STATE OF MAINE
DEPARTMENT OF ENVIRONMENTAL PROTECTION

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COMMISSIONER

January 30, 2004

Senator John L. Martin, Chair
Representative Theodore Koffman, Chair
Joint Standing Committee on Natural Resources
121st Maine Legislature
State House Room 437
Augusta, Maine 04333

Dear Senator Martin, Representative Koffman, and members of the committee:

Attached is a report entitled "A Plan for the Collection and Recycling of Cathode Ray Tubes in Maine" submitted to the Natural Resources Committee by the Department of Environmental Protection in response to the provisions of PL 2003 Chapter 150 ("An Act to Develop a Plan for Cathode Ray Tube Disposal"). The legislation bans the disposal of cathode ray tubes ("CRTs") in Maine beginning January 1, 2006, and required the Department to develop a plan for the collection and recycling of CRTs.

We look forward to further discussion of this important issue with you.

Sincerely,

Dawn R. Gallagher
Commissioner

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Report to the Joint Standing Committee on Natural Resources

A Plan for the Collection and Recycling of Cathode Ray Tubes in Maine

Submitted by the
Maine Department of Environmental Protection

January 2004

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I. Introduction

A. Background

During its First Regular Session the 121st Maine Legislature passed "An Act to Develop a Plan for Cathode Ray Tube Disposal" (L.D. 743 – see Appendix A). This Act bans the disposal of cathode ray tubes (CRTs) in Maine beginning January 1, 2006. It also requires the Department of Environmental Protection (DEP) to develop a recommended plan for the collection and recycling of CRTs and establish a stakeholder group to assist with that effort.

Currently, waste CRTs generated by businesses in Maine are classified as a hazardous waste by toxicity characteristic due to the amount of lead contained in a CRT. Under the universal waste provisions of Chapter 850, the "Hazardous Waste Management Regulations", businesses are already prohibited from disposing of CRTs and must ship them for recycling to a facility licensed to handle Universal Wastes (UW). Because waste CRTs generated by businesses are already required to be recycled, the institution of a general disposal ban on CRTs as of January 1, 2006 has the effect of extending the requirement to recycle CRTs to households. To comply with the disposal ban, households will need access to a convenient, affordable collection and recycling system for CRTs.

The purpose of this report is twofold:

- to provide the Legislature with information on the types, amounts and sources of CRTs currently available for collection, alternative disposal practices, and existing resources and estimated costs for collection and recycling; and
- to identify a plan for expanding in-state resources and paying the costs associated with the collection and recycling of CRTs from households.

LD 743 specifically requires that the plan utilize the concept of "shared responsibility among manufacturers, distributors, retailers, consumers, and other parties." The plan presented in this report was developed with information and input from the "LD 743 Stakeholder Group", which included representatives of manufacturers, retailers, municipalities, UW consolidators and recyclers, environmental groups, Maine businesses, schools, the State Planning Office (SPO) and DEP (see Appendix B).

B. Stakeholder Process

The DEP hosted five days of meetings with the LD 743 Stakeholder Group. These meetings offered the stakeholders an opportunity to share technical information and to express their very varied perspectives and preferences on the advantages and drawbacks to different collection and recycling models. The first meeting in May 2003 focused on identifying resources to address the informational items delineated by LD 743 for inclusion in this report. At the next meeting (1-1/2 days in July) the group discussed the range of collection and recycling options, identifying possibilities and limitations of each option. The September meeting focused on discussing in greater

depth two models presented by the DEP as shared responsibility models that may serve the needs of Maine citizens. The Stakeholder Group also discussed the appropriateness of including a variety of recycling standards in legislation and identified some key concepts to consider when creating a collection and recycling system that will work for Maine.

II. Waste Management Practices

A. Current Regulatory Requirements

The regulatory requirements for managing waste CRTs in Maine currently depend upon whether the waste is generated by a homeowner or business. Waste CRTs generated by businesses have been determined to be a hazardous waste due to the amount of lead they contain. Under Chapter 850 of the Department's rules, waste CRTs are classified as a Universal Waste. Provided they are recycled as Universal Waste, CRTs are subject to less stringent handling, storage and transportation requirements than those generally applied to hazardous wastes.

Currently, waste CRTs generated by households are exempt from hazardous waste regulation and thus may be handled as municipal solid waste (MSW). Some regional and municipal waste management programs have voluntarily begun the separate collection of CRTs for recycling (see Appendix C for results of a survey of municipalities collecting and recycling CRTs as of July 2003). As of January 1, 2006, all CRTs, including household CRTs, must be recycled as a result of the disposal ban in LD 743.

There is also a waste disposal ban at 38 MRSA §1663. This prohibits the landfilling or incineration of mercury-added products as of January 1, 2005. Flat panel monitors and laptop displays contain mercury-containing fluorescent lamps, and are subject to the mercury-added products disposal ban. Other common household products that have been reported to the DEP as mercury-added products under the provisions 38 MRSA 1661-A include electronics with small (<4") LCD displays, such as camcorders, digital cameras, DVD players and telephones.

B. Alternative Disposal Practices and Environmental Impacts of Waste Management Options

In 1989, the State of Maine adopted 38 MRSA §1302 "Declaration of Policy" in regards to the management of waste in the state. This statute states, in part:

> The Legislature finds and declares that it is the policy of the State to pursue and implement an integrated approach to hazardous and solid waste management, which shall be based on the following priorities: reduction of waste generated at the source, including both the amount and toxicity of waste; waste reuse; waste recycling; waste composting; waste processing

which reduces the volume of waste needing disposal, including waste-to-energy technology; and land disposal.

The Legislature finds that it is in the best interests of the State to prefer waste management options with lower health and environmental risk and to ensure that such options are neither foreclosed nor limited by the State's commitment to disposal methods. The Legislature declares that it is in the public interest to aggressively promote waste reduction, reuse and recycling as the preferred methods of waste management.

Removing electronic wastes from the disposal waste stream provides the opportunity to extend the useful life of products through refurbishment and reuse by individuals and organizations who cannot afford new equipment, and provides for the reclamation of valuable metals and other materials commodities. It also conserves landfill capacity, conserves natural resources, and reduces pollution by decreasing the demand for virgin materials and reducing the energy required for production[1].

1. Disposal through landfilling and incineration.

If one only considers the tipping fee for disposal of CRTs at landfills and incinerators, disposal may appear to be the least costly waste management alternative. However, there are additional costs to consider which are not reflected in the disposal tipping fee. CRTs contain significant amounts of lead, such that they comprise approximately 80% of the lead in the MSW waste stream that can be mobilized in a landfill environment[2]. Leachate quality data from Maine MSW landfills show detectable lead levels, corroborating the findings in a study conducted by the Florida Center for Solid and Hazardous Waste Management. Lead is also released into the environment from MSW incinerators. More than 60% of MSW disposed of in Maine is incinerated; estimates of lead emissions from Maine incinerators in 2000 and 2001 were 73 and 68 pounds/year respectively based on emissions reporting received by the Maine DEP Air Bureau (these are emissions figures after new metals control technologies were added to the incinerators). The disposition of this lead into Maine's environment only adds to the environmental lead risk faced by young children in a state where more than 60% of the housing may contain lead paint.

Any lead that is not released in incinerator emissions is retained in the ash, which is then placed in a landfill licensed to accept special waste. MSW and special waste landfills in Maine are constructed with composite liners and leachate collection systems, and are subject to environmental monitoring for at least 30 years after closure of the landfill. These regulatory requirements seek to ensure that pollutants such as lead do not contaminate Maine's groundwater, but they do not offer a guarantee of protection in the long-term. The best long-term resource protection

[1] EPA WasteWise Update, October 2000
[2] Florida Center for Solid and Hazardous Waste Management, December 1999

strategy for groundwater is to minimize the amount of toxics landfilled through such initiatives as recycling of waste products that contain significant amounts of lead.

2. Reuse/Recycling

Companies that collect waste CRTs gain the most value through resale and donation of functional units. A major dismantling operation in Massachusetts has found that approximately 15% of CRTs have reuse value[3]. Units that do not have resale/reuse value can be recycled into three types of commodities: metals, plastics, and glass. Metals include significant amounts of lead, copper, nickel and steel. High-value plastic resins, including high-impact polystyrene (HIPS), acrylonitrile-butadiene styrene (ABS), and polycarbonates (PC) are sold to domestic markets, although currently most plastics are exported to international markets. CRT glass may be used in a closed loop recycling process to make new CRT glass or may be used by copper and lead smelters as a less-expensive direct substitute for silica as a fluxing agent [see Appendix D "Summary Information on Use of Commodities from CRT Recycling" and Appendix E "Obsolete Computers, 'Gold Mine', or High-Tech Trash? Resource Recovery from Recycling" (USGS, July 2001)]. The production of commodities through recycling has direct environmental benefits by decreasing the amount of virgin materials that must be mined and produced, thus reducing environmental impacts of the mining and production processes.

III. Waste Types and Amounts

A. Product types with CRTs

The LD 743 Stakeholder Group categorized products with CRTs into the following general types:

- TVs and other video monitors [including surveillance & Closed Circuit TV (CCTV)];
- computer monitors;
- video games & gambling machines;
- medical equipment;
- other test equipment (e.g., oscilloscopes in automotive and electronics diagnostic test equipment); and
- industrial control equipment

It is anticipated that the collection and recycling system established for managing CRTs from households will primarily receive TVs and computer monitors. Product types that are exclusively used by specialty businesses, such as medical and industrial control equipment, are normally managed by their business owners through contract with the manufacturer or a waste management company. Although some of the other product

[3] August 13, 2003 E-mail from Dick Peloquin, Electronicycle, to Carole Cifrino, Maine DEP

types may be primarily used by businesses, some small businesses in Maine may seek to recycle these products through a municipal collection system.

B. Amounts and sources of CRTs available for collection

1. CRT Quantity Estimate

There have been a variety of methods used by waste management programs and manufacturers to estimate the number of CRTs that will require collection and recycling. These estimates are typically derived in one of two ways. The first method relies on industry sales data for PCs and televisions, and, after making assumptions regarding variables such as the duration of a product's average useful life, estimates the number of products no longer wanted at a given point in time. The estimates can account for a "second life" for many of the units, through assumptions regarding sales or donations for reuse. The second method derives a per capita estimate based upon the data from existing collection programs.

Using the model based on units sold and sales data obtained from public and private sources by the U.S. Environmental Protection Agency (EPA) and the State of Florida, and making a per capita adjustment for Maine's population (0.5% of US total), approximately 110,000 CRTs (televisions and computer monitors only) are projected to be available for recycling from households and small businesses in Maine in 2003. This estimate rises to approximately 150,000 units in 2006. (See Appendix F for details on the derivation of these amounts.)

Using the second method, the annual per capita estimate based upon the data from the Massachusetts program is approximately 57,000 CRTs in Maine. On a statewide basis, Massachusetts has the most mature program known to DEP, and according to their latest collection data, the per capita annual collection value is approximately 1.75 pounds per person in 2002[4].

DEP believes this range of 57,000 -110,000 units represents the reasonable low and high end estimates of CRTs that are currently recoverable in Maine. The estimate based on existing collection data represents a low end value because even the most mature mandatory state program is less than five years old, has room for improvement, and may not reflect the benefits that may be associated with a shared responsibility collection model (i.e., low or no end-of-life recovery fee). The sales data estimate represents a high-end value because the number of units available for recycling do not necessarily translate into the units actually recovered in any particular year as so many variables are involved in making that prediction. Confounding factors which prevent a more precise estimate include: the number of CRTs currently in storage awaiting recycling, whether the collection & recycling program will motivate consumers to move

[4] August 6, 2003 telecon with Brooke Nash, Branch Chief, Municipal Waste Reduction, Mass. Dept. of Environmental Protection

these stored units into the waste management system, and whether changes to the television or PC markets will trigger a more rapid turnover of units currently in use.

2. Sources of CRTs

Waste CRTs are generated by both households and businesses of all sizes. Many businesses in Maine contract with Universal Waste management services or their CRT manufacturer to meet their legal obligation to recycle their waste CRTs. Compliance with this recycling requirement is more problematic, and often more expensive, for small businesses that may have a very small number of CRTs, e.g., the local barbershop or one-person home-based business. To support the implementation of the CRT disposal ban, the system that needs to be developed and funded must provide low- or no-cost collection and recycling services for households. It is anticipated that, to a limited extent, small businesses may pay to access the infrastructure established to collect household CRTs to meet their current CRT recycling responsibility.

C. Other electronic wastes

There have been several pilot projects funded by electronics manufacturers, retailers and the federal, state, and local governments that have collected all types of electronics, from household toasters through copiers[5]. Although the specific objectives of these waste management projects vary, the data and experience gained from these programs can be helpful in considering the efficacy of recycling electronics products other than CRTs (see Appendix G - "Sample Data from Pilot Electronics Collection & Recycling Projects"). Flat panel displays are not CRTs, they are a mercury-added product and also need to be recycled. To create a system that's simple for consumers to use, it makes sense not to require consumers to distinguish the type of computer monitor or television they have, but to plan for the inclusion of these flat panel displays in the collection and recycling system. Also, central processing units (CPUs) from computers have a greater value than the current cost of collecting and recycling them, therefore allowing CPUs into the collection & recycling system for CRTs can help defray the cost of recycling CRTs.

Public policy can play a role in encouraging manufacturers to design products with end-of-life value, thus decreasing the amount of toxics used in manufacturing and ultimately needing disposal (see Appendix H - Product Stewardship). For example, a public policy that bans the disposal of CRTs and requires manufacturers to take at least partial responsibility for recycling their CRT products may provide an economic incentive to the manufacturer to reduce the cost of recycling their CRTs. One of the goals of manufacturers may then become to develop products in accordance with "design for the environment" principles (no- or low-toxicity and recyclable materials, and easy dismantling) and thus create a product that has value at the end of its initial life as feedstock for new products. Products that are produced so that their end-of-life value

[5] See Analysis of Five Community Consumer/Residential Collections – End-of-Life Electronic and Electrical Equipment (USEPA Region 1, Common Sense Initiative, 1999; EPA-901-R-98-003) and "Recycling Used Electronics" Report on Minnesota's Demonstration Project (July 2001).

exceeds the cost of collection and recycling will be collected for recycling rather than disposed of in landfills and incinerators.

IV. Collection and Recycling System Options

At each point in any model for collection and recycling of CRTs there are both financial and management responsibilities. Different models assign these responsibilities to various parties who have a role in CRT production, distribution, use and management as waste. In a full producer responsibility model, the manufacturers of the product are responsible for all aspects of collection and recycling of that product. The other end of the model spectrum holds the consumer responsible for paying all costs associated with recycling a product.

A. Alternative Models

Beginning in June 2001, the National Electronic Product Stewardship Initiative (NEPSI) brought together representatives of federal, state and local governments, electronics producers, and non-governmental organizations to develop a national solution to electronics products management issues. Through this process, NEPSI has delineated four basic models for funding collection and recycling of electronics, plus a fifth "hybrid" model. These include:

- The End-of-Life Fee (EoLF) model. In this model consumers bear the cost of the collection and recycling system by paying a fee at the point of collection.
- The Advanced Recycling Fee (ARF) model. This is a model in which collection and recycling are fully funded by an ARF paid by the consumer when purchasing a new product. The ARF can be managed either by government or a third party organization with substantive manufacturer involvement.
- The Full Cost Internalization (CI) model. This model requires producers to fully finance and manage the collection and recycling of their products, either through collective responsibility (all producers share responsibility for all products) or individual responsibility (each producer is responsible for their own products).
- The Partial Cost Internalization (PCI) model. This model requires producers to finance the costs of the system from consolidation through recycling, with state and local governments paying the costs of collection and transportation to a consolidation point.
- The "Hybrid" model. This model is funded by an ARF for the first several years of a program, and then moves to the PCI system of funding.

The LD 743 Stakeholder Group discussed the benefits and issues associated with each of these basic models as they relate to the conditions and needs in Maine. The group also considered the concepts of a "bounty" model, similar to the system used to collect cans and bottles in Maine, and a hybrid model that would utilize end-of-life fees as the funding source. There are many possible permutations of these models depending on the assignment of financial and management responsibilities for collection,

transportation (including consolidation), and recycling. Every model has its supporters and detractors, usually as a result of whomever is likely to benefit or lose from a financial and/or market-share standpoint. The LD 743 Stakeholder Group did not make a consensus recommendation for funding a CRT collection and recycling program in Maine.

To evaluate whether different collection and recycling models may be appropriate for Maine, the Department established the following objectives for the system.

The waste CRT collection & recycling system for Maine will be designed to:

- share responsibility for the financing and management among producers, distributors, retailers, consumers, and government.
- maximize collection of waste CRTs from households;
- allow for collection of waste CRTs from small businesses;
- accommodate manufacturer and retailer collection programs;
- minimize additional costs to municipalities;
- be relatively simple, clear, and consistent so that all players understand their role in implementation; and
- be flexible enough to accommodate collection and recycling of other waste electronics.

Maine has already invested significant public funds in the development of a collection infrastructure at the municipal/regional level, which demonstrates the State's commitment to a role in a shared responsibility system. The operation of these municipal and regional facilities is funded by local property taxes paid by the general public who are also the consumers in a shared responsibility model.

