Risk Assessment

Best Practices for Achieving Environmentally Sound Management (ESM)

At Facilities that Refurbish and Recycle Used and End-of-Life Electronic Products in North America

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Commission for Environmental Cooperation

Best Practices for Achieving Environmentally Sound Management at Facilities that Refurbish and Recycle Used and End-of-life Electronic Products in North America

Module 3a

Risk Assessment for Managers

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3 Module 3a: Environment, Health and Safety Risk Assessment—For Managers

3.1 Learning Objectives

By the end of this module you will have the tools to:

- identify specific best practices to implement, improve, and demonstrate risk assessment at your facility;
- assess whether your facility follows best practices for risk assessment and how improvement can be made;
- identify hazards and risks to worker health and safety and the environment;
- apply the risk assessment process to your facility's operations; and
- determine if existing control measures to address identified risks at your facility are adequate, or if more should be done.

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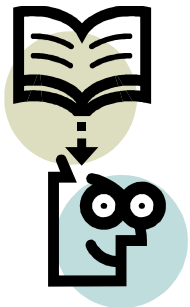

3.2 Pre-questionnaire

1. What would you like to learn about risk assessment from this module?

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2. Are you involved in risk assessment at your facility? If so, what is your role?

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3. How often does your facility undertake risk assessment and what triggers the process? Does your facility have a policy in place relating to responsibilities for conducting risk assessments?

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4. During what facility operations do risks and hazards need to be considered? (check all that apply) and please describe.

- ❒ During both normal and abnormal facility operating conditions

  _____

- ❒ Facility start-up and shut-down

  _____

- ❒ Equipment use

  _____

- ❒ Repair and maintenance

  _____

- ❒ Storage

  _____

- ❒ Emergency situations and accidents

  _____

- ❒ Material and waste handling

  _____

3.3 Check-in on Topics Previously Covered in Modules 1–2

Module 1 (Introduction to ESM)

In Module 1 you learned about:

- the importance and benefits of environmentally sound management (ESM), including elements deemed necessary to achieve ESM at the facility-level;
- potential environmental, health and safety issues associated with refurbishing and recycling electronic products;
- worker health and environmental benefits of implementing ESM at your facility;
- economic benefits of implementing ESM at your facility;
- the benefits of participating in ESM validation and certification programs and how this can increase your client base, inventory volumes, and potential profits; and
- the waste management hierarchy and how it applies to activities undertaken at electronics refurbishing and recycling facilities.

Module 2 (Top Management Commitment to ESM)

In Module 2 you learned about:

- specific best practices for how top management commitment to a systematic approach could be implemented, improved, and/or demonstrated at your facility;
- how to assess whether your facility follows best practices to demonstrate top management commitment to the environment, health and safety and how improvement can be made;
- important elements of an environment, health and safety policy;
- important elements of an environmental, health and safety management system; and
- important procedures to document at your facility, including those relating to communications and training.

3.4 Introduction and Overview of this Module

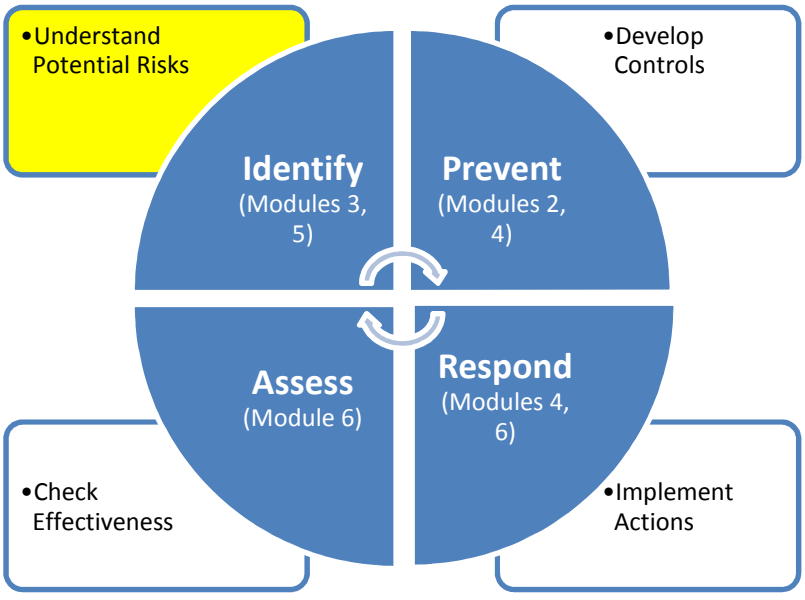
What Is Risk Assessment and How Can You Apply It to Your Facility?

This module will answer this question and provide you with:

- an overview of the material and substance content commonly found in used and end-of-life electronic products, and why certain materials and substances are important for you to know about;
- the benefits of identifying, evaluating and prioritizing risks associated with hazards in your facility;
- an understanding of how to identify hazards and risks to worker safety in your facility and to the environment, relating specifically to refurbishing and recycling[1] used and end-of-life electronic products, using a step-by-step process for risk assessment; and
- an understanding of important policies and procedures that should be used by your facility to encourage ESM.

Exhibit 1 shows how the key responsibilities of operating a facility fit within the framework of ESM, and where these responsibilities will be covered in the training material. Both Module 3 (Risk Assessment) and Module 5 (Legal Compliance) are in the quadrant on understanding potential risks to your facility.

Exhibit 1: Key Responsibilities of Operating a Facility within the Framework of Environmentally Sound Management



[1] Note that this module does not cover general occupational health and safety risk assessment information that is applicable to all industrial operations; rather it is focused on ESM aspects of health and safety as outlined in the "Overview of the Training Material" content which precedes Module 1.

3.5 What Is Risk Assessment?

REMINDER: ESM Criterion #2
Risk Assessment:
Identify actual and/or potential hazards and risks to public and worker health and safety and to the environment which are associated with activities, products and services.

Risk assessment is the process where you:[2]

- ✓ identify occupational and environmental hazards (this module),
- ✓ analyze or evaluate the risks associated with those hazards (this module), and
- ✓ determine appropriate ways to eliminate or control the hazards (Module 4).

Best Practice: Risk assessment should be conducted, at a minimum, on an annual basis and should cover all aspects of the facility's operations. It should include identification of situations or activities that may cause harm to workers (occupational hazard) or to the environment (hazards to the environment).

Regardless of the planned schedule of the risk assessments, you should also perform an assessment when any changes are made to the facility's operations (for example, implementation of a new process), legal requirements (for example, new waste-handling or noise-level requirements) that have not been previously assessed, or following an environment, health or safety incident (e.g., unintended release to the environment, or occupational exposure or accident).

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[2] Canadian Centre for Occupational Health and Safety, <http://www.ccohs.ca/oshanswers/hsprograms/hazard_risk.html>.

3.5.1 Definitions of Risk and Hazard

What Is Risk?

Answer: Risk is the chance or probability that a person will be harmed (experience an adverse health effect) or that the environment will be harmed if exposed to a hazard. A risk is expressed as the probability or likelihood of, for example, developing an illness, getting injured, or an environmental spill.

Definition: Risk vs. Hazard

Risk: the chance, likelihood, or probability that a person or the environment will be harmed if exposed to a hazard.

Hazard: the potential source of harm.

What Is a Hazard?

Answer: A hazard is the potential source of harm to a worker or the environment. There can be occupational hazards or hazards to the environment.

A hazard to the environment:

- is the source of potential damage or *harm to the environment* from: accidental or non-routine industrial releases, routine industrial releases, risks posed by use of chemicals and products, risks during transportation, or specific industrial applications such as contaminated land and land-use planning.

