



OFFICE OF INSPECTOR GENERAL

*Catalyst for Improving the Environment*

## Evaluation Report

# Multiple Actions Taken to Address Electronic Waste, But EPA Needs to Provide Clear National Direction

Report No. 2004-P-00028

September 1, 2004



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### **Abbreviations**

CRT	Cathode Ray Tube
EPA	U.S. Environmental Protection Agency
E-waste	Electronic waste
LCD	Liquid crystal display
NEPSI	National Electronics Product Stewardship Initiative
NGO	Non-governmental organization
OECD	Organization for Economic Cooperation and Development
OIG	Office of Inspector General
OSW	Office of Solid Waste
RCC	Resource Conservation Challenge
RCRA	Resource Conservation and Recovery Act

**Cover photo:** Computer equipment at a landfill (courtesy Snohomish County, Washington).



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY  
WASHINGTON, D.C. 20460

OFFICE OF  
INSPECTOR GENERAL

September 1, 2004

**MEMORANDUM**

SUBJECT: Multiple Actions Taken to Address Electronic Waste,  
But EPA Needs to Provide Clear National Direction  
Report No. 2004-P-00028

FROM: Carolyn Copper /s/  
Director for Program Evaluation  
Hazardous Waste Issues

TO: Thomas P. Dunne  
Acting Assistant Administrator  
Office of Solid Waste and Emergency Response

This is the final report on our evaluation of the effectiveness of EPA's electronic waste programs and regulations conducted by the Office of Inspector General (OIG) of the U.S. Environmental Protection Agency (EPA). This report contains findings that describe the problems the OIG identified and corrective actions the OIG recommends. This report represents the opinion of the OIG and the findings contained in this report do not necessarily represent the final EPA position. Final determination on matters in the report will be made by EPA managers in accordance with established resolution procedures.

**Action Required**

In accordance with EPA Manual 2750, you are required to provide a written response to this report within 90 days of the date of this report. You should include a corrective actions plan for agreed upon actions, including milestone dates. We have no objections to the further release of this report to the public.

If you or you staff have questions, I can be reached at (202) 566-0829, and Steve Hanna, Project Manager, can be reached at (415) 947-4527.



# *Executive Summary*

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## **Purpose**

The use of electronic devices for both business and personal applications has increased dramatically in recent years. These electronic devices include computers, TVs, VCRs, DVD players, and cellular phones. Rapid turnover of these electronic devices is estimated to generate over 2 million tons of electronic waste (E-waste) per year, which raises environmental concerns due to both the E-waste volume and the quantity of hazardous chemicals associated with this waste stream. Approximately 70 percent of the heavy metals in municipal solid waste landfills are estimated to come from electronics discards. Heavy metals such as lead and mercury are highly toxic substances that can cause well-documented adverse health effects, particularly to children and developing fetuses.

The Environmental Protection Agency (EPA) has implemented many projects, including pilot programs, in efforts to address the E-waste management problem. The purpose of this report is to determine whether these programs have adequately addressed concerns associated with E-waste. Specifically, our review evaluated: the outcomes of EPA's E-waste projects and policies; the existing regulation of household hazardous waste; and the information EPA collects on E-waste.

## **Results**

EPA's Office of Solid Waste (OSW) has implemented or participated in many recent projects that have enhanced the general awareness of E-waste issues and included a wide range of stakeholders. Stakeholders are complimentary of OSW's competence, enthusiasm, and dedication. OSW implemented or participated in its E-waste projects voluntarily as a result of their recognition of a developing problem, and not as the result of any mandate or new requirement. However, the potential benefits have not been fully realized because the projects have not been implemented or coordinated in support of a clear set of program goals and measures of effect. In addition, OSW has not finalized a long-delayed rulemaking on the regulation of Cathode Ray Tubes (CRTs), and was forced to withdraw from its own high-visibility product stewardship initiative due to potential cooperative agreement violations. Despite demonstrating some leadership in the effective management of E-waste, this has impacted OSW's leadership credibility in the development of national solutions to E-waste problems. Due to incomplete actions related to addressing E-waste, EPA cannot ensure that the human health and environmental risks associated with E-waste are being effectively addressed.

Under the Resource Conservation and Recovery Act, household hazardous waste, including E-waste, may be disposed at municipal solid waste landfills. To the

degree that E-waste is not recycled or put to further use, this has the potential to allow significant volumes of E-waste disposal at municipal landfills, which could potentially complicate any efforts to regulate E-waste at the national level. While the regulation of household hazardous waste is complex due to the millions of households nationwide, OSW has not addressed the impacts of this or defined any possible alternatives outside of emphasis on recycling and voluntary programs.

Regarding information on E-waste, OSW has not adequately defined the data required to characterize the E-waste problem or track progress, and must rely on speculative data. Further, EPA does not have basic information on the ultimate disposition of its own surplus computers.

## **Recommendations**

We recommend that EPA define the E-waste program, goals, performance measures, and data requirements; ensure that all future E-waste projects are clearly linked to these goals and coordinated with each other; and take actions to improve guidance. We also recommend that EPA ensure that household E-waste volumes are estimated at least every 2 years to determine the impact and facilitate contingency planning. Further, EPA should identify the relevant data needed in support of E-waste goals and performance measures, and take action to have the needed data collected, including for EPA equipment.

In the response to our draft, EPA agreed with many of our recommendations and disagreed with some. Based on the Agency's comments, we made some revisions and clarifications to our report where appropriate. In addition, based on a followup meeting with the Agency to discuss its comments, agreements were reached to resolve and clarify recommendations where we did not have complete agreement. A summary of the Agency's response and our evaluation is included at the end of each chapter. The Agency's complete response is included in Appendix A.

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# Chapter 1

## Introduction

### Purpose

This report addresses efforts of the Environmental Protection Agency (EPA) Office of Solid Waste (OSW) to manage electronic waste (E-waste). We sought to determine whether existing EPA regulations and programs adequately address the risk and resource recovery concerns associated with E-waste. For the purposes of this review, E-waste refers to hazardous and solid waste arising from the disposal of electronic devices such as computers, monitors, televisions, and cellular phones. Specific questions addressed were:

- What outcomes have resulted from existing EPA waste programs and projects and what impacts have EPA's E-waste policies had on State and local solid waste management programs or policies?
- Is EPA's current regulatory oversight of household hazardous waste and conditionally-exempt small quantity generator E-waste generation effective?
- What information does EPA currently have on E-waste generation, recycling, and disposal?

### Background

#### ***Electronic Devices Present New Waste Challenges***

The use of electronic devices for both business and personal use has increased dramatically in recent years. These electronic devices include computers (including printers and monitors), TVs, VCRs, DVD players, and cellular phones. At the same time, the life spans for these items are decreasing due to growing demand for enhanced features and performance. The ubiquitous presence of cellular phones and the advent of liquid crystal displays (LCDs), tablet PCs, and plasma TVs illustrate the rapid rate of change, since these devices were rare or unknown only a few years ago. Furthermore, many new technologies are on the horizon.



Electronic waste at a landfill (EPA web site)

Environmental concerns with electronics are associated with the dramatic increase in the volume of E-waste – a waste stream estimated to be growing approximately three times as fast as the rest of the municipal waste streams. The national volume of E-waste is estimated at over 2 million tons per year, and approximately 90 percent of this waste may be ultimately disposed at municipal solid waste landfills.<sup>1</sup> This estimate includes approximately 50 million computers becoming obsolete each year, with over 300 million obsolete computers estimated by 2005.<sup>2</sup>

The problem with E-waste is not just the volume of waste generated, but also the volume of hazardous chemicals associated with E-waste. Most electronic devices contain a printed wiring board and battery, and these and other components may contain hazardous materials such as lead, mercury, hexavalent chromium, arsenic, beryllium, nickel, zinc, copper, cadmium, and flame retardants. Each CRT (cathode ray tube) contains approximately 4 to 8 pounds of lead,<sup>3</sup> which correlates to 300 million pounds of lead from the 50 million computers estimated to become obsolete each year. Approximately 70 percent of the heavy metals in municipal solid waste landfills are estimated to come from electronics discards.<sup>4</sup> Heavy metals such as lead and mercury are highly toxic substances that can cause well-documented adverse health effects, particularly to children and developing fetuses.

### ***Regulation of E-waste by RCRA***

E-waste is not explicitly regulated as hazardous waste at the national level. However, the Resource Conservation and Recovery Act (RCRA) Subtitle C was established to ensure that hazardous waste is managed in a manner that is protective of human health and the environment. Accordingly, hazardous waste disposed in a landfill must be disposed at designated hazardous waste landfills with additional regulatory controls, rather than municipal solid waste landfills. However, hazardous waste from households and businesses generating hazardous waste below the defined regulatory threshold may dispose of their waste at municipal solid waste landfills.

One way in which hazardous wastes may be defined under RCRA is their potential for leaching of hazardous chemicals. Among E-waste chemicals that have been tested, lead has been shown to exceed the leachate levels for cathode ray tubes, and OSW is currently finalizing a rule to define acceptable management standards for these devices. OSW is currently investigating which other types of E-waste, such as LCDs, computers, and keyboards, could present hazardous characteristics.

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<sup>1</sup>“Municipal Solid Waste in the United States: 2001 Facts and Figures. Appendix C, Computer Electronics in Municipal Solid Waste,” EPA.

