

APPENDIX A

Guidance Document

Guidance on the Interpretation and Application of the e-Stewards Standard

Use of the Guidance Document (Appendix A to the e-Stewards Standard)

The guidance document for the e-Stewards Standard for Responsible Recycling and Reuse of Electronic Equipment® is a work in progress which will be updated on a continuous basis as new information becomes available on best practices. The guidance document (referred to as Appendix A in the Standard) is provided to aid in interpretation of requirements (but does not define requirements), as well as to provide guidance in how to meet the requirements in the Standard, including what are considered, in some cases, best practices provided by industry. The term “should” is used in this guidance document to indicate a recognized means of meeting the intended requirements of the Standard. The term “shall” is used in the Standard to indicate those provisions which are mandatory.

This document is an essential adjunct for implementation and understanding of the e-Stewards Standard and its placement on the Worldwide Web is only to facilitate fluid improvement and updating. It is located in its most current version on the Worldwide Web at: www.e-Stewards.org/Library/e-StewardsStandardGuidanceDocument.html.

For ease of use, the sub-clauses of Section 4 of the Standard (EMS requirements) and this APPENDIX A have related numbers; thus, for example, 4.3.3 of the Standard and A.3.3 of Appendix A both deal with objectives and targets, and 4.5.5 and A.5.5 both deal with internal environmental management system audits. Additional RESOURCES are marked with a ► in the left margin.

1. INTRODUCTION TO STANDARD (Guidance)

The introduction refers to a number of principles, which are explained here.

Precautionary Principle: According to Wikipedia, “The Precautionary Principle is a moral and political principle which states that if an action or policy might cause severe or irreversible harm to the public or to the environment, and in the absence of a scientific consensus that harm would not ensue, the burden of proof falls on those who would advocate taking the action. The principle implies that there is a responsibility to intervene and protect the public from exposure to harm where scientific investigation discovers a plausible risk in the course of having screened for other suspected causes. The protections that mitigate suspected risks can be relaxed only if further scientific findings emerge that more robustly support an alternative explanation. In some legal systems, as in the law of the European Union, the precautionary principle is also a general and compulsory principle of law.”

Cost Internalization (‘polluter pays’) Principle: According to Wikipedia, “In environmental law, the **polluter pays principle** is enacted to make the party responsible for producing pollution responsible for paying for the damage done to the natural environment. It is regarded as a regional custom because of the strong support it has received in most Organization for Economic Co-operation and Development (OECD) and European Community (EC) countries. In international environmental law it is mentioned in Principle 16 of the Rio Declaration on Environment and Development.”

“Polluter pays is also known as **extended polluter responsibility (EPR)**. This is a concept that was probably first described by the Swedish government in 1975. EPR seeks to shift the responsibility dealing with waste from governments (and thus, taxpayers and society at large) to the entities producing it. In effect, it internalizes the cost of waste disposal into the cost of the product, theoretically meaning that the producers will improve the waste profile of their products, thus decreasing waste and increasing possibilities for reuse and recycling.”

Environmental Justice Principle: Participants of the Central and Eastern European Workshop on Environmental Justice (Budapest, December 2003) defined environmental justice (and injustice) in the following way:

Environmental Justice:

“A condition of environmental justice exists when environmental risks and hazards and investments and benefits are equally distributed with a lack of discrimination, whether direct or indirect, at any jurisdictional level; and when access to environmental investments, benefits, and natural resources are equally distributed; and when access to information, participation in decision making, and access to justice in environment–related matters are enjoyed by all.”

Environmental Injustice:

“An environmental injustice exists when members of disadvantaged, ethnic, minority or other groups suffer disproportionately at the local, regional (sub–national), or national levels from environmental risks or hazards, and/or suffer disproportionately from violations of fundamental human rights as a result of environmental factors, and/or denied access to environmental investments, benefits, and/or natural resources, and/or are denied access to information; and/or participation in decision making; and/or access to justice in environment–related matters.”

Collectors, Brokers and transportation companies are currently not eligible for certification under this e–Stewards program.

Although it would be ideal to have as many different types of entities in the Recycling Chain certified to this Standard as possible, including those who simply collect or broker materials to the right places, there are currently inadequate controls available to verify on–going conformance of these types of businesses. Regular audits would be reduced to verifying paperwork, as auditors would be unable to witness actual processing of Electronic Equipment in conformance to this Standard. Instead, these types of entities would simply be passing all Electronic Equipment on to others for actual processing, leaving open too great a potential for material to be diverted to unacceptable

destinations much of the time, while showing auditors paperwork for limited shipments to acceptable destinations part of the time. Although this type of activity certainly remains a possibility even for recyclers and refurbishers, the combination of auditors seeing actual in-house processing of equipment with sampling 12 months/year of downstream records should diminish the risks of unscrupulous activities.

Integration with ISO 14001

► For guidance to small and medium-sized businesses for setting up an ISO 14001 environmental management system, go to:

<http://www.epa.gov/owm/iso14001/ems2001final.pdf> or to Appendix C of this Standard.

2. SCOPE

In-House Processing: The intention of this certification program is to certify those companies that are actually processing Electronic Equipment for Recycling or Reuse, and not those that are simply passing equipment on to others. The reason for this is simple, as discussed above regarding collectors and brokers. In order for customers and independent auditors and their certifying bodies to have the highest level of confidence in an e-Steward's conformance to this Standard, it is important for the first tier e-Steward to perform as many of the requirements as possible in-house, and then send resulting materials to any acceptable Downstream Recyclers who are able to take the materials to the next step in managing this waste stream, in accordance with this Standard. An acceptable alternative is for the initial (first tier) e-Steward to have a customer's equipment sent directly to another certified (and therefore independently audited) e-Steward to perform the initial processing. If this occurs, however, the first tier e-Steward retains responsibility for the Recycling Chain for toxic materials from that customer. An example of this may be if an e-Steward with limited geographical coverage contracts with a national customer who seeks national service from the one service provider – in this case, the first tier e-Steward. That initial e-Steward is allowed under this Standard to subcontract that initial processing of equipment

to another certified e-Steward, but must meet the requirements for Accountability for Downstream Recycling Chain found in Section 4.4.6.5 of the Standard, which are designed to be less stringent when utilizing other certified e-Stewards. To summarize, the first tier e-Steward must actually process the equipment to a large extent, unless they outsource the initial processing work to other certified e-Stewards, without violating the export requirements in the process.

Why In-House Processing? By requiring e-Stewards to do as much in-house processing as possible, this allows customers and auditors to witness actual destruction and/or refurbishment of equipment to a large extent, in facilities containing the equipment, procedures, and trained personnel adequate to complete a significant step in the responsible management of this problematic waste stream. Witnessing the actual disassembly, shredding, and/or refurbishment of equipment decreases the risks (but does not eliminate them) of a company simply loading up containers of untested or non-working equipment and exporting them to the highest bidders globally, as commonly practiced. In-house processing of equipment may also allow auditors (and e-Stewards) to verify a shorter chain of custody for the toxic materials on their way to Final Disposition, thus decreasing opportunities for diversions along the way. A facility full of functioning equipment and trained staff allows a customer or auditor far more assurances of conformance to this Standard than does a simple stack of paperwork indicating that someone may have received some percentage of equipment for some sort of processing, somewhere else, some of the time.

In practice: What this means in practice is that an e-Steward should process as much as possible within their company, or only outsource that initial recycling or refurbishment to another certified e-Steward. While many companies are now doing both in-house refurbishment AND destruction of end-of life equipment, there are also business models that simply accomplish one or the other. What is not acceptable under this Standard is for an e-Steward to pass on untested, non-working equipment to a non-e-Steward for refurbishment. While this Standard promotes reuse first and foremost, there is far too much

potential for uncontrolled exports of either untested, non-working equipment and parts, or the scrap generated from the refurbishment operations.

However, if an asset recovery company goes into customer's facility and takes control of equipment there, sorts those with reuse potential from those without, and ships the scrap directly to a vetted Downstream Recycler in accordance with this Standard, this is an example of acceptable management of the equipment under the e-Steward's control.

3. GLOSSARY OF TERMS

See terms and definitions in the Standard for explanations of terms used in the Standard. Each term that is defined in the Standard is capitalized throughout the Standard. Understanding these terms is critical to understanding of the requirements in the Standard.

4. ENVIRONMENTAL MANAGEMENT SYSTEM REQUIREMENT WITH PERFORMANCE REQUIREMENTS

A.1 General Requirements

A.1.1 Environmental management system shall include health and safety, and all other industry specific performance requirements in this Standard

Any text in **bold font** in the standard must be addressed in the e-Stewards environmental management system.

A.2 Environmental Policy

A.2.1a) Accountability for Hazardous e-Waste throughout Recycling Chain

Central to the overarching goal of this certification program and the e-Stewards Standard, is that the e-Steward will know where ALL of the Hazardous e-Waste and Problematic Components and Materials from their operations end up for final disposition, ensure that those destinations will be in conformance with the Standard, and they will have systems in place to continually control and enforce such restrictions on the management of the toxic materials in this waste stream (such as circuit boards, CRT glass, mercury-containing devices, most batteries, polychlorinated biphenyls, etc.) e-Stewards are required to be accountable for the entire downstream flow of Hazardous e-Waste through their facilities and control, until it has reached Final Disposition, i.e. the last point in the Recycling Chain for each type of toxic material, at which time the Hazardous e-Waste either ceases to be a waste by no longer needing further separation/recycling; is fully tested, refurbished, labeled, packaged and sent for Reuse; or is finally disposed of.

Increasingly, new methods for independent tracking (in real time) of all shipments (year round) are emerging, and e-Stewards may want to incorporate these independent tracking systems once they are available, in order to provide their customers and their auditors with full transparency of their Recycling Chain for the toxic materials. This guidance document will be regularly updated with information regarding such independent tracking systems, as they come on line.

A.2.1 b) Prohibition of exports of Hazardous e-Waste throughout the Recycling Chain which violate the Basel Convention and its Decisions, the OECD Decisions, and domestic laws in countries involved in trade

An e-Steward's environmental management system (EMS) is required to include this high level policy goal to be written into its EMS, which should result in top management's accountability for legal trade in Hazardous e-Waste, throughout the Recycling Chain. Although there is a great deal of specific guidance provided in Section A.4.6.7 of this document regarding how to interpret such a policy, a simplified interpretation for export from OECD countries such as the US and Canada is that all of the Hazardous e-Waste must be kept in OECD and

European Union countries or Lichtenstein throughout Final Disposition. Having a written policy regarding globally legal exports and imports should result in top level oversight of a 'plan/do/check/act' system to enforce such a policy.

A.2.1 c) Social Accountability in Environmental Policy

e-Stewards must not only ensure that their own operations are in complete conformance with the principles of the global SA 8000 standard for social accountability (see below), but they should do everything reasonably possible to ensure Downstream Recyclers are also operating in conformity with this standard, such as not using child or forced labor, through any verification means reasonably available.

If exporting from OECD/EU countries initially, the e-Steward should already have controls in place to ensure the toxic materials remain in OECD/EU countries at all times, and therefore this should be a relatively simple matter to put these additional prohibitions in place. Controls can include contracts or work agreements disallowing such labor, plus the use of (audited) certified e-Stewards as Downstream Recyclers, and/or the use of questionnaires and auditing in initial and on-going due diligence efforts. For non-OECD/EU exports to non-OECD/EU countries, more extensive evidence would need to be provided, such as records of the workforce, verification from government agencies, unscheduled audits, etc.

The SA 8000 Standard provides a global normative document for workers rights, and e-Stewards are encouraged to operate in consistency with the principles found in SA 8000, although they are not required to be certified to SA 8000.