An occupational hazard:

- is any source of potential damage, harm or adverse health effects *to people at work*; and
- can come from a wide range of sources, including any substance, material, process, or practice that has the ability to cause harm or adverse health effect to a person at work.[3]

For Occupational Hazards, What Is an Adverse Health Effect?

Answer: An adverse health effect is any change in body function or the structures of cells that can lead to illness or other health concerns. Adverse health effects include:

- bodily injury or illness;
- change in the way the body functions, grows, or develops, including effects on children, grandchildren, etc. (inheritable genetic effects);
- decrease in life expectancy; or
- change in mental condition resulting from stress.

[3] ibid.

3.5.2 *Why Is Risk Assessment Important?*

Risk assessment provides a step-by-step process that helps a facility identify and prioritize actual and potential risks to the public, to worker health and safety, and to the environment. This process helps to mitigate concerns to human health and the environment. It is an important aspect of **ESM**.

Answer: Risk assessment forms an integral part of a good health and safety management plan, as it helps to:[4]

- ✓ create awareness of hazards in the workplace,
- ✓ identify who may be at risk (employees, cleaners, visitors, contractors, the public, etc.),
- ✓ determine if existing control measures are adequate or if more should be done,
- ✓ prevent injuries or illnesses when done at the design or planning stage, and
- ✓ prioritize hazards and control measures.

Risks may be present during both normal and abnormal facility operating conditions, including during facility start-up and shut-down routines, equipment repair or maintenance, emergency situations and accidents, and material- and waste-handling practices.[5]

Used and end-of-life electronic products contain more than 1,000 different substances, some of which are hazardous and can cause concerns for human health and the environment. For example, exposures may occur when electronic products are broken or dismantled for parts using methods that change the properties of the components (such as the use of heat to melt or solder), or processed for metal or plastic reclamation using methods such as shredding, grinding, smelting and melting. In addition, some processes may use additives that contain hazardous substances (e.g., arsenic, strong acids and bases, and neutralizing agents) to further refine recovered metals.

Substances found in used and end-of-life electronic products that can make workers sick

Various substances present in used and end-of-life electronic products can make workers sick if proper risk management measures are not in place, including training, competency and personal protective equipment. The following substances are considered to be hazardous and can enter the body via absorption, inhalation, or ingestion:

Mercury: used in backlighting of liquid crystal display screens and some batteries.

Lead: used in cathode ray tubes as radiation shielding; tin-lead solders; and plastic stabilizers.

Cadmium: used in cathode-ray tubes as phosphorescent material; some batteries; color pigments; and plastic stabilizers.

Hexavalent chromium: used in color pigments, plastic stabilizers, and anti-corrosion treatments.

Brominated flame retardants: used in plastic housings, circuit boards, cables, keyboards.

Beryllium: used in contact clips and springs, and rotating mirrors in laser printers.

Why Is Risk Assessment Important?

[4] ibid.
[5] United Nations Environment Programme (UNEP). Basel Convention. 2011 (Revised). *Environmentally Sound Management (ESM) Criteria Recommendations*. Partnership for Action on Computing Equipment (PACE).

Some verification and certification programs for e-recyclers and e-refurbishers require risk assessment to be part of the facility's management program:[6]

Example of Risk Assessment Requirements in the Electronics Product Stewardship Canada (EPSC) Recycler Qualification Program for End-of-life Electronics *and* the Electronics Reuse and Refurbishing Program

Environment, Health and Safety (EHS) Risk Assessment Requirements Included in the EPSC 2010 *Recycler Qualification Program for End-of-life Electronics Recycling* manual and EPSC 2012 *Electronics Reuse and Refurbishing Program* manual

E-recyclers and e-refurbishers shall maintain a documented process to conduct an annual EHS risk assessment. The risk assessment shall be planned and conducted in a manner to identify and assess the potential environmental impacts of the operations, and any workplace hazards under both normal and abnormal conditions. The risk assessment shall cover all aspects of the operations and include at a minimum:

1) a process to identify and record physical, chemical and ergonomic hazards;
2) a process to assess risk of identified hazards, considering the potential probability and severity of the hazard;
3) a process to determine the appropriate level of control necessary to eliminate or effectively control the hazards;
4) a process to assess the need and frequency for EHS monitoring and sampling, including:
    a. monitoring and tracking of facility emissions, effluent or wastes;
    b. facility-wide air sampling and analysis for airborne contaminants such as metal content and dusts;
    c. surface sampling for contaminants that may not be released under normal operating conditions, or may be released in quantities below detectable air sampling limits but over time may accumulate to hazardous levels or pose other risk of worker exposure;
    d. analysis of noise levels in processing areas; and
    e. medical examinations, including hearing assessments and blood testing, where required by regulations or if sampling reveals elevated exposure levels.
5) a process to record and track the results of the risk assessment, to facilitate the identification of recurring issues or trends,
6) a process to communicate risks and their associated controls to applicable workers and make the overall results of the risk assessment available to all workers, and
7) a process to conduct subsequent risk assessments, either facility-wide or task-specific, as a result of any changes in operations that may affect exposure levels.

[6] Electronics Product Stewardship Canada (EPSC). 2010. *Recycler Qualification Program for End-of-life Electronics Recycling*. Manual. And: EPSC. 2012. *Electronic Products Reuse and Refurbishing Program.* Manual.

3.5.3 What Should the Risk Assessment Process Include?

Answer: The risk assessment *process* should include:[7]

Best Practice: Maintain a documented process to conduct an annual EHS risk assessment, to identify and assess the potential environmental impacts of the operations, and any workplace hazards under both normal and abnormal operating conditions.

Best Practice: The risk assessment process should include documenting, implementing, communicating and maintaining the:

- ✓ roles and responsibilities for risk assessments;
- ✓ procedures to identify, prioritize and assess environment, health and safety hazards associated with new, existing and planned activities; and
- ✓ environment, health and safety risk and hazard information, to reflect changes in operational, environmental or regulatory requirements.

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[7] UNEP. Basel Convention. 2011. *Guideline on Environmentally Sound Testing, Refurbishment & Repair of Used Computing Equipment*. Partnership for Action on Computing Equipment (PACE) Project 1.1.

Notebook

Facility Check-in

❒ *Goal*: My facility conducts risk assessment at a minimum on an annual basis as well as when changes are made to the facility's operations or regulatory requirements.

Note the current situation: _____

_____

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_____

Note where improvement could be made: _____

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Are there any challenges to conducting risk assessment annually and when changes are made? How might these challenges be overcome? _____

_____

_____

_____

Note one step you can take today / next week / next month to begin the change process: __

_____

_____

Notebook

Facility Check-in:

❒ *Goal*: My facility has a process in place to document, implement, communicate, and maintain the *roles and responsibilities* for planning and conducting risk assessments.

Note the current situation: _____

_____

_____

Note where improvement could be made: _____

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_____

What challenges exist and how might they be overcome? _____

_____

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Note one step you can take today / next week / next month to begin the change process: __

_____

_____

❒ *Goal*: My facility has a process in place to document, implement, communicate and maintain procedures to conduct a risk assessment (identify, prioritize and assess hazards and risks to the environment, to health and safety) for *new, existing and planned activities, products and services*.

Note the current situation: _____

_____

Note where improvement could be made: _____

_____

What challenges exist and how might they be overcome? _____

_____

_____

Note one step you can take today / next week / next month to begin the change process: __

_____

Notebook

❒ *Goal*: My facility has a process in place to **document** and **keep current** environment, health and safety *risk and hazard information*, and **update it** to reflect changes in operational, constituent material, environmental or regulatory requirements, procedures and practices.