The EoLF model depends entirely on the consumer for the financing of the system. During the Stakeholder discussions, the question was raised whether there was a role that producers could play in an EoLF system to create shared responsibility. One industry representative offered that producers could play a voluntary role in consumer education, collection and recycling in an EoLF system. The Department did not perceive this proposal as meeting the intent of the legislation that requires a proposed system to be based on the concept of shared responsibility. End-of-life fees have also been shown to deter consumer participation in the collection and recycling of electronics (see Appendix I – Memo from Ken Hensler on Tri-Community Landfill CRT Collection Activities). For these reasons, the Department did not pursue further development of an EoLF model for Maine.

In an ARF system, the consumer is also responsible for fully bearing the costs of recycling. The ARF can be set at a level that will reimburse all costs to municipalities for the collection and recycling, and must be set to cover the costs of either the State or a third party organization managing the ARF fund. State government would be responsible for enforcing the collection and remission of the ARF by retailers and/or manufacturers, depending on whether the fee is assessed at the point of wholesale or retail sale. Some producers prefer an ARF-based system for several reasons: an ARF

increases the costs of all producers products equally; the increased cost is attributable to the government; and an ARF system limits producers' responsibility in the system to optional participation in a third party organization to manage the ARF if government does not adopt this role. Environmental interests highlight that an ARF system provides no incentives to producers to design their products to minimize the use of toxics and maximize recyclability. Other drawbacks to an ARF system include: an ARF provides no incentive for keeping costs down and lowering costs over time, fee systems do not take advantage of manufacturer expertise in crafting environmental solutions and cost-effective processes for their products, and the management of an ARF system introduces a new, significant cost that must be borne by the consumer. Because consumers bear the full costs of recycling and the lack of responsibility assigned to producers in an ARF system, the Department does not believe that a permanent ARF system meets the shared responsibility objective for Maine. Also, implementing a permanent ARF on all CRT products faces significant legal hurdles (see Appendix J)

The full CI model assigns all financial and management responsibility to the producers. This system can provide some financial incentive to producers to minimize the costs of recycling, which may lead some manufacturers to reduce the amount of toxics in their product and/or to design their products for recycling. Companies that have already integrated environmental factors into their business models may gain a market advantage by having to accommodate lower recycling costs in the price of their products. The Department did not pursue the development of a collection and recycling system based on full cost internalization because the full CI model is not based on the concept of shared responsibility and would not necessarily utilize the infrastructure invested in by the State.

The PCI model assigns only part of the financial and management responsibility for waste products to the producer, with consumers and/or government also having some responsibility. To fully develop a system based on this model, there must be decisions made on who bears which costs and which management responsibilities. An example of this type of system which has been discussed by NEPSI assigns consumers and government responsibility for collecting and transporting waste products to a point of consolidation, with producers then responsible for managing the waste products from the point of consolidation.

B. A System for Maine

A PCI system can meet the needs of Maine to promote the collection and recycling of CRTs by sharing the cost among manufacturers responsible for the recycling of their products, the State through infrastructure development and enforcement, and municipalities in their traditional waste management capacity. However, a major issue identified by manufacturers with the implementation of a PCI system is that those manufacturers that have a lower market share now than when the product needing recycling was produced will have to raise their current product price by a greater amount than their competitors, thus creating a market disadvantage. This can be addressed by implementing the manufacturer responsibility role at a date in the future

that allows enough lead time for manufacturers to plan for the costs of recycling their products. Because televisions have a much longer lifespan than computer monitors, the amount of lead time needed to adjust to the additional responsibility is much greater for TV manufacturers than for computer manufacturers. The hybrid model accommodates the financing of collection and recycling prior to implementation of PCI by imposing an advanced recycling fee (ARF) on the consumer at the time of purchase. However, depending on an ARF system to fund the collection and recycling of computer monitors as well as televisions is risky because it may not be possible to collect the ARF on distance sales, i.e., internet and catalog sales (see Appendix J - AG's letter).

With these major issues in mind, the Department, as directed by LD 743, has drafted legislation (Appendix K) to implement a system that includes:

- consumer responsibility for transporting waste TVs and computer monitors to local collection points (usually at existing municipal transfer stations and recycling facilities;
- consumer/municipal responsibility for the collection and transportation of waste TVs and computer monitors to a nearby point of consolidation in Maine;
- private sector responsibility for operating consolidation centers, tracking the number of waste TVs and computer monitors by manufacturer, and billing manufacturers and the State for their operational and recycling costs related to waste TVs and computer monitors;
- State responsibility for ensuring municipal transportation expenditures do not exceed current costs for shipping and disposal of waste TVs and computer monitors as part of MSW;
- State responsibility for orphan computer monitors from receipt at the point of consolidation until January 1, 2012;
- individual manufacturer responsibility for computer monitors (including flat panel displays and laptops) at the point of consolidation beginning on January 1, 2006;
- a $6.00 ARF on each television sold in Maine from January 1, 2005 until January 1, 2012, managed by the State to pay the costs of recycling TVs and orphan computer monitors from the point of consolidation, the amount of which shall be adjusted as needed to cover program costs (see Appendix K for calculation of ARF);
- retailer responsibility for collecting and forwarding ARF monies to the State for a limited time period;
- individual manufacturer responsibility for televisions at the point of consolidation beginning January 1, 2012;
- collective manufacturer responsibility for orphan TVs and orphan computer monitors beginning January 1, 2012;
- manufacturer responsibility for reporting to the State approximate annual sales in Maine and their progress on collection and recycling of covered electronics;
- State responsibility for oversight of legal requirements and for establishing, evaluating, and revising collection and recycling rate goals for Maine;
- manufacturer responsibility for labeling product with clear manufacturer ID; and
- a prohibition on sales of covered electronics by any manufacturer not in compliance with their responsibilities under this legislation.

The State will manage the temporary ARF and be responsible for managing waste televisions through recycling until the PCI is effective for television manufacturers. A portion of the CRT waste stream was produced by manufacturers that are no longer in business and were not purchased by another corporation that is still in business. Provisions for funding the recycling of these electronic wastes, called "orphans", must be made to prevent the costs from defaulting to the municipalities that operate collection centers. The system proposed by this legislation allows the ARF to be set at a level that will fund collection and recycling of both orphan TVs and orphan computer monitors for as long as the ARF is in effect.

By implementing PCI on January 1, 2006, for computer monitor manufacturers, the State will not need to pursue collection of an ARF on distance sales, thus avoiding potential expensive legal actions. Delaying implementation of the television manufacturer's role in the PCI system recognizes the longer lifecycle of TVs and therefore greater time needed by TV manufacturers to avoid any market inequities as a result of assuming responsibility for their products at the end-of-life. Assigning individual responsibility for their own products to manufacturers provides the private sector with flexibility to determine how to achieve the greatest efficiencies in the production/recycling system.

Currently, manufacturers and retailers sometimes offer take-back programs through one-day collection events, on-going recycling services, and limited time collections at retail stores. The model described here does not preclude manufacturers and retailers from continuing to offer such services as part of their on-going business activities.

V. Resources Needed to Implement the Recommended Collection & Recycling System

The components of any collection and recycling system include points of collection, transportation, and dismantling and recycling operations. To minimize transportation costs, a system for recycling CRTs from Maine also includes locations at which CRTs are consolidated prior to shipment to dismantling and recycling operations.

A. Estimated Costs

The costs for collection and recycling of CRTs include:

- transportation of waste to collection points
- collection infrastructure development
- education and outreach costs
- collection operations
- transportation to consolidation point
- consolidation operations
- transportation from consolidation to dismantler/recycler; and

- recycling/dismantling operations.

At this point in time, consumers are responsible for ensuring their household wastes are transported to their local solid waste facility; the proposed PCI system maintains this role for the consumer. The State has committed to investing $396,000 for collection infrastructure development, much of which is already constructed. Some municipalities have also invested local funds to develop UW collection infrastructure that is capable of handling CRTs. Additionally, the State has funding to develop two regional household hazardous waste (HHW) collection centers that will also serve as collection points for CRTs and CPUs. The State Planning Office (SPO) is currently working with municipalities to determine their willingness to partner with the State in the development and operation of the HHW collection centers. SPO is also responsible for promoting recycling in Maine. With the establishment of a comprehensive collection and recycling system, SPO will bear the costs of education and outreach for electronics recycling as part of its on-going recycling promotion program.

Municipalities are currently responsible for providing for disposal of municipal solid waste from their jurisdictions. The proposed legislation maintains municipal responsibility for ensuring waste TVs and computer monitors are delivered to a facility licensed to accept that waste. Currently, the private sector operates at least twelve locations that are/can be licensed as consolidation points in Maine. These are located throughout southern Maine, as far north as Bangor, and east to Hancock. Given these locations, the cost to municipalities, other than possibly those in northern Maine, for separating and transporting computer monitors and TVs to the consolidation centers are not expected to exceed their current costs for transportation and disposal (disposal tipping fees range from approximately $40 - $128 per ton). Recognizing that there may be some municipalities for which the requirement to transport waste TVs and computer monitors to a consolidation facility may exceed their current costs of transportation and disposal, the ARF fund management can be designed to include a reimbursement system for documented increased costs to municipalities.

In this system, municipalities continue to have the flexibility for deciding how they want to manage waste TVs and computer monitors, e.g., through the operation of a local or regional solid waste transfer station or recycling facility, or by contracting with a disposal facility to accept waste directly from their residents through curbside pick-up or individual delivery. Since the regulatory framework for managing CRTs at solid waste facilities is in place, no changes in these regulations are anticipated.

Both EPA and the State of Florida have produced estimates on the costs of collection, transportation and recycling of TVs and computer monitors[6] (see Appendix L).

[6] EPA cost estimates from 12/17/02 memo to NEPSI Stakeholders from Clare Lindsay, EPA and Lynn Knight, ERG. Collection costs based on data from the NERC survey and Minnesota reports; transportation costs based on information provided by the International Association of Electronics Recyclers; the recycling costs were based on data from the NERC survey, and collections in Minnesota, Massachusetts, and Maine. Florida projections are based on the going rates in Florida not including infrastructure and promotional costs.

Estimated collection costs range from 11 to 17 cents per pound including the cost of publicity, and transportation costs range from 3 to 7 cents per pound. The cost of recycling TVs is estimated to range from10 to 40 cents per pound, and the cost for monitors is estimated to range from 10 to 35 cents per pound. Combining these figures and converting to a per unit cost using an average weight of 50 pounds per TV and 30 pounds per monitor results in overall costs ranging from $12.00 to $32.00 per TV and $8.40 to $17.70 per monitor. These estimates are based on data from actual collection programs. These data do not clearly break out transportation costs from collection to consolidation vs. transportation costs from consolidation to recycling. The sources of these data also noted an expectation that the actual costs of recycling will decrease as greater quantities of CRTs are collected and additional markets for recycled materials develop.

To date, the actual costs of transportation from collection sites through consolidation and recycling in Maine currently range from $0.20 per pound to $0.40 per pound ($10 - $20 per TV and $6 - $12 per monitor) based on utilizing dismantlers/recyclers that adhere to basic environmental management standards. The actual cost varies mostly due to transportation distance.

As part of this system, retailers have a new, albeit temporary, responsibility for collecting the ARF on televisions and remitting receipts to the State. Retailers can be reimbursed for the expense of implementing this new financial responsibility by being allowed to retain a small percentage of receipts (i.e., 3%).

The proposed system assigns the costs of handling by the consolidation centers, transportation from consolidation to recycling, and recycling to the manufacturers, with the temporary ARF funding these expenses for the television manufacturers until 2012. Using these data as a basis to project the amount of funding needed to pay for the recycling of TVs and orphan computer monitors plus additional municipal, state, and retail expenses, it is estimated that the ARF must generate approximately $900,000 annually. This translates into an ARF of $6.00 per unit (see Appendix L for the calculations on which these figures are based).

B. Existing Resources

1, Collection infrastructure

Currently, Maine has committed $396,000 to the development of infrastructure for the initial collection and storage of CRTs at municipal waste management facilities. Some local jurisdictions have also invested local tax dollars to develop additional collection and storage. The map "Electronics Collection Facilities" on page 15 shows the location of these current and planned municipal CRT collection sites. The population served by these local waste management facilities is determined at the local level, with regional associations given preference for receipt of state funding for infrastructure development. These existing and planned facilities will serve approximately 41% of Maine's population. Also, the State Planning Office is currently soliciting proposals from

municipalities to construct and operate permanent, regional household hazardous waste collection facilities that can also serve as CRT collection locations for a significant portion of Maine's population that is not served by more local collection sites. If there is not both a municipality in southern Maine and a municipality in eastern Maine willing to own and operate a HHW collection center open to all Maine residents, then the State may need to consider whether it needs to provide regionally-located CRT collection centers to its citizens.

Some manufacturers offer collection and recycling services to consumers as an incentive for new purchasing or at a fee. Retailers have also participated in some pilot projects to collect waste electronics at their retail facilities; this is usually done as an incentive to purchase new products carried by the retailer. These types of manufacturer and retailer programs can act as a supplement to the collection system established by the State and local governments.

2. Transportation and consolidation services

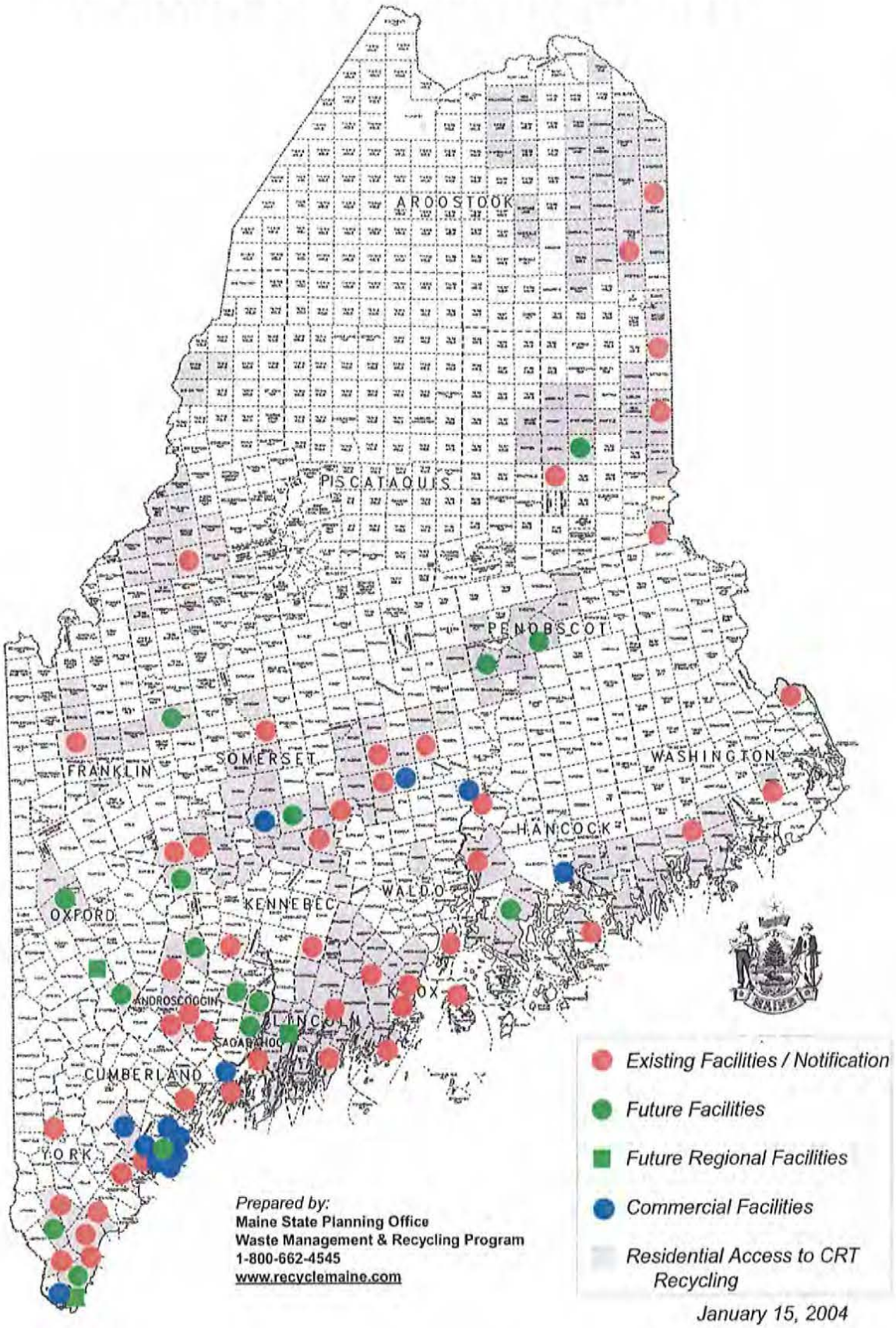
In response to the implementation of Maine's Universal Waste Rule requirements, several private enterprises entered into the business of providing transportation and/or consolidation services for CRTs to businesses in Maine. The private businesses that currently provide transportation and/or consolidation services in Maine are listed in Appendix M. Consolidation facilities in Maine are also noted on Figure 1. These private sector businesses have adequate capacity to handle the collection and consolidation of the additional CRTs expected to enter the collection system as a result of implementing the disposal ban on household CRTs on January 1, 2006.

Since manufacturers and consumers (through the temporary ARF) will be responsible for the costs of handling and recycling the CRTs from receipt at the points of consolidation, consolidation facilities will have new responsibilities in this system. These include implementing a system for an accounting of waste CRTs by manufacturer, and adjusting billing procedures to invoice the manufacturers and the State rather than the municipalities that deliver the wastes to the facilities. The consolidators may contract with the recycling/dismantling business(es) to whom they ship waste CRTs to provide the accounting by manufacturer. As recycling technologies evolve, some manufacturers may want to take possession of their own waste products at the point of consolidation; this system allows the flexibility to do that.