► The SA 8000 may be found at: <http://www.sa-intl.org/index.cfm?fuseaction=Page.viewPage&pageId=473>

Summary of the standard from the SA 8000 website:

The SA8000 Standard is an auditable certification standard based on international workplace norms of International Labour Organisation (ILO) conventions, the Universal Declaration of Human Rights and the UN Convention on the Rights of the Child. [The SA8000 Standard is available for download in various languages](#). A summary of the Standard elements follows:

1. Child Labor: No workers under the age of 15; minimum lowered to 14 for countries operating under the ILO Convention 138 developing-country exception; remediation of any child found to be working
2. Forced Labor: No forced labor, including prison or debt bondage labor; no lodging of deposits or identity papers by employers or outside recruiters
3. Health and Safety: Provide a safe and healthy work environment; take steps to prevent injuries; regular health and safety worker training; system to detect threats to health and safety; access to bathrooms and potable water
4. Freedom of Association and Right to Collective Bargaining: Respect the right to form and join trade unions and bargain collectively; where law prohibits these freedoms, facilitate parallel means of association and bargaining
5. Discrimination: No discrimination based on race, caste, origin, religion, disability, gender, sexual orientation, union or political affiliation, or age; no sexual harassment
6. Discipline: No corporal punishment, mental or physical coercion or verbal abuse
7. Working Hours: Comply with the applicable law but, in any event, no more than 48 hours per week with at least one day off for every seven day period; voluntary overtime paid at a premium rate and not to exceed 12 hours per week on a regular basis; overtime may be mandatory if part of a collective bargaining agreement
8. Compensation: Wages paid for a standard work week must meet the legal and industry standards and be sufficient to meet the basic need of workers and their families; no disciplinary deductions

9. Management Systems: Facilities seeking to gain and maintain certification must go beyond simple compliance to integrate the standard into their management systems and practices.

A.2.1 d) Prohibition of Prison Labor for Processing Hazardous e-Waste throughout the Recycling Chain

Another high level policy goal of the e-Steward's EMS must include a complete disallowance of prison labor to manage Hazardous e-Waste, not only in their own operations, but also throughout the Recycling Chain for each of the Hazardous e-Wastes. This policy goal should ensure e-Stewards have controls in place to prevent Downstream Recyclers from using prison labor, through Final Disposition of Hazardous e-Waste.

A.3 Planning

A.3.2 Legal and Other Requirements

The e-Steward must have a procedure to identify and access applicable legal and other requirements related to its environmental and health and safety aspects, and take them into account when establishing its EMS. This will include all local, state/provincial, and national legal requirements for all aspects of receiving, processing, transporting, storing, shipping, exporting, and protecting data security, workers and the environment relative to electronic equipment and e-waste.

This Standard requires full implementation of worker health and safety regulations and requirements in the workplace, regardless of whether or not government agencies are actively overseeing or enforcing such implementation.

Note: It is not sufficient for an e-Steward to meet only its state/provincial and federal/national legal requirements. The e-Steward requirements for a number of areas go beyond legal requirements.

► **RESOURCES for Legal and Other Requirements:**

Federal Laws – CANADA

In Canada, provinces and territories (not the federal government) have jurisdiction over their respective solid and hazardous waste activities, except for export of such wastes.

► For information on Canada's federal laws:

<http://www.canadianenvironmental.com/legislation/>

Provincial/Territorial Laws – CANADA

The following are e-waste collection and recycling programs in place or under development in Canada, as of July 2009:

Canadian Council of Ministers Electronics Product Stewardship Principles

Alberta's Electronics Designation and Recycling Regulations

British Columbia Recycling Regulation

Nova Scotia E-Waste Regulations

Ontario Waste Diversion Act

Saskatchewan Waste Electronic Equipment Regulations

► Other provinces are developing programs, and harmonization is in process

For more information on provincial programs, go to:

www.eStewardship.ca

Federal Laws – USA

► Federal CRT Rule –

<http://www.epa.gov/osw/hazard/recycling/electron/index.htm>

U.S. National Environmental Policy Act (NEPA)

Comprehensive Environmental Response, Compensation and Liability Act (CERCLA)

Superfund Amendments and Reauthorization Act (SARA)

Community Environmental Response Facilitation Act (CERFA)

Resource Conservation and Recovery Act (RCRA)

The Federal Hazardous and Solid Waste Amendments (HSWA)

Pollution Prevention Act (PPA)

Toxic Substances Control Act (TSCA)

► For an excellent source of information about and links to national e-waste disposal regulations in many countries, states, and provinces, go to:

<http://www.redemtech.com/regulations.aspx> You will need to register, but the information is available at no cost.

State Laws – USA

► For information on the latest state laws, go to the following websites:

<http://www.electronicrecycling.org/public/ContentPage.aspx?pageid=14>

http://www.electronicstakeback.com/legislation/state_legislation.htm

A.3.2.2 Conformance with Export Laws and Regulations

As a result of requirements in the Standard (which are based on existing international law), e-Stewards have two basic sets of export laws they must set up procedures to conform to (in addition to requirements in the Standard):

1. Export (and import) laws of the country in which they operate (export regulations are almost always in national law, and not in state or provincial law or regulations);
2. Any import laws in the importing countries.

A.3.2.3 Data Security and Privacy Requirements

The e-Steward must have a procedure to identify and access applicable legal requirements related to data security and privacy, and take them into account

when establishing its EMS. In some countries, there are national as well as regional laws. In addition, the e-Steward must have procedures to consistently meet legally binding obligations for data security in contracts with customers (if offered), as well as any other laws and regulations related to data security and privacy requirements.

► For one excellent source of information for regulations regarding data security in many countries, states, and provinces, go to: <http://www.redemtech.com/regulations.aspx> You will need to register, but the information is available at no cost, including summaries of the laws, as well as direct links to the laws.

A.4.2 Competence, training and awareness

Any system designed to restrict exports of toxic materials to a limited set of countries and facilities will only be as strong as the humans implementing and overseeing the systems. In the implementation of its EMS policies, an e-Steward must provide on-going training for all personnel performing tasks related to the export policy.

A.4.6 OPERATIONAL CONTROL

A.4.6.1 Health and Safety in the Workplace

General: Because this is an international standard and may be utilized in nations that do not have adequate worker protection laws and/or enforcement, this section is defined with some specificity to provide baseline performance requirements for all e-Stewards in all countries. In addition, because there is little data on actual worker exposures in this industry, this Standard calls on e-Stewards to test and confidentially report actual test results, in order to inform future revisions of this Standard, based on actual data.

The following are specific steps that e-Stewards should take to monitor and protect worker health and safety:

A.4.6.1 a)

Fully Implement Local Regulations

While not true in all regions or all countries, of course, there are many nations/local jurisdictions that have occupational health and safety regulations which are not well enforced in the electronics recycling industry in particular – a relatively new industry. This Standard requires the e-Steward to proactively and fully implement all applicable local requirements for worker health and safety, including those for monitoring and testing actual exposures to toxins in the workplace, even where government oversight is lax.

A.4.6.1 b)

“Qualified” personnel or staff can include certified industrial hygienists, environmental health and safety specialists, safety engineers, etc.

A.4.6.1 c)

Ascertain Hazards

Review incoming products and product label specifications indicating chemical composition; obtain and maintain Material Safety and Data Sheets (MSDSs) that are likely to pertain to Hazardous Electronic Wastes; obtain mill and lab test results from materials submitted to the labs by the e-Steward, and seek manufacturer and/or customer disclosure (e.g. regarding radioactivity of medical equipment), etc.

► See Appendix C for information on *“Toners and Inks”*

Non-conforming materials

Because recyclers receive unusual items which the recycler may or may not be prepared to manage safely, it is important to have a process for dealing with “non-conforming” equipment or materials.

► A document entitled *“Identification, Reporting, and Disposal of Potentially Non-Conforming Equipment”* is offered by Cascade Asset Management, LLC, as an example of procedures necessary for managing incoming equipment which

may require processes other than the recycler's typical operations. See Appendix C for this document.

A.4.6.1 e)

'Qualified Professional' Ergonomist

In order to conduct an effective ergonomic evaluation of the e-Steward's operations, it is very important to have access to the professional opinions of qualified occupational health and safety professionals with training & experience in ergonomics.

Examples of potentially qualified professionals in some countries:

1. Certified Industrial Hygienist (CIH), physical therapist, or occupational therapist with specific training in ergonomics;
2. Certified Ergonomic Evaluation Specialist (CEES);
3. Board of Certification for Professional Ergonomics (BCPE)—either certification as a Certified Professional Ergonomist (CPE), Certified Ergonomist Associate (CEA), Associate Ergonomics Professional (AEP), or CHFP (Certified Human Factors Professional);
4. Canadian College for the Certification of Professional Ergonomists (CCPE)—designation as a Canadian Certified Professional Ergonomist (CCPE) or Associate Ergonomist (AE);
5. Equivalent training/professional experience to competently complete an ergonomics evaluation.

► For information on steps involved in performing an ergonomic evaluation, one source is NIOSH (National Institute for Occupational Safety & Health)

<http://www.cdc.gov/niosh/docs/97-117/epintro.html>

Workplace musculoskeletal disorder (MSD) is a general name given to a group of health problems affecting the joints, muscles, nerves and tendons. Other general names for these health problems are:

Repetitive motion injury (RMI)

Repetitive strain injury (RSI)

Cumulative trauma disorder (CTD)

Occupational overuse syndrome (OOS)

A.4.6.1.1 e–Stewards using Potentially Hazardous Processing Technologies

General: The introduction of shredding, crushing, heating, or using chemical processes for managing Hazardous Electronic Waste can potentially contribute additional health hazards and environmental aspects to those already inherent in this waste stream. If a recycler/refurbisher utilizes Potentially Hazardous Processing Technologies (PHPTs), it is very important to assess the combined risks associated with the specific toxins present and the specific technologies utilized to manage them, in order to determine how to best protect human health and the environment. For example, shredding circuit boards can result in increased airborne toxins if inadequate controls are in place; and the low temperature heating of plastics with brominated flame retardants will likely create new toxics, such as halogenated dioxins and furans, which are some of the most toxic substances known to humankind. For these reasons, e–Stewards utilizing PHPTs must meet additional health and safety requirements in this Standard.

A.4.6.1.1 a)

Determine Hazards in Managed Materials

Currently, one of the best practices in the industry is to assess (identify, quantify, and document) the actual percents (by weight) of hazardous materials in the materials received by the recycler, by sending samples to laboratories and mills for analysis. In addition to providing detailed information about the extent of specific toxins present in the material flows, this process will provide valuable information about expected volumes of output for each material, and can increase the tracking and downstream accountability as a result. It can also assist the recycler in finding the best markets for their specific outputs with known content (including toxicity).

A.4.6.1.1 b)

Air Monitoring

The purpose of the air monitoring section of this Standard is not to ‘reiterate’ regulations that exist in one country or another regarding air monitoring for workers, but to identify a baseline framework of requirements to help ensure that e-Stewards around the world provide a ‘safe’ work place and minimize hazards/exposures to the extent possible. In addition, because there can be high variability in a recycler’s in-coming waste stream, this justifies a greater frequency than annual air monitoring. (Note that the requirement for air monitoring every six months is already a requirement in the US for exposures between the Action Level and Permissible Exposure Limit (PEL) for contaminants such as lead. Also note that more frequent, quarterly air monitoring, is required in the US for exposures greater than the PEL for lead.)

A.4.6.1.1 b) 4 C

Tests and limits for fiberglass and brominated flame retardants

An e-Steward using shredding or other size reduction equipment must test for both fiberglass and brominated flame retardants (BFRs), as these two hazards are commonly found in circuit boards and other electronic waste. For more information about testing for BFRs, see articles in Appendix C, citing studies of PBDE exposures in workers recycling e-waste. Future revisions of this guidance document may contain more specific information on exposure limits and laboratory tests already available for both types of tests. e-Stewards are encouraged to test pre-employment (baseline) levels as well as subsequent exposure levels for at least the following specific congeners of Polybrominated Diphenyl Ethers: 183 (a congener of Octabrominated Diphenyl Ether) and 200 (a congener of Decabrominated Diphenyl Ether), as these appear to be the two PBDE’s found at the highest levels in e-waste processing facilities in studies cited below and found in Appendix C.

