emitted from human activities. Some participants believe collection of household lamps is not worthwhile. Others argue that household lamps should be collected, but the state should not strive for a 100-percent recovery rate. All participants agreed that the greatest emphasis should be placed on business lamps, since they represent the majority of lamps sold and discarded.

■ A collection system for household lamps should use existing collection mechanisms rather than establishing an elaborate new collection program.

■ The best option for collection of household lamps varies according to location. The system should be flexible in order to allow the use of collection mechanisms that are best suited to local conditions.

Recommended collection system

At meetings held in St. Paul on September 2 and September 22, there was broad

support for the collection system described below.

■ The state, counties and utilities would facilitate the development of voluntary collection programs. The following types of collection mechanisms would be encouraged where appropriate:

- Special collection events where transporters collect lamps from all types of generators.
- Public or private recycling drop-off centers.
- Special collection by waste haulers.
- Retail collection.
- Collection of employees' household lamps by business generators.
- Utility service centers.
- Household hazardous waste facilities.

The party responsible for collection could either charge the generator or subsidize the cost of collection.

Manufacturers would be encouraged to participate in the collection system through promotional activities or by sponsoring collection events.

Utilities are already required to promote the use of energy-efficient lighting and to educate their customers about proper lamp disposal. Utilities should provide information to customers on dates, times and locations of lamp collections within their service area.

Counties would also educate the public regarding proper lamp disposal. The education program would include information on locations, dates and times

of lamp collection opportunities within each county. Counties would be required to report on lamp collection activities within the county in annual SCORE reports submitted to the OWM. Recycled lamps will be counted toward the county recycling goal.

State agencies would educate the public, monitor collection and recycling activities and provide technical assistance in the development of collection programs. An implementation plan for technical assistance is presented in the next section.

The OWM would report to the Legislature on opportunities for lamp recycling in the annual report on SCORE programs. The OWM would make recommendations for additional requirements if opportunities do not develop.

Participants in the study recommended that the effective date of the disposal ban for lamps from households be extended to August 1, 1995. The purpose of extending the effective date would be to allow resources to be focused on promoting proper management of business lamps. This would also allow time to ensure that a collection system for household lamps is in place by the time the disposal ban is effective.

It should be noted that some participants did not attend the meetings held in St. Paul where a consensus developed around the option presented above. Some participants attended other meetings or provided written comments that indicated support for other options including retail take-back, manufacturer responsibility, collection by counties, and collection by

those utilities that serve a population greater than a specified size.

The OWM has concerns about the option presented above because it relies on the willingness of residents and small businesses to pay the cost of recycling. Low participation rates and illegal dumping are potential drawbacks of this option. Therefore, the OWM is recommending a collection system that is similar to the one supported by participants in the process, but has also added some additional requirements in order to ensure that there is a source of funding for lamp recycling. This recommendation is presented below.

Recommendation of the Office of Waste Management

The OWM recommends that the responsibility for ensuring that lamps from households and small businesses are collected and recycled be shared by lamp manufacturers, utilities, counties and state agencies. The responsibilities would be shared as follows:

■ **Utilities** are already required to promote the use of energy-efficient lighting and to educate their customers about proper lamp disposal. Utilities should provide information to customers on dates, times and locations of lamp collections within their service area.

■ **Counties** would also educate the public on proper lamp disposal. The education program would include information on locations, dates and times of lamp collection opportunities within each county. Counties would report on lamp

collection activities within the county in annual SCORE reports submitted to the OWM. Recycled lamps will be counted toward the county recycling goal.

■ **Manufacturers** would be required to pay for recycling and transportation of lamps from households and small businesses in order to sell their lamps in the state of Minnesota. Manufacturers should be allowed to collaborate for this purpose. This will eliminate the need to identify the manufacturer of each lamp.

Manufacturers would choose how to pay for recycling. Some counties, utilities, retailers and private collection businesses have indicated a willingness to collect lamps. Manufacturers could develop agreements with any of these entities where the manufacturers would pay for recycling and transportation of the collected lamps.

■ **State agencies** would educate the public, monitor collection and recycling activities and provide technical assistance in the development of collection programs and the promotion of energy-efficient lighting. An implementation plan for technical assistance is presented in the next section.

The OWM recommends that the effective date of the disposal ban for households be changed to August 1, 1995 and that manufacturers be required to pay for recycling and transportation of lamps discarded on or after that date.

New legislation would be required to implement this proposal. The following is a list of new requirements or changes to existing requirements that should be addressed in legislation:

■ Require manufacturers of fluorescent and high-intensity discharge lamps to be responsible for the costs of transporting and recycling (or disposal in a hazardous waste facility), effective August 1, 1995.

■ Prohibit sale of lamps produced by manufacturers that do not comply with the previous requirement after August 1, 1995.

■ Provide an exemption from state antitrust laws for manufacturers that choose to collaborate in order to establish a lamp recycling system.

■ Permit manufacturers or organizations of manufacturers to contract with counties, utilities or other entities in order to fulfill their responsibilities.

■ Require lamp manufacturers to ensure that: a) residents and small businesses in counties with a population of 50,000 or greater have the opportunity to recycle their lamps at least one time per quarter; and b) residents and small businesses in counties with a population of less than 50,000 have the opportunity to recycle their lamps at least one time per year.

■ Require the OWM to report to the Legislature on lamp collection activities in the annual report on SCORE programs required pursuant to Minn. Stat. § 115A.551, subd. 4.

■ Amend Minn. Stat. § 115A.932, subd. 1, to change the effective date of the disposal ban for lamps generated by households from August 1, 1994, to August 1, 1995.

■ Amend Minn. Stat. § 116.92, subd. 3, to add fluorescent and high-intensity discharge lamps to the list of mercury-containing products that must be labeled

to provide information about proper disposal, effective August 1, 1995. The law should allow the required information to be included in a package insert or on the package in lieu of labeling the actual lamp. Include a provision that allows for a comparable federal law to preempt the requirement in Minnesota law.

Implementation plan

The MPCA will provide technical assistance to utilities, local governments, retailers, lamp recycling and transporting businesses, manufacturers and other parties that wish to develop collection systems for lamps from households and small businesses.¹ The MPCA will also continue to provide assistance to household and small business generators regarding proper lamp management. The Minnesota Technical Assistance Program (MnTAP) also provides information to business generators. The Department of Public Service provides technical assistance with activities to promote the use of energy-efficient lighting.