3. Dismantling/Recycling services

CRTs that are currently collected from businesses in Maine are dismantled/recycled primarily by private companies located in other states in the Northeast (see Appendix M). These dismantlers/recyclers currently have adequate capacity to handle the additional numbers of CRTs expected to enter the recycling system due to the January 1, 2006 disposal ban.

Electronics Collection Facilities



Prepared by:
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January 15, 2004

Key to Electronics Collection Facilities Map

Existing Central Accumulation Facilities / DEP Notification

- Auburn
- Bar Harbor
- Brewer
- Bristol Region
- Bucksport Region
- Calais
- Central Penobscot Region, Corinth
- Clinton Region
- Farmington
- Harpswell
- Islesboro
- Jackman Region
- Kennebec Valley Region, Bingham
- Kennebunk
- Limerick
- Lisbon
- Lewiston
- Marion Twp.
- Mid Coast Region, Rockport
- Mid Maine Region, Corinna
- Monticello
- Newport
- Nobleboro/Jefferson Region
- North Haven
- Ogunquit
- Pittsfield Region
- Pleasant River Region, Columbia Falls
- Presque Isle Region
- Rangeley
- Rockland
- Saco
- Saint George
- Sanford
- Scarborough
- Sherman
- South Berwick
- Southern Aroostook Region, Houlton
- Tri Community Region, Fort Fairfield
- Tri County Region, Union
- Turner
- Wells
- Weston
- Wilton
- Windsor
- Winthrop
- Yarmouth

Future Central Accumulation Facilities

- Bath
- Bethel Region
- Blue Hill Region
- Bowdoinham
- Carrabassett Valley
- Howland
- Jay
- Leeds
- Lincoln
- Litchfield
- North Berwick
- Northern Katahdin Region, Island Falls
- Oxford
- Richmond
- Skowhegan
- South Portland
- York

Future Consolidation Facilities

- Kittery
- Lincoln County Recycling, Wiscasset
- Oxford County Recycling, Norway

Commercial Facilities (* = residents can drop-off individual units)

- Clean Harbors - South Portland
- Crossroads – Norridgewock*
- Enpro Services – South Portland
- EnviRon Services – Gorham & Hancock*
- Environmental Management Inc. – Brunswick
- Fleet Environmental - South Portland
- J&J Sales – Kittery
- Maine LabPack, Inc. - South Portland
- Nova Recycling – Stetson
- Troiano Waste Services – Portland
- Wesco Distribution – Bangor & Portland

4. Fund management

The draft legislation proposes to establish an electronic waste recycling account within the Solid Waste Management Fund. The State Planning Office (SPO) Recycling Program is responsible for reporting to the Legislature on waste management in Maine and for managing grants to municipalities for the development of recycling infrastructure. In the draft legislation, SPO is designated to manage this account, including payments to consolidators for recycling computer monitors and televisions, as well as assessing the adequacy of the ARF and increasing/decreasing the ARF amount as appropriate.

C. Additional Resources Needed

The additional resources that are needed to implement the collection and recycling of CRTs from households in Maine include: additional collection locations to serve the population not served by the existing and planned municipal collection infrastructure, and staff resources within the DEP to oversee compliance activities as needed. There is also a need for funding local costs of collection and transportation to consolidation.

VI. Performance Standards

There are several different types of performance standards to consider when establishing an electronics products recycling program. Performance standards on recycling rates set goals for the amount of material collected and recycled, i.e., the percent of the waste stream to be diverted from disposal to recycling. This can be described as the rate of recovery and the rate of component, material and substance reuse and recycling. For example, the European Union has set goals of 75% rate of recovery and 65% component, material and substance reuse and recycling by December 31, 2006[7] for waste electronics.

A second type of performance standard is the environmental management standard that operators within the recycling chain are required to meet. Other performance standards include toxics use reduction standards in the manufacture of products, treatment standards, labeling standards, export standards, and labor standards.

A. Rate of Recovery and Recycling Rate Goals

Since Maine has banned the disposal of CRTs as of January 1, 2006, the State's de facto rate of recovery goal is 100% of waste CRTs captured in the collection and recycling system. To approach this maximum capture rate, the collection and recycling system needs to be available at low or no cost to consumers at the point of collection, and consumers must be motivated to bring their waste CRTs to collection locations.

[7] Directive of the European Parliament and the Council of 27 January 2003 on Waste Electrical and Electronic Equipment

There must be a strong educational component as part of any collection and recycling system to inform the consumer of the benefits of delivering waste CRTs into the system.

When measuring the rate of recovery, the number of units projected to be available for collection will be estimated based on the number of units predicted to become waste annually. It is important to measure the actual number of CRTs collected to evaluate the accuracy of assumptions used to project waste amounts.

A second measure of the recycling rate is the percentage of the waste stream actually reused and recycled. Currently, approximately 15% of the CRT waste stream is diverted for reuse[8]. From the remaining 85%, materials recovered for recycling include reusable parts, metals, glass, and plastics. Processes for improving the recyclability of these waste streams and markets for these recycled materials are constantly evolving. Any materials recycling goal that may be set by the State should be periodically re-evaluated and revised to reflect new developments in recycling of electronic wastes.

B. Environmental Management Standards

To ensure that the collection and recycling of CRTs achieves the overarching goal of protecting the public health and the environment, the system must ensure that the CRT waste materials are handled in accordance with standards that prevent the release of contaminants throughout the entire custody chain, from collection to final processing and materials disposition. Collection centers and consolidators of CRTs in Maine are currently subject to solid and/or hazardous waste regulations with universal waste handling standards that have been tailored to the activity to be protective without being overly-burdensome. At this time there are no CRT dismantlers or recyclers in Maine; such enterprises would be subject to Maine's Hazardous Waste Management Regulations, which provide environmental performance standards for those activities.

To ensure that CRT waste materials are handled in a manner that is protective of public health and the environment, Maine can require that collection centers and consolidation facilities that receive financial assistance or reimbursement from the state ship waste CRTs only to dismantlers/recyclers that meet certain standards. Possible standards include the ability to demonstrate compliance with: local and federal labor and environmental laws that are at least as protective as Maine law, the "Guidelines for Environmentally Sound Management of Used and Scrap Personal Computers"[9] published by the Organisation of Economic Cooperation and Development (OECD), or an independent certification process such as ISO 14,000 or equivalent.

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[8] 15% figure provided by Dick Peloquin, Electronicycle, an electronics recycling/dismantong business in Massachusetts.

[9] Organisation of Economic Cooperation and Development, Paris, 9 August 2001.

C. Other Performance Standards

1. Toxics Use Reduction, Treatment and Labeling Standards

The European Union (EU) has provided some groundwork for establishing toxic use reduction and treatment standards in its February 2003 Directive on the Restriction on the Use of Certain Hazardous Substances in Electrical and Electronic Equipment. Based on an assessment of the available scientific and technical information, this directive requires producers to eliminate three brominated flame retardants (BFRs), [polybrominated biphenyls (PBBs), penta diphenyl ethers (penta-BDEs or PDBEs), and octa diphenyl ethers (octaBDEs)] from electronics products put on the market as of July 1, 2006. These BFRs are endocrine disrupters that mimic hormones and disrupt normal cell functioning and development. They are also persistent bioaccumulative toxics in the environment. This EU directive also establishes a process for evaluating other BFRs to determine if the EU will ban their use in electrical and electronic products as well. Additional evidence available since the adoption of this directive by the EU indicates that deca-BDE debrominates into penta- and octa-BDEs[10], and thus will likely be banned in electrical and electronic products by the EU. Several leading electronics companies have already implemented a PBDE-free manufacturing policy, including Apple, Intel, Sony, Motorola, Dell, HP and Ericcson, and China has banned the use of deca-BDE. In recently passed legislation, the State of California has followed the EU's lead by banning the sale in California of electronics products that are banned for sale in the EU because they are manufactured with certain heavy metals and BFRs[11]. Some manufacturers are replacing PBDEs with Tetrabromobisphenol-A (TBBPA) and Hexabromocyclododecane (HBCD), however emerging research provides some indication that TBBPA and HBCD may also be endocrine disrupters[12].

In February 2003, the EU also passed a Directive on Waste Electrical and Electronic Equipment (WEEE) requiring manufacturers to provide for the recycling of waste electronics. This directive also specifies treatment standards for WEEE, including removal of CRTs, and the removal of the fluorescent coating from CRTs. It also requires producers to provide reuse and recycling information for each type of new EEE put on the market and to identify the location of dangerous substances and preparations in the EEE. Additionally, the Directive requires producers of EEE placed on the market in the EU after August 13, 2005, to be clearly identifiable by a mark on the product. These measures are designed to facilitate the reuse and environmentally sound treatment of WEEE.

2. Export and Labor Standards

In February 2002, the Basal Action Network (BAN) and Silicon Valley Toxics Coalition (SVTC) published the report "Exporting Harm: the High-Tech Trashing of Asia". This report describes the economics of a "recycling" system that provides greater profit to

[10] September 15, 2003 memo from Steve Gurney, EHSC to Maine LD 743 Stakeholder Group
[11] California Senate Bill 20, Chaptered September 25, 2003
[12] September 15, 2003 memo from Steve Gurney, EHSC to Maine LD 743 Stakeholder Group

those who export e-waste to Asia where the lack of worker protection and environmental laws and/or the lack of enforcement of such laws result in the exposure of workers (including children) to toxic levels of lead, beryllium, mercury, cadmium, phosphor, dioxins and BFRs. Unregulated e-waste recycling and disposal operations release significant amounts of these contaminants to the environment through such practices as open burning of plastic waste, river dumping of acids and uncontrolled dumping of process residues.

To help protect the health of workers and prevent environmental contamination from recycling of e-waste in developing countries, BAN and SVTC propose a ban on the export of e-waste along with the more long-term solution of eliminating toxics in the manufacture of toxics. The EU Directive on WEEE promotes the use of "best available treatment, recovery, and recycling techniques" to provide protection of human health and the environment, with Member States responsible for ensuring inspection and monitoring infrastructure to verify compliance. It also requires the exporter of WEEE to prove that the recovery, reuse and/or recycling operation took place under conditions that are equivalent to the requirements of the WEEE Directive. In 1994, the Basel Convention, an international treaty, was amended to include a total ban on the export of hazardous wastes from rich countries to poor countries for any reason, including recycling. The U.S. is currently the only developed country in the world that has not ratified the Basel Convention, so there is no ban on the export of hazardous waste from the U.S. to other countries.

Finally, SVTC and BAN recommend prohibiting the use of prison labor in the dismantling of waste electronics. Prison labor is subsidized by taxpayers, making it difficult for the private sector to compete for the work, undermining the development of adequate recycling infrastructure, and externalizing from the producers the real costs for properly managing e-wastes.

VII. Summary of Steps Needed to Implement an Effective CRT Collection and Recycling System in Maine

1. Establish a shared responsibilities collection and recycling system for televisions, computer monitors, CPUs, and CRTs with screens greater than 4" (draft legislation Appendix J). This system will include:

    - consumer responsibility for transporting waste TVs and computer monitors to local collection points (usually at existing municipal transfer stations and recycling facilities);
    - consumer/municipal responsibility for collection and transportation of waste TVs and computer monitors to a nearby point of consolidation in Maine;
    - private sector responsibility for operating consolidation centers, tracking the number of waste TVs and computer monitors by manufacturer, and billing manufacturers and the State for their operational and recycling costs related to waste TVs and computer monitors;

- State responsibility for ensuring municipal transportation expenditures do not exceed current costs for shipping and disposal of waste TVs and computer monitors as part of MSW;
- State responsibility for orphan computer monitors from receipt at the point of consolidation until January 1, 2012;
- individual manufacturer responsibility for computer monitors (including flat panel displays and laptops) at the point of consolidation beginning on January 1, 2006;
- a $6.00 ARF on each television sold in Maine from January 1, 2005 until January 1, 2012, managed by the State to pay the costs of recycling TVs and orphan computer monitors from the point of consolidation; the amount of the ARF shall be adjusted as needed to cover program costs, but may not exceed $10.00;
- retailer responsibility for collecting and forwarding ARF monies to the State for a limited time period;
- individual manufacturer responsibility for televisions at the point of consolidation beginning January 1, 2012;
- collective manufacturer responsibility for orphan TVs and orphan computer monitors beginning January 1, 2012;
- manufacturer responsibility for reporting to the State approximate annual sales in Maine and their progress on collection and recycling of covered electronics;
- State responsibility for oversight of legal requirements and for establishing, evaluating, and revising collection and recycling rate goals for Maine;
- manufacturer responsibility for labeling product with clear manufacturer ID; and
- a prohibition on sales of covered electronics by any manufacturer not in compliance with their responsibilities under this legislation.

2. Develop additional local collection infrastructure, including facilities accessible to all state residents. This includes continued work to establish two permanent household hazardous waste collection centers that can accept CRTs from all Maine residents.

3. Develop oversight procedures for ensuring compliance with manufacturer responsibilities.

VIII. Relevant Environmental Considerations for a State Collection and Recycling System

The following are additional actions to be taken by the State to ensure that funds expended by the State for CRT management and electronics purchasing support environmentally sound practices:

1. Develop environmentally sound management (ESM) contract specifications for consolidators and dismantlers that receive payment from the State of Maine for handling and recycling CRTs and other electronic wastes.

2. Establish purchasing guidelines for the State of Maine that prohibit the purchase of electronics made with polybrominated biphenyls (PBBs), penta diphenyl ethers (pentaBDEs), and octa diphenyl ethers (octaBDEs), and that phase out the purchase of products made with tetrabromobisphenol-A (TBBPA) and hexabromocyclododecane (HBCD).

Appendices

Appendix A

LD 743 - "An Act to Develop a Plan for Cathode Ray Tube Disposal"

Sec. 1. 38 MRSA §1306, sub-§4 is enacted to read:

4. Cathode ray tube disposal. After January 1, 2006, a person may not dispose of a cathode ray tube in a solid waste disposal facility. This subsection may not be construed to affect existing laws, rules or regulations governing disposal of cathode ray tubes in effect prior to January 1, 2006.

Sec. 2. Stakeholder group established. The Department of Environmental Protection shall convene a stakeholder group to assist the department in developing a recommended plan for the collection and recycling of cathode ray tubes, referred to in this section as "CRTs." The plan must utilize the concept of shared responsibility among manufacturers, distributors, retailers, consumers and other parties. The stakeholder group must be convened no later than 30 days after the effective date of this Act.

1. Membership. The stakeholder group must include representation from an environmental advocacy organization; the electronic manufacturing industry; a recycling or consolidation business; the Executive Department, State Planning Office; a statewide municipal association; a solid waste disposal business; and other interested parties that may have a role in the collection and recycling plan.

2. Duties. The Department of Environmental Protection, with the assistance of the stakeholder group, shall:

A. Identify products that contain CRTs; track the distribution of these products among consumer groups, including households, small businesses and industry; and determine the number of CRTs that are currently available for collection;

B. Identify existing resources for the collection and recycling of CRTs and recommend ways to expand in-state resources for the collection and recycling of CRTs;

C. Review the various types and sizes of CRTs in order to recommend which CRTs should be included in a collection and recycling program;

D. Review alternative disposal practices, including the practice of disposal in lined solid waste landfills or incineration and the practice of collection, recycling and final disposal; and

E. Estimate the cost of collection and recycling of CRTs and recommend a plan for how the costs should be paid, including the costs of collecting orphaned and historic waste. The payment plan must address shared responsibility among manufacturers, distributors, retailers, consumers and other parties.

3. Report. The Department of Environmental Protection shall submit to the Joint Standing Committee on Natural Resources no later than January 30, 2004 a recommended plan, including any legislation necessary to implement the plan, for the collection and recycling of CRTs that utilizes shared responsibility among manufacturers, distributors, retailers, consumers and other parties. The Joint Standing Committee on Natural Resources may report out legislation concerning the collection and recycling of CRTs during the Second Regular Session of the 121st Legislature.'

Appendix B

LD 743 Stakeholder Group

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Appendix C
Maine State Planning Office
Survey of municipalities collecting and recycling CRTs
August 2003

A phone survey was conducted in the summer of 2003 of all communities believed to be collecting and recycling CRTs. The survey was updated with new information and additional communities on January 15th, 2004. The communities were selected based on grants awarded by the State Planning Office for the collection of electronics. All Maine communities are also required to report their waste/recycling activities to the State Planning Office annually. Communities that included CRT recycling in their 2002 report were also included.