<sup>2</sup>*Computerworld*, "Cleaning IT's Basement," Feb. 2004.

<sup>3</sup>Computer TakeBack Campaign and Californians Against Waste, "Poison PCs and Toxic TVs," Feb. 2004.

<sup>4</sup>"Computers, E-waste, and Product Stewardship: Is California Ready for the Challenge," report for EPA Region 9 prepared by the Global Futures Foundation, June 2001.

## Scope and Methodology

We conducted our program evaluation from November 2003 through April 2004. To achieve our objectives, we interviewed EPA staff from OSW; the Office of Prevention, Pesticides, and Toxic Substances; and Regions 3, 5, 9, and 10. External stakeholder interviews were held with States and non-governmental organizations (NGOs). States were selected to include E-waste programs in varying degrees of implementation, and NGOs were selected based on known interest or involvement in E-waste issues. States interviewed were:

- California
- Florida
- Illinois
- Maryland
- Minnesota
- New York

NGOs interviewed were:

- Electronic Industries Alliance
- Hewlett-Packard
- International Association of Electronics Recyclers
- National Recycling Coalition
- Silicon Valley Toxics Coalition

In order to answer our evaluation questions, we asked Regions, States, and other stakeholders a series of structured questions. We also reviewed numerous documents, web sites, and publications. State legislative E-waste data were compiled by examining existing compilations of State E-waste progress, combined with direct review of State web sites. A compilation of EPA projects was prepared by developing and forwarding to OSW a spreadsheet of known projects. OSW staff then verified the data, included new projects, and added grant costs and full-time employee estimates.

We performed our evaluation in accordance with *Government Auditing Standards*, issued by the Comptroller General of the United States.



# Chapter 2

## EPA's Projects Lack Defined Goals and Coordination

In response to the growing challenge of E-waste, OSW has implemented or participated in many recent projects that have enhanced the general awareness of E-waste issues and included a wide range of stakeholders. However, the potential benefits of these projects have not been fully realized because the projects have not been implemented or coordinated in support of a clear set of program goals and measures of effect. In addition, OSW has not finalized a long-delayed rulemaking on the regulation of CRTs, and was forced to withdraw from its own high-visibility product stewardship initiative due to potential cooperative agreement violations. This could impact EPA's leadership credibility in the development of national solutions to E-waste problems. Due to its incomplete actions related to addressing E-waste, OSW cannot ensure the human health and the environment risks associated with E-waste are being adequately addressed.

### Overall E-waste Goals Have Not Been Defined

OSW has been recognized for raising the awareness of E-waste as a significant environmental issue, and for including a wide range of stakeholders in its E-waste projects. OSW implemented or participated in these projects voluntarily as a result of their recognition of a developing problem, and not as the result of any mandate. Further, stakeholders we interviewed were complimentary of OSW's competence, enthusiasm, and dedication. However, OSW's effectiveness has been hampered by a lack of definition of program goals.

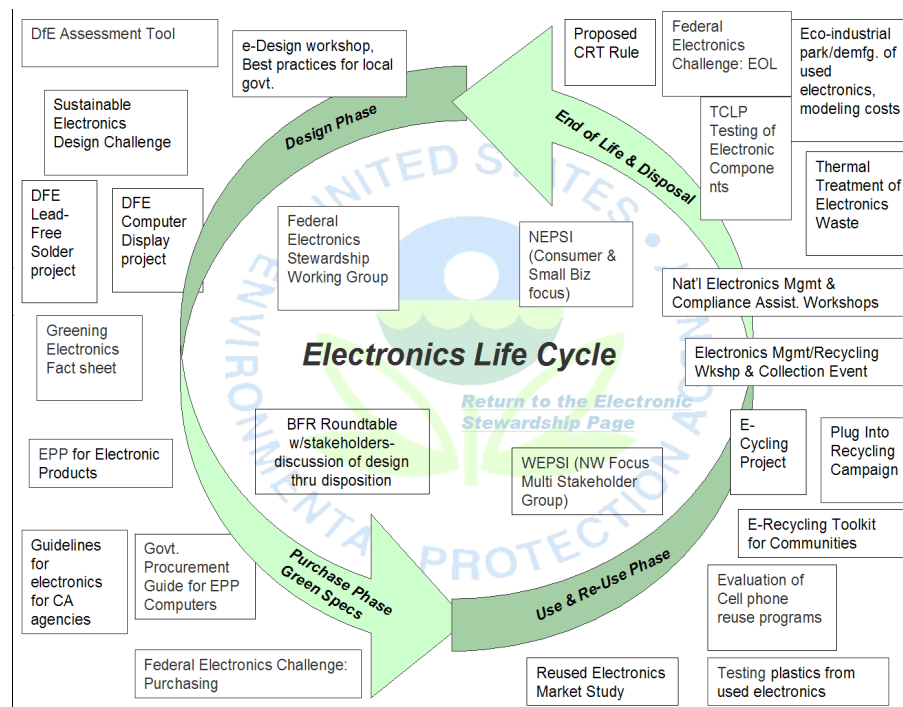
The goals of the E-waste program have never been formally defined, other than draft goals developed under the auspices of the Product Stewardship<sup>5</sup> program within OSW. OSW's internal draft Strategy for Product Stewardship of Electronics, developed in 2001 and updated in 2004, includes the following goals shown in Table 2-1:

Table 2-1: Goals in Draft Strategy for Product Stewardship of Electronics
1. Increase reuse and recycling of used electronics.
2. Ensure that management of electronics is safe and environmentally sound.
3. Foster a life cycle approach to product stewardship, including environmentally-conscious design, manufacturing, and toxics reduction for new electronic products.
4. Provide Federal leadership on government procurement and management of electronics.

<sup>5</sup> OSW defines Product Stewardship as "an emerging environmental philosophy which holds that all who make, distribute, consume, and dispose of products should share the responsibility of reducing their environmental impacts."

Ideally, program goals should drive the projects, performance measures, and data that support those goals, as implied in the OSW 2003-2008 strategic planning document. Program goals should be defined through a strategic planning process that links goals with well-defined strategies, human capital, action plans, and performance results. This has not been the case in the implementation of EPA’s many E-waste projects (see Figure 1). Most stakeholders interviewed were unaware of any OSW E-waste goals. OSW states that most of its E-waste projects are designed to encourage and catalyze voluntary activity by governments, industry, and consumers and that formal processes do not characterize these efforts. Specifically, OSW indicates that while they usually enter into projects with particular goals in mind, they do not typically establish performance measures without input and concurrence from the stakeholders who will be instrumental in achieving these results.

Figure 1 illustrates the various EPA projects focused on the design, purchase, reuse, and disposal of electronics. There is no clear relationship between these life cycle stages, OSW’s draft Product Stewardship goals, other EPA draft Electronics Sector goals, or OSW’s classification of its E-waste projects. While the draft goals represent an effort to define program goals, they are general and not associated with performance measures.



**Figure 1 - EPA E-waste Projects** (Source: <http://www.ofee.gov/es/projects.html>)

Central to the discussion of E-waste goals is the definition of an OSW “E-waste Program.” An OSW E-waste program has not been defined as such, and efforts are dispersed among various OSW divisions and other EPA offices.

## E-waste Projects Developed Without Apparent Coordination

EPA has spent over \$2 million and used nearly 10 full-time equivalent staff in over 30 E-waste projects, pilot programs, and grants, but these efforts have not been well-coordinated or their products clearly defined. Almost all of these costs and staff expenditures have been incurred since 2000, and do not include rulemaking activities such as the CRT rule or in-kind staff contributions from stakeholders. Many of the projects have been small regional pilots or grants, but OSW staff have not clarified whether regions or headquarters have ultimate program or financial responsibility for them. The funding and staffing commitment presumably reflects EPA's recognition of the importance of E-waste. However, the lack of project coordination and the absence of goals have resulted in a general lack of understanding by stakeholders of what EPA is trying to achieve.

In late 2002, OSW grouped many of its voluntary programs into waste-type sectors under a national effort known as the Resource Conservation Challenge (RCC), a major OSW initiative regarding E-waste. RCC strives to encourage life-cycle materials management, pollution prevention, energy conservation, and reduction of priority chemicals through voluntary partnerships with industry. Many pre-existing programs and pilots were claimed under RCC at its launch, and OSW staff are still working to clarify the relationships between these older programs and the RCC. Several Office of Prevention, Pesticides, and Toxic Substances programs are included in RCC. The RCC uses a data-driven approach to developing performance measures and goals of the Government Performance and Results Act, and RCC staff have said that the Electronics sector is one of the most advanced waste streams currently being tracked, with draft goals expected in the fall of 2004. Several RCC electronics projects underway are in Table 2-2:

<b>Table 2-2: Examples of RCC Electronics Projects Underway</b>	
<b>Federal Electronics Challenge</b>	This is a voluntary partnership program among Federal agencies and facilities to manage electronic assets throughout three life stages: acquisition and procurement, operation and maintenance, and end-of-life disposal. The pilot phase was launched in May 2003 with nine agency partners, and full roll-out is expected in the fall of 2004.
<b>Electronic Product Environmental Assessment Tool</b>	This is a grant-based, multi-stakeholder project to develop and implement a tool for evaluating the environmental performance of electronic products. This tool is still under development, but is expected to be completed by September 2004. The tool will not be an explicit label, but should have similar market effects.
<b>Plug-in to E-cycling</b>	Plug-in is a series of pilots testing approaches to shared responsibility for end-of-life management of electronics among manufacturers, retailers, government, and consumers.