► ***“A Newly Recognized Occupational Hazard for US Electronic Recycling Facility Workers:***

Polybrominated Diphenyl Ethers”, Journal for Occupational and Environmental Medicine; Volume 51, Number 4, April 2009 (See Appendix C)

► ***“Polybrominated diphenyl ether exposure to electronics recycling workers – a follow up study”***

Kaj Thuresson, Åke Bergman, Klaus Rothenbacher, Thomas Herrmann, Sverker Sjölin, Lars Hagmar, Olaf Päpke, Kristina Jakobsson
www.elsevier.com/locate/chemosphere (See Appendix C)

► *“Personal air sampling and analysis of polybrominated diphenyl ethers and other bromine containing compounds at an electronic recycling facility in Sweden”* Pettersson-Julander A, van Bavel B, Engwall M, Westberg, November 2004
[http://www.ncbi.nlm.nih.gov/pubmed/15536500?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DiscoveryPanel.Pubmed_Discovery_RA&linkpos=2&log\\$=relatedarticles&logdbfrom=pubmed](http://www.ncbi.nlm.nih.gov/pubmed/15536500?ordinalpos=1&itool=EntrezSystem2.PEntrez.Pubmed.Pubmed_ResultsPanel.Pubmed_DiscoveryPanel.Pubmed_Discovery_RA&linkpos=2&log$=relatedarticles&logdbfrom=pubmed) (See Appendix C)

A.4.6.1.1 c)

Injury and Illness prevention program

1. Conduct a Job Safety Analysis (JSA) for each job position/work task in the facility, including an assessment of (identify and quantify) the hazardous materials involved, and potential exposures. The JSA should consider workplace airborne exposures, ergonomic stresses, noise, electric shock, cuts and abrasions, vibration, thermal processes, machinery, heat stress, radiation, use of cleansers, solvents and other toxic agents, inhalation of vapors (such as solder gun vapors), inhalation of toners, rub-off of lead from handling soldered circuitry, and other potential workplace hazards or identified workplace injury risks and illnesses; and
2. Develop specific procedures for safe handling of specific materials and work processes as a result of the JSA. Work practices and processes should include those for routine work activities (e.g., disassembly or recycling of e-wastes), maintenance activities that must be performed by employees upon occasion, and response measures that shall be implemented by employees in the event of an emergency/accident (see subsection j, below);
3. Keep detailed records of injuries and ‘close calls’, and review regularly to determine effectiveness of IIPP and ergonomics programs.

A.4.6.1.1 f)

On-going Identification of Occupational Hazards and Risks

Establish and maintain an ongoing process for identifying and assessing occupational hazards and risks for injury or illness, as follows:

1. Qualified personnel should conduct workplace inspections, annually at a minimum, to identify and correct health and safety concerns. These inspections should also be conducted whenever products or processes change. The findings of all inspections should be documented and reported to the safety committee;
2. Qualified personnel should also conduct and document inspections following implementation of emergency response plan (see Subsection j, below), as well as review reportable injuries/illnesses (see Subsection l below), and any ‘near misses.’ Responses to all incidents should be reported on and evaluated by the safety committee and management, with a view to preventing such emergencies and/or injuries and illnesses in the future (e.g., through changes in processes and controls, revisions in safe work practices, worker training, upgrades in personal protective equipment, etc.); and
3. Any deficiencies identified during inspections in 1 and 2 above, in this subsection should be immediately corrected; if they cannot be, a corrective plan should be prepared by qualified personnel and include a timeline for implementation.

A.4.6.1.1 g)

Engineering, Administrative, and Personal Protective Equipment Controls

Manage possible exposures of their workers to hazardous materials, and physical hazards, ergonomic and other workplace hazards by engineering, administrative, and personal protective equipment controls (in that order), as follows:

1. Engineering Controls

A. Substitution or elimination of high exposure tasks where possible, process design changes, isolation of sources, automation, local exhaust ventilation and/or capture devices (in order of preference);

- i. Where ventilation and/or capture hoods, filters, dust capture, negative pressure, or other mechanical controls are used, regularly test these devices to ensure adequate protection and develop and implement a schedule for ensuring continued effectiveness of these systems; and
- ii. Develop and implement a preventative maintenance plan including filter change outs for mechanical systems and maintenance on other engineering controls and equipment to ensure performance is in good working order;

2. Administrative Controls

A. Develop safe work practices as part of the injury and illness prevention program (IIPP) (see subsection c above) and annual review of these practices by qualified personnel;

B. Provide workers with an intranet database or other readily accessible source of information on specific workplace hazards (e.g., MSDS, chemical composition sheets, technical specifications) and written safe work practices as part of the IIPP to reduce exposure or contact with physical hazards;

C. Post signage or labeling of areas to identify restricted or hazardous areas, physical or biological hazards, equipment hazards, areas requiring personal protective equipment (and what type) and other site-specific hazards;

D. Develop and implement a written noise protection plan if workers are exposed to noise at or above 85 decibels (dB),

including monitoring, audiometric testing, worker training (see letter h in this section, below), and engineering controls for reducing noise exposure (first priority), followed by administrative controls and use of hearing protection (lower priority); and

E. Consider job rotation a ‘last resort’ as an administrative control; all employees that are ‘rotated’ should have adequate training, personal protective equipment, and should follow proper hygiene and be medically surveilled, as outlined herein.

3. Personal Protective Equipment (PPE)

A. Utilize qualified health and safety professionals (either internal or external) to select and employ the appropriate PPE for workers based on knowledge of the hazards and the evaluations completed above (see subsections b, c, f, and g, above):

i. PPE provided must consider protection for chemical (e.g., heavy metals), physical (e.g., lacerations, eye injuries, noise, radiation), and biological hazards to which workers may be exposed for routine work, emergency response, and maintenance activities;

ii. Provide PPE which is cleaned by a professional laundry service when non-disposable coveralls are used;

iii. Provide foot protection or foot coverings;

iv. Where respiratory protection is required, develop a respirator program that is overseen by qualified personnel (e.g., CIH, safety consultant). This program should include medical determination of fitness for use, annual fit testing and training, provisions for cleaning, storage and

maintenance, daily users seal checks, and an annual evaluation of this program;

v. Respiratory protection should be based on airborne exposure levels (see subsection b, above) and the assigned protection factor for the respirator. Only approved respirators may be used;

vi. An e-Steward should have a process for ensuring use of required PPE by workers at all times; and

vii. PPE should be provided free of charge to workers;

A.4.6.1.1 h)

Provide a Training Program for Workers

1. Worker retraining shall occur at least annually or more frequently, as required by applicable laws and regulations;
2. The e-Steward shall maintain a list of training required by job position;
3. Worker training shall include the following topic areas (as applicable to the workplace); other training topics shall be required based on hazards identified in the workplace:
 - A. Hazard recognition;
 - B. Hazard communications;
 - C. Injury and illness prevention (see Subsection c, above), including procedures for reporting injuries and illness, and the Recycling/refurbishment plan (see 4.4.6.1 d, in the Standard);

D. Emergency response procedures (including evacuation procedures)(see Subsection j, below);

E. Tools and equipment use including machine guarding, lock out tag out, forklift safety, electrical safety, as appropriate, and workplace safety devices;

F. Personal protective equipment, including respiratory protection (see Subsection g above);

G. Slip, trip and fall prevention;

H. Housekeeping and worker hygiene procedures (see Subsection i, below);

I. Hearing conservation (see Subsection g, above);

J. The e-Stewards medical surveillance program (see Subsection k, below);

K. Ergonomic hazards (see Section 4.4.6.1, above);

L. First aid and cardiopulmonary resuscitation (CPR);

4. Provide training for workers who must respond to workplace emergencies, repeated with a frequency necessary to maintain a worker's competency to respond;

5. Training shall cover the importance of conformance with workplace health and safety requirements, and workers' and management's roles and responsibilities in achieving conformance. Training must also inform workers of potential consequences of departure from health and safety requirements;

6. Any contractors working on behalf of an e-Steward should be able to demonstrate their own employees have requisite training for their work tasks or the e-Steward must provide this training prior to the contractor's work at the facility or workplace;
7. The e-Steward shall have a procedure for training of visitors prior to entry into areas where hazardous materials, physical hazards, or other workplace hazards are present;
8. Workers shall be paid their regular wage while attending training sessions;
9. e-Stewards should ensure the evaluation of the effectiveness of the training provided (knowledge retention of workers) at least annually, and the findings of these evaluations should be documented in writing and used to improve the training provided and evaluate the frequency at which retraining is provided; and
10. Worker training records shall be maintained for all workers, for at least 3 years from the date the employee last worked at the facility;

A.4.6.1.1 i)

Workplace cleaning and hygiene procedures

1. Housekeeping Procedures

- A. Ensure that the work area is kept clean through regular cleaning by safe methods (e.g., use of HEPA vacuums and/or wet methods for cleanup);
- B. Document safe cleaning methods to be used, locations where housekeeping must occur, a cleaning schedule, and PPE to be worn during housekeeping;
- C. Provide necessary equipment on-site to implement housekeeping, and keep these items in good working order;

D. Conduct wipe sampling annually by a qualified professional to evaluate the effectiveness of the cleaning methods used; and

E. If cleaning methods are found to be ineffective, they should be upgraded on a timely basis under consultation with the qualified professional and worker training provided;

2. Hygiene Procedures

A. At a minimum, the e-Steward shall ensure no eating, drinking or smoking, use of smokeless tobacco products, or applying cosmetics in work area where hazardous materials are present;

B. The e-Steward shall provide a clean changing area and separate storage of work and street clothing to prevent cross contamination;

C. Work clothing and foot coverings or protection shall not be brought home from the facility or workplace;

D. A clean area, separate from the work area (preferably under positive pressure), should be separated from the work area for workers to take breaks and eat lunch;

E. Washing facilities with warm water, soap, and clean towels, and showers if feasible, should be provided for workers to cleanup before breaks and at the end of their shift; and

F. Implementation of required hygiene procedures shall be reviewed by a qualified professional on at least an annual basis; any deficiencies should be corrected on a timely basis;

A.4.6.1.1 j)

Responding to Emergencies

Have a written plan and procedures for responding to and reporting emergency situations, and identify the personal protection and safety devices that are required on-site to deal with these emergencies:

1. The types of emergencies for which response procedures should be developed include: uncontrolled releases of Hazardous e-Wastes or other hazardous materials, worker injury (including when to contact an ambulance), fires, explosions, and other emergencies that pose risks to worker safety, public health, or the environment;
2. Develop and implement procedures for reporting work related injuries/illnesses, and make these known and available to employees. These procedures must include conditions when employees report injuries and/or illnesses to their supervisor(s), and when employers must document and report workplace injuries and illnesses, as required, to local, state/provincial, or national agencies;
3. Provide facility safety devices (e.g., emergency shutoff system, fire suppression system, emergency notification systems) and a schedule for maintenance and testing of these devices;
4. Provide first aid supplies on-site for employee use and a documented procedure for transport to the nearest medical facility;
5. Provide appropriate spill cleanup kits and procedures for responding to specific contaminant releases as relevant to facility operations (e.g., mercury cleanup kits for e-Stewards that receive mercury-containing devices; CRT cleanup kits for e-Stewards that receive CRT devices);
▶ See Appendix C for examples for Clean-up Procedures for Accidental CRT Breakage
6. Provide eye washes and emergency showers where workers may be exposed to chemical splashes, or other toxic or hazardous materials that irritate or are corrosive to the skin or eyes;

A.4.6.1.1 k)

Develop and Implement a Medical Surveillance Program

The e–Steward should have a designated occupational health provider for medical surveillance of workers, consult with the occupational health provider regarding recommendations for medical surveillance, and develop and implement a medical surveillance program:

1. An e–Steward should accomplish baseline blood level monitoring and annual sampling for workers in high hazard areas;
2. The occupational health provider should be provided with information on work activities performed, work practices, materials handled, exposure controls, PPE, air monitoring results, and any prior worker test results;
3. The written medical surveillance program should be developed in consultation with the occupational health provider and specify the frequency of biological testing, medical exams, audiometric testing, and conditions where workers are removed and returned to work. The program should include worker baseline examinations and specify when follow up medical evaluations are required;
4. The e–Steward shall instruct the occupational health provider to advise employees of any medical condition, occupational or non–occupational which dictates further medical examination or treatment.

