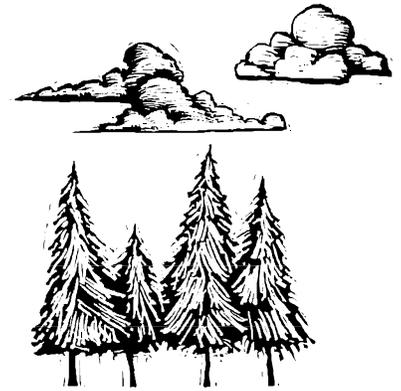


MODULE 3: DETERMINING SIGNIFICANT ENVIRONMENTAL ASPECTS AND SETTING OBJECTIVES

From your work in Module 1, you have probably identified a number of “environmental aspects” associated with your company’s activities. This module will help you prioritize those aspects. It will also help you determine which one(s) you will want to work on first. Do not expect to work on all the environmental aspects identified. “Continuous improvement” implies that this is an on-going process where you address some concerns now and others in the future.

Your operations may have many environmental aspects, but they may not all be significant. First, by ranking each aspect against a set of environmental criteria (e.g., toxicity, wasted materials), you can determine which are most significant. Next, to select which significant environmental aspects (SEAs) you will work on, rank each aspect against practical criteria (e.g., technical and economic feasibility) and benefits criteria (e.g., improved health). For those aspects you select, you will set objectives in terms of the improvements you hope to make.

Determining which aspects are significant includes making subjective decisions. For this reason, you will improve results by having a team of people who represent different job categories. They can provide a cross-section of operational experience when you work on this module.



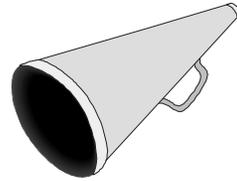
DfE projects emphasize integrating evaluation of both risk and resource conservation into performance and cost evaluations.

Create a Working List of Environmental Aspects

When you developed a list of environmental aspects using the process map of your company's activities, you may have identified a large number of environmental aspects. This is not surprising, since virtually all of your business activities could interact with the environment in some way. In order to identify which environmental aspects are significant, we will review environmental risk information. However, ranking your environmental aspects using environmental risk information can be a labor-intensive process. Therefore, you may want to create a smaller list of environmental aspects to rank using risk information.

First, create a list of selection criteria that suit your company. Below is a list of examples to help you get started:

- ▶ Which aspects might affect your company's ability to comply with regulations and other requirements?
- ▶ Are there pollution prevention opportunities?
- ▶ Are there potential cost savings or business opportunities (e.g., potential customers who require their suppliers to have EMSs)?
- ▶ Are there concerns that might be shared by customers or suppliers?
- ▶ Is there "low-hanging fruit" that might provide early successes which can serve both to educate employees and to build confidence in the IEMS?
- ▶ Are there opportunities to integrate environmental with worker health and safety requirements?
- ▶ Are there community concerns regarding your company's activities?



In describing the approach used to identify and prioritize SEAs, one screenprinter stated that his company:

"Brought in a cross-section of staff and conducted facilitated brainstorming. They then captured the information in a matrix to help prioritize aspects."

Another said his company used "common sense." He said,

"A quick walk around any print shop will produce at least enough SEAs to get an IEMS project under way."

- ▶ Are there unregulated hazardous chemicals that could be managed better or substituted?
- ▶ Are some of your “solutions” to environmental concerns or regulations shifting waste from one media (air, water, land) to another?
- ▶ Could resources be used more efficiently, e.g., energy, water, materials?

You may want to use all or some of these, and you may think of others specifically related to your company’s circumstances. Create a list of criteria and use that to select a group of environmental aspects to rank.

There are several ways to make this selection. One way is for the IEMS team to review the list of environmental aspects and vote on their top concerns. Set a target number to rank, say ten, and let the top ten environmental aspects be your working list.

When you have a reduced list of environmental aspects (e.g., ten), you are ready to rank them using environmental risk information to determine which are significant environmental aspects.

Using Environmental Risk Information to Rank Your Environmental Aspects

Although you will not attempt a formal risk assessment for your IEMS, this module will help you apply your working knowledge and judgment about the chemicals and materials your company uses, and the way in which they are used, to select environmental goals to help create healthier working conditions, communities, and environments. This section presents a brief introduction to the concept of risk and to ranking symbols. Then it presents methods to gather chemical and material **effects** information and rank aspects according to effects; a method for making judgments

Tip

Remember: “aspect” refers to the potential for environmental impact. A significant aspect would have the potential for large impact, either because impact is likely to occur under current operating conditions, or because there is potential for serious impact. Even aspects that are well-controlled should be considered for their **potential** for impact should controls fail.

about **exposure** to chemicals and materials and rank aspects according to exposure; a method for laying out risk as well as other environmental concerns and ranking aspects considering these factors. In addition, methods for ranking environmental aspects as projects in terms of cost and expected improvements are presented as a way to prioritize projects that your company will undertake to get started on your IEMS.