Note the current situation: _____

_____

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_____

Note where improvement could be made: _____

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What challenges exist and how might they be overcome? _____

_____

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Note one step you can take today / next week / next month to begin the change process: __

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3.6 How to Conduct an Environment, Health and Safety (EHS) Risk Assessment

3.6.1 Overview of Steps to Conduct a Risk Assessment

Exhibit 2: Risk Assessment Steps[8]

Step 1. Identify the Stages of Operations

- What needs to be assessed? Identify at each stage of operations.
- Document these.

Step 2. Identify the Hazards

- What can go wrong? Identify real or potential hazards by thinking of possible problems at each stage of operations.
- Document these.

Step 3. Assess the Hazard and Exposure to the Hazard (Level of Risk)

- How often is the hazard likely to happen? How could this hazard impact workers, the community or the environment?
- Document the results of the assessment.

Step 4. Identify the Consequence or Effect of the Hazard / Characterize the Risk

- What is the consequence if something goes wrong? Is the risk large? Will the impact be minor or major? Are there long term implications?
- Document the results of the characterization.

Step 5. Evaluate and Prioritize the Risk

- Which risks are the most important to direct resources to risk management?
- Document the results of the prioritization.

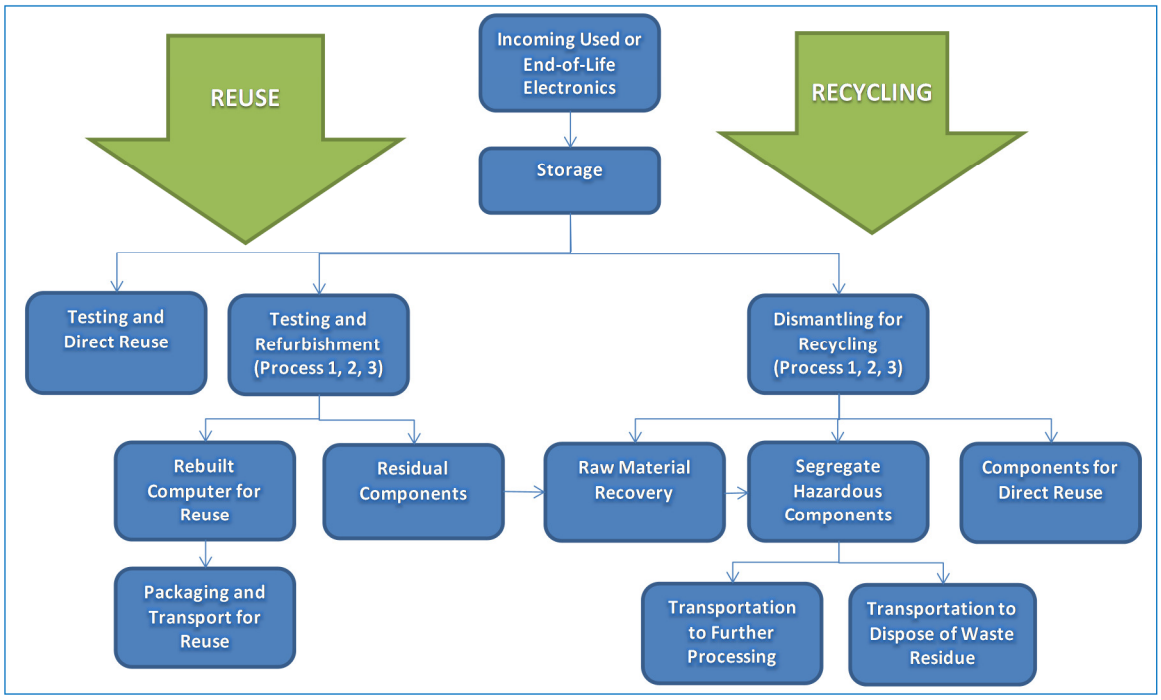
[8] Adapted from: Fairman, R., CD Mead, and WP Williams. 1999. *Environmental Risk Assessment—Approaches, Experiences and Information Sources*. Monitoring and Assessment Research Centre, King's College, London. Published by European Environment Agency—EEA Environmental issue report No 4.[1]

3.6.2 Step 1 of a Risk Assessment: Identify the Stages of Operations

Identify the Stages of Operations at a Facility

To identify what needs to be assessed, it is important that you clearly define the stages of your operations. In the case of e-recycling or e-refurbishing, a good starting point would be to examine the entire operation of the facility as a map, and document all of the processing steps. From this map, you can examine each process in detail and identify the potential hazards that exist (see Step 2: Hazard Identification). A simplistic example of this map is presented in Exhibit 3, although it is expected that a real map for a real-life facility would be larger, have more detail, and show more processes.

Exhibit 3: Facility Process Mapping to Identify What Needs to be Assessed



3.6.3 *Step 2 of a Risk Assessment: Identify the Hazards*

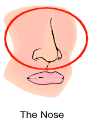
Hazards at a Facility to Workers or to the Environment

At every processing step documented in Step 1, your team should identify potential hazards for Step 2. This includes assessing potential worker exposure to hazardous substances and materials, ergonomic risks, workplace hazards, and the potential for unintended releases to the environment. Hazard identification should be done by a competent team of individuals who have a good working knowledge of hazardous substances and your workplace. Supervisors and workers should be involved at a minimum, and preferably, a risk assessment professional as well.

Hazard identification must take into account:[9,10]

- ✓ routine activities (processing, use, handling or storage) and non-routine activities or unusual conditions such as maintenance, repair, shutdown, power outages, or emergencies;
- ✓ the procedures currently used to control exposure by means of engineering controls, work practices, and hygiene practices;
- ✓ knowledge of hazardous substances and their main pathways of contaminating the environment (dust dispersal, or through wastewater);
- ✓ accident/incident/near-miss records;
- ✓ risks to visitors or the public, and groups that may have a different level of risk, such as inexperienced workers, persons with disabilities, or new or expectant mothers; and
- ✓ the actual and potential exposure pathways of workers to hazardous substances.

Inhalation ***Ingestion*** ***Absorption*** ***Eye Exposure***





Example of Step 2: hazard identification *prior* to shredding

Many different types of electronic devices contain hazardous components that should be removed prior to shredding, such as cathode ray tubes, batteries, printer cartridges, and mercury lamps. Once shredded, hazardous substances can contaminate equipment and other shredded materials.

Example: Batteries should be removed from electronic devices and motherboards prior to shredding—otherwise, workers can be exposed to caustic electrolytes. Shredding of lithium-ion cell batteries can also start fires, if unreacted lithium reacts with oxygen in the air or with moisture, generating heat and, potentially, hydrogen gas.

OECD. 2003. *Technical Guidance for the Environmentally Sound Management of Specific Waste Streams: Used and Scrap Personal Computers.*

[9] Canadian Centre for Occupational Health and Safety, <http://www.ccohs.ca/oshanswers/hsprograms/hazard_risk.html>.

[10] Environment Canada. 2004. *Screening level human health and ecological risk assessment for generic e-waste processing facility*. Prepared by MJC & Associates.

Some of the hazards identified at refurbishing and recycling facilities for electronic products are presented in Exhibit 4 and should be addressed in facility risk prevention and management programs (*note that the exhibit excludes generic hazards present at any industrial facility*).