Plug-in follows from an E-cycling project in Region 3 from 2001-2002 that piloted government-industry collaboration for residential electronics collection

and recycling. The project created 9 permanent collection programs and collected over 2,700 tons of E-waste at a cost of \$1.1 million. OSW staff indicated they view Plug-in as an interim solution to properly recycling electronics until a national solution can be defined and implemented. It is unclear if outputs or data from the pilots have been pre-defined, or if any of the efforts can be scaled to a national level at a reasonable cost. The next Plug-in pilot began in January 2004 in Region 1, and two additional pilots are being developed in Minnesota and the Pacific Northwest. However, despite these efforts, several stakeholders have said they did not understand the purpose of this program or were not aware of it.

## **OSW's Leadership Credibility Has Been Impacted**

Due to delays in rulemaking efforts, EPA withdrawal from a product stewardship initiative, and limited OSW actions to act in an anticipatory manner, OSW's leadership credibility in addressing E-waste has been impacted.

### ***The CRT Rule***

The CRT Rule was a direct output of the Common-Sense Initiative Electronics Sector, which met from 1994 through 1998. The rulemaking process began in OSW in 1998, but is now not projected to be finalized until 2005. EPA staff have indicated that the delays in the rulemaking might have been due to competition for staff resources with other mandatory rulemaking efforts. Regardless, the years of delay have frustrated the participants. We were unable to determine the extent to which these delays are due to factors OSW has management control over.

### ***National Electronics Product Stewardship Initiative***

The National Electronics Product Stewardship Initiative (NEPSI) convened in April 2001 as a multi-stakeholder dialogue for the purpose of developing a national electronics product stewardship system. A large number of stakeholders from manufacturers, States, and non-government organizations were involved in the process, funded by OSW through a cooperative agreement with the University of Tennessee for approximately \$225,000 from April 2001 through August 2004.

Initially, stakeholders viewed the review of regulations as one of several priority issues to be discussed, and believed the dialogue should focus on State and local regulatory issues. However, as early as March 2002, industry stakeholders were divided on a national financing system, and a collective decision was made to "look into outlining the elements of possible federal legislation to facilitate the recycling of used electronics." At that time, OSW was assured by EPA's Office of General Counsel that these discussions were not in violation of any cooperative agreement anti-lobbying provisions.

In October 2003, the stakeholders developed a draft Memorandum of Understanding that contained elements of Federal legislation as well as the intent



of the parties involved to seek legislation. Upon review of the Memorandum of Understanding, the Office of General Counsel rescinded its prior approval of OSW's participation, stating that sections outlined activities clearly in preparation for an effort to engage in unallowable lobbying. Accordingly, OSW withdrew its participation and funding in December 2003, and the last NEPSI meeting held in February 2004 was funded by the participants. NEPSI participants viewed OSW's participation and leadership as essential, and OSW's withdrawal from the process as a critical loss that reflected poorly on EPA.

### ***OSW Has Not Demonstrated Ability to Act in an Anticipatory Manner***

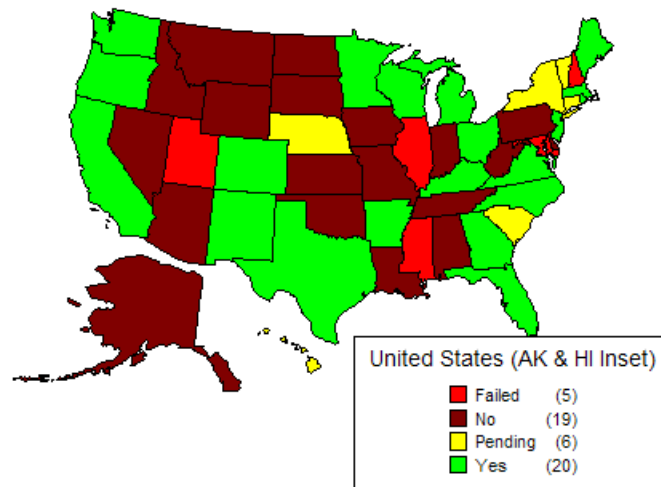
The volume of E-waste is rapidly growing and changing as new technologies are introduced. For example, some new technologies on the horizon are:

- **Nanotechnology** - developing materials at the molecular level.
- **Microelectromechanical sensors** - tiny wireless monitors.
- **Interactive multimedia** - electronic and interactive news delivery.
- **Organic light-emitting diodes** - display screens that directly emit light.
- **3-D displays** - 3-D built into the screen display.

This constant change emphasizes the need for OSW to anticipate changes in the waste stream and provide an appropriate regulatory response in a timely manner. However, while staff have indicated that anticipating new waste streams is a part of their ongoing decision-making process, OSW has not demonstrated its ability to do so related to technological changes that introduce new waste streams. The CRT Rule was a timely initial response that had the potential to demonstrate OSW's leadership and foresight, but the delay of several years has had the opposite effect. This, coupled with OSW's withdrawal from NEPSI and the general confusion about OSW's E-waste goals, has left stakeholders unconvinced that OSW can respond to developing issues in a timely manner.

## **States Taking Actions But Dissatisfied with Lack of National Solutions**

The increasing concern about the management of E-waste is illustrated in the range and number of legislative and regulatory approaches States have adopted to address this topic. Figure 2 highlights the status of States' E-waste legislation and regulation as of January 2004, and indicates that 31 out of 50 States have introduced or passed E-waste legislation or adopted specific E-waste regulations. Pending and passed State legislation and regulations include a variety of approaches, as shown in the following actions taken by States:



**Figure 2 - State E-waste legislation** (Source: OIG analysis)

- **Universal waste classification for CRTs.** This is the broadest regulatory approach, allowing longer storage and accumulation times for CRTs, larger collectible volumes, and reduced tracking requirements than typically required for RCRA hazardous waste. Although CRTs must still be handled as hazardous waste, States have adopted this approach to attempt to reduce the burden of proper disposal and recycling. States that have taken this approach include Colorado, Florida, Kentucky, Michigan, New Jersey, North Carolina, Ohio, Texas, Washington, and Wisconsin.
- **Task forces to study the issue or develop a State program.** Task forces typically request a study commission within State waste divisions or create an external stakeholder group to recommend options for the legislature, usually by a specific deadline. Task forces are underway in Georgia, Maine, New Jersey, New Mexico, Oregon, Rhode Island, and Virginia.
- **Landfill bans.** By the end of 2003, landfill bans in 4 States (California, Maine, Massachusetts, and Minnesota) restricted CRTs from any source from disposal in a municipal solid waste landfills, and bans were pending in 10 other States.
- **Funding for recycling/collection infrastructure.** This has allowed States to fund the development of electronics recycling infrastructure, usually through small grants. Some States have considered this an important preparation for properly handling the impending volumes of E-waste, especially should national or State legislation be passed that restricts disposal. Such funding has been disbursed in Arkansas, Colorado, Florida, and Massachusetts.

- **Manufacturer take-back.** Take-back requires producers to develop, finance, and implement an E-waste recovery system for the collection, handling, processing, recovery, reuse, and recycling of the devices they sell in the State. Manufacturers may pay a fee on their product sales that can be pooled and distributed to recyclers when the equipment reaches them. Take-back is pending in Maine, New York, Vermont, Rhode Island, Texas, and Washington.
- **Consumer education campaigns.** Legislatures have approved educational programs and, in some cases, accompanying funding, to promote proper E-waste recycling and reuse among the public, schools, and businesses. New Jersey and Colorado have already adopted such measures, while bills are pending in Nebraska and South Carolina.
- **Advanced recycling fees.** Advanced recycling fees are similar to manufacturer take-back, only the fee assessed on product sales is a visible one passed along to consumers and government – rather than manufacturers. These fees are pending in six States, although California is the only one set to begin implementation.
- **Hazardous material phase-out.** This type of legislation restricts manufacturers from selling electronic equipment containing one or more listed hazardous substances after 2007. It is linked to the European Union’s Reduction of Hazardous Substance directive (see following section). California is the only State with a direct link to this, although a bill being considered in Washington contains hazardous material restrictions.

State officials we interviewed, as well as EPA staff and those from non-governmental organizations, indicated that States were dissatisfied with the Federal status of E-waste regulation. This dissatisfaction is due in part to the failure to define a national electronics product stewardship solution in NEPSI, the lack of definition of visible E-waste goals, the lack of guidance on how E-waste is Federally regulated, and uncertainty about the rationale behind the myriad of E-waste projects. States are looking to EPA for a national solution. Stakeholders have also expressed concerns that delays in a national product stewardship solution ultimately impact State involvement in the development of such a solution; as States implement their own product stewardship mechanisms, their perspective naturally changes from creating an optimal solution to ensuring that the national solution does not negatively impact their State system. Implementation of a national E-waste solution would potentially simplify States’ efforts and provide a more manageable regulatory picture for industry.