Risk

Risk assessment, in brief, is a process that integrates the work of several sciences to determine the kind and degree of environmental and human health impacts *potentially* produced by *exposure* to a chemical or material.

Risk is composed of two parts: toxicity (hazard or “effects”) and exposure. *Toxicity* is the ability to cause harm to the health of humans, wildlife, or vegetation, as well as the type and seriousness of that effect. You will collect the information needed to form a judgment about effects in Worksheet 3-1. You will review the chemical effects information for each aspect and give a rank based on your judgment of the seriousness of the effects of this chemical or substance.

Exposure is the *amount* of material with which workers, the community, or the environment come into *contact*. The amount is determined by both *severity* and *time* of contact. Severity refers to the amount of material that one can come into contact with at any one time. The time of contact depends on the number of times that contact occurs in a given period (the *frequency* of contact) and the *duration* of the contact. You will collect the information needed to form a judgment about exposure in Worksheet 3-2.

Tip

Visit the DfE website for more tools related to risk.

www.epa.gov/dfe

Contact with humans and animal or plant life is characterized as occurring along pathways. These pathways describe the routes along which the substance must travel, before it enters an animal or plant, and how the substance is taken up by the living organism. Several pathways for human exposure include:

- ▶ breathing the material (inhalation pathway),
- ▶ touching the material (skin or dermal pathway), and
- ▶ ingesting (eating or drinking) the material (oral pathway).

Using Ranking Symbols

One way to rank environmental aspects is to use symbols representing a range of high (H) to low (L). Whatever ranking you use (Figure 3-a shows an example), phrase the meaning consistently across all ranking categories; this is most straightforward if you think of “high” as meaning a project you would ultimately like to undertake and “low” as one having lesser priority. Thus, when considering environmental effects, a chemical receiving a “low” rank would be one with low impact or good environmental performance.

Figure 3-a: Ranking Symbols

Symbol	Meaning	IEMS Meaning
H	High	Most environmental impact
M-H	Moderately High	More environmental impact
M	Moderate	Medium environmental impact
M-L	Moderately Low	Lower environmental impact
L	Low	Lowest environmental impact

Identify and Rank Potential Human Health and Environmental Effects of Chemicals and Materials

To rank the environmental aspects associated with chemicals and materials used in your business operations, you will need to find information on the human health and environmental effects associated with those chemicals. Without this information, you cannot identify the potential impact of each chemical on the environment. Unfortunately, there is no single and comprehensive source of information for most chemicals. Information that will help you understand the effects associated with the chemicals you use may be located in several different sources.

By taking the time and effort to find information about the chemicals you use, you will be able to understand the potential effects of the chemicals on humans and on the environment. You will also know how to use them in a way to minimize or avoid harmful effects. You can decide whether you want to continue using your current chemicals, or find alternatives that would mitigate any potential harmful impact.

Sources of information about chemicals include:

- ▶ **Manufacturer's Safety Data Sheets (MSDSs).** These are supplied by the manufacturer according to OSHA regulation. You should receive a MSDS with any chemicals you purchase. They should be kept in a location that is available for review.
- ▶ **Your suppliers.** Ask them for hazard and exposure information on any products you purchase. Ask them to supply the environmental information that is not on the MSDS.
- ▶ **Your trade association.**

Tip

See Appendix B for a list of sample questions to ask your suppliers.

Tip

Remember, any chemical strong enough to take the place of human labor or to make human labor easier is strong enough to have some kind of environmental risk associated with it. The challenge is how to best manage that risk.

- ▶ EPA or state environmental agency.
- ▶ Online sources in various websites, e.g. various EPA programs. (EPA's DfE Program website contains a Risk Guide with additional information.)

Organize the information you have into a format that will enable you to make comparisons between aspects. You may find that sometimes there exists very little information for a particular chemical. That discovery in itself is useful. By using this format and showing where information gaps occur, you will know that whatever decision you make now about using a specific chemical may change if information becomes available at a later date.

Although you may want to use the chemical now, you may need to make adjustments later when more information becomes available. Worksheet 3-1 will help you organize your information on the chemicals you use in your business activities. The column headings list the categories and specific information needed. The final column asks for your judgment about the ranking of the environmental concerns associated with the chemical or material under consideration.

Figure 3-b lists the kinds of information OSHA requires on an MSDS. Most of the kinds of data listed below can be used to fill in the columns on Worksheet 3-1. Much of the environmental information will have to be found elsewhere.

In addition to carcinogenicity information and qualitative descriptors of health hazards (e.g., sensitizer, causes dizziness, etc.), MSDSs sometimes include *quantitative* toxicity values, which are important for assessing chemicals hazards. These include lethal dose (LD) and lethal concentration (LC) measures, which are typically from laboratory studies done on small mammals such as rats, mice, or rabbits. These measures are used to give guidance as to the dose required to kill a human. This is

important information; however, interpreting its meaning is difficult. In general, if you are comparing several chemicals that have LD or LC measures, the lower measure is the most potent (it means that it takes less to be lethal). Therefore, you would have to be more careful using the chemicals with the lower LD or LC measures, *as compared to* those having higher measures. Be sure to record any quantitative toxicity values found on an MSDS, as well as the more qualitative information.

