



U.S. ENVIRONMENTAL PROTECTION AGENCY

OFFICE OF INSPECTOR GENERAL



Improved Information Could Better Enable EPA to Manage Electronic Waste and Enforce Regulations

Report No. 13-P-0298

June 21, 2013



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Report Contributors:

Carolyn Copper
Jerri Dorsey
Heather Drayton
Jeffrey Harris
Jee W. Kim
Denton Stafford

Abbreviations

CRT	Cathode ray tube
EPA	U.S. Environmental Protection Agency
EPEAT	Electronic Product Environmental Assessment Tool
E-waste	Electronic waste
FEC	Federal Electronics Challenge
GAO	U.S. Government Accountability Office
GSA	U.S. General Services Administration
ICR	Information Collection Request
OECA	Office of Enforcement and Compliance Assurance
OIG	Office of Inspector General
OMB	Office of Management and Budget
OPPT	Office of Pollution Prevention and Toxics
ORCR	Office of Resource Conservation and Recovery
ORD	Office of Research and Development
OSWER	Office of Solid Waste and Emergency Response
PRA	Paperwork Reduction Act
R2	Responsible Recycling Practices
RCRA	Resource Conservation and Recovery Act
SMM	Sustainable Materials Management
TCLP	Toxicity Characteristic Leaching Procedure

Cover photo: Discarded devices such as (from left) cellular phones, computers, and circuit boards found in electronics are commonly referred to as E-waste. (EPA photos)

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At a Glance

Why We Did This Review

The purpose of this review was to determine whether the U.S. Environmental Protection Agency (EPA) has information of sufficient quality to assess the adequacy of its electronic waste (E-waste) management and the effectiveness of its enforcement policies, to assure that public health is protected. E-waste is the fastest growing domestic waste stream. It includes devices such as computers, televisions, and cell phones. E-waste contains toxic materials that pose hazards to human health and the environment if not properly disposed or recycled. E-waste also contains valuable materials. EPA encourages reuse and recycling of electronics over land-filling and incineration. To that end, EPA manages E-waste via federal regulations, voluntary partnership programs, and support of third-party recycler certification programs.

This report addresses the following EPA's Goals or Cross-Cutting Strategies

- *Cleaning up communities and advancing sustainable development.*
- *Enforcing environmental laws.*

For further information, contact our Office of Congressional and Public Affairs at (202) 566-2391.

The full report is at:
www.epa.gov/oig/reports/2013/20130621-13-P-0298.pdf

Improved Information Could Better Enable EPA to Manage Electronic Waste and Enforce Regulations

What We Found

EPA does not have adequate information to ensure effective E-waste management and enforcement to protect public health and conserve valuable resources. For example, EPA manages E-waste without a consistent approach for defining E-waste. This hampers EPA's ability to effectively collect relevant information and set goals. Further, EPA lacks complete information on E-waste disposition, which hinders the effective use of its resources.

EPA enforcement is hampered by the lack of complete information on cathode ray tube (CRT) exporters in the United States. This incomplete information hinders EPA's ability to set enforcement targets for the CRT Rule. EPA also does not have a practical process to determine the hazardous nature of non-CRT waste. Potentially toxic E-waste could be disposed in municipal landfills or incinerated without potential hazards being identified as required. Further, EPA advocates certified E-waste recyclers but has limited knowledge of the extent of compliance by certified recyclers with federal environmental regulations. In addition, EPA staff stated that E-waste management and enforcement are hampered by federal information collection restrictions and a lack of resources.

Recommendations and Planned Agency Corrective Actions

We recommend that EPA: (1) develop a consistent approach for defining E-waste and identifying information to manage the E-waste universe; (2) develop a practical process to address hazards of non-CRT E-waste that ensures that this waste is managed in an environmentally sustainable manner; (3) evaluate implementation of the certification programs for used electronics; (4) evaluate resource needs for E-waste management; (5) evaluate methods for gathering the information needed to set CRT Rule enforcement targets such as the use of Resource Conservation and Recovery Act Section 3007 information request letters to identify CRT exporters.

EPA concurred with all recommendations, but we consider these recommendations unresolved pending receipt of planned corrective actions and completion dates.

Noteworthy Achievements

EPA helped create the Responsible Recycling Practices certification body and created voluntary E-waste programs. EPA amended the CRT Rule to better track E-waste, and inspected facilities identified by the U.S. Government Accountability Office as "willing to violate" the CRT Rule. EPA also participated in the task force that released the National Strategy for Electronics Stewardship in July 2011.



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

THE INSPECTOR GENERAL

June 21, 2013

MEMORANDUM

SUBJECT: Improved Information Could Better Enable EPA to
Manage Electronic Waste and Enforce Regulations
Report No. 13-P-0298

FROM: Arthur A. Elkins Jr.

A handwritten signature in black ink, appearing to read "Arthur A. Elkins Jr.", is written over the printed name.

TO: Mathy Stanislaus, Assistant Administrator
Office of Solid Waste and Emergency Response

Cynthia Giles, Assistant Administrator
Office of Enforcement and Compliance Assurance

This is a report on the subject evaluation 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 has identified and corrective actions the OIG recommends. This report represents the opinion of the OIG and does not necessarily represent the final EPA position. This report contains five recommendations that the EPA agreed to. These recommendations are considered unresolved pending our receipt of EPA's corrective action plan and estimated completion dates.

Action Required

For all recommendations, you are required to provide corrective actions and planned completion dates within 60 days of report issuance. We have no objections to the further release of this report to the public. We will post this report to our website at <http://www.epa.gov/oig>.

If you or your staff have any questions regarding this report, please contact Assistant Inspector General for Program Evaluation Carolyn Copper at (202) 566-0829 or copper.carolyn@epa.gov; or Acting Director for Toxics, Chemical Management, and Pollution Prevention Jerri Dorsey at (919) 541-3601 or dorsey.jerri@epa.gov.

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Chapter 1

Introduction

Purpose

This report addresses the U.S. Environmental Protection Agency's (EPA's) efforts to promote proper management of end-of-life electronic waste (E-waste). We sought to determine whether EPA has information of sufficient quality to assess both the adequacy of its management of E-waste and the effectiveness of its enforcement policies to assure that public health is protected.

Background

Disposal of End of Life Electronic Devices Presents Concerns

The use of electronic products has grown substantially over the past two decades. According to the Congressional Research Service, E-waste refers to obsolete, broken, or irreparable electronic devices. E-waste is the fastest growing category of solid waste in the United States. EPA estimates that the United States generated 2.37 million tons of E-waste in 2009. Of that amount, 75 percent was disposed in landfills or incinerated. Table 1 illustrates the disposal and recycling figures for three key electronic devices in 2009.

Table 1: Management of used and end-of-life electronics in 2009 (millions of units)

	Ready for end-of-life management	Disposed	Collected for recycling	Rate of collection for recycling
Computers	47.4	29.4	18	38%
TVs	27.2	22.7	4.6	17%
Mobile Devices	141	129	11.7	8%

Source: EPA Office of Solid Waste and Emergency Response (OSWER).

Electronic devices are constantly evolving in design and contain varying amounts of plastics, glass, and toxic materials.¹ Electronics also contain precious metals such as gold and rare earth metals.² An opportunity for valuable resource conservation is lost when these devices are disposed of in landfills or incinerated. Further, EPA has serious concerns about unsafe handling of E-waste in developing countries that result in harm to human health and the environment. For

¹ Electronic devices may contain the following potentially toxic metals: antimony, arsenic, barium, beryllium, cadmium, chromium, lead, mercury, nickel, selenium, silver, and thallium.

² Rare earth metals and their compounds comprise 17 periodic elements. Due to their unique physical and chemical properties they are becoming widely used in electronics. Examples include europium (used in liquid crystal displays and fluorescent lighting), yttrium (used in color television and computer monitors), and terbium (phosphors for lighting and display).

example, open-air burning and acid baths are being used to recover valuable materials from electronic components. This exposes workers and communities to harmful substances. There are also problems with toxic materials leaching into the environment. These practices can expose workers and communities to high levels of contaminants such as lead, mercury, cadmium and arsenic. Such exposures can lead to irreversible health effects, including cancers, miscarriages, neurological damage and diminished intelligence.

According to an EPA Office of Research and Development (ORD) report,³ domestically, “a concern exists that e-waste may leach toxic chemicals into the leachate of lined landfills or contaminate groundwater near unlined landfills.” A Congressional Research Service Report⁴ noted that concerns about E-waste landfill disposal have led federal and state governments to encourage recycling. While there is no federal law requiring the recycling of E-waste, 25 states have passed legislation mandating statewide E-waste recycling.⁵ Eighteen of those states have determined which type of electronics to ban from state landfills or incinerators and have completely banned disposal of these electronics in landfills or incinerators.

In 2010, the President established the Interagency Task Force on Electronics Stewardship to enhance the sustainable management of electronics throughout the product lifecycle. The task force released the *National Strategy for Electronics Stewardship* (National Strategy) in July 2011 with multiple action items under four main goals. National Strategy is a priority-setting document for the federal government and EPA made commitments as part of the strategy. These commitments are governing the EPA activities and resources available for used electronics. The strategy goals aim to protect human health and the environment from the potentially harmful effects associated with the improper handling and disposal of electronic devices.