## **United States Lagging Behind International E-waste Efforts**

All individuals we interviewed believed that the United States is lagging behind international efforts in E-waste regulation. E-waste management is being

addressed through current and pending legislation in other countries and through multilateral guidance, agreements, and treaties. Although many of these international initiatives have only recently been passed, and most have not been fully implemented, several contain innovative approaches to reduce hazardous chemicals in electronic products and recycle used electronics. For example:

- The Basel Convention on the Control of Transboundary Movements of Hazardous Waste, adopted in 1989, requires a manifest and notification system for hazardous waste export, and allows transboundary movements of hazardous wastes only upon prior written notification by the exporting state to the authorities of the importing or transporting states. Discarded electronic equipment is subject to these requirements but not for United States handlers, because the United States is one of three countries that have not ratified the Convention.
- The European Union has gone far beyond notification-and-consent procedures with its Waste Electrical and Electronic Equipment and Reduction of Hazardous Substances Directives, passed in January 2003. The Waste Electrical and Electronic Equipment Directive, broad in scope, covers virtually all consumer electronic equipment and requires manufacturers to take financial responsibility for the end-of-life recovery of their products using the best available treatment technology. European Union member states must use manufacturer financing to implement collection systems for electronic equipment from end-users, and must collect annual data on the volumes of equipment marketed, collected, reused and recycled. The NEPSI project attempted to develop an electronic product stewardship program that would have been the United States counterpart to the Waste Electrical and Electronic Equipment Directive.
- The European Union's Reduction of Hazardous Substances Directive prohibits the use of six toxic chemicals in electrical and electronic equipment by July 2006: lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE). However, some materials containing lead and mercury, such as those in computer displays and CRTs, are exempt. Exceptions may also apply to substances deemed technically or scientifically unavoidable. There is no United States counterpart to the Reduction of Hazardous Substances Directive, but there is general agreement among stakeholders that the United States should benefit directly from this directive because manufacturers are likely to market the same product lines in the European Union and the United States.
- The Organization for Economic Cooperation and Development published technical guidance on Environmentally Sound Management for used and scrap personal computers in February 2003, describing standards for refurbishment,

dismantling, material recovery, component treatment, energy recovery, transport, and packaging.

- The Commission for Environmental Cooperation, an organization created by Canada, Mexico, and the United States to address regional environmental concerns, is currently discussing a voluntary challenge to meet the European Union's Reduction of Hazardous Substances Directive in North America. A draft proposal introduced in 2004 met with some resistance from industry, but industry representatives have agreed to continue the dialogue. Initially intended for adoption in June 2004, participants now estimate that the challenge may begin in September 2004.
- Japan, Australia, Canada, Denmark, and Taiwan have taken steps to promote recycling and product stewardship. Australia and Canada are developing voluntary product stewardship strategies through public-private working groups that include government representatives and industry associations. Japan's Specified Home Appliance Recycling Law, implemented in 2001, requires take-back for manufacturers of electrical and electronic goods.

OSW has been active in the Organization for Economic Cooperation and Development (OECD) development of a framework for assuring the environmentally sound management of wastes, including E-waste. Specifically, OSW has led the OECD effort to develop guidelines on environmentally sound management for used personal computers. That technical guidance document was issued in February 2003. Further, under the Basel Convention, the United States (OSW) is the most active nation involved in the development of environmentally sound management guidelines for the management of used cell phones, and is chairing or co-chairing several of the workgroups. OSW is also very active in development of a new Basel initiative for addressing end-of-life personal computers. As part of this new Basel effort, the existing OECD guidelines, whose development was led by OSW, are being recognized as a useful base.

## **Conclusions**

OSW has responded to the E-waste challenge, and shown needed leadership by funding and implementing a range of projects over the past several years, that have raised the awareness of E-waste as a significant environmental issue. However, the lack of definition of an E-waste program, goals, and performance measures, coupled with lack of project coordination and project delays, has prevented the development of a cohesive effort to address the problem. This has eroded stakeholders' confidence in EPA's E-waste leadership and indicates that decisive and rapid leadership in developing and implementing national E-waste solutions is important. Otherwise, the continued implementation of multiple different State E-waste solutions is likely.

## Recommendations

We recommend that the Acting Assistant Administrator for Solid Waste and Emergency Response:

- 2.1 Define its E-waste program, goals, and performance measures, and communicate them to stakeholders. These should be synchronized with the RCC Electronics Sector Government Performance and Results Act performance measures currently under development by OSW.
- 2.2 Within the limits of OSW's jurisdiction and authority, ensure, and communicate to stakeholders, that all E-waste efforts are clearly linked to the defined program goals and coordinated by OSW with other EPA offices to ensure compatibility of all projects and progress towards the defined goals. All projects should clearly define the relevant goal(s) and associated quantitative performance measures. The Federal Electronics Challenge and the Electronic Products Environmental Assessment Tool Project should continue to receive a high level of emphasis to ensure that they remain on schedule and can be used to leverage the reduced toxicity of electronic devices through preferential purchasing.
- 2.3 Ensure the development of a national product stewardship solution for electronics.
- 2.4 Finalize the CRT rule as soon as possible.
- 2.5 In conjunction with stakeholders, evaluate ongoing industry trends to identify potential future E-waste issues.

## Agency Comments and OIG Evaluation

OSW generally agreed with our recommendations. They recognize that electronic waste has been and will continue to be an important area for the Agency to articulate its goals and measures as well as its plans. OSW believes that their E-waste goals are appropriate and that their projects are designed to align with one of these goals. However, OSW acknowledges that they have not fully communicated the goals of their individual projects and how they fit into an overall program. OSW highlighted the following efforts to improve:

- Commit to continuing to communicate their goals.
- Describe goals and strategies on the RCC Electronics Sector web site, and synchronize project and RCC performance measures.
- Develop a draft product stewardship framework as a part of the development of an overall RCC strategy.
- Quantify the decreased use of toxics in electronics and increased recycling and translate these changes into measurable environmental benefits.

- Hold an E-Cycling Summit in early 2005 to bring together stakeholders to evaluate the progress of their projects, share achievements and data, identify further information needs, update plans, and update performance targets.

We modified report language and recommendations in response to the Agency's comments and discussion at a followup meeting. While we state that OSW has not defined E-waste goals and performance measures, they believe that these have been defined but not effectively communicated. We believe that the focus on communication is an appropriate response, and the proposed E-Cycling Summit should be an effective mechanism for obtaining stakeholder input on E-waste goals and performance measures.





## **Chapter 3**

### **Majority of E-waste May Be Disposed in Municipal Landfills**

Much of the anticipated volume of E-waste may ultimately be disposed of in municipal solid waste landfills, even though components of E-waste, such as CRTs, are defined as hazardous waste. This can occur due to the existing RCRA household hazardous waste exclusion, which allows households to dispose of hazardous waste in municipal landfills. The regulation of household hazardous waste was not intended by Congress. This exclusion could potentially undermine any efforts to regulate E-waste at the national level.

#### **Household E-waste Disposal Allowed in Municipal Landfills**

Hazardous waste generated by households and hazardous waste from businesses generating less than 100 kilograms of hazardous waste per month (conditionally-exempt small quantity generators) have been excluded by regulation from RCRA. The estimated number of conditionally-exempt small quantity generators is in the hundreds of thousands, and there are approximately 100 million households. According to EPA, some estimates for ultimate disposal of E-waste as household hazardous waste are as high as 90 percent.

EPA has existing authority to modify the scope of the household hazardous waste exclusion through the rulemaking process. When asked about the appropriateness of the exclusion, interviewees responded with the entire range of answers, from eliminating the exclusion to keeping it as written. Some interviewees indicated the regulation of E-waste from households was desirable but unworkable.

Some States have taken action to regulate E-waste from household sources. California continues to regulate hazardous waste irrespective of its source, and does not recognize the household exclusion of E-waste. In California, the municipal landfills are responsible for preventing disposal of E-waste at their locations. Maine, Massachusetts, and Minnesota have banned CRTs from disposal in municipal landfills irrespective of the CRT source, which effectively excludes CRTs from household hazardous waste exemption. CRT landfill bans have been proposed in 10 additional States, and are still pending final decision.

If an appreciable volume of E-waste is disposed as household hazardous waste, this could minimize the impact of any regulatory efforts to increase reuse and recycling.

## Conclusions

The volume of E-waste disposed at municipal solid waste landfills could represent a significant portion of the E-waste universe. This becomes a concern in light of evidence that some components of E-waste are defined as hazardous. High landfill disposal rates of E-waste could minimize the impact of EPA efforts to increase E-waste recycling and reuse. This is particularly likely if economic factors encourage disposal over recycling. However, the regulation of E-waste from household sources could create an unmanageable, national, regulatory requirement. An assessment of the volume of E-waste disposed in municipal solid waste landfills would help inform EPA decisions to consider alternative approaches for the management of E-waste, including modifications to the scope of the household hazardous waste exclusion.

## Recommendation

We recommend that the Acting Assistant Administrator for Solid Waste and Emergency Response:

- 3.1 Within OSW's jurisdiction and authority, ensure that the volume of E-waste disposed in municipal solid waste landfills is estimated at least biennially and communicated to stakeholders with other E-waste data collected in support of E-waste goals and performance measures.

## Agency Comments and OIG Evaluation

OSW agrees that they need to encourage stored E-waste to move toward recycling rather than disposal, and also believes that much of the current E-waste volume is in storage. They state that future updates to the Characterization report will take account of more recent and sophisticated estimates of E-waste storage. OSW believes that, based on a recent study, E-waste disposed in municipal solid landfills will not pose an environmental risk. Their primary interest in increasing the recycling of E-waste is based on resource conservation. They also disagreed with report language regarding household hazardous waste and made suggestions which were incorporated as appropriate.