A.4.6.2 Reuse and Refurbishment of Electronic Equipment

General: Extending the useful life of electronic equipment is by far the most preferable management option for these energy and resource intensive products. However, the widespread exporting of untested and non–working equipment and parts under the guise of ‘reuse’, “refurbishment”, or “bridging the digital divide” is resulting in far worse devastation of human health and the environment in developing countries than shortening the use of electronic

equipment by responsibly recycling it. For this reason, the e-Stewards Standard requires e-Stewards to be completely accountable for sending only tested, working equipment and parts into any reuse market. For much equipment to be truly useful (and not quickly disposed of) for years to come, it must have all basic functions tested and working, as well as backlighting, keypads, pixels, batteries, etc. that have a long life ahead of them. Mobile phones, for example, with keypads that don't work can easily end up as waste. Batteries, in particular, are essential components in countries or regions where the electrical grid goes down frequently. Therefore, a battery that only holds a charge for 45 minutes or an hour is likely to be 'thrown away' in the importing country and replaced with a better one, resulting in the transboundary movement of toxic waste, likely in violation of the Basel Convention. Many of the components that need to be replaced in used equipment are some of the most toxic components in e-waste; for example, mercury lamps, batteries, and circuit boards.

e-Steward Accountability for Accomplishing Refurbishment: In order for customers to trust that their equipment is going for legitimate reuse as a result of choosing an e-Steward, the e-Steward must take full responsibility for ensuring that on-going tasks required in the Reuse and Refurbishment section of the Standard (4.4.6.2) are completed prior to leaving a certified e-Steward's control. Therefore, the e-Steward should either complete the refurbishment tasks in-house or at another (downstream) certified e-Steward's facility, where policies and procedures are designed to meet this threshold (4.4.6.2), at a minimum. If a downstream certified e-Steward is used for refurbishment, the first tier e-Steward retains responsibility to the customer to ensure this Standard is met. It is not acceptable under this Standard for an e-Steward to pass on untested, non-working equipment to a non-e-Steward for refurbishment. (See 2. SCOPE above for more information regarding in-house vs. outsourced processing.)

There may be circumstances whereby a first tier asset recovery e-Steward takes control of a customer's Electronic Equipment (for example, on-site, at the customer's corporate facility where the e-Steward may do the initial sorting) and elects to ship the non-refurbishable equipment directly to their

Downstream Recycler for destruction and recycling, in conformance all applicable requirements in this Standard (such as 4.4.6.5 Accountability for Downstream Recyclers and 4.4.6.7 Exportation of Hazardous Electronic Wastes).

The e-Steward is responsible for ensuring that any Electronic Equipment and parts – which contain or consist of toxic components as defined by Hazardous Electronic Equipment or Problematic Components or Materials – that are brought into their operations or under their control will only be sold or donated for “reuse” after stringent measures are completed to produce and protect working equipment and parts.

If components or subassemblies contain Hazardous e-Waste, they must also be tested for full functionality prior to being sold or donated into the reuse market. It is not acceptable for the e-Steward to sell circuit boards or batteries (or anything hazardous) “as is”, with an offer to take back any bad components. There are no guarantees that bad components would be returned to the e-Steward, resulting in unknown downstream management for the toxins. All whole equipment and parts that contain or consist of Hazardous Electronic Equipment must be tested and fully functional prior to leaving the e-Stewards (or IDC’s) facilities.

If devices or components do not contain any Hazardous Electronic Equipment and are not essential for the basic functions of the device or component, (e.g. plastic housings without halogenated compounds, aluminum housings, etc.), they do not need to fall under the same scrutiny. However, it is important to remember that cosmetic damage may significantly reduce an electronic product’s value in the reuse marketplace, and result in the entire device being disposed of (along with its toxic components).

A.4.6.2 a) Fully test all Electronic Equipment and Components

Most refurbishers run diagnostic software on each unit, which not only itemizes the technical specifications of each device, but also identifies failed components or functions. A “power up” test is not adequate to determine that the devices are “capable of performing the essential functions they were designed to perform”, but rather simply tells the refurbisher that the power

supply is working. No e-Steward or their certified downstream e-Steward for refurbishment may sell any Electronic Equipment or parts (if they contain HEEs) “as is”, “untested stock”, “beyond economic repair”, or any other category of equipment that is not tested and fully functional.

Fully test all Electronic Equipment and/or components containing or consisting of hazardous electronic components. After testing whole devices to determine what components are working or not working, repairs, upgrades, refurbishment, or repurposing will need to be completed on all components or equipment that is not fully functional and is intended to be reused. If obsolete functions/components are no longer needed (such as a telephone modem or floppy disk drives), and have been upgraded, these obsolete components must be removed if they contain hazardous electronic waste, in order to avoid passing on toxic. For example, obsolete drives with circuit boards must be removed and recycled according to this Standard if a tower is upgraded.

New equipment: If equipment is new and still unopened in its original packaging, this does not guarantee that that the equipment (rejected by manufacturers or retailers) is working. However, if the e-Steward has evidence that new, unused equipment or components that arrived unopened in their original packaging are fully functional, then they do not need to test these before going to reuse. If the e-Steward is in possession of such new equipment for the purposes of destruction or repairing faults, it must go through the full recycling or refurbishment process.

Guidance on testing of equipment and components to determine key functions are functional:

<u>Device/Component</u>	<u>Tests Necessary to Determine ‘Key Functions’ are ‘Fully Functional’</u>	<u>Additional Indications of working equipment/components going for legitimate direct</u>
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		<u>reuse</u>
Laptops	Diagnostic software that indicates what functions are failing, such as hard drive, RAM or power supply failures. Make sure cooling fans are working. Batteries must be tested to meet requirements below for reuse. Mercury lamps must all be functional. No screen burn or scratches/damage. ¹	Offer 30– 90 day repair/replace policy. Provide copy of invoice and contract relating to the sale and/or ownership of equipment for reuse which states that it is for direct re-use and is fully functional.
Batteries (e.g. laptop and mobile phone batteries)	Ensure that each battery is capable of holding at least 80% of its original capacity ² (and not simply that it will hold a charge)	Battery testing under load conditions
Desktop computers	Diagnostic software that indicates what functions are failing, such as hard drive, RAM or power supply failures.	Offer 30– 90 day repair/replace policy

¹ There is a large demand for even non-working laptops in the reuse market. Nonetheless, e-Stewards (or their IDC) must only sell or donate fully functional laptops and parts. Many of the components that go bad in a laptop are considered hazardous waste under the Basel Convention (and therefore this Standard), such as circuit boards, batteries, and mercury lamps.

² This parameter was defined by industry participants in the United Nation’s Mobile Phone Partnership Initiative (MPPI) <http://www.basel.int/industry/mppi.html>

	<p>Make sure cooling fans are working.</p> <p>Batteries inside desktops must be functional.</p>	
CRT Monitors	<p>Diagnostic programs that test for color, contrast, pixels.</p> <p>Visual for screen burn and scratches.</p> <p>Must have cabling intact.</p> <p>If the device is going into the “semi-knockdown market” in another country (to build a new device around a used cathode ray tube), the following must be accomplished <u>prior</u> to exporting only good tubes: all circuit boards and other Hazardous Electronic Equipment must be removed from the device, and the CRT tube itself must be tested with a “Picture</p>	Offer 30- 90 day repair/replace policy

	Tester/Restorer” and determined that it is a viable tube for reuse	
LCD Flat Screens (TVs and Monitors)	Diagnostic software testing for color, contrast, pixels, etc., replace any bad backlighting, look for screen damage.	
Plasma Flat Screens	Diagnostic software testing for color, contrast, etc. Testing for lighting, screen damage.	
CRT Televisions	In addition to all necessary tests listed above for CRT Monitors, a refurbisher must ensure that any TV going into reuse is capable of receiving the type of broadcast signal (digital or analog) in use in the market where it will be reused. ³	
Printers	Wipe data on printer memories, print a test page successfully, make	Offer 30- 90 day repair/replace policy

³ There is little to no market for old TVs in most countries.

	<p>sure the paper feed is working, light carriage is fully functional, visual inspection for broken parts, clean inside and out, toner cartridge functional, provide full toner cartridge if part of the deal</p>	
<p>Fax machines</p>	<p>Wipe data on printer memories, print a test page successfully, make sure the paper feed is working, light carriage is fully functional, visual inspection for broken parts, clean inside and out, provide full toner cartridge if part of the arrangements</p>	
<p>4-In-One or Multi-functional machine (e.g. Printer/fax/copier/scanner in one)</p>	<p>See printers and faxes above</p>	
<p>Mother boards</p>	<p>Connect to a power supply and check functions</p>	<p>Connect to a computer and run diagnostics on mother boards. 30-90 day exchange</p>

		policy.
Microprocessors (e.g. P4 chips)	<i>Guidance under development</i>	
RAM	Insert into test bench computers for testing functionality using diagnostic program	30–90 day exchange policy
Circuit boards	Insert into test bench computers for testing functionality using diagnostic program	Connect to a computer and run diagnostics on mother boards. 30–90 day exchange policy.
Cell phones	<p><u>Tests/Inspection:</u> Power Up Test Call, keypad functionality, good LCD or screen, working speaker and microphone. No water damage or physical damage.</p> <p><u>Additional necessary activities:</u> Data wiping. Truth in advertising. Chargers & batteries always accepted by e–Steward, with or without a cell phone</p>	<p><u>Additional Tests:</u> Camera, Video, Texting functions.</p> <p>Diagnostic software on each phone, generating assessment of technical specifications & dysfunctions.</p> <p>After repairs, this data can be conveyed to buyer, offering detailed specifications on each phone</p>

Copiers	<i>Guidance under development</i>	
Servers	<i>Guidance under development</i>	

A.4.6.2 c)

Eradicate Data

(See A.4.6.3 below)

A.4.6.2 d)

Label or List Identifying Records

Once an e-Steward has invested skilled labor in running diagnostics/testing, repairing, upgrading, and otherwise refurbishing a device or component that contains or consists of Hazardous e-Waste, they will need to document the information listed in 1–8 in this section of the Standard, providing easily accessible evidence of the working condition of and identifying information for each specific device. If a lot of the same type of device or component is all run through the same set of tests and refurbished to the same condition, the documentation can simply list that one type of component, the tests and condition one time for the entire lot, but will need to provide unit by unit identifying information for the rest of the requirements. NOTE: some components may not have indentifying numbers on them.

A.4.6.2 e)

Package refurbished equipment and components to protect them from damage in transit

Guidance: Tested, working, labeled equipment and components must be adequately packaged in order to protect individual products and components from damage during shipping, loading and unloading. Bulk loading or “free stacking” equipment into a container with no separation, packaging, palletization, or other types of protections is completely inadequate. If tested, working bare CRT tubes are being shipped for remanufacturing, they must each be carefully protected, e.g. in Styrofoam trays or layers of cardboard separating,

supporting, and protecting tubes in layers that are then palletized and shrink wrapped.