The MPCA plans to undertake the following activities in order to address technical assistance needs that have been identified by the MPCA and participants in the study:

- Facilitate the development of partnerships among manufacturers, utilities, local governments, retailers and other parties for the purpose of developing lamp collection and recycling systems.
- Continue to educate business generators regarding proper lamp management. Small business generators will be targeted.
- Educate residents about the disposal ban and lamp recycling opportunities.
- Work with businesses that generate small quantities of lamps (less than 100) to identify opportunities for consolidation with other businesses in order to reduce transportation pick-up costs.
- Develop informational materials that provide a step-by-step guide to lamp collection and management and that provide detailed information on compliance with worker safety requirements as well as hazardous waste regulations.
- Provide potential lamp collectors with criteria for selecting lamp transporters and recyclers.
- Establish an ad hoc work group to address problems associated with lamp management. The MPCA and OWM have organized similar groups for other problem materials. Participants can share expertise and work together to solve problems. This group would also provide a forum for increasing familiarity with regulations and for addressing regulatory barriers. The focus of this group need not be limited to lamps from households.
- Collect information on pilot programs and existing collection systems. The information will be used to provide information to generators on lamp collection opportunities, evaluate the effectiveness of alternative collection methods and develop guidelines for collection programs.
- Encourage participants in the MPCA's regional household hazardous waste

program to collect lamps, where feasible. Lamp recycling will be included in the MPCA's contract for household hazardous waste programs. This will result in the MPCA sharing in the liability and will reduce administrative costs associated with contracting with a lamp recycler.

Endnotes

1. The Office of Waste Management's technical assistance programs for problem materials, including fluorescent lamps, were transferred to the Minnesota Pollution control agency by Reorganization Order No. 169, August 18, 1993.

Appendix A: Legislative Requirements

Report on Collection of Lamps from Households and Small Businesses [1993 Minn. Laws, ch. 249, sec. 53]

The director of the office of waste management, in consultation with representatives of public utilities, electric cooperative associations, and municipal utilities that provide electric service to retail customers, the commissioners of the pollution control agency and the department of public service, the Minnesota technical assistance program, the director of the legislative commission on waste management, residential, commercial, and industrial electric power consumers, local government units, representatives of manufacturers, wholesalers, distributors, retailers, and recyclers of fluorescent and high intensity discharge lamps, and other interested persons, shall examine and evaluate the potential for collection systems of spent fluorescent and high intensity discharge lamps from households and small businesses. The director shall identify barriers to an effective collection system and approaches to reduce and remove those barriers.

By November 1, 1993, the director shall submit a report to the legislative commission on waste management that, at a minimum, recommends:

(1) collection and management systems for spent lamps that are generated within the service areas of public utilities not governed by Minnesota Statutes, section 216B.241, subdivision 5, paragraph (b), cooperative electric associations, and municipal utilities that provide electric service to retail customers; and

(2) an implementation plan that includes provisions for technical assistance to public utilities, electric cooperative associations, municipal utilities, lamp manufacturers, wholesalers, distributors, and retailers, and local government units that establish fluorescent and high intensity discharge lamp promotion programs and collection systems.

Any person may establish or participate in pilot projects to encourage the use and proper management of spent lamps as part of the study required under this section. All the costs incurred by a public utility, cooperative electric association, or municipal utility related to a pilot project are conservation improvement spending for the purposes of Minnesota Statutes 1992, section 216B.241.

Promotion of energy-efficient lighting; collection of lamps by certain utilities [Minn. Stat. § 216B.241]

Subd. 5. [CONSERVATION IMPROVEMENT PROGRAM; EFFICIENT LIGHTING.] (a) Each public utility, cooperative electric association, and municipal utility that provides electric service to retail customers shall include as part of its conservation improvement activities a program to strongly encourage the use of fluorescent and high intensity discharge lamps. The program must include at least a public information campaign to encourage use of the lamps and proper management of spent lamps by all customer classifications.

(b) A public utility that provides electric service at retail to 200,000 or more customers shall establish, either directly or through contracts with other persons, including lamp manufacturers, distributors, wholesalers, and retailers and local government units, a

system to collect for delivery to a reclamation or recycling facility spent fluorescent and high intensity discharge lamps from households and from small businesses as defined in section 645.445 that generate an average of fewer than ten spent lamps per year.

(c) A collection system must include establishing reasonably convenient locations for collecting spent lamps from households and financial incentives sufficient to encourage spent lamp generators to take the lamps to the collection locations. Financial incentives may include coupons for purchase of new fluorescent or high intensity discharge lamps, a cash back system, or any other financial incentive or group of incentives designed to collect the maximum number of spent lamps from households and small businesses that is reasonably feasible.

(d) A public utility that provides electric service at retail to fewer than 200,000 customers, a cooperative electric association, or a municipal utility that provides electric service at retail to customers may establish a collection system under paragraphs (b) and (c) as part of conservation improvement activities required under this section.

(e) The commissioner of the pollution control agency may not, unless clearly required by federal law, require a public utility, cooperative electric association, or municipality that establishes a household fluorescent and high intensity discharge lamp collection system under this section to manage the lamps as hazardous waste as long as the lamps are managed to avoid breakage and are delivered to a recycling or reclamation facility that removes mercury and other toxic materials contained in the lamps prior to placement of the lamps in solid waste.

(f) If a public utility, cooperative electric association, or municipal utility contracts with a local government unit to provide a collection system under this subdivision, the contract must provide for payment to the local government unit of all the unit's incremental costs of collecting and managing spent lamps.

(g) All the costs incurred by a public utility, cooperative electric association, or municipal utility for promotion and collection of fluorescent and high intensity discharge lamps under this subdivision are conservation improvement spending under this section.

Lamp disposal [Minn. Stat. § 115A.932, subd. 1]

(c) A person may not knowingly place a fluorescent or high intensity discharge lamp:
(1) in solid waste; or
(2) in a solid waste facility, except a household hazardous waste collection or recycling facility.

This paragraph does not apply to waste lamps generated by households until August 1, 1994.

Appendix B: Key Recommendations from the *Report on the Management of Mercury-Containing Lamps*

Source reduction

■ The Legislature should enact legislation that directs the OWM to recommend mercury limits for fluorescent and HID lamps to the 1995 Legislature if federal standards have not been established by December 31, 1994.

■ The Legislature should enact legislation which directs the OWM to recommend to the 1995 Legislature labeling requirements for mercury-containing lamps sold in Minnesota if no federal requirements have been established by December 31, 1994.

The required labels would identify the type of lamp and provide information about the benefits of using energy-efficient lighting and the proper management of spent fluorescent and HID lamps.

Separate collection and management

■ The OWM recommends that the Legislature immediately prohibit all lamp generators from placing a fluorescent or HID lamp in mixed municipal solid waste, in or on the land, or in a solid waste processing or disposal facility.

The OWM feels that the private sector is developing an adequate infrastructure to ensure that lamps from businesses can be managed. However, the OWM also believes that adequate collection systems and storage outlets do not exist for the collection of household lamps. This infrastructure needs more time to develop.

To facilitate concerns from households, the OWM recommends that household lamps be exempt from the prohibition recommended above until July 1, 1995. The two-year exemption will allow for development of a system to manage household lamps in a cost-effective manner.

Recycling

■ Recycling and reclaiming mercury from the lamps should be the preferred management method, because it better accomplishes the purpose of keeping mercury out of the environment and because recycling is preferred over landfilling in Minnesota's established hierarchy of waste management methods. However, hazardous waste landfilling should remain an option for businesses until sufficient and viable recycling capacity develops to meet all the needs of Minnesota businesses.