Figure 3-b: Information on an MSDS

As defined by the Occupational Safety & Health Administration (OSHA) (29 CFR 1910.1200), an MSDS is written or printed material concerning a hazardous material which contains the following:

- ▶ The identity of the hazardous material (except as provided for materials that are trade secrets).
- ▶ The physical and chemical characteristics of the hazardous chemical (such as vapor pressure, flash point).
- ▶ The physical hazards of the hazardous chemical, including the potential for fire, explosion, and reactivity.
- ▶ The health hazards of the hazardous chemical, including signs and symptoms of exposure, and any medical conditions which are generally recognized as being aggravated by exposure to the chemical.
- ▶ The primary route(s) of entry.
- ▶ The OSHA PEL (Permissible Exposure Level), the ACGIH (American Conference of Governmental Industrial Hygienists) Threshold Limit Value, and any other exposure limit used or recommended by the chemical manufacturer, importer, or employer preparing the MSDS, where available.
- ▶ Whether the hazardous chemical is listed in the National Toxicology Program (NTP) Annual Report on Carcinogens (latest edition) or has been identified as a potential carcinogen in the International Agency for Research on Cancer (IARC) Monographs (latest editions) or by OSHA.
- ▶ Any generally applicable precautions for safe handling and use which are known to the chemical manufacturer, importer, or employer preparing the MSDS, including appropriate hygienic practices, protective measures during repair and maintenance of contaminated equipment, and procedures for clean-up of spills and leaks.
- ▶ Any generally applicable control measures which are known to the chemical manufacturer, importer or employer preparing the MSDS, such as appropriate engineering controls, work practices, or personal protective equipment.
- ▶ Emergency and first aid procedures.
- ▶ The date of preparation of the MSDS or the last change to it.
- ▶ The name, address, and telephone number of the chemical manufacturer, importer, employer or other responsible party preparing or distributing the MSDS, who can provide additional information on the hazardous chemical and appropriate emergency procedures, if necessary.

Worksheet 3-1:^a Health, Safety and Environmental Potential Effects Information

Operation	Environmental Aspect	Information Sources	Regulatory Data: ^b Carcinogen? OSHA Permissible Exposure Limit (PEL)? Volatile Organic Compound (VOC)? Toxic Release Inventory (TRI)?	Human Health Effects by Pathways Acute and Chronic ^c			Effects on Wildlife and Other Environmental Effects ^d			Worker Safety	Rank	
				Inhalation	Dermal	Oral	Air	Water	Land		Human	Environment
Manufacture Step 1	Chemical 1	MSDS, trade association	yes 10 ppm no no	Chronic: cancer Acute: dizziness	Chronic: sensitizer	acute: LC50 of 100 ppm	ozone depletion	Acute: kills fish	kills worms	flammable		
Contact Person:				Date Completed:								

^a Corresponds to Table EA-03 in *Company Manual Template*.

^b Most information for this column can be found on the MSDS.

^c Partial information for these columns might come from the MSDS, but other resources may be needed. In particular, acute effects are usually reported on MSDS sheets. Chronic effects are sometimes on MSDS sheets, but often will have to be found elsewhere. LC refers to lethal concentration. Inhalation LC50 is the concentration of a chemical in air that causes death in 50 percent of the test organisms at the end of the specified exposure period. LD refers to lethal dose. LD50 is the dose of a chemical taken by mouth, absorbed by the skin, or injected that is estimated to cause death in 50 percent of the test animals. Lethal dose data are expressed in terms of amount of chemical divided by the body weight, e.g., mg/kg.

^d MSDSs usually do not include environmental effects.

Note: This worksheet provides an example of the kinds of information found on an MSDS, but it is not a part of the press cleaning example. For more information on risk-related data, including methods for interpreting quantitative toxicity values, refer to the Risk Guide provided on the DfE Program website.

Rank Exposure to Chemicals and Materials

In determining exposure, the amount of material as well as the frequency and duration of contact must be considered. An important element in exposure is contact. If there is no possibility of contact occurring, then there may be no exposure and therefore no risk. In some cases, as when a toxic substance such as lead is embedded in a product such that no contact occurs during use of that product, the toxic substance may still leach out of that product if it is disposed of in a landfill. The possibility of contact throughout the use and disposal of a product should therefore be considered. If, however, a toxic substance is contained such that neither humans nor the environment would come into contact with it, then exposure would be low. In ranking such a chemical use the rank given to the “Workers,” “Community,” and “Environment” would be “Low” (L). In ranking exposure, it is, therefore, necessary to consider how contact might occur and whether, in fact, it does.