EPA’s Management of E-Waste

The basis for EPA’s E-waste management is the Agency’s solid waste management hierarchy (see figure 1). This hierarchy ranks the most environmentally sound methods for municipal solid waste. Source reduction (including reuse) is the most preferred method, followed by recycling, energy recovery, and treatment and disposal. EPA’s main objective in its management of E-waste, based on the hierarchy, is to encourage the use of more environmentally sound methods for dealing with discarded electronics.

³ EPA ORD Report, USEPA Region/ORD Workshop on Emerging Pollutants, p. 26 (2003).

⁴ Congressional Research Service Report, Managing Electronic Waste: Issues with Exporting E-Waste, p. 4 (2010).

⁵ Twenty-five states have passed various forms of producer responsibility or take-back legislation; however, in most instances, the laws require that the producer (or importer) of the electronic product offer or finance take-back opportunities to their customers in the regulated states.

Figure 1: EPA solid waste management hierarchy



Source: EPA OSWER.

In support of this hierarchy, EPA enforces regulations, and encourages participation in E-waste voluntary programs and the use of third-party certified recycling companies. We detail each of these in the following sections.

EPA's Regulation of E-Waste

EPA regulates the management and disposal of E-waste through Resource Conservation and Recovery Act (RCRA) authority.⁶ As part of the RCRA regulatory program, EPA also issued a specific rule to manage cathode ray tubes (CRTs) after testing confirmed they contained lead above regulatory limits.⁷

RCRA

A RCRA goal is to ensure that hazardous wastes are managed in a manner that is protective of human health and the environment.⁸ As part of this goal, hazardous waste cannot be disposed in municipal solid waste landfills and other non-hazardous waste landfills. If waste is listed as hazardous waste or has hazardous characteristics⁹ and is not otherwise exempt or excluded from RCRA, the waste is considered RCRA hazardous waste. Hazardous wastes must be treated and disposed in EPA-approved hazardous waste landfills that have more regulatory controls than municipal solid waste landfills. Wastes that are hazardous solely because they have a hazardous characteristic may be considered non-hazardous and disposed in a municipal landfill after they have been treated to decharacterize them and meet other waste treatment requirements.

⁶ 42 U.S.C. § 6901 et seq.

⁷ 71 Fed. Reg. 42927- 949, (July 28, 2006) (codified at 40 C.F.R. §§ 261.39 – 261.41). RCRA Toxicity Characterization of Computer CPUs and Other Discarded Electronic Devices (2004), available at www.ees.ufl.edu/homepp/townsend/Research/ElectronicLeaching/default.asp.

⁸ 42 U.S.C. § 6902(a)(4).

⁹ There are four hazardous waste characteristics: ignitability, corrosivity, reactivity, and toxicity.

E-waste is regulated as a RCRA hazardous waste when a non-household waste generator disposes of used electronics that exhibit a hazardous characteristic at a quantity more than 220 pounds per month.¹⁰ E-waste can be hazardous or non-hazardous, leading to different EPA management approaches. E-waste is considered hazardous by RCRA when a waste generator has knowledge that discarded waste is hazardous or the waste tests hazardous for a characteristic.¹¹ Under the federal regulations, electronic devices can be disposed in municipal landfills if they are considered non-hazardous or the devices are otherwise exempt or excluded from RCRA.

CRT Rule

Used CRTs are the only electronic devices specifically regulated as hazardous waste.¹² CRTs are the video display component of computers and television monitors.¹³ Many CRTs from color monitors exceed EPA's Toxicity Characteristic Leaching Procedure (TCLP) regulatory limit for lead content.¹⁴ Therefore, RCRA controls CRT end-of-life management, including export.¹⁵ EPA's CRT Rule went into effect in 2007. The rule's purpose is to encourage the recycling of used CRTs and CRT glass by conditionally excluding recycled CRTs from full RCRA hazardous waste management requirements.¹⁶ The rule created alternative management requirements for CRT tubes and glass being recycled, and applies to CRT exporters and recyclers in the United States.¹⁷ The rule requires CRT exporters and recyclers in the United States to comply with existing hazardous waste notice and consent requirements and additional hazardous waste management regulations for CRT tubes and glass.¹⁸ Domestic CRT recyclers must follow packaging, labeling, and storage requirements.¹⁹

¹⁰ Household and conditionally exempt small quantity generators (generators < 220 lbs per month) are generating hazardous waste if their waste expresses a hazardous characteristic (such as exceeding a toxicity characteristic regulatory value); however, they have been excluded from having to manage those materials in a hazardous waste landfill. See 40 C.F.R part 261 Subpart C; 40 C.F.R § 261.4(b)(1); 40 C.F.R §261.5(a); and 40 C.F.R §262.11.

¹¹ It is the generators' duty to determine whether they have a hazardous waste.

¹² There is a body of evidence to show that the CRT exceeds the toxicity characteristic regulatory limit for lead. However, if the CRTs are recycled under the required conditions they are excluded from the definition of solid and, therefore, hazardous waste.

¹³ 71 Fed. Reg. 42928 (July 28, 2006).

¹⁴ CRTs also contain cadmium and mercury. 71 Fed. Reg. 42930 (July 28, 2006).

¹⁵ 71 Fed. Reg. 42949 (July 28, 2006).

¹⁶ 71 Fed. Reg. 42928 (July 28, 2006).

¹⁷ *Id.*

¹⁸ 40 C.F.R. § 261.39 – 261.41.

¹⁹ 40 C.F.R. § 261.39. Also, on March 15, 2012, EPA proposed a rule change to better track exports of CRTs for reuse and recycling. 77 Fed. Reg. 15336- 343 (March 15, 2012).

EPA's Voluntary Programs

EPA established a number of voluntary programs and initiatives to address the solid waste management hierarchy for E-waste.²⁰ These efforts encourage federal agencies to purchase greener electronics and manage used electronics in an environmentally safe manner. Specifically, voluntary programs include the Federal Electronics Challenge (FEC) and the Federal Green Challenge under the Agency's Sustainable Materials Management (SMM) Electronics Challenge. EPA also provides technical support for the Electronic Product Environmental Assessment Tool (EPEAT). EPEAT was developed using an EPA grant and is managed by a third party called the Green Electronics Council. The EPEAT program aims to reduce the amount of E-waste that needs to be reused, recycled, or managed while reducing the amount of toxic material found in electronics waste. EPEAT aids purchasers in buying the greenest equipment by informing purchasers of the electronic products' environmental criteria.²¹

Third Party Certifications

EPA encourages recyclers to be certified by one of two electronics recycling certifications. The two available certification programs are Responsible Recycling Practices (R2) and e-Stewards. EPA relies on third parties to ensure that domestic recyclers adhere to certification standards. The certifications share common elements that promote responsible used electronic recycling. Both programs set best management practices for safe electronic device recycling. EPA convened a 3-year multi-stakeholder process to develop the R2 standard. The Basel Action Network, a non-profit organization, created the e-Stewards certification.

Roles of EPA Offices in Managing the Hierarchy

Multiple EPA offices are responsible for managing E-waste under the solid waste management hierarchy:

- Office of Resource Conservation and Recovery (ORCR), within OSWER, develops E-waste policy. ORCR also manages the Federal Green Challenge component of the SMM Electronics Challenge.
- Office of Enforcement and Compliance Assurance (OECA) enforces compliance with the CRT Rule. OECA also provides assistance, monitoring, and enforcing compliance with RCRA hazardous waste regulations by inspecting regulated facilities.
- Office of Pollution Prevention and Toxics (OPPT), within the Office of Chemical Safety and Pollution Prevention, manages the national voluntary programs (e.g., FEC and technical support for EPEAT) with a focus on pollution prevention and federal environmental stewardship practices.

²⁰ EPA's E-waste voluntary programs were developed prior to the development of the National Strategy.

²¹ The current National Strategy seeks to encourage consumer purchasing of EPEAT products and development of new EPEAT standards for non-EPEAT products.

- ORD works with EPA’s program and regional offices to develop research plans for E-waste studies.
- EPA regional offices support and implement the E-waste strategies of the above headquarters offices.

Prior Reports

A prior EPA Office of Inspector General (OIG) report evaluated EPA’s various E-waste projects and their outcomes. Report No. 2004-P-00028, *Multiple Actions Taken to Address Electronic Waste, But EPA Needs to Provide Clear National Direction*, was issued September 1, 2004. This report noted that EPA implemented or participated in many projects that enhanced the general awareness of E-waste issues. However, EPA lacked a clear set of program goals and measures of effect. We concluded that due to incomplete actions related to E-waste, EPA could not ensure that it was effectively addressing the human health and environmental risks associated with E-waste. Additionally, EPA had not adequately defined the information required to characterize the E-waste problem or track progress.

The U.S. Government Accountability Office (GAO) also evaluated EPA’s management of E-waste in several reports. These reports covered various EPA E-waste issues, including EPA’s voluntary programs, CRT Rule enforcement, and the FEC.²²

Noteworthy Achievements

Since the 2004 OIG report, EPA provided funding to and facilitated R2 development with electronics stakeholders. EPA launched EPEAT and FEC. EPA issued the final CRT Rule in 2006. In March 2012, EPA proposed a CRT Rule amendment to enhance the ability of tracking CRT exports.

Following publication of a GAO 2008 report, *EPA Needs to Better Control Harmful U.S. Exports through Stronger Enforcement and More Comprehensive Regulation*, EPA obtained the names of the 43 companies that GAO identified in its report as “willing to violate the hazardous waste regulations.” OECA worked with the regions to investigate all 43 listed companies and took formal or informal enforcement actions as needed.