Exhibit 4: Potential Health and Environmental Hazards from Refurbishing/Recycling Facilities that Process Electronic Products[11]

Area	Hazard to Workers	Hazard to the Environment
Receiving	▪ Exposure to hazardous substances where equipment has broken (e.g., lead, mercury), or hazard from sharps from accidental breakage.	▪ Unintended releases to air from broken equipment (e.g., lead, mercury) are possible. ▪ Soil contamination from spills/breakage.
Testing (Refurbishing Facilities)	▪ Worker exposure to and workplace contamination of hazardous substances via inhalation (e.g., mercury, resulting from accidental breakage of lamps) or ingestion (e.g., lead, cadmium, from accidental breakage of CRTs). ▪ Hazards from sharps from accidental breakage.	▪ Unintended releases to air of contaminants such as mercury from accidental breakage. ▪ Unintended releases to soil of hazardous contaminants such as lead, cadmium or other hazardous substances, from accidental breakage.
Operations—Manual and Mechanical Processes	*Refurbishing:* Mainly manual processes. ▪ Exploding capacitors as a result of upgrading computer capacity. ▪ When replacing mercury-containing liquid crystal display screen lights during refurbishment, workers may be exposed to mercury via inhalation. *Recycling*: Manual and mechanical processes. ▪ Shredding: Shredding operations produce hazardous dusts. Workers may be exposed via inhalation or ingestion if protective equipment is not worn, or from inadequate handwashing. ▪ Shredding: If batteries are not removed prior to shredding, they can release caustic substances and may cause electrical short circuits and fires, which are hazardous to workers.[12] ▪ Smelting: Heating processes can cause air emissions such as metal fumes and metal oxide particulates, (e.g., beryllium or cadmium, from batteries), as well as particles of incomplete combustion (PAHs), and generation of dioxins and furans from plastics or circuit boards that contain brominated flame retardants (BFRs), and may expose workers and downwind communities via inhalation. ▪ Metallurgical: Substances, such as cyanide, that may be added in some recovery processes are hazardous to worker health when ingested.	▪ Shredding: Shredding operations can produce hazardous dusts. Local communities may be exposed via inhalation or ingestion through local contaminated plants and animals. ▪ Smelting: Heating processes can cause air emissions such as metal fumes and metal oxide particulates, (e.g., beryllium or cadmium, from batteries), as well as particles of incomplete combustion (PAHs), and generation of dioxins and furans from plastics or circuit boards that contain brominated flame retardants (BFRs), and may expose local communities via inhalation, and plants and animals via ingestion from airborne deposition. If slag from smelting is re-smelted via precipitation or leaching, it can generate wastewater with toxic metals, which could contaminate local surface water if improperly managed.[13] Disposal of slag in landfill can also be hazardous if it has not been rendered stable. ▪ Granulating Plastics: Halogenated compounds containing chlorine and bromine are present in plastics. If burned they can form airborne dioxins and furans which are persistent environmental pollutants that accumulate in air, water and soil. Dioxins and furans are toxic and can cause reproductive and developmental problems in humans and animals.

[11] *Sources*: United Nations Environment Programme (UNEP). Basel Convention. 2011. *Guideline on Environmentally Sound Testing, Refurbishment & Repair of Used Computing Equipment*. Partnership for Action on Computing Equipment (PACE) Project 1.1.
UNEP. 2007. *E-waste. Volume I: Inventory Assessment Manual*. International Environmental Technology Centre.
Environment Canada. 2004. *Screening level human health and ecological risk assessment for generic e-waste processing facility*. Prepared by MJC & Associates.

[12] UNEP. Basel Convention. 2009. *Guideline on the Refurbishment of Used Mobile Phones*. Mobile Phone Partnership Initiative (MPPI) Project 1.1.

[13] Concentrations of arsenic, chromium, lithium, molybdenum, antimony, selenium, beryllium, silver, cobalt, cadmium, copper, nickel, lead and zinc have been documented in rivers and reservoirs near electronic waste processing facilities that do not practice ESM.

Exhibit 4 (Continued)

Area	Hazard to Workers	Hazard to the Environment
Equipment Maintenance via Manual Labor	▪ Workers may be exposed to hazardous substances in cleaners and/or dust via inhalation, or ingestion via skin contamination.	▪ Local air emissions may result from poor air containment from cleaning operations, or improper maintenance of air containment controls.
Material and Waste Handling	▪ After material separation processes, waste material must often be handled manually and properly packaged for transport to final processing or disposal. Hazardous substances that could enter the body at this stage via absorption, inhalation, or ingestion if improperly handled include, for example: mercury, lead, cadmium, hexavalent chromium, brominated flame retardants, or beryllium.	▪ Local air emissions of hazardous substances if proper air containment, spill containment, and wastewater management are not in place during material handling/holding.[14]
Storage / Holding	▪ After waste material is properly packaged it is typically held in a holding area until enough material is accumulated for viable transport. Holding areas could expose workers to accidental inhalation or ingestion via skin contamination with hazardous substances that are not packaged and stored properly.	▪ Indoor or outdoor holding/storage areas may leach hazardous substances from electronic waste or components (e.g., batteries), which could contaminate soil, groundwater or surface water if non-pervious flooring and spill containment does not exist. ▪ Holding areas used to store removed mercury lamps prior to transport to mercury recovery facilities may result in unintentional releases of mercury vapour to air, which could contaminate workers and the local environment.
Downstream	▪ To conform with the principle of ESM, refurbishers and reyclers which process electronic products should also take reasonable care to ensure that any downstream processors and transport providers that they do business with also have suitable risk prevention and management programs in place. ▪ Further detail presented in following pages.	

Why is exposure to these substances so hazardous for workers?

Answer: Exposure to these substances can make you very sick if appropriate risk counter measures are not in place. Workers exposed to heavy metals and other toxic substances can develop serious and life-threatening illnesses and diseases (e.g., lead or mercury poisoning, berylliosis, etc.).

How is the environment affected by these substances if they are released?

Answer: Hazardous substances that may be released from processing used and end-of-life electronic products may contaminate air, land and water. Many contaminants are able to migrate far outside the facility and can be ingested by plants and animals.

[14] Hazardous substances such as mercury, lead, cadmium, chromium, and beryllium are toxic to plants and animals and even a small amount can contaminate entire ecosystems through air deposition to soil and surface water, and accumulation in animals and vegetable matter.

How should the hazards be documented?

Answer: The following is a sample of a hazard identification form[15] that can be customized for your needs at your workplace. One of these could be completed for each process being assessed during the risk assessment.

Exhibit 5: Sample Hazard Identification Form

Name of person doing assessment:	
Date:	
Activity/Procedure being assessed (1):	
Known or expected hazards associated with the activity:	
The risk of injury and its severity likely to arise from these hazards:	
Who is at risk?	
References (if applicable):	
Signature of assessor:	

[15] Canadian Centre for Occupational Health and Safety, <http://www.ccohs.ca/oshanswers/hsprograms/sample_risk.html>.

Identifying Potential Hazards Downstream from Your Facility

Why should recyclers and refurbishers care about what happens to materials and components that they send to downstream processors, service providers and vendors?[16]

Answer: Downstream processors, service providers and vendors may, for example:

- not practice ESM at their facility or deal with downstream processors that practice ESM;
- not be authorized to engage business in the jurisdiction in which they are located or deal with downstream processors, service providers and vendors that possess necessary authorizations;
- not have adequate infrastructure or capacity to process used products, components, materials, and residual wastes;
- not have environmental, health and safety management systems in place;
- not manage and dispose of components, materials, and residual wastes properly and/or legally;
- not practice diligent occupational health and safety procedures;
- not track quantities of shipments of used and waste electronic products and materials to ensure transparency, traceability and proper documentation; or
- not have emergency plans, facility closure plans and financial guarantees in place to protect the environment, worker health and community safety.