A.4.6.2 f)

Evidence of downstream reuse

The e-Steward must provide evidence of refurbished equipment and components moving into legitimate reuse markets, by maintaining verifiable records for all equipment and parts that go for reuse. Such documentation must include, at a minimum, the requirements listed in 1 and 2 of this subsection.

In the absence of appropriate documentation required in letters a), c), d), and f), customers and auditors will presume that an item or shipment is Hazardous e-Waste.

A.4.6.2 h)

Mass Balance Accounting

All Electronic Equipment refurbished for Reuse, and resulting scrap must be included in a mass balance system accounting. See A.5.1.1 a) for details on Mass Balance Accounting.

A.4.6.2 i)

Optional take-back service

If practicable and desirable, the e-Steward may offer to take back end-of-life equipment and components originally sold or donated for Reuse, with or without charges to the customer, so that reused equipment will return to the e-Steward for responsible end-of-life management, or further reuse.

A.4.6.3 DATA SECURITY

Conformity with NIST:

Broadly speaking, a refurbisher must demonstrate that they have the operational

framework to comply with NIST 800-88 (see below) plus e-Stewards performance requirements, and they must have an information system that confirms compliance (i.e. evaluates successful data wiping) on a device-by-device basis.

The e-Steward's operational framework must govern 1) what must be done, 2) how the operation must be performed, and 3) how to manage exceptions/errors. The record keeping system must document execution of everything above in detail, and with transparency.

On a practical level, refurbishers and their auditors must confirm that technicians know what kind of sanitization procedure is to be performed in every instance, and that they know how to perform it. The system must ensure that every asset is processed. Refurbishers must confirm that verification of every sanitization is performed and recorded. Every data-bearing device must appear in terminal reporting, with a record of the type of sanitization performed.

In summary, the e-Steward must create the operational governance system/framework, must ensure technicians are capable of executing procedures, and have a reporting system to capture and report all critical data on each device.

Written Notification to Customers: An e-Steward is responsible for having clear agreements with customers regarding what data security services they are and aren't providing, including any indemnity provided to customers. Therefore, the e-Steward must maintain records of such agreements, contracts, MOUs, or work orders for customers that clearly define what data security services the e-Steward will be providing (or did provide in the past), or that none will be provided.

"Customers" may mean corporations (in which case detailed contracts are typical), individuals (walk-ins), school districts, or municipalities who are organizing public e-waste collections events. In the latter case, conformance to

this requirement may look like a single written agreement with the organizer (municipality, in this example) – the ‘customer’ who signs a waiver, but who in turn must have a mechanism to notify all members of the public who drop off their e-waste that no data security services are being offered. This ‘mechanism’ may include a number of ways of communicating with the public, such as: in public flyers, services announcements, and ads promoting the event in advance; and/or in large signs at the collection event itself.

► For a copy of the National Institute of Standards and Technology (NIST) standard for data security, go to:

http://www.nist.org/nist_plugins/content/content.php?content.52

Incorporate NIST 800–88, Guidelines for Media Sanitization, in its entirety, with the following amendments pertaining to hard drives:

1. Hard Drive Bad Sector Handling: All hard drives contain imperfections in the magnetic medium which may cause a logical sector on the hard drive to be unreadable and/or unwritable. In such cases overwrite sanitization applications are unable to write obliterating data to bad sectors which may contain data, potentially exposing such data to unauthorized access if the drive is dispositioned. When a sufficiently large number of bad sectors are encountered as to pose a material breach risk, the hard drive must be destroyed. By eliminating the possibility of resale, hard drive destruction significantly increases the cost of data sanitization.
 - 1.1. Data owner security policy should be explicit regarding the allowable number of bad sectors encountered before the hard drive must be destroyed. The bad sector threshold should be established according to the sensitivity of the data, and the data owner’s tolerance of risk.
 - 1.2. Data logging should include a list of bad sector numbers encountered.
 - 1.3. Update figure 4.1 (of the NIST standard) to include destruction of drives where the bad sector threshold is exceeded.
 - 1.4. Update table 5.1 to include allowance for a sub-threshold number of bad sectors.

2. Verify Methods: All sanitization methods are subject to failure, therefore, verification of effective sanitization should be tracked as part of the data set which confirms the termination of the data lifecycle. The overwrite method of sanitization offers advantages for verification because automated means may be used for confirming that the obliterating pattern has been written to the hard drive.
 - 2.1. Where the need for reliability is very high, every logical block of the hard drive should be verified by reading it and certifying that the expected pattern of obliterating data is present.
 - 2.2. Where less time consuming verification is required, a sampling of blocks may be read and confirmed, so long as the first and last blocks are included in the sample.
 - 2.3. In desktop PCs and servers, hard drives should be visually inspected to compare against the record of verified sanitizations.
 - 2.4. Drives which have been disconnected, or are inoperable, must be reprocessed.
3. Quality Control: Because of the critical nature of the operational procedures for data destruction, a rigorous and formal quality control program is fundamental to ensuring consistently reliable results.
 - 3.1. Cycle counting should be performed on all data bearing inventory to ensure that perpetual inventory records are accurate.
 - 3.2. A sample of sanitized drives should be subjected to sector analysis on a daily basis, and the results recorded for audit purposes. When operating multiple shifts, samples are required from each shift.
4. Personnel: Though automation increases the reliability of sanitization, the performance of sanitizing technicians is always a limiting factor on the reliability of the process.
 - 4.1. New hires should be subjected to criminal background checks and drug screening and these records must be available for audit.
 - 4.2. A formal training and certification process should be employed to ensure that all sanitizing technicians are fully familiar with all procedures.
 - 4.3. The sanitizing technician must be identified in the security logging.

A.4.6.4 MANAGING HAZARDOUS e-WASTE AND PROBLEMATIC COMPONENTS AND MATERIALS

A.4.6.4 a)

Safely remove toxic components so they are not shredded, heated, crushed, etc. (unless you are the End Processor for that type of material)

As discussed in SCOPE in number 2 near the top of this document, e-Stewards are encouraged to teardown end-of-life equipment to the extent possible, and even if shredding equipment, are required to remove toxic components listed in 4.4.6.4 a) prior to shredding or using machinery for size reduction. Clearly the goal is to separate and consolidate toxic components that are typically allowed by law to be shredded, even though this may endanger human health and the environment. For this reason, e-Stewards are required to remove the toxic items listed in 1-12 of this subsection, and then ship those consolidated components to an appropriate processor for each toxic material, as defined in this Standard.

There may, however, be some toxic components that are better left to specialists (End Processors) to manage, rather than exposing workers and the workplace. For example, an e-Steward may want to separate and consolidate bad LCD screens from laptops (rather than having workers attempt to remove tiny mercury lamps in-house, which inevitably break), then ship whole screens to a mercury processor where exposures and releases may be better controlled.

A.4.6.4 b)

Manage consolidated toxic components as such

The e-Steward should be collecting, storing and transporting consolidated toxic components in ways that are defined by regulations and the needs of End Processors for these materials.

Batteries removed from equipment and components should be stored and transported in ways that keeps them separated to avoid unintentional

discharges, such as by placing button/coin cell batteries separately on packing tape to avoid contact with each other, or waxing, or placing tape over the battery terminals. Button cell batteries coming into contact with each other set up the potential for a fire because many of them still have a charge and, combined, they can heat up to the point of combustion. Such a fire is not easily extinguished. Lithium batteries can explode if compressed. Lead/gel and lead/acid batteries should be managed according to state/provincial and local regulations.

A.4.6.5 ACCOUNTABILITY FOR DOWNSTREAM RECYCLING CHAIN

General: Probably one of the most important criteria of the entire e-Stewards Standard is this one, holding e-Stewards accountable for controlling, tracking, and restricting the downstream destinations of all Hazardous e-Waste (HEWs) until the materials have successfully reached End Processors and Final Disposition in conformance with this Standard, including the export section. (Equipment and parts that contain HEWs and are destined for Reuse reach the end of their Recycling Chain once they are fully refurbished and documented according to this Standard, and do not need to be tracked further.)

Although the task of controlling and tracking materials to final disposition is challenging now, eventually service providers throughout the Recycling Chain may be certified to this Standard, and/or to an appropriate End Processor standard, which will significantly lighten the due diligence burden. In addition, there may be new technologies and services available in the next few years enabling customers and e-Stewards to track every shipment in real time, verifying its departure from and arrival at acceptable destinations, twelve months a year. In the meantime, there are a number of techniques that an e-Steward can employ on an on-going basis to improve confidence in vendor conformance throughout the Recycling Chain.

First and foremost, the e-Steward must put internal systems in place to control, monitor and restrict which downstream vendors are allowed to receive

Hazardous e-Waste from the e-Steward, in conformance with the Standard.

Section 4.4.6.5 is broken into 5 subsections, as follows:

- a) Perform initial due diligence on all potential Downstream Recyclers prior to sending any Hazardous e-Waste to them;
- b) Sign and enforce a contract with all next tier Downstream Recyclers (the content of which may be less rigorous for Downstream Recyclers who are also certified e-Stewards);
- c) Assure on-going conformance to the Standard, on the part of all Downstream Recyclers managing HEWs (again, less demanding if using certified e-Stewards downstream);
- d) Verify compliant activities by all Intermediaries;
- e) Provide customers (if asked) transparency regarding the destinations of their HEWs and materials going for Reuse.

An e-Steward must carefully vet every potential vendor of Hazardous e-Waste, put written agreements/contracts in place with vendors you chose requiring their conform to your requirements, including receiving necessary records from them (such as Acknowledgements of Receipt of your shipments to them, as well as documentation to and from their downstream vendors), consistently restrict which vendors are allowed to receive HEWs, train and monitor staff, monitor shipments and records, regularly audit or receive documentation of vendors receiving the toxic materials (depending on if an e-Steward or not), and build all of this into their management system with top level commitment and oversight.

Among other things, an e-Steward must verify that shipments are going from processing facility (Downstream Recycler) to another processing facility (with or without Brokers involved), and only to facilities that have been approved as acceptable in the Recycling Chain, including the End Processors. If the initial e-Steward is located in an OECD country such as Canada or the US, all of the Downstream Recyclers and End Processors for HEWs must be located in OECD countries (except for cleaned cullet that meets requirements in the Standard).

It is widely accepted that the shorter the Recycling Chain, the greater controls and the less likely materials will be diverted. Ideally, there is no more than one

'middleman' between the initial e-Steward's operation and the End Processor for most HEWs. This significantly increases controls and decreases risks for diversion of materials. Trusted vendor relationships with an on-going pipeline flow of materials to those same approved vendors is the goal, as opposed to selling to brokers who in turn sell to 15-30 customers around the world.

A.4.6.5 a)1A

Perform Initial Due Diligence on Potential Downstream Recyclers/Determine They Have In-House Technical Capability and Operational Capacity to Further Process HEWs

One of the basic concepts underlying the e-Stewards' Recycling Chain is that each next tier vendor in that chain must process the received materials to another level of preparation for Final Disposition, whether for materials recovery or Reuse, rather than passing equipment or materials on to a vendor who will simply pass it along to yet others. This subsection 4.4.6.5 requires the first tier e-Steward to determine that each Downstream Recycler for each HEW must have the in-house technical capability and operational capacity to further prepare the e-Stewards HEWs for final disposition, so that every company/vendor between the first tier e-Steward and the End Processors are essentially 'pre-processors' for e-Waste that is being recycled or reused.

The following chart is provided to help determine what type of processing is the typical 'next step' for any given material destined for material recovery, so that e-Stewards and their auditors can look for legitimate Downstream Processors who not only possess the capability to process the mixed materials to (at least) the next level(s) of processing, but who can also expel or produce materials which hopefully have value in the marketplace, are in a form acceptable to End Processors, or can be minimally disposed of.