In 2010, EPA Regions 8, 9, and 10, with OECA coordination, participated in a cargo inspection exercise with the U.S. Department of Homeland Security’s

²² GAO report, *Electronic Waste: Strengthening the Role of the Federal Government in Encouraging Recycling and Reuse 14* (2005); GAO report, *Electronic Waste: EPA Needs to Better Control Harmful U.S. Exports through Stronger Enforcement and More Comprehensive Regulation* (2008); GAO report, *Electronic Waste: Considerations for Promoting Environmentally Sound Reuse and Recycling* (2010); and GAO report, *Actions Needed to Provide Assurance That Used Federal Electronics Are Disposed of in an Environmentally Responsible Manner* (2012).

Customs and Border Protection. The exercise involved inspecting electronic cargo at the seaports in EPA regions. This was part of the International Network for Environmental Compliance and Enforcement's Seaport Environmental Security Network's international hazardous waste inspection efforts. This exercise resulted in finding CRT Rule violations in Region 9. In 2012, as part of the Seaport Network's second inspection project, EPA and Customs and Border Protection conducted targeted, joint inspections of electronic cargo at a Region 9 seaport, also with OECA coordination. Two additional Customs and Border Protection violations involving CRT exports were identified for enforcement action. The international network and its partners, including EPA, have plans to undertake additional cargo inspections at different domestic seaports.

EPA, with the Council on Environmental Quality and the U.S. General Services Administration (GSA), co-chaired and actively participated in the national task force that released the National Strategy in July 2011. The strategy goals aim to protect human health and the environment from the potentially harmful effects associated with the improper handling and disposal of electronic devices.

In 2012, EPA evolved the Plug-In to e-Cycling program to the SMM Electronics Challenge. The objectives of this challenge are to challenge manufacturers and retailers to voluntarily commit to sending 100 percent of used electronics collected for reuse and recycling to third party certified recyclers, increase the total amount of used electronics collected for reuse and recycling, and be transparent about their efforts by publically posting collection information and data.

Scope and Methodology

We performed our evaluation from May 2011 to October 2012 in accordance with generally accepted government auditing standards. Those standards require that we plan and perform the evaluation to obtain sufficient and appropriate evidence. Further, this evidence must provide a reasonable basis for our findings and conclusions. The evidence obtained during this evaluation provides a reasonable basis for our findings and conclusions based upon our objectives.

The scope of this evaluation included EPA's E-waste voluntary programs and OECA's RCRA enforcement efforts. Additionally, ORD's role with E-waste research was analyzed to understand its function in contributing to needed science information.

To address our objective, we reviewed and analyzed relevant federal regulations, guidance, appropriations information, public comments, and presentations. Our evaluation of the National Strategy and its action items is limited to their potential role in addressing the findings detailed in this report on EPA's management of E-waste. We reviewed state electronic waste and producer responsibility regulations. We also conducted a literature review of applicable congressional

testimonies, proposed legislative changes, and research articles. We reviewed prior E-waste evaluation reports from GAO and EPA OIG. We also examined international policies that regulate E-waste.

During this evaluation, we interviewed program directors and staff from EPA's OECA, OPPT, ORCR, ORD, Office of Air and Radiation,²³ and Office of International and Tribal Affairs. We interviewed program directors and staff in EPA Regions 4, 5, 7, 9, and 10.²⁴ We interviewed program directors and staff from the California Environmental Protection Agency and the Illinois Environmental Protection Agency. We also met with representatives from UNICOR,²⁵ the Information Technology Industry Council, and the Institute of Scrap Recycling Industries to gain their insights on EPA's E-waste management. We reviewed and analyzed documents provided to us at these meetings and documents received from OIG information requests. We also reviewed certified recycling facilities' inspection information in the Agency's Enforcement and Compliance Online database.

²³ ORCR and the Office of Air and Radiation are responsible for E-waste incineration/combustion issues. ORCR is in charge of hazardous waste incineration; Office of Air and Radiation is in charge of municipal solid waste incineration.

²⁴ EPA regional offices were selected based on ORCR/OECA recommendations.

²⁵ "UNICOR" is the trade name for Federal Prison Industries, Inc.

Chapter 2

Improved Information Could Better Enable EPA to Manage E-Waste and Enforce E-Waste Regulations

Improved information could better enable EPA to manage E-waste and enforce E-waste regulations. EPA does not have a uniform definition of E-waste and adequate information on E-waste disposition. EPA's lack of a uniform and consistent approach to defining E-waste hampers the Agency's ability to effectively collect relevant disposal information and set management goals for E-waste recycling and reuse. With more accurate and comprehensive information, EPA could better direct its limited resources to the greatest needs of E-waste end of life management. Additionally, EPA lacks complete information on CRT exporters in the United States to help set enforcement targets for the CRT Rule. EPA also does not have a practical process to characterize the hazardous nature of non-CRT waste. Potentially toxic E-waste is disposed in municipal landfills or incinerated without having the hazards identified as required by RCRA. EPA also advocates that E-waste be processed by certified E-waste recyclers but has limited knowledge of the extent of compliance by certified recyclers with federal environmental regulations.

EPA Needs a Consistent Approach to Defining E-Waste to Collect Relevant Information and Set Management Goals

EPA does not have a uniform definition of E-waste or a comprehensive list of electronics that are categorized as E-waste. Further, the National Strategy does not seek to address the lack of a clear and consistent definition. EPA states that defining E-waste is difficult and not practical. The OIG concludes that a consistent approach to defining E-waste, such as a baseline definition or a list of devices, is necessary to properly characterize the size and composition of the E-waste universe. A consistent approach to defining E-waste would also serve to identify the information needed to effectively manage the risks from E-waste. For example, for each activity defining E-waste, EPA could include consistent categories such as types of devices, scarce resources contained, or potential for toxicity. However, EPA defines and lists E-waste differently in each of its programs and initiatives, including the National Strategy. The variance in definitions hampers EPA's overall ability to effectively collect relevant information and set goals to manage the program. Without a clear and consistent management universe, EPA is unable to direct its limited resources toward developing goals and program activities to address program needs. The Agency's 2009 roadmap report for future materials management, *Sustainable Materials Management: The Road Ahead*, discussed the critical need to establish the universe when creating a materials management strategy analytical framework. EPA has not established the universe for its E-waste management strategy.

According to ORCR staff, electronics technology and composition are constantly evolving. These changes make defining E-waste difficult and not practical. Staff stated that the Agency develops official legal definitions when specific terms are included in regulations, such as hazardous waste listings. Since there is no current or proposed federal hazardous waste listing for E-waste,²⁶ EPA has not seen the need to define E-waste broadly.

ORCR staff expressed concern that a set definition is not flexible enough to adapt to technological changes. The staff said that new electronics emerge on the market and contain components not previously included in an official definition. Under RCRA, hazards from used electronics can be identified as they occur. On the other hand a hazardous waste listing is a static snapshot in time and would need to be frequently updated to incorporate any new hazardous waste electronics that are generated. ORCR staff explained that each program or initiative defines E-waste uniquely to deal with technology changes and shifts in consumer demand. This approach has resulted in numerous Agency E-waste definitions that vary greatly in scope. For example, the National Strategy contains the following broad statement:

For the purposes of this document, however, the Task Force considers ‘e-waste’ as subset of ‘used electronics.’ Used electronics can be reused, refurbished, and recycled, and can be a source of valuable parts and/or raw materials (e.g., gold, copper, glass), which can be returned to the supply chain to reduce overall waste.

In contrast, OPPT defines electronics more specifically for the purposes of the FEC. OPPT targets common office electronics, such as desktop and laptop computers for the FEC. At an EPA headquarters “E-cycling” event in April 2012, 39 separate electronic products were listed as “acceptable materials” for E-cycling. This product list had not been incorporated into an official or commonly utilized Agency definition.

The electronics recycler certifications have two different definitions of what constitutes E-waste. Both programs used approaches to defining E-waste that allow for flexibility with the evolving nature of electronics. R2 lists specific equipment and uses a future provision to deal with the issue of evolving technology. R2 includes “any other or new (future) types of equipment that are designed primarily to store or convey information electronically, and any new accessories to such equipment.” A future provision is one option for EPA to address their concern of technological advancement. The other certification body, e-Stewards, addresses the challenge of evolving technology by focusing on the constituents contained in products. e-Stewards also makes a distinction between hazardous and non-hazardous E-waste.

²⁶ The CRT Rule is the only federal E-waste-specific regulation. The rule applies to CRTs only and not to other electronic products; while CRT is defined in the rule, E-waste is not.

EPA Needs Complete Information on National E-Waste Disposition to Better Direct Its Limited Resources

The 2004 OIG report on E-waste concluded that EPA lacked complete national information. According to this report, the E-waste information collected was not adequate to support management decisions. In response to the 2004 OIG report recommendation regarding the volume of E-waste disposed in municipal solid waste landfills, EPA issued end-of-life information in a report titled *Electronics Waste Management in the United States Through 2009*. However, 8 years later, the finding remains the same despite EPA's efforts to address the OIG recommendation. EPA lacks accurate and comprehensive information on the volume of E-waste disposed, including information on municipal solid waste landfills and also on the volume of E-waste recycled, in order to gather electronic disposal data. Without such information, EPA cannot track the progress of its efforts to support its waste management hierarchy goal of promoting E-waste recycling and reuse over disposal. EPA is therefore unable to identify areas of greatest need to direct its limited resources. The National Strategy does not fully address this information limitation.