Using downstream vendors that do practice ESM:[17]

- maintains high public opinion and integrity of your business operations by assuring that your business partners also hold the same high values for protecting the environment and human health,
- may be a requirement of verification and certification programs for refurbishers and recyclers that process electronic products, and
- demonstrates due diligence and helps to minimize potential legal issues that may arise if business partners and associates are not in compliance with local, state, or national legal requirements.

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[16] Electronics Product Stewardship Canada (EPSC). 2010. *Recycler Qualification Program for End-of-life Electronics Recycling*.

[17] UNEP. Basel Convention. 2011. *Guideline on Environmentally Sound Testing, Refurbishment & Repair of Used Computing Equipment*. Partnership for Action on Computing Equipment (PACE) Project 1.1.

Notebook

Facility Check-In:

❒ *Goal*: My facility has a process in place to identify hazards and risks with downstream processors, vendors and service providers that our organization does business with.

Note the current situation: _____

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Note where improvement could be made: _____

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What challenges exist and how might they be overcome? _____

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Note one step you can take today / next week / next month to begin the change process: __

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3.6.4 Step 3 of a Risk Assessment: Assess the Hazard

What should be examined to assess the hazard?

Answer:

To assess the hazard and determine its level of risk (severity of harm), you may wish to consult the expertise of an occupational health and safety professional. The following should be considered when assessing hazards at the workplace:[18]

- environmental and occupational health and safety legal requirements,
- industry codes of practice / best practices,
- information about previous injuries, illnesses, "near misses," accidents and emergency situations,
- location and management of hazardous processing activities, materials, and components,
- observations and recommendations of workers to eliminate or reduce hazards at the workplace,
- potential routes of hazard transport, where substances like lead and mercury may accumulate in work areas or be transported to other areas (e.g., lunchroom, washrooms, home), and
- results of testing (e.g., emissions, discharges, air sampling, blood testing, etc.).

Example of Step 3: Hazard Assessment

-- Tips for Risk Assessors—

When assessing potential hazards or exposure, also consider infrequent or accidental releases, such as the breakage of mercury-containing lamps and cathode ray tubes during shipment unloading and processing, which can also pose significant risks to worker health and safety during acute or chronic exposure.

Since airborne contaminants can pose hazards through other routes of entry, such as contact with eyes and absorption through skin, you should consider and evaluate all potential routes of entry and associated hazards from airborne particles, not just inhalable dust.

Electronics Product Stewardship Canada (EPSC). (2010). *Recycler Qualification Program for End-of-life Electronics Recycling*. Guidance manual.

Remember to include factors that contribute to the level of risk, such as:

- work environment (layout, general housekeeping, accident-prone areas, etc.), and
- worker skills and competency and use of personal protective equipment.

[18] Canadian Centre for Occupational Health and Safety, <http://www.ccohs.ca/oshanswers/hsprograms/hazard_risk.html>.

Assess the Hazard and Exposure to the Hazard (Level of Risk) (Step 3, Continued)

Is there a methodology for assessing the hazard?

Answer: It is important to identify the level of risk by thinking about the consequences or effects of the hazards that you have identified.

Exhibit 6 presents one example of how you can document the level of risk, also called severity of harm. When you document the level of risk, consider whether the impact would be:[19]

1. slightly harmful (e.g., superficial injuries; minor cuts and bruises; nuisance and irritation; ill-health leading to temporary discomfort; easily contained environmental spill localized on site);

2. harmful (e.g., short-term illness with potential for full recovery; burns; concussion; dermatitis; asthma; ill-health; non-hazardous emission to the air or water; etc.); or

3. Extremely harmful (e.g., poisonings; multiple injuries; fatal injuries; occupational cancer; acute fatal diseases; other severely life shortening diseases; blindness; release of hazardous substances to air, soil, or water which cannot be easily cleaned up; etc.).

In addition, you could also think about the type of damages your business could face if the environment or human health is harmed as a result of a facility incident (e.g., lawsuits; fines; facility shutdowns; medical expenses; employee leave; emergency response expenses; contaminated site cleanup expenses; loss of trust and confidence by clients, shareholders, business partners government and the public; loss of employee morale, loss of business; media attention; investigations; loss of capital investments; etc.). The type of damages would depend on the scope and magnitude of the event. An example of a hazard has been included in the first row of Exhibit 6.

Exhibit 6: Example of Level of Risk[20]

Hazard	Level of Risk / Severity of Harm		
	Slight Harm	Moderate Harm	Extreme Harm
Hazard 1: When equipment arrives at my facility, workers in the receiving area are sorting equipment so fast that often equipment is not secured properly and breakage occurs. Often, the broken items include cathode ray tubes or LCD monitors.			√
Hazard 2 (Describe)		√	
Hazard 3 (Describe)			√
Hazard 4 (Describe)	√		

[19] Adapted from the Canadian Centre for Occupational Health and Safety, <http://www.ccohs.ca/oshanswers/hsprograms/hazard_risk.html>.

[20] *Source*: British Standards Organization, as cited in Canadian Centre for Occupational Health and Safety, <http://www.ccohs.ca/oshanswers/hsprograms/hazard_risk.html>.

3.6.5 *Step 4 of a Risk Assessment: Identify Consequences of the Hazard / Characterize the Risk*

How do you characterize the risk?

Answer:

It is important for your team to characterize the risk by thinking about the consequence or effect of the hazards that you identified (level of risk) in combination with the potential occurrence. Although there is no one way to characterize risk, Exhibit 7 presents an example of how you can integrate the potential occurrence into the table using the following scale:

- ✓ **Very likely**—typically experienced at least once every six months
- ✓ **Likely**—typically experienced once every five years
- ✓ **Unlikely**—typically experienced once in 5–10 years
- ✓ **Very unlikely**—less than 1% chance of being experienced

Exhibit 7: Example of Characterizing Risk[21]

Hazard	Likelihood of Harm / Potential Occurrence	Level of Risk / Severity of Harm		
		Slight Harm	Moderate Harm	Extreme Harm
Hazard 1 (Describe)	Very unlikely	√		
Hazard 2 (Describe)	Unlikely		√	
Hazard 3 (Describe)	Likely			√
Hazard 4 (Describe)	Very likely	√		

[21] ibid.

3.6.6 *Step 5 of a Risk Assessment: Evaluate and Prioritize the Risk*

How do we prioritize risks?

Answer:

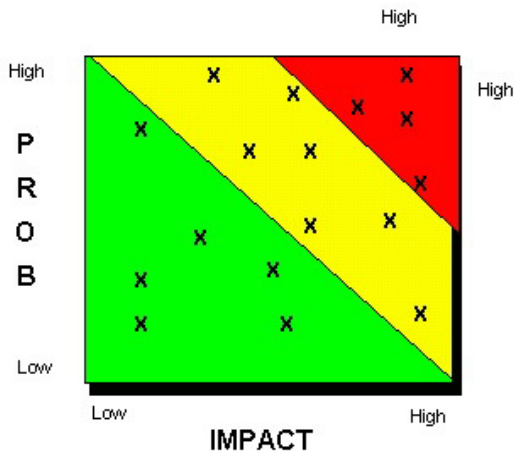
There is no single way to prioritize hazards. Ranking hazards requires knowing about the workplace activities and being able to show objective judgement. One option is to use the table already prepared (from Step 4) and identify which cells have extreme harm identified and are *also* ranked as likely or very likely in potential occurrence—with these hazards prioritized. Exhibit 8 presents one example of this method.