# Chapter 4

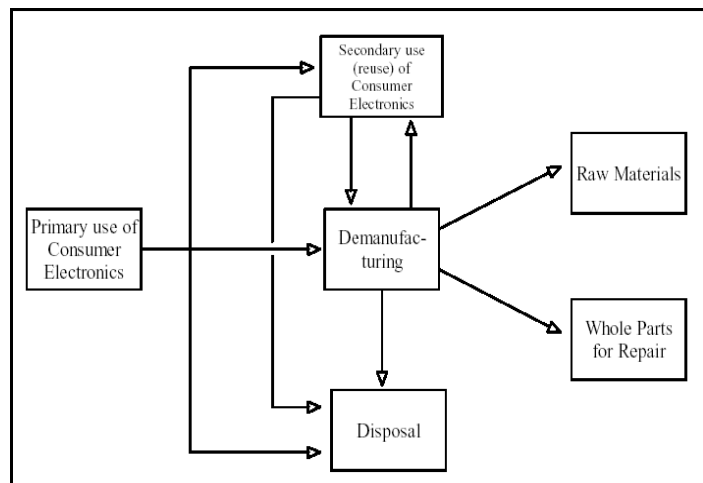
## EPA Does Not Collect Adequate Data on E-waste

Existing data collected on E-waste are inadequate to support program management decisions. Data on each possible component of the life cycle are critical to evaluate the success of ongoing projects and the scope of the problem. However, data requirements and collection mechanisms have not been defined to address the problem. Consequently, any program efforts are forced to rely upon speculative data. In addition to the lack of adequate national data, EPA does not have adequate data on the disposition of its own computers. EPA needs adequate information to monitor the scope of the E-waste problem and track progress.

### Data Not Routinely Collected

OSW does not collect sufficient data to clearly define the E-waste problem and track progress in addressing the problem. A primary reason is the lack of defined goals and performance measures, which facilitate quantification (see Chapter 2 for a discussion of the lack of goals). The potentially high cost of data collection and maintenance underscores the need to explicitly define the uses of data prior to collection. Well-defined program goals and performance measures will ensure that only necessary data are collected in the appropriate formats, level of detail, and frequency.

The one ongoing source of E-waste data is the Consumer Electronics in Municipal Solid Waste appendix of the OSW Waste Characterization Report. In a life cycle flow chart from the 2001 report (see Figure 3), each arrow indicates the data needed to adequately measure the problem, define current status, and measure progress. While this report appears to make efficient use of data from existing sources and clearly states the underlying assumptions, the report relies on pre-existing, readily available data sources instead of identifying and collecting the requisite data. OSW staff indicate that the existing E-waste data sources were “soft”



**Figure 3 - Consumer Electronics Life Cycle**  
(Source: EPA - Municipal Solid Waste in the United States: 2001 Facts and Figures)

and some of the non-EPA organizations interviewed did not agree with the assumptions used in the Waste Characterization Report.

OSW has made progress in defining E-waste data requirements with the recent eCycling project in EPA Region 3, and is currently developing data standards for the implementation of other Plug-In pilots. This project has explicitly recognized the need for high-quality, useful data. Further, the RCC (see Chapter 2) appears committed to the collection of data in support of performance measures and Government Performance and Results Act goals; data collected for the Electronics Sector of this effort may provide some of the needed data.

The lack of up-to-date data is likely due to the fact that defining data requirements and collecting sound data can be an expensive process and using existing data is more expedient. However, the lack of definition of data needs and the implementation of mechanisms to collect those data impairs the ability of OSW to monitor the scope of the E-waste problem.

## **Disposition of EPA's Own Surplus Computers Unclear**

As part of our efforts to evaluate the data EPA collects on E-waste, we asked Regions 3 and 9 Facilities Management staff, as well as Headquarters Facility Management and Services Division staff, to account for recent surplus computers. Region 3 stated it donated computers to schools and non-profit organizations as authorized under Executive Order 12999. The donations occurred after EPA removed the hard drives, to comply with a court-ordered injunction against EPA that prohibited the disposal of computer property in order to protect potentially useful data sought in a Freedom of Information Act request. Region 9 has been storing its surplus computers since 2000 in compliance with the injunction. Headquarters donates excess devices to schools and non-Federal organizations or transfers them to the General Services Administration.

No facility management office in Region 3 or 9 was able to provide more than estimates of the number of excess computers stored or recently disposed. Region 3 Facility Services Branch did not have exact records, and information was only obtained through a contract work order description outlining contractor work specifications for the cleansing of computer hard drives prior to donation. Headquarters prepares three reports at the request of the General Services Administration on EPA property sold, exchanged, or donated to schools and non-Federal recipients; however, we found the information in these reports to be inadequate to quantify the numbers or disposition of surplus EPA computers.

We also noted that Headquarters does not appear to provide Regional offices with guidance on how to properly recycle or dispose of broken equipment. Interviews with Facilities Management staff indicated some devices were thrown out in the trash.

Although not directly managed by OSW or RCC, the Recycling Electronics and Asset Disposition contract – initiated by the Office of Prevention, Pesticides, and Toxic Substances; the Office of Acquisition Management; and the Office of Environmental Information – should assist EPA and other Federal agencies in managing the end-of-life phase. This Government Wide Acquisition Contract, which was expected to be awarded in the summer of 2004, will provide the Government sector with a procurement tool to properly manage electronic inventories and recycle and properly dispose of excess or obsolete electronic personal property in an environmentally responsible manner. The contract places a strong emphasis on data destruction/sanitization and on creating an audit trail to report on the equipment's final destination. EPA staff are anticipating the development of this project to provide mechanisms to quantify the disposition of EPA's surplus personal computers. On March 19, 2004, the Office of Management and Budget designated EPA as the authorized Federal agency to manage this Government Wide Acquisition Contract and to handle the disposition of E-waste for all federal departments and agencies.

## **Conclusions**

EPA does not currently collect adequate E-waste data, which limits its ability to demonstrate the effectiveness of its E-waste efforts. This is due in part to the lack of an explicit definition of E-waste goals and, therefore, the lack of data needs in support of those goals. Additionally, EPA cannot readily track the disposition of its own surplus computers, which impacts its credibility in implementing national E-waste management strategies.

## **Recommendations**

We recommend that the Acting Assistant Administrator for Solid Waste and Emergency Response:

- 4.1 Identify and communicate to stakeholders the relevant data needed in support of the E-waste goals and performance measures, as defined in Recommendation 2.1. To ensure the proper definition of required data, OSW could convene a stakeholder working group to define the necessary data, frequency of collection, and most efficient and effective mechanisms for the collection of the data.
- 4.2 Work with the Office of Prevention, Pesticides, and Toxic Substances, and the Office of Acquisition Management, to ensure the implementation of the Recycling Electronics and Asset Disposition Government-wide acquisition contract. OSW should ensure that adequate data are collected to provide appropriate end-of-life measurements of EPA's computers. In the interim, OSW, the Office of Prevention, Pesticides, and Toxic Substances, and the Office of Acquisition Management should ensure the disposition of EPA's computers is in accordance with its E-waste goals,

develop mechanisms to track computer purchases and disposition Agency-wide, and develop effective communication mechanisms with regional offices to ensure that the Agency is adhering to its own (as well as applicable State) hazardous waste regulations.

## **Agency Comments and OIG Evaluation**

OSW agrees that adequate data are essential for the development of goals and performance measures for their E-waste initiatives. They feel that their existing goals and performance measures are based on adequate data, and they also have additional actions underway to supplement these data. Discussions of data requirements with stakeholders, as proposed by OSW as a topic in their 2005 E-Cycling summit, should address our concerns. As appropriate, additional modifications were made to the report and recommendations based on OSW's comments.

## ***Agency Response to Draft Evaluation Report***

August 1, 2004

### **MEMORANDUM**

SUBJECT:   OIG Evaluation of EPA Activities on Waste Electronics  
            Assignment No. 2004-000002

FROM:       Thomas P. Dunne/s/  
            Acting Assistant Administrator  
            Office of Solid Waste and Emergency Response

TO:          Carolyn Copper  
            Director of Program Evaluation: Hazardous Waste Issues

This memorandum responds to the draft evaluation of the EPA Office of the Inspector General on EPA's electronic waste programs and regulations, dated June 30, 2004.

We appreciate your report and the work that lies behind it. We have carefully reviewed the report and agree with many of the recommendations and disagree with some. We respectfully request that the authors of this report carefully review our responses and revise the report accordingly.

Thank you for the opportunity to review the draft. If you need additional information, you may contact Thea McManus, Associate Director of the Municipal and Industrial Solid Waste Division, Office of Solid Waste, at (703) 308-8738 or Clare Lindsay, Office of Solid Waste, at (703) 308-7266.

cc: Matt Hale, Director, Office Director, OSW  
      Maria Vickers, Deputy Office Director, OSW  
      Robert Dellinger, Division Director, HWID  
      Lillian Bagus, Division Director, MISWD  
      Thea McManus, Associate Division Director, MISWD

# **MULTIPLE ACTIONS TAKEN TO ADDRESS ELECTRONICS WASTE, BUT EPA NEEDS TO PROVIDE CLEAR NATIONAL DIRECTION**

## **EPA Comments on the Office of Inspector General's Draft Report Assignment No. 2004-000002**

**July 30, 2004**

This document presents EPA's responses to the major findings and recommendations made in the above-referenced report.