The following chart should be read from top to bottom, indicating primary, secondary, and tertiary processes necessary for most types of electronic components, beginning with safety devices necessary for each type of processing. Some processes (the vertical columns) end (at the bottom of their columns) by requiring additional processes, in other columns. Process by-product waste is created during Processes B to G in the chart below.

Downstream Processes For Each Type of Electronic Component

	A	B	C	D	E	F	G	H
<i>Process</i> →	Manual	Shredder	Shred w/ magnet	Shred w/ more than magnet separator	Wet treatment	Pyro-treatment	Extraction	Bale
<i>safety devices</i> ↓								
explosion control		x	x	x		x		
noise control		x	x	x		x		
dust control	x	x	x	x		x	x	
Fume control					x	x	x	
<i>eWaste</i> ↓	Manual	Shredder	Shred w/ magnet	Shred, magnet + more	Wet treat	Pyro-treatment	Extraction	Bale
Batteries		x			x	x		
CD ROM				x				
Cell Phones	x	x	x	x				
CRT Glass						x		
DVD Players				x				
Hard Drives	x	x	x	x				
High Value Circuit Cards		x	x	x	x	x		
Home Electronics	x			x				
Ink Cartridges		x	x	x			x	
Insulated wire				x				
Low Value Circuit Cards		x	x	x		x		
Med	x			x				

Equipment								
Memory		x	x	x	x	x		
Mercury Lumps							x	
Micro processor		x	x	x	x	x		
Monitors	x			x				
PCs/Tower	x			x				
Plastics			x					x
Power Supply				x				
Printers	x		x	x				
Tape Drives			x	x				
Telephones	x		x	x				
Televisions	x	x	x	x				
Toner Cartridges		x	x	x			x	
	↓	↓	↓	↓	↓	↓	↓	↓
<u>Process Outcome</u>	Compon ents	Co- mingled	Co- mingled	Separate d	Cathode	Ingots	Bulk	Plastic
	Aluminu m	Aluminu m	Aluminu m	Aluminu m	Copper	Alumin- um	Toner	
	Batteries					Copper	Mercury	
	Circuit Cards	Circuit Card	Circuit card	Circuit card		Brass	ink	
	CRTS					Steel		
	Hard Drives					Gold		
	Insulate d Copper	Insulate d Copper	Insulate d Copper	Insulated Copper		Silver		
	Plastics	Plastics	Plastic	Plastics		Palladiu m		
	Power Supply					Platinum		
	Stainless	Stainless	Stainles	Stainless	Precious	Cadmiu		

		s		Metal Sludges	m		
	Steel	Steel		Steel	Heavy Metal Sludges	Lead	
	↓	↓	↓	↓	↓	↓	↓
<u>Further Processes Required</u>	D,F & G	D	D	F	F	Consumers	Recyclers
	Batteries				Heavy Metal Sludges		
	Insulated Copper				Precious Metal Sludges		
	Power Supply						
	Circuit Cards						
	Hard Drives						
	CRTS						

4.4.6.5 c)

Assure On-going Downstream Recycler Conformance to this Standard

(Under development)

TYPICAL DOCUMENTATION/RECORDS

A listing and description of the types of documents and records that the typical recycler utilizes

- Bills of Lading
- Shipping reports/logs
- Hazardous Waste Manifests

- Tracking reports (documenting materials through multiple vendors to final disposition)
- Shipping Container reports
- Acknowledgement of Receipt certificates, usually issued by a refiner or smelter formally acknowledging receipt of a specific shipment of a specific material on a specific date
- Assay certificates (usually produced by refiners, who have assayed or tested the value of a shipment of materials containing some valuable metals)
- Inbound/outbound logs
- Operating Permits
- Certificates of Recycling (these are not legal documents, nor anything but a certificate produced by a recycler/processor, and can be valueless. They can never be relied on for evidence of specific shipments to acceptable vendors, etc.)
- Competent Authority's Consent (written consent provided by the 'competent authority' in the importing and transit countries. See definition section for *Hazardous e-Waste* in the definitions section of the e-Stewards Standard, and see the export section in the Guidance document/Appendix A of the Standard for more information on competent authorities.)
- Downstream vendor audit results
- Licenses
- Agency Inspection reports, e.g. OSHA, or environmental protection agency
- Acknowledgement of Consent (AoC) provided by US EPA or a similar document from Environment Canada, indicating they have received formal consent from the 'competent authority' in an importing nation. NOTE: this document from the US or Canadian federal government does not take the place of or suffice for requirements for consent from the Competent Authority in importing countries.)
- Safety and environmental training records
- Safety and Environmental Written Programs

A.4.6.5 a) 2 A

Site Evaluation Form (for non-e-Stewards downstream)

► See Appendix C for a sample New Vendor Questionnaire, provided by industry. Additional questions may need to be added for use in this program.

A.4.6.6. MATERIALS RECOVERY AND FINAL DISPOSITION

a) As safer alternatives become available for every use of mercury, it will need to be retired in perpetuity, rather than continually reclaimed and put back into toxic products. In the US, mercury export ban legislation passed in 2008 requires that such a long term storage facility be in operation by 1/1/2013, in order to retire large stock piles of mercury.

c) 2. Guidance for exporting to glass-to-glass markets: See A.4.6.7 **Possible non-Waste Exemption for Prepared CRT Cullet**, below.

e) Recommendations for battery recycling based on type of battery:

Environmentally Sound Final Disposition for Batteries Found in Electronics

Type of Battery	Where is it Found?	What may be Toxic	Minimum type of processing / disposal	Best type of processing / disposal
Lithium-ion	Laptops, cell phones, PDA,	Phosphate, cobalt (heavy metal)	Pyrometallurgical or hydrometallurgical process / min-hazardous land fill	Electric arc furnace available now. Soft-chem process available in the future
Lithium Metal/ Lithium Primary	Button cell, Coin batteries,	Possible Lithium Perchlorate, Some have	Hyrometallurgical process/ min-hazardous landfill	Hydrometallurgical process available now. Soft chemical, solvent

		mercury		free process available in the future
Lead Acid	Universal power system, back up.	Lead	Mechanical + smelt process of Recycling	Mechanical + smelt process.
Alkaline-cell	Digital cameras,	Manganese (perhaps), potassium hydroxide	Collection for decommission/permitted, lined & leachate-controlled landfills or min-hazardous landfill	Permitted, lined and leachate-controlled landfills. Future necessity in the EU for solvent free processing.
Nickel-metal hydride,	Older cell phones, laptops,	Ni (heavy metal) potassium hydroxide	Recycling, current process with stainless steel / min-hazardous landfill	Steel mill processing / future possibility for solvent free, soft chem. Process
nickel-cadmium (Ni-Cad)	Electric tools, shavers, cordless phone	Ni, Cd (heavy metals) potassium hydroxide	Recycling, Cadmium recovery specialist. Retort furnace / min-hazardous landfill	Cadmium retort furnace.

i) The copier industry is moving away from selenium drums typically found in analog copiers, but they continue to arrive at recyclers' facilities, and many recyclers do not recognize them. Selenium copier drums should be easy to spot based on the bright colors of the shiny, tube-shaped, cylindrical drums. Adding the additional step of determining whether the copier is analog or digital will help recognize it even further: analog copiers are ones that have a start button only. Digital copiers are ones that have multiple settings and functions that can be adjusted before starting to copy.

Selenium is still used in solar panels and other photovoltaics because it reacts in the presence of light which is why it was used in copiers.

► Link to good summary of selenium: <http://www.eoearth.org/article/Selenium>

A.4.6.7 EXPORT OF HAZARDOUS ELECTRONIC WASTES

(A decision tree-type tool will be provided in the near future, to assist in determining how to interpret and apply the export requirements in this Standard, along with text below.)

Overview of export in this Standard: This Standard requires e-Stewards located in Canada and the US to operate as if their country has ratified both the Basel Convention and the Amendment to the Convention, regardless of the legal status of either in their country. Currently Canada is a Party to the Basel Convention and the United States is not. But neither of these countries has ratified the Basel Ban Amendment. When exports take place from US or Canada to another member country within the OECD group of developed countries, it is also important that the national implementation of these OECD rules be followed. It is important therefore to better understand these international agreements. For the sake of clarity we break this discussion into two sections:

- A. Exports of hazardous e-waste from Canada or US to non-OECD countries; and
- B. Exports of hazardous e-Waste from Canada or US to another OECD country.

A. Exports of hazardous e-Waste from Canada or the US to non-OECD countries

The Basel Convention: The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (www.basel.int) is an international treaty created by nations in the late 1980s to minimize, control and sometimes to prohibit the flow of hazardous wastes between countries and in particular flows from developed to developing countries. It was created in

response to many scandalous toxic waste exports from developed to developing nations that threatened to become epidemic in the late 1980s.

The Basel Convention was adopted in Basel, Switzerland on March 22, 1989, and entered into full legal force on May 5, 1992. Today, its secretariat is based in Geneva, Switzerland. As of February 22, 2009, 170 countries, the vast majority of countries, have ratified the Basel Convention, obligating them as Parties to transpose the legally-binding obligations under the international treaty into their domestic laws, and set up control mechanisms to enforce those laws. (For a current list of Parties see <http://www.basel.int/ratif/ratif.html>). To date, all of the developed countries except the United States have ratified the Basel Convention, and most developing countries have ratified it.

Since coming into legal force, the Basel Convention Parties have adopted hundreds of decisions, a protocol, and an amendment, and they have amended its annexes which contain hazardous waste definitions. The primary obligations of the Basel Convention on Parties include:

- 1) Obligation to reduce transboundary movements of waste to a minimum.
- 2) Obligation to become nationally self-sufficient in hazardous waste management.
- 3) Obligation to reduce the generation of hazardous wastes.
- 4) For those hazardous wastes that have been produced, to ensure that they are managed in an environmentally sound manner.
- 5) Obligation to not allow the export of hazardous wastes to countries that have forbidden or not consented to their import.
- 6) Obligation to prohibit trade between Parties and non-Parties unless a special agreement is signed between the countries concerned, that is fully consistent with the Basel Convention.

Basel Convention Definitions of Hazardous Wastes: The Basel Convention defines wastes and then hazardous wastes by use of various annexes. First, it defines waste by a material's intended destination. If a material is being exported to a destination described in Annex IV, parts A (final disposal) and B (recycling), or it is required to be disposed of by national law as described in Annex IV, then it is a waste. Next, the Convention defines hazardous waste by two methods. If a material is listed on Annex I (Substances) and it possesses

characteristic found on Annex III (Hazardous Characteristics), then it is considered a hazardous waste subject to strict controls under the Convention. A material that possesses a hazardous characteristic but does not appear on Annex I is not a hazardous waste when destined to a disposal or recycling operation. Likewise, a substance appearing on Annex I which does not possess a hazardous characteristic found on Annex III, is not a hazardous waste when destined for a disposal or recycling destination. In other words, for the purposes of e-waste, if a material contains certain substances (such as mercury, lead, cadmium, etc.) to the extent that it exhibits hazardous characteristics (such as toxicity, flammability, etc.), and it is destined for either recycling or disposal, it is regulated under the Basel Convention.

In 1998, the Parties created two new annexes because Annex I and III were not reflective of actual waste streams encountered in the real world. Annex VIII was created as a list of waste streams for which it was presumed that the wastes were hazardous (existing on Annex I and exhibiting a hazardous characteristic). And they produced Annex IX, a list of waste streams presumed to not be hazardous. However the presumption can always be challenged against the original Annexes I and III which are the final arbiters of the international Basel definitions.

The second way a waste can be considered hazardous under the Basel Convention is when any of the countries concerned in a transboundary movement of hazardous wastes considers it as such by national definition. The sovereign right of countries to define wastes in a manner that is more inclusive than the Basel Convention is part and parcel of the Basel Convention's rights. This does not allow countries however to derogate from the existing internationally derived definitions and ignore these definitions.