■ All lamp recyclers should be required by legislation to remove all but trace amounts of mercury from any of the other components of fluorescent and HID lamps, so that they can be reused in other products without defeating the purpose of keeping mercury out of the environment.

System finance for business lamps

■ Most participants in this study voiced support of the proposal to allow market forces to determine the most cost-effective management for lamps generated by businesses. The OWM recommends that this option be followed. The present infrastructure, however, needs to be adjusted to accommodate small businesses so that they can manage their lamps in a cost-effective way.

Fluorescent and HID lamps generated by households

Lamps generated by households can be appropriately managed by expanding the already established household hazardous waste collection programs throughout the state. However, the infrastructure that would support such a program is not fully in place at this time. Household hazardous waste facilities need more storage space

and more funding to manage fluorescent and HID lamps.

Funding is needed in order to expand Minnesota's household hazardous waste programs to include management of used fluorescent and HID lamps. The OWM recommends that the Legislature consider the following options to help finance this expansion:

■ Provide funding for management of household quantities of fluorescent and HID lamps through a fee placed on lamp distributors. The fee would be assessed on the total number of lamps sold in Minnesota at the retail level. At present this number is 12 percent of the lamps sold in Minnesota. This fee could be integrated into any broader problem materials fee that is established.

The advantage of this mechanism is that it would raise funds for management of lamps. The disadvantages are that passing the fee on to the consumer would create a disincentive for purchasing energy efficient lighting; and many distributors who serve Minnesota businesses are based in other states, making it difficult to collect and administer the fees.

■ Provide funding for management of household quantities of fluorescent and HID lamps through a fee placed on lamp manufacturers. The fee would be assessed on the total number of lamps sold in Minnesota at the retail level. This fee could be integrated into any broader problem materials fee that is established.

Since there are fewer lamp manufacturers than distributors, administering the fee would be simpler than a distributor fee, and it may encourage lamp manufacturers to develop alternative lighting systems based on lower levels of mercury. This mechanism, however, would still

potentially create a disincentive for purchasing energy-efficient lighting if the lamp manufacturers passed the fee on to fluorescent and HID lamp purchasers.

If the manufacturers spread the cost over all lamps, businesses would be paying twice -- once when they paid more for their lamps and again when paying for the management of the spent lamps. It also would have many of the other disadvantages the distributor fee would have.

■ Provide funding for management of household quantities of fluorescent and HID lamps by placing a flat fee on all residential electric utility customers. This mechanism would provide funds for managing energy-efficient lamps by charging energy users, thereby assessing a fee on the mercury released to the atmosphere at electric power plants. A disadvantage of this mechanism is that Minnesota has more than 100 electric utilities, many of them cooperatives, which are not regulated by the Public Utilities Commission. A fee assessed on those utilities would most likely be difficult to administer.

■ Provide funding for management of household quantities of fluorescent and HID lamps by charging all residential electric utility customers a fee based on the amount of electricity consumed, such as a kilowatt-hour surcharge. This option could include an exemption from the fee for very small electrical users similar to the conservation rate break that some state utilities offer.

This mechanism creates an incentive to use less energy, which will reduce mercury in the environment. It will consequently provide people an incentive to use energy-efficient lighting. The disadvantages are the same as those for a flat utility fee.

Appendix C: Fact Sheet

What to Do With Used Fluorescent and High-Intensity Discharge Lamps

What to do with used fluorescent and high-intensity discharge lamps

Businesses in Minnesota are increasingly using fluorescent lighting because it is energy-efficient and saves money on electricity bills. Compared to incandescent lighting, fluorescent lighting significantly decreases power plant emissions of a variety of air pollutants such as mercury, lead, nitrogen oxides and sulfur dioxide.

However, used fluorescent and high-intensity discharge (HID) lamps have recently been identified as an environmental concern, and lamps used by businesses are now banned from solid waste disposal in Minnesota. It will be illegal to dispose of household lamps in solid waste after August 1, 1994.

Fluorescent and HID lamps contain small amounts of mercury, lead and sometimes cadmium. Several million fluorescent and HID lamps are discarded in Minnesota each year. A 1988 study showed them to be the second largest source of mercury in household and commercial garbage, after batteries.

Why is mercury an environmental concern?

Mercury is a heavy metal that can accumulate in living tissue and cause adverse health effects. Sources of mercury in the environment from human activity include coal-burning power plants, batteries and fluorescent and HID lamps. In Minnesota, mercury contamination in lakes has been detected. The Minnesota Pollution Control Agency (MPCA) and Department of Health have issued warnings in recent years about mercury concentrations in fish from Minnesota lakes.

A small amount of mercury is an essential component in fluorescent and HID lamps, but when a lamp is broken or disposed in a landfill or incinerator, it can contaminate air, surface water and ground water. Therefore, it is good policy to keep the mercury in fluorescent lamps out of the waste stream.

Are fluorescent and HID lighting still a good environmental and economic choices?

Absolutely. The use of energy-efficient lighting is one of the best choices a business can make to protect the environment, and it saves money. Businesses that replace used lamps regularly should continue that practice, and those considering the switch to high-efficiency fluorescents should not hesitate to make the change.

Here are some of the reasons why using efficient lighting makes good sense.

- **Energy-efficiency means less mercury is released into the environment.** New technologies in fluorescent lighting are reducing the amount of energy used to run the lights.

In Minnesota, 69 percent of our electricity is generated by coal-burning plants. Since coal contains mercury, the energy-efficiency of fluorescent lighting means less mercury is released when power is generated to run the lamps – about 50 percent less than running the equivalent five to nine incandescent bulbs, even when the mercury in the fluorescent lamp is counted.

Minnesota Office
of Waste
Management

Minnesota
Pollution Control
Agency

Minnesota
Department of
Public Service

Minnesota
Department of
Administration

Minnesota
Technical
Assistance
Program

Hennepin County
Department of
Environmental
Management

- **Other harmful emissions are also reduced.** Reducing power consumption significantly reduces production of greenhouse gases and other pollutants, as well.

Over the lifetime of a 28-watt compact fluorescent, for example, 1,020 pounds less carbon dioxide and three pounds less nitrogen oxide are released from power plants. Radioactive wastes and other toxic and solid waste by-products of power generation are also reduced.

- **Fewer new power plants are needed.** When less energy is demanded, electric utilities need less new generating capacity, resulting in more savings for customers.

Fluorescent and HID lamps have always contained mercury. Why is management of these lamps now a concern?

The U.S. Environmental Protection Agency (EPA) developed the Toxicity Characteristic Leaching Procedure (TCLP) Test for determining whether a waste is hazardous. The test is more sensitive to hazardous contaminants than the one previously used. Many fluorescent and HID lamps, when subjected to the TCLP test, are determined to be a hazardous waste. In 1993, the Minnesota Legislature banned disposal of used fluorescent and HID lamps from businesses in solid waste.

Minnesota has been in the forefront of responding to growing public concern about mercury and other metals in the environment, as well being a leader in other waste issues, and has acted more quickly than most states to address management of fluorescent and HID lamps.

How should hazardous lamps be handled, transported and disposed?