Severity (Quantity)

Determining the quantity of chemical or material that humans or the environment are exposed to can be difficult, especially if the substance becomes diluted in air as vapor or dust or in water. Potential exposure is affected by both the amount of a chemical product used and the concentration of the subject chemical in the product. First, determine the quantity used per time period (shift, week, month, year). If the chemical of interest is part of a product, then apply the percentage that the chemical constitutes in the product to the total usage of the product to determine the quantity used of that chemical. For example, a product may be a single, pure chemical (such as a solvent), or it may be a dilute water-based mixture, with the active ingredients being only a small percentage of the total amount. The higher the concentration, the higher the potential exposure to that ingredient. See the Exposure section of the Risk Guide on the

DfE website for more information on evaluating the exposure amount and ingredient concentrations.

Exposure Time

In addition to quantity, the duration of contact determines the exposure to a chemical or material. How often is the chemical or material used and for how long? The time period used should be related to that used for quantity. For example, if you measure quantity per month, then the time periods should show how many times (frequency) and for how long (duration) it is used per month. Use whatever time frame works with your business operation, but be consistent.

Personal Protective Equipment

The use of personal protective equipment (e.g., gloves, eye protectors, breathing masks) can greatly alter exposure to a chemical or substance, for the personal protective equipment provides a barrier that prevents or reduces contact. Even though personal protective equipment is used, some exposure may occur because people are not perfect in their adherence to instructions and because equipment fails. Consider the possibility of failure when making judgments about exposure to chemicals and materials.

Pathways

Substances can come into contact with living organisms through air, water, land, and other solids. For example, chemicals and substances can be inhaled from the air in the form of dust, vapors, and mists. Humans can ingest chemicals and substances in liquids or food. Substances can get into liquids or food by falling into them from the air, or by food coming into contact with chemicals on surfaces or hands. Finally, touching the chemical or substance can occur when dust, mists, or vapors contact bare skin or when unprotected hands touch contaminated

Tip

See the Exposure section of the Risk Guide on the DfE website for more information on evaluating the exposure amount and ingredient concentrations.

surfaces. Animal and plant life can take up chemicals and substances from the environment in much the same way. Figures 3-c and 3-d show some typical exposure pathways for chemicals used in business operations. When ranking aspects, determine how contact might occur; then decide how severe that contact actually is and how much time is involved (the frequency and duration of contact). (For consistency in comparisons between criteria, apply the same time period to every aspect in your ranking exercise.)

Worksheet 3-2 will help you think about the exposure for each chemical you consider. This chart can be filled in for each chemical or material and represents your best judgment about exposure. The rank for each can then be placed in the last column. The rank represents your judgment.

Worksheet 3-2: Exposure to Chemicals and Materials

Operation	Aspect	Quantity* Used per time period	Exposure Time		Personal Protective Equipment (PPE)	Pathway		Rank Exposed Groups		
			Duration**	Frequency		Human: Inhalation, Dermal, Oral	Environment: air, water, land	Workers	Community	Environ- ment
press cleaning	acetone, toluene, MEK, isopropyl alcohol blend air releases	24 oz. per day	10 min.	5 times per day	gloves	inhalation	air, water	H w/o PPE	L	M-L
Contact Person:				Date Completed:						

*If ingredient in chemical product, use quantity of chemical not product, i.e., apply the percentage that the ingredient makes up of the product.

**How many minutes or hours per day is the chemical or material used?

Note: For more information about evaluating exposure, refer to the exposure section of the Risk Guide on the DfE Program website.