- 64 recycling programs were singled out and contacted for the survey.
- 37 recycling programs said they are actively collecting and recycling CRTs
- 27 recycling programs said they are not yet collecting and recycling CRTs

Survey Question:

1. Is your community actively collecting and recycling televisions and computer monitors?

   Yes No

Electronics Update (1-15-2004)		
Program	**2000 Census**	**operational as of January 2004?**
Auburn	23,203	no
Bar Harbor	2,680	yes
Bath	9,266	no
Bethel Region	3,003	no
Blue Hill Region	6,605	no
Bowdoinham	2,612	no
Brewer	8,987	yes
Bristol Region	3,541	yes
Bucksport Region	7,750	no
Calais	3,447	yes
Carrabassett Valley	399	no
Central Penobscot Region, Corinth	4,675	yes
Clinton Region	16,517	yes
Farmington	4,098	yes
Harpswell	5,239	yes

Howland	1,362	no
Islesboro	603	yes
Jackman Region	1,329	yes
Kennebec Valley Region, Bingham	4,727	yes
Kennebunk	10,476	yes
Kittery	9,543	no
Limerick	2,240	Yes
Lisbon	9,077	yes
Leeds	2,001	no
Lewiston	35,690	yes
Lincoln	5,221	no
Lincoln County (except Bristol Region)	29,507	no
Marion Twp.	6,946	no
Mid Coast Region, Rockport	11,815	yes
Mid Maine Region, Corinna	9,812	Yes
Monticello	790	yes
Newport	3,017	yes
Nobleboro/Jefferson Region	8,585	yes
North Berwick	4,293	no
North Haven	381	no
Northern Katahdin Valley Region	4,395	no
Ogunquit	1,226	yes
Oxford	3,960	no
Oxford County Region	25,166	no
Pittsfield Region	14,157	yes
Pleasant River Region, Columbia Falls	8,475	yes
Presque Isle Region	14,736	yes
Rangley	1,052	yes
Richmond	3,298	no
Rockland	7,609	yes
Saco	16,822	yes
Saint George	2,580	yes
Sanford	20,806	yes
Scarborough	16,970	yes
Sherman	937	yes
Skowhegan	8,824	no
South Berwick	6,671	yes
South Portland	23,324	no
Southern Aroostook Region, Houlton (except Monticello)	10,354	yes
Tri Community Region, Fort Fairfield	23,491	yes
Tri County Region, Union	7,481	no
Turner	4,972	no
Wells	9,400	yes
Weston	203	no

Wilton	4,123	yes
Windsor	2,204	no
Winthrop	6,232	yes
Yarmouth	8,360	no
York	12,854	no
Infrastructure or Funding Available:	530,119	
Maine Population:		1,274,923

Currently Operating			
Population served (currently collecting)		312,196	24.5%
Population – unserved		962,727	75.5%
Operating and/or Grant Funds in Place			
Population - Infrastructure or Funding Available		530,119	41.6%
Population - Not Served and no Funding in Place		744,804	58.4%

Appendix D

Summary Information on Use of Commodities from CRT Recycling

CRT Recycling - from "The Monitor of Electronics Recycling Issues", Issue #1, Materials for the Future Foundation, San Francisco, September 2001

- Three types of commodities produced: metals, plastics, and glass.
- Very small amounts of copper, nickel and steel can be recovered from CRTs.
- High-value plastic resins sold to domestic markets include: high-impact polystyrene (HIPS), acrylonitrile-butadiene styrene (ABS) and polycarbonates (PC).
- MBA Technologies in CA has process to recycle, but most plastics exported to international markets.
- The market value of resulting commodities does not cover all costs involved with CRT recycling (collection, packaging, transportation, dismantling and processing). 2001 value of CRT glass cullet averaged $180/ton, processing CRT glass alone cost $100/ton.

Glass-to-Glass Recycling (From "The Monitor...")

- Closed loop recycling process of reclaiming leaded CRT glass to make new CRT glass.
- Steps include: remove CRT from monitor or TV; remove all non-glass material from exterior of CRT; release the vacuum; crush CRT and separate any remaining metals from glass; and remove phosphorescent coatings and prepare uniform cullet.
- US Glass-to-Glass Recyclers include:
  - NxtCycle (a division of National Environmental Waste) processing facilities in Phoenix & Utah. Dismantled by Utah prison inmates. Some components shredded and landfilled as residual fluff. All ABS and HIPS plastic housing is recycled domestically; CRT glass sent to Envirocycle for processing.
  - Dlubak Glass in Sandusky, Ohio. CRTs demanufactured by US Federal Prison industries (UNICOR).
  - Envirocycle in Hallstead, PA and Stowe, Ohio, culled for resale, dismantled "in house"

Glass-to-Lead Recycling

- CRT glass used as a fluxing agent in the smelting process (a less-expensive, direct replacement for silica)
- Noranda (copper smelter in Quebec, Canada and lead smelter in New Brunswick, Canada); Doe Run (lead smelter in Missouri).

Plastics recycling

"Recycling Infrastructure for Engineering Thermoplastic: A Supply Chain Analysis" Dillon, Patricia S., The Gordon Institute at Tufts Univeristy for USEPA, May 1999

- Six major plastics resins in electronics include:
  - Acrylonitrile butadiene styrene (ABS),

- polycarbonate (PC),
- ABS/PC blends,
- high-impact polystyrene (HIPS),
- polyvinylchloride (PVC), and
- polyphenylene oxide (PPO)

- Technology no longer major obstacle to plastics recycling.
- Original electronics Manufacturers (OEMs) need assurance of adequate volumes of consistent, quality supply of recycled plastics.

Some plastics may contain chlorine and bromine compounds (flame retardants). When shredded or heated, measures must be taken to protect human health and the environment. (OECD "guidelines for the ESM of Used and Scrap Personal Computers" August 2001)

Appendix E

USGS Fact Sheet on Computer Recycling

USGS
science for a changing world

Obsolete Computers, "Gold Mine," or High-Tech Trash? Resource Recovery from Recycling

Introduction

Obsolete computers contain significant amounts of recoverable materials including metals from wires and circuit boards, glass from monitors, and plastics from casings (fig. 1). For example, 1 metric ton (t) of electronic scrap from personal computers (PC's) contains more gold than that recovered from 17 t of gold ore.[1] In 1998, the amount of gold recovered from electronic scrap in the United States was equivalent to that recovered from more than 2 million metric tons (Mt) of gold ore and waste.[2]

The amount of computer waste increases annually as electronic systems play an increasingly important role in all aspects of technology, but significant amounts of material used in the devices are not recovered. Because microchip development is so rapid (Hamilton and Takahashi, 1996), users are able, every 18 months, to purchase computers that are twice as powerful at the same price as those currently available (Jung, 1999). This cyclic trend (with its inherent surplus of old computer components) has been sustained for nearly 20 years of recent computer history. To meet consumer demand, the computer and electronics industry has become the largest manufacturing employer in the United States, representing 11 percent of the gross domestic product and growing at an annual rate of 4 percent (Porter, 1998).

The quantities and types of materials used in computer products to meet this demand are great and varied, as is the potential to recover these computers and their materials for reuse, remanufacturing, and recycling. In 1998, nearly 43 million new PC's and notebook computers were purchased by consumers in the United States; and it is estimated that in the year 2003, nearly 70 million computers will be purchased by consumers in the United States (National Safety Council, 1999).

In 1997, it was estimated that between 1985 and 2005, approximately 325 million PC's would become obsolete in the United States (Jung, 1999). In a business environment, the useful life of a PC is about 2 years, while in homes PC's are used from 3 to 5 years (Jung, 1999). Between 14 and 20 million PC's become obsolete every year in the United States. About 75 percent of these obsolete computers are not discarded because their owners perceive them to be valuable (Goodrich, 1999); a portion of these will not be recycled. For every three computers purchased in the United States, two will be taken out of service, and this ratio is expected to increase to 1:1 by 2005. It is projected that by 2005, a total of 680 million PC's will have been sold worldwide. Of that total, it is estimated that 150 million computers will be recycled that year and 55 million computers will end up in landfills along with unreclaimed portions of the 150 million recycled computers (Hamilton and Takahashi, 1996).

Figure 1. Circuit boards are sought after by recyclers for their metals content, especially gold and silver. Photograph courtesy of Melissa Goodrich, Recycling Today.

Recycling Flow

Figure 2 is a generalized materials flow diagram that shows what happens to obsolete PC's and their components.

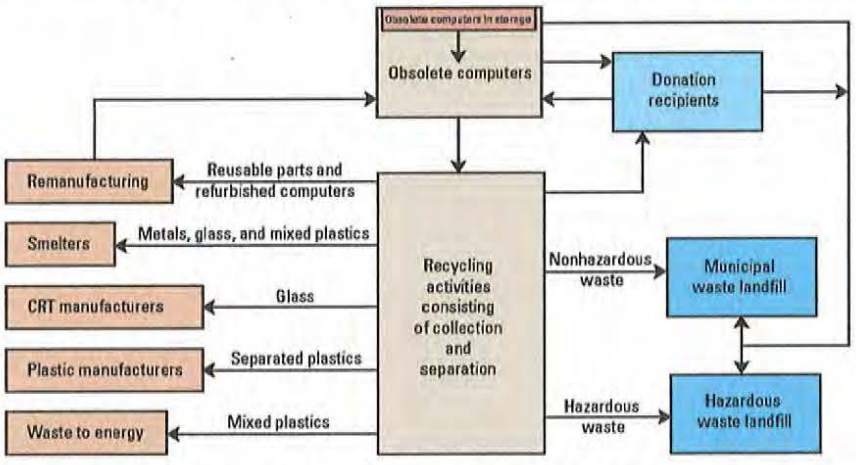

Figure 2. A generalized materials flow diagram illustrating what happens to obsolete PC's and their components.

[1] Based on 1 troy ounce of gold recovered for every 3 t of electronic scrap (10.4 grams per metric ton (g/t)) and an average gold ore feed grade of 0.9 g/t for a typical gold openpit cyanide leaching operation in Nevada with an overall 67 percent gold recovery.

[2] Based on a 2.7:1 waste-to-ore ratio.

This figure includes
- computers that owners retain (but do not use) or donate or dispose of directly or indirectly to municipal waste and hazardous waste landfills (The U.S. Environmental Protection Agency (EPA) categorizes cathode ray tubes (CRT's) as hazardous waste, although exemptions exist for disposal of equipment generated by households and small business.);
- computers that can be refurbished and sold or donated by companies or organizations; and
- what happens to computers that can be dismantled and sold for reuse, melted and recycled, incinerated as a fuel for producing energy, and disposed of in landfills.

Computers and other electronic devices represent a large resource of potentially recoverable material. Table 1 lists selected types and amounts of material reportedly recovered in 1997 and 1998 from computer and other electronic scrap. In 1998, about 2.6 million PC's and notebook computers were recycled in the United States, and this number is expected to quadruple by 2003 (National Safety Council, 1999). Recyclers received nearly 50 percent of electronic products directly from manufacturers; about 30 percent from large companies that utilize electronics in their business; and the rest from small companies, government offices, and individuals (National Safety Council, 1999).

Some scrap is unwanted because of low precious metal content and the potentially hazardous nature of some of its materials. For example, the presence of lead in some electronic scrap prevents it from being placed in a municipal landfill. Some refiners actually have to charge as much as $1 per pound to process the scrap because of these deleterious materials (Broughton, 1996).

Some scrap was exported to Taiwan for open burning and chemical processing; however, the Taiwanese government had reportedly become increasingly concerned about the environmental damage caused by this practice (Broughton, 1996). Chinese and other Asian consumers pay 15 to 20 cents per pound for electronic scrap on the U.S. West Coast (Goodrich, 1999). Environmental regulations are less strict (or not enforced), and labor costs are much lower in some of these countries.

Table 1.—Reported material recovered by electronics recyclers in the United States.
[In thousands of metric tons. Modified from National Safety Council (1999) and Sean Magaan (Noranda, Inc., Micro Metallics Corp., oral commun., 1999)]

Type of material	1997	1998
Glass	11.6	13.2
Plastic	3.7	6.5
Metals		
Aluminum	3.9	4.5
Steel	14.5	19.9
Copper	4.3	4.6
Combined precious metals (gold, palladium, platinum, and silver)	0.001	0.001
Other	3.1	3.6
Total	41.1	52.3

Metals

The metals contained in PC's commonly include aluminum, **antimony**, **arsenic**, barium, beryllium, **cadmium**, **chromium**, **cobalt**, copper, gallium, gold, iron, **lead**, manganese, **mercury**, palladium, platinum, **selenium**, silver, and zinc. Eight of these metals (shown in bolded type) are listed as hazardous by the Resource Conservation and Recovery Act (RCRA), one of the Federal laws that control the disposition of waste in the United States. This law prohibits companies from incinerating some types of electronic scrap or disposing of it into municipal landfills.

Historically, recovering precious metals from electronic scrap has been one of the greatest economic incentives for the electronics recycling industry. However, in an effort to cut costs, manufacturers have gradually reduced the precious metal content in electronic products, and this trend is likely to continue (Porter, 1998). Information on the specific amounts of individual precious metals (gold, silver, and the platinum group metals) recovered is unavailable, but as much as one-third of the precious metals recovered from scrap may be gold (Sean Magaan, Noranda, Inc., Micro Metallics Corp., oral commun., 1999). The value of the 1 t of precious metals recovered from electronic scrap in the United States in 1998 (table 1) probably exceeded $3.6 million. This value was obtained by assuming that the precious metals recovered consisted of 60 percent silver and 40 percent gold, palladium, and platinum. The average price used to calculate the value was $5.10 per troy ounce of silver and an average of $300 per troy ounce of gold, palladium, and platinum. Several U.S. companies reported producing more than 1,500 troy ounces per year of precious metals from electronic scrap (Dawn Amore, National Recycling Coalition, oral commun., 1999).

Circuit boards and batteries contain most of the heavy metals, and circuit boards contain the highest precious metal values. One metric ton of circuit boards can contain between 80 and 1,500 g of gold and between 160 and 210 kg of copper (Veldhuizen and Sippel, 1994). This is 40 to 800 times the concentration of gold contained in gold ore mined in the United States and 30 to 40 times the concentration of copper contained in copper ore mined in the United States. Gold in an obsolete computer has little or no value. Like ore, it must be collected, concentrated, and refined in order to acquire a high value.

The United States and foreign mineral processing companies use electronic scrap from computer circuit boards for two reasons: (1) it has a high precious metal content and (2) it contains much lower levels of deleterious elements common to ores, such as arsenic, mercury, and, especially, sulfur. These elements can contribute potentially harmful atmospheric emissions (Rob Bouma, Noranda, Inc., oral commun., 2000) and could result in additional costs for recovery and disposal. Military electronic scrap, mostly computer circuit boards, received from the former Soviet Union (Nadeau, 1999) are especially sought for recycling because of their comparatively high precious metal content. The scrap can contain 10 times the amount of precious metals than mined ores and significantly higher amounts of precious metals as electronic components produced elsewhere.

In the mid-1980's, one of the world's largest mining companies, Noranda, Inc. (Noranda) of Canada, investigated ways to make their smelters more profitable. Feasibility studies and testing determined that "mining" computer and other electronic scrap would bring a welcome supplement of copper and precious metals to their smelters. Noranda's findings indicated that the concentration of some metals in average computer and other electronic scrap may be more than twice that found in ores.

So in 1984, Noranda began processing small amounts of scrap (Reid, 1999) and, by 1999, was the largest electronics recycling plant in North America, receiving more than 50,000 t/yr of electronic scrap from 300 to 400 suppliers in 18 countries (Nadeau, 1999; Reid, 1999). Recyclable materials are considered to be an important feed for Noranda's smelters, as essential as ore concentrates are to the operation's profitability (Rob Bouma, Noranda, Inc.,

written and oral commun., 1999). In order to treat electronic scrap more efficiently, a subsidiary of Noranda in California entered into an agreement with the Hewlett-Packard Company. Hewlett-Packard provides approximately 1,400 t of obsolete PC's and other computer-related electronic scrap to Noranda for recycling on a monthly basis (Reid, 1999). After the computers are dismantled and the components are separated and tested, the useable components are sold, and the shredded metals are separated to be sold as scrap or transported to Noranda's smelters in Canada. Hewlett-Packard pays Noranda for this service and, in return, is assured that components with toxic materials are treated legally, thus avoiding potential liability (Reid, 1999). Hewlett-Packard reuses or recycles nearly 1,600 t or 99 percent by weight of materials received from its customers and company operations.

Major electronic companies also recycle. IBM operates ten materials recovery plants around the world. In 1997, these operations processed more than 62,000 t of manufacturing scrap equipment, obsolete IBM machines, and customer-returned equipment. More than 90 percent was recycled and less than 5 percent was sent to landfills (Amore, 1999).

Plastics

Plastics derived from computer casings can be reused to house different electronic devices, melted down for use as raw materials for new products, or used as fuel. More than 6,500 t of plastic were reportedly recovered from U.S. electronics recyclers in 1998, an increase of nearly 25 percent over 1997 (National Safety Council, 1999). When used as a fuel for cement kilns in the smelting process, 1 t of plastic can replace nearly 1.3 t of coal (National Safety Council, 1999). The plastic components are consumed at a very high temperature and when mixed with oxygen-enriched air aids the combustion process. Using plastic in this way conserves space in landfills and decreases the use of coal. However, truly effective recycling of plastics from computers is hampered by two things: the variety of plastics used and a lack of labeling. Mixtures of recovered plastic have little value; however, if the plastics are cleaned and separated, prices can range from $265/t for flaked polypropylene to $900/t for pelletized ABS (acrylonitrile-butadiene-styrene).

Glass

Glass, primarily from cathode ray tube (CRT) monitors, represented about 25 percent of the total weight of material produced by electronics recyclers in 1998, or about 13,200 t (National Safety Council, 1999). Because of its lead content, glass is classified as hazardous waste, and it must be handled, processed, and disposed of in a manner consistent with federally mandated guidelines.

Figure 3. Obsolete computers and monitors, which could be donated, recycled, or remanufactured, accumulate in office storerooms.