EPA acknowledged in the 2009 report that “there is a need for improved and consistent reporting of electronic products collection and recycling . . . to develop a clearer picture” of the United States’ used electronics end-of-life management. Additional stakeholder collaboration, research, and information gathering is necessary to address the existing information gap of representative and comprehensive information concerning national figures for residential and commercial use patterns, life span of electronic devices, and recycling collection quantities. Further, the National Strategy echoes the 2009 EPA report by stating that information on electronic device end-of-life disposition—such as disposal, reuse, and recycling volume—would be useful “to determine the most effective approaches to collection, recycling and reuse” but “there is little information available.”

EPA's 2009 report made the caveat that the lack of concrete information for the use and management of end-of-life electronics limited the report findings. In particular, EPA extrapolated the only available information, consisting of eight states and representing 29 percent of the United States population, to estimate the total quantity of electronic devices collected for recycling from residential sources nationally in 2009. EPA also relied on surveys of recyclers to determine the amount of electronic products collected from commercial sources. In the 2009 EPA report, the Agency determined the national figure based on survey responses of only seven recyclers.²⁷ A Region 4 staff member asserted that the information in the report may be accurate but is limited information and not comprehensive.

²⁷ EPA does not know the universe of non-certified recyclers. As of May 7, 2012, R2 had 202 certified facilities and e-Stewards had 31 certified facilities.

While implementation of the National Strategy is EPA's current E-waste priority, it does not fully address the limitations that impede EPA's effectiveness in gathering domestic E-waste information. According to EPA staff, the Office of Management and Budget's (OMB's) Paperwork Reduction Act (PRA) requirements and lack of resources hinder the Agency's information gathering activities. The PRA²⁸ requires agencies to justify any collection of information from the public. Agencies must describe the information to be collected, provide a reason for why the information is needed, and estimate the time and cost for the public to answer the request. Agencies are required to obtain OMB approval for each information collection request (ICR) used.

EPA staff from both the voluntary and enforcement programs indicated that the PRA was a challenge to their E-waste information collection efforts. The current ICR in place allows EPA to collect E-waste information only from its program partners. All other information collection efforts would be subject to PRA's "collection of information" requirement. This requires OMB to pre-approve Agency information requests from 10 or more non-federal entities. EPA is thus limited to surveying nine non-federal entities. If EPA plans to gather information from 10 or more non-federal entities, the Agency will first need to apply for an ICR. According to ORCR staff, programs determine whether to seek an ICR based on need and whether they have a strong justification. In some cases, the willingness of management to pursue the ICR is a factor. Deterrents can range from lack of resources to the knowledge or perception that it would be too difficult to seek an ICR and successfully get OMB approval. EPA E-waste programs have only requested one ICR and it has been in place since 2008.

EPA's lack of staff and resources devoted to the E-waste program further limits the Agency's ability to effectively gather E-waste information. ORCR staff said the Agency's involvement in addressing numerous National Strategy action items has added to their work but additional resources were not provided.

In addition to lacking complete national information on E-waste disposition, EPA is not taking full advantage of information from Agency-sponsored research. Many EPA E-waste staff we spoke to were not familiar with relevant research that the Agency has conducted on various E-waste issues (including the research highlighted in the bullets below). We found that even ORD staff were not aware of any of the E-waste research sponsored by ORD prior to 2011. Staff also said that ORD had not done research on the disposal of end-of-life electronics. Contrary to this claim, we presented EPA with excerpts from ORD's 2007–2012 Multi-Year Plan for the land research program that included the following E-waste issues:

²⁸ The PRA established the Office of Information and Regulatory Affairs within OMB to provide central Agency leadership and coordinate government-wide efforts to reduce unnecessary paperwork burden and improve the management of information resources.

- Pilot proposal to evaluate toxic constituents in electronic waste.
- Preliminary assessment of research needs for electronics wastes sampling.
- A joint ORD and OSWER (National Electronics Team) preparation of E-waste disposal white paper.

ORD staff said that their responsibility did not include E-waste until they received funding in the 2011 budget to look into E-waste. We concluded, based on this statement and the general lack of awareness of E-waste research by most staff we spoke with, that EPA has not incorporated information from past E-waste research to better its programs.

Agency-sponsored research on E-waste is not stored in a central repository and can be difficult to find for Agency staff. We found several E-waste-related research documents in different websites. We were unable to find certain studies identified in ORD's list of projects.

EPA Needs Information on Domestic CRT Exporter Universe to Target CRT Rule Enforcement Inspections

OECA does not have adequate information on the number of CRT exporters in the United States to help them set enforcement targets for the CRT Rule. EPA used the list of domestic exporters identified in the 2008 GAO report to identify enforcement targets as part of EPA national enforcement initiatives.²⁹ However, the Agency has not developed up-to-date targets and relevant goals since that initial effort. OECA staff said there are challenges in identifying the universe of exporters. One challenge was that many exporters are “fly-by-night” (transient) businesses. Other exporters go out of business or change names. Another challenge is that EPA is only aware of exporters that are abiding by the CRT Rule because EPA does not have the resources to identify all possible exporters.

According to Agency staff, EPA's enforcement of E-waste is limited by its staffing and funding levels. Regional staff said their mode of operation is more reactive than proactive. Regional staff also stated that they do not have the budget to proactively seek out CRT Rule violators. This lack of resources is why regional staff focus on responding only to tips and complaints concerning potential CRT Rule violations reported by the public and other stakeholders. Region 10 staff said they would like to address E-waste issues in locations that are far from the regional office but lack funds.

As a result of these limitations, EPA does not establish enforcement targets for the CRT Rule. Thus, the Agency cannot measure the results of its CRT Rule enforcement. EPA proposed a rule change in March 2012 for the current CRT Rule to increase EPA's ability to obtain more shipment information from

²⁹ GAO developed the list of targets by conducting undercover work posing as foreign buyers of broken CRTs and identifying 43 U.S. exporters willing to ship broken CRTs in violation of the CRT Rule.

exporters. However, OECA staff said the proposed changes will not improve the current limitations for domestic exporter universe information. Therefore, the lack of available information will continue to be an issue for CRT Rule enforcement.

Regional Best Practice: Use of RCRA Information Request Letters to Identify CRT Exporters

Some EPA regions are implementing actions we consider a best practice. Under the provisions of RCRA Section 3007(a),³⁰ EPA may require persons who handle or have handled hazardous waste to provide information relating to such wastes. Several EPA regional offices use RCRA 3007 information request letters to identify exporters of CRTs. Regional offices seek information concerning CRT shipments to countries outside the United States. Of the regions we visited, Regions 4, 9, and 10 utilize this technique. Region 9 was the most successful in having several recyclers respond. Region 9 stated that they also visit recycling facilities if they do not respond to the information request letters.

EPA Needs a Practical Process to Characterize the Hazards of Non-CRT Electronics to Ensure Proper Disposal of Hazardous E-Waste

EPA does not have a practical process for determining the hazardous characteristics of non-CRT E-waste.³¹ As such, EPA lacks information on the potential hazard characteristics of non-CRT E-waste sent to landfills by generators. Potentially toxic E-waste is disposed in municipal landfills or incinerated without having the hazards identified as required by RCRA. The lack of available information limits the effectiveness of EPA's existing enforcement efforts. According to Agency staff, the RCRA-required TCLP³² is not practical for E-waste because it is costly and time consuming.³³ Thus, generators of E-waste are not testing with TCLP. Also, the Agency is not monitoring, identifying, and enforcing improper non-CRT E-waste disposal.

It is difficult to conduct a TCLP on E-waste because the procedure requires small particles for a representative sample. Further, electronic devices are large, bulky, and heterogeneous with respect to locations of toxic elements. There are also complications associated with the variability in testing results among similar devices. For example, hazardous characteristics can differ for an electronic device from the same manufacturer if the device was made in different years.

³⁰ 42 U.S.C. § 6927(a)

³¹ CRTs are the only electronic devices where TCLP laboratory data were available for EPA to make a hazardous determination. Other devices tested in an EPA-sponsored study include laptops, printers, televisions, cell phones, remote controls, and computer mice. Each of these devices exceeded toxicity characteristic levels in at least one test. However, EPA's opinion is that it has not reached the rulemaking threshold of available laboratory data for such devices.

³² When establishing RCRA, Congress authorized EPA to establish criteria that characterize wastes by identifying potential hazards to human health and the environment (40 C.F.R. § 262.11(c)(1)). Accordingly, one of the tests EPA designed was the TCLP. This test was intended to predict leaching potential of wastes when mismanaged.

³³ TCLP can take several days and cost as much as \$3,000 for a full analysis.

Nonetheless, some electronic devices test hazardous under TCLP. For example, TCLP of circuit boards indicate that circuit board lead levels exceed the RCRA regulatory limit of 5.0 milligrams per liter.