Basel Convention Definitions and Electronic Waste: Various countries have taken on the task of comparing known electronic wastes and the Basel Convention annexes. No country in our view has done a more thorough job of this to date than Australia. The e-Stewards definitions that apply to e-Stewards with respect to the Basel Convention and the Basel Ban Amendment implementation and listed above are based on Australia's determinations in this

regard with one important exception – BAN is not including plastics containing brominated flame retardants in our definitions of hazardous wastes at this time. For further information on Australia’s Basel Convention e-Waste designations see:

<http://www.deh.gov.au/settlements/publications/chemicals/hazardous-waste/pubs/used-electronics.pdf>

Basel Convention Definitions Regarding Re-Use, Repair and Refurbishment: In 2005 in its report “Digital Dump”, BAN documented violations of the Basel Convention and Basel Ban by traders that claimed used electronic equipment was functional and/or repairable and was therefore in their minds not a waste. It is true that materials that are not destined to recycling or disposal operations are not considered wastes and therefore cannot be considered as hazardous waste. This is why used equipment that is ready for direct re-use is not in BAN’s hazardous e-waste definitions.

Working equipment not destined for disposal or recycling but rather for re-use (either through sales or charitable donations) is not considered waste and therefore is not forbidden from export in this Standard. However, before such an export can proceed, such equipment needs to be tested for functionality and labeled as such to ensure that the equipment in question is really fully functional. Furthermore, a proper re-use end-market must be assured. In the absence of these requirements, the material is presumed to be hazardous e-waste.

Questions have been raised as to whether exports for repair and refurbishment operations in recipient countries qualify as exports of waste. This matter was looked into very closely by the UN’s Mobile Phone Partnership Initiative (MPPI). Within that multi-stakeholder working group, all participating Parties of the Convention voiced the opinion that the Basel Convention did apply for exports for repair in some important instances. They therefore produced what is known as the “Decision Tree” approach as the way for exporters and competent authorities to determine which control procedure should apply for exports for repair according to the Basel Convention. The Decision Tree approach stipulates that exports for repair can involve both reuse as well as

disposal/recycling. That is, repair generally involves disposal of non-working parts as part of the operation. Therefore, unless it could be shown that such replacement of non-working parts were not hazardous, the export could not take place outside of the rules of the Basel Convention. Thus, testing of equipment prior to export for repair, refurbishment and re-use is vital, to determine which parts are not working. The MPPI recognized that it was not its job to legally interpret the Convention, therefore they included a “voluntary approach” for the unlikely event that all of the countries involved in a waste trade event (import, export and transit) did not believe that the equipment in question was covered under the Basel Convention. For the purposes of this Standard it is important only to note that we are applying the Decision Tree Approach (see link below).

To view Decision Tree, see the diagram found on page two of the following link: http://ban.org/Library/BP10_June_2008.pdf. One can substitute the words “mobile phones” with “used electronic equipment”. The green boxes indicate the material is either a non-waste or a non-hazardous waste. But the yellow box (A1180) indicates that the export must be controlled under the Basel Convention/Ban Amendment rules.

Basel Convention Party to non-Party Trade Ban: Countries that have ratified the Basel Convention may not trade in Basel regulated wastes with non-Parties such as Haiti, Afghanistan, and the United States, unless a separate bi-lateral or multi-lateral waste trade agreement has been concluded by the countries in question in accordance with Article 11 of the Convention (Article 4, Paragraph 5). But these agreements must be consistent with the Basel Convention obligations. The OECD Council Decision C(2001)107/FINAL, commonly known as the Amber/Green decision, is one such multilateral agreement which is used often today and to which the US government is a Party. This decision, discussed below, as well as the US/Canadian bilateral agreement is the only Article 11 agreement by which Basel Parties can receive exports of hazardous wastes from the United States. Only member states of the OECD group of developed countries can legally import hazardous wastes from the United States at this time due to the fact that the United States is not a Party, and can only do so for recycling, not for final disposal.

Thus, it is illegal for Basel Parties that are not part of the OECD group to import hazardous wastes from the United States and such exports from the United States violate those countries laws. For the purposes of this Standard, the US as a non-Party is forbidden from exporting to any Basel Party any hazardous electronic waste unless it is exported to an OECD country for recycling in accordance with the national rules implementing OECD Council Decision C(2001)107/FINAL.

Basel Ban Amendment: Most developed countries had hoped that the original Basel Convention would have banned the most egregious form of hazardous waste trade – that which is exported for economic reasons (cost externalization) to developing countries which lack the technology, the infrastructure, and the safety nets to safely manage hazardous wastes, and that which disproportionately burdens the poor. When the notion of a ban within the Convention was blocked by certain developed countries including the United States in 1989, the developing countries, soon joined by the European Union, sought to create such a ban. This was achieved in 1994 at the Second Conference of the Parties by a consensus decision (Decision II/12). In 1995 at the Third Conference of the Parties, there was another decision (Decision III/1) to amend the Convention accordingly.

The Amendment prohibits hazardous waste from being exported from any country in a group of developed countries comprising member states of the OECD, European Union (EU) and Liechtenstein to any country outside of this group for any reason. For the purposes of this Standard, that means there is a no-exceptions ban on trade in hazardous e-waste (as defined in this Standard based on Basel definitions) from OECD/EU/Liechtenstein (39 countries currently) to or through other countries not in that group. While the Ban Amendment has been ratified by 64 countries (See <http://www.basel.int/ratif/ban-alpha.htm> for list of current ratifications of the amendment)

it has yet to enter into global legal force and there is still some legal confusion as to when that might take place. However, it is already in full legal force for 32 of the 39 countries to which it applies. All European nations have ratified and implemented this complete ban on exporting hazardous waste (as defined in the Basel Convention) to developing countries. E-Stewards are simply joining the ranks of those who wish to respect and implement this Amendment to the Basel Convention. E-Stewards must abide by this ban as if the country they operate in had

fully ratified and implemented it – no exports of hazardous electronic waste to non-OECD countries without exception.

US and Canadian Exports to non-OECD, EU countries and Liechtenstein: A small number of countries are part of the Basel Ban EU/OECD/Liechtenstein group that are not member states of the OECD. These countries include: Bulgaria, Cyprus, Estonia, Latvia, Liechtenstein, Lithuania, Rumania and Bulgaria. For exports of hazardous electronic waste from Canada to these countries the normal rules of the Basel Convention must apply. Exports of hazardous electronic waste from the United States to these countries are forbidden unless a special Article 11 agreement is first concluded.

B. Exports of Hazardous e-Waste from the US or Canada to another OECD country

Exports for OECD Final Disposal destinations Exports for final disposal (not recycling) between the US and Canada must adhere to the US/Canadian bilateral waste trade agreement. Exports from Canada to other OECD countries for final disposal operations must only be undertaken in accordance with the rules of the Basel Convention. Exports from the US to other OECD countries for final disposal (as opposed to recycling) are prohibited.

Exports for OECD Recycling Destinations -- Using the Amber/Green Decision: Both the United States and Canada are allowed to export hazardous electronic wastes to recycling destinations in other OECD countries as long as they conduct such exports in compliance with national laws that implement the OECD Council Decision C(2001)107/FINAL (amber/green decision). For US e-Stewards, these rules are found in RCRA, Code of Federal Regulations (CFR), at 40 CFR Part 262 Subpart H:

► <http://ecfr.gpoaccess.gov/cgi/t/text/textidx?type=simple;c=ecfr;cc=ecfr;sid=ec9ad3217207585e647012a8d43356a2;idno=40;region=DIV1;q1=Part%20262;rgn=div6;view=text;node=40%3A25.0.1.1.3.8>

Additionally in the US, the new CRT rule is now part of this notification and

consent requirement which now becomes relevant within our standard only for OECD countries. For more information about the CRT rule see:

► <http://www.epa.gov/waste/hazard/recycling/electron/crtfs06.htm>

For Canadian exporters these rules can be found in the federal Export and Import of Hazardous Waste and Hazardous Recyclable Material Regulation, 2005 (EIHWHRMR) of the Canadian Environmental Protection Act.

► See http://www.ec.gc.ca/ceparegistry/documents/regs/g2-13911_r1.pdf

The “amber/green decision” provides for slightly less restrictive trade in hazardous wastes amongst the 30 member countries than is required in the Basel Convention. For example, when one OECD country wishes to export a hazardous waste to another OECD country, the government must notify the importing country of the impending shipment, but if the importing government does not respond within 30 days, it is considered “tacit consent” and the shipment may proceed, unlike the Basel protocol for prior informed consent which requires definitive consent.

The OECD treaty is only pertinent for e-Stewards located in OECD countries and shipping hazardous e-waste to OECD countries. When an e-Steward exports hazardous e-waste (as defined in this standard) from an OECD country to an OECD country (such as from Canada to Sweden), the e-Steward must ensure that the OECD treaty obligations are met as implemented by the country concerned. This generally means that the exporting e-Steward’s national government’s ‘competent authority’ must notify the importing OECD government’s competent authority that it wishes to ship a controlled waste (such as CRTs and CRT glass or unsorted batteries) to the other OECD country.

It must be pointed out that the OECD definitions and the Basel Definitions of controlled wastes differ slightly but *in one very important way* with respect to e-waste. While the Basel Convention controls printed circuit boards that contain hazardous substances such as lead, beryllium and cadmium, the OECD treaty does not. Thus circuit boards can be sent between OECD countries without controls, as “green” listed wastes.

Further, the United States has incorrectly removed OECD defined hazardous waste from its RCRA/OECD control rules, requiring that the waste must also meet national definitions of hazardous waste. Despite the fact that BAN fundamentally disagrees with that interpretation, for the sake of practicality this standard will accept national interpretations of the OECD rules for the time being, no matter how faulty.

Interpretation of Specific e-Stewards Export language in 4.4.6.7:

Initial paragraph of 4.4.6.7: An e-Steward is responsible for tracking materials and holding all Downstream Recyclers of hazardous e-waste accountable for keeping these materials in OECD countries throughout final disposition. This includes untested or non-working equipment or components, if they contain any 'hazardous electronic equipment', as defined in this standard. If the trade is from an OECD country such as Canada or the US and going to another OECD country such as a European country, that trade must be conducted according to the requirements of the OECD treaty as implemented in the country concerned. If the export of hazardous e-waste is from an OECD country, it may not go to a non-OECD country for any reason, all the way to final disposition. All trade must respect the laws of the importing and transit countries.

Interpretation of "e-Stewards shall assure" sections:

- a) This paragraph defines the export policy for e-Stewards located in OECD/EU countries and Liechtenstein by calling for the hazardous e-waste generated in these countries to remain in (or only be traded between) these countries throughout final disposition, effectively implementing the Amendment to the Basel Convention. For example, both Canada and the US have ratified the OECD Decision, and therefore e-Stewards in these and other OECD countries must keep the hazardous e-waste (as defined within this standard) within this group of countries. This sub-clause a, however, does not speak to exports originating in non-OECD/non-EU countries, thus letter c) of this export clause.

For a list of OECD countries, go to

► http://www.oecd.org/countrieslist/0,3351,en_33873108_33844430_1_1_1_1_1,00.ml .

b) This paragraph disallows trade between Parties and non-Parties to the Basel Convention (i.e. between nations that have and have not ratified the Convention), and disallows trade through non-Parties (i.e. using a non-Party as a transit country), as established in Article 4 Paragraph 5 of the Basel Convention, unless all the nations involved have ratified a separate trade agreement allowable under (consistent with) the Basel Convention, such as the OECD amber/green decision.

c) This paragraph covers trade of hazardous e-waste that is allowed under the e-Stewards Standard (not prohibited in letters (a) and (b)), and explains that it must be done according to national laws that implement the Basel Convention or the OECD amber/green decision. This will likely require some form of prior informed consent between countries prior to the shipment being allowed.