In 1998, nearly 1.8 million monitors were collected in the United States for recycling or remanufacturing (fig. 3), about 60 percent of which were exported for this purpose (National Safety Council, 1999). Broken glass from monitors is purchased by several companies for the production of new CRT's. Noranda recycles more than 1,000 t of monitors, CRT's, and broken glass from CRT's per year (Rob Bouma, Noranda, Inc., oral commun., 1999). Whole monitors are fed to the company's copper smelter in Quebec. These monitors may contain between 4 and 7 percent copper, between 5 and 10 percent lead, approximately 30 percent silica (the chief component of the glass in CRT's), in addition to other material (primarily plastic from the plastic casings).

CRT's also are recycled. They have between 10 and 13 percent copper, between 15 and 20 percent lead, and between 50 and 60 percent silica. The copper is recovered and converted into a saleable metal at Noranda's metallurgical facilities in Quebec. The silica contained in the glass CRT's has value because silica is required as a fluxing agent in the metals separation process. The silica ultimately combines with slag, an iron-silicate waste product. The lead in the glass is not currently recovered and also is contained in the slag. Because the slag is highly inert and stable, it does not leach lead (Rob Bouma, Noranda, Inc., oral commun., 2000). The silica recovered from the glass CRT's replaces purchases of equivalent amounts of silica.

Clean CRT glass (crushed/broken with the steel and plastic removed) is sent to Noranda's lead smelter in New Brunswick. The facility treats about 200,000 t of lead ore concentrates annually. A large percentage of the lead contained in the glass is recovered, and the silica is consumed in the process as a fluxing agent (Rob Bouma, Noranda, Inc., oral commun., 1999).

In Canada, if the monitors or CRT's are shredded or broken, they are classified as hazardous waste. As such, this material must have formal import approval from the Canadian Government and must be shipped under a Canadian Federal waste manifest.

Although there is value contained in the monitors and CRT's, the handling costs require Noranda to charge a net fee for recycling the materials. The fee depends on a number of factors, including the form of the material (whether whole monitors, CRT's with or without copper yokes attached, shredded or unshredded, steel removed, and so on), the type of packaging, the mode of delivery, and the lot size. The fee is normally several hundred dollars per metric ton. In 1998, approximately 100,000 monitors were shipped to smelters in the United States (National Safety Council, 1999). Over the next decade in the United States, the amount of glass may decrease and the amount and types of other materials recovered from monitors will change as displays using liquid crystal technologies gain popularity.

Barriers and Opportunities

In the United States, between 14 and 20 million PC's become obsolete every year. About 75 percent of these obsolete computers are not discarded because their owners perceive them to be valuable (Goodrich, 1999). Eventually, most of these computers will end up in municipal landfills because consumers don't know how best to dispose of them. Currently, more than 10 million PC's, workstations, and mainframes are being added to landfills annually, exceeding 135,000 t of material. This potential supply is of great interest to recyclers.

Recycling (including reuse) reduces the need for new materials. Consequently, less energy is consumed, the amount of potentially toxic material destined for landfills is reduced, and there is less disruption to the environment. The reuse of components and refurbishment of computers lengthens their life spans and, when part of donation programs, provides inexpensive learning tools for students.

Currently, the most effective way to recycle computers is through manufacturers, such as Hewlett-Packard. Most businesses, however, must arrange to have their discarded computers handled by electronics recycling firms and (or) hazardous waste facilities. Computer monitors and other computer components, such as lithium batteries, are separated out by the electronics recycling businesses, are usually considered to be hazardous waste, and, as a result, cannot be placed in municipal landfills. Therefore, computer recyclers in the United States are typically classified as hazardous waste handlers. A number of hazardous waste regulations apply to computer recyclers, which significantly increase operating costs and the overall costs of recycling (Jung, 1999). Additionally, as PC technology continues to evolve, the amount of precious metals used in components is decreasing; as a result, computer parts are worth less. Processing scrap that has lower value coupled with increasing labor, plant, and regulatory costs could have a profound influence on the current structure of the electronics recycling industry, potentially resulting in decreased recycling.

On the other hand, recycling may increase as more and more people recognize the value of recycling. Picking up individual computers by recyclers is not economically practical because it's too expensive and participation is too low. However, centralized collection sites at electronic superstores and curbside pickup on specific dates have shown promise. Computer leasing programs also offer potential for increasing recycling and reuse rates. Other approaches under consideration include requiring returnable deposit fees when purchasing a new computer, take-back programs that require retailers or manufacturers to retain responsibility for end of use, and landfill bans.

Legislators, companies, governmental organizations, public interest groups, and universities have been working on ideas to reduce the amount of waste generated from obsolete computers and electronics and also increase rates of recycling. These ideas include improving the ability to upgrade—thereby extending the useful life of a computer—and improving the ability to efficiently dismantle and separate the various components. Examples could include consistent use of types of screws, labeling the plastics, and eliminating toxic materials wherever possible. The Environmental Health Center, a division of the National Safety Council, provides information on obsolete computers, including a list of recyclers. It is available from the World Wide Web at http://www.nsc.org/ehc/epr2/donate.htm

The Environmental Issues Council of the Electronic Industries Alliance has organized the Consumer Education Initiative to inform consumers about recycling and reuses of used electronics, including computers. An extensive list of recyclers, by State, is offered at their website. It is available from the World Wide Web at http://www.eiae.org/

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Appendix F

Projected Waste CRT Generation in Maine

The number of waste CRTs expected to enter a collection and recycling system can be projected based on either sales data or on actual collection results from other state programs. This appendix contains background information on Maine demographics and CRT product sales, and sample calculations that project amounts of waste CRTs that may be generated in Maine.

Background information for calculating product amounts in Maine:
Maine population: 1,286,670 (2000 Census estimate for 2001) = 0.5% U.S. population
U.S. population: 281,421, 906 (2000 Census); Number of Maine households: 518,200

Background information for estimating waste amounts:
Average weight of TVs = 50 pounds (National Safety Council 1999 report, and California & Massachusetts e-waste studies; same figure used by FL)
Average weight of monitors = 30 pounds (NSC report & CA Integrated Waste Management Board); 25 pounds – EIA/MA
Average lifespan of TVs: 15 –17 years [figure provided by major TV manufacturer, used by NEPSI and FL (15.8 years)]
Average lifespan of monitors:
4 years (Eastern Washington based on NSC baseline study and "a review of various industry web-based resources")
6-7 years (NSC total lifespan)

Product sales information
National Electronic Product Stewardship Initiative (NEPSI):
TVs = 30,000,000 national annual sales to households & small businesses
0.5% = 150,000 in Maine
44 million TVs, monitors, and laptops sold per year to households & small businesses: 0.5% = 220,000
220,000 – 150,000 = 70,000 monitors & laptops sold per year in Maine
Stanford Research, Inc. – 2000 U.S. sales of computer monitors, terminals & workstations = 28,400,000. Maine's share at 0.5% = 142,000 units; If 50% residential & small business, then 71,000 units.

Major TV manufacturer – 2000 U.S. sales of TVs = 24,148,000; ME's share = 120,740

Estimations of Waste CRTs in Maine based on product sales:

EPA:
Preliminary estimates - Units available to enter waste stream from households & small businesses (monitors based on IDC historic & forecast sales data; TVs based on historic sales data from manufacturer via NEPSI).

	TVs – national	TVs – Maine	Monitors – national	Monitors – Maine	**Total CRTs – Maine**
2003	14,280,000	71,400	7,480,000	37,400	**108,800**
2004	14,740,000	73,700	10,330,000	51,650	**125,350**
2005	15,060,000	75,300	14,720,000	73,600	**148,900**
2006	15,280,000	76,400	14,890,000	74,450	**150,850**

Florida:
Florida DEP developed a waste flow modeling tool to estimate generation of waste CRTs from households and small businesses through 2006 based on historic & projected sales data plus assumptions on first use lifespan, reuse rates, storage time, and percent disposal. Using Florida's numbers of units projected to be available for recycling, we can calculate a population-proportionate number of units for Maine.

	FL – TVs*	ME – TVs	FL – monitors*	ME – monitors	**Projected ME total CRTs**
2003	828,000	73,103	434,000	37,414	**110,517**
2004	855,000	73,707	599,000	51,638	**126,345**
2005	873,000	75,259	854,000	73,621	**148,880**
2006	886,000	76,379	864,000	74,483	**150,862**

*2003-2006: Florida DEP Electronics Flow and Cost Projection, 3/5/03 Revision
Florida population = 5.8% of U.S.

Eastern Washington: (2001 population = 1,320,052)
TVs – Assumptions: 2.55 TVs per household (from MA study) and 8 year lifespan
(2.55 TVs/household x 650,000 households)/8 years = 207,188 TVs/year
CRTs – Projected amounts based on number of households, survey data on computer ownership, and 4 year lifespan: 2002 = 97,000; 2005 = 108,000
If assume TV lifespan of 15.8 years, Maine computer ownership = 85% Eastern WA, Maine population = 97.5% of Eastern Washington:
TVs - (2.55 x 518,200)/15.8 = 83,633 units; Monitors - 94,575 x 0.85 = 80,389 units
Projected Maine total = 164,022 waste CRTs annually

Estimation based on actual collection of waste CRTs:

Massachusetts - disposal ban in place: Per Brooke Nash (MA DEP) 2002 memo, actual Massachusetts CRT collection has leveled off at approximately 1.75#/person/year. Maine projections at this rate = 2,251,673# = 30,022 monitors & 27,020 TVs.
Projected ME total = 57,042 waste CRTs annually.

Maine – voluntary program, no disposal ban, with end-of-life fee:

Tri-Community Landfill on-going collection serves approximately 26,500 people. 3/28/02 – 2/25/03 collected 441 TVs (22,050# in 11 months = 24,055# annually) and 440 monitors (13,200# in 11 months or 14, 400# annually) = 1.45#/person/year.

Appendix G

Sample Data from Pilot Electronics Collection & Recycling Projects

Analysis of Five Community Consumer/Residential Collections – End-of-Life Electronic and Electrical Equipment (USEPA Region 1, Common Sense Initiative, 1999; EPA-901-R-98-003)

- TVs and monitors made up almost 50% of the items collected
- Studies in Japan examined the amount of work required to disassemble electronic products; the results show most of the improvement burden is on the original manufacturer. ("Recovery of Waste from Electrical and Electronic Equipment; Economic and Environmental Impacts", a report produced for the European Commission DGXI, AEA Technology, AEAT/2004 Issue 1, July 1997.)
- Nxtcycle 2002 "Electronics Recycling Shared Responsibility" Program – CA, ID & UT, Sony, Sharp & Panasonic products = 4,300 out of 38,500 CRTs (11%).

6/30/03 "Recycling Today" – "This year, Dell has collected more than 700 tons of unwanted computer equipment for donation and recycling during its Dell Recycling National Tour of 13 cities..." (no cost drop-offs)

"Recycling Used Electronics" Report on Minnesota's Demonstration Project (July 2001)

- Electronics from businesses made up 21% of the material collected by weight.
- 15% of collected TVs were orphan products
- The cost of shipping materials from collection events to the central facility was the largest single expenditure by the recycler.
- Glass-to-glass recycling twice as cost effective as glass-to-lead loop (smelting) even with longer distance transport.

American Plastics Council "Characterization and Processing of Plastics from Minnesota's Demonstration Project for the recovery of End-of Life Electronics" (2002 Fisher et al.)

- "Front-end" separation process (i.e., at point of consolidation) critical to efficient reprocessing. Excluded TVs with high levels of lamination and/or obvious coatings and monitors with large amounts of metal coatings. Then separated into three basic categories: plastics from televisions (primarily black housings), plastics from computers (primarily light-colored housings and peripherals), and plastics from miscellaneous electronics (typically mixed color).
- Identified eight different basic resins.
- Television plastics successfully reprocessed into virgin resin equivalent product (T-HIPS).
- T-HIPS could potentially be used in similar applications as virgin resins in addition to other current applications such as plastic lumber, outdoor furniture, flooring and road patch.
- Comparison to previous report "Plastics from Residential Electronics Recycling: Report 2000" shows: a decrease in television plastics and increase in higher-valued engineering plastics from computers; and a significantly better yield of virgin-equivalent product due to growing familiarity with the resin and better separation equipment and techniques.

Appendix H

Product Stewardship*

Product Stewardship is a principle that directs all actors involved in the life cycle of a product to take responsibility for the impacts to human health and the natural environmental that result from the production, use and disposal of the product and to promote the development and use of consumer products that pose increasingly fewer health and environmental impacts. The primary actors in the life cycle of a product typically include manufacturers, retailers, consumers and government.

The product stewardship approach provides incentives to manufacturers to consider the entire life-cycle impacts of a product and its packaging – energy and materials consumption, air and water emissions, the amount of toxics in the product, worker safety, and waste disposal – in product design, and to take increasing responsibility for the end-of-life management of the products they produce. The objective of product stewardship is to encourage manufacturers to redesign products with fewer toxics, and to make them more durable, reusable, and recyclable, and with recycled materials. Since waste disposal impacts and associated costs have been the basis for engaging manufacturers, attention has initially focused on waste management problems and solutions. However, the challenge of product stewardship is to move beyond disposal to facilitate a paradigm shift toward "zero waste" and sustainable production."

WHY PRODUCT STEWARDSHIP HAS BECOME AS ISSUE?

The economic prosperity of the last 10 years has increased average per capita income, but it has also dramatically increased the amount of waste sent to landfills, incinerators, and wastewater treatment plants. It has also increased the amount of waste recycled. Increased waste means increased recycling and disposal costs. Costs are further escalated by the need to keep a growing number of toxic products out of solid waste disposal facilities. The costs of managing the recyclables and toxic waste have become a financial burden for local communities and local agencies have turned back to the states for assistance. State agencies are now turning to product manufacturers and other potential industry partners to become part of the solution and to alleviate the burden created by what many local governments are calling an "unfunded industry mandate."

* This information is provided by the Product Stewardship Institute at the University of Massachusetts in Lowell.

In an Organisation of Economic Co-operation Development (OECD) Workshop on Extended Product Responsibility, Washington, D.C., Dec 1-3, 1998, Clare Lindsay of the USEPA presented the following goals of "extended product responsibility" as promoted by USEPA:

- To reduce waste generation and increase recycling
- To reduce the financial burden of local governments for waste management; and
- To give incentives to producers to design and manufacture products that result in less waste and are more recyclable

Appendix I

Memo from Ken Hensler on Tri-Community Landfill CRT Collection Activities

Memo to: Carole Cifrino
From: Ken Hensler
Date: May 7, 2003
Re: Stakeholders Meeting on June 5, 2003

Carol, in reviewing the "Duties" established for this Stakeholders Group, you might find our experiences interesting and helpful. Tri-Community received financial assistance from SPO to establish a Universal Waste Storage Facility. Even though the law clearly does not include residential units until 2005, my Board felt compelled to include residential as part of our program from the beginning. They had a great deal of concern with trying to distinguish the difference between a CRT utilized in a business and a CRT utilized at home. Pricing was also a concern. Not really knowing how much of this "stuff" was out there, we created artificial pricing, well below market, to at least encourage participation with minimal financial impact. It was agreed that the Board would review the activity on a quarterly basis and see how the economics were shaking out. In April of 2002, we opened our doors for business and were overwhelmed with the volume of material. Attached to this memo are some activity reports that break this out in the different categories. What the reports do not indicate is what sources were involved in delivering the material i.e., business, public entities or residential. I can only suggest to you that our best "gestimates" are that these sources vary greatly by material. For instance, 95% of fluorescent bulbs are business or public with only a small percentage from residential. CRTs, which include televisions, are 35% business, public and about 65% residential. One of the interesting things to note is that the volumes have continued to decline from the relatively high numbers that we saw in the beginning. An obvious conclusion would be that we received the stockpiles early on and I'm sure this has some merit. But adding to the decline in deliveries could be the fact that we raised our prices around October to try to narrow the gap on revenues and disposal costs. And, by the way, an additional increase was instituted in March on CRT's only.

As a side note, if you heard my presentation at the MRRA Conference in April, you may appreciate the fact that we are beginning to see some indication of illegal dumping going on. So far this spring we have picked up 6 TV's roadside and discovered at least another dozen hidden in the metal pile, inert debris pile and woodpile. The stark reality is simple; some people will not or cannot pay the actual costs associate with the disposal of this material.

I hope you find this information useful. Let me know if you have any questions.

Tri-Community Landfill
UNIVERSAL WASTE COST / PRICE COMPARISONS
CRTs Received & Shipped During the Period of
October 11, 2002 thru July 7, 2003

Dates	Collection fee	# of TVs	# of Monitors	Total weight*	Units/ month	Cost	Cost per unit	Cost per #
3/28/02 - 10/11/02	$2 each unit	305	324	24970#	97	$8,681.40	$13.80	$0.35
10/11/02 - 2/25/03	$6 each unit	136	116	10,280#	56	$4,083.90	$16.21	$0.40
2/25/03 - 5/7/03	$6 each monitor; $10 for <25" TVs; $20 for 25" or > TVs	42	64	4,020#	42	$1,528.50	$14.42	$0.38
*Assume TVs average weight of 50 pounds, monitors average weight of 30 pounds								
Population served = 26,500								

Appendix J

Memo from Office of Attorney General re: Fee on Distance Sales

State of Maine

Office of Attorney General

6 State House Station
Augusta, Maine 04333-0006

Phone: 626-8800
Fax: 626-8812

Memorandum

To: David Lennett
Brooke Barnes
Scott Whittier
Paula Clark
Carole Cifrino
John James
Jim Dusch

From: Denny Harnish, Assistant Attorney General

Date: July 28, 2003

Subject: CRT Management Plan under L.D. 743

INTRODUCTION

Last session the Legislature enacted L.D. 743, which was codified at 38 M.R.S.A. § 1306(4). This law prohibits disposal of any cathode ray tube ("CRT") in a solid waste disposal facility after January 1, 2006. This law also requires DEP to submit a report to the Joint Standing Committee on Natural Resources no later than January 30, 2004 which includes a recommended plan for the collection and recycling of CRTs. In an email dated July 15, Dave Lennett asked for input from this Office on two issues related to the DEP Plan.