Used mercury-containing lamps from business, industry and institutions may not be placed in the trash. To avoid the release of mercury, lamps should not be broken or crushed.

The following lamp management options are available to business.

1. **On-site storage.** Properly label the lamp storage area or each container as hazardous waste and pack the lamps to prevent breakage. The storage area must also be marked with notices instructing employees how to pack and label the lamps. Records must be kept on stored lamps, keeping track of the number removed from service each year and the storage location.

Suggested storage methods

Companies currently storing used fluorescent and HID lamps for recycling have found the following practices work well.

- Waste lamps are replaced by a maintenance worker or electrical contractor, and are put into storage boxes.
- Waste lamps can be stored in the same boxes that new lamps were shipped in, or in other boxes of similar size. Box spacers may be needed to prevent breakage. Storage boxes can be custom-ordered or purchased from carton distributors – see "Boxes" in the Yellow Pages.
- Boxes are kept in a designated storage location. Either the storage area must be marked as a hazardous waste storage area, or each box must be labeled as hazardous waste and dated.
- Filled boxes are stacked five across, with each row perpendicular to the one below it. Stacks are piled no higher than five feet so lamps on the bottom are not crushed by the weight.

2. **Off-site storage and recycling in Minnesota.** Send the lamps to another site in Minnesota for storage or recycling. Labeling and packing requirements are the same as for on-site storage. For transport within the state, waste-tracking invoices are used. The waste-tracking invoice

must include the following information about the lamps: the date, the number of lamps, the location from which they are being shipped and their destination. Businesses planning to transport or store used lamps for others should contact their county offices (in the Metro Area) or the MPCA for more information.

3. **Out-of-state storage, recycling or disposal.** Ship used lamps to a recycling facility or to a treatment, storage and disposal facility outside Minnesota. Shipments to treatment, storage and disposal facilities in other states must use a hazardous waste manifest, and a licensed hazardous waste transporter must be used. Any land disposal or other state restrictions must also be met. Shipments destined for out-of-state recycling facilities may use a waste-tracking invoice unless any of the states along the way require a hazardous waste manifest. When being shipped out of state, lamps must be packed to prevent breakage and labeled as hazardous waste.

A business or institution that replaces the equivalent of more than 1,000 four-foot fluorescent lamps per year must have a hazardous waste license and report to the MPCA or appropriate metro-area county on what it does with the used lamps. Smaller quantities need not be reported, but must still be managed properly, as described in this fact sheet.

Is the current policy likely to remain in effect?

The requirements for managing fluorescents may change again. Minnesota's policy is intended to provide the best possible management of used lamps under current regulations.

Even though used fluorescents have been banned from solid waste in Minnesota, energy-efficient lighting is still the most environmentally sound choice for businesses and residences. The energy that fluorescents, compact fluorescents and HID lamps save means less mercury and other pollutants re-

leased into the environment as well as lower costs for electricity.

If you have information or comments about fluorescent or HID lamps, the MPCA would like to hear from you. Please call at 800-657-3724. Response from industry and trade groups is especially invited.

For more information

- **Energy use comparisons for different types of lighting:** Minnesota Department of Public Service, 612-296-5175; in Greater Minnesota, call 800-657-3710 and ask for "Energy." Or, call your power utility or lighting consultant.
- **Non-regulatory technical assistance:** Call Minnesota Technical Assistance Program (MnTAP), 612-627-4646 or 800-247-0015.
- **Study reports on fluorescent lamps:** OWM, 612-649-5750 or 800-657-3843.
- **Hazardous waste regulations**
Anoka County: 422-7069.
Carver County: 448-1217.
Dakota County: 891-7556.
Hennepin County: 348-4919.
Ramsey County: 292-7898.
Scott County: 496-8177.
Washington County: 430-6655.
Greater Minnesota: MPCA, 800-657-3724.
- **Procedures and disposal options for state agencies:** 612-296-2600. State agencies will receive updated information through broadcast bulletins on the Department of Administration's fax system.
- **Transporting and recycling contacts:** See list on back of this fact sheet.

Recycling contacts for used lamps

The following list of fluorescent and HID lamp recycling companies is provided as a service to organizations seeking information about lamp management. The information is given voluntarily by the companies listed, and they should be contacted personally about the services offered and the facility's compliance with laws applying to the management of hazardous waste. The appearance of a company's name on this list does not constitute endorsement by any of the participating agencies, nor does it imply that the company is in compliance with all applicable laws. This list is not represented as being complete. For information regarding transporters, please contact the recyclers.

Advanced Environmental Recycling Corp.

2519 Mitchell
Allentown, PA 18103
800-554-2372
fax: 215-770-1264
Robert M. Blanchfield

Lighting Resources, Inc.

386 S. Gordon St.
Pomona, CA 91766
800-572-9253
John M. Chilcott

Mercury Recovery Services

2021 S. Myrtle
Monrovia, CA 91016
818-301-1372
Bob Roberts

Mercury Refining Co., Inc.

790 Watervliet-Shaker Road
Latham, NY 12110
518-785-1703
Karen McHugh

Mercury Technologies Corp.

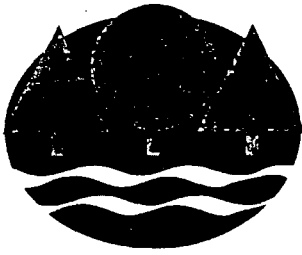
30677 Huntwood
Hayward, CA 94544
510-429-1129
Paul Abernathy

Mercury Technologies of Minnesota, Inc.

Pine City Industrial Park
Pine City, MN 55063-0013
612-629-7888
800-864-3821
Raymond Hite, Sue Yarusso

Recyclights

2010 E. Hennepin Ave.
Minneapolis, MN 55413
612-378-9571
Joe Bester



Minnesota Pollution Control Agency

August 1993

Summary of Management Requirements for Fluorescent Lamps

(Attachment to "What to do with Used Fluorescent and High-Intensity Discharge Lamps" Fact Sheet)

The following information is a summary of the Minnesota Pollution Control Agency's (MPCA) requirements for fluorescent lamps and high-intensity discharge (HID) lamps for businesses. The requirements and additional information are discussed in the fact sheet, "What to do with Used Fluorescent and High-Intensity Discharge Lamps" which was developed through a cooperative effort between the Minnesota Pollution Control Agency, Minnesota Office of Waste Management, Minnesota Department of Public Service, Minnesota Department of Administration, Minnesota Technical Assistance Program and the Hennepin County Department of Environmental Management.

Used fluorescent and high-intensity discharge (HID) lamps have recently been identified as an environmental concern. Lamps used by businesses are now banned from solid waste disposal in Minnesota. The following information may be used as a guideline for managing lamps from your business.

Required Management of Lamps from Businesses

The MPCA staff requires the following for lamps, unless laboratory tests clearly show they are nonhazardous:

1. Do not break or crush.
2. Store for recycling.
3. If storage is not feasible, ship to an existing recycling facility. (Comply with the transportation requirements listed below.)
4. If lamps break, store in a sealed container for recycling or ship, using a manifest and a licensed transporter, to a hazardous waste landfill.