As a general matter, we are concerned that the Draft Report contains numerous unattributed statistics. We recommend that the Final Draft cite sources for all statistics presented.

### **CHAPTER 1**

OIG states on page 2 that E-waste is not explicitly regulated as hazardous waste at the national level in spite of the fact that RCRA "was established to ensure that hazardous waste is disposed at designated hazardous waste landfills with additional regulatory controls, rather than municipal solid waste landfills." We wish to take issue with this statement; as explained later, it was Congress' intent in RCRA that household hazardous waste be excluded from hazardous waste regulation.

As discussed more fully in our response to Chapter 3 of the OIG report, we have determined that CRTs from TVs and computers frequently exhibit a hazardous characteristic. We are reviewing whether other common E-wastes also exhibit a hazardous characteristic. However, CRTs or any other E-waste that exhibits a hazardous characteristic that is generated by a household or conditionally exempt small quantity generator is, under Federal law, permitted under RCRA to go to a municipal solid waste landfill. Moreover, despite suggestions by the OIG in its Draft Report that disposal of any household E-waste in municipal landfills could be harmful to health and the environment (e.g., statement on page 2 re the "potential leaching of hazardous chemicals in the groundwater" associated with E-waste), we do not have evidence to support this concern. Nevertheless, we agree with OIG about the need to recycle electronics for resource conservation purposes.

Also on page 2, the OIG asserts that "lead has been shown to exceed the leachate levels for a wide variety of electronic devices including CRTs, LCDs, computers, keyboards, mice, VCRs and even remote controls. According to EPA's testing procedure, most electronic devices may therefore be characterized as hazardous waste." As discussed more fully in our response to Chapter 3, EPA is looking at which other types of E-waste could present hazardous characteristics. This work is not yet complete, so we are not at this time prepared to agree with the statement that "most electronic devices may...be... hazardous waste." Indeed, it should be recalled that EPA has already exempted circuit boards from the definition of hazardous waste if these items are bound for recycling. If it is the circuit boards that could cause some electronic products to demonstrate a hazardous characteristic, this exemption may already apply to these products when sent for recycling.



## **CHAPTER 2**

### **E-WASTE GOALS HAVE NOT BEEN DEFINED**

OIG states that EPA's E-waste goals have never been formally defined; that they are simply draft internal goals. Moreover, OIG states that there is no relationship between EPA's linkage of its E-waste projects to the life cycle stages of electronic products and various other articulations of EPA's goals, including the draft strategic plan for E-waste, and the draft RCC Electronic Sector goals.

In 2001, EPA articulated four broad goals for E-waste prevention and management. These goals are listed on Page 5, Table 2-1 of the Draft OIG Report. The Office of Solid Waste (OSW) acknowledges that these goals have not been shared in the form of a final, published strategic plan. Instead, we have shared our goals in many varied venues over the last several years. Examples of where and when we communicated our goals, include: 1) E-Scrap 2003 Recycling Conference; and 2) the IEEE 2004 International Symposium on Electronics and the Environment.

Each of our individual E-waste projects is designed to align with one or more of our stated goals. Moreover, each project has its own specific goals. The project-specific goals are presented in individual project web sites. Examples include: 1) Plug In -- Give Americans more opportunities to safely, conveniently, consistently, and cost-efficiently recycle their old electronics and promote safe recycling of electronics once they are collected ([www.plugintocycling.org](http://www.plugintocycling.org)); and 2) FEC – Achieve cost-effective, environmentally responsible electronics management in the Federal government ([www.federalelectronicschallenge.net](http://www.federalelectronicschallenge.net)). Taken together, all of EPA's E-waste projects strategically address the full life-cycle of electronic products: from design, to purchase, to use, to discard, to recycling.

We appreciate OIG's concern, however, that we have not fully communicated the goals of the individual projects and how they fit into an overall program. We believe we have made important steps in this regard since OIG conducted its interviews, and we will continue to work on clearly communicating our goals.

### **PERFORMANCE MEASURES HAVE NOT BEEN DEFINED**

OIG indicates that OSW's draft goals are not associated with performance measures. It is important to understand that most of EPA's E-waste projects are designed to encourage and catalyze voluntary activity by governments, industry, and consumers. While we usually enter into projects with particular goals in mind, we do not typically establish performance measures without input and concurrence from the stakeholders who will be instrumental in achieving these results.

As the projects become more developed and paths for further action are chosen, EPA and program partners agree upon quantifiable performance measures. This is exactly what happened in the case of all of our major projects related to E-waste. Plug-In is a good example. Each Plug-In partner signs an MOU with EPA setting out numeric goals for the number of e-cycling events to be held by that partner. The program as a whole also sets targets for the number of outreach and educational efforts completed. On an annual basis, partners report their results to EPA, including the number of collection events held, units recycled, and weight of material recycled. Plug-In also tracks cost, volume, and other data associated with each of its ongoing pilot projects. Thus far, in the 3-

week take-back pilot conducted by Staples in April in the Pacific Northwest (a catalyst for the nationwide Office Depot program now underway), Staples collected approximately 3,000 used computers and donated approximately \$25,000 to local schools. The other pilots are just getting underway and will be reporting similar data upon their completion.

Last year, EPA, through the RCC Electronics Cluster, recognized the importance of setting a national recycling goal for electronics. At that time, the NEPSI Dialogue was still underway. The Electronics Cluster, consisting of varied stakeholders, decided that as long as NEPSI was working on this issue, it would have been premature to set a separate RCC electronics recycling goal. If the NEPSI process comes to a conclusion this year without closure on a goal, the Electronics Cluster will once again take up the task of setting a national goal for electronics recovery.

In addition to our performance measures, OSW recently launched an evaluation of the benefits of our electronics projects. With this kind of information, OSW not only will be able to quantify decreased use of toxics in electronics and increased recycling, but also translate these changes into measurable environmental benefits. This effort will also help us in ongoing efforts to refine our performance measures to ensure that we are achieving the greatest possible benefits.

## **E-WASTE PROJECTS DEVELOPED WITHOUT APPARENT COORDINATION**

OIG suggests that EPA's many E-waste projects over the last several years have not been well-coordinated, resulting in a general lack of understanding by stakeholders of what EPA is trying to achieve. We appreciate the concerns of many stakeholders on this issue and are working to address them. Part of the challenge is the local nature of many electronic waste projects and the many different Federal, state and local agencies with interest in the issue. The proliferation of E-waste projects also attests to the complexity of the issues inherent in E-waste and the many approaches and solutions needed to address these issues, e.g., regulatory revisions to promote greater recycling, financing options, improved product and process design, safer recycling practices, data gathering and analysis, improved government procurement and end-of-life management, just to name a few. This proliferation of projects, in the context of voluntary efforts, is also a way to see what works and to be responsive to special needs identified by particular EPA regions.

To address these challenges, OSW, OPPT, ORD, and the Regional Offices have coordinated closely within EPA and with other agencies, such as GSA and OFEE, in the development of a comprehensive lifecycle-based approach to E-waste. We have held coordination calls regularly to ensure that our joint efforts are complementary and not duplicative and to minimize the burden on stakeholders, particularly industry partners who were involved in multiple EPA efforts. An E-Cycling summit planned for the beginning of 2005 will bring together all stakeholders to evaluate the progress of the Plug-In, EPEAT, and FEC programs, among others, to share achievements and data, identify further information needs, update plans, and update performance targets. We believe this Summit will go a long way in addressing the issues OIG raises.

OIG also states that EPA spent over \$6 million on E-waste projects, largely since 2000. We wish to point out that the \$6 million figure includes a series of Congressional set-asides totaling some \$3.8 million to West Virginia University and the Polymer Alliance Zone to increase recycling of plastics from electronics waste. Subtracting these mandatory set-asides, the total would come to \$2.2 million in EPA discretionary spending (not including rulemaking) over a period spanning from 1997 to 2003.

## RECOMMENDATIONS

- 2.1 **Define E-waste program, goals, and performance measures, and communicate them to stakeholders. These should be synchronized with the RCC Electronics Sector Government Performance and Results Act performance measures currently under development by OSW.**

### *RESPONSE*

We believe that our current E-waste program, goals, and performance measures are reasonable within a voluntary program framework. Nevertheless, we recognize that electronic waste has been, and will continue to be, an important area for the Agency to articulate its goals and measures, as well as its plans. Therefore, to ensure that the Agency's efforts in this area are understood and clearly communicated, we plan to review the existing description of the Electronics Cluster on the RCC website and make sure that our goals and strategies are fully explained on this website, and that this information is linked to our individual E-waste project websites. We will also periodically review and update our goals and measures as the program develops. We will also synchronize our project performance measures with any performance measures ultimately developed by the RCC Electronics Sector.