The first issue is whether Maine has the authority to require out-of-state companies that sell electronic equipment in Maine over the Internet to collect an Advance Recycling Fee ("ARF") for the recycling of CRTS contained in such equipment. The second issue is whether there is any precedent for directing money obtained from an ARF to a non-governmental entity or to a trust fund to be used by a non-governmental entity for purposes identified in the statute.

SHORT ANSWER

The second question is easier to answer than the first. There is statutory precedent for legislation that would divert funds from one private party to another private party as an incentive to encourage the recycling of CRTs. In addition, there is precedent for the establishment of a trust fund operated by the State which could contract with private parties to carry out the purposes specified in the statute. I have not found any precedent for a system in which a fee imposed under state law is directly passed on to a private entity.

Whether out-of-state companies who sell electronic equipment over the Internet could be required to collect and remit an ARF depends on whether the Courts construe this payment as a fee or a tax. A fee would likely be upheld, a tax might not. Whether the ARF would be considered a tax or a fee is strongly related to how it would be used. It is likely that out-of-state companies could be required to provide incentives and consolidation facilities to help recycle CRTs.

A. Precedents for handling ARFs.

ARFs have been imposed on various types of solid waste pursuant to 36 M.R.S.A. §§ 4831-4834. At one point these fees applied not just to tires and lead-acid batteries, but also to major appliances, furniture, etc. The fees on appliances and furniture have been repealed, but the fees on tires and batteries remain. The ARFs collected pursuant to Title 36 have been deposited in the Solid Waste Management Fund authorized at 38 M.R.S.A. § 2201. This fund is administered by the State and, with the authorization of the Legislature, can be used to pay State administrative costs and operational costs related to solid waste management.

At one time there was also a trust fund created under the Bottle Bill. 32 M.R.S.A. §§ 1861-1872. This trust fund, which was described at 38 M.R.S.A. § 1866-A, has since been repealed. It is my understand that the § 1866-A trust fund was also administered by the State and was to be used for State administrative and operational costs related to the Bottle Bill.

The Bottle Bill does, however, lend some precedential support to the use of privately administered recycling incentives. The Bottle Bill created market incentives for the manufacturers, distributors, dealers and consumers of beverage containers to reuse or recycle the containers thereby removing the blight on the landscape caused by inappropriate disposal of these containers. Maine Beer and Wine Wholesalers Association, Inc. v. State of Maine, 619 A. 2d 94 (Me. 1993). These market incentives are not administered by the State and do not result in fees flowing into State coffers. Instead, the Bottle Bill requires every beverage container sold, or offered for sale to Maine consumers, to have a refund value of at least five cents (and to be labeled as such). 32 M.R.S.A. § 1863. Under 38 M.R.S.A. § 1866 beverage dealers are required to accept beverage containers of the kind, size and brand sold by the dealer and to pay the five-cent per container cash refund value. The statute takes advantage of a

pre-existing distribution network for beverage containers by authorizing beverage dealers or local redemption centers to charge beverage wholesalers or manufacturers a handling fee of three cents per returned container in addition to the payment of the refund value on that container. 32 M.R.S.A. § 1866(4).

A similar incentive system was created L.D. 1921, the Mercury Switch Law, 38 M.R.S.A. § 1665-A. The Mercury Switch Law provides for a $1.00 per switch bounty on mercury switches removed from dismantled vehicles in this State. Automobile manufacturers are required to pay this bounty and are also required to establish and operate consolidation facilities at which removed mercury switches can be presented by automobile dismantlers for payment of the bounty. The consolidation facilities also provide for the recycling of mercury switches.

I was unable to find any precedent for a State operated fund that would receive ARFs for direct disbursement to private entities. This may be because money that comes in to the State is automatically credited to the general fund unless the legislature creates a special fund for receiving the money. However, besides the trust funds described above, there are a number of funds including the Uncontrolled Sites Fund and the Hazardous Waste Fund that have been established as non-lapsing revolving trust funds authorized to accept fees, fines and other public or private funds. The latter two funds are available for carrying out purposes of the Uncontrolled Sites Law and Hazardous Waste, Solid Waste and Septage Management Acts and are set forth at. respectively, 38 M.R.S.A. § 1364(6) and 38 M.R.S.A. § 1319-B. While neither of these funds authorizes direct disbursements to private parties, both of them have been used to support contracts entered with third parties.

In summing up this section of the memorandum, there is precedent for using ARFs as an incentive for the proper disposal or recycling of a particular type of product. Under these precedents the ARFs are handled exclusively by private parties. There is also precedent for State operated funds which can contract with private parties to carry out the purposes of the statutes under which those funds were created. I have not found any specific precedent for imposing a mandatory fee and then directing that money to a non-governmental trust fund of some sort.

B. Discussion of whether out-of-state companies can be compelled to collect and remit ARFs.

1. Application of the Commerce Clause to Taxes.

If an ARF on cathode ray tubes was challenged under the Commerce Clause and was viewed by the reviewing court as a sales or use tax, there may be difficulties in requiring Internet providers to collect such taxes. If the ARF is considered to be a fee, it is more likely that such a fee would pass constitutional muster. Even if an ARF is legally sustainable, the tracking and enforcement of such fees would pose substantial administrative and resource burdens.

The United States Constitution gives Congress the power to "[t]o regulate commerce . . . among the several states." U.S. Constitution, Art. I, § 8.cl.3. This power includes a negative aspect, known as the dormant Commerce Clause, that restricts the ability of state and local governments to burden interstate commerce by impeding private trade in the national market place through local regulation or taxation. GMC v. Tracy, 519 U.S. 278, 287 (1997).

State legislation can be stricken as violative of the Commerce Clause if it is discriminatory, protectionist or seeks to have an extra territorial effect. Philadelphia v. New Jersey, 437 U.S. 617, 624 (1978). In addition, laws that come into direct collision with the federal regulation of interstate commerce and undermine a compelling need for national uniformity in regulation or are otherwise inimical to the national commerce can be stricken. Southern Pacific Co. v. Arizona, 325 U.S. 761, 769 (1945).

State sales and use taxes are subject to a unique Commerce Clause analysis. Such taxes will be sustained if they are i) applied to an activity with a substantial nexus with the taxing state; ii) are fairly apportioned; iii) do not discriminate against interstate commerce; and iv) are fairly related to the services provided by the state. Complete Auto Transit, Inc. v. Brady, 430 U.S. 274, 279 (1977). If Maine attempted to require companies that sell electronic equipment into the State over the Internet to collect an ARF and if the ARF were considered by the reviewing Court to be a sales or use tax, then, under the Complete Auto Transit test a reviewing Court would have to determine whether there was a substantial nexus between that out-of-state company and Maine.

Prior to the Complete Auto Transit case, the United States Supreme Court had established a so-called bright line test for nexus. In order for a state to require an out-of-state company to collect sales or use taxes that company had to have a physical presence such as sales representatives or outlets in the state. National Bellas Hess, Inc. v. Department of Revenue of Illinois, 386 U.S. 753 (1967). Many commentators believed that the Complete Auto Transit case overruled Bellas Hess. However, in Quill v. North Dakota, 504 U.S. 289 (1992), the United States Supreme Court held that Bellas Hess was still good law and that in order for a state to require an out-of-state seller to collect state sales or use taxes, the out-of-state seller had to have a physical presence in the taxing state. The Court acknowledged that this bright line physical presence test was subject to challenge as artificial and as inconsistent with other Commerce clause and Due Process jurisprudence. However, the Court asserted that the artificiality of such a rule was more than offset by its benefits: establishing the boundaries of legitimate state authority to impose a duty to collect sales and use taxes; reducing litigation concerning such taxes; and encouraging settled expectations thereby fostering investment by businesses and individuals.

Plainly, Quill raises problems for states that seek to tax electronic commerce. There are over 100 *Law Review* articles concerning the possible taxation of electronic commerce and/or the Internet. Obviously, I have not read all of these articles but those which I have read all discuss Quill and all of them suggest that in many cases it will be difficult for a taxing state to establish the nexus required by Quill over an out-of-state

Internet provider. Interestingly, I have been able to find a post-Quill case which upheld state taxes imposed on a company that sold computer products via mail, telephone and the Internet. State of Louisiana v. Quantex Microsystems, Inc., 809 So. 2d 246 (La. 2001). The Quantex Court found that the limited warranty provided with the purchase of computer products (which was serviced by the manufacturer of the computer products and not by Quantex) was considered sufficient nexus to require Quantex to collect the taxes. See also, America On Line, Inc. v. Ruth E. Johnson, Commissioner of Revenue, Lexsee 2002 Tenn. App. at Lexis 555. Thus, it might be possible even in the post-Quill era to support an ARF imposed on out-of-state manufacturers or sellers of computer products, even if that ARF were considered to be a sales or use tax, but only if we could demonstrate some direct or indirect physical presence of that company in this state. Of course, such an effort would entail substantial legal and staff resources and would have to be pursued on a company by company basis.

2. Application of the ITFA to taxes.

In 1998, Congress entered the area of Internet taxation by enacting the Internet Tax Freedom Act ("ITFA"). As set forth in the note to 47 U.S.C. § 151, the ITFA imposed a moratorium on states or political subdivisions on enacting multiple and discriminatory taxes on electronic commerce. § 1101(a). The original moratorium expired in 2001. An extension of the moratorium is due to expire in November of this year. Congress is presently considering whether or not to further extend this moratorium or to make the ban permanent. The ITFA defines a discriminatory tax to include one imposed upon an Internet access service or an online services provider as agent of a remote seller. § 1104(B)(1). Therefore, in addition to raising the Commerce Clause, an Internet provider faced with a state ARF would surely seek to take advantage of the ITFA moratorium. Note, that the ITFA applies only to taxes. A tax is defined as "any charge imposed by any governmental entity for the purpose of generating revenues for governmental purposes, and is not a fee imposed for a specific privilege, service, or benefit conferred." § 1104(B)(8). In short, fees as opposed to taxes are not precluded by the ITFA.

3. Application of the Commerce Clause to fees.

If the ARF were considered to be a fee as opposed to a tax then, it would be subject to a more lenient review under a Commerce Clause challenge. Since the ARF would apply, at least on its face, equally to in-state and out-of-state manufacturers and sellers of electronic equipment and since the appropriate disposal or recycling of CRTs is plainly a legitimate local public interest, a reviewing court would quite likely use the balancing test set forth in Pike v. Bruce Church, Inc., 397 U.S. 137, 142 (1970) to determine the constitutionality of the ARF. Under the Pike test, state legislation will be stricken for violation of the Commerce Clause only if the indirect burden on interstate commerce "clearly exceeds the local benefits." In cases where Courts have applied this test, state legislation has almost invariably been upheld. The most recent example is the recommended decision of Judge Kravchuck regarding L.D. 1921.

4. Whether the ARF would be considered a tax or a fee depends in part on who collects it and how it is used.

Whether the ARF would be considered to be a tax or a fee does not depend upon whether the ARF is described as a fee or a tax. Rather, courts focus on whether the fee bestows a benefit upon the party being required to pay the fee that is not shared by other members of society. Fees are distinguished from taxation in that taxation is a legislative function which is intended to broadly benefit society. National Cable Television Association, Inc. v. United States, 415 U.S. 336 (1974).

Examples of charges upheld as fees include application review fees. New England Power Co. v. NRC, 683 F. 2d 12, 14 (1st Cir. 1982); Union Pacific Railroad Co. v. PUC, 899 F. 2d 854, 856 (9th Cir. 1990); fees raising money that was placed in a special fund to help defray the agency's regulation related expenses In re Justices of the Supreme Court of Puerto Rico, 695 F. 2d 17, 27 (1st Cir. 1982); and fees intended to discourage particular conduct by making it more expensive South Carolina ex rel Tindal v. Block, 717 F. 2d 874, 887 (4th Cir. 1983).

Courts facing cases that lie near the middle of the tax/fee spectrum have tended to emphasize the ultimate use of the revenues produced by the charge asking whether it provides a general benefit to the public, of a sort often financed by a general tax, or whether it provides more narrow benefits to the regulated companies or defrays the agency's cost of regulation. See San Juan Cellular Telephone Company v. Public Service Commission of Puerto Rico, 967 F. 2d 683 (1st Cir. 1992). For example, municipal charges which had been designated as fees were actually taxes because the money raised was treated as part of the City's general revenue. Conversely, charges that helped a regulatory agency process applications or identified authorized vehicles for regulatory purposes or funded a milk price support program were properly considered to be fees. See cases collected at 967 F. 2d at 685-86.

Considering the proposed ARF in the context of these cases, the fact that such a fee would be directed to a special fund could be helpful to its consideration as a fee. To the extent that such a fund was used by DEP to defray its costs related to the CRT recycling program, that too would be helpful. On the other hand, it could be argued that the proper recycling or disposal of CRTs provides a general benefit to the public of a sort often financed by general tax and that such a fee provides no special benefit to manufacturers of CRTs. In sum, the caselaw provides no definitive guidance on whether CRTs would be considered to be a tax or a fee. Consequently, there can be no definitive answer as to whether the ITFA would preclude such a charge as a tax or whether the ARF would be considered violative of the Commerce Clause under a Quill-type analysis. Besides these legal problems there may be substantial practical problems in attempting to impose the duty to collect the ARF on totally out-of-state entities. During the period of time in which a percentage of the unclaimed refund values collected by beverage distributors under the Bottle Bill was supposed to be directed to the State, the Attorney General's Office was involved in pursuing collection of these funds from out-of-state manufacturers and distributors. Such collection efforts entailed

substantially more work at a greater cost and were less certain in positive outcomes than were similar collection efforts directed at in-state entities. Ultimately, the Legislature decided to repeal this portion of the Bottle Bill.

CONCLUSION

In sum, it would seem more advisable both for legal and practical reasons to pursue an incentive strategy similar to those set forth in the Bottle Bill and L.D. 1921, the Mercury Switch Law, than to directly impose an ARF on out-of-state manufacturers. If the Bottle Bill were used as guidance, in-state sellers of electronic products could be used as the first step of the take-back process. Alternatively, if L.D. 1921 were used for purposes of guidance, out-of-state manufacturers of electronic products could be required to contract for the establishment and operation of consolidation facilities located in Maine and to provide an incentive to private parties who bring CRTs to those facilities. In my opinion, both those types of laws could be successfully sustained against Commerce Clause and Due Process challenges and, in addition, have the benefit of actually having precedents in Maine law.

Thank you for the opportunity to weigh in on these questions. Good luck in fashioning a fair and effective CRT recycling plan.

DH/tt

Appendix K
Draft Legislation to Implement a CRT Collection and Recycling System in Maine

An Act to Protect Health and the Environment by Providing for a System of Shared Responsibility for the Safe Collection and Recycling of Electronic Waste

Be it enacted by the People of the State of Maine as follows:

Sec. 1. 38 MRSA §1609 is enacted to read:

38 MRSA §1609. Electronic waste.

1. Findings; purpose

The Legislature finds and declares that the establishment of a program to provide for the collection and recycling of electronic devices in Maine is consistent with its duty to protect the health, safety and welfare of its citizens, enhance and maintain the quality of the environment, conserve natural resources and prevent air, water and land pollution. The Legislature further finds that such a program is consistent with the overall Legislative solid waste management policy including its intent to "pursue and implement an integrated approach to solid waste management" and to "aggressively promote waste reduction, reuse and recycling as the preferred methods of waste management".

The Legislature finds that the purpose of this section is to establish a comprehensive electronics recycling system that ensures the safe and environmentally sound handling, recycling and disposal of electronic products, and encourages the design of electronic products and components that are less toxic and more recyclable.

The Legislature finds that it is further the purpose of this section to establish an electronics recycling program that is convenient and minimizes cost to the consumer of these products. It is the intent of the Legislature that manufacturers of these products will be responsible for ensuring proper handling, recycling and disposal of discarded products, and that costs associated with consolidation, handling and recycling be internalized by the manufacturers of electronic products before the point of purchase. In order to reduce the likelihood of the illegal disposal of electronic products, costs should not be imposed on consumers at the point of discard.

The Legislature finds that the manufacturers of electronic products and components should reduce, and to the extent feasible, ultimately phase out the use of hazardous materials in those products. The Legislature further finds that electronic products should be designed to facilitate greater reuse and recycling.

The Legislature finds that a system of shared responsibility for the collection and recycling of covered electronic devices among manufacturers, distributors, retailers, consumers and other parties is the most effective and equitable means of implementing such a program. Manufacturers of electronic devices, in working to achieve the goals and objectives of this section, should have the flexibility to partner with each other, with state, municipal and regional governments, and with businesses that provide collection and handling services, to develop, implement and promote a safe and effective electronics recycling system for Maine.

2. Definitions. As used in this subchapter, unless the context indicates otherwise, the following terms have the following meanings.

A. Covered electronic device. "Covered electronic device" means each of the following: a Computer Central Processing Unit ("CPU"), and a Cathode Ray Tube ("CRT"), a CRT device, flat panel display or any other similar video display device with a screen size that is greater than four inches in size measured diagonally and that contains one or more circuit boards. "Covered electronic equipment" does not include automobiles or large pieces of commercial or industrial equipment, including but not limited to, commercial medical equipment, that contain a CRT, CRT device, flat panel screen or similar video display device that is contained within, and is not separate from, the larger piece of equipment.