Transportation Requirements for Lamps from Businesses

1. Pack lamps in a way to protect them from breaking.
2. Recycling facilities request: **DO NOT** tape lamps together for storage or shipment. Recycling facilities may return lamps that are taped together.
3. Shipments within Minnesota: Waste-tracking invoices may be used instead of manifests when shipping lamps within the State of Minnesota. Include the following information on the waste-tracking invoice:
 - a. Date of shipment
 - b. Location from which they were shipped
 - c. Destination location
 - d. Number of lamps shipped

1.28
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4. Shipments into Minnesota from another state: A waste-tracking invoice outlined above may be used instead of a hazardous waste manifest for any shipments from another state to a recycling facility in Minnesota, except that in the event a state through which the waste will be transported requires a hazardous waste manifest, then a hazardous waste manifest must be used.
5. Shipments out of Minnesota to another state: Shipments destined for a disposal facility in another state require a hazardous waste manifest. For shipments destined for a recycling facility in another state, a waste-tracking invoice outlined previously may be used instead of a hazardous waste manifest, except that in the event a state through which the waste will be transported requires a hazardous waste manifest, then a hazardous waste transporter and manifest must be used. The only exception to the above is that all shipments to another state under the VSQG program effort require a manifest regardless of whether the shipment is to a disposal or recycling facility.

Storage Requirements for Lamps

The MPCA staff requires the following for storage of fluorescent lamps:

1. Store in an area and a manner that will prevent breakage.
2. Use signs and notices that show employees where and how to store lamps.
3. Label the lamp storage area or each container as hazardous waste.
4. If on-site storage is not possible, transport the lamps to a storage location. A manifest is not needed as long as lamps are transported to a site within Minnesota, but waste-tracking invoices are required.

NOTE: If you are transporting and/or storing lamps from other businesses or if you are interested in transporting and/or storing lamps from other businesses, please contact the MPCA staff for further information and requirements.

Record Keeping

Any time lamps are stored or shipped off site, records need to be kept. Businesses should keep track of three things:

1. The number of lamps removed from service during each calendar year.
2. The storage location of the lamps.
3. Shipping documents.

Generator License

A business or institution that replaces or removes from service the equivalent of more than 1,000 four-foot fluorescent lamps per year must have a hazardous waste generator license. Smaller quantities need not be reported, but must still be managed properly, as described above. For further information regarding licensing, please contact MPCA staff or the hazardous waste staff from the appropriate Metro Area county. For metropolitan county staff phone numbers, see page 3 of the fact sheet.

If you have any additional questions, call:

Jim Brist

612/297-8331

Paula Peterson

612/297-8330

In Greater Minnesota, toll free:

800/657-3724

Appendix D: Communities Served by NSP

Alphabetic List of Communities NSP Serves

*In some cases NSP does not serve the entire community.
Please call your local NSP office for more information.*

City	St.	Reg.	Serv.	City	St.	Reg.	Serv.	City	St.	Reg.	Serv.
Abbotsford	WI	04	E	Bellchester	MN	SE	E	Cameron	WI	00	E
Ada*	MN	ND	E	Belview	MN	NW	E	Campia	WI	00	E
Afton	MN	ME	E	Bergland	MI	03	EG	Canisota	SD	SD	E
Albany	MN	NW	E	Berthold	ND	ND	E	Cannon City	MN	SE	E
Albertville	MN	NW	E	Bessemer	MI	03	EG	Cannon Falls	MN	SE	E
Alexandria	SD	SD	E	Big Lake	MN	NW	EG	Canova	SD	SD	E
Alma	WI	06	E	Birchwood	MN	ME	EG	Canton	SD	SD	E
Alma Center	WI	07	E	Birchwood	WI	00	EG	Canton	WI	06	E
Alma City	MN	SE	E	Bird Isand	MN	NW	E	Carthage	SD	SD	E
Almelund	MN	ME	E	Biscay	MN	MW	E	Carver	MN	MW	E
Almena	WI	00	E	Black River Falls*	WI	07	E	Castle Rock	MN	SE	E
Altoona	WI	05	EG	Blaine	MN	MW	E	Cataract	WI	07	E
Altura	MN	SE	E	Blair	WI	07	E	Catawba	WI	02	E
Amery	WI	00	E	Blakely	MN	SE	E	Cedar Falls	WI	06	E
Angelo	WI	07	E	Blomkest	MN	NW	E	Center City	MN	ME	EG
Angus	WI	00	E	Bloomer City*	WI	05	E	Centerville	MN	ME	E
Annandale	MN	NW	E	Bloomington	MN	MW	E	Centerville	SD	SD	E
Anoka*	MN	MW	E	Bluff Siding	WI	07	E	Centerville	WI	07	E
Apple Valley	MN	ME	E	Bombay	MN	SE	E	Champlin	MN	MW	E
Arden Hills	MN	ME	EG	Bongards	MN	MW	E	Chancellor	SD	SD	E
Arkansaw	WI	06	E	Borup	MN	ND	E	Chandler	MN	SD	E
Arland	WI	00	E	Boyceville	WI	06	E	Chanhassen	MN	MW	E
Arlington City*	MN	SE	E	Boyd	WI	04	E	Chaseburg	WI	07	E
Artesian	SD	SD	E	Branch	MN	ME	E	Chaska*	MN	MW	E
Ashland	WI	02	EG	Bridgewater	SD	SD	E	Cchetek	WI	00	E
Athens	WI	04	E	Brill	WI	00	E	Chili	WI	04	E
Atwater	MN	NW	E	Brooklyn Center	MN	MW	E	Chippewa Falls	WI	05	EG
Augusta	WI	05	E	Brooklyn Park	MN	MW	E	Chisago City	MN	ME	EG
Averill	MN	ND	E	Brooten	MN	NW	E	Christie	WI	04	E
Avon	MN	NW	E	Brownston*	MN	NW	E	Circle Pines	MN	ME	E
Baker	MN	ND	E	Bruce	WI	02	E	Clara City	MN	NW	E
Balaton	MN	SD	E	Buffalo*	MN	NW	E	Claremont	MN	SE	E
Baldwin	WI	00	E	Buffalo	WI	07	E	Claremont	MN	NW	E
Baltic	SD	SD	E	Buffalo Lake	MN	NW	E	Clarkfield	MN	NW	E
Bangor*	WI	07	E	Burkhardt	WI	00	E	Clarks Grove	MN	SE	E
Barron*	WI	00	E	Burlington	ND	ND	E	Clayton	WI	00	E
Barronett	WI	00	E	Burnsville	MN	MW	E	Clear Lake	MN	NW	E
Bay City	WI	00	E	Burr Oak	WI	07	E	Clear Lake	WI	00	E
Bayport	MN	ME	EG	Butterfield	MN	SE	E	Clearwater	MN	NW	E
Bayfield	WI	02	EG	Butternut	WI	02	EG	Clements	MN	NW	E
Beauford	MN	SE	E	Buxton	ND	ND	E	Cleveland	MN	SE	E
Becker	MN	NW	EG	Byron	MN	SE	E	Clinton Falls	MN	SE	E
Belgrade	MN	NW	E	Cable	WI	02	E	Coates	MN	ME	E
Belle Plaine	MN	SE	E	Cadott*	WI	05	E	Cobden	MN	NW	E
								Cochrane	WI	06	E