Figure 3-c: Screen Printing Exposure Pathways

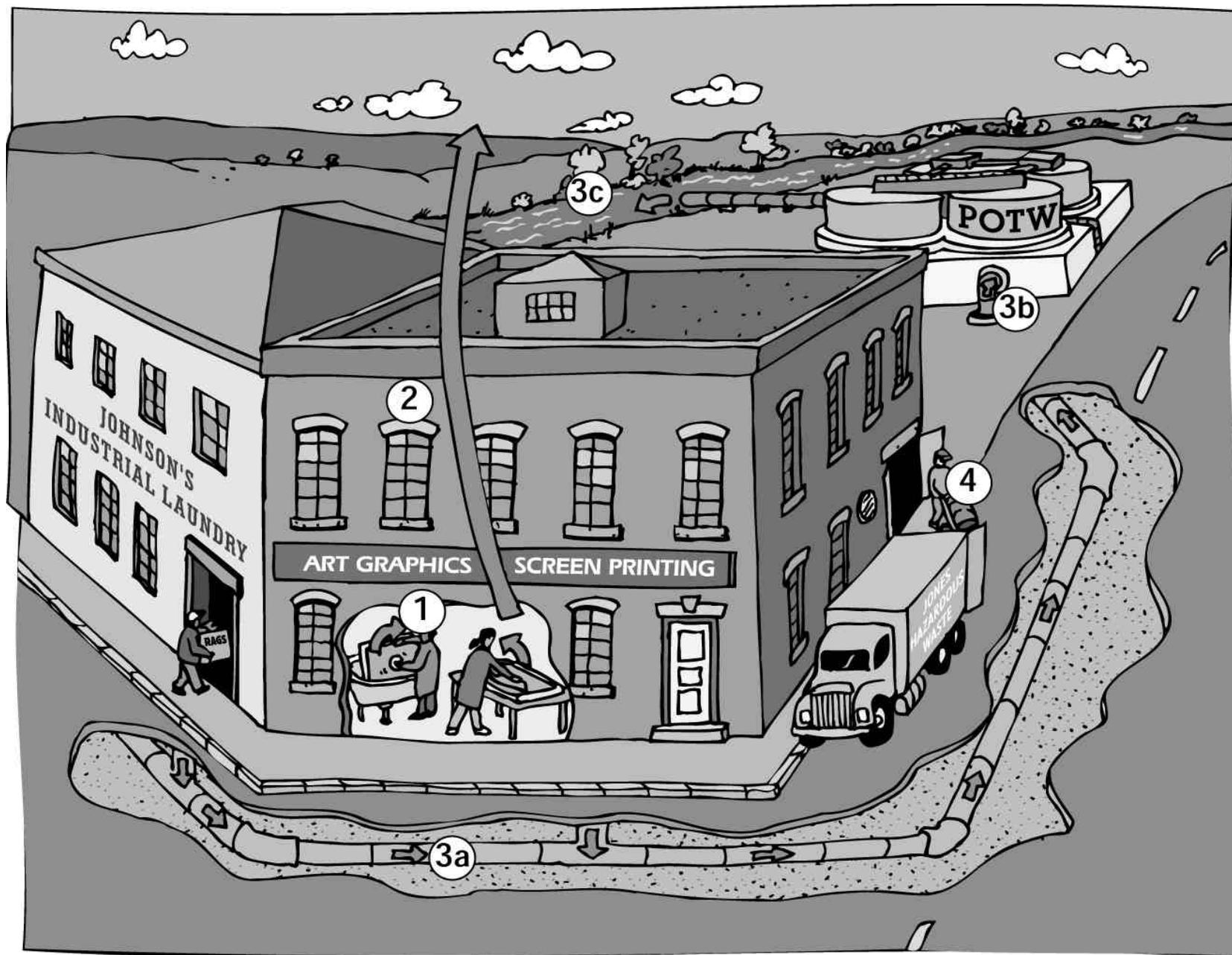


Figure 3-d: Dry Cleaning Exposure Pathways



Ranking Your Significant Environmental Aspects

Now you will put the Effects information together with the Exposure information and consider some additional information. The following paragraphs explain how to use Worksheet 3-3 to rank significant environmental aspects.

Regulatory Concerns

For each aspect, refer to the regulations associated with it that were identified in Module 1 and decide how important these are to your company. For example, an aspect might be regulated, but your company might be small enough that it was exempt from the regulation. The regulatory concern for your company might therefore be considered low (i.e., not important enough for a project). On the other hand, your company might have an environmental aspect to which a regulation applies. If you can stay in compliance easily, you might also rank the regulatory concern low. Or, if the cost of compliance is large or you have experienced difficulties in meeting compliance, you may rank this high (meaning that it may be a good candidate for a project). You do not need at this point to define your aspect in terms of an environmental concern. That will show up as you rank the remaining columns for this aspect.

Chemical and Material Risk

Place both the ranking for effects and the ranking for exposure from Tables 3-1 and 3-2 in the columns. The effects rank for humans would be placed in both the worker and community columns.

MODULE 3: SIGNIFICANT ENVIRONMENTAL ASPECTS AND OBJECTIVES

Worker Safety

Look at the information in Worksheet 3-1 under worker safety and apply a judgment of ranking. Enter this rank in the worker safety column.

Other Community Issues

There are a variety of community concerns that might affect your designation of a particular activity as a significant aspect. These are issues other than pollution. Some examples are the noise level or odor produced by your plant; increased traffic caused by your business; and increased light needed for your operations. You may come up with others specific to your operation and your community. Worksheet 3-3 provides a place to document and rank these issues. Place the rank from this worksheet in Worksheet 3-5.

Worksheet 3-3: Community Issues			
Operation	Aspect	Community Issues (List)	Rank
Contact Person:		Date:	

Natural Resources

This criterion should be used to identify the use of water, energy, and other environmental resources, such as forests or land. The rank that you give to a particular aspect under this criterion is highly subject to the specific circumstances and values of your company and community. For example, a high rate of water use would be of higher concern in a desert region than in a region where water is more plentiful. This column allows you to consider what resource issues you might associate with a particular aspect. The rank you give is based on your judgment related to your own specific circumstances. Other natural resource issues include generation of solid waste and its contribution to landfills in your area. Worksheet 3-4 provides a place to document and rank these natural resource concerns. Place the rank from this worksheet in Worksheet 3-5.

 **Tip**

Remember: The ranks have no intrinsic meaning. They are merely a shorthand for expressing your judgment about priorities.

Worksheet 3-4: Natural Resources Use			
Operation	Aspect	Natural Resources Used	Rank
Contact Person:		Date:	

Overall Ranking and Significance

Review the columns for each aspect and make a judgment as to whether each aspect should be determined H, H-M, M, M-L, L in rank. After all the aspects have been given an overall rank, determine which of them you believe are significant for your company. Place a yes (Y) or no (N) in the final column.