B. Computer monitor. "Computer monitor" means a cathode ray tube or flat panel display primarily intended to display information from a central processing unit and/or the internet.

C. Consolidation facility. "Consolidation facility" means a facility where electronic wastes are consolidated and temporarily stored while awaiting shipment to a recycling, treatment or disposal facility. For purposes of this section only, a consolidation facility is also a transport vehicle owned or leased by a recycling/dismantling facility with a minimum 40-foot trailer used to collect covered electronic devices at municipal collection sites in Maine.

D. Department. "Department" means the Maine Department of Environmental Protection.

E. Manufacturer. "Manufacturer" means any person that, irrespective of the selling technique used, including by means of distance communication, manufactures and sells covered electronic devices under its own brand, or sells covered electronic devices produced by other suppliers under its own brand and label.

F. Municipal collection site. "Municipal collection site" means a municipally-owned solid waste transfer station or recycling center, including facilities owned by a consortium of municipalities, or a facility that is under contract with a municipality of consortium of municipalities to provide solid waste management services.

G. Office. "Office" means the Maine State Planning Office.

H. Orphan waste. "Orphan waste" means a covered electronic device for which no manufacturer can be identified.

I. Recycling/dismantling facility. "Recycling/dismantling facility" means a business that processes waste covered electronic devices for reuse and recycling.

J. Recycling. "Recycling" means the use of materials contained in previously manufactured goods as feedstock for new products, but not for energy recovery or energy generation by means of combustion.

K. Retailer. "Retailer" means a person who sells a covered electronic device in the state to a consumer. "Retailer" includes a manufacturer of a covered electronic device who sells directly to a consumer through any means, including, but not limited to, transactions conducted through sales outlets, catalogs, or the internet, or any similar electronic means, but does not include a sale that is a wholesale transaction with a distributor or other retailer.

L. Television or TV. "Television" or "TV" means a cathode ray tube or flat panel display primarily intended to receive video programming via broadcast, cable, or satellite transmission.

3. **Sales prohibition.** Effective on January 1, 2006, any manufacturer not in compliance with this section is prohibited from offering a covered electronic device for sale in Maine. Manufacturers not in compliance with this section shall provide the necessary support to retailers to ensure their covered electronic devices are not offered for sale in Maine.

4. **Manufacturer label required.** Effective on January 1, 2005, manufacturers may not offer for sale in Maine a covered electronic device unless it is affixed with a visible, permanent label clearly identifying the manufacturer of that product.

5. **Responsibility for recycling.**

   A. Municipal responsibility. Municipalities are responsible for ensuring that computer monitors and televisions generated as waste from households within their jurisdiction are delivered to a consolidation facility in Maine. Municipalities may meet this requirement through collection at and transportation from a local

or regional solid waste transfer station or recycling facility, by contracting with a disposal facility to accept waste directly from their residents, through curbside pick-up or other convenient collection and transportation systems.

B. Consolidation facility responsibility. Effective on January 1, 2006, each consolidation facility is responsible for identifying the manufacturer of each waste computer monitor delivered to the facility and identified as generated by a household in Maine, and for maintaining an accounting of the number of waste household computer monitors by manufacturer. Effective on January 1, 2012, each consolidation facility is responsible for identifying the manufacturer of each waste television delivered to the facility and identified as generated by a household in Maine, and for maintaining an accounting of the number of waste household televisions by manufacturer. The consolidation facility may perform the manufacturer identification at the consolidation facility or may contract for this identification and accounting service with the recycling/dismantling facility to which the waste is shipped.

Consolidation facilities are responsible for working cooperatively with manufacturers to ensure implementation of a practical and feasible financing system. At a minimum, consolidation facilities are responsible for invoicing manufacturers and the state for the handling, transportation and recycling costs for which they are respectively responsible under the provisions of this section.

Consolidation facilities in Maine shall transport computer monitors and televisions to recycling/dismantling facilities that provide a sworn certification that their handling, processing, refurbishment and recycling of covered electronic devices meet environmentally sound management guidelines published by the department and available no later than December 31, 2004. Consolidation facilities shall maintain for a minimum of three years a copy of the sworn certification from each recycling/dismantling facility that receives covered electronic devices from the consolidation facility, and shall provide the department with a copy of these records within 24 hours of request.

C. Computer manufacturer responsibility. Effective on January 1, 2006, a computer monitor manufacturer is individually responsible for the handling and recycling of computer monitors produced by that manufacturer or by any business for which the manufacturer has assumed legal responsibility, that are generated as waste from households in Maine and received at consolidation facilities in Maine. At a minimum, manufacturers must pay for the operational costs of the consolidation facility attributable to the handling of their computer monitors generated as wastes by households in Maine, transportation costs from the consolidation facility to a licensed electronics dismantler/recycler, and the cost of recycling.

Effective on January 1, 2012, manufacturers of computer monitors are collectively responsible for the handling and recycling of all computer monitors, including orphan waste monitors, generated as waste by households in Maine received at consolidation facilities in Maine. Manufacturers must pay for the operational costs of the consolidation facility attributable to the handling of all computer monitors generated as waste by households in Maine, transportation costs from the consolidation facility to a licensed electronics dismantler/recycler, and the cost of recycling.

Manufacturers are responsible for working cooperatively with consolidation facilities to ensure implementation of a practical and feasible financing system. Manufacturers must reimburse consolidation facilities for allowable costs incurred with in 90 days of receipt of an invoice.

D. Television manufacturer responsibility. Effective on January 1, 2012, manufacturers of televisions are collectively responsible for financing the handling and recycling of all televisions generated as waste by households in Maine received at consolidation facilities in Maine. Television manufacturers must pay for the operational costs of the consolidation facility attributable to the handling of all televisions generated as waste by households in Maine, transportation costs from the consolidation facility to a licensed electronics dismantler/recycler, and the cost of recycling.

Manufacturers are responsible for working cooperatively with consolidation facilities to ensure implementation of a practical and feasible financing system. Manufacturers must reimburse consolidation facilities for allowable costs incurred with in 90 days of receipt of an invoice.

E. State responsibility. Effective on January 1, 2006 and ending December 31, 2011, the state is responsible for the cost of handling and recycling of orphan waste computer monitors generated from households in Maine and received at consolidation facilities in Maine. The state must pay for the operational costs of the consolidation facility attributable to the handling of the orphan waste computer monitors generated by households, transportation costs from the consolidation facility to a licensed electronics dismantler/recycler as well as the cost of recycling.

6. Manufacturer plan and reporting requirements.

A. Plan requirement.

(1) Except as provided in this section, by January 1, 2012, every manufacturer must develop, submit to the department, implement, and finance the implementation of a plan for the collection and recycling or reuse of all

computer monitors and televisions generated as waste by households in Maine. A manufacturer may satisfy the plan requirements of this chapter by agreeing to participate in a collective recovery plan with other manufacturers. The collective recovery plan must meet the same standards and requirements of the plans submitted by individual manufacturers.

(2) All plans required by this chapter must include, at a minimum:
(a) A description of the collection system, including the methods of convenient collection;
(b) A public education element to inform the public about the collection system, including details about meeting all consumer notification and labeling requirements;
(c) Details for implementing and financing the handling from receipt at consolidation facilities in Maine, recovery, recycling, and reuse of all computer monitors and televisions generated as waste by households in Maine;
(d) Details for the method of reimbursing consolidators for the cost of handling and recycling of the household computer monitors and televisions;
(e) Documentation of the willingness of all necessary parties to implement the agreement, including the parties that will participate in the consolidation, treatment, recovery, reuse, and recycling of the computer monitors and televisions;
(f) Assurances that the system, and all necessary parties, will operate in compliance with local, state, and federal waste management rules and regulations;
(g) Descriptions of the performance measures that will be used and reported by the manufacturer to report recovery and recycling rates for computer monitors and televisions at end of life;
(h) Descriptions of additional or alternative actions that will be taken to improve recovery and recycling rates, if needed;
(i) Annual sales data on the number and type of covered electronic products sold by the manufacturer in Maine over the ten years preceding the filing of the plan for televisions, and five years preceding the filing of the plan for computer monitors and central processing units.

(3) The manufacturers are responsible for all costs associated with the development and implementation of the plans. If the costs are passed on to consumers, it must be done so with front end financing, and not with an end of life fee.

(4) All plans required by this section must be submitted to the department by January 1, 2011, with implementation by manufacturers beginning by January 1, 2012.

B. Reporting requirement. Beginning on July 1, 2007 for computer monitor manufacturers and beginning July 1, 2013 for manufacturers of all covered electronic devices, and annually thereafter, manufacturers that offer a covered electronic device for sale in Maine shall submit a report to the department that includes the following: a description of the collection, consolidation and recycling services utilized to recover the manufacturer's products; substantiated estimates, on an annual basis for the preceding calendar year, on the quantities of covered electronic devices marketed in Maine and collected for recovery in Maine; the capture rate for electronics based on state sales; substantiated estimates of the percentage of collected materials that are reused and recycled from their products; the identification of end markets for the collected waste; and any systems implemented by the manufacturer to ensure environmentally sound management of their products. The manufacturer may indicate which, if any, portions of the report it considers proprietary and, if the department concurs that the information meets state legal requirements for confidentiality, those sections of the report shall not be made public.

7. Advanced Recovery Fee (ARF). Beginning on January 1, 2005, an Advanced Recovery Fee (ARF) is hereby imposed upon each initial sale within the state of each television to a consumer by a retailer. A retailer that sells a television to a consumer shall collect a fee of six dollars ($6) for each unit sold. Retailers shall remit the ARF monies collected at least quarterly to the Bureau of Revenue Services for deposit into a dedicated sub-account within the Solid Waste Management Fund. The ARF shall sunset on January 1, 2012 unless the Joint Standing Committee on Natural Resources reports out legislation providing for an extension of the fee. A retailer selling televisions may retain 3 percent of the ARF as reimbursement for costs associated with the fee collection.

By July 1, 2007, the office shall evaluate whether the amount of the ARF is appropriate to cover eligible expenses incurred by consolidation facilities and municipalities. The office may increase or decrease the ARF as necessary to pay eligible expenses, but at no time shall the fee exceed $10.00.

8. Fund management. The fee collected pursuant to this section shall be deposited into the Maine Solid Waste Management Fund. The ARF revenues in this account must be distributed as follows:

A. Payment to consolidation facilities. The office shall reimburse consolidation facilities when invoiced for expenses incurred prior to January 1, 2012 and consisting of the operational costs of the consolidation facility attributable to the handling of household-generated televisions and orphan computer monitors, transportation costs for these units from the consolidation facility to a licensed electronics dismantler/recycler, and the cost of recycling these units.

Consolidation facilities are eligible for reimbursement provided they are in compliance with paragraph 5.B above.

B. Payment to municipalities. The office shall reimburse municipalities when invoiced for that portion of expenses incurred prior to January 1, 2012 related to the transportation of computer monitors and televisions from a municipal collection site to a near-by consolidation facility in Maine that the municipality can document exceed the current cost of transportation and disposal of an equivalent tonnage of that municipality's municipal solid waste.

C. Expenses incurred for enforcement by department. The department shall be reimbursed for expenses it incurs from activities related to enforcement of the provisions of this section.

The office is responsible for informing municipalities and consolidation facilities about the provisions of this subsection. Any funds remaining in the Electronic Waste Collection and Recycling Account after payment for all eligible costs incurred prior to January 1, 2012 by consolidation facilities and municipalities shall be used to support municipal recycling programs unless otherwise directed by the Joint Standing Committee on Natural Resources.

9. Enforcement. This section shall be enforced by the department in accordance with the provisions of 38 M.R.S.A. 347-A and 349.

10. Reports to the Legislature. The department shall submit a report on the recycling of electronic waste in Maine to the Joint Standing Committee on Natural Resources by January 15, 2008 and every 2 years after that until January 15, 2014. This report shall include an evaluation of the recycling rates in Maine for covered electronic devices, an explanation of any adjustments made to or recommended for the ARF, a discussion of compliance and enforcement related to the requirements of this section, and recommendations for any changes to the program for collection and recycling of electronics in Maine.

Green Government Initiative

Procurement

All vendors of electronics to the State of Maine must provide take-back and management services for their products at the end-of-life and must be in compliance with all the requirements of this act. The bidder must provide assurances that all take-back and management services will operate in compliance with all applicable environmental laws. Purchasing preference will be given to electronics that incorporate design for the environment.

Appendix L

Estimated Cost of ARF Collection & Recycling System

Cost Data on Collection, Transportation and Recycling of CRTs

Collection costs:

EPA[13]: $0.13 - 0.17 per pound (TVs = $6.50 – 8.50/unit, monitors = $3.90 – 5.10/unit)

Florida[14]: $0.11 - 0.14 per pound (TVs = $5.53 - 7.23/unit, monitors = $3.32 - 4.34/unit)

Transportation costs:

EPA: $0.03 - 0.07 per pound (TVs = $1.50 – 3.50 per unit; monitors = $0.90 – 2.10 per unit)

Florida: $0.03 - 0.06 per pound (TVs = $1.50 - 2.98 per unit; monitors = $0.90 - 1.80 per unit)

Recycling costs:

EPA: TVs = $0.12 - 0.40 per pound ($6.00 – 20.00 per unit)
Monitors = $0.12 -0.35 per pound ($3.60 – 10.50 per unit)

Florida: TVs = $0.10 - 0.34 per pound ($5.00 – 17.00 per unit)
Monitors = $0.10 - 0.30 per pound ($3.00 - 9.00 per unit)

Overall cost

Data source	collection	transportation	recycling	cost per #	cost per TV	cost per monitor
EPA – low end	$0.13	$0.03	$0.12	$0.28	$14.00	$8.40
EPA – high end – TVs	$0.17	$0.07	$0.40	$0.64	$32.00	n/a
EPA – high end – monitors	$0.17	$0.07	$0.35	$0.59	n/a	$17.70
Florida – low end – TVs & monitors	$0.11	$0.03	$0.10	$0.24	$12.00	$12.00
Florida – high end- TVs	$0.14	$0.06	$0.34	$0.54	$27.00	n/a
Florida – high end – monitors	$0.14	$0.06	$0.30	$0.50	n/a	$15.00

[13] From 12/17/02 memo to NEPSI Stakeholders from Clare Lindsay, EPA and Lynn Knight, ERG. Collection costs based on data from the NERC survey and Minnesota reports; transportation costs based on information provided by the International Association of Electronics Recyclers; the recycling costs were based on data from the NERC survey, and collections in Minnesota, Massachusetts, and Maine.

[14] Florida projections are based on the going rates in Florida not including infrastructure and promotional costs.

Cost of collection and transportation of TVs and monitors to point of consolidation

Data source	Collection	Transportation to consolidation*	Total Cost	Cost per TV
EPA – low end	$0.13/#	$0.015/#	$0.145/#	$7.25
EPA – high end	$0.17/#	$0.035/#	$0.205/#	$10.15
Florida – low end	$0.11/#	$0.015/#	$0.125/#	$6.25
Florida – high end	$0.14/#	$0.03/#	$0.17/#	$8.50

*Assume ½ of transportation cost from collection to consolidation, ½ from consolidation to dismantler/recycler

Cost of handling and recycling of TVs after delivery to the point of consolidation

Data source	Transport to Recycling*	Recycling	Total cost	Cost per unit
EPA – low end – TVs and monitors	$0.015	$0.12	$0.135/#	$6.75
EPA – high end – TVs	$0.035	$0.40	$0.435/#	$21.75
EPA – high end – monitors	$0.035	$0.35	$0.385/#	$11.55
Florida – low end – TVs and monitors	$0.015	$0.10	$0.115/#	$5.75
Florida – high end – TVs	$0.03	$0.34	$0.37/#	$18.50
Florida – high end – monitors	$0.03	$0.30	$0.33/#	$9.90

*Assume ½ of transportation cost from collection to consolidation, ½ from consolidation to dismantler/recycler

Cost per TV from delivery to the point of consolidation through recycling is estimated to range from $5.75 - $21.75; average cost = $13.75 per TV.

Cost per monitor from delivery to the point of consolidation through recycling is estimated to range from $5.75 - $11.55; average cost = $8.65 per monitor.

Advanced Recovery Fee Calculation

To calculate the Advanced Recovery Fee value needed to cover the cost of handling and recycling waste TVs and orphan monitors from delivery to consolidation point:

Assume:

- annual sales in Maine of 150,000* TVs;
- average 40,000* waste TVs annually (2006 - 2011);
- average cost per TV = $13.75
- average 40,000* waste monitors annually (2006 – 2011)
- 30% of waste monitors are orphans
- average cost per monitor = $8.64
- $80,000 annually to State to administer program:

40,000 waste TVs X $13.75 per TV = $550,000 annually to recycle TVs

40000 waste monitors x 30% x $8.64 per monitor = $103,600 annually to recycle orphan monitors

ARF per TV unit sold in Maine = ($550,000 + $103,680 + $80,000)/150,000 = $4.89

This figure does not include any monies needed to reimburse municipalities for increased waste management costs due to the new CRT recycling requirement, nor does it include monies to compensate retailers for their temporary responsibilty for collection and remission of the ARF to the State. It is fiscally prudent to set the ARF at $6.00 per unit to accommodate this unpredictable expense and possible variations from predicted sales and/or waste amounts. The ARF can be adjusted based on actual collections and expenses once the system is in place and has operated for a year or more.