- 2.2 **Ensure that all E-waste efforts are clearly linked to the defined program goals and coordinated by OSW with other EPA offices to ensure compatibility of all projects and progress towards the defined goals. All projects should clearly define the relevant goals(s) and associated quantitative performance measures. The Federal Electronics Challenge and the Electronics Products Environmental Assessment Tool Project should continue to receive a high level of emphasis to ensure that they remain on schedule and can be used to leverage the reduced toxicity of electronic devices through preferential purchasing.**

### *RESPONSE*

We agree it is important that all of our E-waste projects be linked to clear goals, coordinated with other EPA offices and accompanied by quantitative performance measures. We believe that our E-waste efforts to date have been clearly linked to the E-waste program goals and are compatible with each other. Also, quantitative performance measures are already in place for our ongoing projects or under development in partnership with stakeholders. We will continue to assure that our E-waste projects fit squarely with our broad E-waste goals and that the performance measures for these projects are refined and coordinated with other measurement efforts such as those proceeding under the RCC and GPRA. OSW also will continue to coordinate with OPPT/PPD to ensure that the FEC and the EPEAT projects receive a high level of emphasis.

## OSW'S LEADERSHIP CREDIBILITY AT RISK

OIG points to delays in issuing the CRT final rule; EPA's withdrawal from the NEPSI dialogue; and alleged failure by EPA to anticipate changes in E-waste and to provide an appropriate regulatory response as evidence that EPA's leadership credibility is at risk or has been harmed.

We agree with OIG that EPA needs to provide credible leadership in the area of E-waste management and recycling. We are pleased, therefore, to see continued participation by major multi-national stakeholders, key states and municipalities, and NGOs in NEPSI, the Plug-In program and EPEAT. Plug-In, for example, has expanded significantly over the past year, to include more than a dozen private sector partners and 22 state and local government partners. We see this as evidence that these programs continue to be perceived as important and valuable.

OSW is aware that it has taken longer than hoped to finalize the CRT rule and that this delay has caused problems for some stakeholders. We are working hard to get the rule finalized in early 2005. However, we do not agree that there is currently a lack of guidance for how CRTs are currently regulated under federal law. We specifically encourage states to adopt approaches consistent with our CRT regulatory proposal, as we stated in the preamble to our June 12, 2002, notice. We also routinely refer inquiries on this issue to the states which have the authority and discretion to address CRTs differently.

We are also still optimistic that the NEPSI dialogue will bear fruit. We withdrew from the process when discussions had turned from voluntary initiatives to consideration of a joint effort to lobby for Federal legislation. While we would have liked to remain involved, we were concerned that doing so would raise questions with anti-lobbying restrictions applicable to EPA staff and EPA grantees. After our departure, the dialogue continued, found separate funding, and was able to issue an important resolution in February of this year indicating substantial progress by the stakeholders on a series of important issues. Overall, we believe the NEPSI process has been a valuable and necessary step toward a national solution, and it should be recognized as such.

OIG also claims that OSW has failed to anticipate changes in the E-waste stream and provide regulatory response in a timely manner. Furthermore, OIG also states that OSW has not anticipated technological changes that will introduce new waste streams. We disagree. For the last two years, we have been investigating whether a wide variety of non-CRT electronic devices (including flat panel displays, cell phones and more) may be identified as characteristic hazardous wastes when discarded. We will closely examine technical and jurisdictional issues related to these devices. Technical issues include the appropriateness of using the Toxicity Characteristic Leaching Procedure (TCLP) to measure the propensity for electronics to leach metals in municipal landfills. Jurisdictional issues will include examining the sources of various electronic devices, such as whether they are largely generated by households or conditionally exempt small quantity generators.

## **RECOMMENDATIONS**

- 2.3 Convene a working group to finalize the development of a product stewardship framework for electronics, begun in the NEPSI dialogue. The type of working group utilized should ensure that no limitations are placed on the possible recommendations, as was encountered in the development of draft Federal legislation in NEPSI.**

## ***RESPONSE***

At this time, we do not see the need to convene a working group to finalize a product stewardship framework for electronics. The NEPSI process has not yet formally come to an end. Industry stakeholders are still seeking to reach a consensus on a national financing system. We will continue to monitor the progress of NEPSI. If, at some point in the future, it does seem advisable to

create another working group to complete any work not completed as part of NEPSI, we will consider doing so. Any such effort, however, will be subject to the same constraints and limitations relating to Federal legislation if EPA is involved. In the meantime, as part of the development of an overall strategy for the Resource Conservation Challenge, we have recently developed a draft product stewardship framework. This framework addresses a number of product sectors, including electronics. This strategy is being reviewed internally within EPA at this time and is expected to be finalized and publicized in the upcoming months.

#### **2.4 Finalize the CRT Rule as soon as possible.**

##### ***RESPONSE***

EPA agrees with this recommendation. We have drafted a final rule on CRTs and CRT glass destined for recycling. The draft final rule is currently undergoing internal Agency review before submission to the Office of Management and Budget (OMB). After Administration review, we anticipate that the rule will be finalized and published in the Federal Register in 2005.

#### **2.5 Define OSW's regulatory ability to address new definitions of E-waste, in a manner that precludes major delays such as those encountered in the CRT rule. In addition to addressing electronic devices determined to be hazardous waste, this effort should include an evaluation of industry trends to identify potential future impact areas. This could be implemented through a stakeholder review committee tasked with evaluating electronic waste streams and their implications.**

##### ***RESPONSE***

We agree that EPA needs to determine whether other non-CRT electronic devices could be characteristic hazardous wastes when discarded. We are currently reviewing a recently issued analysis by the University of Florida on CPUs, monitors, laptops, printers, VCRs, cell phones, keyboards, mice, remote controls, smoke detectors, and flat panel displays. We will be examining closely any technical and jurisdictional issues related to these devices. The Agency will also be studying industry trends to identify areas of potential future concern. We currently believe that informal consultation with various well-informed stakeholders is a better way to learn about these trends than a formal review committee.

#### **U.S. LAGGING BEHIND INTERNATIONAL E-WASTE EFFORTS**

We recognize the concern of many that the United States is lagging other countries in addressing E-waste. However, we would like to point out a number of international efforts related to e-waste management where the United States is actually leading the rest of the world. For example, the United States has been one of the most active nations in the Organization for Economic Cooperation and Development (OECD) supporting the development of a framework for assuring the environmentally sound management (ESM) of wastes, including e-wastes. Specifically, OSW led the OECD effort to develop guidelines on ESM for used personal computers. That technical guidance document was issued in February 2003. Further, under the Basel Convention, the United States (OSW) is the most active nation involved in the development of ESM guidelines for the management of used cell phones, as we are chairing or co-chairing several of the workgroups. We are also very active in development of a new Basel initiative for addressing end-of-life personal

computers. As part of this new Basel effort, the existing OECD guidelines, whose development was led by OSW, are being recognized as a useful base.

### **CHAPTER 3**

#### **EXCLUSION MAY ALLOW HIGH VOLUMES OF E-WASTE IN MUNICIPAL LANDFILLS**

OIG states that much of the anticipated volume of E-waste (perhaps as much as 90 percent) may be disposed ultimately in municipal solid waste landfills, due to the existing RCRA household hazardous waste exclusion, which allows households to dispose of hazardous waste in municipal landfills.

The implication of OIG's statement is that all E-waste would exhibit a RCRA hazardous waste characteristic. To date, EPA has only concluded that CRTs from televisions and personal computers typically and frequently fail the TCLP. The Municipal Waste Characterization Report, which estimates the amount of E-waste discarded, addresses far more e-waste than just CRTs -- including VCRs, camcorders, CD players, radios, telephones, printers and fax machines. EPA is in the process of assessing which other electronics fail the TCLP. Some may but we do not expect it to be the entire range of consumer electronics.

The most recent MSW Characterization Report does estimate that 91% of E-waste is discarded. However, this is a worst case estimate. As the report recognizes much end-of-life E-waste is in storage. Future updates to the Characterization report will take account of more recent and sophisticated estimates of E-waste storage, likely resulting in a significantly smaller estimate of e-waste discarded. A recent estimate of household CRT disposal prepared for OSW indicated that 3.9 million computer monitors and 7.65 million televisions were discarded in municipal landfills in 2000. This is a fraction of the household TVs and PCs that become obsolete in a given year. See OIG's estimate on page 2 of its report that 50 million computers become obsolete each year. EPA agrees with OIG, however, that we need to encourage these stored products to move toward recycling rather than disposal.

Regardless of how much E-waste that may exhibit a hazardous characteristic finds its way into municipal landfills, EPA does not believe that this will pose an environmental risk. In October 1991, EPA issued updated criteria for MSWLFs that may receive household waste that exhibits a hazardous characteristic and conditionally exempt small quantity generator (CESQG) hazardous waste to ensure the protectiveness of these landfills. In addition, several studies over the years have shown that leachate from municipal landfills for most metals is at levels below the drinking water standards. Our primary interest in focusing on increasing recycling of E-waste is based on resource conservation and minimization of the environmental insults that result from materials extraction rather than on environmental risks from landfilling the waste in properly managed landfills.

These findings are further supported by a recent SWANA study, which reported that municipal solid waste landfills can provide safe, long-term management of products containing heavy metals and can effectively control the release of heavy metals to the environment. The report, entitled, "The Effectiveness of Municipal Solid Waste Landfills in Controlling the Releases of Heavy Metals to the Environment" is available online at [www.SWANASTore.com](http://www.SWANASTore.com).