Ranking Environmental Aspects: Examples

The following example shows you how to rank the aspects identified in Module 1 using the criteria in Worksheets 3-5a and 3-5b. Examples of both small and large projects are included. It is important that you think through even solutions that seem obvious, because sometimes you might find a better solution. Refer to Figure 1-h and Worksheet 1-5 to refresh your memory on this example.

Example 1: Toner Cartridges

In this example, a copy machine is used to make paper copies as part of day-to-day business activities. The inputs are toner, paper, and electricity (energy) to run the copies. Outputs include spent toner cartridges, waste paper from poor quality copies, noise, and usable copies. There are no restrictions on use of the copier. Spent toner cartridges are simply discarded with the office trash.

Let's consider the use of toner in copying. Unused toner is considered as an input, while used toner is considered as an output. The same product generates different concerns at different stages of its use. Let's look at the criteria for each in Worksheet 3-5a. The worksheet shows the aspects identified in Figure 1-h. Only the two toner input and output aspects are scored for this example, for illustration. However, in a real exercise, all the aspects would be scored.

Tip

If you are pursuing ISO 14000 **certification**, you will have to address each significant aspect. You may want to consider reducing the number of significant aspects to two or three in the beginning and add more as your company grows in experience with the IEMS process.

Worksheet 3-5a:^a Criteria to Determine Significant Aspects—Toner Cartridge Example^b

Operation	Aspect ^b	Regulatory Concerns	Chemical and Material Risk			Worker Safety	Other Community Issues: ^d	Natural Resources: ^e	Overall Ranking	Significant ? Y/N
			Worker Eff/Exp ^c	Community Eff/Exp ^c	Environment Eff/Exp ^c					
Copying	Paper Use									
	Toner (Input)	M	L/L	L/L	L/L	L		L	M-L	N
	Documents									
	Waste Paper									
	Used toner (Out)	M-H	L/L	L/L	H/H	L		M-H	M-H	Y
	Odors									
Contact Person:					Date Completed:					

^a Corresponds to SEA-01 in *Company Manual Template*.

^b Include each input and output of a process step.

^c Effects/Exposure

^d Noise, Traffic, Light, Odor.

^e Include such items as Resource Use, Solid Waste, Energy Use

Ranking Notes for this Example:

Regulatory concerns may be present due to the chemicals used inside the cartridge or due to solid or hazardous waste regulations.

Effects of Chemicals and Materials inside the toner cartridge are probably of concern. You would have identified these in Module 1.

However, since the cartridges are not opened either during input or output use, there would be no exposure. Frequency of impact, therefore, would be low.

Workers: Worker health and safety would be of low or no concern if the toner is used only in the cartridges.

Community: The community's health and safety would be of low or no concern if the toner is used only in the

Environment might be high if you do not currently recycle your cartridges. Chemicals can spill out of the cartridges if they are placed in a landfill.

Natural Resource Use would be low for water, but might be a concern for land if you do not recycle the used cartridge.

How to Obtain Overall Rank: this can be done in two ways.

1. Look across the columns and assign a total that in your judgement best reflects the individual ranks in each column.
2. Assign a number from 1-5 to each rank such that H = 5 and L = 1. Sum these across the columns and then divide by the number of columns used to get an average rank for that row. For toner input the total would be 11 (counting each risk column as 2 because they have two scores and disregarding other community issues because it was not applicable). Divide by 9 (the number of columns used). The average rank would be 1.2, which corresponds with M-L. Place M-L in the Total column.

Meaning of Environmental Aspects Rank: The total rank for toner used as an input is M-L and for used toner as an output is M-H. These ranks tell you that toner cartridges as waste outputs of your copying generate more concern than they do as new inputs. Your main concern would be to reduce any potential impact of the used toner cartridges. You could reduce potential impact in at least three ways:

- ▶ ensure that the cartridges are not opened either before or after use, to avoid exposure to the chemicals;
- ▶ ensure that the cartridges are recycled according to the distributor's instructions, so that there is neither concern for ecological exposure to the chemicals in landfills, nor a contribution to the solid waste going into landfills; and
- ▶ reduce the number of waste toner cartridges by cutting down on unnecessary copying.

Example 2: Chemical Use and Waste

A second example will provide more points to consider in developing objectives. Consider the chemical inputs and the chemical waste outputs of a "Press Cleaning" example.

In this example, a printer uses a chemical press cleaner (solvent mixture) to manually clean the press after each print run. An uncovered bucket of cleaner is kept at press-side along with a bin of clean, cloth wipers and an uncovered container of soiled wipers. To clean the press, the printer scrapes excess ink from the press for reuse, dips one or more wipers in the press cleaner and wipes the press; wipes the press with one or more clean, dry wipers; and places soiled wipers in an open bin. Soiled wipers are transferred to a closed storage container at the end of the shift. Most of the resulting ink/solvent mixture is contained on the wipers, but excess is captured in drums and disposed of as a hazardous waste. Soiled wipers are sent to the laundry weekly.