*These figures were arrived at using low-end sales (120,000 TVs in 2000) and waste generation (approximately 30,000 each TVs and monitors based on a 1.75# per capita generation rate) data, and increasing each of these numbers by 25% to account for changes over time in sales and waste generation expected due to continued sales growth and consumers upgrading to flat panels and digital TV..

Appendix M

Universal Waste Management and Recycling Companies Serving Maine

The following list is not necessarily a complete list of universal waste handlers. The DEP, by providing this list does not imply that the companies listed are in compliance with applicable laws, nor does this list represent an endorsement. A generator should personally evaluate the services and compliance status of any company hired to handle universal wastes.

Universal waste management companies that wish to have their names added or deleted from the list can contact 207-287-2651.

Universal Wastes include: CRT's (Computer monitors, TV's, etc.), Mercury Lamps, Mercury Devices (Includes thermometers, manometers, switches, etc.), Mercury Thermostats, Motor Vehicle Mercury Switches, PCB ballasts (Non-leaking), Batteries

Other wastes listed by the following companies may be handled for convenience but are not Universal Wastes.

Note: Companies that take CRTs also usually take CPUs.

AERC Com. Inc.
2591 Mitchell Avenue ID#PAD987367216
Allentown, PA 18103
(800) 554-2372
On the web: www.aercmti.com
Recycling Facility (Lamps, Mercury containing batteries, Mercury Thermostats, Mercury Thermometers)
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Thermostats, and Mercury Thermometers.

Chem Safe Consulting, Inc.
P.O. Box 332
Mapleton, ME 04757-0332
(207) 764-5387
On the web: www.chem-safe.com
Universal Waste Consultant

Clean Harbors Environmental Services, Inc.
17 Main Street ID#MED982546988
South Portland, ME 04106
(207) 799-8111
Contact: Richard Grimm
On the web: www.cleanharbors.com
Transporter/Consolidator
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Thermometers, and Mercury Thermostats.

Colt Recovery Group
8 Roosevelt Avenue ID#NHD982745192
Hudson, NH 03051
(603) 880-6800
On the web: www.coltrefining.com
Recycling Facility (CRTs)
Wastes Accepted: CRTs

Conservation Lighting
84D Warren Avenue ID#MER00500439
Westbrook, ME 04092
(800) 696-4709
On the web: www.conliteinc.com
Transporter/Consolidator (in-state)
Wastes Accepted: Lamps, PCB Ballasts

Earth Protection Services, Inc.
10 South 48th Avenue, Suite #4 ID#AZR000005454
P. O. Box 23820
Phoenix, AZ 85603-3820
(800) 414-0443 or (802) 353-9282 fax: (602) 353-9285
Contact: Dusty Raesch
On the web: www.earthpro.com
Recycling Facility / Transporter
Wastes Accepted: Lamps, PCB Ballasts, Batteries, and CRTs

Eastern Environmental Technologies
47 Purdy Avenue ID#NYD987012986
Port Chester, NY 10573
(800) 808-7227 fax: (914) 934-9659
On the web: www.easternenvironmental.com
Recycling Facility (PCB and non-PCB Ballasts)/Consolidator
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Thermostats, and Mercury Thermometers

ElectroniCycle Inc.
461-471 West Broadway ID#MAR000503359
Gardner, MA 01440
(800) 829-5082
Contact: Debra Peloquin
On the web: www.electronicycle.com
Recycling Facility (CRTs and Electronics)/Consolidator
Wastes Accepted: CRTs and Electronics

Envirolite
4 Wilder Drive, Unit 7
Plaistow, NH 03865
(800) 355-4479 fax: (603) 378-0829
Contact: Mike Ray
e-mail: mray@envirolights.com
On the web: www.encocontainer.com
Transporter/Consolidator
Wastes Accepted: Lamps, PCB and non-PCB Ballasts, Batteries, and CRTs

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ENPRO Services, Inc.
106 Main Street ID#MAD980670004
South Portland, ME 04106
(207) 773-0733 fax: (207) 773-6693
Contact: Danny Rogers
On the web: www.enpro.com
Transporter
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Thermometers, and Mercury Thermostats

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EnviRon Services, Inc.
101 Bishop Street ID#MER000500736
P. O. Box 8101
Portland, ME 04104
(207) 828-1300 fax: (207) 828-1188
Contact: Ron Smalley
On the web: www.environservices.com
Transporter/Consolidator (in-state)
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Thermometers, and Mercury Thermostats

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Environmental Management, Inc.
51 River Road ID#MER00505338
Brunswick, ME 04011
(207) 729-7549
Contact: Kris Lidback
On the web: www.emi-maine.com
Transporter/Consolidator (in-state)
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Devices, Mercury Thermometers, and Mercury Thermostats

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Full Circle, Inc.
509 Manida Street ID#NYD986980233
Bronx, NY 10474
(800) 775-1516
On the web: www.fcballast.com
Recycling Facility (Ballasts)/Consolidator
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Thermometers, and Mercury Thermostats

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General Chemical Corporation
133 Leland Street ID#MAD019371079
Framingham, MA 01702
(508) 872-5000
On the web: www.generalchemical.com
Transporter/Consolidator
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Thermometers, and Mercury Thermostats

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Gilman Electrical Supply
53 Main Street ID#MER000502088
Newport, ME 04953
(800) 439-7937 or (207) 368 4306 fax: (207) 368-5105
Contact: Bill Lee
e-mail: billl@gilmannewport.com
Transporter/Consolidator
Wastes Accepted: Lamps and PCB Ballasts

Healthcare Compliance Service
P. O. Box 72557
Thorndale, PA 19372
(610) 518-5299 fax: (610) 518-2995
Contact: Bruce McCarther
e-mail: hcstoday@cs.com
On the web: www.hcstoday.com
Consolidator
Wastes Accepted: Batteries, Mercury Amalgam, Mercury Thermometers, Mercury Devices, and Mercury-containing Medical Devices

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J &J Sales Co.
220 State Road ID#MER000501106
Kittery, ME
Mail to: Box 2033
Norway, ME 04268
(207) 576-1464 fax: (207) 744-0063
e-mail: jo11757@megalink.net
Transporter/Consolidator
Wastes Accepted: CRTs, Computer Electronics, Telecommunication Electronics, Electronic Surplus and Scrap

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Lighting Resources
498 Park 800 Drive ID#IN0000351387
Greenwood, IN 46143
(317) 888-3889 fax: (317) 888-3890
Contact: Norm Ege
On the web: www.lightingresources.com
Recycling Facility (Lamps, Ballasts)/Consolidator
Wastes Accepted: Lamps, PCB and non-PCB Ballasts, Batteries, CRTs, Mercury Devices, Mercury Thermometers, and Mercury Thermostats

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Maine Labpack, Inc.
248 Preble Street ID#MER000002683
South Portland, ME 04106
(207) 767-1933 fax: (207) 761-2406
Contact: John Carpenter
On the web: www.mainelabpack.com
Transporter/Consolidator
Wastes Accepted: Lamps, PCB and non-PCB Ballasts, Batteries, CRTs, Mercury Devices, Mercury Thermometers, Electronics, and Mercury Thermostats

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Mercury Technologies of Minnesota, Inc.
1110 Holstein Drive NE ID#MND985746262
P. O. Box 13
Pine City, MN 55063
(800) 864-3821 fax: (320) 629-7799
Contact: Sue Yarusso
On the web: www.mercurytechnologies-mn.com
Consolidator/Recycling Facility (Lamps)
Wastes Accepted: Lamps

Mercury Waste Solutions
21211 Durand Avenue ID#WIR000000356
Union Grove, WI 53182
(800) 741-3343 fax: (262) 878-2699
On the web: www.mwsi.com
Recycling Facility (Lamps, Mercury Devices)/Consolidator
Wastes Accepted: Lamps, PCB and non-PCB Ballasts, Batteries, CRTs, Mercury Devices, Mercury Thermometers, and Mercury Thermostats

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Northeast Lamp Recycling, Inc.
250 Main Street ID#CT5000001495
East Windsor, CT 06088
(860) 292-1992
On the web: www.nlrlamp.com
Transporter/Consolidator/Recycling Facility (Lamps)
Wastes Accepted: Lamps, PCB and non-PCB Ballasts, Batteries, CRTs, Mercury Thermometers, and Mercury Thermostats

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NOVA Recycling
512 Wolfboro Road ID#MER000500793
Stetson, ME 04488
(207) 296-2400 fax: (207) 296-2401
Contact: Samuel Hands
Consolidator (in-state)
Wastes Accepted: Lamps, PCB and non-PCB Ballasts, Batteries, CRTs, Mercury Switches and Devices, Mercury Thermometers, and Mercury Thermostats

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Onyx Environmental Services
398 Cedar Hill Street ID#MA5088404800
Marlborough, MA 07152
(800) 354-2382
Contact: Jim Sullivan
On the web: www.onyxes.com
Transporter/Consolidator
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Devices, Mercury Thermometers, and Mercury Thermostats

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Onyx Special Services
218 Canton Street ID#MA5000004713
Stoughton, MA 02072
(800) 478-6055
Contact: Marissa Frischetti, ext. 227 or Amanda Poverchuck, ext. 213
On the web: www.onyxes.com
Recycling Facility (Lamps, Mercury Thermometers, Mercury Thermostats)/Consolidator
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Thermometers, and Mercury Thermostats

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Reclamere, Inc.
905 Pennsylvania Avenue
Tyrone, PA 16686
(814) 684-5505 fax: (814) 684-6044
Contact: Joseph P. Harford
On the web: www.reclamere.com
Recycling Facility (Electronics, CRTs)/Broker
Wastes Accepted: CRTs, All Electronics (except white goods)

Safety Kleen Corporation
Route 202, RR3, Box 1990 ID#MED980667810
Leeds, ME 04263
(207) 933-4496
On the web: www.safetykleen.com
Transporter/Consolidator (in-state)
Wastes Accepted: Lamps, PCB Ballasts, Batteries, Mercury Devices, Mercury Thermometers, and Mercury Thermostats

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Supreme Computer Recycling
1955 Swarthmore Avenue ID#NJR000035444
Lakewood, NJ 08701
(732) 370-4100
On the web: www.supremerecycling.com
Transporter/Consolidator/Recycling Facility (Electronics)
Wastes Accepted: CRTs, CPUs, and Electronics

Troiano Waste Services, Inc.
P.O. Box 3541 ID#MER000501346
Portland, Me 04104-3541
(207) 767-2070 or (800) 310-2070 fax: (207) 767-6156
Contact: Nelson Libby
Transporter/Consolidator (in-state)
Wastes Accepted: Lamps, Rechargeable Batteries, CRTs, CPUs, and Electronics

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United Industrial Services, aka Total Waste Mgmt. Corp.
142 River Road ID#NHD980521843
Newington, NH 03801
(800) 345-4525
On the web: www.totalwaste.com
Transporter/Consolidator
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Devices, Mercury Thermometers, and Mercury Thermostats

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UniWaste Services Corp.
125 Aviation Avenue ID#NHD510179559
Pease International Tradeport
Portsmouth, NH 03801
(866) 522-7711 or (603) 422-7711 cell: (603) 944-6458
Contact: Robert T. Nicholson
On the web: www.uniwaste.com
Consolidator/Recycling Facility (Lamps)
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Devices, Mercury Thermometers, Mercury Thermostats, and Electronic Scrap

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USA Lamp and Ballasts Recycling, aka USA Lights of Ohio
5366 Este Avenue ID#OH0000264085
Cincinnati, OH 45232
(800) 778-6645
On the web: www.usalamp.com
Recycling Facility (Lamps)/Consolidator
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Thermometers, and Mercury Thermostats

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Wesco Distribution
80 Farm Road ID# MER000500553
Bangor, ME 04401
(207) 942-6713 or (800) 432-7969
Contact: Jim Baines
e-mail: Jbaines@wescodist.com
Transporter/Consolidator (in-state)
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Mercury Devices, Mercury Thermometers, and Mercury Thermostats

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Wuf Technologies
7 South State Street
Concord, NH 03301
(603) 224-7959 fax: (603) 229-1960
Contact: Richard A. Dingolo
e-mail: rdingolo@wuftech.com
On the web: www.wuftech.com
Recycling Facility (Electronics)/Consolidator
Wastes Accepted: Lamps, PCB Ballasts, Batteries, CRTs, Electronics, Mercury Devices, Mercury Thermometers, and Mercury Thermostats

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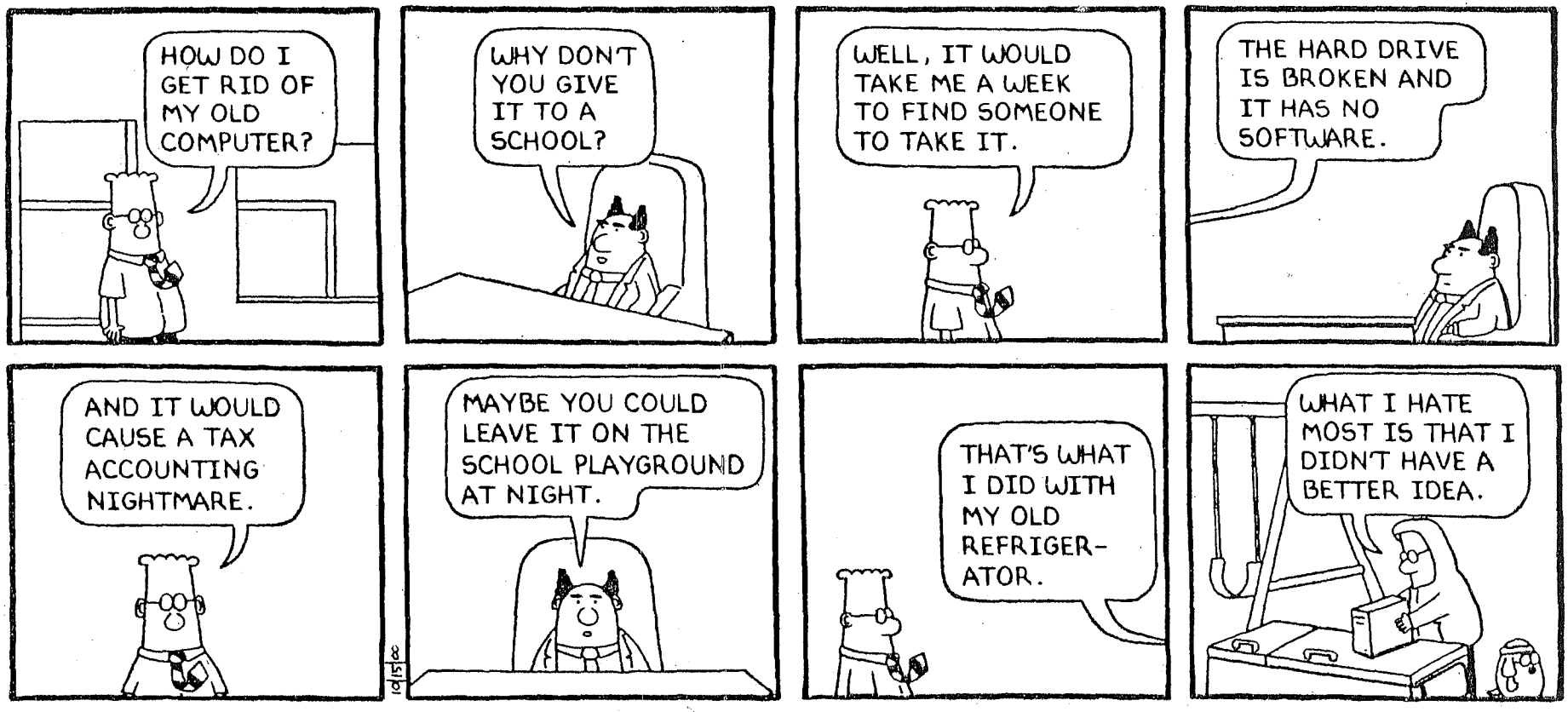

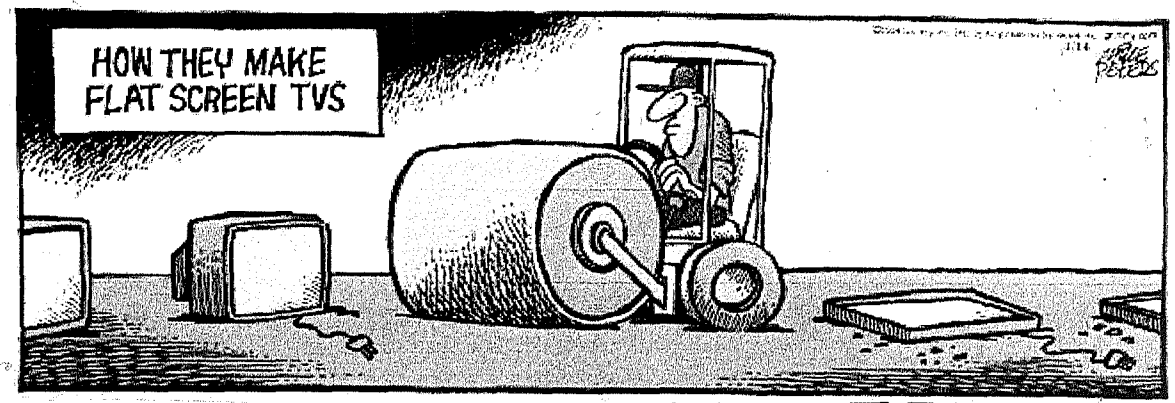

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