With regard to the discussion of whether the household waste exclusion is based on regulation or statute, we have several suggestions. First, the 4th paragraph on page 15 of the draft OIG report should be omitted. By stating that the exclusion itself is regulatory and not based on statute, the report suggests that EPA could eliminate the exclusion altogether. However, not only did EPA promulgate the exclusion on the basis of expressed legislative intent in legislative history (Senate Report No. 94-988 at 16 (1976)), Congress subsequently recognized the household waste exclusion and included it in the Hazardous and Solid Waste Amendments of 1984, P.L. 98-616 (HSWA). See RCRA sections 3001(i), 4005(c), and 4010(c), which were added by HSWA. It is therefore OSWER's position that the household waste exclusion is statutorily based, that Congress intended there to be an exclusion for household waste, and that elimination of this exclusion would be contrary to RCRA.

At the very least, the first sentence of the 4th paragraph on page 15 should be edited for accuracy as follows: "We have concluded that **the scope of** the household hazardous waste exclusion is based on regulation, not statute." OSWER agrees that the scope of the household waste exclusion could be amended. Indeed, the scope of the exclusion has been amended since it was originally promulgated. See 49 Fed. Reg. 44978 ( Nov. 13, 1984).

### ***RECOMMENDATION***

- 3.1 Ensure that household hazardous waste E-waste volumes are estimated annually, to determine the impact of the household hazardous waste exclusion on E-waste disposal in municipal solid waste landfills. In conjunction with stakeholders, OSW should define contingency plans if the household hazardous waste E-waste volume exceeds specified amounts.**

### ***RESPONSE***

OSW will continue to refine its estimate of e-waste disposed in the US as part of its Municipal Solid Waste Characterization Report, using updated estimates of e-waste storage. We do not agree that there is any need to define contingency plans regarding volumes of e-waste discarded in landfills because we strongly believe MSW landfill management practices consistent with our requirements are protective of human health and the environment. Furthermore, indications are strong that recycling of e-waste will grow as a result of citizen interest, voluntary business commitment, and policy mandates at the state and, possibly eventually, at the Federal level.

## **CHAPTER 4**

### **EPA DOES NOT COLLECT ADEQUATE DATA ON E-WASTE**

OIG states that existing data collected on E-waste are inadequate to support regulatory decisions and that EPA is forced to rely on speculative national data. OIG appears to presume that the E-Waste problem will be solved exclusively through regulation. In the area of electronic waste, the Agency is emphasizing primarily voluntary programs. We are using a regulatory approach only where absolutely necessary (the CRT Rule, for example).

Within the framework of voluntary programs, EPA has not traditionally practiced as rigorous data collection efforts as may be required to support regulatory actions. Nevertheless, in its pursuit of E-waste solutions, EPA has funded data collection activities in a targeted and efficient manner to inform its activities. In addition, for EPA's E-waste initiatives, we have had access to a wide array of data from numerous sources dating from the late 90's to the present (some funded by EPA and some not) which are more than adequate to demonstrate that electronics is a growing waste stream that should be recycled.<sup>6</sup> This includes data collected by a number of states moving aggressively to divert electronics from disposal (e.g., CA, MA, MN and FL). Thus, we disagree that existing E-waste data are inadequate to support our efforts.

Recently, we have concentrated on data related to the costs of collecting, transporting and processing electronics bound for recycling, as well as recovery rates experienced by municipal and privately-sponsored e-waste collection programs.<sup>7</sup> For example, while still involved in the NEPSI Dialogue, we developed a voluntary on-line data reporting system, open to state and local governments. Participants in NEPSI, as well as others who became aware of the data base, provided detailed information about the costs, material collected, and other important data related to over 58 collection programs in 18 states. In partnership with the Polymer Alliance Zone, this database is now being expanded and improved so that data can be added by many more sources and viewed by any interested party.

The improved system will be a central repository for data voluntarily submitted on electronics collection programs sponsored by government, industry and those participating in EPA's voluntary projects (e.g., Plug-In to eCycling Program and pilots). Data will be accessible online to any interested party and offer them the ability to track their own data and/or analyze data from other programs for their own planning purposes. This project will standardize and increase the reliability of the information that is collected on e-waste collection programs around the nation. EPA intends to use data from this database as the foundation for program evaluation and planning to be completed at the National Summit planned for early 2005.

Moreover, this spring OSW launched a quantitative assessment of the environmental benefits of diverting electronics from disposal into reuse or recycling. As part of this effort, we will be reviewing baseline generation, disposal and recycling patterns (using existing information from a wide variety of sources), further refining the performance measures for our various major electronics

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<sup>6</sup> "Disposition and End-of-Life Options for Personal Computers," a **Carnegie Mellon University** report (1997). **National Safety Council** report, "Electronic Product Recovery and Recycling Baseline Report," (1999). EPA's **MSW Characterization Report** (updated at least every 2 years; a special effort was made a couple of years ago to characterization of the various kinds of e-waste, rather than just providing an undifferentiated estimate of e-waste in total). **International Association of Electronics Recyclers** annual survey of the electronics recycling industry. OSW's **Capacity Analysis for CRT Management (June, 2004)**.

<sup>7</sup> **A report by the State of Massachusetts, "Electronics Re-Use and Recycling Infrastructure Development in Massachusetts,"** (2000) documented the results and the lessons-learned from a state-wide, state-supported CRT collection project; **Northeast Recycling Council report on "Setting Up and Operating Electronics Recycling/Reuse Programs: A Manual for Municipalities and Counties"** (2001), surveyed programs around the country and offered guidance to others seeking to develop their own programs; **EPA Region 3's report, "Final Report on The Mid-Atlantic States Electronics Recycling Pilot,"** (2004) documented costs and results from a 14-month region-wide collection pilot primarily focused on municipal dropoffs and permanent collections, with some assistance from industry; **EPA's data analysis for the NEPSI Dialogue** included a variety of estimates of the number of TVs and PCs available for recycling in future years, as well as expected storage times and average per-capita recovery rates from pilots around the country; **EPA's Plug-In to eCycling Program** collects data on the costs and results of ongoing and one-time e-waste collections sponsored by its industry and municipal partners (so far 162 one-time collections and 11 ongoing collections).



initiatives and using this information to measure the potential health and environmental benefits of meeting these measures. This work was launched several months ago and will take some time to bear fruit.

As regards data on the disposition of EPA's own computers, OARM tracks the disposition of EPA computers in two ways: 1) the donation of computers through the Computers For Learning Program is documented and a list is provided to GSA of all computers donated via this program; and 2) OARM also manages disposition of EPA computers turned over to OARM (HQ only) via the excess property program administered by GSA. The Regions, OARM Cincinnati and OARM RTP have independent disposal programs. Nevertheless, OARM HQ does capture information on computers excessed by those offices and provides an Agency-wide listing of computers disposed via GSA in an annual report to them. OARM does not have a mechanism to track the disposition of computers after turnover to GSA, nor should the organization since GSA is the responsible disposal agent.

With regard to the Recycling Electronics and Asset Disposition (READ) contract, OSW wishes to amend the OIG report to add the fact that, on March 19, 2004, OMB designated EPA as the authorized Federal agency to manage this Government Wide Acquisition Contract and to handle the disposition of e-waste for all federal departments and agencies.

## ***RECOMMENDATIONS***

- 4.1 Identify the relevant data needed in support of the e-waste goals and performance measures, as defined in Recommendation 2.1. To ensure the proper definition of required data, OSW should convene a stakeholder working group to define the necessary data, frequency of collection, and most efficient and effective mechanisms for the collection of the data.**

## ***RESPONSE***

OSW agrees that adequate data are essential for the development of good goals and performance measures for our E-waste initiatives. We believe the goals and performance measures we have established are based on adequate data available now from a wide variety of sources. Moreover, we have a number of specific actions underway to supplement certain of this data. We will continue to examine where additional data could be valuable, how best to obtain it and whether resources would permit this data gathering. At this time, we do not believe that a separate stakeholder working group is needed to assist in this effort. We are already working with multiple stakeholders in the Plug In project to assist in the development of a national data base on electronics recycling costs and results. If, however, a working group like that recommended would prove valuable in the future, we would certainly consider this.

- 4.2 Work with the Office of Prevention, Pesticides, and Toxic Substances, and the Office of Acquisition Management, to ensure the implementation of the Recycling Electronics and Asset Disposition Government-wide acquisition contract. OSW should ensure that adequate data are collected to provide appropriate end-of-life measurements of EPA's computers. In the interim, OSW, the Office of Prevention, Pesticides, and Toxic Substances, and the Office of Acquisition Management should ensure the disposition of**

**EPA's computers is in accordance with its E-waste goals, develop the mechanisms to track computer purchases and disposition Agency-wide, and develop effective communications mechanisms with regional offices to ensure that the Agency is adhering to its own (as well as applicable State) hazardous waste regulations.**

***RESPONSE***

EPA agrees with the recommendation regarding implementation of the READ acquisition contract. With regard to collection of information on computers excessed by EPA, the Agency (OARM, not OSW) does collect information on this material --at least until those computers are turned over to GSA for final management. As GSA has the final decision over what is done with materials turned over to them, EPA is not in a position currently to track this disposition once materials leave its control. The READ contract, when implemented, will provide a mechanism for any Federal Agency to track final disposition of its computers. However, OARM, with agreement from GSA, will only track disposition through turnover to GSA. Nevertheless, EPA will work in the context of the Federal Electronics Challenge to encourage GSA to track disposition of all Federal E-waste to its ultimate disposition.

## ***Distribution***

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