St. State
Reg. Region
Serv. Service

E Electricity
G Gas

*Wholesale Electric

NSP service area regions: MW Metro West
ME Metro East
NW Northwest
SE Southeast
SD South Dakota
ND North Dakota

Wisconsin divisions: 00 Indianhead
02 Lake Superior
03 Range
04 Central-East
05 Central-Metro
06 Central-West
07 Southern-Sparta
08 La Crosse

City	St.	Reg.	Serv.	City	St.	Reg.	Serv.	City	St.	Reg.	Serv.
Cokato	MN	NW	E	Downsville	WI	06	E	Fifield	WI	02	EG
Colby	WI	04	E	Dresback	MN	SE	E	Fletcher	MN	NW	E
Cold Springs	MN	NW	E	Dresser	WI	00	E	Florence	MN	SD	E
Cologne	MN	MW	E	Dundas	MN	SE	EG	Flynntown	MN	NW	E
Columbia Heights	MN	MW	E	Durand	WI	06	E	Foley	MN	NW	EG
Comstock	MN	ND	E	E Grand Forks*	MN	ND	EG	Forest	WI	00	E
Comstock	WI	00	E	Eagan	MN	ME	EG	Forest Lake	MN	ME	EG
Concord	MN	SE	E	Eagle Lake	MN	SE	E	Forestburg	SD	SD	E
Coon Rapids	MN	MW	E	Eagle Point	WI	05	E	Foster	WI	04	E
Coon Valley	WI	07	E	Eagleton	WI	05	E	Fountain City	WI	07	E
Conrath	WI	02	E	Earl	WI	00	E	Franklin	MN	NW	E
Corcoran	MN	NW	E	East Bethel	MN	ME	G	Freeport	MN	NW	E
Cornell*	WI	05	E	Eau Claire	WI	05	EG	French Island	WI	08	EG
Cosmos	MN	NW	E	Eau Galle	WI	06	E	Fridley	MN	MW	E
Cottage Grove	MN	ME	EG	Echo	MN	NW	E	Frontenac	MN	SE	E
Cottonwood	MN	NW	E	Eden Prairie	MN	MW	E	Fulton	SD	SD	E
Courtland	MN	SE	E	Eden Valley	MN	NW	E	Galesville	WI	07	E
Cream	WI	06	E	Edgerton	MN	SD	E	Garretson	SD	SD	E
Crooks	SD	SD	E	Edina	MN	MW	E	Garvin	MN	SD	E
Crystal	MN	MW	E	Elba	MN	SE	E	Gaylord	MN	SE	E
Cummings	ND	ND	E	Eleva	WI	06	E	Gem Lake	MN	ME	EG
Currie	MN	SD	E	Elk Mound	WI	05	E	Genoa	WI	08	E
Curtiss	WI	04	E	Elko	MN	SE	E	Gibbon	MN	SE	E
Cylon	WI	00	E	Ellis	SD	SD	E	Gilman	WI	04	E
Dakota	MN	SE	E	Ellsworth	WI	00	E	Glencoe*	MN	MW	E
Dallas	WI	00	E	Elmwood	WI	06	E	Glenwood	MN	NW	E
Danube	MN	NW	E	Elysian	MN	SE	EG	Glenwood City	WI	00	E
Dassel	MN	NW	E	Emerado	ND	ND	G	Glen Flora	WI	02	E
De Soto	WI	08	E	Emery	SD	SD	E	Glidden	WI	02	EG
Deephaven	MN	MW	E	Essig	MN	SE	E	Glyndon	MN	ND	E
Deer Park	WI	00	E	Ettrick	WI	07	E	Golden Valley	MN	MW	E
Delano*	MN	MW	E	Evan	MN	NW	E	Good Thunder	MN	SE	E
Delhi	MN	NW	E	Excelsior	MN	MW	E	Goodhue	MN	SE	EG
Dell Rapids	SD	SD	E	Ewer	MI	03	G	Goodview	MN	SE	EG
Dellwood	MN	ME	EG	Fairchild	WI	04	E	Grand Forks	ND	ND	EG
Dennison	MN	SE	E	Fairfax*	MN	NW	E	Grand Forks AFB	ND	ND	G
Deronda	WI	00	E	Falcon Heights	MN	ME	EG	Granite Falls*	MN	NW	E
Des Lacs	ND	ND	E	Fall Creek	WI	05	E	Granton	WI	04	E
Dilworth	MN	ND	EG	Fargo	ND	ND	EG	Green Isle	MN	SE	E
Dodge	WI	07	E	Faribault	MN	SE	EG	Green Lake	MN	NW	E
Dodge Center	MN	SE	E	Farmington	MN	ME	E	Greenfield	MN	MW	E
Dolton	SD	SD	E	Farmington	WI	00	E	Greenwald	MN	NW	E
Dorchester	WI	04	E	Fedora	SD	SD	E	Greenwood	MN	MW	E
Downing	WI	00	E	Felton	MN	ND	E	Greenwood	WI	04	E

St. State
Reg. Region
Serv. Service

E Electricity
G Gas

*Wholesale Electric

Alphabetic List of Communities NSP Serves

*In some cases NSP does not serve the entire community.
Please call your local NSP office for more information.*