Exhibit 8: Example of Risk Prioritization—Chart Checklist

Hazard	Likelihood of Harm / Potential Occurrence	Level of Risk/Severity of Harm		
		Slight Harm	Moderate Harm	Extreme Harm
Hazard 1 (Describe)	Very unlikely	√		
Hazard 2 (Describe)	Unlikely		√	
Hazard 3 (Describe)	Likely			√
Hazard 4 (Describe)	Very likely	√		

A second example of a methodology is to plot the results on a grid. The X-axis along the left is the *probability or frequency*; and the Y-axis along the bottom right is the *severity of harm*. Moving from bottom to top of the probability scale is from low to high probability, and moving from left to right along the impact scale is from low impact to high impact (severity). The risks are plotted on the grid individually. Following, any risks that show up in the upper right area of the grid (both high probability and high impact) should be priority.

Exhibit 9: Example of Risk Prioritization—Grid Plot



Evaluate and Prioritize the Risk (Step 5, Continued)

You and your team can also use the information assembled in Step 4 to inform an opinion of tolerable risk level. This assessment is best conducted using an internal risk assessment committee. Information on this method is presented below.

Tolerability Guidance:[22]

Very low – These risks are considered acceptable. You do not need to take further action other than to ensure that the controls are maintained.

Low – You do not need additional controls unless they can be implemented at very low cost (in terms of time, money, and effort). Assign low priority to actions that would further reduce these risks. Make arrangements to ensure that the controls are maintained.

Medium – Consider whether the risks can be lowered to a tolerable level and preferably to an acceptable level (taking into account the costs of additional risk reduction measures). Implement measures within a defined time period. Make arrangements to ensure that controls are maintained, particularly if risk levels are associated with harmful consequences.

High – Make a substantial effort to reduce the risk. Implement risk reduction measures urgently within a defined time period. Consider suspending or restricting the activity, or applying interim risk control measures until risk reduction has been completed. You may have to allocate considerable resources to additional control measures. Make arrangements to ensure that controls are maintained, particularly if the risk levels are associated with extremely harmful consequences and very harmful consequences.

Very high – These risks are unacceptable. Substantial improvements in risk control measures are needed to reduce the risk to a tolerable or acceptable level. You should halt work activity until risk controls have been implemented and have reduced the risk tolerance level.

What happens after risks are prioritized?

Answer:

They are eliminated or minimized. The risk assessment process gives managers increased capacity to manage identified risks. The process enables managers to: know more about the risks in their facilities; know more about the scope, magnitude and likelihood of these hazards and risks; and ensure that all reasonable care is taken to prevent, minimize or otherwise address identified hazards and risks.

For more information on risk minimization, see Module 4

[22] Adapted from: BSI. 2004. *Occupational health and safety management systems—Guide*. British Standard (BS) 8800:2004. And: BSI. 2004. *Managing Safety the Systems Way: Implementing OHSAS 18001 using BS 8800*. London: British Standards Institution.

Group Discussion 1: Risk Assessment

Pick an area of the facility where typical hazards occur (see Exhibit 4). Go through the risk assessment process, thinking through the steps at a fictional facility, a group member's facility, or a combination of members' facilities.

Focus the conversation on what you would have to think through for that step and any challenges you might run in to, not on identifying as many hazards as possible. As you go, discuss any best practices / examples that you are familiar with and that are worth sharing. You may not get through all the steps of the risk assessment, because of available time.

(1) Identify the processing stages: Identify 2 or 3 processing steps to focus on.

(2) Identify the hazards: Identify 4 or 5 potential hazards. Go through the hazard identification form (Exhibit 6). Who should be involved in the process? What non-routine activities or unusual conditions might you need to consider?

(3) Assess the hazard and the exposure to the hazard: Pick 2 or 3 hazards. Discuss how you might determine their level of risk.

(4) Characterize the risk: Think through how you would identify the likelihood of harm (potential occurrence) along with the consequences of the hazards identified in (3).

(5) Evaluate and prioritize the risk. Work through how you might rank the hazards you identified in (3).

Group Discussion 2: Risk Assessment Processes

This module identifies processes that your facility can incorporate to ensure that risk assessment is undertaken in a comprehensive manner. Now, you can discuss one of these processes as a group.

As part of a comprehensive risk assessment process, a facility:

1) conducts risk assessment at a minimum on an annual basis as well as when changes are made to the facility's operations or regulatory requirements, or following an incident;

2) has a process in place to document, implement, communicate, and maintain the roles and responsibilities for planning and conducting risk assessments;

3) has a process in place to document and keep current environment, health, and safety risk and hazard information, and update it to reflect changes in operational, constituent material, environmental or regulatory requirements, or in procedures and practices; and

4) has a process in place to identify hazards and risks involving potential secondary or tertiary processors who take reclaimed material.

Pick and carry out one of these processes:

(a) identify what elements a policy/process would include (think who, what, when, where, how),
(b) discuss good examples of policies/processes that you are familiar with, or
(c) assess what types of facility activities, operations and services possess risks that may not be readily apparent (e.g., formation of beryllium dust from shredding, which may lead to berylliosis or chronic beryllium disease),

and then draft a sample policy (if time allows).

Notes

3.7 Gap Analysis of Policy and Procedures Associated with Risks for Environment, Health and Safety

A facility also needs to assess its *policies and procedures* for risks to worker health and safety and environmental protection. Policies and procedures that minimize risks include management systems, and policies or plans to protect worker health and safety and the environment.

The following checklists[23] are for you to use to conduct a gap analysis to assess whether important policies and procedures are in place to ensure ESM.

Note that in the following checklists, the acronym "CPE" has been used to refer to one of the OECD core performance elements for ESM (introduced in Module 1).

Each checklist has a column where the assessor can indicate "Y" for Yes, "N" for No, or "NA" for Not Applicable, followed by a column where the assessor can indicate the type of corrective action required (if any). The first row of the first checklist has been completed as an illustrative example.

Best Practice: The risk assessment process should include a gap analysis of policies and procedures associated with risks for the environment, health and safety.

Checklist 1: Environment, Health and Safety Management System (CPE #1)

Requirements	Y/N/NA	Action?
Has the facility established, documented, implemented, maintained and continually improved a management system that is focussed on environmental protection, worker health and safety?	Y	None needed; system is reviewed annually
Is the management system certified by a recognized party?		
Is the management system or facility audited periodically by an independent auditor?		
Does management regularly monitor and examine the progress towards environmental health and safety objectives?		
Is the facility assessed on its performance regarding environmental, health and safety aspects against measureable objectives?		

[23] Bureau of International Recycling (BIR). 2006. *Tools for Environmentally Sound Management: All You Need for an ISO-Compliant Environmental Management System that Includes OECD Core Performance Elements for the World's Recycling Industries*.

Checklist 2: Environment, Health and Safety (EHS) Policy (CPE #2)

Requirements	Y/N/NA	Action?
Is there a documented environment, health and safety policy?		
Does the policy include commitment to continual improvement, pollution prevention, and legal compliance?		
Is the policy appropriate to the nature, scale, and environmental and health impacts of its activities?		
Is there a procedure to communicate the policy to all employees?		
Is the procedure consistently followed?		
Is the procedure periodically reviewed and updated to keep it current?		