Possible non-Waste Exemption for Prepared CRT cullet

In the definition of hazardous electronic waste we make note of a possible exemption for CRT cullet that this standard will recognize:

“For the purposes of exportation, if CRT cullet or glass, cleaned of all phosphors and other particulates, is to be used as a direct feedstock in manufacturing new products without further processing or preparation (other than quality control screening), then a ‘competent authority’ of the importing country and all transit countries may make a determination that the material is not a waste, (and therefore not a Basel regulated waste or a “hazardous electronic waste” in this standard). Such a determination provided in writing by the legitimate competent authority and provided to the e-Steward auditors will be required to exercise this exemption from what is otherwise a clearly listed

Basel Convention hazardous waste, and therefore a hazardous e-waste in this Standard (See Appendix 1).”

As most CRT glass-to-glass recycling markets exist in developing countries while the Basel Convention distinctly lists CRT glass on its Annex VIII as hazardous when it is a waste, the only possibility for exempting this material from Basel controls is if the competent authorities of all Basel countries concerned believe that the prepared cullet destined for a glass-to-glass furnace is not in fact a waste due to the fact that the smelter is a primary smelter and is only substituting cullet as a feedstock without further preparations of the material needed. Because CRTs and CRT cullet are clearly regulated as a Basel Convention hazardous waste, and because Basel Convention Parties such as India, Malaysia or China are forbidden from receiving Basel listed hazardous waste from non-Basel Parties, such as the United States, and because even Basel Parties such as Canada are not allowed to ship Basel wastes to non-OECD countries under this standard, there is only one viable legal means by which the export can be made possible and it is wholly dependent on the interpretation of the authorities in the importing country. And that interpretation must be made by a Basel competent authority and must conclude that the material is a non-waste and therefore falls outside of the scope of the Basel Convention.

NOTE: The “competent authority” is the governmental authority designated by a nation that has ratified the Basel Convention to be responsible for receiving notifications (from other countries) of transboundary movement of hazardous wastes (as defined in the Basel Convention) and for responding to such notifications, in compliance with their obligations under the Basel Convention. They may either consent to or reject the request, and sometimes ask for additional information prior to making such a determination.

To locate contact information for the “competent authority” in any Basel country, go to the Basel Convention website, and go to the “Country Contacts” webpage, at: ► <http://www.basel.int/contact-info/frsetmain.html>

Additional Guidance on e-Stewards' Export:

Clarification of Entire Recycling Chain: The e-Steward is responsible for ensuring that all exports, imports, and transits of hazardous electronic wastes remain in conformance with this Standard throughout the recycling chain, until they reach final disposition (see Terms and Definitions for 'final disposition'). This will require full cooperation and transparency of all Downstream Recyclers receiving hazardous e-waste, documentation of shipments to and from those vendors to all their downstream and final tier processors of hazardous e-waste, until no more processing of the waste/mixed materials is needed.

Imports and Transits: It is also incumbent upon the e-Steward to ensure that all imports and transits of hazardous electronic wastes to and/or through their businesses and countries are in compliance with the Basel Convention and the Basel Ban Amendment, as well as the OECD treaty (if OECD to OECD trade). For example, e-Stewards in one country may not import hazardous electronic waste from businesses in other countries if it is not in conformity with this Standard, even if they simply re-export that material to another country. "Transshipping" (through a third country) is regulated under the Basel Convention, and therefore covered under this standard.

Records documenting legal export/imports:

- When exporting in accordance with paragraph (c) of 4.4.6.7 Guidance under development auditors will need to see copies of the Acknowledgements of Consent (AOCs) from EPA or Environment Canada, which you must keep on record. The Bills of Lading of the actual shipment must also be provided and be dated after the AOC. In the US if you are shipping CRT devices for reuse (labeled and tested as fully functional only), you must have on record a copy of your one-time notification of US EPA for exporting CRT devices for reuse to any country.
- If you are exporting cleaned, furnace-ready cullet, in conformity with this standard, to a non-OECD country, you must provide a current, written consent from the 'competent authority' stipulating that the importing

country considers such material to be a non-waste and therefore outside of the controls of the Basel Convention.

Further guidance under development.

A.4.6.8 SITE CLOSURE PLANS

If the e-Steward can document pre-existing contamination of the site, and is not held responsible for that pre-existing contamination by law or regulation, their closure plans do not have to cover such pre-existing contamination.

A.4.8 INSURANCE REQUIREMENTS

Without prejudice to e-Steward's obligation to indemnify its customers, an e-Steward should procure, at its expense, and maintain for the duration of its certification as an e-Steward, and in the event of any policies written on a "claim made" form, be maintained for a minimum of 3 years after expiration of the certification, the insurance policies described below with financially responsible insurance companies, reasonably acceptable to its customers, with suggested policy limits not less than those indicated below.

Special Provisions Applicable to E-Steward's Insurance coverage:

1. Additional Insured – e-Steward should have all policies, except the Workers' Compensation, Employer's Liability policy, the Professional Liability policy, and the e-Steward's Pollution Liability policy, endorsed to name its customers as an Additional Insured with respect to the Services to be performed by the e-Steward.
2. Waiver of Subrogation – e-Steward should have all policies endorsed to waive the insurer's rights of subrogation in favor of its customers.

3. Deductibles – The e–Steward may arrange deductibles or self–insured retentions as part of the required insurance coverages. However, it is expressly agreed that all deductibles or self–insured retentions are the sole responsibility of the e–Steward.
4. Adequacy of Insurance Limits – The insurance coverage limits stated below are suggested minimum coverage requirements, not limits of liability.
5. Certificates of Insurance – The e–Steward should furnish auditors with Certificates of Insurance, evidencing the insurance coverage suggested in this Standard.

Suggested Coverage Levels

- A. Workers’ Compensation – Insurance for statutory obligations imposed by law. ⁴
- B. Employers Liability – Insurance with suggested limits of \$1,000,000 for bodily injury by accident and \$1,000,000 for bodily injury by disease, including, if applicable, maritime coverage endorsement.
- C. Commercial General Liability – (Standard ISO occurrence form) – including products and completed operations coverage, full fire legal liability and contractual liability, with a per occurrence suggested limit of \$1,000,000, and \$2,000,000.00 in the Aggregate.
- D. Business Auto Liability – Coverage for bodily injury and property damage liability, including pollution coverage arising out of the transport of toxic or hazardous materials or substances, for all owned, hired or non–owned vehicles, with an each accident suggested limit of \$2,000,000. Policy(ies)

⁴ For US based e-Stewards, this should include, where applicable, coverage under United States Longshoremen’s and Harbor Workers’ Act and Jones Act. (If applicable, Defense Base Act for those employees providing Services on a U.S. Military installation outside of the United States).

should be endorsed to include Pollution Liability Endorsement (ISO Form CA 994481293) and the Motor Carrier Act (MCS 90) Endorsement.

- E. Professional Liability or Errors and Omissions – For asset management companies, suggest \$5,000,000 per occurrence and aggregate providing coverage for claims arising out of the performance of professional Services, resulting from any error, omission or negligent act of the e-Steward.
- F. Pollution Liability – Covering sudden and non-sudden release of pollutants resulting in damage to the environment or in bodily injury arising out of the operations or Services of e-Steward. Suggested minimum per occurrence limits of liability of \$2,500,000 for e-Stewards utilizing Potentially Hazardous Processing Technologies.

A.5.1 CHECKING/MONITORING AND MEASUREMENT

A.5.1.1 a)

Mass Balance

Mass Balance Accounting is a method used to audit the flow of material by weight, reconciling incoming weights with documentation of outbound materials/products. e-Stewards must have an accounting of all inbound and outbound material shipments. Inbound shipments may be logged by unique customer number or Bill-of-Lading (BOL) number to protect customer list privacy and must include the gross weight of material received. All outbound material shipments, including materials for donation, reuse/resale, recycling, disposal and all other must be documented by date, weight, type and grade of material, BOL number and buyer or destination facility. Documentation from the receiving party confirming ownership or receipt of each shipment must also be maintained. The best management practice appears to be doing a monthly mass balance accounting; the Standard encourages this monthly timeframe, but only requires such a calculation every six months at a minimum.

The challenge in doing mass balance calculations is with the amount of unprocessed inventory sitting in a warehouse compared to the throughput of

inventory (known as inventory aging and inventory turns, respectively). Companies can assess their unprocessed inventory levels through a physical inventory, weighing all items in their warehouses, or weighing some of it and extrapolating weight of similar containers/lots. This is an important management tool and is more beneficial than burdensome.

Two different formulas are provided below to assist an e-Steward in calculating Mass Balance for their operations.

Mass Balance Technique One

Formula: $A + X - Y = B$ where:

- A = Beginning unprocessed inventory
- X = Incoming Inventory over the period
- Y = Outgoing Inventory over the period
- B = End unprocessed inventory

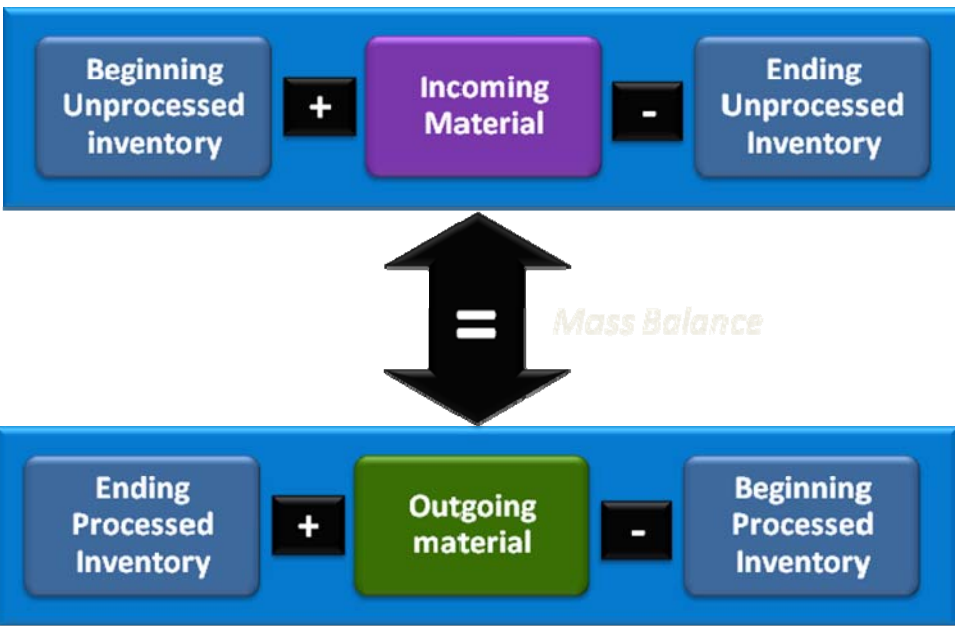
Mass Balance Technique Two

Formula: Beginning Unprocessed Inventory + Incoming Material - Ending Unprocessed Inventory =
Ending Processed Inventory + Outgoing Material - Beginning Processed Inventory

- 1 Determine the time period to be covered by the mass balance accounting; this should be 6 months at a minimum.
- 2 Determine beginning inventory on hand of processed and unprocessed material.
- 3 Verify reported incoming material for the period. This will typically involve comparing recorded weights to weights reported to customers
- 4 Verify reported outgoing weights by material type. This can be verified through shipping documents, invoices, payments, and any

other documentation that occurs between the recycler and the downstream destination.

- 5 Determine ending inventories of processed and unprocessed material.
- 6 Total weight in each category should equal, allowing for a maximum 5% discrepancy.



END OF APPENDIX A (Guidance Document)

This document will continually evolve to support consistent interpretation of the e-Stewards Standard and its application