City	St.	Reg.	Serv.	City	St.	Reg.	Serv.	City	St.	Reg.	Serv.
Hadley	MN	SD	E	Inver Grove				Lindstrom	MN	ME	EG
Hager City	WI	00	E	Heights	MN	ME	EG	Lino Lakes	MN	ME	EG
Hallie	WI	05	EG	Iona	MN	SD	E	Little Canada	MN	ME	EG
Hamburg	MN	MW	E	Iron River	MI	02	G	Little Falls	WI	07	E
Ham Lake	MN	ME	G	Ironwood	MI	03	EG	Lone Tree	ND	ND	E
Hammond	MN	SE	E	Janesville Village*	MN	SE	E	Long Beach	MN	NW	E
Hammond	WI	00	E	Jasper	MN	ME	EG	Long Lake	MN	MW	E
Hampton	MN	SE	E	Jim Falls	WI	05	E	Lonsdale	MN	SE	E
Hanley Falls	MN	NW	E	Joel	WI	00	E	Lorraine	WI	00	E
Hanover	MN	NW	E	Jordan	MN	SE	E	Loretto	MN	MW	E
Harrisburg	SD	SD	E	Junius	SD	SD	E	Lowry	MN	NW	E
Hartland	MN	SE	E	Kandyohi	MN	NW	G	Loyal	WI	04	E
Hastings	MN	ME	E	Kasota Village*	MN	SE	E	Lublin	WI	04	E
Hatfield	MN	SD	E	Kasson*	MN	SE	E	Luck	WI	00	E
Hatfield	WI	07	E	Kellogg	MN	SE	E	Lydia	MN	SE	E
Hatton	ND	ND	E	Kennan	WI	02	E	Lynn	WI	04	E
Haugen	WI	00	E	Kenyon Village*	MN	SE	E	Madelia Village*	MN	SE	E
Hawkins	WI	02	E	Kilkenny	MN	SE	E	Madison Lake	MN	SE	EG
Hayfield	MN	SE	E	Kimball Prairie	MN	NW	E	Mahtomedi	MN	ME	EG
Hayward	WI	02	E	Kingston	MN	NW	E	Maiden Rock	WI	06	E
Hazel Run	MN	NW	E	Knapp	WI	06	E	Manchester	MN	SE	E
Hector	MN	NW	E	La Crescent	MN	SE	E	Mankato	MN	SE	E
Henderson	MN	SE	E	La Crosse	WI	08	EG	Mantorville	MN	SE	E
Hersey	WI	06	E	Ladysmith	WI	02	E	Maple Grove	MN	MW	E
Hillsboro	ND	ND	E	Lafayette	MN	SE	E	Maple Lake	MN	NW	E
Hillsdale	WI	00	E	Lake City*	MN	SE	EG	Maple Plain	MN	MW	E
Hilltop	MN	MW	E	Lake Crystal*	MN	SE	E	Mapleton	MN	SE	E
Hixton	WI	07	E	Lake Elmo	MN	ME	EG	Mapleton	ND	ND	EG
Hokah	MN	SE	E	Lake Henry	MN	NW	E	Maplewood	MN	MI	EG
Holdingford	MN	NW	E	Lake Lillian	MN	NW	E	Marine On			
Holland	MN	SD	E	Lake St. Croix				St Croix	MN	MI	EG
Holmen	WI	08	EG	Beach	MN	ME	E	Marion	SD	SD	E
Homer	MN	SE	EG	Lake Wilson	MN	SD	E	Marshall*	MN	NW	E
Hopkins	MN	MW	E	Lakeland	MN	M	EG	Mason	WI	02	E
Houlton	WI	00	E	Lakeland Shores	MN	ME	E	Mayer	MN	MW	E
Howard Lake	MN	NW	E	Lakeville	MN	ME	E	Maynard	MN	NW	E
Hudson	WI	00	EG	Landfall	MN	ME	EG	Mayville	ND	ND	E
Hugo	MN	ME	EG	Larimore	ND	ND	E	Mazeppa	MN	SE	E
Humbird	WI	07	E	Lauderdale	MN	ME	EG	Medicine Lake	MN	MW	E
Huntingdon	WI	00	E	Le Sueur*	MN	SE	E	Medina	MN	MW	E
Hurley	WI	03	EG	Lennox	SD	SD	E	Medford*	WI	04	E
Ihlen	MN	SD	E	Lester Prairie	MN	MW	E	Meire Grove	MN	NW	E
Independence	WI	07	E	Lexington	MN	ME	E	Mellen	WI	02	EG
Ingram	WI	02	E	Lilydale	MN	ME	EG	Melrose	WI	07	E

St. State
Reg. Region
Serv. Service

E Electricity
G Gas

*Wilson Electric

NSP service area regions: **Wisconsin divisions:**
 MW Metro West 00 Indianhead
 ME Metro East 02 Lake Superior
 NW Northwest 03 Range
 SE Southeast 04 Central-East
 SD South Dakota 05 Central-Metro
 ND North Dakota 06 Central-West
 07 Southern-Sparta
 08 La Crosse

City	St.	Reg.	Serv.	City	St.	Reg.	Serv.	City	St.	Reg.	Serv.
Melrose City*	MN	NW	E	New Market	MN	SE	E	Plum City	WI	06	E
Melvina	WI	07	E	New Munich	MN	NW	E	Plymouth	MN	MW	E
Mendota	MN	ME	EG	New Richland	MN	SE	E	Point Douglas	MN	ME	E
Mendota Heights	MN	ME	EG	New Richmond*	WI	00	E	Portland	ND	ND	E
Menomonie	WI	06	EG	New Ulm*	MN	SE	E	Poskin	WI	00	E
Meriden	MN	SE	E	Newport	MN	ME	EG	Prairie Farm	WI	00	E
Midway	WI	08	E	Nicollet	MN	SE	E	Prentice	WI	02	EG
Mikana	WI	00	E	Nodine	MN	SE	E	Prescott	WI	00	E
Milan	WI	04	E	North Bend	WI	07	E	Prinsburg	MN	NW	E
Millville	MN	SE	E	North Hudson	WI	00	EG	Prior Lake	MN	SE	E
Mindoro	WI	07	E	North Mankato	MN	SE	E	Pulaski	MN	NW	E
Minneapolis	MN	MW	E	North Oaks	MN	ME	EG	Ramona	SD	SD	E
Minneapolis-St. Paul International Airport	MN	ME	E	North Red Wing	WI	00	E	Ramsey	MI	02	EG
Minneiska	MN	SE	E	North Redwood	MN	NW	E	Randolph	MN	SE	E
Minnesota City	MN	SE	EG	North St Paul*	MN	ME	EG	Range	WI	00	E
Minnesota Lake	MN	SE	E	Northfield	MN	SE	EG	Rapidan	MN	SE	E
Minnnetonka	MN	MW	E	Northfield	WI	07	E	Raymond	MN	NW	E
Minnnetonka Beach	MN	MW	E	Norwalk	WI	07	E	Reads Landing	MN	SE	E
Minnetrissa	MN	MW	E	Norwood	MN	MW	E	Red Wing	MN	SE	EG
Minot	ND	ND	E	Nye	WI	00	E	Redwood Falls*	MN	NW	E
Mondovi	WI	06	E	Oak Center	MN	SE	E	Reeve	WI	00	E
Monroe	SD	SD	E	Oak Park Heights	MN	ME	EG	Regal	MN	NW	E
Montevideo	MN	NW	E	Oakdale	MN	ME	EG	Renner	SD	SD	E
Monticello	MN	NW	E	Ogema	WI	02	EG	Renville	MN	NW	E
Montreal	WI	03	EG	Olivia*	MN	NW	E	Reynolds	ND	ND	E
Montrose	MN	NW	E	Onalaska	WI	08	EG	Rib Lake	WI	02	EG
Moorhead	MN	ND	G	Orono	MN	MW	E	Rice	MN	NW	G
Morgan	MN	NW	E	Osakis	MN	NW	E	Rice Lake*	WI	00	E
Morristown	MN	SE	E	Osceola	WI	00	E	Richardson	WI	00	E
Morton	MN	NW	E	Osseo	MN	MW	E	Richfield	MN	MW	E
Mound	MN	MW	E	Osseo	WI	05	E	Richmond	MN	NW	E
Mounds View	MN	ME	EG	Otisco	MN	SE	E	Ridgeland	WI	07	E
Neillsville	WI	04	E	Owen	WI	04	E	Ridgeway	MN	SE	E
Nelson	WI	06	E	Park Falls	WI	02	EG	Riplinger	WI	04	E
Nerstrand	MN	SE	E	Paynesville	MN	NW	E	River Falls*	WI	00	E
New Auburn	MN	00	E	Pemberton	MN	SE	E	Riverside	ND	ND	EG
New Auburn	WI	00	E	Pepin	WI	06	E	Robbinsdale	MN	MW	E
New Brighton	MN	ME	EG	Phillips	WI	02	EG	Roberts	WI	00	E
New Germany	MN	MW	E	Pigeon Falls	WI	07	E	Rock Elm	WI	06	E
New Hope	MN	MW	E	Pine Creek	WI	07	E	Rockford	MN	MW	E
New London	MN	NW	EG	Pine Island	MN	SE	E	Rockland	WI	07	E
				Pine Springs	MN	ME	EG	Rockville	MN	NW	E
				Pipestone	MN	SD	E	Rogers	MN	NW	E
				Plato	MN	MW	E	Rollingstone	MN	SE	EG