Thus, the inputs are the press cleaner and clean wipers. Outputs are reusable ink, soiled wipers, and waste ink/solvent mixture. The environmental aspects include the waste ink/solvent mixture and air and water emissions of press cleaner. Air emissions of press cleaner occur both in the print shop (from the uncovered bucket of cleaner, the cleaning operation itself, and the storage container of soiled wipers), and at the laundry (from the soiled wipers). We will score the two aspects of chemicals used in press cleaning and waste from those chemicals.

 **Tip**

Refer to Figure 1-i and Worksheet 1-5 to refresh your memory on this example.

Worksheet 3-5b:^a Criteria to Determine Significant Aspects—Chemical Use and Waste Example^b

Operation	Aspect ^b	Regulatory Concerns	Chemical and Material Risk			Worker Safety	Other Community Issues: ^d	Natural Resources ^e	Overall Ranking	Significant? Y/N
			Worker Eff/Exp ^c	Community Eff/Exp ^c	Environment Eff/Exp ^c					
Press Cleaning	Step 1									
(in)	Toxic chemical constituents	M-H	M/ M-H	M/ M-L	M/ M-L	M-L	n/a	M-H	M	
	Wipers									
	Energy									
	Water									
(out)	Waste chemicals	M-H	M/ M-H	M/ H	M/ H	M-L	n/a	M-H	M-H	
	Soiled Wipers									
	Waste Water									
	Air Releases #1									
	Product for next step									
Contact Person:					Date Completed:					

^a Corresponds to SEA-01 in *Company Manual Template*.

^b Include each input and output of a process step.

^c effects/exposure

^d Include noise, traffic, light, odor.

^e Include such items as resource use, solid waste, energy use.

Ranking Notes:

Regulatory Concerns: check the lists of regulations and standards to see if they apply to any of the chemicals you have identified as inputs. For outputs from your manufacturing process, find out whether the regulations for solid and hazardous waste make mention of these chemicals. Consider whether new chemical products are formed and become wastes during the process of step 1. If so, don't forget to check for these chemicals as well as the input chemicals. **Chemical and Material Risk:** Assign the ranks from your Effects and Exposure Worksheets. **Safety** might include reference to a flammable chemical. Hence the rank of M-L. **Natural Resource Use** may be important for both input and output chemicals. Also, consider the quantity of water used as an input or to take care of waste.

Meaning of Rank

The total for input chemicals is M and M-H for output (waste). If you compare all the ranks, it would seem that the waste chemicals in this example, using assumed criteria, constitutes a more significant concern than do the other activities.

Grouping Environmental Aspects

In reviewing your company's list of environmental aspects you may discover that some aspects occur in more than one process step. Energy use is a good example. It might be effective in some circumstances to combine all the process steps having energy aspects, and develop a facility-wide strategy and program for achieving improvement. Understand, however, that the energy aspect should be ranked in each process step to determine its relative importance in that step. For example, energy use in office work might be a different priority than energy use in a manufacturing step. In addition, standards and procedures developed to reduce energy use would be different for each process step. Consequently, although you might achieve certain efficiencies through a facility-wide effort, your actual environmental improvement will be attained through objectives set for each process step.

Consider "Practical" Criteria Also

In order to determine which significant environmental aspects will become projects, it is important to consider the economic and technical feasibility and the time frame for your company. It is also important to consider what improvements could be expected from each project. Selecting high-priority projects is desirable from an environmental perspective, but there is value in undertaking some short term, "easier to implement" projects which may not be ranked high in environmental risk. The easier projects provide a useful learning experience, boost confidence as people see results, and focus attention on environmental goals.

Tip

You do not have to evaluate alternatives for all significant environmental aspects. Therefore, it is important to consider the "do-ability" of each project and to determine what improvements might be achieved by each project before deciding which ones to undertake.

Tip

Remember: If your company is considering ISO certification, you will have to demonstrate action on every SEA.

In the examples above, deciding to reduce the volume of copying and to recycle toner cartridges used in your office copier is a relatively short-term, low-cost environmental project to set in place as shown in Worksheet 3-6. Determining how to deal with chemical waste products could be a longer process: the obvious solution may not be the best, and a project that appears difficult and long-term may turn out to have a simple solution. The many alternative approaches to dealing with waste products can range from chemical substitutions to changing the nature of the wastes, changing work practices to reduce the volume of the waste, and changing disposal methods. Your final environmental program might include changes in each of these phases. In the example, although ink wastes may have the highest environmental risk rank, addressing those problems could be longer-term and more costly. On the other hand, doing so might yield greater cost savings than the quicker, cheaper toner cartridge example.

You need not rank your practical criteria; you can consider them by simply describing the practical considerations for each potential project. Worksheet 3-6 helps you lay out the considerations for each significant environmental aspect. At this point the worksheet provides you with a “first cut” qualitative judgment, to help choose aspects for further work. Aspects not selected at this time may be suitable for future projects.