The identification, characterization, and handling of the regulated waste stream are the central goals of OECA's RCRA Compliance Monitoring Strategy. Under RCRA, generators are required to determine whether their solid waste is hazardous. This can be accomplished by either testing the waste or applying their knowledge of the materials or processes used. In contrast, E-waste generators are currently not testing electronics as part of the hazardous waste characterization due to the high cost and time resources. Further, EPA is not enforcing its RCRA authority in this area when warranted and it is not independently testing electronic devices to be able to verify generator determinations. Currently, if the device is not a CRT, EPA does not have the information to challenge the generator's position of the device being hazardous or non-hazardous. Therefore, EPA does not have a practical process to validate generators' non-hazardous waste claims. E-waste generators will likely continue to not test until EPA or another authority enforces and/or mandates this requirement. This gap in enforcement leads to uncertainty on the potential hazards of generator-discarded E-waste in landfills.

In reference to the findings in the 2004 OIG report, EPA stated that the Agency is in the process of assessing the appropriateness of TCLP to non-CRT electronic devices. ORCR staff stated that their office, along with ORD, did research alternative leach testing approaches. However, these approaches would not solve the challenges that exist when applying the TCLP to electronics (i.e., these newly developed tests are just as expensive and time consuming as TCLP). OECA staff said that they have not made any rulemaking requests. However, the staff would like EPA to develop a more practical procedure for identifying hazards in electronics. To reduce the uncertainty regarding used electronics' hazardous waste determination status, EPA should develop a more practical waste characterization process for non-CRT electronics. This would permit enforcement staff to conduct proper enforcement of the RCRA requirement.

EPA Needs Information on Compliance of Recycling Industry to Support Its Advocacy of Certified Recyclers

EPA encourages E-waste recycling companies to receive certification. In addition, the National Strategy has a goal of ensuring that the federal government leads by example. One action item to achieve that goal is to establish a comprehensive government-wide policy on used federal electronics that ensures all federal electronics are processed by certified recyclers. However, the Agency does not know whether certified recyclers comply with the certifying organizations' standards that align with federal regulations.

EPA encourages electronics recyclers to receive certification by either R2 or e-Stewards. Companies voluntarily submit to these independent certifications.

The standards serve as an important control in the electronics recycling process. Both certifying bodies have their own audit processes. However, EPA does not have a routine practice of independently auditing recycling facilities for RCRA compliance.³⁴ Both certification programs require that facilities comply with all federal and state environmental, health, and safety regulations, including RCRA hazardous waste disposal and record keeping provisions. EPA regional staff expressed concerns with the certification programs inspecting for these provisions. Staff from Region 10 characterized EPA's reliance on the certification programs as a "challenge." Region 10 staff explained that they did not know whether the certification organizations were reviewing the recyclers' compliance. Region 7 staff would not recommend some certified recyclers because of poor housekeeping practices which are violations of RCRA standards. This staff also knew of recyclers that were compliant with standards but, due to the high costs of obtaining a certification, were not certified.

The National Strategy emphasizes the use of certified recyclers for all federal electronics. As part of the on-going National Strategy effort, EPA, in collaboration with GSA and the applicable accreditation board, will review the need to initiate a study of the implementation of the currently used electronics certification programs. This review will also evaluate such aspects as vigorousness of facility and downstream audits, consistency and frequency of audits, and auditor training. The implementation study applies only to recyclers that federal agencies utilize and will be used to assist in determining which certification programs to use. During this review, EPA plans to participate as an observer and accompany GSA on facility visits. Any recommendations will go to the accreditation board or third-party certifier.

This planned upcoming review of the certification programs associated with the National Strategy should provide some level of assurance that certified recyclers are complying with federal regulations. However, the National Strategy review will not address federal regulatory compliance issues at certified facilities that arise outside this limited review. EPA should include certified recyclers in its RCRA inspection work plans to ensure that they are complying with federal regulations. Otherwise, EPA has no assurance the certified recyclers abide by R2 or e-Stewards recycling standards' requirement that recyclers comply with all applicable environmental, health, and safety regulations. As a result, EPA risks recommending certified recyclers that may fail to adhere to federal environmental regulations, which may ultimately harm human health and the environment.

³⁴ Of the 233 recycling facilities that R2 and e-Stewards have certified, EPA has inspected 10 R2 facilities and zero e-Stewards facilities (10 inspections equals 4 percent of total certified recyclers) as part of RCRA inspection. These are not "audits" of recycling certification standards but RCRA hazardous waste inspections of facilities. Six of the 10 facilities inspected did not comply with RCRA. The analysis numbers represent OIG's review performed on May 4, 2012 (R2) and May 7, 2012 (e-Stewards). As of October 26, 2012, 342 electronics recycling facilities have been certified by one or both of the certification programs.

Additionally, EPA lacks information on the size and compliance status of non-certified recyclers. EPA's focus in managing E-waste is to encourage recycling. However, the Agency does not have information about the E-waste sent to the recyclers. EPA Region 4 staff said many of the facilities inspected have RCRA violations. In one case, regional staff found six mason jars (70 pounds) of mercury inside the facility. The staff in Region 4 believe that, based on their inspections, improper recycling of E-waste is a domestic environmental problem. EPA needs to target electronic recyclers in the RCRA inspections to ensure that non-certified recyclers are adhering to federal regulations.

Regional Best Practice: Targeted Inspections of Electronic Facilities

EPA Regions 4 and 7 target electronic recycling facilities as an enforcement priority. Region 4 found RCRA violations during inspections. Region 4 planned to focus on E-waste enforcement in 2011, and the region did carry this focus over to 2012. According to Region 4's *E-Waste Inspection/Enforcement Strategy*, the region proposed to inspect at least 10 E-waste collection facilities. These inspections led to finding RCRA violations at several facilities in 2011.

Additionally, Region 4 identifies "downstream recyclers" based on its inspections of targeted facilities. The region's inspection of several downstream recyclers has resulted in the discovery of RCRA violations. Region 4 staff noted they find the worst violators when they look "downstream" from the initial targeted recycler.

Region 7 is targeting the electronics recycling facilities in its RCRA inspections to identify recyclers who may be exporting CRTs without notifying EPA. Region 7 staff said that the region reviews the results of inspections, including the violations found. Based on this review, Region 7 revises inspection plans for the following year. If inspections find no violations in the electronics sector, the region will look at a different sector for the following year. The region can also conduct compliance outreach based on violations. Region 7 staff stated that they are inspecting the region's recycling contractor with the purpose of assuring that their contractor is RCRA compliant.

Conclusions

EPA has limited information and resources to ensure effective management and enforcement of the fastest growing waste stream in the country. EPA has made several advancements in recent years. However, if more comprehensive measures are not taken, EPA's ability to manage this complex issue will continue to be limited.

Recommendations

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

1. Develop a consistent approach for defining E-waste to set the conditions for goal setting and tracking. Identify and gather information to manage the goals and, if necessary, submit an ICR request to OMB.
2. Develop a more practical process to address the hazards of non-CRT electronic waste that ensures that this waste is managed in an environmentally sustainable manner.
3. Evaluate the implementation of currently used electronics certification programs as detailed in the National Strategy. If necessary, conduct RCRA inspections (for federal regulations only) of certified recyclers accordingly.
4. Evaluate resource needs for E-waste management and direct available additional resources as needed.

We recommend that the Assistant Administrator for Enforcement and Compliance Assurance:

5. Evaluate methods for gathering the information necessary to set CRT rule enforcement targets such as the use of RCRA 3007 information request letters to identify CRT exporters.

Agency Comments and OIG Evaluation

OSWER concurred with recommendations 1, 2, 3, and 4, and OECA concurred with recommendation 5. These recommendations are unresolved pending receipt of corrective actions and completion dates.

OSWER responded at the exit conference that development of a uniform definition (recommendation 1) is not feasible at this time but reiterated the agency comments that the agency will continue to define for each individual program. At a subsequent meeting, the OIG presented modified recommendation language to facilitate the Agency in considering a more consistent approach to defining E-waste for its various programs. OSWER agreed to the modified recommendation. We consider this recommendation unresolved pending receipt of corrective actions and completion dates.

OSWER disagreed with recommendation 2 in its initial response and to OIG's modified recommendation language at a subsequent meeting because any drawbacks that the TCLP may have with testing the leachability of waste

electronics would also apply to any alternative testing procedures and processes, including alternative leaching processes that could be used. The OIG accepted OSWER's proposed revision to recommendation 2. We consider this recommendation unresolved pending receipt of corrective actions about OSWER's ability to monitor, identify, and ensure proper disposal of non-CRT E-waste disposal, including completion dates.

OECA disagreed with the OIG's initial recommendation 5 because the current regulatory requirements and proposed modifications to the CRT rule will deem additional information gathering efforts unnecessary. The OIG presented modified recommendation language to facilitate the Agency in evaluating methods for gathering information necessary for setting CRT Rule enforcement targets. OECA concurred with the modified recommendation. We consider this recommendation unresolved pending corrective actions and estimated completion dates.

The OIG deleted recommendation 6 which recommended that OECA evaluate E-waste enforcement resource needs and direct available resources as needed. This decision was based on the OIG's review of OECA's response to the draft report stating that it does not have the resources to maintain any initiatives that target E-waste exporters. OECA staff explained that they allocate resources and staff to priority enforcement issues. Currently, E-waste enforcement is not a priority. The OIG accepted the response.

We made changes to the report as appropriate. The Agency's complete response, along with the OIG's evaluation, is in appendix A.