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Alphabetic List of Communities NSP Serves

*In some cases NSP does not serve the entire community.
Please call your local NSP office for more information.*

City	St.	Reg.	Serv.	City	St.	Reg.	Serv.	City	St.	Reg.	Serv.
Roscoe	MN	NW	E	Spring Park	MN	MW	E	Trego	WI	00	E
Roseland	MN	NW	E	Spring Valley	WI	06	E	Trempealeau	WI	07	E
Rosemount	MN	ME	E	Spring Brook	WI	00	E	Trosky	MN	SD	E
Roseville	MN	ME	EG	St Augusta	MN	NW	G	Turtle Lake	WI	00	E
Roswell	SD	SD	E	St Anthony	MN	MW	E	Unity	WI	04	E
Rowena	SD	SD	E	St Bonifacius	MN	MW	E	Unityville	SD	SD	E
Royalton	MN	NW	G	St Clair	MN	SE	EG	Vadnais Heights	MN	ME	EG
Rusk	WI	06	E	St Cloud	MN	NW	EG	Vermillion	MN	SE	E
Ruthton	MN	SD	E	St Croix Falls	WI	00	E	Veseli	MN	SE	E
Sabin	MN	ND	E	St James*	MN	SE	E	Victoria	MN	MW	E
Sacred Heart	MN	NW	E	St Joseph	MN	NW	EG	Vilas	SD	SD	E
Salem	SD	SD	E	St Joseph	WI	00	E	Villard	MN	NW	E
Sand Creek	WI	00	E	St Louis Park	MN	MW	E	Viroqua	WI	07	E
Sarana	WI	00	E	St Martin	MN	NW	E	Wabasha	MN	SE	EG
Sartell	MN	NW	EG	St Mary's Point	MN	ME	E	Waconia	MN	MW	E
Sauk Center*	MN	NW	E	St Michael	MN	NW	E	Wacouta Beach	MN	SE	E
Sauk Rapids	MN	NW	EG	St Nicholas	MN	NW	E	Waite Park	MN	NW	EG
Savage	MN	MW	E	St Paul	MN	ME	EG	Wakefield*	MI	03	EG
Scandia	MN	ME	EG	St Paul Park	MN	ME	EG	Waldorf	MN	SE	E
Sedan	MN	NW	E	St Peter*	MN	SE	E	Waltham	MN	SE	E
Shafer	MN	ME	E	Stacy	MN	ME	EG	Wanamingo	MN	SE	E
Shakopee*	MN	MW	E	Stanley	WI	04	E	Wanderoos	WI	00	E
Sheldon	WI	02	E	Stanton	MN	SE	E	Warsaw	MN	SE	EG
Shell Lake	WI	00	E	Star Prairie	WI	00	E	Waseca*	MN	SE	E
Sherman	SD	SD	E	Starbuck	MN	NW	E	Washburn	WI	02	EG
Shoreview	MN	ME	EG	Stetsonville	WI	04	E	Wasioja	MN	SE	E
Shorewood	MN	MW	E	Stevenstown	WI	04	E	Waterford	MN	SE	EG
Silver Lake	MN	MW	E	Stewart	MN	NW	E	Watertown	MN	MW	E
Sioux Falls	SD	SD	E	Stillwater	MN	ME	EG	Waterville	MN	SE	E
Skyberg	MN	SE	E	Stockholm	WI	06	E	Watkins	MN	NW	E
Skyline	MN	SE	E	Stoddard	WI	08	E	Watson	MN	NW	E
Slayton	MN	SD	E	Strum	WI	06	E	Waumandee	WI	06	E
Sleepy Eye*	MN	SE	E	Sunfish Lake	MN	ME	EG	Waverly	MN	NW	E
Smiths Mill	MN	SE	E	Sunrise	MN	ME	E	Wayzata	MN	MW	E
Somerset	WI	00	E	Sunset Beach	MN	NW	E	Weaver	MN	SE	E
South Bend	MN	SE	E	Taylor	WI	07	E	Webster	MN	SE	E
South Haven	MN	NW	E	Taylor's Falls	MN	ME	E	Wegdahl	MN	NW	E
South St Paul	MN	ME	EG	Tea	SD	SD	E	West Concord	MN	SE	E
Sparta	WI	07	E	Thompson	ND	ND	E	West Fargo	ND	ND	EG
Spencer	WI	04	E	Thorp	WI	04	E	West Lakeland	MN	ME	EG
Spicer	MN	NW	EG	Tilden	WI	05	E	West Salem	WI	07	E
Spooner*	WI	00	E	Tonka Bay	MN	MW	E	West St Paul	MN	ME	EG
Spring Hill	MN	NW	E	Tony	WI	02	E	West Union	MN	NW	E
Spring Lake Park	MN	MW	E	Tracy	MN	SD	E	Westboro	WI	02	EG

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NSP service area regions: Wisconsin divisions:

MW Metro West	00 Indianhead
ME Metro East	02 Lake Superior
NW Northwest	03 Range
SE Southeast	04 Central-East
SD South Dakota	05 Central-Metro
ND North Dakota	06 Central-West
	07 Southern-Sparta
	08 La Crosse

City	St.	Reg.	Serv.
Westby*	WI	07	E
Westport	MN	NW	E
Weyerhauser	WI	02	E
Wheeler	WI	06	E
White Bear Lake	MN	ME	EG
Whitehall*	WI	07	E
Willernie	MN	ME	EG
Wilson	MN	SE	E
Wilson	WI	06	E
Winfred	SD	SD	E
Winona	MN	SE	EG
Winsted	MN	MW	E
Winthrop*	MN	SE	E
Wissota	WI	05	E
Withee	WI	04	E
Witoka	MN	SE	E
Wolverton	MN	ND	E
Wood Lake	MN	NW	E
Woodbury	MN	ME	EG
Woodland	MN	MW	E
Woodstock	MN	SD	E
Woodville	WI	00	E
Worthing	SD	SD	E
Wyoming	MN	ME	EG
York	WI	04	E
Young America	MN	MW	E
Zumbro Falls	MN	SE	E
Zumbrota	MN	SE	E

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 Reg. Region G Gas Electric
 Serv. Service