Worksheet 3-6: Criteria to Select Environmental Projects

Project to Address Aspect	Time Frame	Cost	Technical Feasibility	Total Feasibility
Toner (In)	N/A	N/A	N/A	N/A
Used Toner (Out)	Short (1 month)	Negligible; time to write procedure	Easy	Excellent
Press cleaner (In)	Longer evaluation	Employee time	Needs help from suppliers, etc.	More difficult
Waste Ink (Out) Soiled Wipers (Out)	Longer evaluation	Employee time, process change	Needs help from suppliers, etc.	More difficult
Contact Person:			Date Completed:	

Finally, compare in general the expected improvements to be gained by working on each aspect. Like any undertaking in a business operation, you should be able to describe what you expect to get before you undertake the project! First, develop a list of benefits criteria. These might include such things as:

- ▶ Reduced human health impacts
- ▶ Reduced environmental impacts
- ▶ Cost savings
- ▶ Improved community relations
- ▶ Improved employee morale
- ▶ Customer benefit

Again, these particular criteria might not fit your company. Make a list of criteria identifying kinds of improvements that could be derived from undertaking environmental projects. These expected improvements need not be ranked; simply describe the potential for each criterion to be achieved. Worksheet 3-7 illustrates the two examples.

 **Tip**

Considering the benefits does not mean undertaking an analysis of potential outcomes. It means identifying the kinds of improvements that might be achieved by implementing a particular project and then deciding what value (priority) that improvement has for your company.

Worksheet 3-7: Potential Improvements						
Aspect	Human Health ¹	Environment	Cost Savings	Community Relations	Morale	Expected Improvements
Toner (In)	Little effect	Little	Low	N/A	N/A	N/A
Used Toner (Out)	Some effect through waste	Some effect in waste	Some	Good; shows effort	Good learning tool	Some
Press Cleaner (In)	Improve worker health	Some improve, air	Some through efficiency	Good	Good; workers happy	Good
Waste Ink (Out) Press Cleaner (In) Soiled Wipers (Out)	Improve community; reduce presence of hazardous materials	Improve effect on landfill, groundwater, habitat	Some through efficiency and reduced waste fees	Excellent PR	Good; workers happy	Excellent
Contact Person:					Date Completed:	

¹ Workers, Community, Global

Overall Summary of Ranking

Worksheet 3-8 illustrates how to put together the results from ranking the significant environmental aspects with the results from the economic, technical and improvements worksheets so that you can determine which will make the best projects for your company at this time. Projects not chosen now can be developed later. The example illustrates that while chemical waste may present one of the most involved projects in terms of feasibility, it may also provide the greatest improvements. The final decision rests with your company and should reflect both your values and your needs. You may want to undertake both a short-term and a long-term project.

Tip

It is important to recognize that the tables are merely a tool to help you summarize your judgment and organize your thoughts. The ranks placed in the tables do not have any intrinsic value but are used for purposes of comparing the results to each other.

Worksheet 3-8: Overall Ranking Summary				
Process Step Aspect	Aspect Total	Feasibility Total	Benefits Total	Significant Y/N
Toner (In)	M-L	N/A	N/A	
Used Toner	M-H	H	M	N
Chemicals	M	M-L	M-H	
Chemical Waste	H	M-L	H	Y
Contact Person:			Date Completed:	

Setting Objectives

The point of the priority setting exercises, of course, is to reduce your company's impact on the environment. The process outlined in this Guide describes two approaches: making your current activities and processes the best they can be and making significant changes in the products your company uses or produces, and in the processes or activities of your company. If you intend to seek ISO 14000 certification, you will need to take action on each SEA identified. If you are not seeking

certification, you can be more flexible in undertaking projects. Module 4 describes the process of evaluating alternatives for those SEAs you believe will require changes. Module 6 describes the process of developing operational controls for the SEAs that will not involve significant changes at this time. (You may decide to evaluate alternatives and make changes in these later.)

At this point, general objectives can be developed for each SEA identified. These objectives should be consistent with your company's environmental policy and also with your company's compliance requirements. Using the examples ranked on the worksheets above, a company could specify its objectives as follows:

- ▶ Reduce the waste from used toner cartridges.
- ▶ Reduce the environmental impact of press cleaning.

These objectives state the desired outcome in terms of the desired improvement in environmental impact, not in terms of the specifics of how it might be accomplished. For example, the objective of reducing waste from toner cartridges is open as to how that might be accomplished. One could reduce the use of toner cartridges, ensure that the recycling program is adhered to, or stop using copiers and printers that have toner cartridges in favor of another technology. Likewise, reducing impact from the press cleaning process can be accomplished in different ways.

In looking at these two objectives, one might note that the toner cartridge objective might be met by writing and posting a **procedure** that ensures recycling of the cartridges and by making sure that people who change the toner cartridges have sufficient *training* in this procedure. On the other hand determining how to reduce the impact of chemical wastes may involve some greater

changes that would be provided by operational controls and training *alone*. In this case, an **alternatives evaluation** would be necessary. After an alternative is identified, of course, operational controls and training would be needed for the new product, process or activity.

It is important to take on what you can finish. In the beginning, tackle the SEAs that you can handle, what is environmentally important, and whatever is urgent. Your company can start on any remaining SEAs when you have completed the first ones.