Status of Recommendations and Potential Monetary Benefits

RECOMMENDATIONS						POTENTIAL MONETARY BENEFITS (in \$000s)	
Rec. No.	Page No.	Subject	Status ¹	Action Official	Planned Completion Date	Claimed Amount	Agreed-To Amount
1	18	Develop a consistent approach for defining E-waste to set the conditions for goal setting and tracking. Identify and gather information to manage the goals and, if necessary, submit an ICR request to OMB.	U	Assistant Administrator for Solid Waste and Emergency Response			
2	18	Develop a more practical process to address the hazards of non-CRT electronic waste that ensures that this waste is managed in an environmentally sustainable manner.	U	Assistant Administrator for Solid Waste and Emergency Response			
3	18	Evaluate the implementation of the currently used electronics certification programs as detailed in the National Strategy. If necessary, conduct RCRA inspections (for federal regulations only) of certified recyclers accordingly.	U	Assistant Administrator for Solid Waste and Emergency Response			
4	18	Evaluate resource needs for E-waste management and direct available additional resources as needed.	U	Assistant Administrator for Solid Waste and Emergency Response			
5	18	Evaluate methods for gathering the information necessary to set CRT rule enforcement targets such as the use of RCRA 3007 information request letters to identify CRT exporters.	U	Assistant Administrator for Enforcement and Compliance Assurance			

¹ O = recommendation is open with agreed-to corrective actions pending
 C = recommendation is closed with all agreed-to actions completed
 U = recommendation is unresolved with resolution efforts in progress

Agency Response and OIG Comments

MEMORANDUM

SUBJECT: Response to Office of Inspector General Draft Report No. OPE-FY11-0015:
Improved Information Could Better Enable EPA to Manage Electronic Waste and Enforce Regulations, dated October 9, 2012

FROM: Mathy Stanislaus, Assistant Administrator
Office of Solid Waste and Emergency Response

Cynthia Giles, Assistant Administrator
Office of Enforcement and Compliance Assurance

TO: Carolyn Copper
Assistant Inspector General for Program Evaluation

Thank you for the opportunity to respond to the issues and recommendations in the draft report *Improved Information Could Better Enable EPA to Manage Electronic Waste and Enforce Regulations*, dated October 9, 2012. Improving the management of electronics and the enforcement of relevant regulations in the United States is an EPA priority.

For those report recommendations with which the Agency agrees, we have provided a description of ongoing actions that respond to the recommendations. For those report recommendations with which the Agency does not agree, we have explained our position. For your consideration, we have included a Technical Comments Attachment to supplement this response.

Significance of the National Strategy for Electronics Stewardship

As you know, EPA co-led, with the General Services Administration (GSA) and the Council on Environmental Quality (CEQ), the development of the National Strategy for Electronics Stewardship. The National Strategy, released July 20, 2011, carries out the Administration's intentions by identifying a leadership role for the U.S. Government, creating incentives for the design of greener electronics and increased domestic electronics recycling, and promoting more responsible management of used electronics with U.S. trade partners. It contains four overarching goals:

1. Build Incentives for Design of Greener Electronics, and Enhance Science, Research and Technology Development in the U.S.;
2. Ensure that the Federal Government Leads by Example;

3. Increase Safe and Effective Management and Handling of Used Electronics in the U.S.;
and
4. Reduce Harm from U.S. Exports of e-Waste and Improve Safe Handling of Used Electronics in Developing Countries.

The National Strategy resulted from extensive collaboration among 16 Federal departments and agencies, as well as consultation with stakeholders from the electronics, retail, and recycling industries, environmental organizations, state and local governments, and concerned citizens. As a strategic document, it identifies areas where we lack sufficient information and data, and where more efforts in the electronics product lifecycle are needed. EPA committed publically to a significant number of key projects, programs and initiatives as a result of the intensive and thoughtful cross-government and cross-sectors deliberations that took place in developing the National Strategy. Many of EPA's commitments require input and collaboration across the government and with a broad set of stakeholders.

The National Strategy represents the Federal Government's plan for improving electronics stewardship in the United States and as such, it is EPA's roadmap for actions. EPA noted to the OIG the significance of the National Strategy as a priority setting document and the fact that the commitments EPA made as a consequence of the National Strategy are governing the activities and resources available for used electronics. However, the draft OIG report does not reflect a proper appreciation of the National Strategy's significance in this regard.

OIG Response: OIG added language to the report that highlights the fact that the National Strategy is a priority setting document and is currently governing the activities and resources available for electronics. However, the focus of the evaluation was on existing Agency electronic programs and regulations and the information used in these programs to manage to established goals and targets of programs. As stated in the report, our review of the National Strategy was limited to its potential impacts on existing programs, regulations, and the collection of management information. Further, the National Strategy is focused primarily on federal agencies' activities whereas the OIG evaluation was focused on EPA's national management of E-waste. It is the conclusion of the OIG that the National Strategy and the Agency's role in "key projects, programs, and initiatives" will not adequately address the deficiencies in management information detailed in this report regarding EPA's role in the national management of E-waste. Notably, the National Strategy: (1) does not seek to address the Agency's lack of a uniform definition, (2) echoes the Agency's 2011 report titled, "Electronics Waste Management in the United States Through 2009" in stating that end-of-life disposition of used electronics information would be useful but little information is available, and (3) does not contain specific goals to increase EPA's effectiveness in gathering domestic E-waste information.

We appreciate the OIG's recognition of EPA's achievements in their report. EPA successfully implemented the Plug-In to e-Cycling program in 2004 and evolved the program to the *Sustainable Materials Management (SMM) Electronics Challenge*. EPA worked with stakeholders to develop a voluntary industry standard and certification program for electronics recyclers. Currently, there are two accredited certification programs for the electronics recycling industry: the Responsible Recycling Practices (R2) and the e-Stewards® programs. EPA

continues to support safer and more protective recycling by encouraging use of accredited third-party electronic recycling certification programs. The Agency issued the final Cathode Ray Tube (CRT) regulation in 2006 and in 2012 proposed a CRT rule amendment to enhance the ability to track CRT exports. Just recently, EPA launched the national *SMM Electronics Challenge*. The objective of this challenge is to raise the bar on responsible management of used electronics by challenging manufacturers and retailers to voluntarily commit to sending 100% of used electronics collected for reuse and recycling to third party certified recyclers; increasing the total amount of used electronics collected for reuse and recycling; and, being transparent about their efforts by publically posting collection information and data.

OIG Response: The OIG incorporated the above points that were effective after the 2004 OIG report that were not already included in other areas of the report into the Noteworthy Achievements section of the report, such as the launch of the SMM Electronics Challenge.

This response also provides comments on topics that are incompletely or inaccurately discussed and addressed in the draft report, including waste management policies in the U.S., the Resource Conservation and Recovery Act (RCRA) and supporting regulations, and the existence of collaboration across EPA programs beyond RCRA on other aspects of electronics management. For example, the draft report states that “*Domestically, E-waste in landfills can pose potential environmental risks when toxic chemicals from discarded electronics leach into groundwater*” (p-2), even though EPA shared with the OIG supporting information that shows landfilling waste electronics in a well-managed, modern landfill is not expected to pose a risk to groundwater. Further, the draft report states that “*Concerns about E-waste landfill disposal have led federal and state governments to encourage recycling*” (p-2). As noted previously, EPA believes disposal in a compliant landfill is protective of human health and the environment and is not the reason that the Federal government encourages recycling of used electronics.

OIG Response: The OIG amended the final report to attribute the above statements to an EPA report and a congressional report, respectively.

As the OIG itself acknowledges on p.2 of the report, EPA’s Solid Waste Management Hierarchy prioritizes the most environmentally sound methods for municipal solid waste management with source reduction, reuse and recycling being preferred over disposal. Electronic products are made from valuable resources and highly engineered materials, including metals, plastics, and glass that have significant recycling potential. Reusing and recycling electronics conserves our natural resources and avoids air and water pollution, as well as greenhouse gas emissions that are caused during extraction and manufacturing of virgin materials.

It would also be appropriate for the OIG to further discuss and recognize the importance of the Office of Solid Waste and Emergency Response’s (OSWER’s) and the Office of Chemical Safety and Pollution Prevention’s (OSCPP’s) collaboration on the Electronic Product Environmental Assessment Tool (EPEAT) due to its importance in source reduction. OSWER contributes expertise on electronics design specific to: easy and safe disassembly, producing less waste, using recycled content, using less packaging, and ensuring proper end-of life management. This collaboration is critical because EPEAT reduces the amount of electronics

waste that needs to be reused, recycled or managed while reducing the amount of toxic material found in electronics waste.

OIG Response: The OIG included the statement on EPEAT’s effects in the background section.

The draft report appears to reflect some misunderstandings of the RCRA regulatory programs (Subtitle C and Subtitle D), and the way these programs address risks posed by different types of waste generally. The identification of wastes as either hazardous or non-hazardous is a key element to determining which program these wastes will be managed under. Therefore, it is important to have a clear understanding of how EPA defines hazardous waste (e.g., listed vs. characteristic) and also how risks are managed under both Subtitle C and Subtitle D. For example, the hazardous waste regulatory program has identified waste CRTs and printed circuit boards as nearly always expressing a hazardous characteristic, and thus these wastes are regulated as hazardous when disposed. Many other types of used electronics may not meet the definition of hazardous waste, but are nonetheless managed at non-hazardous solid waste disposal facilities, which as stated previously, are protective of human health and the environment.