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Checklist 3: Planning (CPE #2 and CPE #3)

Requirements	Y/N/NA	Action?
Environment, Health and Safety Planning/Procedures (CPE #2)		
Is there a procedure to identify environmental, health and safety aspects of company's activities and procedures that it can control and influence (risk assessment planning)?		
Does the procedure determine which identified aspects have or could have significant environmental, health and safety impacts?		
Is the procedure implemented and consistently followed?		
Is the procedure periodically reviewed and revised?		
Legal Requirements Planning/Procedures (CPE #3)		
Is there a procedure to identify legal requirements as well as industrial standards or codes of practice, corporate requirements, or voluntary initiatives, etc.?		
Do both management and employees have reasonable access to the requirements?		
Is the procedure implemented and consistently followed?		
Is the procedure periodically reviewed and revised to keep it current?		
Are legal requirements taken into account in the continual improvement of the environment, health and safety management system?		
Facility Objectives and Continual Improvement Planning/Procedures (CPE #3)		
Are there established, implemented and maintained documented environment, health and safety objectives/targets for the company?		
Are the objectives/targets measureable?		
Are there timelines for the objectives/targets?		
Are legal requirements taken into account in setting the performance objectives?		
Are specific responsibilities designated for achieving objectives and targets at relevant levels within the company?		
Is there a process for periodic review of the objectives?		

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Checklist 4: Operations—Roles and Responsibilities (CPE #4)

Requirements	Y/N/NA	Action?
In each of the operational areas of your facility, are the roles, responsibilities and authorities established, documented, and communicated?		
Are these roles, responsibilities and authorities for different operational areas of your facility understood by all staff?		
Does management consistently provide necessary resources (including financial resources, human resources—including specialized skills that may be required or even specialized technology) essential to the implementation and control of the environment, health and safety management system?		
Has top management appointed a specific management representative with defined roles, responsibilities and authority ensuring environment, health and safety requirements are established, implemented, and maintained?		

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Checklist 5: Operations—Competence, Training and Awareness (CPE #4)

Requirements	Y/N/NA	Action?
Does the facility identify training needs associated with its potential health, safety, and environmental impacts? (For example, are risk assessment results taken into account when designing employee training programs)?		
Are there procedures established, implemented and maintained to ensure employees are aware of the importance of conformance with the environment, health, and safety policy and with the procedures of the environment, health, and safety management system?		
Are there procedures established, implemented and maintained to ensure employees are aware of the significant environment and health impacts (actual and potential) of their work activities and the benefits of improved performance related to their work? (For example regular usage of personal protective equipment).		
Are there procedures established, implemented and maintained to ensure employees are aware of their role and responsibilities in achieving conformance with environment, health and safety procedures and with requirements of management systems such as emergency preparedness?		
Does the facility have an appropriate and adequate training program for the personnel involved in the management of waste and materials, in particular of hazardous waste and materials?		

Checklist 6: Operations—Communications

Requirements	Y/N/NA	Action?
Has the facility established, implemented and maintained a communication procedure?		
Does the communication procedure relate to internal communications and external communications (for example, receiving, documenting and responding to relevant communications from external interested stakeholders)?		
Is the communications procedure implemented and consistently followed?		
Is the communications procedure periodically reviewed and revised where needed so as to keep it up-to-date?		

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Checklist 7: Operations—Documentation of Procedures, and Document Control (CPE #1)

Requirements	Y/N/NA	Action?
Are roles/responsibilities for conducting risk assessments documented?		
Does documentation include health, safety and environment, including procedures to identify, prioritize and assess risks to environment, health and safety?		
Does documentation include identification of the main facility operations or processes and their potential interaction with health or the environment?		
Is there an established, implemented and maintained procedure for controlling all environment, health and safety documents required?		
Does the facility have an approval procedure for establishing documents and other procedures?		
Does the facility have a procedure to review and update documents? For example, to ensure that changes are made when necessary and that the current version of documents are in place. If obsolete documents are to be retained for any purpose, is there a procedure to ensure they are marked accordingly?		
Does the facility have a procedure to ensure that documents remain legible and readily identifiable?		

Checklist 8: Operations—Internal Controls (CPE #1, CPE #2, CPE #6)

Requirements	Y/N/NA	Action?
Using results from a risk assessment, does the facility establish, implement and maintain documented procedures to control activities that are associated with potential environmental or health risks?		
Are these procedures communicated to suppliers and onsite contractors?		
Is onsite recovery or disposal of waste generated by the process carried out in compliance with the applicable laws?		
Is onsite recovery or disposal of waste generated by the process tracked internally and recorded appropriately?		
Is outgoing waste destined for recovery or disposal appropriately recorded and handed over only to environmentally sound recover and/or disposal operations?		
Does the facility have an adequate plan for closure and aftercare?		
Is the closure plan periodically updated?		
Are there financial guarantees to ensure that the necessary measures are undertaken upon definite cessation of activities to prevent any environmental or public health damage and to ensure that the return of the site of operation is to a satisfactory state as required by applicable laws?		

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Checklist 9: Operations—Emergency Preparedness (CPE #5)

Requirements	Y/N/NA	Action?
Has the facility established, implemented and maintained procedures to identify potential for accidents that could have an impact on the environment or worker health, and how it would respond to those emergencies?		
Does the facility respond to the actual emergency situations and prevent associated adverse impacts?		
Does the facility periodically review and revise (if necessary) its emergency preparedness and response procedures, in particular after the occurrence of accidence or emergency situations?		
Does the facility test emergency procedures?		
Does the facility take sufficient measures to safeguard occupational health and safety, and environmental protection?		
Are adequate measures taken to prevent exposure to unacceptable environmental, health and accident risks to people working and living in the vicinity of the facility?		
Do these measures include international or national laws, agreements, etc. (mandatory or voluntary)?		
Is reliable information on the facility's activities which might affect the environment or worker health and safety available to the public in a timely manner?		
Does the facility have an adequate emergency plan, including monitoring, reporting and responding to accidental pollutant releases, and other emergencies?		
Is the emergency plan based on an evaluation of existing and potential risks?		
Is there an emergency co-ordinator designated to handle hazardous wastes?		
Is there a complete and up-to-date contingency plan available that covers both short term and long term remedial activities?		
Is the emergency plan periodically reviewed by the relevant authority and or auditor?		

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Checklist 10: Checking—Monitoring and Measurement (CPE #3)

Requirements	Y/N/NA	Action?
Has the facility established, implemented and maintained procedures to monitor and measure on a regular basis the key characteristics of its operations and activities that can have a significant impact on the environment or worker health?		
Doe the facility have a reporting program?		
Does the reporting program cover relevant legal requirements, including key process parameters?		
Does the reporting program cover compliance with applicable health and safety requirements?		
Does the reporting program cover effluents and emissions, incoming, stored and outgoing waste, and in particular hazardous waste?		
Do the procedures of monitoring and measuring include requirements for information to monitor performance? Applicable operational controls? Conformance with objectives?		
Does the facility ensure that calibrated or verified monitoring and measuring equipment is used and maintained?		
Does the facility ensure that associated monitoring records are retained?		
Does the facility maintain records on the generation, recovery or disposal of waste, its types and amounts, and are these available to authorities upon request?		

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Checklist 11: Checking—Evaluation and Corrective Action (CPE #1)

Requirements	Y/N/NA	Action?
Are there established, implemented and maintained procedures for periodically evaluating compliance with applicable legal requirements?		
Are there records of the results of these periodic evaluations?		
Does the facility evaluate compliance with other requirements to which it subscribes?		
Are there established, implemented and maintained procedures for dealing with actual and potential nonconformities and for taking corrective action and preventative action?		
Do the procedures define requirements for identifying and correcting nonconformities and taking actions to mitigate their impacts related to the environment or to health?		
Do the procedures define requirements for investigating nonconformities, determining their cause and taking actions to avoid reoccurrence?		
Do the procedures define requirements for recording the results of corrective and preventative actions and for reviewing the effectiveness of the corrective and preventative actions taken?		
Are corrective actions taken appropriate to the magnitude of the problem and potential impact?		
Does the facility ensure that necessary changes in the environmental, health and safety system is documented?		