OIG Response: The OIG finding is specific to non-CRT electronics and it relates to the Agency’s statement above: “Many other types of used electronics may not meet the definition of hazardous waste, but are nonetheless managed at non-hazardous solid waste disposal facilities.” As the Agency states, non-CRT electronics may not meet the definition of hazardous waste; however the OIG was also told, and studies indicate, that some electronics may meet the definition. The OIG concludes that there is uncertainty regarding the hazardous characteristic of non-CRT electronic waste. Based on the response above, EPA is allowing non-CRT E-wastes to be disposed of in non-hazardous solid waste disposal facilities without requiring testing or review of “generator knowledge.” Per RCRA (see 40 CFR § 261), a generator of waste is required to make a determination as to whether its waste is hazardous, using either testing or its knowledge of the waste. The OIG concludes that the hazard characteristic determination requirement of RCRA is not being applied to non-CRT electronics because TCLP is not a practical test for electronics.

The OIG recommended that EPA include certified recyclers in RCRA inspection plans if certification compliance issues arise based on EPA’s evaluation of certification programs. However, OIG is confusing the certification bodies’ role for ensuring that their voluntary certification standards are met with EPA’s independent enforcement role in cases where violations of RCRA have occurred at a recycling facility. Although EPA participated in the development of the practices and environmental standards that are found in one of the electronics recycler certification programs in the U.S. today, these are not EPA programs but programs that are run by private organizations.³⁵ As such, it is the role of the third party organization or certifying body to audit and certify the electronics recycling facility, and to ensure continuous

³⁵ The two certification programs are: (1) the e-Stewards[®] certification program which was created and is run by the Basel Action Network, a private non-profit organization; and (2) the Responsible Recycling Practices (R2) which is run by R2 Solutions, also a private non-profit organization.

conformance to these practices and standards. Conformance to the standards, however, does not relieve recyclers of their RCRA or other federal, state, or local legal obligations. Should EPA learn of potential RCRA violations, EPA will investigate the alleged violations and take appropriate enforcement action, as necessary. EPA Regions and states inspect electronics recycling facilities, which may or may not be certified, and as appropriate will take enforcement actions if a violation is discovered. EPA realizes that these certification programs are not the only answer to ensuring proper electronics management, but we expect that they will raise the environmental floor for the electronics recycling industry as a whole. EPA plans to evaluate the effectiveness of the implementation of the certification programs. Additionally, EPA continues to work with the certification programs to encourage the continual improvement of electronics recycling practices and standards.

OIG Response: The OIG clarified the findings/recommendation language in the report to state that based on the findings of the planned National Strategy review of the certification programs, if necessary, EPA will plan RCRA inspections (for federal regulations only) of certified recyclers accordingly. The OIG has documented articles detailing violations of certification standards as well as federal standards by certified recyclers. The OIG concludes that given the federal initiative to utilize only certified recycling facilities and recent accounts of violating certified recyclers, EPA minimizes risk and increases effectiveness of its E-waste management by including certified recyclers in their inspections.

Finally, it is unclear why certain conclusions in the report are drawn as there are no references cited. It would be helpful to the reader if the OIG provided a bibliography containing the reports, publications, transcripts and information that they used to draw their conclusions. (Note: See Technical Comments Attachment for further discussion of these comments, as well as other comments.)

OIG Response: The OIG draws its conclusions in part, from the information provided by the Agency during the course of our review. Chapter 1 provides the purpose and background, and discusses how we conducted our work and the criteria we relied upon. This report provides our findings and conclusions that address our objectives for performing the evaluation.

EPA Comments on individual recommendations in draft report

Recommendation #1: Define e-waste to set the conditions for goal setting and tracking. Identify and gather information to manage the goals, and, if necessary, submit an ICR request to OMB.

EPA Response:

EPA agrees that we should define, in the context of individual actions, what used electronics is considered by that action, as appropriate.

We appreciate the OIG's suggestion that EPA develop a single definition of used electronics. EPA and the other agencies that participated in the development of the National Strategy for Electronics Stewardship collectively considered this issue and were unable to come up with a meaningful definition that would not quickly become obsolete due to the changing nature of electronic devices and frequent introduction of new and unique products. Even without the single definition of used electronics, agencies were able to set goals, identify projects and set tracking mechanisms for progress. We do agree that for each used electronics action, program or data gathering effort that we first identify the types of electronics that will be included in the effort and any rationale for the decision.

We agree that information on used electronics is important and we currently gather appropriate information as part of our municipal solid waste characterization report and as part of our efforts surrounding certified electronics recycling that allows the Agency to manage our goals. In addition, we already make information that we have on exports of CRTs publically available. Once results from the three export flows projects being conducted under the National Strategy are released (see discussion below), we will assess the information and incorporate that information into our reports and decision-making, as appropriate. We will submit an ICR request to OMB as appropriate and necessary, but have not done so to date.

Since 2005, we have collected and published information about the disposition and end-of life management of electronics collected for recycling and we intend to continue to provide this information to the public. In 2005, based on recommendations from the OIG, we developed two approaches for collecting a set of baseline end-of-life electronics data. This work led to the July 2008 release of a baseline data report. We released an updated report entitled *Electronics Waste Management in the United States through 2009* (November 2010). Although EPA acknowledged in that report that it extrapolated available information to provide national estimates, we believe that the report generally reflects the state of electronics waste in the United States nationally. We intend to continue to collect this type of information and incorporate it into EPA's Municipal Solid Waste Characterization Report.

In addition, we already post data specific to CRTs exported for recycling and reuse on our website and have proposed revisions to the CRT rule that will further enhance our knowledge of CRT exports.

The National Strategy recognized that the U.S. government lacks information on the amount of used electronics that are exported. Consequently, under the National Strategy, there are three ongoing projects that will help to better characterize the flow of used electronics from the United States. Specifically:

- U.S. International Trade Commission (USITC) has launched a study that gathers information from electronics recyclers on what they export and to where;
- EPA, through the organization Solving the E-waste Problem (StEP), is supporting efforts to characterize transboundary flows of used electronics; and
- EPA, through the Commission of Environmental Cooperation, is supporting efforts to characterize the flow of electronics from North America.

OIG Response: OIG understands the Agency's explanation of the complexities of defining E-waste or used electronics (which we also detail in the report). However, the OIG continues to conclude that a uniform definition would allow the Agency to fully identify the universe and ensure effective E-waste management to protect public health and conserve valuable resources. The OIG acknowledges the Agency's response that development of a uniform definition is not feasible at this time. The OIG held a subsequent meeting with the Agency to discuss modified recommendation language to facilitate the Agency in considering a more consistent approach to defining E-waste for its various programs. A consistent approach for defining E-waste would serve as a clear means to set and track goals as well as the basis for necessary information collection. To assist the Agency in this effort, the report detailed methodologies used by the recycler certification bodies in defining E-waste. These entities deal with the same complex issues described above. The OIG requests that the Agency provide estimated timeframes for completion. The Agency concurred with the modified recommendation at the subsequent meeting.

The OIG accepts the Agency's response to the portions of the recommendation regarding identifying and gathering information and utilizing the ICR when necessary. We consider this recommendation unresolved pending corrective actions for all parts of the recommendation and estimated completion dates, and the responsible party/office.

Recommendation # 2: Develop a more practical characterization procedure for non-CRT electronics.

EPA Response:

We disagree with this recommendation. We believe that the Toxicity Characteristic Leaching Procedure (TCLP) is an appropriate way to evaluate the potential hazards of e-waste under plausible domestic disposal conditions (i.e., landfilling). Any drawbacks that the TCLP may have with testing the leachability of waste electronics would also apply to any alternative testing procedure, including alternative leaching procedures that could be used. We also believe that development of a broad hazardous waste listing for waste electronics under RCRA would not be supported by currently available data.

EPA evaluated the appropriateness of the TCLP test in the report entitled *RCRA Toxicity Characterization of Computer CPUs and Other Discarded Electronic Devices* (July 15, 2004), prepared by Dr. Timothy Townsend. Later work by Dr. Townsend showed that use of lead-free solders would significantly reduce the lead leaching potential of printed circuit boards used in electronic devices (Townsend et al, 2008). While we acknowledge that the TCLP test has some drawbacks in the case of debris-like waste, such as electronics, the same drawbacks would apply to other testing procedures that could be used to characterize used electronics, such as alternative leaching procedures or testing for the total content of particular metals. Electronics waste is highly heterogeneous and there are a large number of different types and models of waste electronic products collected for management at any time. In addition, the suite of devices available for sale can change rapidly over time (e.g., cell phone turnover is often every 2 years).

We do not plan to require generators to test in order to determine the regulatory status of waste electronics when testing is not required for other types of wastes³⁶ (the Agency considered and rejected this general approach; see 55 FR 11829-30; March 29, 1990); rather, under the RCRA regulations, the generator may use either testing or knowledge of the materials or processes involved in generating the waste to make the determination. (See 40 CFR 262.11).

Development of a hazardous waste listing under RCRA would also be problematic. It would need to be based on the same type of data described above, with the same issues about e-waste heterogeneity and change over time. Based on the data we currently have, used electronics broadly defined (exclusive of CRTs and printed circuit boards) are unlikely to fail the Toxicity Characteristic regulatory test or exhibit any of the other hazardous waste characteristics, and are unlikely to pose risks to human health and the environment when disposed using plausible U.S. domestic waste management practices. Also, because of regulation in the European Union and the successful voluntary consensus EPEAT standard, the expected trend is that over time more electronics enter end-of life containing less of the known toxins than in the past.