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Checklist 12: Checking—Internal Audits (Environmental Management Systems Only) (CPE #1)

Requirements	Y/N/NA	Action?
Does the facility ensure that internal audits of its environmental management system are conducted at planned intervals to determine whether the system conforms to the requirements of ISO 14001, EMAS, or OHSAS 18001, and whether the system has been properly implemented and is maintained?		
Does the facility provide information on the results of audits to management?		
Are audit programs planned, established, implemented and maintained by the facility?		
Are audit programs taking into consideration the environmental importance of the operations concerned and the results of previous audits?		
Are audit procedures established, implemented and maintained to address the responsibility and requirements for planning and conducting audits, reporting results and retaining associated records?		
Are audit procedures established, implemented and maintained to address the determination of audit criteria, scope, frequency and methods?		
Do the selection of auditors and the conduct of audits ensure objectivity and the impartiality of the audit process?		

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Checklist 13: Checking—Management Review (CPE #1)

Requirements	Y/N/NA	Action?
Does top management review the facility's environment, health and safety management system at planned intervals to ensure its continuing suitability, adequacy, and effectiveness?		
Do reviews include assessing opportunities for improvement and the need for changes to the environment, health and safety management system, including the policy, objectives and targets?		
Does input to management reviews include results of internal audits and evaluations of compliance with legal requirements and with other requirements to which the facility subscribes?		
Does input to management reviews include communications from external parties, including complaints?		
Does input to management reviews include performance results? (For example, the extent to which results have been met.)		
Does input to management reviews include recommendations for improvement?		
Do outputs from management reviews include any decisions and actions related to possible changes to policy, objectives/targets, and elements of the management system consistent with continual improvement?		

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Checklist 14: Due Diligence—Downstream Considerations (CPE #3)

Downstream Considerations	Y/N/NA	Action?
Does the processor have the technical capability to process hazardous waste, as confirmed through permits/licences, etc.?		
Does the processor practice occupational health and safety, as evidenced through inspection of documentation and onsite audits?		
Does the processor have appropriate environmental permits in place for its jurisdiction, to protect the local environment and community from air or water discharges?		
Does the processor appropriately track quantities of waste shipments to ensure transparency and allow for proper documentation?		
Does the processor properly label hazardous waste and ensure it is processed and transported as such?		
Does the processor ensure hazardous waste is recycled as much as possible and, when disposed of, use licensed incineration facilities?		
Does the processing facility have emergency plans in place that include financial guarantees to ensure resourcing is available to accommodate emergency response, site decontamination and facility closure?		
Does the processor conduct scheduled or unscheduled audits of their downstream processors?		
Does the processor require transparency with *its* downstream processors, regarding verifiable and traceable material shipments (i.e., does it require its processors to track quantities or verify shipments via documentation, or does it have other ESM requirements of its downstream processors)?		
Does the processor have means to ensure that the downstream processors it selects are not engaged in illegal hazardous waste shipments to non-Basel countries (e.g., unscheduled auditing; documentation trails, such as shipment manifests)?		

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3.8 Summary—Key Take-away Messages

The Risk Assessment Process:

- ✓ It is important to identify and assess risks relating to direct facility activities, operations and services, as well as risks that might exist from gaps in policies and procedures, to ensure health and safety. These risks can exist both at your facility and at downstream processors, vendors and service providers that you do business with.
- ✓ Used and end-of-life electronic products contain hazardous substances such as lead, mercury, cadmium, and beryllium. Other hazardous substances, such as dioxins and furans, can be formed during recycling operations. All hazardous substances can pose danger to worker health and safety, the local community, and the broader environment, and are important to identify and consider during the risk assessment process.
- ✓ The risk assessment process includes five steps:

  Step 1. Identify the stages of operations

  Step 2. Identify the hazards

  Step 3. Assess the hazard and exposure to the hazard (level of risk)

  Step 4. Identify the consequence or effect of the hazard—characterize the risk

  Step 5. Evaluate and prioritize the risk
- ✓ To ensure ESM, risks are prioritized during the risk assessment process, and then eliminated if possible, or minimized when they cannot be eliminated.

Using the best practices, all combined, presented in Module 3 will allow your company to be in a better position to offer assurance that it has a serious commitment to worker health and safety, the environment and the local community.

Notebook

Please check off which of the following risk assessment measures[24] your facility has in place. Then, write some notes in the right-hand column, on what you think could be a priority for action.

Risk Assessment: Checklist for Continual Improvement

Has Top Management Made a Commitment to the Following through Documented Procedures and/or Policies?	Priorities for Action
❒ Is there a risk assessment process in place to identify and assess risks to the environment, and worker health and safety? ❒ Is this risk assessment process conducted at minimum on an annual basis? ❒ Is risk assessment conducted when changes are made to the facility's operations or regulatory requirements?	• • •
❒ Is a process in place to document, implement, communicate, and maintain roles and responsibilities for planning and conducting risk assessment? ❒ Is a process in place to document and keep current environment, health and safety risk and hazard information? ❒ Is a process in place to identify hazards and risks with potential vendors / downstream processors? ❒ Is a process in place to assess policies and procedures for gaps in how they can help to protect the environment, and health and safety?	• • •

[24] UNEP. Basel Convention. 2011 (Revised). *Environmentally Sound Management (ESM) Criteria Recommendations*. Partnership for Action on Computing Equipment (PACE).

3.9 Post-questionnaire

1. Were your learning objectives from Pre-questionnaire, Question #1, met? If not, what questions do you have that have still not been answered?

2. What challenges do you think might be a part of identifying risks and hazards at your facility? Is there anything that would help you or your facility overcome these challenges?

3. What best practices, ideas or suggestions came out of this module and from other participants that you would like to think about implementing at your facility?

4. Do you feel that you and your facility have the *tools and knowledge* (forms, skills, personnel, etc.) to perform strong risk assessments, including: identifying the problem(s); identifying the hazards; determining the level of risk for each hazard; characterizing the risk; and evaluating and prioritizing the risk?

   Note the current situation: _____

   _____

   _____

   Note what is still needed: _____

   _____

   _____

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   What challenges exist and how might they be overcome? _____

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   Note one step you can take today/next week/next month to begin the change process: __

   _____

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   _____

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3.10 Additional Resources

- **Canadian Centre for Occupational Health and Safety** website: <http://www.ccohs.ca/>. Available online: downloadable posters on health and safety and WHIMIS fact sheets.
- **US Occupational Safety and Health Administration** website: <http://www.osha.gov/>. Available online: written programs and examples to meet the state regulations; hazardous materials training and other training materials; resources for small businesses; etc.
- **Autogestión en Seguridad y Salud en el Trabajo** website: <http://autogestion.stps.gob.mx:8162/>. Available online: written programs, examples, norms, training materials, Q&A, etc.
- **International Labour Organization** website: <http://www.ilo.org>. Training materials available online: <http://www.ilo.org/safework/info/instr/lang--fr/nextRow--20/index.htm>.
- **Injury and Illness Prevention Program, University of California, Berkley**. Office of Environment, Health and Safety. Examples of worksheet for hazard identification, available online: <http://www.ehs.berkeley.edu/images/ehs/iipp/iippform1.pdf>.
- **Injury and Illness Prevention Program, University of California, Berkley**. Office of Environment, Health and Safety. Examples of worksheet for safety assessment, available online: <http://www.ehs.berkeley.edu/images/ehs/iipp/2012_iipp3shopselfinsp.pdf>.
- **Health and Safety Ontario**. Tips for Conducting a Hazard Assessment. Online at: <http://www.healthandsafetyontario.ca/Resources/Articles/WSPS/9-tips-on-conducting-a-hazard-assessment.aspx>.