Finally, while the risks from potentially unsafe recycling practices in developing nations are real, RCRA regulations must be based on risks posed by plausible management at disposal facilities within the United States.

OIG Response: The OIG acknowledges the waste characterization difficulties associated with non-CRT E-waste. As the Agency states above, non-CRT electronics are “unlikely to fail the Toxicity Characteristic regulatory test”; however, research studies demonstrate that some electronics may indeed fail the test. The OIG concludes that there is uncertainty regarding the hazardous characteristics of non-CRT electronic waste. EPA is allowing non-CRT E-wastes to be disposed of in non-hazardous solid waste disposal facilities without requiring a test or review of “generator knowledge.” Per RCRA (see 40 CFR 261), a generator of waste is required to make a determination as to whether its waste is hazardous, using either testing or its knowledge of the waste. The OIG concludes that the hazard characteristic determination requirement of RCRA is not being applied to non-CRT electronics because TCLP is not a practical test for electronics. The OIG understands from the Agency responses that developing a more practical laboratory procedure at this time is not feasible. The OIG held a subsequent meeting with the Agency to discuss modified recommendation language to facilitate the Agency in considering a broader approach to achieving RCRA requirements. The Agency disagreed with the modified language at the meeting, stating that any drawbacks that the TCLP may have with testing the leachability of waste electronics would also apply to any alternative testing process, including alternative leaching processes that could be used.

OIG accepts the Agency’s proposed revision to recommendation 2. We consider this recommendation unresolved pending receipt of corrective actions about EPA’s ability to monitor, identify, and ensure proper disposal of non-CRT E-waste, including completion dates.

³⁶ We would note that the Agency could not mandate a testing requirement without going through a rulemaking.

Recommendation #3: Evaluate the implementation of the currently used electronics certification programs as detailed in the National Strategy. If certification compliance issues arise after this review, include certified recyclers in RCRA inspection work plans to ensure that they are complying with federal regulations.

EPA Response:

We agree with the recommendation that we evaluate the implementation of the currently used certification programs as detailed in the National Strategy for Electronics Stewardship.

To meet our obligations and commitments under the National Strategy, EPA is working with GSA and the applicable accreditation board to conduct a study of the implementation of the current used electronics certification programs. This review will evaluate various aspects of the certification programs: vigorousness of facility and downstream audits; consistency and frequency of audits and auditor training. The results of the study will be used to inform the Federal Government's policy on management of its used electronics.

We believe the portion of the recommendation that states that if certification compliance issues arise after this review, include certified recyclers in RCRA inspection work plans to ensure that they are complying with federal regulations is not reflective of EPA's existing policy, and thus, do not support.

The OIG has inappropriately merged two issues: *conformance* to the voluntary practices and standards established under the certification recycling programs and *compliance* with federal regulation. Conformance to electronics recycler certification standards does not relieve recyclers of used electronics of their RCRA or other federal, state, or local legal obligations, nor does conformance to voluntary standards obviate the responsibility of regulatory authorities to conduct RCRA inspections.

Should EPA learn of potential violations of RCRA legal requirements, EPA will investigate the alleged violations and take appropriate enforcement action, as necessary. EPA Regions and states continue to inspect electronics recycling facilities that may or may not be certified, and take enforcement actions as appropriate.

Since the electronics recycler certification practices and standards are voluntary and are not EPA standards, EPA does not audit or certify facilities for conformance with the certification standards and, therefore, is not responsible for decisions related to certification status.

Determining if a facility is in conformance with a standard is the responsibility of the certifying body (CB). The CB also investigates complaints against certified facilities. The severity of the complaint determines whether the CB suspends certification or whether the company loses certification completely.

OIG Response: The OIG accepts the Agency’s response to the part of the recommendation regarding evaluating the implementation of the current certification programs. We consider this part of the recommendation unresolved pending estimated completion dates.

The OIG understands the difference between conformance with voluntary practices and compliance with regulation. However, the OIG still concludes that certified recycling facilities should be included in RCRA inspection work plans. The OIG documented accounts where certified recyclers were found to be violating both certification standards and federal regulations. The OIG concludes that given the federal initiative to utilize only certified recycling facilities and recent accounts of violating certified recyclers, it is in the best interest of EPA to include certified recyclers in their inspections.

Regarding the second part of the recommendation, the OIG will clarify the language in the report to state that based on the findings of the planned National Strategy review of the certification programs, if necessary, EPA will plan RCRA inspections (for federal regulations only) of certified recyclers accordingly. We consider this part of the recommendation unresolved pending the inclusion of proposed alternatives to this part of the recommendation, estimated completion dates, and the responsible party/office.

Recommendation #4: Evaluate resource needs for e-waste management and direct available additional resources as needed.

EPA Response:

We agree with the recommendation to evaluate resource needs for e-waste management and direct available additional resources as needed.

We will continue to set priorities for responding to action items under the National Strategy considering available resources.

OIG Response: The OIG accepts the Agency’s response to this recommendation to evaluate resource needs for E-waste management. We consider this recommendation unresolved pending the inclusion of estimated completion dates.

Recommendation #5: Enforce the CRT Rule in a more proactive manner by gathering the information necessary to set CRT rule enforcement targets.

EPA Response:

We disagree with the recommendation to enforce the CRT Rule in a more proactive manner by gathering the information necessary to set CRT rule enforcement targets.

Given the current regulatory requirements and the fact that EPA has proposed to modify the CRT rule to gather additional information³⁷, EPA does not believe it is necessary to undertake any additional data gathering efforts. The regulations at 40 C.F.R. §261.41 require companies that export used CRTs for recycling or reuse to submit written notifications to EPA Regional Administrators and Regional Import-Export Coordinators. As of September 2012, 136 companies have notified EPA of their intent to export CRTs for reuse; six companies have notified of their intent to recycle (one company has notified for both reuse and recycling). In total, there are 141 companies that have notified of their intent to export CRTs for reuse or to recycle. This information can be found on EPA's website, under Export Requirements for Cathode Ray Tubes: <http://www.epa.gov/osw/hazard/international/crts/reuse.htm>

As the OIG previously noted, EPA launched a two year focused enforcement effort directed at CRT exports. Between 2008 and 2010, EPA opened over 125 investigations against electronic waste recyclers. All EPA Regions participated in this effort and conducted 91 inspections and identified violations at 19 facilities. As also noted in your report, Regions 4 and 7 maintained an enforcement priority targeting electronic recycling facilities in 2011 and into 2012. EPA has a well-established compliance monitoring and enforcement program for all RCRA requirements and we now include the CRT requirements in that program. As part of this overall RCRA compliance monitoring and enforcement program, Regions and states continue to inspect electronics recycling facilities, which may or may not be certified, and bring appropriate enforcement actions each year. Regions also continue to respond to any tips received regarding shipments of CRTs and to investigate these facilities as appropriate. The Office of Enforcement and Compliance Assistance (OECA) maintains the expertise developed during the initial focus effort on electronics recyclers and continues to assist the Regions in developing new cases.

OIG Response: The OIG acknowledges the past efforts of the Agency with CRT Rule enforcement. The OIG concludes that based on enforcement results of EPA regions that the OIG visited in this evaluation, enforcement work still remains for the CRT Rule. The OIG also acknowledges the modifications made to the CRT Rule to gather additional information. As detailed in the report, some EPA staff we interviewed do not believe that the modifications will assist in gaining a better understanding of the CRT exporter universe to help set enforcement targets.

The OIG concludes that the Agency needs to evaluate methods for gathering the information necessary to set CRT Rule enforcement targets such as the use of RCRA 3007 information request letters to identify CRT exporters. The OIG presented modified recommendation language to facilitate the Agency in evaluating information gathering methods. OECA concurred with the modified recommendation. We consider this recommendation unresolved pending corrective actions and estimated completion dates.

Recommendation #6: Evaluate resource needs for e-waste enforcement and direct available additional resources as needed.

EPA Response:

³⁷ The proposed CRT rule also proposed revisions of certain export provisions to better track exports of CRTs for reuse and recycling.

We disagree with the recommendation to evaluate resource needs for e-waste enforcement and direct available additional resources as needed.

Since the CRT enforcement effort was initiated in 2008, EPA's enforcement resources have declined. EPA, therefore, cannot maintain an initiative solely targeted at electronic waste exporters. Instead, EPA will continue to inspect electronics recyclers as part of its routine compliance monitoring and enforcement efforts to address the universe of RCRA-regulated facilities.

OECA continues to share regional questions/challenges of cases about used electronics on monthly teleconferences with the Regions, as well as at annual meetings of import/export regional coordinators. OECA has also provided the regions with a template for a RCRA 3007 information request letter; this was noted in your report as a "Regional Best Practice."

OIG Response: The OIG acknowledges EPA's resource constraints with respect to an enforcement initiative targeted solely on CRT exporters. In a subsequent meeting, OECA staff also explained that resources and staff are directed to address priority enforcement issues. E-waste enforcement is not a priority issue area for OECA currently. The OIG accepts EPA's response and will delete this recommendation.

Contact information

If you have any questions regarding this response, please contact Suzanne Rudzinski, Director, Office of Resource Conservation and Recovery at (703)-308-8895.

Attachment

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